Report Title:

Geo-Environmental Site Investigation

Project Name:

Red Mile Nursery, Pinchbeck

Report Reference: **BRD3760-OR2-C**

Date: **September 2021**

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REPORT CONTROL SHEET

REPORT TITLE	**GEO-ENVIRONMENTAL SITE INVESTIGATION**
PROJECT	**RED MILE NURSERY, PINCHBECK**
CLIENT	**BELLWAY HOMES**

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
BRD3760-OR2-A	First Issue - Interim report as monitoring on going.	30/07/2021	N Kimber & A Leon	B Devonshire
BRD3760-OR2-B	Second Issue - Corrected conceptual model drawing.	05/08/2021	N Kimber	B Devonshire
BRD3760-OR2-C	Third Issue - Updated gas and assessment and incorporating additional testing.	22/09/2021	N Kimber	J Brockwell

BRD Environmental Limited

Geotechnical and Environmental Services

- Ground Investigation
- Japanese Knotweed Removal
- Soil, Water and Gas Testing
- Contamination Assessment
- Geotechnical Advice
- Remediation Solutions

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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. BRD3760-OP3-A
	Site Photographs	Ref. BRD3760-OP4-A
	Revised Conceptual Site Model	Ref. BRD3760-OP6-C
	Proposed Development Layout	"Planning Site Layout", LMC - Architect Limited, ref. 487-SK-01, rev. D, dated 27/07/21.
	Exploratory Hole Location Plan	Ref. BRD3760-OD1-B
APPENDIX 2	**EXPLORATORY HOLE RECORDS**	
	Logs of trial pits.	Ref. TP101-TP111
	Photographic records of trial pits.	Ref. BRD3760-OP5-A
	Logs of boreholes.	Ref. WS101-WS110 & BH101-BH102
	Logs of hand dug pits	Ref. HD01 to HD08
	Gas monitoring records.	6 x A4 pages
	Groundwater monitoring records.	2 x A4 pages
APPENDIX 3	**LABORATORY TEST RESULTS**	
	DETS report 21-08552.3, 21-08553, 21-08672, 21-08835, 21-08882, 21-09094, 21-10406 & 21-11370.	58 x A4 pages
	SPT report 39021_1	30 x A4 pages

SUMMARY REPORT - GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site is split into two halves. The eastern half of the site is an open field, which at the time of the investigation was overgrown with grasses and weeds. The western half, which used to be a nursery, is an open area of disturbed ground and access track. The disturbed ground is from the demolition of the former nursery buildings.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed as residential houses.
HISTORICAL SUMMARY	The first available map from 1886 shows the site as an open field with a footpath crossing from the north west corner to the south east corner. By 1938, four buildings labelled as a nursery are constructed in the west of the site. The 1967 map edition shows the building configuration to have changed is now called "Redmile Nurseries". From 1986 onwards, nursery buildings appear and disappear, but all remain in the western half of the site. Google Earth Imagery from 1999 shows that most of these buildings on site are greenhouses and the eastern half of the site is agricultural land. Imagery from 2016 to 2020 shows some of the greenhouses have been demolished. The eastern half remains the same.
PUBLISHED GEOLOGY	The site is shown to be underlain by Tidal Flat Deposits. These superficial deposits typically consist of soft silty clay with layers of sand, gravel and peat. The shallowest bedrock is indicated to be the Oxford Clay Formation, which typically comprises silicate-mudstone with sporadic beds of argillaceous limestone nodules. Nearby BGS borehole logs indicate the presence of "Boulder Clay" (glacial Till) between the Tidal Flat Deposits and the Oxford Clay Formation.
ACTUAL GROUND CONDITIONS	The investigation has proved Tidal Flat Deposits composed of soft clays, silts and sands overlying Glacial Till composed of a stiff, gravelly, silty clay.
HYDROGEOLOGY	The site is situated upon unproductive strata. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The closest water feature to the site is Blue Gowt Drain, which runs along the northern boundary. A small, unnamed drain also runs along the eastern boundary and joins up with the Blue Gowt Drain adjacent to the north east corner of site. Blue Gowt Drain joins up with the River Glen approximately 5km north west of site, which in turn runs to the River Welland around 5.6km to the north east. The site is in a Zone 3 area and is likely to be affected by flooding.
PREVIOUS GROUND REPORTS	The site has been the subject of desk based research and site investigation. Ground Engineering produced a combined report referenced as follows: • "Site Investigation Report - Land off Wardentree Lane, Spalding, Lincolnshire", Ground Engineering, report ref. C14985, dated April 2020.

SUMMARY REPORT - GEOTECHNICAL

SUBJECT	COMMENTS
EXCAVATIONS	It should be possible to forward excavations employing normal equipment. Specialist groundwater control, such as well pointing, will be required at this site. It is unlikely that requirements of the Party Wall Act will apply to the development.
SLOPE STABILITY	It is considered that slope stability is unlikely to be a concern at this site.
SUB-SURFACE CONCRETE	Made Ground / Topsoil: Design Sulphate Class of DS-1 and Aggressive Chemical Environment for Concrete class of AC-1 applies. Tidal Flat Deposits / Glacial Till: Design Sulphate Class of DS-4 (DS-2 for pile design) and Aggressive Chemical Environment for Concrete class of AC-4 (AC-2 for pile design) applies.
SOAKAWAYS	Site is not suitable for surface water disposal to soakaways or other forms of infiltration device.
PAVEMENT DESIGN	A preliminary design California Bearing Ratio (CBR) of less than 2% has been recommended.
FOUNDATIONS	
LIKELY FOUNDATION TYPE	A piled foundation will be required for all units.
VOLUME CHANGE POTENTIAL	Medium i.e. moderate swelling or shrinking with moisture content changes.
ESTIMATED FOUNDATION DEPTHS	Pile lengths to be determined by specialist piling contractor.
HEAVE PROTECTION	Will be required for plots near trees, although the risk of heave is theoretical only as the ground is saturated.

SUMMARY REPORT – CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	The Made Ground within the access tracks around the nursery contains elevated concentrations of PAH and is a risk to human health if left in-situ within future garden and landscaping areas. The Made Ground in the immediate vicinity of trial pit TP107 is contaminated with asbestos fibres. This contamination is very localised but does present a risk to human health if left in-situ.
LANDFILL GAS	Appropriate landfill gas protection measures are required for all plots at this development.
RADON GAS	Radon gas protection measures are not required.
RISKS TO THE WATER ENVIRONMENT	Groundwater testing has been completed in the nursery area, which has recorded some trace concentrations of PAH marginally elevated above the limits of detection. At these very low trace concentrations it is not considered that they present a significant risk to the water environment.
RISKS TO BUILDING MATERIALS AND SERVICES	It is considered likely that 'barrier' pipes incorporating an aluminium foil layer or plastic wrapped metal pipes will be required for new water supplies within the western former nursery area of the site. Conventional polythene pipework is appropriate for the eastern field area, but this is subject to approval by the local water supply company.
REMEDIATION	The outline remediation methodology is detailed as follows: • The Made Ground forming the access tracks in the nursery area should either be excavated and removed from site, or alternatively a 'clean' soil capping layer to 600mm thickness will need to be provided for the future gardens and landscaping within the affected areas. • Given its limited extent, the localised asbestos contaminated material at trial pit TP107 should just be chased out and excavated and then removed from site. Verification sampling of the excavation will be required to demonstrate that all the asbestos contamination has been removed. • The installation of Characteristic Situation 2 gas protection measures will be required for all plots. • All remediation works should be supervised and verified by an experienced Geo-Environmental Consultant. Verification testing of any remediation excavations will be required for both the removal of the access track Made Ground and the asbestos contamination around TP107. Samples will need to be taken from the base and faces of the resultant excavation. All the remediation works should be documented in a Verification Report for submission to the various regulatory authorities and building warranty providers.

WASTE SOIL DISPOSAL	It is considered that the uncontaminated Made Ground and natural sub-soils disposed of from the site would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill as 'inert waste' It is considered that the identified PAH and asbestos contaminated Made Ground soils disposed of from the site would be classified as 'non-hazardous waste'.

SUMMARY REPORT – KEY RECOMMENDATIONS

RECOMMENDATIONS

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 and Environment Agency to confirm that the investigation undertake is satisfactory to address the relevant planning condition.

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Bellway Homes Ltd trading as Bellway Homes.
SITE	Land situated off Wardentree Lane in the village of Pinchbeck.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client intends to purchase the site and develop it for residential housing.
REPORT TYPE	Geo-environmental site investigation (i.e. combined geotechnical ground investigation and Phase 2 contamination assessment).
REPORT OBJECTIVES	The purpose of the report is to present the findings of a ground investigation, and to present both geotechnical and contamination assessments of the ground conditions revealed.

1.2. SCOPE OF WORKS

The agreed scope of works was:

Main Investigation

- Formal review of existing Ground Engineering report for the site.
- Undertake initial inspection of site to confirm access and investigation layout. Potentially could coincide with meeting a Cadent engineer to confirm working arrangements.
- Production of health and safety documentation, mobilisation to site and provision of welfare facilities.
- Specialist survey company to undertake a utility services scan at each investigation point to confirm the absence of any underground services.
- Two days of windowless sampling using a percussive drilling rig to provide approximately 10No. 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 8No. boreholes. Installations will be finished with a flush fitting metal stopcock cover.
- One day of trial pitting using a mechanical excavator to provide approximately 8No. trial pits to a nominal depth of 3m, ground conditions permitting. We have allowed for the provision of a hydraulic breaker.
- All exploratory points will be logged and sampled in general accordance with BS5930:2015 by supervising Geo-Environmental Consultant.
- In-situ geotechnical testing of fine soils using a Hand Shear Vane and/or Pocket Penetrometer.

- A photo-ionisation detector (PID) will be used during the site works to assist in identifying and delineating any volatile organic contamination.

- Determination of the accurate location and level of exploratory points by topographical 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.

- Groundwater sampling to be undertaken on the first monitoring visit (if groundwater present), with the purging of monitoring wells and the collection of groundwater samples for testing using sampling equipment dedicated to each well.

- Chemical testing of soil samples. Budget based on the following testing schedule:

    - 10No. Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
    - 10No. Inorganics Suite - water soluble sulphate, pH, organic matter.
    - 10No. Speciated Polycyclic Aromatic Hydrocarbons (PAH).
    - 8No. Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
    - 8No. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.
    - 3No. Volatile Organic Compounds (VOC) suite.
    - 3No. Semi-Volatile Organic Compounds (SVOC) suite.
    - 5No. Asbestos quantification.
    - 5No. Organochlorine Pesticides.

- Chemical testing of 3No. water samples for the following testing schedule:

    - Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
    - Inorganics Suite - sulphate, pH.
    - Speciated Polycyclic Aromatic Hydrocarbons (PAH).
    - Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
    - Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.

- 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:

    - 4No. Moisture content.
    - 4No. Plasticity indices.
    - 2No. Particle size distribution by wet sieve and follow on hydrometer.
    - 4No. Intact dry density and saturation moisture content of Chalk.
    - 4No. pH and water soluble sulphate analysis.
    - 4No. Total sulphate and sulphur analysis.

- Provision of a combined factual and interpretative investigation report. Factual findings to include all exploratory point records and test results. Interpretative reporting to include a summary of information from the previous investigations, any update to the Generic Quantitative Contamination Risk Assessment (GQRA) as well as a Geotechnical Assessment

providing comments on pavement design, concrete classification, foundation design recommendations and waste classification.

Additional Deep Boreholes

The drilling of three deeper boreholes to confirm the deeper ground conditions and provide design parameters for pile design.

- Drilling of 3No. boreholes using cable percussive drilling techniques to 25m depth, ground conditions permitting. Due to the loose nature of the ground conditions, two casing sizes will be needed for the drilling. Recovery of undisturbed and disturbed samples and in-situ Standard Penetration Testing (SPT) in general accordance with BS5930:2015.

- Boreholes will be logged and sampled in general accordance with BS5930:2015 by supervising Geo-Environmental Consultant.

- Geotechnical testing as appropriate to the nature of the ground conditions encountered, but the budget is based on the following testing schedule:

    - 6No. Moisture content.
    - 6No. Plasticity indices.
    - 12No. Shear strength by quick undrained triaxial compression test.
    - 4No. One dimensional consolidation tests by oedometer.
    - 3No. Loss on ignition.
    - 8No. pH and water soluble sulphate analysis.
    - 8No. Total sulphate and sulphur analysis.

- Incorporation of borehole records and test results into existing investigation report.

Additional Water Monitoring

As discussed later in the report, in order to have more confidence in the chemical results an additional monitoring visit was undertaken to obtain further groundwater samples, as well as a surface sample from the adjacent surface watercourse. The additional items were therefore added to the scope:

- Groundwater sampling to be undertaken as part of an additional monitoring visit, with the purging of monitoring wells and the collection of groundwater samples for testing using sampling equipment dedicated to each well.

- Chemical testing of 4No. water samples for the following testing schedule:

    - Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
    - Inorganics Suite - sulphate, pH.
    - Speciated Polycyclic Aromatic Hydrocarbons (PAH).
    - Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
    - Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.

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, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. In the case of Japanese Knotweed, BRD can undertake separate surveys for this plant undertaken by a Property Care Association qualified surveyor.

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	Red Mile Nursery, Pinchbeck, Spalding, Lincolnshire, PE11 3UF.
NATIONAL GRID REFERENCE	524647E, 325086N

2.2. SITE DESCRIPTION

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	The site is split into two halves. The eastern half of the site is an open field, which at the time of the investigation was overgrown with grasses and weeds. The western half, which used to be a nursery, is an open area of disturbed ground and access track. The disturbed ground is from the demolition of the former nursery buildings. In the middle of the nursery area is a trench full of water surrounded by Heras style fencing. It is presumed to have been dug to remove some services as broken plastic pipe could be seen in the spoil heap. The water within the trench likely reflects the local groundwater table. The site is bound by Heras style temporary fencing and secured with a gate and padlock. Along the western boundary of the site are locked site cabins and a public footpath. The public footpath is separated from the main site with Heras style fencing.
SURROUNDING LAND USE	The site is in a mixed residential and agricultural area. To the north and east of the site is arable land. To the south and west of the site are residential properties.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed with residential housing.
HISTORICAL SUMMARY	Historical maps are presented within the previous report already completed for the site. Below is a brief summary of the site history obtained from a review of the previous site investigation report and using available online resources. The first available map from 1886 shows the site as an open field with a footpath crossing from the north west corner to the south east corner. The site is surrounded by arable land. By 1938, four buildings labelled as a nursery are constructed in the west of the site. The 1967 map edition shows the building configuration to have changed, but the site remains as a nursery now called "Redmile Nurseries". From 1986 onwards, nursery buildings appear and disappear, but all remain in the western half of the site. Google Earth Imagery from 1999 shows that most of these buildings on site are greenhouses and the eastern half of the site is agricultural land. Imagery from 2016 to 2020 shows some of the greenhouses have been demolished. The eastern half remains the same.

SUBJECT	COMMENTS
PUBLISHED GEOLOGY	The site is shown to be underlain by Tidal Flat Deposits. These superficial deposits typically consist of soft silty clay with layers of sand, gravel and peat. The shallowest bedrock is indicated to be the Oxford Clay Formation, which typically comprises silicate-mudstone with sporadic beds of argillaceous limestone nodules. Nearby BGS borehole logs indicate the presence of "Boulder Clay" (glacial Till) between the Tidal Flat Deposits and the Oxford Clay Formation. One log from the "A16 Trunk Road" describes it as "grey silty CLAY with numerous medium to fine subrounded gravel sized erratics, mainly chalk with some flint". Another also includes mudstone gravel.
RADON	Radon protection measures are not required.
HYDROGEOLOGY	The site is situated upon unproductive strata. The site is not located within a groundwater Source Protection Zone.
HYDROLOGY	The closest water feature to the site is Blue Gowt Drain, which runs along the northern boundary. A small, unnamed drain also runs along the eastern boundary and joins up with the Blue Gowt Drain adjacent to the north east corner of site. Blue Gowt Drain joins up with the River Glen approximately 5km north west of site, which in turn runs to the River Welland around 5.6km to the north east. The site is in a Zone 3 area and is likely to be affected by flooding.

2.3. PREVIOUS INVESTIGATIONS

The site has been the subject of desk based research and site investigation. Ground Engineering produced a combined report referenced as follows:

- "Site Investigation Report - Land off Wardentree Lane, Spalding, Lincolnshire", Ground Engineering, report ref. C14985, dated April 2020.

2.3.1. Scope of Previous Investigation and Ground Conditions

The investigation comprised 6No. deep boreholes to 15m bgl and 10No. trial pits to between 3.00m and 3.40m bgl. Within these exploratory points, they encountered the Tidal Flat Deposits (TFD) to between 9.60m and 11.60m bgl. The TFD was typically described as a slightly sandy and gravelly, silty clay, which varied locally to sandy, clayey silt and silty fine sand. Underlying the TFD, Ground Engineering identified glacial Till. The glacial Till was typically described as a slightly sandy, slightly gravelly, silty clay. In the nursery area (west half of site), Made Ground was identified from surface. It was generally encountered between 0.20m and 0.50m bgl but also locally between 1.00m and 1.50m bgl. It typically consisted of slightly sandy, slightly gravelly, silty clay with gravel including but not limited to flint, quartzite, igneous rock, ash, coal, clinker, asphalt and brick.

Groundwater seepages were recorded during the forwarding of some trial pits and boreholes. It was encountered between 1.00m (TP6 & TP10) and 3.00m (TP1 & TP5) bgl within the trial pits and at 1.70m bgl in borehole BH6. On completion of the borehole, groundwater was recorded at 4.60m bgl. No monitoring wells were installed so no resting groundwater levels were recorded.

2.3.3. Contamination Assessment

During the previous investigation, no olfactory or visual evidence of fuel contamination was observed. There was also no asbestos containing materials noted in the soils during the investigation.

A total of 6No. samples were sent for chemical testing, with 3No. in the nursery area and 3No. in the field. A sample of Made Ground from TP2 at 0.20m bgl contained an elevated concentration of lead and benzo(a)pyrene. Ground Engineering stated that the Made Ground would not be suitable in respect to the proposed buildings or soft landscaping, but would be suitable beneath buildings or areas of permanent hardstanding. The underlying natural soils were considered suitable for retention and reuse with the development if required.

2.3.4. Geotechnical Assessment

A number of trial pits were unstable between 0.80m and 2.0m bgl. The trial pits generally collapsed on encountering groundwater.

The ground conditions encountered have limited bearing pressures and potentially high compressibility, combined with shallow groundwater and near surface desiccation. Ground Engineering recommended that a piled foundation scheme would be the most appropriate foundation solution for the proposed development. Ground Engineering stated that the TFD soils had a Design Sulphate Class of DS-2 and Aggressive Chemical Environment for Concrete Class of AC-2. There was no assessment of the glacial Till soils for pile concrete classification. Ground Engineering also produced a preliminary California Bearing Ratio (CBR) of 1% (<2%) for the surface soils.

2.3.5. BRD Discussion

BRD considered the site to have been inadequately investigated in terms of contamination. Whilst there is no suggestion that there is widespread contamination, there is not enough information to determine the current level of remediation. Only 3No. samples were tested from the nursery area, one of which contained elevated levels of lead and benzo(a)pyrene. Due to shallow groundwater identified in the investigation, there may be some groundwater contamination around the tank location or potential older tank locations. However, no groundwater samples had chemical testing undertaken to determine this. Ground Engineering identified organic soils underlying the site, which present a potential gas risk to future users. As no monitoring wells had been installed in the boreholes, no ground gas and vapour monitoring could be undertaken to determine the gas risk on site.

After reviewing the Ground Engineering report, BRD considered that additional investigation of the site, in particular the nursery, should be undertaken. This includes more testing of the Made Ground and underlying soils, as well as gas and groundwater monitoring.

BRD also considered additional deeper boreholes would be required for pile design. Ground Engineering drilled to 15m bgl, stopping just within the glacial Till. This lead to limited geotechnical testing of the Till material into which the piles would be embedded. Boreholes extending to at least 25m would enable additional geotechnical testing of the deeper material, aiding the design for piled foundations.

3. GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	Trial pits were selected as they expose more soils, which enables a more reliable record of the ground conditions encountered. Windowless sample boreholes were selected as monitoring installations were required across the site as well as for in-situ testing. Cable percussive boreholes were selected to identify and test the deeper ground conditions for piling design purposes.	
DATES OF SITE WORKS	The main field works were undertaken between the 28th June and 2nd July 2021 as well as the 5th July 2021 the following week. Monitoring visits were undertaken on 12th, 16th and 27th July, 9th and 20th August, 3rd and 15th September 2021.	
CONSTRAINTS TO EXPLORATORY HOLE LAYOUT	The main constraint to the exploratory holes was the high-pressure gas main. The gas main runs north to south through the field, just east of the centre of the site. It also runs parallel to the southern border, along the edge of the nursery. Cadent gave a 6m offset, however, BRD employed a 10m offset to be more cautious.	
EXPLORATORY HOLE SPACING	Approximately 10-20m grid.	
LAYOUT RATIONALE	**SOURCE / FEATURE**	**EXPLORATORY HOLE**
CONTAMINATION SOURCES TARGETED	Nursery area (west of site).	WS101 to WS105 and TP103 to TP111.
	Fuel tank in nursery area.	WS101.
GROUND FEATURES TARGETED	General site coverage.	WS101 to WS110, TP101 to TP111 and BH101 to BH103.
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 also more biased towards the Made Ground samples as this stratum represents the soils most likely to be contaminated.	
ANALYSIS PLAN	Given the sites history as a nursery and based on the previous investigations findings, BRD has scheduled a suite of typically occurring contaminants associated with such a former use. The contaminants includes metals, polycyclic aromatic hydrocarbons (PAHs), total petroleum hydrocarbons (TPHs) and organochlorine pesticides. As there is a potential risk is to the water environment, the groundwater has also been analysed for a similar suite to the soils.	

3.3. BRD FIELDWORK

HAND DUG INSPECTION PITS	
REFERENCES	HD01 to HD08
DEPTH RANGE	From 0.25m to 0.60m.
BACKFILL	The inspection pits were backfilled with arisings upon completion.

TRIAL PITS	
REFERENCES	TP101 to TP111.
DEPTH RANGE	From 1.00m to 3.40m.
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.

CABLE PERCUSSIVE BOREHOLES	
REFERENCES	BH101 to BH103.
DEPTH RANGE	25m.
RIG TYPE	Dando 2000.
INSTALLATION / BACKFILL	Boreholes BH101 to BH103 were backfilled with arisings only.

WINDOWLESS SAMPLING BOREHOLES	
REFERENCES	WS101 to WS110.
DEPTH RANGE	5.45m.
RIG TYPE	Premier Drilling Rig.
INSTALLATION / BACKFILL	Boreholes WS106 and WS108 were backfilled with arisings only. Boreholes WS101 to WS105, WS107, WS109 and WS110 had monitoring wells installed. These comprised 50mm nominal diameter standpipes fitted with a gas tap finished with a flush 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.

MONITORING	
TYPE	Ground gases and vapour monitoring, and groundwater monitoring.
DATES	Ground gas and vapour monitoring (6No. visits) - 12th, 16th and 27th July, 9th and 20th August and 3rd September 2021. Groundwater monitoring (2No. visits) - 12th July and 15th September 2021.
GROUNDWATER SAMPLING METHOD	Samples were retrieved using a sampling bailer dedicated to each well.

3.4. 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 DETS 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	10
Liquid and plastic limits	10
Particle size distribution by wet sieve and hydrometer	2
Quick undrained triaxial compression	8
One dimensional consolidation	2
Organic content by mass loss on ignition	3
pH and Water soluble Sulphate	13
Total Sulphur and Sulphate	13

SOIL CHEMICAL TESTING	
The soil samples for contamination and/or chemical geotechnical testing were forwarded to the laboratory of DETS 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	16
Speciated Polycyclic Aromatic Hydrocarbons (PAH)	21
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split	11
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE)	6
Organic Matter	13
Asbestos Identification	11
Semi-Volatile Organic Compounds (SVOCs)	3
Volatile Organic Compounds (VOCs)	3
Organochlorine Pesticides	5
Waste Acceptance Criteria (WAC) testing	2

GROUNDWATER CHEMICAL TESTING	
The water samples for contamination and/or chemical geotechnical testing were forwarded to the laboratory of DETS 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.	
WATER TESTS	**NUMBER OF SAMPLES TESTED**
Arsenic, Cadmium, Chromium, Chromium VI, Copper, Lead, Mercury, Nickel, Selenium, Zinc	7
Speciated Polycyclic Aromatic Hydrocarbons (PAH)	7
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split	7
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE)	7

4. GROUND CONDITIONS

4.1. OVERVIEW

The ground conditions encountered were similar to the anticipated geology based on the previous investigation and mapped geology. In the west of the site (nursery area), Made Ground was encountered from surface overlying the Tidal Flat Deposits. In the eastern area of the site (field area), Topsoil / Made Ground Topsoil was encountered from surface overlying the Tidal Flat Deposits. Glacial Till was found beneath the Tidal Flat Deposits across the site.

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

4.2. ARTIFICIAL GROUND

Made Ground was encountered in borehole BH101, hand dug pits HD01 to HD08, trial pits TP103 to TP107, TP109 to TP111 and boreholes WS101 to WS105. All of these exploratory points were located in the west of the site (nursery area). The depth to the base of the Made Ground varied between 0.10m bgl (WS105 & TP109) and 0.65m bgl (TP111).

4.2.1. Beneath Former Nursery Buildings

Boreholes WS102, WS103 and WS105 as well as trial pit TP106 and hand dug pit HD06 were forwarded beneath the former nursery buildings. The area has been disturbed from the demolition of these buildings so the Made Ground varied. In WS102, it consisted of a gravelly, sandy silt with gravel of limestone, brick fragments and charcoal. In WS103, the Made Ground consisted of gravelly, sandy clay with gravel of limestone, brick fragments and charcoal. In WS105, there were two layers of Made Ground. The first was composed of a gravelly clay and the second of a gravelly, clayey sand, both with gravel of concrete. In TP106, the Made Ground was composed of a clayey, sandy gravel with gravel of limestone, quartzite and tarmac fragments. The layer was also ashy in part. In HD06, there were two layers of Made Ground. The first consisted of very gravelly, slightly silty sand, with gravel of quartzite, flint, brick and concrete fragments. The second was composed of a slightly gravelly, slightly sandy, slightly clayey silt. The gravel included brick, concrete fragments and occasional charcoal fragments.

4.2.2. Access Track and Remainder of the Nursery

Boreholes BH101, WS101 and WS104, hand dug pits HD01 to HD08 (except HD06) as well as trial pits TP103 to TP105, TP107 and TP109 to TP111 were forwarded in the access track and other areas outside of the building footprints. The Made Ground was typically a sandy gravel or gravelly sand. Gravel includes flint, quartzite, limestone, brick and concrete fragments, metal and tarmac. Trial pit TP105 contained two layers of Made Ground, the second of which was slightly ashy.

4.3. TOPSOIL AND MADE GROUND TOPSOIL

Topsoil and Made Ground Topsoil was encountered in the east of the site (field area) in trial pits TP101, TP102, TP108 and boreholes BH102, BH103 and WS106 to WS110. The Topsoil / Made Ground Topsoil typically consisted of silty or sandy clay. The Made Ground Topsoil also included occasional plastic and charcoal. The depth to the base of the Topsoil / Made Ground Topsoil varied from 0.10m bgl (BH102 & BH103) to 0.40m bgl (WS106 to WS109).

4.5. SUPERFICIAL DEPOSITS

4.5.1. Tidal Flat Deposits

Tidal Flat Deposits were encountered throughout the site in all exploratory points (except HD04, HD05 and HD08, which were terminated before the natural soils were encountered). The superficial deposits varied in composition, but were typically composed of a sandy, silty CLAY, sandy, clayey SILT or a silty SAND. Many of the layers encountered at varying depths across the site contained organic material and had a natural organic odour. The Tidal Flat Deposits were found to the base of each trial pit, hand dug pit and windowless sample borehole. The base of the Tidal Flat Deposits was encountered in the cable percussive boreholes between 10.00m bgl and 10.70m bgl.

4.5.2. Glacial Till

Glacial Till was encountered in boreholes BH101 to BH103 only. It was generally described as a stiff to very stiff gravelly, silty clay with gravel composed of chalk. The Glacial Till was proven to the base of each borehole at 25m bgl.

4.6. BEDROCK

The bedrock geology was not encountered in any of the exploratory holes.

4.7. GEOTECHNICAL COMMENTS

The Tidal Flat Deposits were recorded very soft consistency or with loose density, caused the trial pits become unstable, and collapse.

4.8. CONTAMINATION OBSERVATIONS

No visual or olfactory evidence of contamination was noted during the forwarding of exploratory holes.

4.9. GROUNDWATER BEHAVIOUR

During the progressing of exploratory holes, the following general observations of groundwater behaviour were made.

Groundwater seepage was observed in trial pit TP105 at 2.50m bgl, TP106 at 1.50m bgl, TP107 at 1.60m bgl and TP111 at 1.25m bgl. Groundwater was also struck in boreholes WS101 to WS105 and WS108 at 2.00m bgl. In WS110, groundwater was struck at 3.00m bgl. All groundwater strikes and seepages from the windowless sample boreholes and trial pits were encountered in the Tidal Flat Deposits.

No groundwater was encountered in borehole BH101, although it may be that the installation of casing obscured vision of any water strikes within the Tidal Flat Deposits. Groundwater was struck in boreholes BH102 and BH103. The groundwater in borehole BH102 was struck in the glacial Till at 18.50m bgl, and after 20 minutes, rose to 12.20m bgl. The groundwater in borehole BH103 was struck at 10.70m bgl, and after 20 minutes, rose to 3.00m bgl. Again it is likely in BH102 and BH103 that the casing obscured recording any water strikes within the Tidal Flat Deposits.

4.10. GROUNDWATER MONITORING

DATE	RESTING GROUNDWATER RANGE	COMMENTS
12/07/21	From 1.95m to 0.69m bgl.	All eight monitoring wells contained groundwater, three of which have levels less than 1m bgl. Borehole WS107 contained the deepest groundwater at 1.95m bgl, whilst borehole WS103 contained the shallowest groundwater at 0.69m bgl.
16/07/21	From 1.99m to 0.78m bgl.	All eight monitoring wells still contained groundwater on the second visit, with four having levels within to top 1m. As with the previous visit, borehole WS107 had the deepest groundwater and WS103 had the shallowest. All of the monitoring wells showed a fall in groundwater levels, except WS104 where the groundwater level rose from 1.05m bgl to 0.87m bgl.
27/07/21	From 2.13m to 0.87m bgl.	All eight monitoring wells still contained groundwater, however, the overall level of water has deepened. This is probably due to the lack of recent rainfall, reflecting seasonal variation in the groundwater.
09/08/21	From 2.12m to 0.85m bgl.	All eight monitoring wells contained groundwater, which has stayed at a similar depth to the previous visit. Over these last 4No. monitoring visits, borehole WS107 has consistently had the deepest groundwater and WS103 the shallowest.
20/08/21	From 1.84m to 1.07m bgl.	All eight monitoring wells contained groundwater, but the groundwater trend was different to the previous visits as borehole WS109 now contained the deepest groundwater and WS102 the shallowest.
03/09/21	From 2.32m to 1.24m bgl.	All eight monitoring wells contained groundwater. Groundwater levels in all boreholes (except WS109) have fallen or stayed the same since visit five. Borehole WS103 had the deepest groundwater, with WS109 containing the shallowest.

DATE	RESTING GROUNDWATER RANGE	COMMENTS
15/09/21	From 1.35m to 1.41m bgl (only WS101, WS103 and WS105 were monitored)	This monitoring visit was undertaken to gain additional water samples for testing and as such not all of the boreholes were dipped for groundwater levels. In comparison to the previous visit, the levels had all risen since the previous visit, particularly WS101 and WS103, but still very much in keeping with the range of levels seen over the course of the monitoring.

In summary, although groundwater fluctuated across the seven monitoring visits, those boreholes with the shallowest groundwater were located closest to the Blue Gowt Drain in the north of the site. The boreholes with the deepest groundwater were closest to the road in the south of the site.

5. GEOTECHNICAL PROPERTIES

5.1. COARSE SOIL PARAMETERS

5.1.1. Standard Penetration Tests

Standard Penetration Tests undertaken in the sandy soils of the Tidal Flat Deposits have recorded N-values ranging from 0 to 5, being indicative of very loose to loose soils.

In the Glacial Till, large pockets of sandy soils were recorded near the contact with the Tidal Flat Deposits at depths between 10m and 12m in boreholes BH102 and BH103. N-values of 17 and 29 were recorded in these soils indicative of medium dense sands.

5.1.2. Particle Size Distribution

The grading curves of the two samples of Tidal Flat Deposits subject to PSD determination revealed the soil to be poorly graded slightly clayey, sandy silt. A sand content between 33% and 42% was recorded and a fines content of between 58% and 67%, of which the clay content ranges between 5% and 10%.

5.2. FINE SOIL PARAMETERS

5.2.1. Index Property Testing

SOIL TYPE	Tidal Flat Deposits.
PLASTICITY INDEX (PI)	7% (One sample: Non shrinkable soil type). 11% - 19% (Two samples: Low volume change potential). 28% - 39% (Two samples: Medium volume change potential). 41% (One sample: High volume change potential).
MODIFIED PI	Not applicable - no oversize particles.
COMMENTS	The average value for the samples tested in this investigation is 24%, indicative of medium volume change potential. From previous investigation plasticity indices recorded from samples tested at depths between 0.5m and 0.8m depth ranging from 14% to 31%, averaging 22%, also indicating medium volume change potential soils.
NHBC CLASS	Medium volume change potential.

SOIL TYPE	Glacial Till.
PLASTICITY INDEX (PI)	Oversize particles present.
MODIFIED PI	19% (One sample: Low volume change potential). 20% - 25%(Three samples: Medium volume change potential).
NHBC CLASS	Medium volume change potential.

5.2.2. 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.

5.2.2.1. Hand Shear Vane

SOIL TYPE	Tidal Flat Deposits.
CORRECTION FACTOR μ	μ = 1.0
JUSTIFICATION	By comparison with and interpretation from laboratory triaxial tests.
DISCUSSION OF CORRECTED RESULTS	The recorded undrained shear strength was in the range of 16kPa to 40kPa for the silty soils, averaging 25kPa being indicative of low strength soil type. For clayey soils recorded in trial pit TP104 tested at 0.6m depth an average shear strength value of 53kPa indicating medium strength soils type was recorded.

5.2.2.2. Hand Penetrometer

SOIL TYPE	Tidal Flat Deposits.
DISCUSSION OF CORRECTED RESULTS	The recorded undrained shear strength was in the range of 8kPa and 50kPa, averaging 20kPa, which is indicative of low strength soil type.

5.2.2.3. Standard Penetration Test Correlations

A total of 81No. Standard Penetration Tests were undertaken in the fine soils recorded across the site.

Tests undertaken in the clayey and silty soils of the Tidal Flat Deposits have recorded N-values between 0 and 9 which is indicative of very soft to stiff soils, averaging N = **1**. The elevated values were recorded at the base of these deposits, N=9 in borehole BH101 at 9.7m depth or at about 1.0m depth with N-values ranging from 4 and 8. The deeper value is due to these sediments typically show a strength increase due to its overweight consolidation. The slightly higher shallower values are likely to be a result of the effects of the topsoil and drying atmospheric process which creates a crust of stiffer soils.

N-values recorded in the Glacial Till which was typically recorded below 10m depth range between 20 and 51 which are indicative of very stiff to hard soils.

For fissured, over consolidated fine-grained soils, such as the Glacial Till, SPT N_{60}-values can be converted using industry standard correlations, such as Stroud's method, to equivalent undrained shear strengths of a 100mm-diameter triaxial compression test. This conversion uses values for Stroud's conversion factor, **f1**, selected on the basis of plasticity index recorded in the samples tested in the Glacial Till.

For the Tidal Flat Deposits an approach based on the sensitivity and the SPT N_{60}-values of the soils has been considered to obtain an illustrative equivalent undrained shear strength using Schmertman's method based on the plasticity index recorded from these soils.

Energy ratio values for both the windowless sampling borehole rig and the cable percussive rig of Er=0.88 and Er=0.73 has been used based on the annual calibration certificate provided by each sub-contractor.

Equivalent undrained shear strength values for the Tidal Flat Deposits between 0kPa and 106kPa have been recorded at depths between 1.0m and 9.7m being indicative of extremely low to high strength soil type, but typically values less than 40kPa were recorded, indicating low strength soils type.

Equivalent undrained shear strength values for the Glacial Till between 94kPa and 348kPa have been recorded at depths between 10m and based on the boreholes, about 25m depth, being indicative of high to extremely high strength soil type.

The following charts show the distribution with depth of the N_{60} values considered in every borehole together with the derived equivalent undrained shear strength values for the Tidal Flat and Glacial Till deposits.

5.2.2.4. Laboratory Tests

Eleven undisturbed samples (traditional U100 plastic sample tubes) from the Glacial Till soils recorded on site, from boreholes BH101 to BH103, were subjected to triaxial compression without measurement of pore water pressure.

For most of the samples the undrained triaxial test recorded three shear stress stages due to the presence of gravel content and then the middle value has been considered as the most representative of the shear strength recorded values.

The undisturbed samples of Glacial Till recorded undrained shear strength values in the range of 178kPa and 432kPa which is indicative of very high to extremely high strength soils.

The following charts show the distribution with depth of the undrained shear strength values recorded in the triaxial tests (left side chart) and the right side chart shows a combination of all the undrained shear strength values recorded in the triaxial tests undertaken in both, previous and this ground investigation.

5.2.3. Organic Content

SOIL TYPE	Tidal Flat Deposits.
MASS LOSS ON IGNITION	2.1% - 6.8%
ORGANIC CONTENT	Low to medium.

5.2.5. One-dimensional Consolidation

Two one-dimensional consolidation tests were performed on specimens of Glacial Till, from boreholes BH101 and BH103 at depth of 11.2m and 16.7m, respectively. The test results show this soil to be an over consolidated clay.

For the sample recorded at 11.2m depth, the measured Coefficient of compressibility (mv) were between 0.08m^2/MN and 0.10m^2/MN indicative of medium compressibility.

For the sample recorded at 16.7m depth, the measured Coefficient of compressibility (mv) were between 0.04m^2/MN and 0.11m^2/MN indicative of low compressibility.

5.3. SULPHATE AND pH

	MADE GROUND / TOPSOIL			
	Sulphate		pH	
Characteristic Value	300 mg/l		7.0 units	
Justification	Mean of highest two results rounded to nearest 100mg/l.		Mean of lowest 20% results.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	9	13 - 334* mg/l	9	7.7 - 8.5 units
Groundwater	-	N/A	-	N/A
Total Potential Sulphate	-	Not tested as pyrite geologically unlikely.		

* One Made Ground sample recovered from TP105 at 0.2m depth has been recorded with a slightly elevated content on water soluble sulphate of 1,670mg/l. This value has been discarded from the soil classification as it is considered an outlier and non-representative of the near surface soils.

	TIDAL FLAT DEPOSITS / GLACIAL TILL			
	Sulphate		pH	
Characteristic Value	TPS: 6.18%		7.9 units	
Justification	Based on Total Potential Sulphate.		Lowest groundwater result.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	20	15 730 mg/l	20	8.0 8.6 units
Groundwater	6	84 - 208 mg/l	6	7.9 - 8.4 units
Total Potential Sulphate	17	0.06% - 6.18% Nine out of seventeen samples potentially pyritic.		

6. GEOTECHNICAL ASSESSMENT

6.1. INTRODUCTION

The following advice and recommendations are based on the construction of 96No. low rise, two to three storey, residential properties across the site. The 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 2.

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 shallow trench excavations above the groundwater 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. 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.
GROUNDWATER CONTROL	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' will be required. 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 site is relatively flat and no significant changes in level as part of the development are anticipated. It is therefore considered that slope stability is unlikely to be a significant concern at this site.

6.4. SUB-SURFACE CONCRETE

MADE GROUND / TOPSOIL	
SITE / SOIL CATEGORY	Natural ground.
DESIGN SULPHATE CLASS	DS-1
GROUNDWATER REGIME	Mobile.
AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASS	AC-1

TIDAL FLAT DEPOSITS / GLACIAL TILL	
SITE / SOIL CATEGORY	Natural ground containing pyrite.
DESIGN SULPHATE CLASS	DS-4 (DS-2 for pile design).
GROUNDWATER REGIME	Mobile.
AGGRESSIVE CHEMICAL ENVIRONMENT FOR CONCRETE (ACEC) CLASS	AC-4 (AC-2 for pile design).
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.

6.5. SOAKAWAYS

Although no BRE365 soakage tests were undertaken during this investigation, it is apparent that the shallow groundwater will have a significant impact on the ability to adopt soakaway drainage as part of the proposed development. It should be noted that the Environment Agency (EA) 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. Clearly such an unsaturated zone is not achievable on this site.

Based on the above, it is considered that the site is unsuitable for conventional soakaways and a positive drainage solution to a local sewer or water course should be pursued.

6.6. PAVEMENT CONSTRUCTION

From consideration of the observed ground conditions it is recommended that a preliminary design California Bearing Ratio (CBR) of less than 2% is assumed at this stage.

It is possible that the use of geo-grid type reinforcement to provide an additional degree of support and stability by limiting any differential settlement in the pavement foundation may be required.

The cohesive deposits will be prone to rapid degradation during wet weather working and this should be avoided where possible. 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.

The soils recorded on site should be considered a frost susceptible soil and therefore a minimum total pavement construction of 450mm is required.

Increased road pavement construction thickness should be anticipated where paved areas cross over ground disturbed by the removal of the existing structures.

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

The ground conditions are unsuitable for conventional footings and so a piled foundation solution will likely be required.

6.7.2. Floor Slabs

In consideration of the fact that the majority of the near surface soils of the Tidal Flat Deposits are clay in nature, due to the depth of the Made Ground at some limited areas and the need for gas protection measures (as discussed later in report), fully suspended floor slabs designed and constructed in accordance with NHBC Standards are recommended at this development.

6.7.3. Piling

Due to the granular nature of the soil and the position of the groundwater, traditional bored piles may be difficult to construct unless they are cased through to the underlying Glacial Till. The need for casing could be avoided through the use of Continuous Flight Auger (CFA) piling techniques and this may be the best method to construct cast in-situ piles.

Driven pre-cast concrete piles would be a viable option, however, the proximity of neighbouring structures may make them unsuitable due to noise and vibration considerations.

Based on the information gained from this investigation, working loads between 450kN and 577kN have been estimated for a single isolated 450mm diameter bored pile installed to 15m and 18m depth, respectively, under a with safety partial factors of 2 applied to shaft friction and 3 to base resistance. Lower partial factors, different diameter piles and different depths might be adopted by the piling contractor in the detailed design once they have considered the investigation data available and the design loadings area available.

For the purposes of pile design, the skin friction from the Tidal Flat Deposits has been ignored, and that the working load has been calculated from a combination of skin friction and end bearing within the underlying Glacial Till.

The existing trees located along the boundaries may theoretically cause soil heave (the risk is theoretical at this site as the groundwater is too shallow for heave to occur, but it is prudent to assume heave could happen for design purposes). In the influence zone of trees, pile caps and ground beams will have to be separated from the soil by a suitable void former on the sides and in the case of ground beams, underneath. Piles will have to be designed to withstand the seasonal movements exerted by the remaining and proposed vegetation either by the use of suitable reinforcement or by the provision of sleeving through the swelling zone. Such precautions against heave should be designed and constructed in accordance with NHBC Standards.

It is recommended that consultation with a specialist piling contractor is undertaken in order to evaluate pile loads, diameter and depths based upon the ground conditions revealed within the context of the specified technical requirements of the chosen piling method. In any event, positive contractual assurances should be sought from the piling contractor in respect of the performance of their proprietary system.

6.8. RECOMMENDATIONS FOR FURTHER GEOTECHNICAL WORK

No further geotechnical ground investigation is recommended at this stage.

7. RISK ESTIMATION – SOILS

7.1. HUMAN HEALTH

The results displayed below are from all the various phases of testing undertaken as part of the BRD investigation. 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	16	15	37	0
Cadmium	mg/kg	16	0.4	22	0
Chromium (total)	mg/kg	16	18	910	0
Chromium (hexavalent)	mg/kg	16	<2	21	0
Copper	mg/kg	16	21	2,400	0
Lead	mg/kg	16	226	200	1
Mercury	mg/kg	16	1.6	11	0
Nickel	mg/kg	16	17	180	0
Selenium	mg/kg	16	<3	250	0
Zinc	mg/kg	16	156	3,700	0
pH	Units	33	7.7 - 8.6	<5-10>	0
Naphthalene	mg/kg	21	2.06	2.3	0
Acenaphthylene	mg/kg	21	2.16	170	0
Acenaphthene	mg/kg	21	0.56	210	0
Fluorene	mg/kg	21	0.49	170	0
Phenanthrene	mg/kg	21	5.45	95	0
Anthracene	mg/kg	21	2.40	2,400	0
Fluoranthene	mg/kg	21	13.10	280	0
Pyrene	mg/kg	21	13.70	620	0
Benzo(a)anthracene	mg/kg	21	7.62	7.2	1
Chrysene	mg/kg	21	6.43	15	0
Benzo(b)fluoranthene	mg/kg	21	10.70	2.6	5
Benzo(k)fluoranthene	mg/kg	21	7.79	77	0
Benzo(a)pyrene	mg/kg	21	8.94	2.2	5
Indeno(1,2,3-cd)pyrene	mg/kg	21	5.18	27	0
Dibenzo(a,h)anthracene	mg/kg	21	2.95	0.24	6
Benzo(ghi)perylene	mg/kg	21	10.40	320	0
TPH Aliphatic C5-C6	mg/kg	11	<0.01	42	0
TPH Aliphatic C6-C8	mg/kg	11	<0.05	100	0
TPH Aliphatic C8-C10	mg/kg	11	<2	27	0
TPH Aliphatic C10-C12	mg/kg	11	<2	130	0
TPH Aliphatic C12-C16	mg/kg	11	<3	1,100	0
TPH Aliphatic C16-C35	mg/kg	11	25	65,000	0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aliphatic C35-C44	mg/kg	11	31	65,000	0
TPH Aromatic C5-C7	mg/kg	11	<0.01	70	0
TPH Aromatic C7-C8	mg/kg	11	<0.05	130	0
TPH Aromatic C8-C10	mg/kg	11	<2	34	0
TPH Aromatic C10-C12	mg/kg	11	<2	74	0
TPH Aromatic C12-C16	mg/kg	11	<2	140	0
TPH Aromatic C16-C21	mg/kg	11	28	260	0
TPH Aromatic C21-C35	mg/kg	11	79	1,100	0
TPH Aromatic C35-C44	mg/kg	11	<10	1,100	0
Benzene	mg/kg	11	<2	0.87	0
Toluene	mg/kg	11	<5	130	0
Ethylbenzene	mg/kg	11	<2	47	0
Xylene (total of all types)	mg/kg	11	<2	56	0
Methyl Tert Butyl Ether (MTBE)	mg/kg	11	<5	49	0
Volatile Organic Compounds (VOCs)	mg/kg	3	<LOD	LOD*	0
Semi-Volatile Organic Compounds (SVOCs)	mg/kg	3	0.2	LOD*	3
Organochlorine Pesticides	mg/kg	5	<LOD	LOD*	0
Asbestos	Presence	11	0.002	Fibres Present	1
Hydrocarbon Vapour (PID)	ppm	21	0.0	50	0

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	
LEAD	When compared to the generic assessment criteria of 200mg/kg, one elevated concentration of lead was recorded in the Made Ground at a concentration of 226mg/kg in trial pit TP106 at 0.20m bgl. In the previous Ground Engineering investigation, one elevated concentration of lead was also recorded at 0.20m bgl within the Made Ground in trial pit TP2, at a concentration of 370mg/kg. A normality plot was undertaken which demonstrated that the lead concentrations for the 14No. samples of Made Ground approximated to a normal distribution. The maximum value test demonstrated that there are unlikely to be any statistical outliers. The mean lead concentration from the 14No. samples of Made Ground was 90mg/kg and the upper 95th percentile was 141mg/kg. The upper 95th percentile is lower than the GAC for lead and therefore it is considered not to be a contamination hazard. It is also worth noting that the lead concentrations recorded are typical of background concentrations.

<table>
<tr><td>ASBESTOS</td><td>A chrysotile asbestos bundle detected at 0.002% by weight was observed in the Made Ground sample from 0.20m bgl in trial pit TP107 only. No visual evidence of asbestos was observed within the Made Ground soils and no other samples tested identified asbestos, including the 5No. additional hand dug pits completed around this location (namely HD04-HD08).

BRD employed the JIWG 'Decision support tool for the qualitative risk ranking of work activities and receptors involved in or exposed to asbestos in soil and Construction & Demolition materials' (Version 2, February 2017). This confirmed that the risk ranking as being medium.</td></tr>
<tr><td>PAH</td><td>Six samples of Made Ground within the nursery area have recorded elevated levels of PAH compounds. The elevated levels were found specifically within the access track of the nursery. A table of the elevated levels is displayed below:

<table>
<tr><th>Compound</th><th>GAC</th><th>TP103 (0.20m)</th><th>TP105 (0.20m)</th><th>TP107 (0.20m)</th><th>TP111 (0.10m)</th><th>TP111 (0.50m)</th><th>WS101 (0.10m)</th></tr>
<tr><td>Benzo(a)anthracene</td><td>7.2</td><td>-</td><td>7.62</td><td>-</td><td>-</td><td>-</td><td>-</td></tr>
<tr><td>Benzo(b)fluoranthene</td><td>2.6</td><td>6.88</td><td>10.70</td><td>5.66</td><td>8.23</td><td>-</td><td>4.02</td></tr>
<tr><td>Benzo(a)pyrene</td><td>2.2</td><td>6.66</td><td>8.94</td><td>5.02</td><td>7.36</td><td>-</td><td>3.73</td></tr>
<tr><td>Dibenz(ghi)perylene</td><td>0.24</td><td>0.70</td><td>1.06</td><td>0.48</td><td>0.89</td><td>2.95</td><td>0.39</td></tr>
</table>
Note that the concentrations are displayed in mg/kg.

It is likely that the concentrations relate to the presence of older tarmac fragments and/or charcoal within the Made Ground.</td></tr>
<tr><td>SVOC</td><td>A single SVOC compound recorded three concentrations fractionally elevated above the detection limit. This comprised 2-Methylnaphthalene recorded at 0.2mg/kg in the sample of Made Ground from TP111 and 0.1mg/kg in the samples of natural soil from WS101 and WS110. At such a low level, this is not considered to present any cause for concern.</td></tr>
</table>

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 first instance it is more appropriate to consider groundwater analysis, which has been undertaken and presented in the following Section 8. However, the soils testing cannot be ignored and therefore the recorded concentrations should be initially assessed based on professional judgement.

The elevated PAH is likely to be due to the tarmac fragments found within the Made Ground and the concentrations are generally low. As the hydrocarbons are intrinsic to the binder in the tarmac, they are not readily leachable and it is not considered that they offer a significant contamination risk to the underlying water environment.

7.3. BUILDING MATERIALS

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
pH	units	33	7.7 - 8.6	<5.5	0
Sulphate (w/s)	mg/l	33	1670	500	4
Sum of any VOC above detection limits	mg/kg	3	<LOD	0.5	0
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	mg/kg	3	0.2	2	0
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	11	53	10	2
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	11	132	500	0
Sum of BTEX + MTBE above detection limits	mg/kg	11	0.109	0.1	1
Phenols	mg/kg	3	<LOD	2	0
Cresols and chlorinated phenols	mg/kg	3	<LOD	2	0
Naphthalene	mg/kg	21	2.06	0.5	1
Benzo(a)pyrene	mg/kg	21	8.94	0.5	6

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA	
PAH	The concentrations of the Polycyclic Aromatic Hydrocarbons (PAH) benzo(a)pyrene and naphthalene recorded within the Made Ground within the nursery site are above the limits for the use of conventional polyethylene (PE) water supply pipes.
TPH, BTEX & MTBE	The concentrations of TPH, BTEX & MTBE recorded within the Made Ground within the nursery site are above the limits for the use of conventional polyethylene (PE) water supply pipes.
WATER SOLUBLE SULPHATE	Concentrations of water soluble sulphate 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 – WATER

8.1. WATER MONITORING RESULTS

The results tabulated below are a combination of two monitoring visits (12th July and 15th September 2021. Boreholes WS101, WS103 and WS105 were sampled on both visits, but during the second visit a surface water sample was also taken from Blue Gowt Drain bordering the site.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	µg/l	7	>5	50	0
Cadmium	µg/l	7	<0.4	5	0
Chromium (hexavalent)	µg/l	7	<20	50	0
Chromium (total)	µg/l	7	<5	50	0
Copper	µg/l	7	<5	50	0
Lead	µg/l	7	<5	50	0
Mercury	µg/l	7	<0.05	1	0
Nickel	µg/l	7	35	20	5
Selenium	µg/l	7	<5	10	0
Zinc	µg/l	7	108	5,000	0
pH	Units	7	7.9 - 8.8	6 to 9	0
Naphthalene	µg/l	7	0.09	2	0
Acenaphthylene	µg/l	7	0.01	-	-
Acenaphthene	µg/l	7	<0.01	-	-
Fluorene	µg/l	7	<0.01	-	-
Phenanthrene	µg/l	7	0.04	-	-
Anthracene	µg/l	7	<0.01	-	-
Fluoranthene	µg/l	7	0.05	-	-
Pyrene	µg/l	7	0.05	-	-
Benzo(a)anthracene	µg/l	7	<0.01	-	-
Chrysene	µg/l	7	<0.01	-	-
Benzo(b)fluoranthene	µg/l	7	<0.01	-	-
Benzo(k)fluoranthene	µg/l	7	<0.01	-	-
Benzo(a)pyrene	µg/l	7	<0.01	LOD	0
Indeno(1,2,3-cd)pyrene	µg/l	7	<0.01	-	-
Dibenzo(a,h)anthracene	µg/l	7	<0.01	-	-
Benzo(ghi)perylene	µg/l	7	<0.008	-	-
Total PAH	µg/l	7	0.17	0.2	0
TPH Aliphatic C5-C6	µg/l	7	<10	15,000	0
TPH Aliphatic C6-C8	µg/l	7	<10	15,000	0
TPH Aliphatic C8-C10	µg/l	7	11	300	0
TPH Aliphatic C10-C12	µg/l	7	13	300	0
TPH Aliphatic C12-C16	µg/l	7	12	300	0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aliphatic C16-C35	µg/l	7	36	-	-
TPH Aromatic C5-C7	µg/l	7	<10	10	0
TPH Aromatic C7-C8	µg/l	7	<10	700	0
TPH Aromatic C8-C10	µg/l	7	<10	300	0
TPH Aromatic C10-C12	µg/l	7	<10	90	0
TPH Aromatic C12-C16	µg/l	7	<10	90	0
TPH Aromatic C16-C21	µg/l	7	<10	90	0
TPH Aromatic C21-C35	µg/l	7	14	90	0
Benzene	µg/l	7	<1	10	0
Toluene	µg/l	7	<5	74	0
Ethylbenzene	µg/l	7	<5	300	0
Xylene (total of all types)	µg/l	7	<LOD	30	0
Methyl tert-butyl ether (MTBE)	µg/l	7	<10	15	0

8.2. SURFACE WATER

RESULTS EXCEEDING ASSESSMENT CRITERIA
Within the surface water sample from Blue Gowt Drain, no contaminants were recorded at concentrations exceeding their respective assessment criteria.

8.3. GROUNDWATER

RESULTS EXCEEDING ASSESSMENT CRITERIA	
NICKEL	When compared to the generic assessment criteria of 20µg/l, five elevated concentrations of nickel were recorded at concentrations ranging between 28µg/l and 35µg/l. Naturally elevated nickel is common within groundwater associated with the Tidal Flat Deposits. Combined with the fact all of the results are consistent and only marginally elevated, it is not considered that nickel presents a contamination hazard and is therefore not considered further.
PAH	Over the two monitoring visits, a few PAHs have been found marginally above the limits of detection. However, for those substances where a generic assessment criteria (GAC) exists, the corresponding PAH concentrations do not exceed these. It is considered that due to the fact that the PAHs are only marginally above detection limits that the contamination risk to the water environment is not significant. It is also quite possible that the trace PAH may be attributable to the natural organic acids within the Tidal Flat Deposits.

RESULTS EXCEEDING ASSESSMENT CRITERIA	
TPH	Where there is no generic assessment criteria (GAC) for a contaminant, the results are considered when the limit of detection (LOD) is exceeded. In this case, three of the six groundwater samples recorded TPH Aliphatic C16-35 at very low concentrations. It is noted that these compounds have a very low overall mobility in groundwater and so the low concentrations recorded are not considered to be significant. Given the organic nature of the Tidal Flat Deposits, the results may be reflecting background concentrations from naturally occurring organic acid compounds. It is quite possible that the trace concentrations reflect the drilling disturbance of the surrounding soils, as the second confirmatory monitoring visit does not record any elevated TPH concentrations. In any case it is not considered that these trace TPH concentrations present any significant risk to the water environment.

9. RISK ESTIMATION – GAS

9.1. RESULTS SUMMARY

PARAMETER	MINIMUM	MAXIMUM	COMMENTS
Methane	0.0%	4.8%	No significant concentrations recorded. The maximum recorded value of 4.8% occurred on the first visit in WS102 and is likely to have been caused by drilling disturbance. The methane percentage in WS102 is lower through the subsequent visits and is <1% by the fifth and sixth visits.
Carbon Dioxide	0.1%	7.7 %	Boreholes WS107, WS109 and WS110 in the east of the site (field area) consistently have carbon dioxide values above 5%.
Oxygen	3.8%	20.6%	The oxygen levels were typically depleted as carbon dioxide concentrations increased.
Hydrogen Sulphide	0ppm	1ppm	No significant concentrations recorded.
Carbon Monoxide	0ppm	9ppm	Minor concentrations recorded.
Atmospheric pressure	1010mB	1029mB	Three monitoring visits have occurred during a falling pressure trend and three during a rising pressure trend.
Groundwater levels	2.32m	0.69m	There has been an overall decrease in groundwater levels from visit one to visit six.
Flow rate	-4.3 l/hr	0.3l/hr	Some high flows up to 8l/hr have been recorded but these are all as a consequence of 'piston effect' in the monitoring wells. This is where shallow groundwater (less than 1m bgl) has forced gas up into the upper unperforated pipe creating artificial higher gas flow rates (piston effect). These values are not representative and have been discounted. The highest representative flow rate is 0.3l/hr. 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.

9.2. GAS RISK ASSESSMENT

9.2.1. Monitoring Duration

SENSITIVITY OF DEVELOPMENT	High (Residential with gardens)	
	IDEALISED	**ACTUAL**
MONITORING PERIOD	Three months	Three months
TOTAL NUMBER OF VISITS	Six visits	Six visits
NUMBER OF VISITS DURING FALLING PRESSURE TRENDS	At least two visits	Three visits
COMMENT	The number of gas monitoring visits completed complies with the guidance within CIRIA C665.	

9.2.2. Gas Source

GAS SOURCE	**GENERATION POTENTIAL**	**COMMENTS**
Natural soils with high organic content e.g. peat	Moderate	Organic soils have been observed throughout the whole of the site. The decaying material will likely release gas into the soils.

9.2.3. Building Type

In accordance with BS8485:2015 +A1:2019, the development comprises Type A buildings. These buildings are in private ownership with no controls over the use of and alterations to the building. This building type typically comprises private dwellings.

9.2.4. Gas Regime Characterisation

	CHARACTERISTIC GAS CONCENTRATION (fraction)	**CHARACTERISTIC GAS FLOW RATE (l/hr)**	**GAS SCREENING VALUE (l/hr)**
Methane	0.048	0.3	0.0144
Carbon Dioxide	0.077	0.3	0.0231
Methodology	BS8485:2015 +A1:2019.		
Gas Regime	Characteristic situation 2 as some carbon dioxide values have been consistently recorded above 5% as well as some sporadic elevated methane values.		

9.3. GAS PROTECTION MEASURES

9.3.1. Radon Gas

The site is not situated within an area where radon gas protection measures are required in new buildings.

9.3.2. Volatile Organic Compounds

The site is not affected by Volatile Organic Compounds (VOC) contamination.

9.3.3. Methane and Carbon Dioxide

Taking into account the proposed building type and Characteristic Situation 2 gas regime, then in accordance with BS8485:2015 +A1:2019 the minimum gas protection score required within the new dwellings is 3.5 points. Ways of achieving this score are illustrated in the following table. Note that one measure per element is required to achieve the score.

ELEMENT	ACHIEVABLE MEASURES	SCORE
STRUCTURAL BARRIER	Pre-cast suspended segmental subfloor (i.e. beam and block).	0
	Cast in-situ ground bearing floor slabs (with only nominal mesh reinforcement).	0.5
	Cast in-situ monolithic reinforced ground bearing ratio or reinforced suspended floor slabs with minimal penetrations.	1 or 1.5
VENTILATION	Pressure relief pathway (usually formed of low fines gravel or a thin geocomposite blanket or strips terminating in a gravel trench external to the building).	0.5
	Passive sub-floor dispersal layer with very good performance.	2.5
	Passive sub-floor dispersal layer with good performance.	1.5
	Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents.	1.5 to 2.5
	Active positive pressurization by the blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer.	1.5 to 2.5
MEMBRANE	The installation of a high strength and durable methane and carbon dioxide resistant membrane.	2
TOTAL SCORE		3.5

In most instances, the required score of 3.5 points can be achieved with from a standard beam and block construction providing that there is good ventilation through the sub-floor void and that a membrane is installed that meets the requirements of BS8485:2015 +A1:2019.

10. RISK EVALUATION

10.1. REVISED CONCEPTUAL MODEL

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

ADDITIONAL POLLUTANT LINKAGES	During the ground investigation, no additional sources of contamination were identified. Some trace TPH concentrations were detected during the initial round of groundwater monitoring but not at any levels which exceeded GAC. As second confirmatory round of water monitoring has confirmed a lack of contamination, both within the groundwater and the adjacent Blue Gowt Drain.
INVALID POLLUTANT LINKAGES	All of the potential pollutant linkages identified at the start of the ground investigation were proven to be valid.
LIMITATIONS AND UNCERTAINTIES	All of the potential contamination sources have been targeted by the exploratory holes and therefore it is considered that a sufficient number of exploratory points have been completed for contamination assessment purposes.

10.2. 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
Made Ground affected by PAH. (Nursery track)	Direct contact Inhalation Ingestion [1]	Future residents	Moderate risk
	Direct contact [2]	Building materials and services	Moderate risk
Made Ground affected by asbestos. (TP107)	Inhalation [3]	Future residents	Moderate risk
Organic soils - Carbon Dioxide	Inhalation [4]	Future residents	Moderate risk

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

RISK TO HUMAN HEALTH

The Made Ground within the nursery tracks contains elevated levels of PAH and is a risk to human health if left in situ within future garden and landscaping areas.

The Made Ground local to trial pit TP107 only is contaminated with asbestos fibres. This presents a moderate risk to human health if left in-situ, however, the surrounding testing has shown that the contamination is isolated to this location.

The gas monitoring has demonstrated that the naturally organic soils underlying the site are producing elevated concentrations of soil gas, in particular carbon dioxide. Although the gas is more prevalent in the eastern half of the site, the gas is likely to be formed in pockets due to the nature of the material. As the material is found through the entire site, soil gas could potentially be found within the western section. It would therefore be prudent to say the entire site is affected by the soil gas, as opposed to just the eastern section.

RISK TO WATER ENVIRONMENT

Groundwater testing has been completed in the nursery area, which has recorded some trace concentrations of PAH marginally elevated above the limits of detection. At these very low trace concentrations it is not considered that they present a significant risk to the water environment.

RISK TO BUILDING MATERIALS AND SERVICES

Elevated concentrations of PAH and TPH have been recorded in the Made Ground soils across the western nursery area of site. These compounds can denature and permeate plastic services, which is a particular concern for water supply pipes. This could lead to both the taste and quality of drinking water supplies being compromised and as such it is considered that a low to moderate risk is presented to water supplies laid in this part of the site. This associated risk can be easily managed through the use of hydrocarbon resistant pipes, for example plastic 'barrier' pipes incorporating an aluminium foil layer or metal pipes.

It should be noted that no contamination posing a risk to water supply pipes has been identified in the eastern field part of the site and so conventional plastic pipes can used in this area.

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.

10.3. RISK MANAGEMENT

10.3.1. Introduction

The Made Ground in the nursery area, specifically where the access tracks are present, contains elevated concentrations of PAH and in the vicinity of trial pit TP107, asbestos fibres have been found. This contamination presents a risk to the proposed development and warrants some remediation.

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 and Environment Agency to confirm that the investigation undertake is satisfactory to address the relevant planning condition.

10.3.2. Further Contamination Assessment

It is considered that no further ground investigation is required for contamination assessment purposes.

10.3.3. Outline Remediation Method Statement

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 method statement or strategy will need to be developed by an experienced Geo-Environmental Consultant once the layout has been approved and finalised.

The outline remediation methodology is detailed as follows:

- The Made Ground forming the access tracks in the nursery area should either be excavated and removed from site, or alternatively a 'clean' soil capping layer to 600mm thickness will need to be provided for the future gardens and landscaping within the affected areas.

- Given its limited extent, the localised asbestos contaminated material at trial pit TP107 should just be chased out and excavated and then removed from site. Verification sampling of the excavation will be required to demonstrate that all the asbestos contamination has been removed.

- The installation of Characteristic Situation 2 gas protection measures, as set out in Section 9.3, will be required for all plots.

- Hydrocarbon resistance 'barrier' water supply pipes will need to be installed across the western nursery section of the site. Conventional polythene pipework should suffice for the eastern field.

- All remediation works should be supervised and verified by an experienced Geo-Environmental Consultant. Verification testing of any remediation excavations will be required for both the removal of the access track Made Ground and the asbestos contamination around TP107. Samples will need to be taken from the base and faces of the resultant excavation.

- Any imported soils, such as topsoil or subsoil, will need to be tested to confirm that they are uncontaminated and suitable for use at the site. However, it is considered that there should be a sufficient source of site-won material to achieve this from arisings in the eastern field part of the site.

All the remediation works should be documented in a Verification Report for submission to the various regulatory authorities and building warranty providers.

10.4. WASTE SOIL DISPOSAL

Topsoil should be viewed as a resource rather than a waste. As the topsoil is suitable for residential garden use in terms contamination, the topsoil at the site should be stripped and re-used with any 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 uncontaminated Made Ground and natural sub-soils disposed of from the site would be classified as 'non-hazardous waste' and would be characterised for disposal to landfill 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 has been completed and the results are in the Appendices which confirm the soil tested complies 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 both the identified PAH contaminated Made Ground soils and the asbestos contaminated soils would be classified for disposal as 'non-hazardous waste' and as such the waste will require pre-treatment prior to off-site disposal e.g. by selective excavation. The chemical results should be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils. The waste code from the European Waste Catalogue (EWC) 2002 for the soils would be 17 05 03 'Soil and Stones, containing dangerous substances'.

Although not encountered to date, should any fragments of asbestos be found around TP107 during the excavation, these should be handpicked from the soil by a competent and qualified contractor. Any handpicked fragments of asbestos should be disposed of as 'hazardous waste'.

11. HEALTH AND SAFETY FILE INFORMATION

11.1. 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. The information is not exhaustive and stems only from the aspects identified within the scope of the works undertaken by BRD.

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.

The works undertaken by BRD are detailed in the previous sections of this report.

11.2. HAZARDS

During the course of the BRD works the following noteworthy safety hazards have been identified:

11.2.1. 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.

11.2.2. Asbestos

While dealing with the asbestos identified on site at TP107, measures to protect the health and safety of site workers should always be implemented including use of appropriate personal protective equipment, education and good hygiene practices. In respect of this remediation work, the JIWG Decision Support Tool for CAR2012 Work Categories proposes that a low risk to construction workers is posed by these occasional fragments and suggests that remedial work is classified as 'Non-Licensed Work'. During remedial works with the affected Made Ground soils and the stockpile EN149 type FFP3 disposable masks should be worn. Manual/localised dust suppression such as wetting the ground should also be applied and localised and basic personal decontamination facilities should be provided.

Whilst BRD is unaware of any other asbestos within the site, the potential for asbestos containing materials (ACM) within Made Ground on brownfield sites is a common occurrence and competent contractors should have procedures for addressing the associated risks. All below ground operatives would be expected to have asbestos awareness training, so that they can identify any suspected ACM and inform site management so it can be appropriately dealt with.

11.2.3. Other Issues

During the BRD works the following safety hazards were identified:

- There are multiple slip, trip and fall hazards around the site.

11.3. EXISTING STRUCTURES

The nursery buildings have been demolished. The only buildings present on site are the temporary site cabins.

11.4. HAZARDOUS MATERIALS

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.

11.5. 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 144 "Spalding" Solid and Drift edition (1:50,000) published 1992.

- "Site Investigation Report - Land off Wardentree Lane, Spalding, Lincolnshire", Ground Engineering, report ref. C14985, dated April 2020.

SUPPORTING INFORMATION

GROUND INVESTIGATION

Exploratory holes are logged by an experienced Geo-Environmental Consultant in general accordance with 'Code of practice for site investigations' BS5930:2015, British Standards Institution, 2015. 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.

Static Cone Penetration Tests

Cone Penetration Tests (CPT) consist of pushing a conical 60° cone into the ground at a constant rate and recording the force required to do this. Sensors in the cone record other information and this data can be correlated to a number of different geotechnical parameters.

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 20 to 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 tests are undertaken in general accordance with 'Digest DG 365: Soakaway design' BRE, Revised 2016. The test pits are usually gravel filled for safety with a slotted vertical pipe through which water observations are made. Water is generally supplied by a tanker to allow fast filling of the pits with water. Compliant tests are filled and allowed to drain near empty three times.

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 $N_{60} = \frac{E_r}{60} \; x \; \lambda \; x \; C_N \; x \; N$ *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. Laboratory results 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/cm²)	*Indicative Undrained Shear Strength (kN/m²)*	*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+A2:2017', The British Standards Institution 2017.*
- *'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
PHASE1	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***			*Moderate Risk*	*Moderate/Low Risk*
	LIKELY		*Moderate Risk*	*Moderate/Low Risk*	*Low Risk*
	LOW LIKELIHOOD	*Moderate Risk*	*Moderate/Low Risk*	*Low Risk*	
	UNLIKELY	*Moderate/Low Risk*	*Low 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)[$]	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	
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	

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
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	
MTBE	49	73	7,900	EIC/AGS/CL:AIRE GAC

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.
$ 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 historically employing 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 (GAC) that are protective of groundwater resources.

The reference source for the target concentrations is generally the EA's Environmental Quality Standards (EQS) (accessed July 2018: http://evidence.environment-agency.gov.uk/ChemicalStandards/report.aspx?cid=17), the Water Supply (Water Quality) Regulations 2016 and the DW1/DW2 criteria from the Surface Water (Abstraction for drinking water)(classification) Regulations 1996. The target concentrations are outlined in the table below. The 'Petroleum Hydrocarbons in Groundwater: Guidance on assessing petroleum hydrocarbons using existing hydrogeological risk assessment methodologies'. CL:AIRE, 2017 has also been used as reference source for the values.

ANALYSIS	GENERIC ASSESSMENT CRITERIA (GAC)	SOURCE
Arsenic	50 µg/l	DW1 & EQS
Cadmium	5 µg/l	EQS
Chromium (total)	50 µg/l	DW2 & EQS
Copper	50 µg/l	DW1
Nickel	20 µg/l	EQS
Lead	50 µg/l	DW1
Mercury	1 µg/l	WSR
Selenium	10 µg/l	WSR
Zinc	5 mg/l	DW2
Cyanide	50 µg/l	WSR
pH	6 to 9 units	EQS
Benzene	10 µg/l	EQS
Toluene	74 µg/l	EQS
Ethylbenzene	300 µg/l	WHO guideline
Xylene	30 µg/l	EQS
Methyl tert-butyl ether (MTBE)	15 µg/l	Taste and odour threshold.
Naphthalene	2 µg/l	EQS
Benzo(a)pyrene	0.0017 µg/l	EQS – Less than Limit of Detection (LOD)
Total PAH	0.2 µg/l	DW1
TPH Aliphatic C5-C6	15,000 µg/l	World Health Organization (WHO) guide values for TPHCWG fractions in drinking water
TPH Aliphatic C6-C8	15,000 µg/l	
TPH Aliphatic C8-C10	300 µg/l	
TPH Aliphatic C10-C12	300 µg/l	
TPH Aliphatic C12-C16	300 µg/l	
TPH Aromatic C5-C7	10 µg/l	
TPH Aromatic C7-C8	700 µg/l	
TPH Aromatic C8-C10	300 µg/l	
TPH Aromatic C10-C12	90 µg/l	
TPH Aromatic C12-C16	90 µg/l	
TPH Aromatic C16-C21	90 µg/l	
TPH Aromatic C21-C35	90 µg/l	

There are no available generic assessment criteria for some of the analytical parameters which have been scheduled, for example hexavalent chromium, 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 building contains radon, some buildings built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken. The maps contained within BRE211:2015 '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 buildings, extensions or refurbishments.

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 and 'BS8485:2015 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' BSi 2015.

Gas Screening Value

The methods within CIRIA C665 and BS8485 both use the gas concentrations together with the 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:

Gas Screening Value (l /hr) = borehole flow rate (l/hr) x 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.

Characteristic Gas Situation

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	Hazard potential	Gas Screening Value (CH4 or CO2 l/hr)	Additional factors
CS1	Very low risk	<0.07	Typically Methane ≤1% and/or Carbon Dioxide ≤5%. Otherwise consider an increase to characteristic situation 2.
CS2	Low risk	0.07 to <0.7	Borehole air flow rate not to exceed 70 l/hr. Otherwise consider an increase to characteristic situation 3.
CS3	Moderate risk	0.7 to <3.5	-
CS4	Moderate to high risk	3.5 to <15	-
CS5	High risk	15 to <70	-
CS6	Very high risk	>70	-

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 64m^2, 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



Not to scale.

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Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP3-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Site Walkover Photographs

Plate 1: Access to the site in the south west corner.

Plate 2: Site cabins in the east of the site.

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP4-A
Date Issued:	July 2021

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info@brduk.com

Site Walkover Photographs

Plate 3: Part of the nursery area in the west of the site.

Plate 4: The trench in the nursery area of the site presumed to have been dug for services removal. Note shallow groundwater.

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Site Walkover Photographs

Plate 5: The field area (eastern half) of the site viewed from the nursery area.

Plate 6: View west from the north east corner of the site.

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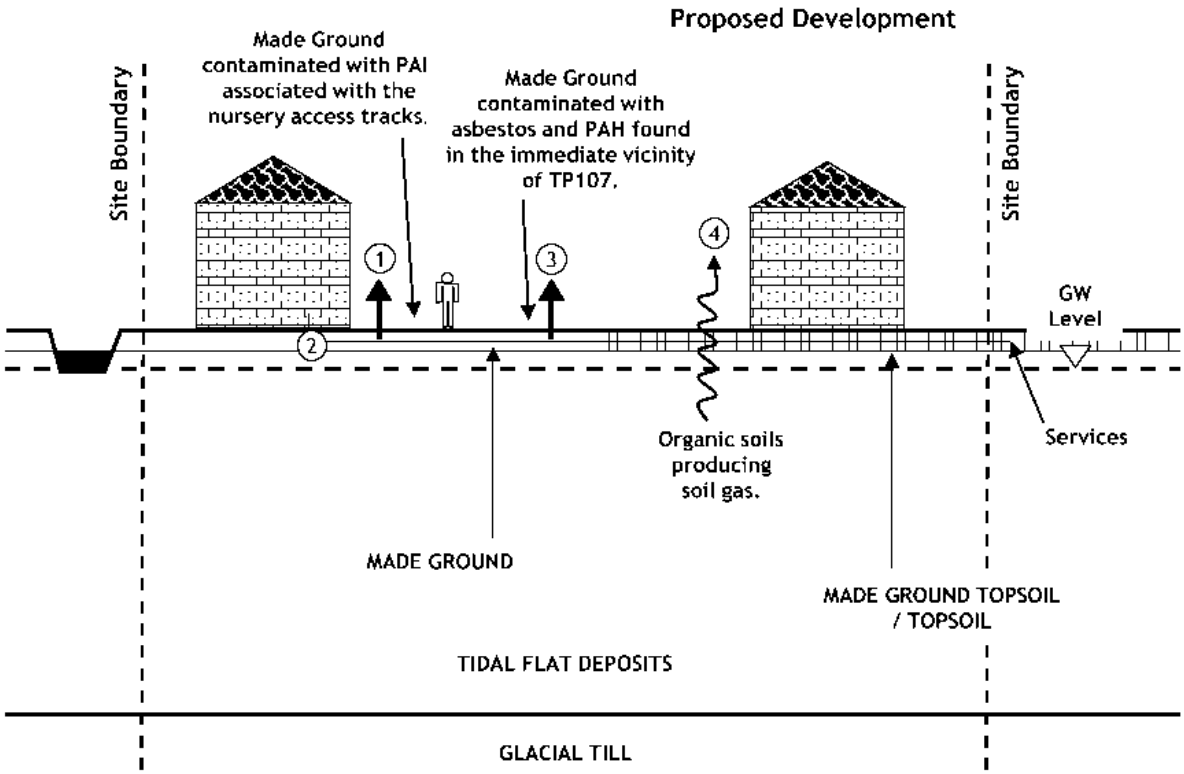
Site Walkover Photographs

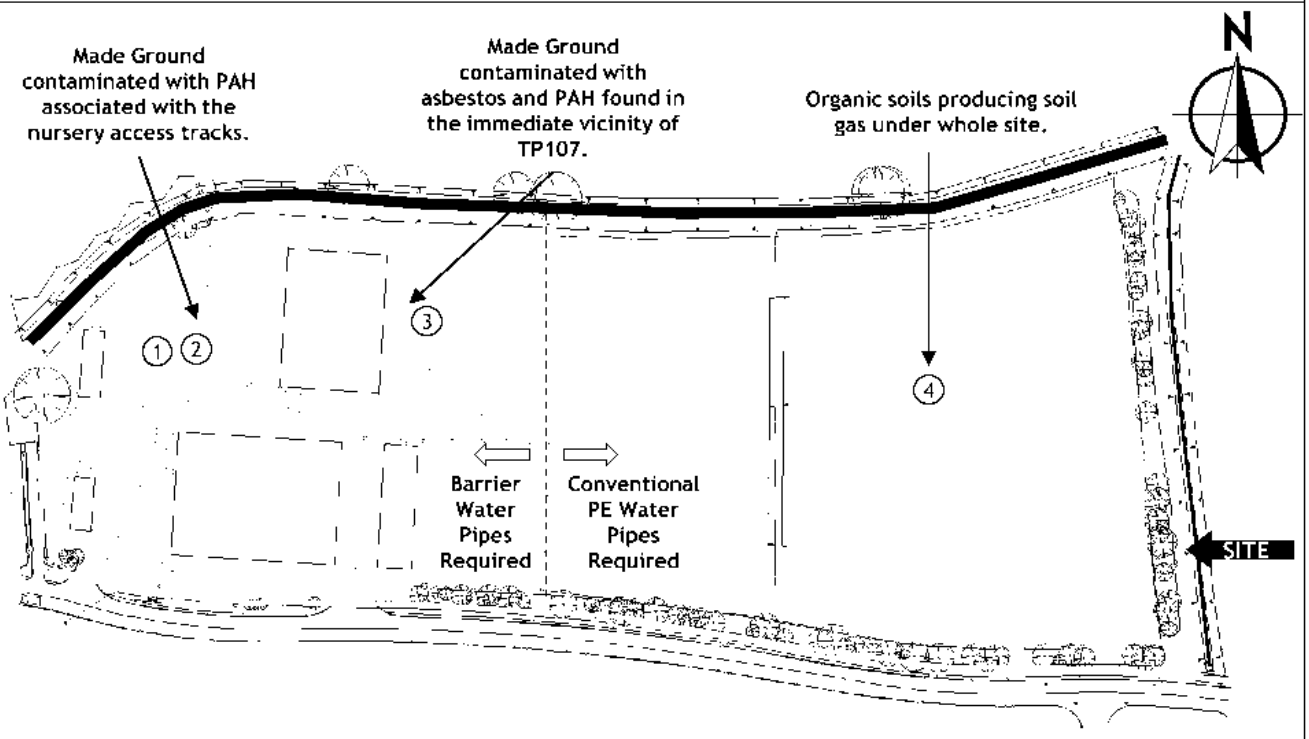
Plate 7: The access to the field from the south eastern corner of the site.

Plate 8: Blue Gowt Drain north of the site. Viewed east.

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Revised Conceptual Model





Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP6-C
Date Issued:	September 2021

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info@brduk.com

HOUSE TYPE SCHEDULE	
TA - Tailor - 3B	9
TH - Thespian - 3B	11
CH Chandler 3B	10
QU - Quilter - 3B	10
MA Mason 3B	10
SC - Scrivener - 4B	14
MI - Milliner - 4B	8
TOTAL MKT HOMES	72
ST-GF - Stationer - 1B2P AH	3
BT-FF - Bookbinder - 1B2P AH	3
MN - Mancipe - 2B4P AH	6
MN - Mancipe - 2B4P SO	2
TI - Tillman - 3B4P AH	3
TI - Tillman - 3B4P SO	5
CT Cartographer 4B5P AH	2
TOTAL AH HOMES	24
GRAND TOTAL	96

SUDs in POS = 0.2103 Ha.
POS exc. SUDs = 0.9215 Ha.
POS Total = 1.132 Ha.

Note: refer to Arboriculturalist and landscaping information for all tree information.

SUDS = 0.0431 Ha.

SUDS = 0.0511 Ha.

LAP 100 m2

Swale = 0.0453 Ha.

Swale = 0.0206 Ha.

Swale = 0.0220 Ha.

Swale = 0.0181 Ha.

Existing access removed & reinstated with kerb

WARDENTREE LANE

Note: refer to Arboriculturalist and landscaping information for all tree information.

Note: refer to Arboriculturalist and landscaping information for all tree information.

5m cycle path link

Maintenance access for IDB

Amble Side

The Lodge

Neves

RED MILE

D. 27/07/21 HA mix amended.
C. 12/06/21 Swales / SUDs amended.
B. 03/06/21 LPA amendments.
A. 18/05/21 LPA amendments.
Revisions

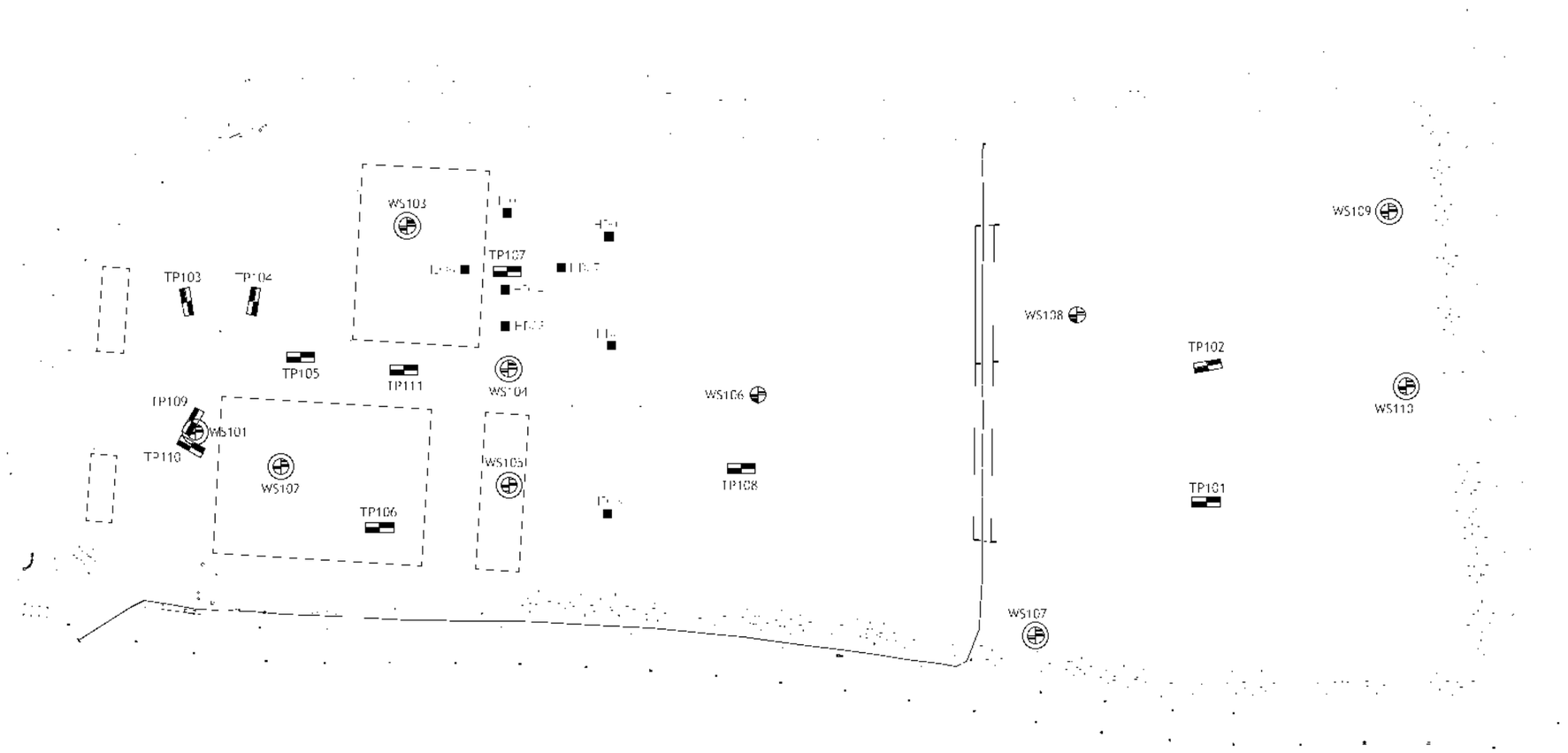
LMC - Architect Limited
87 Main Street, Lyddington, Rutland, LE15 9LS
Tel/Fax 01572 820185
Mob e 07985 943743

Client
Bellway Homes Limited (Eastern Counties)

Project
Land off
Wardentree Lane
Pinchbeck, Spalding

Drawing
Planning Site Layout

Scales	Sheet size	Date	Drawn
1:500	A1	26/01/21	LMC
Drawing Number			Rev.
487-SK-01			D



Key:

- WS — Windowless Sample Borehole with monitoring well installed
- WS — Windowless Sample Borehole
- Cable Percussive Borehole
- TP — Trial Pit
- HP ■ Hand Dug Pit (Approximate Position)
- —— Gas Main
- Site Boundary (Approximate Position)

Notes:

Reproduced from Safe Dig Surveys Ltd, 'PAS128-SURVEY', drawing ref: 20201222UCL-SPAL, Rev: A, dated 08/02/2021.

All exploratory holes located by topographical survey grade GPS except where stated otherwise in the key.

Revision	Date	Description	Drawn	Approved
B	27/08/21	Hand dug pits HD01-HD08 added.	RD	BD
A	20/07/21	First issue.	RD	BD

Drawing title: EXPLORATORY POINT PLAN

Project title: RED MILE NURSERY, PINCHBECK

Client: BELLWAY HOMES

Scale	Original drg. size/colour	Date
1:1250	A3 / C	20/07/2021
Drawn: RD	Checked: NK	Approved: BD

Drawing Number: BRD3760-OD1 Rev: A

BRD Environmental Ltd

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www.brduk.com

APPENDIX 2

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP101

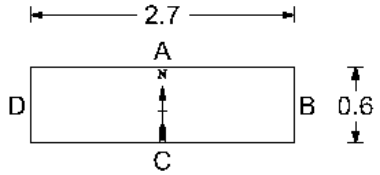
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			TOPSOIL: Grass over: Soft, brown, sandy, silty clay with frequent rootlets.	0.20 (2.98)	TS	
0.20	J1		Firm, brown with occasional grey, sandy, silty CLAY.		TIDAL FLAT DEPOSITS	
0.90	D1			1		
			Soft to firm, grey with occasional brown, very sandy, clayey SILT.	1.20 (1.98)		
1.60	D2					
			Loose, grey and orange brown, very silty SAND with occasional organic black specks.	1.70 (1.48)		
				2		
				3		
				3.30 (-0.12)		
				4		

Pit Stability: Unstable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.179 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.30m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP102

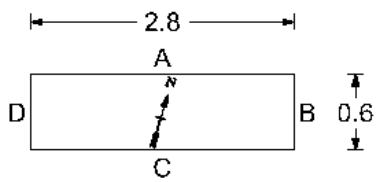
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.15	J1		TOPSOIL: Grass over: Soft, brown, sandy, silty clay with frequent rootlets.		TS	
			Firm, brown and grey, sandy, silty CLAY.	0.30 (2.63)	TIDAL FLAT DEPOSITS	
0.80	J2			1		
			Soft to firm, brown with occasional grey, sandy SILT.	1.10 (1.83)		
			Soft to firm, grey with orange brown, slightly clayey, sandy SILT with frequent decaying plant remains.	1.90 (1.03) 2		
2.20	B1					
			Very soft, grey, sandy SILT with frequent decaying plant remains.	2.70 (0.23) 3		
				3.30 (-0.37) 4		

Pit Stability: Slightly unstable throughout
Groundwater: Not encountered

Surface Elevation Level:
2.929 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.10m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP103

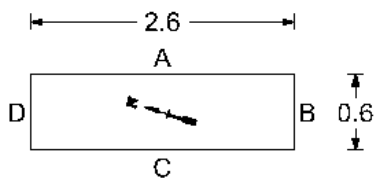
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Loose to medium dense, yellowish brown, slightly clayey, sandy gravel of fine to coarse, subangular to subrounded flint, quartzite and limestone with occasional brick and concrete fragments.	0.25 (3.13)	MG	
			Soft, brown with occasional grey, sandy, silty CLAY.	0.90 (2.48)	TIDAL FLAT DEPOSITS	
2.00	SV	18/20/20 kPa	Very soft, grey and brown, sandy, clayey SILT with frequent organic matter including decaying plant material.	1		
2.60	SV	34/34/20 kPa		2		
			Very soft, grey, slightly sandy, clayey SILT with frequent decaying plant material.	2.70 (0.68)		
				3		
				3.50 (-0.12)		
				4		

Pit Stability: Unstable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.381 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.50m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP104

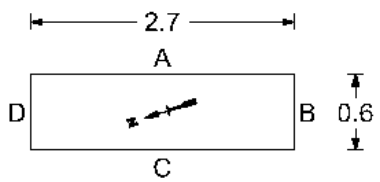
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Loose, light brown, gravelly, clayey sand with occasional rootlets. Gravel is fine to coarse, subangular to subrounded limestone with occasional brick fragments.	0.20 (3.16)	MG	
			Firm, light brown with light grey, silty, sandy CLAY.		TIDAL FLAT DEPOSITS	
0.60	SV	56/54/50 kPa				
0.80	J2					
			Soft to firm, light brown with occasional light grey, slightly clayey, sandy SILT with occasional decaying organic material including plant material.	0.90 (2.46)		
1.50	B1			1		
				2		
				3		
				3.10 (0.26)		
				4		

Pit Stability: Unstable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.355 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.10m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Bellway Homes
Project Title:	Red Mile Nursery, Pinchbeck
Project No:	BRD3760
Logged By:	M Wood
Date Completed:	28/06/2021
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP105

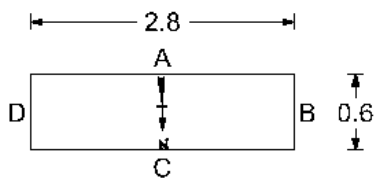
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Medium dense, yellowish brown, very sandy gravel of fine to coarse, subangular to subrounded quartzite and limestone with frequent brick, grass and occasional metal fragments.	0.40 (3.00)	MADE GROUND	
0.55	J2		MADE GROUND: Soft to firm, dark grey, slightly ashy, sandy, gravelly clay. Gravel is fine to coarse, subangular to subrounded flint with rare tarmac, metal and plastic fragments.	0.60 (2.80)		
			Soft, light brown, very sandy SILT.	1	TIDAL FLAT DEPOSITS	
2.00	B1			2		
2.10	SV	20/22/20 kPa				
			Very soft, dark grey, clayey SILT with occasional decaying organic matter including plant material.	2.50 (0.90)		
2.80	D1			3		
3.00	SV	40/32/34 kPa				
				3.20 (0.20)		
				4		

Pit Stability: See General Remarks
Groundwater: Seepage at 2.50m

Surface Elevation Level:
3.397 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.20m bgl.
Unstable below 2.50m.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP106

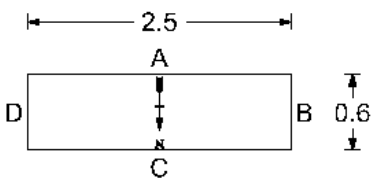
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Loose, brown with occasional dark grey, ashy in part clayey, sandy gravel of fine to coarse, subangular to subrounded limestone and quartzite with occasional tarmac fragments.	0.30 (2.77)	MG	
0.70	SV	40/32/34 kPa	Soft, light brown, sandy SILT.	0.70 (2.37)	TIDAL FLAT DEPOSITS	
1.00	J2		Loose, saturated, light brown, sandy SILT.	1		
1.30	D1					
1.60	SV	20/20/24 kPa	Very soft, saturated, light grey and light brown, very sandy SILT.	1.50 (1.57)		
2.90	SV	16/16/18 kPa	Very soft, dark grey, slightly sandy, clayey SILT with frequent organic matter including plant material.	2.70 (0.37)		
				3.40 (-0.33)		

Pit Stability: Generally stable throughout
Groundwater: Seepage at 1.50m

Surface Elevation Level:
3.072 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.40m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP107

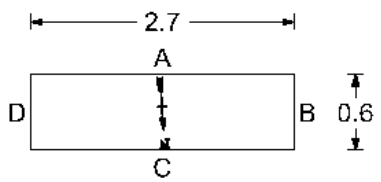
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Medium dense to dense, yellowish brown, slightly clayey, sandy gravel of fine to coarse,e subangular to subrounded limestone and quartzite with occasional brick, concrete and tarmac fragments.	0.40 (2.77)	MG	
1.10	J2		Loose, saturated, light brown with light grey, very silty SAND.	1	TIDAL FLAT DEPOSITS	
1.70	D1		Very soft, grey, slightly sandy, clayey SILT with frequent organic matter including plant material.	1.60 (1.57)		
1.80	SV	30/30/26 kPa		2		
2.70	D2					
2.90	SV	18/18/20 kPa		3		
				3.10 (0.07)		
				4		

Pit Stability: Generally stable throughout
Groundwater: Seepage at 1.60m

Surface Elevation Level:
3.172 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.10m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client:	Bellway Homes
Project Title:	Red Mile Nursery, Pinchbeck
Project No:	BRD3760
Logged By:	M Wood
Date Completed:	28/06/2021
Method Used:	180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP108

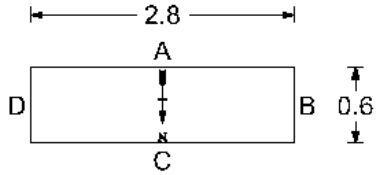
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		TOPSOIL: Grass over: Loose, brown, slightly clayey sand with frequent rootlets.	0.35 (2.69)	TS	
0.70	B1		Loose to medium dense, light brown with occasional light grey, silty fine SAND.	1	TIDAL FLAT DEPOSITS	
0.90	J2			2		
2.50	B2		Loose, saturated, grey with occasional light brown, very silty, fine SAND with occasional organic matter consisting of plant material.	2.00 (1.04)		
				3		
				3.00 (0.04)		
				4		

Pit Stability: Unstable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.039 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 3.00m bgl.
Trial pit collapsed back to 2.30m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP109

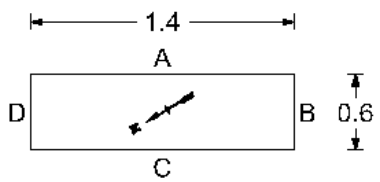
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Loose, brown, grey, silty gravel of fine to coarse, subangular to subrounded flint and quartzite with brick fragments.	0.10 (3.29)	M	
			Firm, grey with occasional black specks, sandy, silty CLAY. Black specks are organic.		TIDAL FLAT	
			Loose to medium dense, greyish brown, silty SAND.	0.90 (2.49)		
				1.30 (2.09)		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.391 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.30m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP110

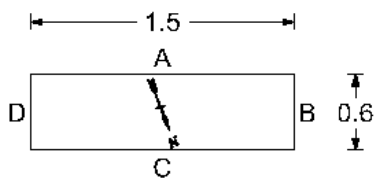
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Dense, brown to dark brown, slightly clayey, very sandy gravel of fine to coarse subangular to subrounded flint and limestone with occasional brick and concrete.	0.20 (3.10)	MG	
			Firm, grey with occasional black specks, sandy, silty CLAY. Black specks are organic.	0.80 (2.50)	TIDAL FLAT	
			Loose to medium dense, greyish brown, silty SAND.	1.00 (2.30)		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:
3.296 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.00m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

TRIAL PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: M Wood
Date Completed: 28/06/2021
Method Used: 180° Backhoe excavator (JCB 3CX type)

Trial Pit No.

TP111

Sheet 1 of 1

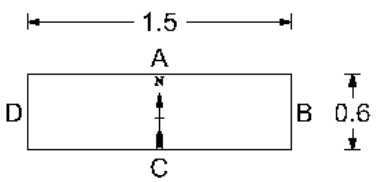
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Medium dense, brown to yellowish brown, slightly clayey, sandy gravel of fine to coarse, subangular to subrounded limestone and quartzite with brick, tarmac, glass and concrete fragments.	0.20 (3.06)	MADE GROUND	
0.50	J2		MADE GROUND: Loose to medium dense, dark grey, clayey sand with frequent charcoal and brick fragments.	0.65 (2.61)		
1.00	SV	32/32/24 kPa	Soft, brown to light brown, slightly sandy, clayey SILT.	1.30 (1.96)	TIDAL FLAT	

1
2
3
4

Pit Stability: Generally stable throughout
Groundwater: Seepage at 1.25m

Surface Elevation Level:
3.263 mAOD

Plan of Trial Pit:



General Remarks:
Trial pit terminated at 1.30m bgl.
Relative density of coarse soils based on visual assessment only.

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

Trial Pit Photographs

TP101

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP102

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP103

01295 272244
info@brduk.com

Trial Pit Photographs

TP104

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP105

01295 272244
info@brduk.com

Trial Pit Photographs

TP106

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP107

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP108

Use the 'insert picture' function and then use these grey steps as a rough guide. When aligning two photo's, bear in mind that the lower one has to be slightly smaller and then the top photo should be cropped so that they are aligned.

01295 272244
info@brduk.com

Trial Pit Photographs

TP109

Use the 'insert picture' function and then use these grey steps as a rough guide. When aligning two photo's, bear in mind that the lower one has to be slightly smaller and then the top photo should be cropped so that they are aligned.

01295 272244
info@brduk.com

Trial Pit Photographs

TP110

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

Trial Pit Photographs

TP111

Project Title:	Red Mile Nursery, Pinchbeck
Client:	Bellway Homes
BRD Reference:	BRD3760-OP5-A
Date Issued:	July 2021

01295 272244
info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS101

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.10 0.10	PID J1	0.0 ppm		MADE GROUND: Dark brown to black, gravelly sand. Gravel of fine to coarse, subangular to subrounded limestone, quartzite and tarmac.	0.05 (3.37) 0.20 (3.22)		MG	
				MADE GROUND: Friable, brown SILT with orange brown staining and some limestone gravel.				
0.50 0.50	PID J2	0.0 ppm		Soft, dark grey, clayey SILT with occasional charcoal and natural organic odour.				
0.80	PEN	0.5x3 kg/cm²		Soft, brown, very silty CLAY.	0.70 (2.72)			
				0.90 m: Becomes wet.	1.0			
1.00	SPT	3 N		Soft, orange brown, sandy CLAY. 1.00 m: SPT: 1,0/1,0,1,1	1.00 (2.42)			
1.50	D1							
1.80	PEN	0.25x3 kg/cm²		1.80 m: Becomes very soft.				
2.00	SPT	0 N	▼1	2.00 m: SPT: 0,1/0,0,0,0 2.00 m: No SPT recovery.	2.0			
				Very soft, wet, dark grey, sandy CLAY with a natural organic odour.	2.60 (0.82)		TIDAL FLAT DEPOSITS	
				2.80 m: Too soft for hand penetrometer.				
3.00	SPT	2 N		3.00 m: SPT: 0,1/1,1,0,0 3.00 m: No SPT recovery.	3.0			
3.70	D2							
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.423 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS101

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from: Very soft, wet, dark grey, sandy CLAY with a natural organic odour. 4.50 - 5.00 m: Organic material. 4.80 m: Too soft for hand penetrometer. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.03)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.423 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS102

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.05	PID	0.0		MADE GROUND: Dark brown, gravelly, sandy silt. Gravel of fine to coarse, subangular to subrounded limestone, brick fragments and charcoal.	0.10 (3.12)		MG	
0.05	J1	ppm						
				MADE GROUND: Dark brown, silty clay with frequent charcoal.				
0.40	PID	0.0						
0.40	J2	ppm			0.50 (2.72)			
				Soft, brown, very clayey SILT / silty CLAY.				
0.80	PEN	1.0/0.75x2 kg/cm²						
1.00	SPT	3 N		1.00 m: SPT: 1,1/1,1,1,0	1.0			
				1.00 m: Becomes moist.				
					1.70 (1.52)			
1.80	PEN	0.5/0.25x2 kg/cm²		Very soft, grey mottled orange brown, silty CLAY with occasional orange brown, sandy pockets.				
1.90	D1							
2.00	SPT	0 N	▼1	2.00 m: SPT: 0,0/0,0,0,0	2.0		TIDAL FLAT DEPOSITS	
					2.60 (0.62)			
				Very soft, dark grey, silty CLAY with organic material and a natural organic odour.				
				2.80 m: Too soft for hand penetrometer.				
3.00	SPT	0 N		3.00 m: SPT: 0,0/0,0,0,0	3.0			
				3.80 m: Too soft for hand penetrometer.				
3.90	D2							
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
				4.00 - 5.00 m: No core recovery.				
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.221 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS102

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 2.60m: Very soft, dark grey, silty CLAY with organic material and a natural organic odour. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.23)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.221 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

		Borehole No.
Client:	Bellway Homes	**WS103**
Project Title:	Red Mile Nursery, Pinchbeck	
Project No:	BRD3760	
Logged By:	N Kimber	
Date Commenced:	28/06/2021	**Sheet 1 of 2**
Date Completed:	28/06/2021	
Method Used:	Windowless Percussive Sampling Rig	

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.30 0.30	PID J1	0.0 ppm		MADE GROUND: Dark brown, gravelly, sandy clay. Gravel of fine to coarse, subangular to subrounded limestone, brick fragments and charcoal.	0.40 (2.72)		MG	
				Firm, brown, silty CLAY with red brown staining.	0.60 (2.52)		TIDAL FLAT DEPOSITS	
0.80 0.80 0.90 1.00	PID J2 PEN SPT	0.0 ppm 1.25/1.0x2 kg/cm² 4 N		Soft, reddish brown, mottled grey, silty CLAY. 1.00 m: SPT: 1,0/1,1,1,1	1.0			
1.20	D1							
				1.40 m: Becomes firm and slightly moist.				
1.80	PEN	0.5/0.25x2 kg/cm²		1.80 m: Becomes very soft.				
2.00	SPT	0 N	1	2.00 m: SPT: 0,0/0,0,0,0 2.00 - 3.00 m: 10% recovery.	2.0			
3.00	SPT	0 N			3.0			
				Very soft, dark grey, silty CLAY with a natural organic odour. 3.00 m: SPT: 0,0/0,0,0,0 3.00 - 4.00 m: No core recovery.	3.00 (0.12)			
4.00 4.00	SPT D2	0 N		4.00 m: SPT: 0,0/0,0,0,0 4.00 - 5.00 m: 10% recovery.	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.124 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS103

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 3.00m: Very soft, dark grey, silty CLAY with a natural organic odour. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.33)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.124 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS104

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	PID	0.0		MADE GROUND: Dark brown, gravelly, clayey sand. Gravel of fine to coarse, subangular to subrounded limestone, quartzite and brick fragments.	0.10 (3.10)		MG	
0.20	J1	ppm		MADE GROUND: Light yellow brown, gravelly sand. Gravel of fine to coarse, subangular igneous rock.	0.40 (2.80)			
				Firm, dark brown becoming brown mottled red brown, silty CLAY.				
0.70	PID	0.0						
0.70	J2	ppm						
0.80	PEN	1.0/0.75x2 kg/cm²						
1.00	SPT	1 N			1.0 1.00 (2.20)			
				Loose, brown, occasionally mottled grey, silty, fine SAND. 1.00 m: SPT: 0,1/0,0,1,0 1.00 - 2.00 m: 70% recovery.				
				Soft, reddish brown mottled grey, clayey SILT.	1.40 (1.80)			
				1.80 m: Too soft for hand penetrometer.				
2.00	SPT	3 N	▼1	2.00 m: SPT: 1,1/1,1,0,1	2.0		TIDAL FLAT DEPOSITS	
2.50	D1							
				2.80 m: Too soft for hand penetrometer.				
3.00	SPT	0 N			3.0 3.00 (0.20)			
				Very soft, dark grey silty CLAY with a natural organic odour. 3.00 m: SPT: 0,0/0,0,0,0 3.00 - 4.00 m: No core recovery.				
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.204 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS104

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
4.70	D2			Continued from 3.00m: Very soft, dark grey silty CLAY with a natural organic odour.				
5.00	SPT	0 N		4.80 m: Too soft for hand penetrometer. 5.00 m: SPT: 0,0/0,0,0,0	5.0			
					5.45 -(2.25)		TIDAL FLAT DEPOSITS	
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.204 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS105

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
				MADE GROUND: Dark brown, gravelly clay. Gravel of fine to coarse, subangular to subrounded concrete.	0.05 (3.08)		M	
				MADE GROUND: Yellow brown, gravelly, clayey sand. Gravel of fine to coarse, subangular to subrounded concrete.	0.10 (3.03)			
0.40	PID	0.0		Dark brown, clayey SILT.				
0.40	J1	ppm			0.50 (2.63)			
				Firm, dark brown mottled orange brown, clayey SILT.				
					0.80 (2.33)			
0.90	PID	0.0		Very loose, orange brown mottled brown, silty, fine SAND.				
0.90	J2	ppm			1.0			
1.00	SPT	3 N		1.00 m: SPT: 0,0/1,0,1,1				
					1.30 (1.83)			
				Very loose, wet, grey mottled orange brown, silty SAND.				
					1.60 (1.53)			
				Very soft, moist, orange brown mottled grey, silty CLAY.				
1.80	D1							
2.00	SPT	0 N	1		2.0			
					2.00 (1.13)			
				Very soft, wet, dark grey silty CLAY.				
				2.00 m: SPT: 0,0/0,0,0,0				
				2.00 - 3.00 m: 20% recovery.				
					3.0			
3.00	SPT	0 N		3.00 m: SPT: 0,0/0,0,0,0				
				3.00 - 4.00 m: 10% recovery.				
					4.0			
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0				
					4.50			

TIDAL FLAT DEPOSITS

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.13 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 28/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS105

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 2.00m: Very soft, wet, dark grey silty CLAY. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.32)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.13 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS106

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20 0.20	PID J1	0.0 ppm		TOPSOIL: Grass over dark brown, silty clay with frequent rootlets.	0.40 (2.65)		TOPSOIL	
0.60 0.60	PID J2	0.0 ppm		Loose, brown, silty, fine SAND.			TIDAL FLAT DEPOSITS	
0.90	D1			0.80 m: Becomes moist.				
1.00	SPT	3 N		1.00 m: SPT: 1,1/1,1,1,0 1.00 m: No SPT recovery.	1.0			
2.00	SPT	5 N		Soft, wet, dark grey, silty, fine SAND with a natural organic odour. 2.00 m: SPT: 0,1/0,1,2,2	2.0 2.00 (1.05)			
2.80 2.80	PID J3	0.0 ppm						
3.00	SPT	2 N		3.00 m: SPT: 0,0/1,0,1,0 3.00 m: No SPT recovery.	3.0			
				3.50 m: Organic material.				
3.80	D2							
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.051 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS106

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	3 N		Continued from 2.00m: Soft, wet, dark grey, silty, fine SAND with a natural organic odour. 5.00 m: PST: 1,1/1,0,1,1	5.0 5.45 -(2.40)		TIDAL FLAT DEPOSITS	
					6.0 7.0 8.0 9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.051 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS107

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	PID	0.0		MADE GROUND TOPSOIL: Grass over dark brown, silty clay with frequent rootlets and occasional plastic.	0.40 (2.74)		MGTS	
0.20	J1	ppm						
				Brown, clayey, fine SAND.				
0.70	PID	0.0						
0.70	J2	ppm						
0.80	PEN	1.0/1.5x2 kg/cm²			1.0			
1.00	SPT	3 N		1.00 m: SPT: 0,1/0,1,1,1				
				Soft, brown mottled orange brown, sandy CLAY.	1.40 (1.74)			
1.80	PEN	0.25/0.5x2 kg/cm²						
2.00	SPT	0 N			2.0			
				Very soft, brown, slightly sandy CLAY.	2.00 (1.14)		TIDAL FLAT DEPOSITS	
2.20	D1			2.00 m: SPT: 0,0/0,0,0,0				
				Very soft, brown mottled dark grey, sandy CLAY with a natural organic odour and organic material.	2.50 (0.64)			
				2.80 m: Too soft for hand penetrometer.				
2.90	D2				3.0			
3.00	SPT	0 N		3.00 m: SPT: 0,0/0,0,0,0				
				Very soft, dark grey, silty CLAY with organic material and natural organic odour.	3.70 -(0.56)			
				3.80 m: Too soft for hand penetrometer.				
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.144 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS107

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 3.70m: Very soft, dark grey, silty CLAY with organic material and natural organic odour. 4.80 m: Too soft for hand penetrometer. 5.00 m: SPT: 0,0/0,0,0,0	5.0 5.45 -(2.31) 6.0 7.0 8.0 9.0		TIDAL FLAT DEPOSITS	

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
3.144 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS108

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	PID	0.0		TOPSOIL: Grass over dark brown, sandy clay with frequent rootlets.			TOPSOIL	
0.20	J1	ppm			0.40 (2.47)			
				Brown mottled orange brown, very sandy CLAY / very clayey SAND.			TIDAL FLAT DEPOSITS	
0.80	PEN	1.0/1.5x2 kg/cm²						
0.90	PID	0.0						
0.90	J2	ppm			1.0			
1.00	SPT	4 N		1.00 m: SPT: 0,1/1,1,1,1				
				1.30 m: Becomes moist.				
					1.70 (1.17)			
1.80	PEN	0.75x3 kg/cm²		Soft, reddish brown mottled orange brown and grey, slightly sandy CLAY.				
2.00	SPT	1 N	▼1		2.00 (0.87)			
2.10	D1			Very soft, wet, grey mottled orange brown, sandy CLAY.				
				2.00 m: SPT: 0,0/0,0,0,1				
					2.60 (0.27)			
				Very soft, dark grey mottled reddish brown, slightly sandy CLAY with organic material and natural organic odour.				
				2.80 m: Too soft for hand penetrometer.				
3.00	SPT	0 N			3.00 (0.13)			
				Very soft, dark grey silty CLAY with organic material and a natural organic odour.				
				3.00 m: SPT: 0,0/0,0,0,0				
				3.00 - 4.00 m: No recovery.				
4.00	SPT	0 N			4.0			
				4.00 m: SPT: 0,0/0,0,0,0				
				4.00 - 5.00 m: 40% recovery.				
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.869 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS108

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 4.50m: Very soft, dark grey silty CLAY with organic material and a natural organic odour. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.58)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.869 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS109

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20 0.20	PID J1	0.0 ppm		MADE GROUND TOPSOIL: Grass over, dark brown, sandy clay with occasional charcoal.	0.40 (2.32)		MGTS	
				Orange brown, very clayey SAND / very sandy CLAY.	0.60 (2.12)		TIDAL FLAT DEPOSITS	
0.70 0.70 0.80	PID J2 PEN	0.0 ppm 1.75/2.25x2 kg/cm²		Firm, red brown mottled orange brown and grey, sandy CLAY.				
1.00	SPT	3 N		1.00 m: SPT: 1,1/0,1,1,1	1.0			
1.80	PEN	0.5/0.25x2 kg/cm²		Very soft, brown, very sandy CLAY.	1.70 (1.02)			
2.00	SPT	0 N		2.00 m: SPT: 0,0/0,0,0,0 2.00 - 3.00 m: 50% recovery.	2.0			
				Very soft, dark grey, sandy CLAY with organic material and a natural organic odour.	2.50 (0.22)			
				2.80 m: Too soft for hand penetrometer.				
3.00	SPT	0 N		3.00 m: SPT: 0,0/0,0,0,0	3.0			
3.20	D1							
				3.80 m: Too soft for hand penetrometer.				
4.00	SPT	0 N		4.00 m: SPT: 0,0/0,0,0,0	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.719 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS109

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	2 N		Continued form 2.50m: Very soft, dark grey, sandy CLAY with organic material and a natural organic odour. 4.80 m: Too soft for hand penetrometer. 5.00 m: SPT: 0,0/0,0,1,1	5.0 5.45 -(2.73) 6.0 7.0 8.0 9.0		TIDAL FLAT DEPOSITS	

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.719 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS110

Sheet 1 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20 0.20	PID J1	0.0 ppm		TOPSOIL: Dark brown, sandy clay with frequent rootlets.	0.30 (2.68)		TS	
0.50 0.50	PID J2	0.0 ppm		Brown, very clayey SAND.				
1.00	SPT	2 N		0.90 m: Becomes moist.	1.0 1.00 (1.98)			
1.60	D1			Soft, wet, brown, very sandy CLAY. 1.00 m: SPT: 1,0/1,0,1,0				
2.00	SPT	3 N		Loose, wet, dark grey, very clayey SAND with a natural organic odour. 2.00 m: SPT: 0,0/0,1,1,1	2.0 2.00 (0.98)		TIDAL FLAT DEPOSITS	
				Loose, wet, dark grey, very clayey SAND with a natural organic odour.	2.80 (0.18)			
3.00	SPT	0 N	▼	Very soft, wet, dark grey, very sandy CLAY / very clayey SAND with organic material and a natural organic odour. 3.00 m: SPT: 0,1/0,0,0,0	3.0 3.00 (1.02)			
4.00	SPT	5 N		4.00 m: SPT: 1,0/0,1,2,2	4.0			
					4.50			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.978 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

PROBEHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 29/06/2021
Date Completed: 29/06/2021
Method Used: Windowless Percussive Sampling Rig

Borehole No.

WS110

Sheet 2 of 2

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
5.00	SPT	0 N		Continued from 3.00m: Very soft, wet, dark grey, very sandy CLAY / very clayey SAND with organic material and a natural organic odour. 5.00 m: SPT: 0,0/0,0,0,0	5.0		TIDAL FLAT DEPOSITS	
					5.45 -(2.47)			
					6.0			
					7.0			
					8.0			
					9.0			

General Remarks:
Borehole terminated at 5.45m bgl.

Surface Elevation Level:
2.978 mAOD

All dimensions in metres
Log Scale 1:25

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 29/06/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH101

Sheet 1 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.25	D1			MADE GROUND: Yellow brown, sand and gravel of various lithologies.	0.10 (3.13)		MG	
0.50	B1			MADE GROUND: Brown, gravelly, sandy clay. Gravel of fine to coarse, subangular to subrounded quartzite, brick fragments and tarmac.	0.50 (2.73)			
1.20	SPT	2 N		Soft, brown mottled dark brown, very clayey SAND / very sandy CLAY.	1			
1.20	D2			1.20 m: SPT: 1 for 150mm / 1 for 150mm, 1 for 150mm	2			
2.20	SPT	2 N		Soft, brown mottled grey, sandy CLAY.	2.10 (1.13)			
2.20	D3			2.20 m: SPT: 1 for 150mm / 1 for 150mm, 1 for 150mm				
2.20	B2			2.20 m: Becomes wet.	3			
3.20	SPT	1 N		Very, soft, dark grey, sandy SILT with organic material and a natural organic odour.	3.00 (0.23)			
3.20	D4			3.20 m: SPT: 1 for 450mm				
3.20	B3				4			
4.20	SPT	1 N		Very soft, dark grey mottled brown, clayey SILT with a natural organic odour.	4.00 (-0.77)		TIDAL FLAT DEPOSITS	
4.20	D5			4.20 m: SPT: 1 for 225m / 1 for 225mm				
5.20	SPT	2 N		5.20 m: SPT: 1 for 150mm / 1 for 150mm, 1 for 150mm	6			
5.20	D6							
6.70	SPT	1 N		6.70 m: SPT: 1 for 225m / 1 for 225mm	7			
6.70	D7							
7.70	B4				7.70 (-4.47)			
					8 8.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
28-06-21	1.20	1.20	200	Dry	SPT
28-06-21	2.20	1.60	200	Dry	SPT
28-06-21	3.20	3.00	200	Dry	SPT
28-06-21	4.20	4.20	200	Dry	SPT
28-06-21	5.20	5.20	200	Dry	SPT
28-06-21	6.70	6.00	200	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 10m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
3.226 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 29/06/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH101

Sheet 2 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
8.20 8.20	SPT D8	3 N		Soft, dark grey, silty CLAY with organic material and a natural organic odour. 8.20 m: SPT: 1 for 150mm / 1 for 150mm, 1,1 8.20 m: Occasional shell fragments.	(-4.77)		TIDAL FLAT	
9.70 9.70	SPT D9	9 N		9.70 m: SPT: 2 for 150mm / 1,2,3,3	10.00 (-6.77)			
10.20	B5			Stiff, brown mottled grey, slightly gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.			GLACIAL TILL	
11.20	U1	80 Blow						
11.70	D10							
12.20	D11							
12.70 12.70	SPT D12	43 N		12.70 m: SPT: 13 for 150mm / 9,10,11,13				
13.70 13.75	D13 B6			Stiff to very stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	13.75 (-10.52)			
14.20	U2	85 Blow						
14.55	D14							
15.20	D15							
15.70 15.70	SPT D16	51 N		15.70 m: SPT: 15 for 150mm / 11,12,13,15	16.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
28-06-21	8.20	8.20	200	Dry	SPT
28-06-21	9.70	9.00	200	Dry	SPT
28-06-21	10.00	10.00	200	Dry	
29-06-21	12.70	10.00	200	Dry	SPT
29-06-21	15.70	10.00	200	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 10m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
3.226 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 29/06/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH101

Sheet 3 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
				Continued from 13.75m: Stiff to very stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	(-12.77)			
16.70	D17				17			
17.20	U3	90 Blow						
17.60	D18				18			
18.20	D19							
18.70	SPT	49 N						
18.70	D20			18.70 m: SPT: 12 for 150mm / 9,11,14,15	19			
19.70	D21							
20.20	U4	90 Blow			20		GLACIAL TILL	
20.55	D22			20.55 m: Rare cobble of chalk.				
21.20	D23				21			
21.70	SPT	51 N						
21.70	D24			21.70 m: SPT: 14 for 150mm / 10,11,14,16	22			
22.70	D25							
23.20	SPT	50 N			23			
23.20	D26			23.20 m: SPT: 14 for 150mm / 10,12,13,15				
					24 24.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of tes:
29-06-21	18.70	10.00	200	Dry	SPT
29-06-21	21.70	10.00	200	Dry	SPT
29-06-21	23.20	10.00	200	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 10m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
3.226 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 28/06/2021
Date Completed: 29/06/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH101

Sheet 4 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
24.10	D27			Continued from 24.00m: Stiff to very stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	(-20.77)			
24.55	SPT	51 N		24.55 m: SPT: 14 for 150mm / 9,12,14,16			TILL	
24.55	D28				25 25.00 (-21.77)			
					26			
					27			
					28			
					29			
					30			
					31			
					32			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
29-06-21	24.55	10.00	200	Dry	SPT
29-06-21	25.00	10.00	200	Dry	-

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 10m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
3.226 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 02/07/2021
Date Completed: 05/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH102

Sheet 1 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	D1			MADE GROUND TOPSOIL: Grass over dark brown, sandy clay with occasional brick fragments and frequent rootlets.	0.10 (2.96)			
0.32	D4			Dark brown, silty CLAY.	0.30 (2.76)			
0.50	B1			Firm, dry, brown, sandy CLAY.				
1.20	SPT	8 N		1.20 m: SPT: 2 for 150mm / 2,2,2,2				
1.20	D2							
1.70	B2							
2.20	SPT	4 N		2.20 m: SPT: 1 for 150mm / 1,1,1,1				
2.20	D3							
3.20	SPT	2 N		Loose, wet, dark grey, clayey SAND with a natural organic odour. 3.20 m: SPT: 1 for 150mm / 1 for 150mm, 1 for 150mm	3.00 (0.06)		TIDAL FLAT DEPOSITS	
3.70	B3							
4.20	SPT	2 N		4.20 m: SPT: 1 for 150mm / 1 for 150mm, 1 for 150mm				
4.20	D5							
5.20	SPT	3 N		5.20 m: SPT: 1 for 150mm / 1 for 150mm,1,1				
5.20	D6							
6.00	B4			Very soft, moist, dark grey, clayey SILT with organic material and a natural organic odour.	6.00 (2.94)			
6.50	SPT	1 N		6.50 m: SPT: 1 for 450mm				
6.50	D7							
					8.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
02-07-21	1.20	-	150	Dry	SPT
02-07-21	2.20	2.20	150	Dry	SPT
02 07 21	3.20	3.20	150	Dry	SPT
02-07-21	4.20	4.20	150	Dry	SPT
02-07-21	5.20	5.20	150	Dry	SPT
02-07-21	6.50	6.20	150	Dry	SPT
02 07 21	8.00	6.20	150	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Water strike slow seepage only.

Surface Elevation Level:
3.059 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 02/07/2021
Date Completed: 05/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH102

Sheet 2 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
8.00	SPT	1 N		Continued from 6.00m: Very soft, moist, dark grey, clayey SILT with organic material and a natural organic odour.	(-4.94)			
8.00	D8							
8.50	B5			8.00 m: SPT: 1 for 225mm / 1 for 225mm	8.50 (-5.44)			
				Soft, moist, grey, clayey SILT with organic material and a natural organic odour.	9		TIDAL FLAT DEPOSITS	
9.50	SPT	4 N		9.50 m: SPT: 1 for 150mm / 1,1,1,1				
9.50	D9				10			
10.35	SPT	29 N		Medium dense, dark grey mottled dark brown, slightly gravelly, silty SAND. Gravel of fine to medium, subangular to subrounded quartzite.	10.30 (-7.24)			
10.35	D10			10.35 m: SPT: 5 for 150mm / 5,7,8,9				
11.00	B6				11			
11.85	SPT	20 N		11.85 m: SPT: 6 for 150mm / 4,5,5,6	12			
				Stiff, brown, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	12.00 (-8.94)			
12.50	SPT	30 N		12.50 m: SPT: 12 for 150mm / 6,7,9,8				
12.50	D11							
13.00	B7				13		GLACIAL TILL	
14.00	U1				14			
14.50	D12							
15.00	D13				15			
15.50	SPT	35 N		15.50 m: SPT: 10 for 150mm / 6,8,10,11				
15.50	D14				15.80 (-12.74)			
					16			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
02-07-21	9.50	6.20	150	Dry	SPT
02-07-21	10.35	6.20	150	Dry	SPT
02 07 21	10.80	6.20	150	Dry	
05-07-21	10.80	6.20	150	Dry	-
05-07-21	11.85	11.50	150	Dry	SPT
05-07-21	12.50	12.20	150	Dry	SPT
05 07 21	15.50	12.20	150	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Water strike slow seepage only.

Surface Elevation Level:
3.059 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 02/07/2021
Date Completed: 05/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH102

Sheet 3 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
				Stiff to very stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	16.00 (-12.94)			
16.50	B8							
16.50	D15							
17.00	U2				17			
17.50	D16							
18.00	D17				18			
18.50	SPT	42 N						
18.50	D18			18.50 m: SPT: 12 for 150mm / 8,10,11,13				
					19			
19.50	D19							
20.00	U3				20			
20.50	D20							
21.00	D21				21			
21.50	SPT	46 N						
21.50	D22			21.50 m: SPT: 13 for 150mm / 9,11,12,14				
					22			
22.50	D23							
23.00	U4				23			
23.50	D24							
					24 24.00			

GLACIAL TILL

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
05-07-21	18.50	12.20	150	Dry	SPT
05-07-21	18.50	12.20	150	18.5	-
05 07 21	21.50	12.20	150	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Water strike slow seepage only.

Surface Elevation Level:
3.059 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 02/07/2021
Date Completed: 05/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH102

Sheet 4 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
24.00	D25			Continued from 15.80m: Stiff to very stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	(-20.94)			
24.55	SPT	49 N		24.55 m: SPT: 14 for 150mm / 9,12,13,15			TILL	
24.55	D26				25 25.00 (-21.94)			
					26			
					27			
					28			
					29			
					30			
					31			
					32			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
05-07-21	24.55	12.20	150	Dry	SPT
05-07-21	25.00	12.20	150	Dry	-

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Water strike slow seepage only.

Surface Elevation Level:
3.059 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 30/06/2021
Date Completed: 01/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH103

Sheet 1 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.20	D1			TOPSOIL: Dark brown, sandy clay with frequent rootlets.	0.10 (2.89)			
				Firm, dark brown, silty CLAY.				
0.50	B1			Medium dense, brown, silty, fine SAND with red staining in places.	0.45 (2.54)			
1.20	SPT	10 N		1.20 m: SPT: 3 for 150mm / 3,2,3,2				
1.20	D2				1.50 (1.49)			
1.70	B2			Soft, dark grey, sandy CLAY with a natural organic odour.				
2.20	SPT	4 N		2.20 m: SPT: 1 for 150mm / 1,1,1,1				
2.50	D3		▽1					
3.20	SPT	1 N		3.20 m: SPT: 1 for 450mm				
3.20	D4			Very soft, dark grey, sandy SILT with organic material and a natural organic odour.	3.40 (-0.41)		TIDAL FLAT DEPOSITS	
3.70	B3							
4.20	SPT	1 N		4.20 m: SPT: 1 for 225mm / 1 for 225mm				
4.20	D5							
5.20	SPT	1 N		5.20 m: SPT: 1 for 225mm / 1 for 225mm				
5.20	D6							
6.70	SPT	3 N		6.70 m: SPT: 1 for 150mm / 1 for 150mm,1,1				
6.70	D7				8.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
30-06-21	1.20	-	200	Dry	SPT
30-06-21	2.20	1.60	200	Dry	SPT
30-06-21	3.20	3.10	200	Dry	SPT
30-06-21	4.20	4.20	200	Dry	SPT
30-06-21	5.20	5.20	200	Dry	SPT
30-06-21	6.70	6.70	200	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 11m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
2.99 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 30/06/2021
Date Completed: 01/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH103

Sheet 2 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
8.20 8.20	SPT D8	2 N		Continued from 3.40m: Very soft, dark grey, sandy SILT with organic material and a natural organic odour. 8.20 m: SPT: 1 for 150mm, 1 for 150mm, 1 for 150mm	(-5.01)			
8.70	B4			Very soft, bluish dark grey, sandy SILT with organic material and natural organic odour.	8.60 (-5.61) 9		TIDAL FLAT DEPOSITS	
9.70 9.70	SPT D9	2 N		9.70 m: SPT: 1 for 150mm, 1 for 150mm, 1 for 150mm	10			
10.70 10.70	SPT D10	14 N	1	Stiff, dark brown mottled grey, slightly gravelly, silty CLAY. Gravel of fine to medium, subrounded quartzite. 10.70 m: SPT: 3 for 150mm / 3,4,3,4	10.70 (-7.71) 11		GLACIAL TILL	
11.25	B5			Medium dense, wet, dark brownish grey, gravelly, silty SAND. Gravel of fine to coarse, subangular to subrounded quartzite and chalk.	11.25 (-8.26) 12			
12.20	SPT	17 N		12.20 m: SPT(c): 5 for 150mm / 3,4,4,6	13			
13.00	B6							
13.70	SPT	22 N		13.70 m: SPT(c): 7 for 150mm / 4,5,6,7	13.75 (-10.76)			
14.00	B7			Stiff, dark reddish brown, gravelly, silty CLAY. Gravel of fine to medium, subangular chalk.	14			
15.20 15.20	SPT D11	37 N		15.20 m: SPT: 10 for 150mm / 8,9,9,11	15			
					16 16.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
30-06-21	8.20	8.20	200	Dry	SPT
30-06-21	9.70	9.70	200	Dry	SPT
30 06 21	10.70	10.00	200	Dry	SPT
30-06-21	10.70	10.00	200	10.7	3.00
30-06-21	11.15	11.00	200	2.9	-
01-07-21	11.15	11.00	200	1.8	-
01 07 21	12.20	12.20	150	4	
01-07-21	13.70	13.60	150	4.6	-
01-07-21	15.20	14.50	150	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 11m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
2.99 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 30/06/2021
Date Completed: 01/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH103

Sheet 3 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
16.00	B8			Stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk.	(-13.01)		GLACIAL TILL	
16.70	U1	80 Blow			17			
17.20	D12							
17.70	D13				18			
18.20	SPT	42 N						
18.20	D14			18.20 m: SPT: 10 for 150mm / 8,9,11,14				
19.20	D15				19			
19.70	U2	85 Blow						
20.15	D16				20			
20.70	D17							
21.20	SPT	51 N			21			
21.20	D18			21.20 m: SPT: 14 for 150mm / 11,12,13,15				
22.20	D19				22			
22.70	U3	90 Blow						
23.20	D20				23			
23.70	D21							
					24 24.00			

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of tes:
01-07-21	18.20	14.50	150	Dry	SPT
01-07-21	21.20	14.50	150	Dry	SPT

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 11m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
2.99 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

BOREHOLE RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: N Kimber
Date Commenced: 30/06/2021
Date Completed: 01/07/2021
Method Used: Cable Percussive Drilling Rig

Borehole No.

BH103

Sheet 4 of 4

Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
24.55 24.55	SPT D22	52 N		Continued from 16.00m: Stiff, dark grey, gravelly, silty CLAY. Gravel of fine to coarse, subangular to subrounded chalk. 24.55 m: SPT: 15 for 150mm / 11,13,13,15	(-21.01) 25 25.00 (-22.01) 26 27 28 29 30 31 32		TILL	

Drilling Progress

Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins - type of test:
01-07-21	24.55	14.50	150	Dry	SPT
01-07-21	25.00	14.50	150	Dry	
07.07.21	25.00			3.3	

Chiselling

From	To	Hours

General Remarks:

Borehole terminated at 25.00m bgl.
Hand dug to 1.20m bgl for services clearance.
Drilled to 11m bgl using 200mm casing then reduced to 150mm.

Surface Elevation Level:
2.99 mAOD

All dimensions in metres
Log Scale 1:50

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: C Bishop
Date Completed: 16/07/2021
Method Used: Hand Dug

Pit No.

HD01

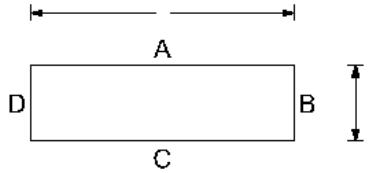
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.15	J1		MADE GROUND: Greyish brown to brown, very gravelly, silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, concrete fragments and brick with occasional glass and rare cobbles of concrete.	0.25 ()	MADE GROUND	
0.40	J2		MADE GROUND: Brown, gravelly, sandy silt. Gravel of fine to medium, subangular to subrounded quartzite, concrete fragments, brick and charcoal.	0.50 ()		
			Loose to medium dense, light brown, slightly clayey SAND.	0.55 ()	TFD	
				1		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.55m bgl.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client:	Bellway Homes
Project Title:	Red Mile Nursery, Pinchbeck
Project No:	BRD3760
Logged By:	C Bishop
Date Completed:	16/07/2021
Method Used:	Hand Dug

Pit No.

HD02

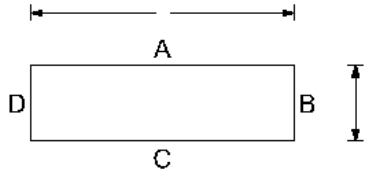
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Greyish brown to brown, very gravelly, silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, concrete fragments and brick with occasional glass and rare cobbles of concrete.	0.15	MG	
			Soft to firm, brown mottled light brown, very sandy, slightly clayey SILT.	0.60	TIDAL FLAT DEPOSITS	

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.60m bgl.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: C Bishop
Date Completed: 16/07/2021
Method Used: Hand Dug

Pit No.

HD03

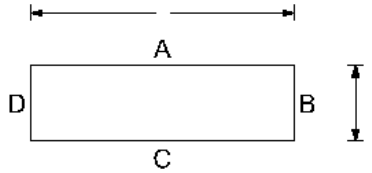
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Grass over loose, brown, slightly clayey sand with frequent rootlets.		MADE GROUND	
			Loose to medium dense, brown mottled orange brown, silty fine SAND.	0.40 ()	TIDAL FLAT	
				0.60 ()		
				1		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.60m bgl.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: C Bishop
Date Completed: 20/08/2021
Method Used: Hand Dug

Pit No.

HD04

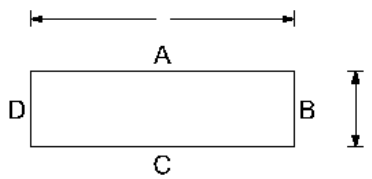
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Medium dense to dense, brown, very gravelly, slightly silty sand. Gravel of fine to coarse, subangular flint, brick and concrete fragments.	0.25	MADE GROUND	

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.25m bgl due to no progress.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client:	Bellway Homes
Project Title:	Red Mile Nursery, Pinchbeck
Project No:	BRD3760
Logged By:	C Bishop
Date Completed:	20/08/2021
Method Used:	Hand Dug

Pit No.

HD05

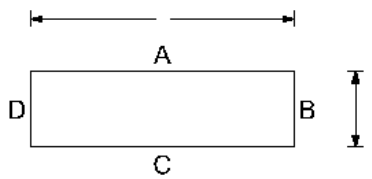
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.20	J1		MADE GROUND: Medium dense to dense, light brown, very gravelly, slightly silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, flint, brick and concrete fragments.	0.30	MADE GROUND	

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.30m bgl due to no progress on concrete slab.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: C Bishop
Date Completed: 20/08/2021
Method Used: Hand Dug

Pit No.

HD06

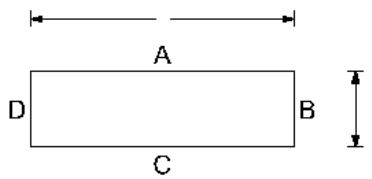
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Medium dense to dense, light brown, very gravelly, slightly silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, flint, brick and concrete fragments.	0.10 ()	MADE GROUND	
0.20	J2		MADE GROUND: Brown to dark brown, slightly gravelly, slightly sandy, slightly clayey silt. Gravel of fine, subangular to subrounded brick, concrete fragments and occasional charcoal fragments.	0.25 ()		
			Loose to medium dense, brown to dark brown, clayey SAND.	0.30 ()	TFD	
				1		

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.30m bgl upon encountering natural soil.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client:	Bellway Homes
Project Title:	Red Mile Nursery, Pinchbeck
Project No:	BRD3760
Logged By:	C Bishop
Date Completed:	20/08/2021
Method Used:	Hand Dug

Pit No.

HD07

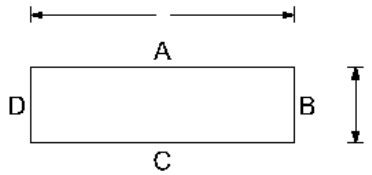
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.10	J1		MADE GROUND: Greyish brown to brown, very gravelly, silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, concrete fragments and brick with occasional glass and rare cobbles of concrete.	0.15 ()	MG	
			Soft to firm, brown mottled light brown, very sandy, slightly clayey SILT.	0.30 ()	TFD	

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.30m bgl upon encountering natural soil.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

INSPECTION PIT RECORD

Client: Bellway Homes
Project Title: Red Mile Nursery, Pinchbeck
Project No: BRD3760
Logged By: C Bishop
Date Completed: 20/08/2021
Method Used: Hand Dug

Pit No.

HD08

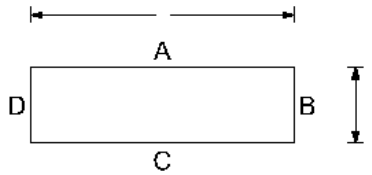
Sheet 1 of 1

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.15	J1		MADE GROUND: Dense to very dense, light brown, very gravelly, slightly silty sand. Gravel of fine to coarse, subangular to subrounded quartzite, flint and concrete fragments.	0.25	MADE GROUND	

Pit Stability: Generally stable throughout
Groundwater: Not encountered

Surface Elevation Level:

Plan of Inspection Pit:



General Remarks:
Hand dug pit terminated at 0.25m bgl due to no progress on concrete slab.
Relative density based on visual assessment only.

All dimensions in metres
Log Scale 1:10

Telephone: 01295 272244
Email: info@brduk.com

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	12/07/2021	Ground conditions:	Firm and wet	Recorded by:	CB
Time at start:	8:51 AM	Weather conditions:	Part rain	Pressure trend:	Falling
Time at finish:	11:18 AM	Air Temperature (°C):	16	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	1.01	0.89	4.11	0.0	0.1	20.5	0.1	0.1	20.4	0	0	1014	0.1	0.6	
WS102	0.78	0.65	4.06	4.8	0.8	19.0	19.0	3.1	14.7	0	1	1014	0.0	0.0	
WS103	0.69	0.53	4.05	0.0	0.5	20.3	0.5	0.5	20.3	1	0	1014	1.9	0.2	Initial flow reading of 4.0 l/hr, fell to 1.9 l/hr after 60 seconds.
WS104	1.05	0.88	3.90	0.5	1.1	20.2	0.5	1.1	20.1	5	1	1014	8.0	1.1	
WS105	0.91	0.74	3.60	0.2	0.8	20.6	0.2	0.8	20.5	8	0	1014	7.8	2.4	Initial flow reading of 10.5 l/hr, fell to 7.8 l/hr after 60 seconds.
WS107	1.95	1.82	4.25	0.0	6.1	11.5	0.1	7.5	11.4	0	0	1013	0.1	0.8	
WS109	1.45	1.32	4.22	0.0	5.4	9.1	0.0	5.4	9.1	0	0	1013	-0.1	1.3	
WS110	1.83	1.72	3.33	0.0	7.2	3.8	0.0	7.2	3.7	0	0	1013	0.0	1.2	

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	16/07/2021	Ground conditions:	Dry	Recorded by:	CB
Time at start:	9:24 AM	Weather conditions:	Sunny	Pressure trend:	Rising
Time at finish:	10:16 AM	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	1.11	0.98	4.12	0.0	0.1	20.4	0.0	0.2	20.4	4	0	1029	0.0	0.0	
WS102	0.87	0.75	4.06	1.4	0.4	19.7	4.6	1.2	18.6	4	1	1029	-0.1	0.0	
WS103	0.78	0.61	4.02	0.0	0.4	20.4	0.1	0.4	20.4	2	0	1029	-0.1	0.0	
WS104	0.87	0.80	3.91	0.3	1.1	20.2	0.3	1.1	20.2	5	0	1029	0.2	0.0	
WS105	0.99	0.82	3.57	0.0	1.3	20.2	0.0	1.3	20.2	2	0	1029	8.0	0.0	
WS107	1.99	1.85	4.25	0.0	5.6	13.6	0.0	5.6	13.6	1	0	1029	0.0	0.0	
WS109	1.51	1.38	4.22	0.0	5.2	13.9	0.1	5.2	13.9	0	0	1029	0.2	0.0	
WS110	1.87	1.75	2.89	0.0	6.6	7.7	0.0	6.6	7.7	1	0	1029	0.2	0.0	

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	27/07/2021	Ground conditions:	Firm and dry	Recorded by:	CB
Time at start:	9:29 AM	Weather conditions:	Scattered showers	Pressure trend:	Falling
Time at finish:	10:26 AM	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	1.22	1.10	4.12	0.0	1.0	18.7	0.1	2.8	17.4	0	0	1010	0.0	0.0	
WS102	0.95	0.83	4.05	2.6	0.6	18.7	7.4	1.6	17.4	0	0	1010	-0.1	0.0	
WS103	0.87	0.70	3.97	0.0	0.5	19.1	0.5	0.5	19.1	2	0	1010	0.0	0.0	
WS104	1.06	0.89	3.91	0.1	1.8	18.5	0.2	1.8	18.5	6	0	1010	-2.6	0.0	Initial flow reading of -3.6 l/hr, fell to -2.6 l/hr after 60 seconds.
WS105	0.98	0.82	3.54	0.1	1.5	18.9	0.1	1.5	18.9	8	0	1010	-0.3	0.0	
WS107	2.13	1.99	4.26	0.0	6.0	14.5	0.0	6.0	14.5	0	0	1010	0.2	0.0	
WS109	1.62	1.49	4.22	0.0	5.1	16.5	0.1	5.1	15.9	0	0	1010	0.1	0.0	
WS110	2.03	1.91	2.85	0.0	7.6	10.5	0.1	7.6	10.5	0	0	1010	0.1	0.0	

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	09/08/2021	Ground conditions:	Firm and moist	Recorded by:	CB
Time at start:	11:07 AM	Weather conditions:	Partly sunny	Pressure trend:	Rising
Time at finish:	11:51 AM	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	1.28	1.15	4.11	0.0	0.7	20.3	0.0	2.3	19.2	1	0	1011	0.0	0.5	
WS102	0.99	0.86	4.07	1.5	0.6	20.1	2.6	0.9	19.8	1	0	1011	0.0	0.0	
WS103	0.85	0.69	3.89	0.0	0.4	20.1	0.2	0.4	20.1	3	1	1012	0.0	0.0	
WS104	1.15	0.98	3.90	0.0	3.1	18.4	0.0	3.1	18.4	6	1	1012	0.0	0.0	
WS105	1.03	0.86	3.49	0.0	1.4	19.8	0.0	1.4	19.7	9	1	1011	-3.0	2.1	Initial flow reading of -4.0 l/hr, fell to -3.0 l/hr after 60 seconds.
WS107	2.12	1.98	4.25	0.0	6.4	14.4	0.0	6.5	14.4	2	0	1011	0.2	0.7	
WS109	1.74	1.61	4.22	0.0	5.0	16.8	0.0	5.0	16.8	0	0	1011	0.1	0.5	
WS110	2.04	1.92	2.86	0.0	7.7	11.6	0.0	7.7	11.6	1	0	1011	0.2	0.8	

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	20/08/2021	Ground conditions:	Firm and dry	Recorded by:	CB
Time at start:	10:38 AM	Weather conditions:	Partly sunny	Pressure trend:	Rising
Time at finish:	12:02 PM	Air Temperature (°C):	19	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	1.41	1.29	4.10	0.0	1.3	19.2	0.1	1.9	19.2	2	0	1017	0.0	0.0	
WS102	1.07	0.95	4.05	0.7	0.3	19.9	2.9	0.9	19.2	2	1	1017	0.0	0.0	
WS103	1.13	0.96	3.91	0.0	0.5	19.7	0.1	0.5	19.7	3	1	1017	-0.1	0.0	
WS104	1.31	1.15	3.83	0.0	3.6	17.8	0.0	3.6	17.8	4	1	1017	0.1	0.9	
WS105	1.17	1.02	3.34	0.0	1.9	18.9	0.0	1.9	18.9	9	1	1017	-4.3	1.9	Initial flow of -5.8 l/hr, fell to -4.3 l/hr after 60 seconds.
WS107	1.30	1.17	4.24	0.0	6.4	15.5	0.0	6.4	15.5	2	0	1017	0.0	0.0	
WS109	1.84	1.72	4.22	0.0	4.6	17.7	0.0	4.6	17.7	1	0	1017	0.0	0.0	
WS110	1.57	1.45	2.82	0.0	7.6	12.1	0.0	7.6	12.1	2	0	1017	0.0	0.4	

Gas Monitoring Record

Project Name: Red Mile Nursery
Client: Bellway Homes
Project No: BRD3760

Date:	03/09/2021	Ground conditions:	Firm and Dry	Recorded by:	DB
Time at start:	08:43	Weather conditions:	Overcast and cool	Pressure trend:	Falling
Time at finish:	09:40	Air Temperature (°C):	12	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.

CH_4 = Methane CO_2 = Carbon Dioxide O_2 = Oxygen H_2S = 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
				Steady			Peak		Minimum	Peak					
Borehole	GWL Ground (m)	GWL Pipe (m)	Base Ground (m)	CH_4 (%)	CO_2 (%)	O_2 (%)	CH_4 (%)	CO_2 (%)	O_2 (%)	CO (ppm)	H_2S (ppm)	Baro - metric (mb)	Steady (l/hr)	PID (ppm)	
WS101	2.00	1.88	4.20	0.0	2.0	18.6	0.1	3.2	18.4	0	0	1026	0.0	0.2	
WS102	2.16	2.04	2.86	0.1	1.3	19.9	0.1	1.4	19.9	0	0	1026	0.1	0.4	
WS103	2.32	2.19	4.24	0.0	0.8	20.5	0.1	0.9	20.2	0	0	1026	0.1	0.2	
WS104	1.40	1.24	3.35	0.0	4.8	17.4	0.2	4.8	17.4	0	0	1026	0.2	0.6	
WS105	1.45	1.28	3.86	0.1	4.7	15.5	0.1	4.7	15.5	0	0	1026	0.2	0.7	
WS107	1.30	1.20	3.74	0.1	5.2	18.4	0.1	5.2	18.4	0	0	1026	0.2	0.7	
WS109	1.24	1.10	4.07	0.1	5.4	17.1	0.1	5.4	17.1	0	0	1026	0.3	0.3	
WS110	1.58	1.45	4.18	0.0	7.6	13.9	0.1	7.6	13.9	0	0	1026	0.2	0.4	

Groundwater Monitoring Record

Project: Red Mile Nursery, Pinchbeck
Client: Bellway Homes
Project No: BRD3760

Borehole name	Date	Monitored by (initials)	Borehole depth (m)	Qty free product detected (mm)	Groundwater level below ground surface (m)	Groundwater level below top of standpipe (m)	Amount purged (l)	Post purge groundwater level below top of standpipe (m)	Comments
WS101	12/07/2021	CB	4.11	N/A	1.01	0.89	10.00	3.82	Brown, slightly sandy, silty water.
WS102	12/07/2021	CB	4.06	N/A	0.78	0.65			
WS103	12/07/2021	CB	4.05	N/A	0.69	0.53	21.00	1.89	Dark brown, sandy, silty water.
WS104	12/07/2021	CB	3.90	N/A	1.05	0.88			
WS105	12/07/2021	CB	3.60	N/A	0.91	0.74	18.00	2.35	Dark brownish grey, very sandy, silty water. Slight sheen.
WS107	12/07/2021	CB	4.25	N/A	1.95	1.82			
WS109	12/07/2021	CB	4.22	N/A	1.45	1.32			
WS110	12/07/2021	CB	3.33	N/A	1.83	1.72	5.00	2.43	Dark grey, very sandy, silty water. Slight metalliferous odour.

Groundwater Monitoring Record

Project: Red Mile Nursery, Pinchbeck
Client: Bellway Homes
Project No: BRD3760

Borehole name	Date	Monitored by (initials)	Borehole depth (m)	Qty free product detected (mm)	Groundwater level below ground surface (m)	Groundwater level below top of standpipe (m)	Amount purged (l)	Post purge groundwater level below top of standpipe (m)	Comments
WS101	15/09/2021	DB	4.12	0.00	1.41	1.30	6.50	3.91	Brown/greyish clayey / silty water with no sheen or odour
WS103	15/09/2021	DB	3.75	0.00	1.35	1.17	13.00	3.50	Brown clayey / silty water with no sheen or odour
WS105	15/09/2021	DB	3.35	0.00	1.41	1.24	7.00	3.01	Orange brown clayey / silty water with no sheen or odour
									A surface water sample from Blue Gowt Drain was taken on this visit from around the public footbridge area

APPENDIX 3

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

Derwentside Environmental Testing Services Ltd
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Kent
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t: 01622 850410

DETS Report No: 21-08552

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	06/07/2021
Sample Scheduled Date:	06/07/2021
Report Issue Number:	3
Reporting Date:	26/08/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.
This report supersedes 21-08552, issue no.2.
Opinions and interpretations are outside the laboratory's scope of ISO 17025 accreditation. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced except in full, without the prior written approval of the laboratory.

For Topsoil and WAC analysis the expanded uncertainty measurement should be considered while evaluating results against compliance values.

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Soil Analysis Certificate						
DETS Report No: 21-08552		28/06/21	28/06/21	28/06/21	28/06/21	28/06/21
BRD Environmental Ltd		None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck		TP101	TP103	TP105	TP105	TP106
Project / Job Ref: BRD3760		J1	J1	J1	J2	J1
Order No: None Supplied		0.20	0.10	0.20	0.55	0.20
Reporting Date: 26/08/2021		553128	553129	553131	553132	553133

Determinand	Unit	Accreditation	(n)				
Asbestos Screen (S)	N/a	ISO17025					
Sample Matrix (S)	Material Type	NONE					
Asbestos Type (S)	PLM Result	ISO17025					
Asbestos Quantification (S)	%	ISO17025				< 0.001	< 0.001
pH	pH Units	MCERTS	8.1	8.5	8.1	7.7	7.9
W/S Sulphate as SO_4 (2:1)	mg/l	MCERTS	601	334	1670	252	152
W/S Sulphate as SO_4 (2:1)	g/l	MCERTS	0.60	0.33	1.67	0.25	0.15
Organic Matter (SOM)	%	MCERTS	4.6	10.2	9.4	10	2.8
Arsenic (As)	mg/kg	MCERTS	8	11	13	11	13
Cadmium (Cd)	mg/kg	MCERTS	< 0.2	0.3	0.4	0.3	0.3
Chromium (Cr)	mg/kg	MCERTS	17	15	18	16	16
Chromium (hexavalent)	mg/kg	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	MCERTS	10	18	15	16	21
Lead (Pb)	mg/kg	MCERTS	19	43	129	196	226
Mercury (Hg)	mg/kg	MCERTS	< 1	1.6	< 1	< 1	< 1
Nickel (Ni)	mg/kg	MCERTS	13	10	8	11	13
Selenium (Se)	mg/kg	MCERTS	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	MCERTS	54	80	111	156	117

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	28/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP107	TP111	TP111	WS101	WS101
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J2
Order No: None Supplied	**Depth (m)**	0.20	0.10	0.50	0.10	0.50
Reporting Date: 26/08/2021	**DETS Sample No**	553134	553135	553136	553137	553138

Determinand	Unit	RL	Accreditation	(n)	(n)			
Asbestos Screen (S)	N/a	N/a	ISO17025	Detected				
Sample Matrix (S)	Material Type	N/a	NONE	Chrysotile present as bundle				
Asbestos Type (S)	PLM Result	N/a	ISO17025	Chrysotile				
Asbestos Quantification (S)	%	< 0.001	ISO17025	0.002	< 0.001		< 0.001	
pH	pH Units	N/a	MCERTS	8.4	8.4	7.8	8.3	8.1
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	97	51	49	46	68
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.10	0.05	0.05	0.05	0.07
Organic Matter (SOM)	%	< 0.1	MCERTS	3.4	2.8	3.1	2.3	3.2
Arsenic (As)	mg/kg	< 2	MCERTS	8	9	13	7	8
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	0.3	< 0.2	< 0.2	0.3	0.2
Chromium (Cr)	mg/kg	< 2	MCERTS	12	8	16	10	12
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2	< 2	< 2
Copper (Cu)	mg/kg	< 4	MCERTS	10	12	17	11	16
Lead (Pb)	mg/kg	< 3	MCERTS	30	45	92	17	21
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1	< 1	< 1
Nickel (Ni)	mg/kg	< 3	MCERTS	9	4	17	7	9
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3	< 3	< 3
Zinc (Zn)	mg/kg	< 3	MCERTS	45	50	73	31	47

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	29/06/21	29/06/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	WS103	WS109	WS110		
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2		
Order No: None Supplied	**Depth (m)**	0.30	0.20	0.50		
Reporting Date: 26/08/2021	**DETS Sample No**	553139	553144	553145		

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	7.7	7.8	8.5		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	93	13	15		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.09	0.01	0.01		
Organic Matter (SOM)	%	< 0.1	MCERTS	3.4	2.6	2.9		
Arsenic (As)	mg/kg	< 2	MCERTS	10	10	7		
Cadmium (Cd)	mg/kg	< 0.2	MCERTS	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	15	18	14		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	10	12	6		
Lead (Pb)	mg/kg	< 3	MCERTS	20	21	7		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	12	13	11		
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS	52	54	37		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	28/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP101	TP103	TP105	TP105	TP106
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J1	J2	J1
Order No: None Supplied	**Depth (m)**	0.20	0.10	0.20	0.55	0.20
Reporting Date: 26/08/2021	**DETS Sample No**	553128	553129	553131	553132	553133

Determinand	Unit	RL	Accreditation			(n)		
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	0.35	0.14	0.22	0.42
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	0.40	0.26	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	0.56	0.12	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	0.14	0.49	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	2.15	5.45	0.51	0.14
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.77	2.04	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	6.98	13.10	0.77	< 0.1
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	6.94	13.70	0.63	< 0.1
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	4.94	7.62	0.39	< 0.1
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	3.99	6.43	0.42	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	6.88	10.70	0.66	< 0.1
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	3.03	4.20	0.20	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	6.66	8.94	0.46	< 0.1
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	3.89	5.18	0.27	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	0.70	1.06	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	3.95	5.13	0.26	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	51.9	85	4.9	< 1.6

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	28/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP107	TP111	TP111	WS101	WS101
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J2
Order No: None Supplied	**Depth (m)**	0.20	0.10	0.50	0.10	0.50
Reporting Date: 26/08/2021	**DETS Sample No**	553134	553135	553136	553137	553138

Determinand	Unit	RL	Accreditation	(n)	(n)			
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	2.06	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	MCERTS	0.12	0.20	2.16	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	0.18	0.26	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	0.13	0.48	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	MCERTS	2.11	2.73	5.40	0.91	0.31
Anthracene	mg/kg	< 0.1	MCERTS	0.62	0.98	1.82	0.32	< 0.1
Fluoranthene	mg/kg	< 0.1	MCERTS	8.18	8.07	1.49	4.77	0.68
Pyrene	mg/kg	< 0.1	MCERTS	8.20	7.43	1.38	4.58	0.59
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	4.24	4.97	0.78	3.05	0.30
Chrysene	mg/kg	< 0.1	MCERTS	3.98	4.87	11	2.66	0.33
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	5.66	8.23	1.08	4.02	0.37
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	1.93	2.97	7.79	1.77	0.14
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	5.02	7.36	0.73	3.73	0.28
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	2.70	4.39	< 0.1	1.90	0.18
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	0.48	0.89	2.95	0.39	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	2.49	5.06	10.40	1.73	0.16
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	45.7	58.5	49.7	29.3	3.3

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	29/06/21	29/06/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	WS103	WS109	WS110		
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2		
Order No: None Supplied	**Depth (m)**	0.30	0.20	0.50		
Reporting Date: 26/08/2021	**DETS Sample No**	553139	553144	553145		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	0.71	0.17	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	0.16	0.12	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	0.56	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	0.15	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	0.30	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6		

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	29/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP107	TP111	WS101	WS101	WS110
Project / Job Ref: BRD3760	**Additional Refs**	J1	J2	J1	J2	J2
Order No: None Supplied	**Depth (m)**	0.20	0.50	0.10	0.50	0.50
Reporting Date: 26/08/2021	**DETS Sample No**	553134	553136	553137	553138	553145

Determinand	Unit	RL	Accreditation	(n)				
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	75	< 10	< 10	< 10	< 10
Aliphatic >C35 - C44	mg/kg	< 10	NONE	31	< 10	< 10	< 10	< 10
Aliphatic (C5 - C44)	mg/kg	< 30	NONE	56	< 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	28	9	25	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	MCERTS	79	18	42	< 10	< 10
Aromatic >C35 - C44	mg/kg	< 10	NONE	< 10	< 10	< 10	< 10	< 10
Aromatic (>C5 - C44)	mg/kg	< 30	NONE	107	< 30	67	< 30	< 30
Total >C5 - C44	mg/kg	< 60	NONE	163	< 60	67	< 60	< 60

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	29/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP107	TP111	WS101	WS101	WS110
Project / Job Ref: BRD3760	**Additional Refs**	J1	J2	J1	J2	J2
Order No: None Supplied	**Depth (m)**	0.20	0.50	0.10	0.50	0.50
Reporting Date: 26/08/2021	**DETS Sample No**	553134	553136	553137	553138	553145

Determinand	Unit	RL	Accreditation	(n)				
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

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Soil Analysis Certificate - Volatile Organic Compounds (VOC)								
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	29/06/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP111	WS101	WS110		
Project / Job Ref: BRD3760	**Additional Refs**	J2	J2	J2		
Order No: None Supplied	**Depth (m)**	0.50	0.50	0.50		
Reporting Date: 26/08/2021	**DETS Sample No**	553136	553138	553145		

Determinand	Unit	RL	Accreditation					
Dichlorodifluoromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Vinyl Chloride	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Chloromethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
Chloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Bromomethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
Trichlorofluoromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
MTBE	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
trans-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1-Dichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
cis-1,2-Dichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
2,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Chloroform	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Bromochloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1,1-Trichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1-Dichloropropene	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
Carbon Tetrachloride	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,2-Dichloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
1,2-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Trichloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Bromodichloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Dibromomethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
TAME	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
cis-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Toluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
trans-1,3-Dichloropropene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1,2-Trichloroethane	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
1,3-Dichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Tetrachloroethene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Dibromochloromethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,2-Dibromoethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Chlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1,1,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Ethyl Benzene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
m,p-Xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
o-Xylene	ug/kg	< 2	MCERTS	< 2	< 2	< 2		
Styrene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Bromoform	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
Isopropylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,1,2,2-Tetrachloroethane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,2,3-Trichloropropane	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
n-Propylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
Bromobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
2-Chlorotoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,3,5-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
4-Chlorotoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
tert-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,2,4-Trimethylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
sec-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
p-Isopropyltoluene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,3-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,4-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
n-Butylbenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
1,2-Dichlorobenzene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		
,2-Dibromo-3-chloropropane	ug/kg	< 10	MCERTS	< 10	< 10	< 10		
Hexachlorobutadiene	ug/kg	< 5	MCERTS	< 5	< 5	< 5		

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Soil Analysis Certificate - Semi Volatile Organic Compounds (SVOC)						
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	29/06/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP111	WS101	WS110		
Project / Job Ref: BRD3760	**Additional Refs**	J2	J2	J2		
Order No: None Supplied	**Depth (m)**	0.50	0.50	0.50		
Reporting Date: 26/08/2021	**DETS Sample No**	553136	553138	553145		

Determinand	Unit	RL	Accreditation					
Phenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
1,2,4-Trichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
2-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Nitrobenzene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
0-Cresol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
bis(2-chloroethoxy)methane	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
bis(2-chloroethyl)ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
2,4-Dichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
2-Chlorophenol	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
1,3-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
1,4-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
1,2-Dichlorobenzene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
2,4-Dimethylphenol	mg/kg	< 0.15	ISO17025	< 0.15	< 0.15	< 0.15		
Isophorone	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachloroethane	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
p-Cresol	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15		
2,4,6-Trichlorophenol	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
2,4,5-Trichlorophenol	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15		
2-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Chloro-3-methylphenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Methylnaphthalene	mg/kg	< 0.1	MCERTS	0.2	0.1	0.1		
Hexachlorocyclopentadiene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Hexachlorobutadiene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
2,6-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dimethyl phthalate	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
2-Chloronaphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
4-Chloroanaline	mg/kg	< 0.15	NONE	< 0.15	< 0.15	< 0.15		
4-Nitrophenol	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Chlorophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
3-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Nitroaniline	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
4-Bromophenyl phenyl ether	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Hexachlorobenzene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
2,4-Dinitrotoluene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Diethyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dibenzofuran	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Azobenzene	mg/kg	< 0.1	NONE	< 0.1	< 0.1	< 0.1		
Dibutyl phthalate	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
Carbazole	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1		
bis(2-ethylhexyl)phthalate	mg/kg	< 0.15	MCERTS	< 0.15	< 0.15	< 0.15		
Benzyl butyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Di-n-octyl phthalate	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		

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Soil Analysis Certificate - Organochlorine Pesticides							
DETS Report No: 21-08552	**Date Sampled**	28/06/21	28/06/21	29/06/21	29/06/21	29/06/21	
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	TP104	TP106	WS106	WS107	WS108	
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J1	J1	J1	
Order No: None Supplied	**Depth (m)**	0.10	0.20	0.20	0.20	0.20	
Reporting Date: 26/08/2021	**DETS Sample No**	553130	553133	553141	553142	553143	

Determinand	Unit	RL	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

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Waste Acceptance Criteria Analytical Certificate - BS EN 12457/3

DETS Report No: 21-08552		**Date Sampled**	28/06/21			**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: Red Mile Nursery, Pinchbeck		**TP / BH No**	TP111					
Project / Job Ref: BRD3760		**Additional Refs**	J2					
Order No: None Supplied		**Depth (m)**	0.50					
Reporting Date: 26/08/2021		**DETS Sample No**	553136					
Determinand	**Unit**	**MDL**						
TOC[MU]	%	< 0.1	1.8			3%	5%	6%
Loss on Ignition	%	< 0.01	7.80			--	--	10%
BTEX[MJ]	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	55.2			100	--	--
pH[M,I]	pH Units	N/a	7.8			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 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]			0.07	0.05		0.5	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]			< 0.0005	< 0.0005		< 0.005	0.01	0.2	2
Molybdenum[U]			0.130	0.024		0.3	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		< 0.05	0.06	0.7	5
Selenium[U]			< 0.005	< 0.005		< 0.05	0.1	0.5	7
Zinc[U]			0.081	0.038		0.4	4	50	200
Chloride[U]			48	10		128	800	15000	25000
Fluoride[U]			1.1	< 0.5		< 1	10	150	500
Sulphate[U]			53	39		397	1000	20000	50000
TDS			245	140		1414	4000	60000	100000
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-
DOC			46.6	19.1		211	500	800	1000
Leach Test Information									
Sample Mass (kg)			0.21						
Dry Matter (%)			82						
Moisture (%)			22						
Stage 1									
Volume Eluate L2 (litres)			0.31						
Filtered Eluate VE1 (litres)			0.12						

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
Stated limits are for guidance only and DETS Ltd cannot be held responsible for any discrepencies 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

DETS Report No: 21-08552		**Date Sampled**	28/06/21			**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: Red Mile Nursery, Pinchbeck		**TP / BH No**	WS105					
Project / Job Ref: BRD3760		**Additional Refs**	J1					
Order No: None Supplied		**Depth (m)**	0.40					
Reporting Date: 26/08/2021		**DETS Sample No**	553140					
Determinand	**Unit**	**MDL**						
TOC[MU]	%	< 0.1	1.5			3%	5%	6%
Loss on Ignition	%	< 0.01	4.50			--	--	10%
BTEX[MJ]	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[MJ]	pH Units	N/a	8.2			--	>6	--
Acid Neutralisation Capacity	mol/kg (+/-)	< 1	< 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	0.03		0.3	20	100	300
Cadmium[U]			< 0.0005	< 0.0005		< 0.02	0.04	1	5
Chromium[U]			< 0.005	0.007		< 0.20	0.5	10	70
Copper[U]			< 0.01	0.01		< 0.5	2	50	100
Mercury[U]			< 0.0005	< 0.0005		< 0.005	0.01	0.2	2
Molybdenum[U]			0.017	0.006		< 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		< 0.05	0.06	0.7	5
Selenium[U]			< 0.005	< 0.005		< 0.05	0.1	0.5	7
Zinc[U]			0.055	0.019		0.2	4	50	200
Chloride[U]			43	7		99	800	15000	25000
Fluoride[U]			0.7	< 0.5		< 1	10	150	500
Sulphate[U]			24	6		79	1000	20000	50000
TDS			209	64		161	4000	60000	100000
Phenol Index			< 0.01	< 0.01		< 0.5	1	-	-
DOC			16.4	15.5		156	500	800	1000
Leach Test Information									
Sample Mass (kg)			0.20						
Dry Matter (%)			85.6						
Moisture (%)			17						
Stage 1									
Volume Eluate L2 (litres)			0.32						
Filtered Eluate VE1 (litres)			0.15						

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Samples Descriptions page describes if the test is performed on the dried or as-received portion
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Soil Analysis Certificate - Sample Descriptions
DETS Report No: 21-08552
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 26/08/2021

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
553128	TP101	J1	0.20	15	Brown sandy clay
553129	TP103	J1	0.10	9.6	Brown sandy clay with stones
553130	TP104	J1	0.10	12.7	Brown sandy clay with stones
553131	TP105	J1	0.20	7.8	Brown sandy gravel with stones and concrete
553132	TP105	J2	0.55	13.9	Brown sandy clay with stones
553133	TP106	J1	0.20	12.8	Brown sandy clay with stones and brick
553134	TP107	J1	0.20	9.9	Brown sandy gravel with stones and concrete
553135	TP111	J1	0.10	4.2	Brown sandy gravel with stones and brick
553136	TP111	J2	0.50	18	Brown sandy clay
553137	WS101	J1	0.10	15.8	Brown sandy clay
553138	WS101	J2	0.50	17.2	Brown sandy clay
553139	WS103	J1	0.30	13.8	Brown sandy clay
553140	WS105	J1	0.40	14.4	Brown sandy clay
553141	WS106	J1	0.20	12.9	Brown sandy clay
553142	WS107	J1	0.20	14.4	Brown sandy clay with vegetation
553143	WS108	J1	0.20	12.7	Brown sandy clay
553144	WS109	J1	0.20	14.2	Brown sandy clay
553145	WS110	J2	0.50	16.2	Brown sandy clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample [1-5]
Unsuitable Sample [-72]

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08552
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 26/08/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

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Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08552
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 26/08/2021

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethan	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

Parameter	Matrix Type	Suite Reference	Expanded Uncertainity Measurement	Unit
TOC	Soil	BS EN 12457	20.0	%
Loss on Ignition	Soil	BS EN 12457	35.0	%
BTEX	Soil	BS EN 12457	14.0	%
Sum of PCBs	Soil	BS EN 12457	23.0	%
Mineral Oil	Soil	BS EN 12457	9.0	%
Total PAH	Soil	BS EN 12457	11.6	%
pH	Soil	BS EN 12457	0.28	Units
Acid Neutralisation Capacity	Soil	BS EN 12457	18.0	%
Arsenic	Leachate	BS EN 12457	18.7	%
Barium	Leachate	BS EN 12457	11.6	%
Cadmium	Leachate	BS EN 12457	20.3	%
Chromium	Leachate	BS EN 12457	18.3	%
Copper	Leachate	BS EN 12457	24.3	%
Mercury	Leachate	BS EN 12457	23.7	%
Molybdenum	Leachate	BS EN 12457	14.7	%
Nickel	Leachate	BS EN 12457	16.1	%
Lead	Leachate	BS EN 12457	15.7	%
Antimony	Leachate	BS EN 12457	17.9	%
Selenium	Leachate	BS EN 12457	22.0	%
Zinc	Leachate	BS EN 12457	17.4	%
Chloride	Leachate	BS EN 12457	15.3	%
Fluoride	Leachate	BS EN 12457	16.4	%
Sulphate	Leachate	BS EN 12457	20.6	%
TDS	Leachate	BS EN 12457	12.0	%
Phenol Index	Leachate	BS EN 12457	14.0	%
DOC	Leachate	BS EN 12457	10.0	%
Clay Content	Soil	BS 3882: 2015	15.0	%
Silt Content	Soil	BS 3882: 2015	14.0	%
Sand Content	Soil	BS 3882: 2015	13.0	%
Loss on Ignition	Soil	BS 3882: 2015	35.0	%
pH	Soil	BS 3882: 2015	0.14	Units
Carbonate	Soil	BS 3882: 2015	16.0	%
Total Nitrogen	Soil	BS 3882: 2015	12.0	%
Phosphorus (Extractable)	Soil	BS 3882: 2015	24.0	%
Potassium (Extractable)	Soil	BS 3882: 2015	20.0	%
Magnesium (Extractable)	Soil	BS 3882: 2015	26.0	%
Zinc	Soil	BS 3882: 2015	14.9	%
Copper	Soil	BS 3882: 2015	16.0	%
Nickel	Soil	BS 3882: 2015	17.7	%
Available Sodium	Soil	BS 3882: 2015	23.0	%
Available Calcium	Soil	BS 3882: 2015	23.0	%
Electrical Conductivity	Soil	BS 3882: 2015	10.0	%

4480

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OX16 5HT

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t: 01622 850410

DETS Report No: 21-08553

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	06/07/2021
Sample Scheduled Date:	06/07/2021
Report Issue Number:	1
Reporting Date:	12/07/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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

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Soil Analysis Certificate						
DETS Report No: 21-08553	**Date Sampled**	28/06/21	28/06/21	28/06/21	28/06/21	28/06/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	WS103	WS105	WS107	WS101	BH101
Project / Job Ref: BRD3760	**Additional Refs**	D1	D1	D2	D2	D7
Order No: None Supplied	**Depth (m)**	1.20	1.80	2.90	3.70	6.70
Reporting Date: 12/07/2021	**DETS Sample No**	553146	553147	553148	553149	553150

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.3	8.3	8.5	8.3	8.0
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	325	299	919	719	2083
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.03	0.03	0.09	0.07	0.21
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	45	32	157	130	422
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.04	0.03	0.16	0.13	0.42
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	0.23	0.16	1.21

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditat on

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Soil Analysis Certificate						
DETS Report No: 21-08553	**Date Sampled**	29/06/21	29/06/21	30/06/21	01/07/21	01/07/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	BH101	BH101	BH103	BH103	BH103
Project / Job Ref: BRD3760	**Additional Refs**	D12	D20	D10	D14	D22
Order No: None Supplied	**Depth (m)**	12.70	18.70	10.70	18.20	24.55
Reporting Date: 12/07/2021	**DETS Sample No**	553151	553152	553153	553154	553155

Determinand	Unit	RL	Accreditation		(n)			(n)
pH	pH Units	N/a	MCERTS	8.6	8.4	8.3	8.5	8.3
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	645	1407	747	1186	913
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.06	0.14	0.07	0.12	0.09
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	97	313	35	122	136
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.10	0.31	0.04	0.12	0.14
Total Sulphur	%	< 0.02	NONE	0.11	0.60	0.46	0.66	0.74

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate						
DETS Report No: 21-08553	**Date Sampled**	02/07/21				
BRD Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	BH102				
Project / Job Ref: BRD3760	**Additional Refs**	D8				
Order No: None Supplied	**Depth (m)**	8.00				
Reporting Date: 12/07/2021	**DETS Sample No**	553156				

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.2				
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	1775				
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.18				
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	277				
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.28				
Total Sulphur	%	< 0.02	NONE	2.06				

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 21-08553	
BRD Environmental Ltd	
Site Reference: Red Mile Nursery, Pinchbeck	
Project / Job Ref: BRD3760	
Order No: None Supplied	
Reporting Date: 12/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
553146	WS103	D1	1.20	20.3	Light brown clay
553147	WS105	D1	1.80	21.3	Light brown sandy clay
553148	WS107	D2	2.90	31.8	Brown clay
553149	WS101	D2	3.70	17.8	Brown sandy clay
553150	BH101	D7	6.70	31.6	Brown clay
553151	BH101	D12	12.70	13.6	Brown clay
553152	BH101	D20	18.70	12.3	Brown clay with chalk
553153	BH103	D10	10.70	12.4	Brown sandy clay
553154	BH103	D14	18.20	12.7	Brown clay
553155	BH103	D22	24.55	12.6	Brown clay with chalk
553156	BH102	D8	8.00	23.1	Brown clay

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample -IS
Unsuitable Sample -US

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08553
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 12/07/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

4480

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DETS Ltd
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DETS Report No: 21-08672

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	08/07/2021
Sample Scheduled Date:	08/07/2021
Report Issue Number:	1
Reporting Date:	14/07/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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UKAS TESTING
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Soil Analysis Certificate						
DETS Report No: 21-08672	**Date Sampled**	05/07/21	05/07/21			
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied			
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	BH102	BH102			
Project / Job Ref: BRD3760	**Additional Refs**	D14	D22			
Order No: None Supplied	**Depth (m)**	15.50	21.50			
Reporting Date: 14/07/2021	**DETS Sample No**	553598	553599			

Determinand	Unit	RL	Accreditation		(n)			
pH	pH Units	N/a	MCERTS	8.1	8.2			
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	1434	1691			
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.14	0.17			
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	505	730			
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.51	0.73			
Total Sulphur	%	< 0.02	NONE	0.07	0.65			

Analytical results are expressed on a dry weight basis where samples are ass sted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 21-08672	
BRD Environmental Ltd	
Site Reference: Red Mile Nursery, Pinchbeck	
Project / Job Ref: BRD3760	
Order No: None Supplied	
Reporting Date: 14/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
553598	BH102	D14	15.50	15.1	Brown clay
553599	BH102	D22	21.50	10.6	Brown clay with chalk

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

Insufficient Sample [ins]

Unsuitable Sample [uns]

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08672
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 14/07/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

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DETS Report No: 21-08835

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	13/07/2021
Sample Scheduled Date:	13/07/2021
Report Issue Number:	1
Reporting Date:	19/07/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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Soil Analysis Certificate						
DETS Report No: 21-08835	**Date Sampled**	28/06/21	29/06/21	28/06/21	28/06/21	
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	WS102	WS106	TP101	TP106	
Project / Job Ref: BRD3760	**Additional Refs**	D1	D1	D1	D1	
Order No: None Supplied	**Depth (m)**	1.90	0.90	0.90	1.30	
Reporting Date: 19/07/2021	**DETS Sample No**	554379	554380	554381	554382	

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	MCERTS	8.3	8.5	8.2	8.2	
Total Sulphate as SO_4	mg/kg	< 200	MCERTS	250	1076	484	357	
Total Sulphate as SO_4	%	< 0.02	MCERTS	0.02	0.11	0.05	0.04	
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	34	334	15	55	
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.03	0.33	0.01	0.05	
Total Sulphur	%	< 0.02	NONE	< 0.02	0.04	0.02	< 0.02	

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 21-08835	
BRD Environmental Ltd	
Site Reference: Red Mile Nursery, Pinchbeck	
Project / Job Ref: BRD3760	
Order No: None Supplied	
Reporting Date: 19/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
$ 554379	WS102	D1	1.90	19.5	Light brown sandy clay
$ 554380	WS106	D1	0.90	17.1	Light brown clay
$ 554381	TP101	D1	0.90	14.3	Light brown sandy clay
$ 554382	TP106	D1	1.30	18	Light brown sandy clay

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

Insufficient Sample [I/S]

Unsuitable Sample [U/S]

$ samples exceeded recommended holding times

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08835
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 19/07/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

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DETS Report No: 21-08882

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	14/07/2021
Sample Scheduled Date:	14/07/2021
Report Issue Number:	1
Reporting Date:	20/07/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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Water Analysis Certificate						
DETS Report No: 21-08882	Date Sampled	12/07/21	12/07/21	12/07/21		
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105		
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	3.82	1.89	2.35		
Reporting Date: 20/07/2021	DETS Sample No	554702	554703	554704		

Determinand	Unit	RL	Accreditation					
pH	pH Units	N/a	ISO17025	7.9	8.0	7.9		
Sulphate as SO_4	mg/l	< 1	ISO17025	100	190	157		
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	33.1	20.6	26.3		
Arsenic (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4	< 0.4	< 0.4		
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Chromium (hexavalent)	ug/l	< 20	NONE	< 20	< 20	< 20		
Copper (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Lead (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Mercury (dissolved)	ug/l	< 0.05	ISO17025	< 0.05	< 0.05	< 0.05		
Nickel (dissolved)	ug/l	< 5	ISO17025	30	32	35		
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Zinc (dissolved)	ug/l	< 2	ISO17025	7	5	5		

Subcontracted analysis [S]
Insufficient sample [IS]
Unsuitable Sample [US]

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Water Analysis Certificate - Speciated PAH							
DETS Report No: 21-08882	Date Sampled	12/07/21	12/07/21	12/07/21		
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105		
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	3.82	1.89	2.35		
Reporting Date: 20/07/2021	DETS Sample No	554702	554703	554704		

Determinand	Unit	RL	Accreditation					
Naphthalene	ug/l	< 0.01	NONE	< 0.01	0.04	0.02		
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Acenaphthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Fluorene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Phenanthrene	ug/l	< 0.01	NONE	< 0.01	0.04	< 0.01		
Anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Fluoranthene	ug/l	< 0.01	NONE	0.07	0.07	< 0.01		
Pyrene	ug/l	< 0.01	NONE	0.04	0.02	0.01		
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Chrysene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01		
Benzo(ghi)perylene	ug/l	< 0.008	NONE	< 0.008	< 0.008	< 0.008		
Total EPA-16 PAHs	ug/l	< 0.01	NONE	0.06	0.12	0.03		

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Water Analysis Certificate - TPH LQM Banded						
DETS Report No: 21-08882	Date Sampled	12/07/21	12/07/21	12/07/21		
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105		
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	3.82	1.89	2.35		
Reporting Date: 20/07/2021	DETS Sample No	554702	554703	554704		

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10	< 10	< 10		
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10	< 10	< 10		
Aliphatic >C8 - C10	ug/l	< 10	NONE	10	11	< 10		
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10	13	< 10		
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10	17	< 10		
Aliphatic >C16 - C35	ug/l	< 10	NONE	28	24	36		
Aliphatic >C35 - C44	ug/l	< 10	NONE	< 10	< 10	< 10		
Aliphatic (C5 - C44)	ug/l	< 70	NONE	< 70	< 70	< 70		
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10	< 10	14		
Aromatic >C35 - C44	ug/l	< 10	NONE	< 10	< 10	< 10		
Aromatic (>C5 - C44)	ug/l	< 70	NONE	< 70	< 70	< 70		
Total >C5 - C44	ug/l	< 140	NONE	< 140	< 140	< 140		

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Water Analysis Certificate - BTEX / MTBE							
DETS Report No: 21-08882	Date Sampled	12/07/21	12/07/21	12/07/21		
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105		
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: None Supplied	Depth (m)	3.82	1.89	2.35		
Reporting Date: 20/07/2021	DETS Sample No	554702	554703	554704		

Determinand	Unit	RL	Accreditation					
Benzene	ug/l	< 1	ISO17025	< 1	< 1	< 1		
Toluene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
Ethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
p & m-xylene	ug/l	< 10	ISO17025	< 10	< 10	< 10		
o-xylene	ug/l	< 5	ISO17025	< 5	< 5	< 5		
MTBE	ug/l	< 10	ISO17025	< 10	< 10	< 10		

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Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-08882
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 20/07/2021

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichlorometha	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

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DETS Report No: 21-09094

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	20/07/2021
Sample Scheduled Date:	20/07/2021
Report Issue Number:	1
Reporting Date:	28/07/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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Soil Analysis Certificate						
DETS Report No: 21-09094	**Date Sampled**	16/07/21	16/07/21	16/07/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD01	HD02	HD03		
Project / Job Ref: BRD3760	**Additional Refs**	J2	J1	J1		
Order No: None Supplied	**Depth (m)**	0.40	0.10	0.20		
Reporting Date: 28/07/2021	**DETS Sample No**	555691	555692	555693		

Determinand	Unit	RL	Accreditation					
Asbestos Quantification [S]	%	< 0.001	ISO17025		< 0.001			
pH	pH Units	N/a	MCERTS	7.8	8.0	7.7		
W/S Sulphate as SO_4 (2:1)	mg/l	< 10	MCERTS	30	19	< 10		
W/S Sulphate as SO_4 (2:1)	g/l	< 0.01	MCERTS	0.03	0.02	< 0.01		
Organic Matter (SOM)	%	< 0.1	MCERTS	3.6	1.1	3.1		
Arsenic (As)	mg/kg	< 2	MCERTS	11	15	12		
Cadmium (Cd)	mg/kg	< 0.2	NONE	< 0.2	< 0.2	< 0.2		
Chromium (Cr)	mg/kg	< 2	MCERTS	15	8	15		
Chromium (hexavalent)	mg/kg	< 2	NONE	< 2	< 2	< 2		
Copper (Cu)	mg/kg	< 4	MCERTS	15	14	11		
Lead (Pb)	mg/kg	< 3	MCERTS	47	13	21		
Mercury (Hg)	mg/kg	< 1	MCERTS	< 1	< 1	< 1		
Nickel (Ni)	mg/kg	< 3	MCERTS	11	5	11		
Selenium (Se)	mg/kg	< 2	MCERTS	< 3	< 3	< 3		
Zinc (Zn)	mg/kg	< 3	MCERTS	68	50	50		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)

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Soil Analysis Certificate - Speciated PAHs							
DETS Report No: 21-09094	**Date Sampled**	16/07/21	16/07/21	16/07/21		
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied		
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD01	HD02	HD03		
Project / Job Ref: BRD3760	**Additional Refs**	J2	J1	J1		
Order No: None Supplied	**Depth (m)**	0.40	0.10	0.20		
Reporting Date: 28/07/2021	**DETS Sample No**	555691	555692	555693		

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Acenaphthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluorene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Phenanthrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	0.19	< 0.1		
Pyrene	mg/kg	< 0.1	MCERTS	< 0.1	0.18	< 0.1		
Benzo(a)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Chrysene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(b)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(k)fluoranthene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(a)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Dibenz(a,h)anthracene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Benzo(ghi)perylene	mg/kg	< 0.1	MCERTS	< 0.1	< 0.1	< 0.1		
Total EPA-16 PAHs	mg/kg	< 1.6	MCERTS	< 1.6	< 1.6	< 1.6		

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 21-09094	**Date Sampled**	16/07/21				
BRD Environmental Ltd	**Time Sampled**	None Supplied				
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD02				
Project / Job Ref: BRD3760	**Additional Refs**	J1				
Order No: None Supplied	**Depth (m)**	0.10				
Reporting Date: 28/07/2021	**DETS Sample No**	555692				

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

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Soil Analysis Certificate - BTEX / MTBE							
DETS Report No: 21-09094	Date Sampled	16/07/21					
BRD Environmental Ltd	Time Sampled	None Supplied					
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	HD02					
Project / Job Ref: BRD3760	Additional Refs	J1					
Order No: None Supplied	Depth (m)	0.10					
Reporting Date: 28/07/2021	DETS Sample No	555692					

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	MCERTS	< 2				
Toluene	ug/kg	< 5	MCERTS	< 5				
Ethylbenzene	ug/kg	< 2	MCERTS	16				
p & m-xylene	ug/kg	< 2	MCERTS	76				
o-xylene	ug/kg	< 2	MCERTS	17				
MTBE	ug/kg	< 5	MCERTS	< 5				

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 21-09094	
BRD Environmental Ltd	
Site Reference: Red Mile Nursery, Pinchbeck	
Project / Job Ref: BRD3760	
Order No: None Supplied	
Reporting Date: 28/07/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
555691	HD01	J2	0.40	11.5	Brown sandy clay
555692	HD02	J1	0.10	7.2	Brown sandy clay with stones and vegetation
555693	HD03	J1	0.20	12	Brown sandy clay

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

Insufficient Sample [IS]

Unsuitable Sample [US]

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-09094
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 28/07/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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
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DETS Report No: 21-10406

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	24/08/2021
Sample Scheduled Date:	24/08/2021
Report Issue Number:	1
Reporting Date:	31/08/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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Soil Analysis Certificate						
DETS Report No: 21-10406	**Date Sampled**	20/08/21	20/08/21	20/08/21	20/08/21	20/08/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD04	HD05	HD06	HD07	HD08
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J1
Order No: None Supplied	**Depth (m)**	0.20	0.20	0.20	0.10	0.15
Reporting Date: 31/08/2021	**DETS Sample No**	561062	561063	561064	561065	561066

Determinand	Unit	RL	Accreditation					
Asbestos Quantification [S]	%	< 0.001	ISO17025	< 0.001	< 0.001	< 0.001	< 0.001	< 0.001

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C. The Method Description page describes if the test is performed on the dried or as-received portion
Subcontracted analysis (S)
(n) Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditat on

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Soil Analysis Certificate - Speciated PAHs						
DETS Report No: 21-10406	**Date Sampled**	20/08/21	20/08/21	20/08/21	20/08/21	20/08/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD04	HD05	HD06	HD07	HD08
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J1
Order No: None Supplied	**Depth (m)**	0.20	0.20	0.20	0.10	0.15
Reporting Date: 31/08/2021	**DETS Sample No**	561062	561063	561064	561065	561066

Determinand	Unit	RL	Accreditation					
Naphthalene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	mg/kg	< 0.1	ISO17025	0.73	0.16	0.15	0.10	0.19
Pyrene	mg/kg	< 0.1	ISO17025	0.22	0.16	0.14	< 0.1	0.19
Benzo(a)anthracene	mg/kg	< 0.1	ISO17025	0.28	0.27	0.26	< 0.1	0.28
Chrysene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	mg/kg	< 0.1	ISO17025	0.22	0.22	0.19	< 0.1	0.22
Benzo(k)fluoranthene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	mg/kg	< 0.1	ISO17025	0.11	0.11	< 0.1	< 0.1	0.12
Indeno(1,2,3-cd)pyrene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenz(a,h)anthracene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(ghi)perylene	mg/kg	< 0.1	ISO17025	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Total EPA-16 PAHs	mg/kg	< 1.6	ISO17025	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

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Soil Analysis Certificate - TPH LQM Banded						
DETS Report No: 21-10406	**Date Sampled**	20/08/21	20/08/21	20/08/21	20/08/21	20/08/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD04	HD05	HD06	HD07	HD08
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J1
Order No: None Supplied	**Depth (m)**	0.20	0.20	0.20	0.10	0.15
Reporting Date: 31/08/2021	**DETS Sample No**	561062	561063	561064	561065	561066

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	ISO17025	< 2	< 2	< 2	< 2	< 2
Aliphatic >C10 - C12	mg/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
Aliphatic >C12 - C16	mg/kg	< 3	ISO17025	< 3	< 3	< 3	< 3	< 3
Aliphatic >C16 - C35	mg/kg	< 10	ISO17025	< 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	ISO17025	< 2	< 2	< 2	< 2	< 2
Aromatic >C10 - C12	mg/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
Aromatic >C12 - C16	mg/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
Aromatic >C16 - C21	mg/kg	< 3	ISO17025	< 3	< 3	< 3	< 3	< 3
Aromatic >C21 - C35	mg/kg	< 10	ISO17025	< 10	< 10	< 10	< 10	18
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

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Soil Analysis Certificate - BTEX / MTBE						
DETS Report No: 21-10406	**Date Sampled**	20/08/21	20/08/21	20/08/21	20/08/21	20/08/21
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	HD04	HD05	HD06	HD07	HD08
Project / Job Ref: BRD3760	**Additional Refs**	J1	J1	J2	J1	J1
Order No: None Supplied	**Depth (m)**	0.20	0.20	0.20	0.10	0.15
Reporting Date: 31/08/2021	**DETS Sample No**	561062	561063	561064	561065	561066

Determinand	Unit	RL	Accreditation					
Benzene	ug/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
Toluene	ug/kg	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5
Ethylbenzene	ug/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
p & m-xylene	ug/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
o-xylene	ug/kg	< 2	ISO17025	< 2	< 2	< 2	< 2	< 2
MTBE	ug/kg	< 5	ISO17025	< 5	< 5	< 5	< 5	< 5

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Soil Analysis Certificate - Sample Descriptions	
DETS Report No: 21-10406	
BRD Environmental Ltd	
Site Reference: Red Mile Nursery, Pinchbeck	
Project / Job Ref: BRD3760	
Order No: None Supplied	
Reporting Date: 31/08/2021	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
561062	HD04	J1	0.20	3	Brown sandy gravel with stones and concrete
561063	HD05	J1	0.20	3.5	Brown sandy gravel with stones and concrete
561064	HD06	J2	0.20	5.3	Brown sandy gravel with stones and concrete
561065	HD07	J1	0.10	3.8	Brown sandy gravel with stones
561066	HD08	J1	0.15	1.9	Brown sandy gravel with stones and concrete

Moisture content is part of procedure E003 & is not an accredited test
Insufficient Sample [1/S]
Unsuitable Sample [**/S]

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Soil Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-10406
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 31/08/2021

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	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
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

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DETS Report No: 21-11370

Site Reference:	Red Mile Nursery, Pinchbeck
Project / Job Ref:	BRD3760
Order No:	None Supplied
Sample Receipt Date:	16/09/2021
Sample Scheduled Date:	17/09/2021
Report Issue Number:	1
Reporting Date:	21/09/2021

Authorised by:

Dave Ashworth
Technical Manager

Dates of laboratory activities for each tested analyte are available upon request.

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Water Analysis Certificate						
DETS Report No: 21-11370	**Date Sampled**	15/09/21	15/09/21	15/09/21	15/09/21	
BRD Environmental Ltd	**Time Sampled**	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	**TP / BH No**	WS101	WS103	WS105	Stream Sample	
Project / Job Ref: BRD3760	**Additional Refs**	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	**Depth (m)**	3.91	3.50	3.01	None Supplied	
Reporting Date: 21/09/2021	**DETS Sample No**	564811	564812	564813	564814	

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	ISO17025	8.4	8.1	8.0	8.2
Sulphate as SO_4	mg/l	< 1	ISO17025	84	208	150	36
Total Organic Carbon (TOC)	mg/l	< 0.1	NONE	35.1	14.7	21.1	10.8
Arsenic (dissolved)	ug/l	< 5	ISO17025	18	< 5	< 5	< 5
Cadmium (dissolved)	ug/l	< 0.4	ISO17025	< 0.4	< 0.4	< 0.4	< 0.4
Chromium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5
Chromium (hexavalent)	ug/l	< 20	NONE	< 20	< 20	< 20	< 20
Copper (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5
Lead (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5
Mercury (dissolved)	ug/l	< 0.05	ISO17025	< 0.05	< 0.05	0.30	< 0.05
Nickel (dissolved)	ug/l	< 5	ISO17025	17	35	28	< 5
Selenium (dissolved)	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5
Zinc (dissolved)	ug/l	< 2	ISO17025	11	11	108	26

Subcontracted analysis [S]
Insufficient sample [IS]
Unsuitable Sample [US]

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Water Analysis Certificate - Speciated PAH						
DETS Report No: 21-11370	Date Sampled	15/09/21	15/09/21	15/09/21	15/09/21	
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105	Stream Sample	
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	Depth (m)	3.91	3.50	3.01	None Supplied	
Reporting Date: 21/09/2021	DETS Sample No	564811	564812	564813	564814	

Determinand	Unit	RL	Accreditation					
Naphthalene	ug/l	< 0.01	NONE	0.02	0.06	0.04	0.09	
Acenaphthylene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Acenaphthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Fluorene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Phenanthrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	0.02	0.03	
Anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	0.02	0.03	
Pyrene	ug/l	< 0.01	NONE	0.01	< 0.01	0.02	0.02	
Benzo(a)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Chrysene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(b)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(k)fluoranthene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(a)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Indeno(1,2,3-cd)pyrene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Dibenz(a,h)anthracene	ug/l	< 0.01	NONE	< 0.01	< 0.01	< 0.01	< 0.01	
Benzo(ghi)perylene	ug/l	< 0.008	NONE	< 0.008	< 0.008	< 0.008	< 0.008	
Total EPA-16 PAHs	ug/l	< 0.16	NONE	< 0.16	< 0.16	< 0.16	0.17	

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Water Analysis Certificate - TPH CWG Banded						
DETS Report No: 21-11370	Date Sampled	15/09/21	15/09/21	15/09/21	15/09/21	
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105	Stream Sample	
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	Depth (m)	3.91	3.50	3.01	None Supplied	
Reporting Date: 21/09/2021	DETS Sample No	564811	564812	564813	564814	

Determinand	Unit	RL	Accreditation					
Aliphatic >C5 - C6	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C6 - C8	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic >C21 - C34	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aliphatic (C5 - C34)	ug/l	< 70	NONE	< 70	< 70	< 70	< 70	
Aromatic >C5 - C7	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C7 - C8	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C8 - C10	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C10 - C12	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C12 - C16	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C16 - C21	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic >C21 - C35	ug/l	< 10	NONE	< 10	< 10	< 10	< 10	
Aromatic (C5 - C35)	ug/l	< 70	NONE	< 70	< 70	< 70	< 70	
Total >C5 - C35	ug/l	< 140	NONE	< 140	< 140	< 140	< 140	

DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
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Water Analysis Certificate - BTEX / MTBE						
DETS Report No: 21-11370	Date Sampled	15/09/21	15/09/21	15/09/21	15/09/21	
BRD Environmental Ltd	Time Sampled	None Supplied	None Supplied	None Supplied	None Supplied	
Site Reference: Red Mile Nursery, Pinchbeck	TP / BH No	WS101	WS103	WS105	Stream Sample	
Project / Job Ref: BRD3760	Additional Refs	None Supplied	None Supplied	None Supplied	None Supplied	
Order No: None Supplied	Depth (m)	3.91	3.50	3.01	None Supplied	
Reporting Date: 21/09/2021	DETS Sample No	564811	564812	564813	564814	

Determinand	Unit	RL	Accreditation					
Benzene	ug/l	< 1	ISO17025	< 1	< 1	< 1	< 1	
Toluene	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	
Ethylbenzene	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	
p & m-xylene	ug/l	< 10	ISO17025	< 10	< 10	< 10	< 10	
o-xylene	ug/l	< 5	ISO17025	< 5	< 5	< 5	< 5	
MTBE	ug/l	< 10	ISO17025	< 10	< 10	< 10	< 10	

DETS Ltd
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Water Analysis Certificate - Methodology & Miscellaneous Information
DETS Report No: 21-11370
BRD Environmental Ltd
Site Reference: Red Mile Nursery, Pinchbeck
Project / Job Ref: BRD3760
Order No: None Supplied
Reporting Date: 21/09/2021

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Water	UF	Alkalinity	Determination of alkalinity by titration against hydrochloric acid using bromocresol green as the end point	E103
Water	F	Ammoniacal Nitrogen	Determination of ammoniacal nitrogen by discrete analyser.	E126
Water	UF	BTEX	Determination of BTEX by headspace GC-MS	E101
Water	F	Cations	Determination of cations by filtration followed by ICP-MS	E102
Water	UF	Chemical Oxygen Demand (COD)	Determination using a COD reactor followed by colorimetry	E112
Water	F	Chloride	Determination of chloride by filtration & analysed by ion chromatography	E109
Water	F	Chromium - Hexavalent	Determination of hexavalent chromium by acidification, addition of 1,5 diphenylcarbazide followed by	E116
Water	UF	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E115
Water	UF	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E115
Water	UF	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through liquid:liquid extraction with cyclohexane	E111
Water	F	Diesel Range Organics (C10 - C24)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	Dissolved Organic Content (DOC)	Determination of DOC by filtration followed by low heat with persulphate addition followed by IR dete	E110
Water	UF	Electrical Conductivity	Determination of electrical conductivity by electrometric measurement	E123
Water	F	EPH (C10 – C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID	E104
Water	F	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of liquid:liquid extraction with hexane followed by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E104
Water	F	Fluoride	Determination of Fluoride by filtration & analysed by ion chromatography	E109
Water	F	Hardness	Determination of Ca and Mg by ICP-MS followed by calculation	E102
Leachate	F	Leachate Preparation - NRA	Based on National Rivers Authority leaching test 1994	E301
Leachate	F	Leachate Preparation - WAC	Based on BS EN 12457 Pt1, 2, 3	E302
Water	F	Metals	Determination of metals by filtration followed by ICP-MS	E102
Water	F	Mineral Oil (C10 - C40)	Determination of liquid:liquid extraction with hexane followed by GI-FID	E104
Water	F	Nitrate	Determination of nitrate by filtration & analysed by ion chromatography	E109
Water	UF	Monohydric Phenol	Determination of phenols by distillation followed by colorimetry	E121
Water	F	PAH - Speciated (EPA 16)	Determination of PAH compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E105
Water	F	PCB - 7 Congeners	Determination of PCB compounds by concentration through SPE cartridge, collection in dichloromethar	E108
Water	UF	Petroleum Ether Extract (PEE)	Gravimetrically determined through liquid:liquid extraction with petroleum ether	E111
Water	UF	pH	Determination of pH by electrometric measurement	E107
Water	F	Phosphate	Determination of phosphate by filtration & analysed by ion chromatography	E109
Water	UF	Redox Potential	Determination of redox potential by electrometric measurement	E113
Water	F	Sulphate (as SO4)	Determination of sulphate by filtration & analysed by ion chromatography	E109
Water	UF	Sulphide	Determination of sulphide by distillation followed by colorimetry	E118
Water	F	SVOC	Determination of semi-volatile organic compounds by concentration through SPE cartridge, collection in dichloromethane followed by GC-MS	E106
Water	UF	Toluene Extractable Matter (TEM)	Gravimetrically determined through liquid:liquid extraction with toluene	E111
Water	UF	Total Organic Carbon (TOC)	Low heat with persulphate addition followed by IR detection	E110
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C35. C5 to C8 by headspace GC-MS	E104
Water	F	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 liquid:liquid extraction with hexane, fractionating with SPE followed by GC-FID for C8 to C44. C5 to C8 by headspace GC-MS	E104
Water	UF	VOCs	Determination of volatile organic compounds by headspace GC-MS	E101
Water	UF	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E101

Key

F Filtered
UF Unfiltered

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

0998

Contract	**Pinchbeck**
Serial No.	**39021_1**

Client:

BRD Environmental Ltd

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

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

Samples Submitted By:

BRD Environmental Ltd

Samples Labelled:

Pinchbeck

Approved Signatories:

☐ **J.C. Garner B.Eng (Hons) FGS**
Technical Director & Quality Manager

☐ **W. Johnstone**
Materials Lab Manager

☑ **D. Sabnis**
Operations Manager

Dinlar Sabnis

Date Received: 06/07/2021

Samples Tested Between: 06/07/2021 **and** 23/07/2021

Remarks:

For the attention of Nicola Kimber
Your Reference No: BRD3760

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. 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.
5. The results within this report only relate to the items tested or sampled.

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

0998

Contract	**Pinchbeck**		
Serial No.	**39021_1**	**Target Date**	20/07/2021
Scheduled By	BRD Environmental Ltd		

Schedule Remarks

Bore Hole No.	Type	Sample Ref.	Top Depth	Loss On Ignition	One Dimensional Consolidation	Water Content (BSEN)	Liquid/Plastic Limits	Wet Sieve Preparation	Triaxial Test	Particle Size Distribution (BS1377)	Sample Remarks
BH101	D	8	8.20	1							
BH101	U	1	11.20		1						
BH101	D	10	11.70			**1**	1	1			
BH101	U	3	17.20						1		
BH101	U	4	20.20						1		
BH101	D	27	24.10			**1**	1	1			
BH102	D	6	5.20			**1**	1				
BH102	D	7	6.50	1							
BH102	UT	2	17.00						1		
BH102	UT	3	20.00						1		
BH102	D	21	21.00			**1**	1	1			
BH102	UT	4	23.00						1		
BH103	D	4	3.20	1							
BH103	D	8	8.20			**1**	1				
BH103	D	11	15.20			**1**	1	1			
BH103	UT	1	16.70		1				1		
BH103	UT	2	19.70						1		
BH103	UT	3	22.70						1		
TP102	B	1	2.00							**1**	
TP104	B	1	1.50							**1**	
TP107	D	1	1.70			**1**	1				
WS101	D	1	1.50			**1**	1				
WS104	D	1	2.50			**1**	1				
WS108	D	1	2.10			**1**	1				
Totals				**3**	**2**	**10**	**10**	**4**	**8**	**2**	**End of Schedule**

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

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Contract	**Pinchbeck**
Serial No.	**39021_1**

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 (%)	Plasti-city Index (%)	Liquid-ity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
BH101	11.70	D	10	18.2	44	18	26	0.01	Wet Sieved	3 (M)	18.7*	27	Stiff dark yellowish brown slightly gravelly slightly sandy silty CLAY with occasional bluish grey mottling and decayed roots. Gravel is fine and medium angular to subrounded chalk and chert	CI
BH101	24.10	D	27	14.4	37	15	22	-0.03	Wet Sieved	9 (M)	15.8*	28	Hard dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium angular to subrounded chalk and chert	CI
BH102	5.20	D	6	28.6	34	23	11	0.51	From Natural	0 (A)		24	Very dark grey slightly organic very silty fine SAND locally oxidised to brown	CLO
BH102	21.00	D	21	15.8	36	15	21	0.04	Wet Sieved	8 (M)	17.2*	27	Very stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium angular to subrounded chalk and chert	CI
BH103	8.20	D	8	36.3	40	21	19	0.81	From Natural	0 (A)		24	Very soft dark grey slightly organic silty CLAY locally oxidised to brown with rare fine shell debris	CIO
BH103	15.20	D	11	22.2	44	19	25	0.13	Wet Sieved	6 (M)	23.7*	25	Firm dark yellowish brown slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subangular and subrounded chalk	CI
TP107	1.70	D	1	46.1	66	25	41	0.51	From Natural	0 (A)		24	Soft mottled very dark grey and brown slightly organic CLAY	CHO
WS101	1.50	D	1	27.1	30	23	7	0.59	From Natural	0 (A)		24	Yellowish brown clayey fine SAND/SILT	CL/ML

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 & BS 1377: 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 is non-porous. See BS1377: Part 2: 1990 Clause 3 Note 1.

Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

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Contract	**Pinchbeck**
Serial No.	**39021_1**

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 (%)	Plasti-city Index (%)	Liquid-ity Index	Sample Preparation				Description	Class
									Method	Ret'd 0.425mm (%)	Corr'd W/C <0.425mm	Curing Time (hrs)		
WS104	2.50	D	1	42.6	66	27	39	0.40	From Natural	0 (A)		24	Soft yellowish brown CLAY with occasional bluish grey mottling	CH
WS108	2.10	D	1	37.2	48	20	28	0.61	From Natural	0 (A)		24	Very soft mottled bluish grey and brown silty CLAY with rare recently active and decayed 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 & BS 1377: 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:

Table Notation: Ret'd 0.425mm: (A) = Assumed, (M) = Measured

TEST REPORT

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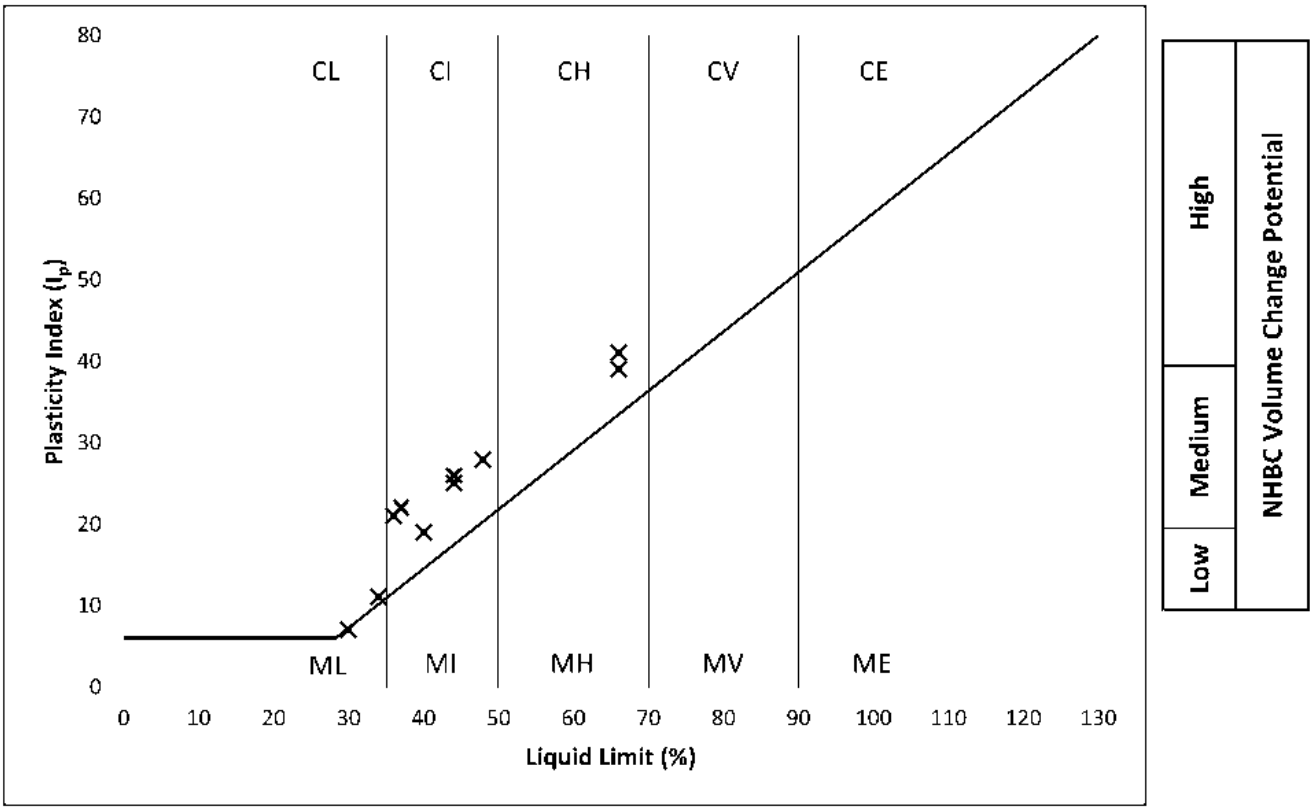
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Method of Preparation:	BS 1377: Part 2: 1990: 4.2
Method of Test:	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

TEST REPORT

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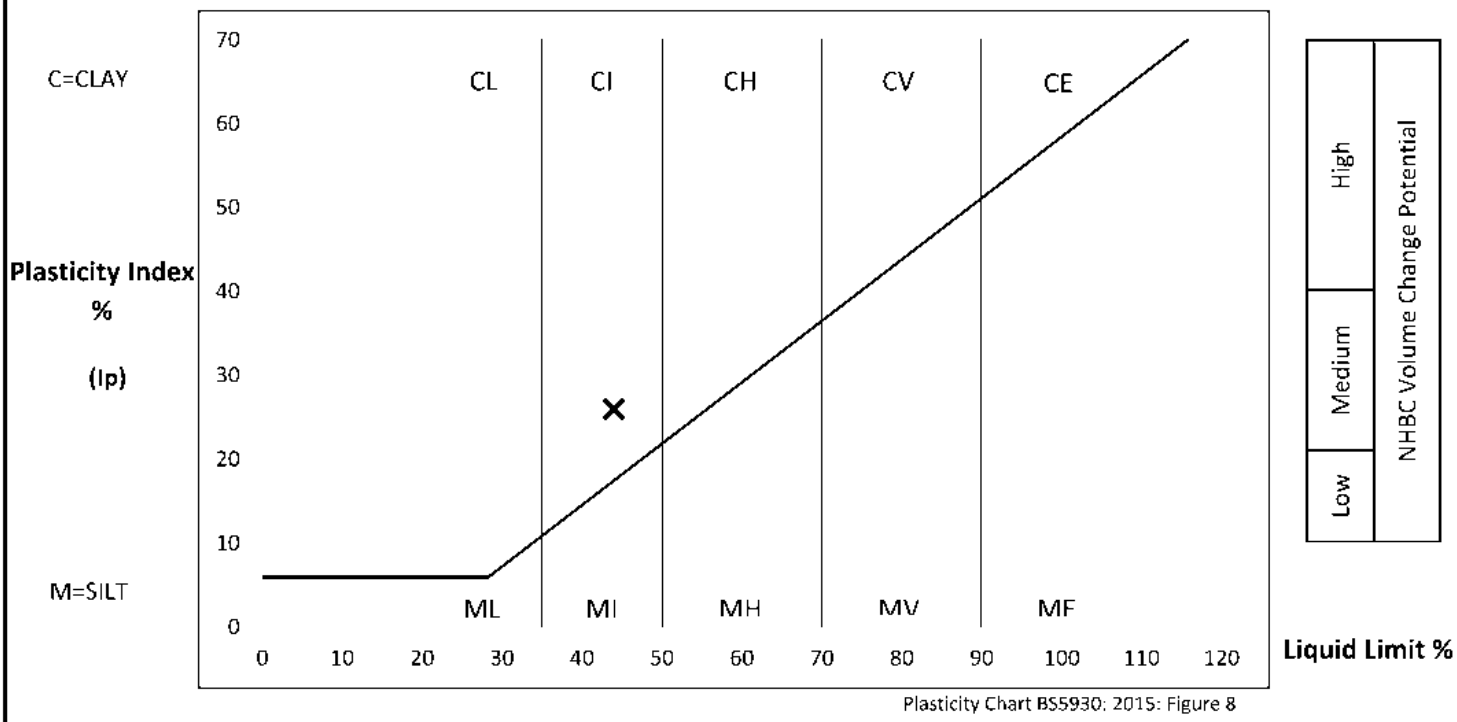
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH101	11.70	D	10	18.2	Stiff dark yellowish brown slightly gravelly slightly sandy silty CLAY with occasional bluish grey mottling and decayed roots. Gravel is fine and medium angular to subrounded chalk and chert	

PREPARATION			Liquid Limit	44 %
Method of preparation	Wet sieved over 0.425mm sieve		Plastic Limit	18 %
Sample retained 0.425mm sieve	(Measured)	3 %	Plasticity Index	26 %
Corrected water content for material passing 0.425mm		18.7 %	Liquidity Index	0.01
Sample retained 2mm sieve	(Measured)	2 %	NHBC Modified (I'p)	25 %
Curing time	27 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 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: 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)

TEST REPORT

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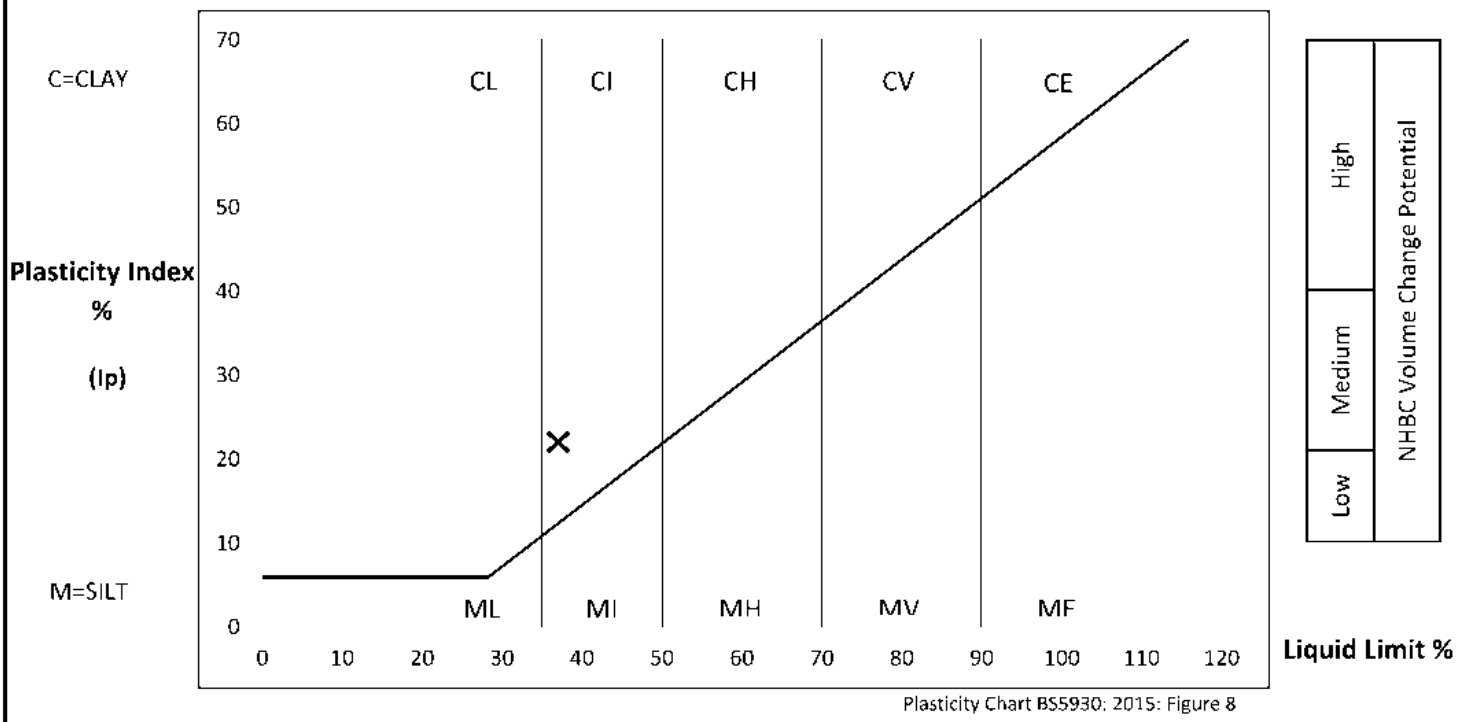
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH101	24.10	D	27	14.4	Hard dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium angular to subrounded chalk and chert	

PREPARATION			Liquid Limit	37 %
Method of preparation		Wet sieved over 0.425mm sieve	Plastic Limit	15 %
Sample retained 0.425mm sieve	(Measured)	9 %	Plasticity Index	22 %
Corrected water content for material passing 0.425mm		15.8 %	Liquidity Index	-0.03
Sample retained 2mm sieve	(Measured)	6 %	NHBC Modified (I'p)	20 %
Curing time	28 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 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: 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)

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

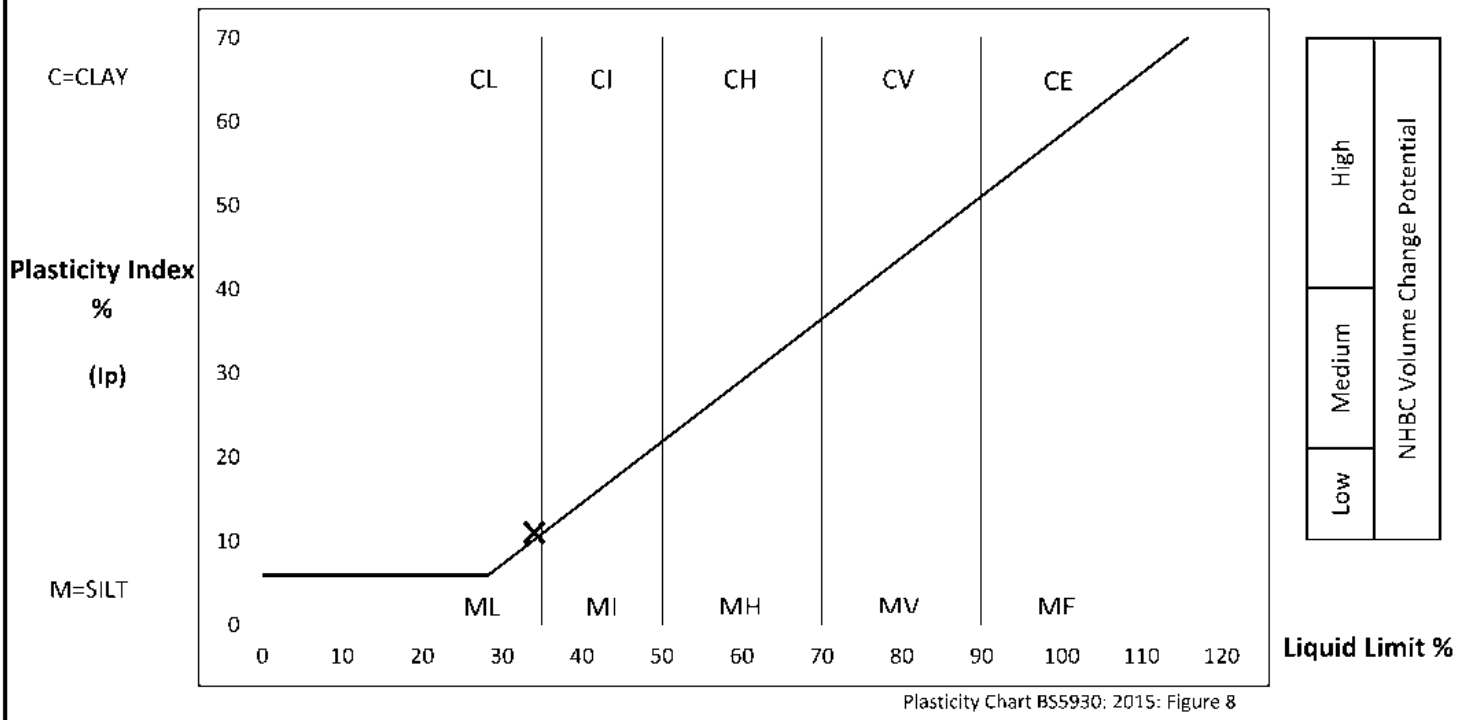
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH102	5.20	D	6	28.6	Very dark grey slightly organic very silty fine SAND locally oxidised to brown	Material noted as plotting above the A-Line.

PREPARATION			Liquid Limit	34 %
Method of preparation		From natural	Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	11 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.51
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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:

TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD

DATE ISSUED: 23/07/2021

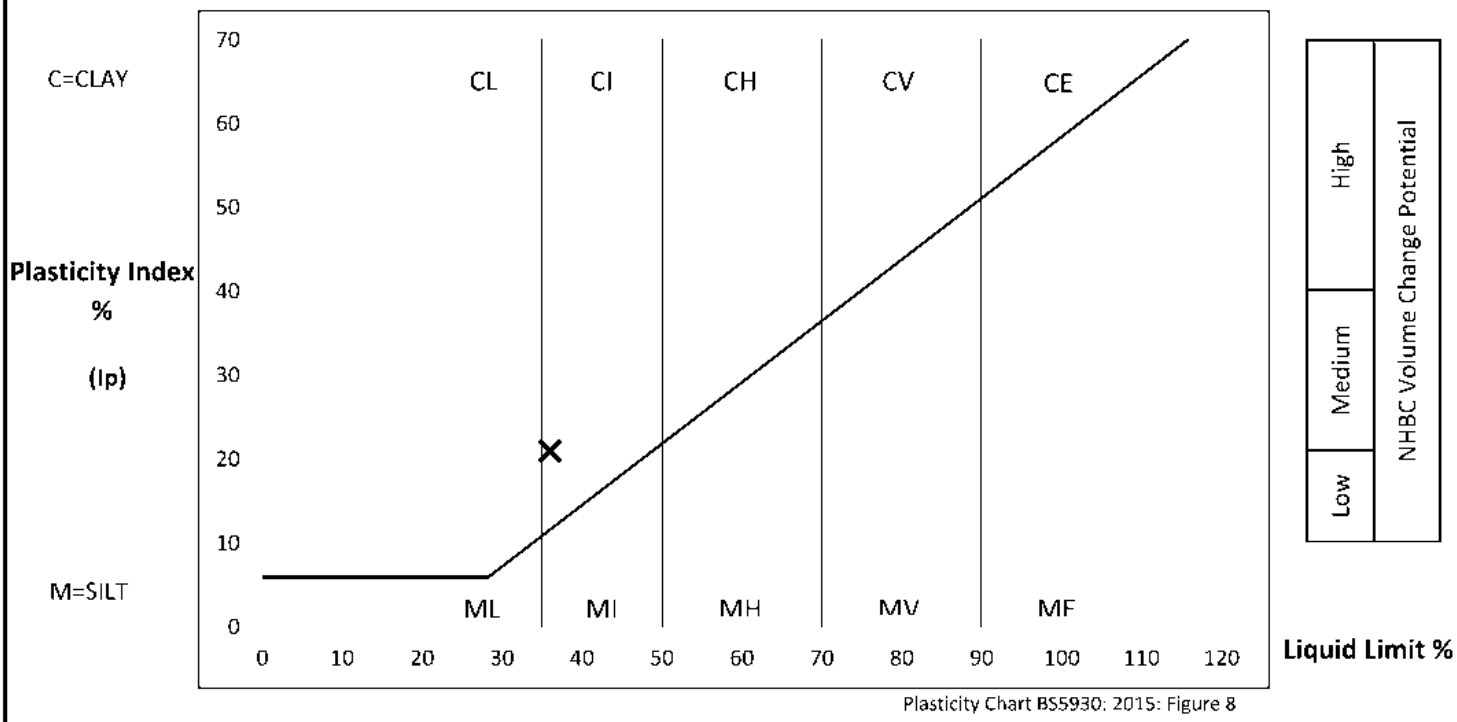
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH102	21.00	D	21	15.8	Very stiff dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium angular to subrounded chalk and chert	

PREPARATION			Liquid Limit	36 %
Method of preparation		Wet sieved over 0.425mm sieve	Plastic Limit	15 %
Sample retained 0.425mm sieve	(Measured)	8 %	Plasticity Index	21 %
Corrected water content for material passing 0.425mm		17.2 %	Liquidity Index	0.04
Sample retained 2mm sieve	(Measured)	5 %	NHBC Modified (I'p)	19 %
Curing time	27 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 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: 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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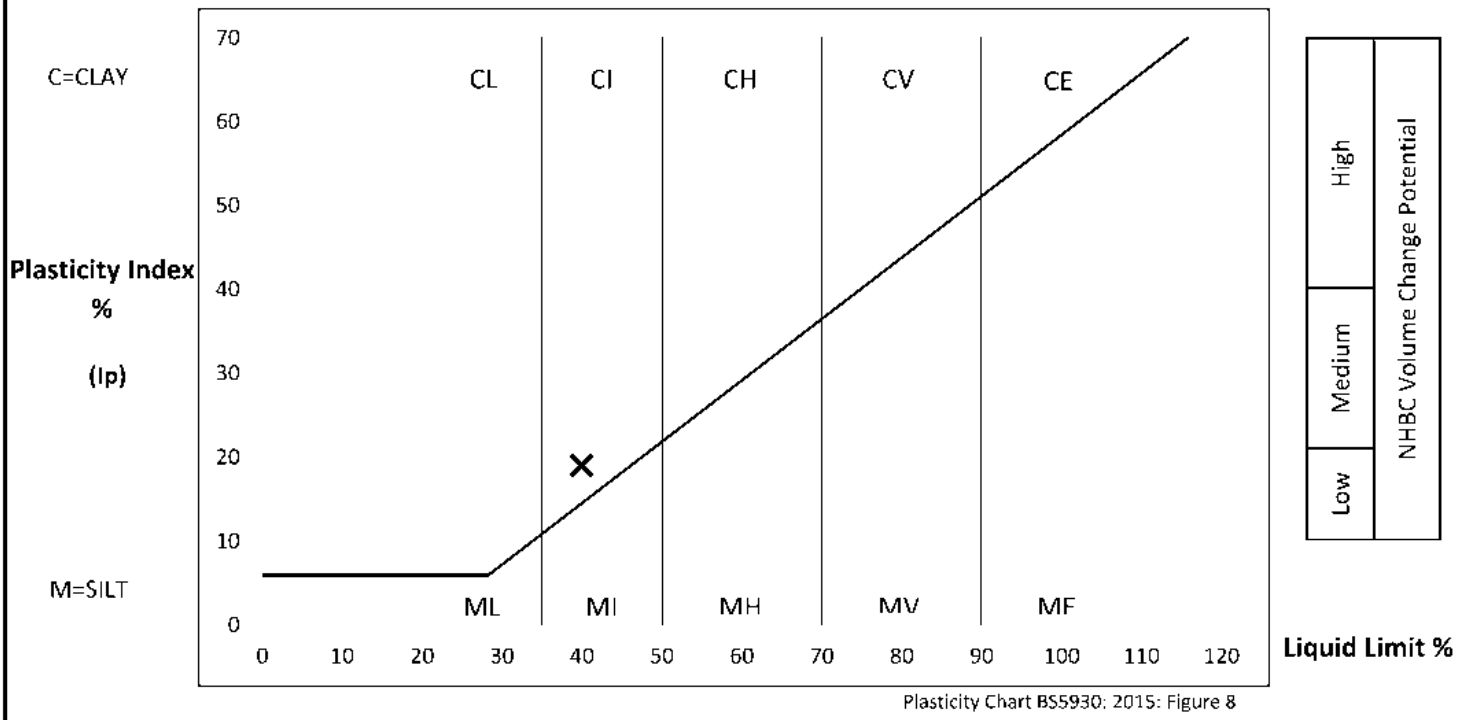
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Contract	**Pinchbeck**
Serial No.	**39021_1**

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

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH103	8.20	D	8	36.3	Very soft dark grey slightly organic silty CLAY locally oxidised to brown with rare fine shell debris	

PREPARATION			Liquid Limit	40 %
Method of preparation		From natural	Plastic Limit	21 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	19 %
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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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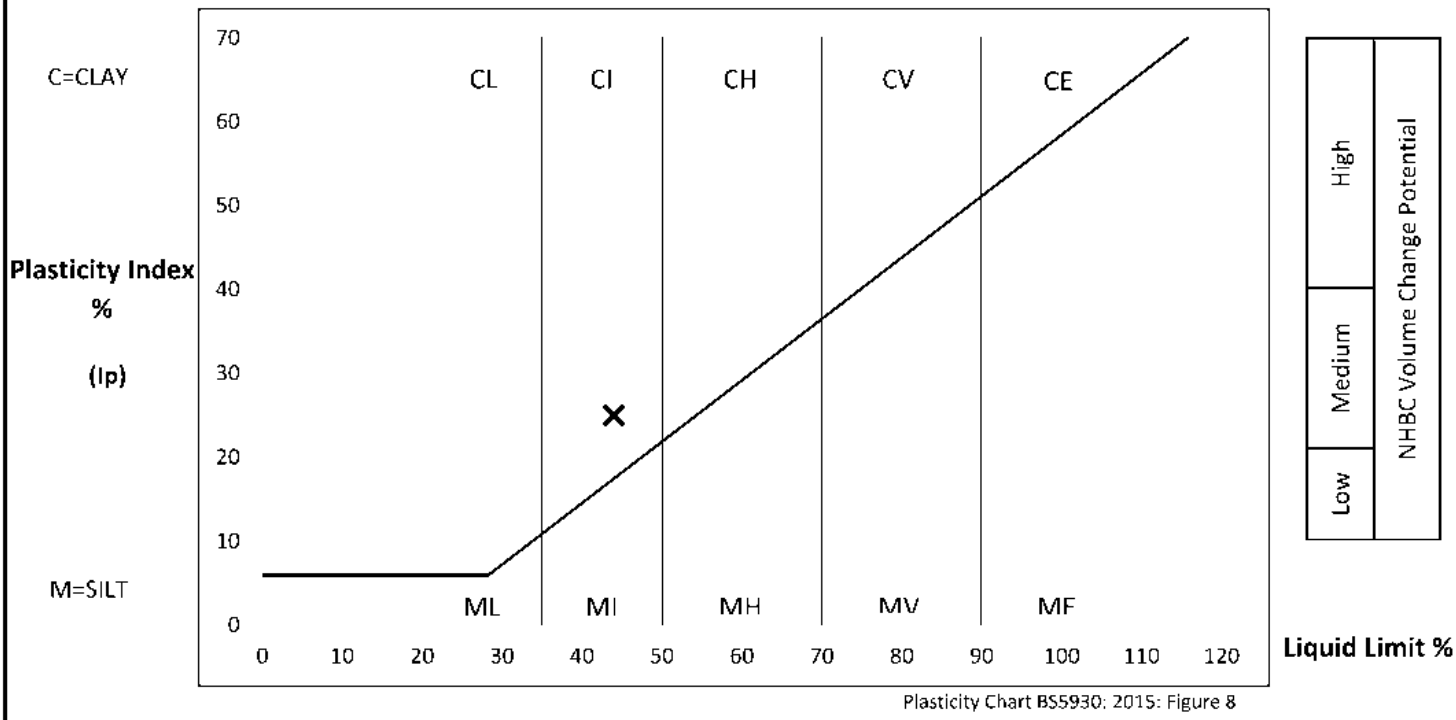
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
BH103	15.20	D	11	22.2	Firm dark yellowish brown slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subangular and subrounded chalk	

PREPARATION			Liquid Limit	44 %
Method of preparation	Wet sieved over 0.425mm sieve		Plastic Limit	19 %
Sample retained 0.425mm sieve	(Measured)	6 %	Plasticity Index	25 %
Corrected water content for material passing 0.425mm		23.7 %	Liquidity Index	0.13
Sample retained 2mm sieve	(Measured)	4 %	NHBC Modified (I'p)	24 %
Curing time	25 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 1377: Part 2: 1990: 4.2
Method of Test:	BS EN ISO: 17892-1: 2014 & BS 1377: 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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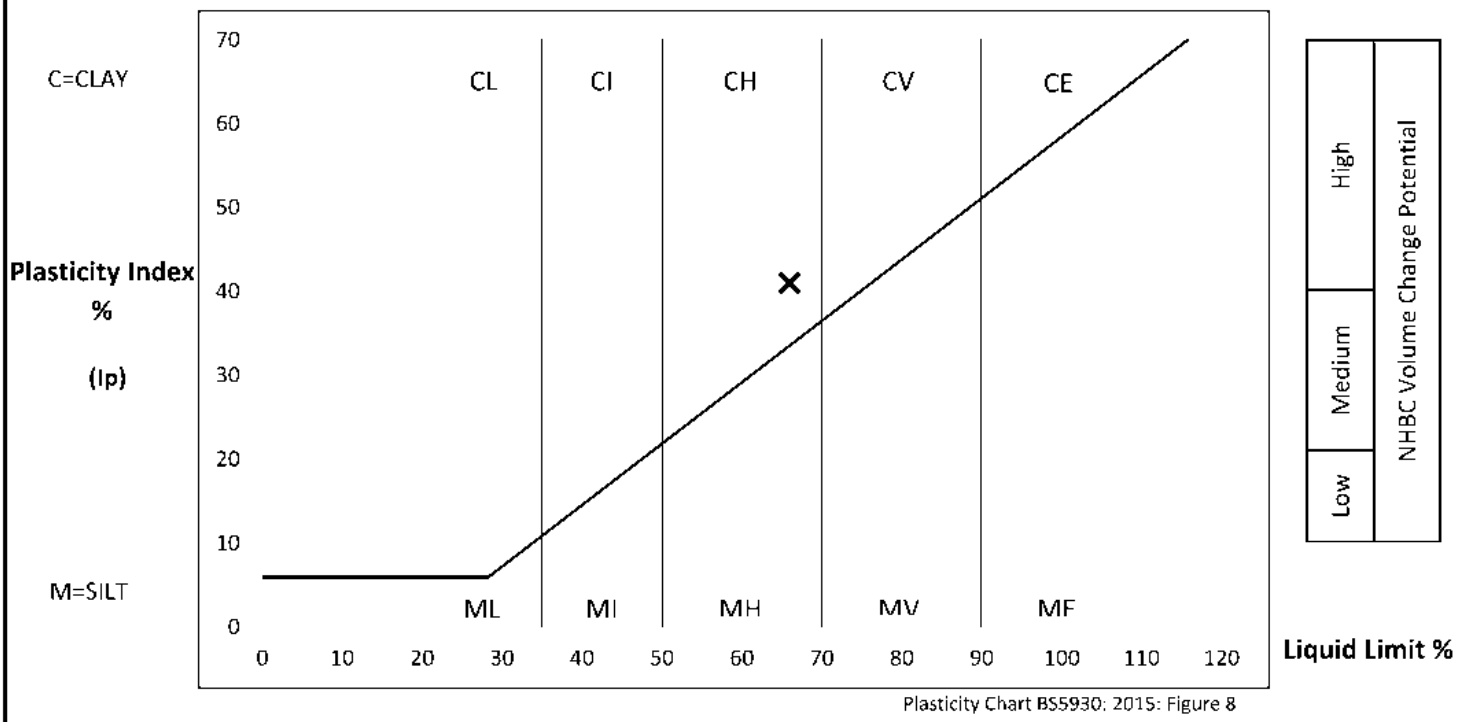
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
TP107	1.70	D	1	46.1	Soft mottled very dark grey and brown slightly organic CLAY	

PREPARATION			Liquid Limit	66 %
Method of preparation		From natural	Plastic Limit	25 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	41 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.51
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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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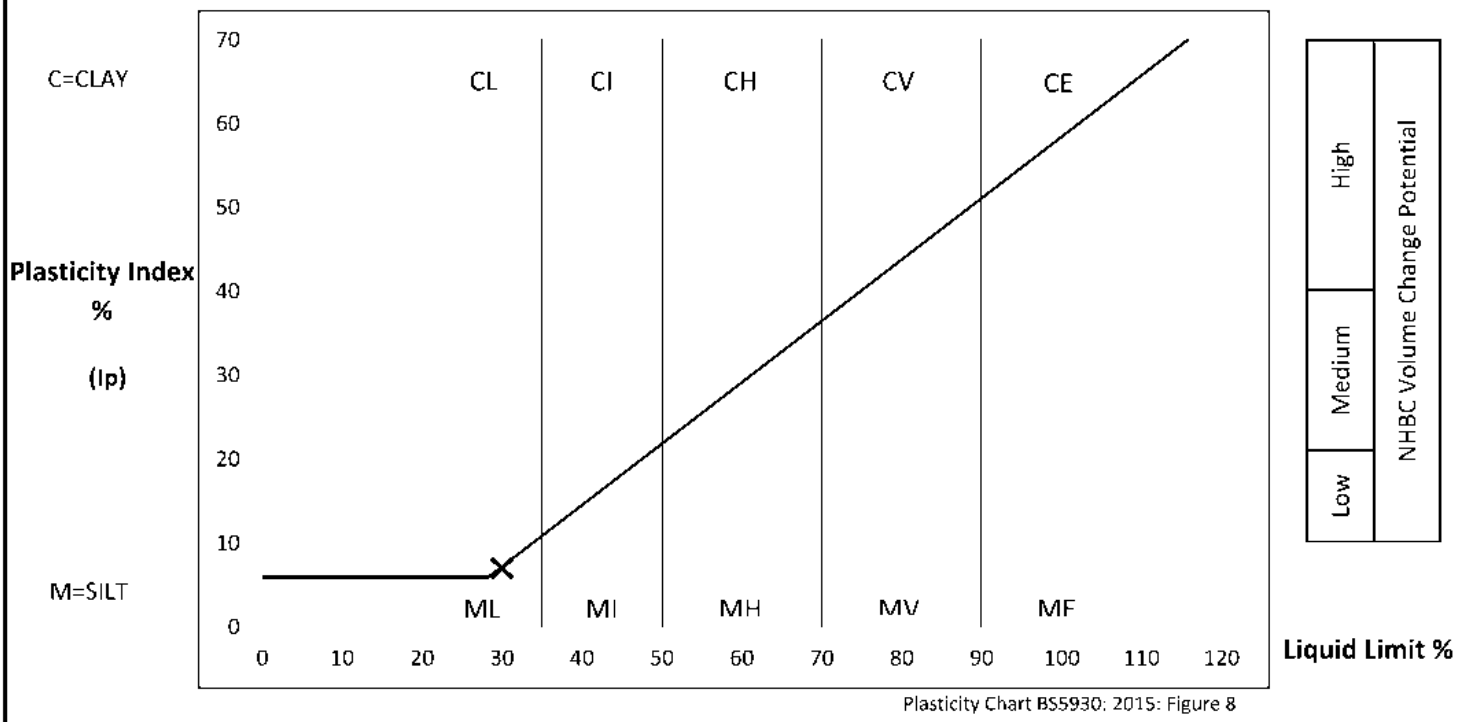
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Contract	**Pinchbeck**
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS101	1.50	D	1	27.1	Yellowish brown clayey fine SAND/SILT	

PREPARATION			Liquid Limit	30 %
Method of preparation		From natural	Plastic Limit	23 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	7 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.59
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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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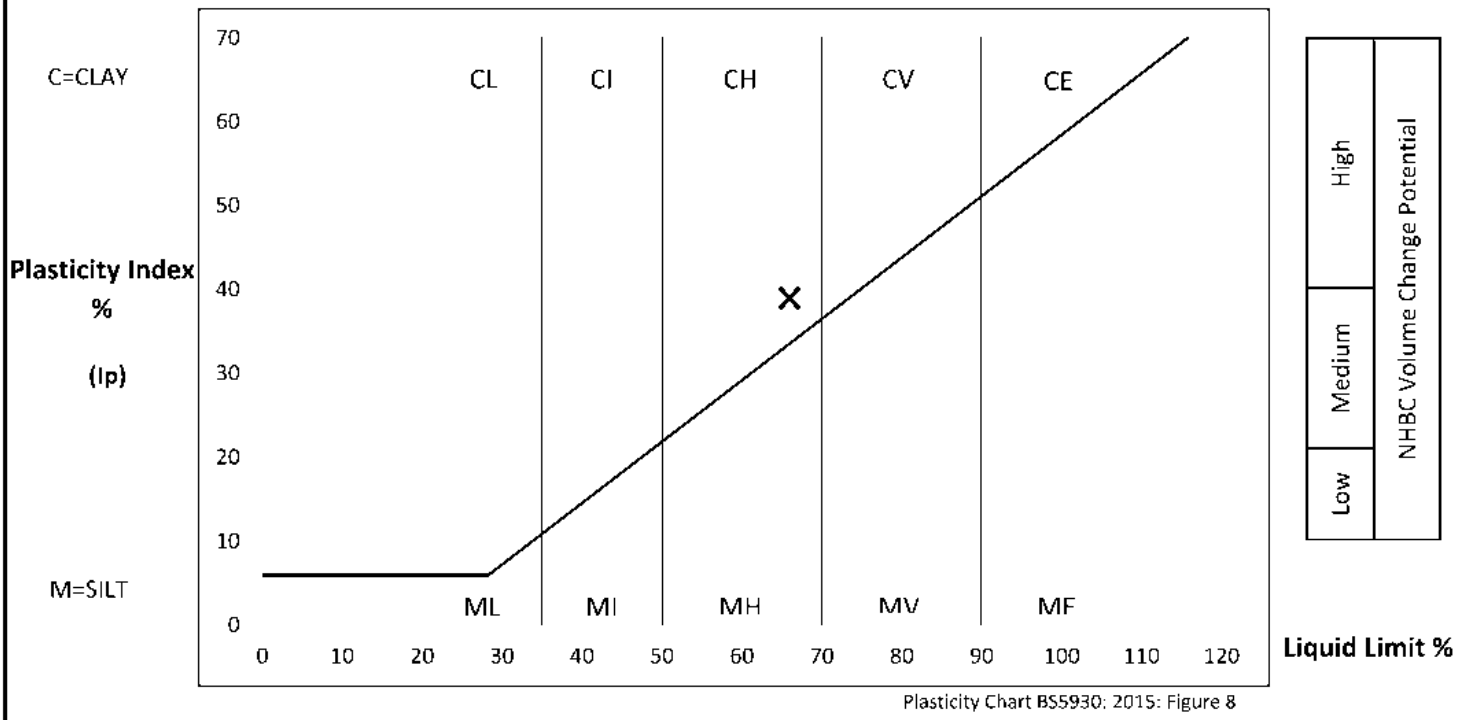
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS104	2.50	D	1	42.6	Soft yellowish brown CLAY with occasional bluish grey mottling	

PREPARATION			Liquid Limit	66 %
Method of preparation		From natural	Plastic Limit	27 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	39 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.40
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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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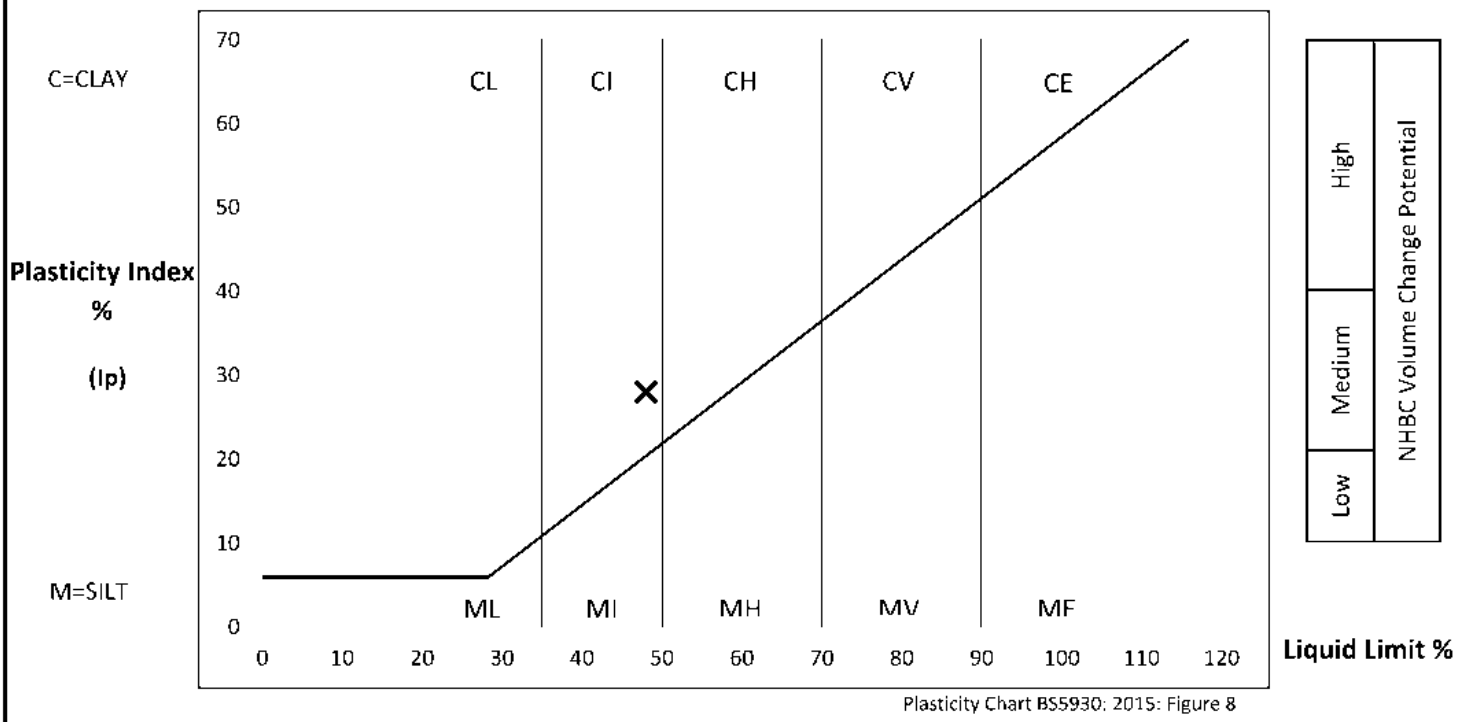
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DETERMINATION OF WATER CONTENT, LIQUID LIMIT AND PLASTIC LIMIT AND DERIVATION OF PLASTICITY INDEX AND LIQUIDITY INDEX

Borehole / Pit No.	Depth m	Sample Type	Sample Reference	Water Content (W) %	Description	Remarks
WS108	2.10	D	1	37.2	Very soft mottled bluish grey and brown silty CLAY with rare recently active and decayed roots	

PREPARATION			Liquid Limit	48 %
Method of preparation		From natural	Plastic Limit	20 %
Sample retained 0.425mm sieve	(Assumed)	0 %	Plasticity Index	28 %
Corrected water content for material passing 0.425mm			Liquidity Index	0.61
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 1377: Part 2: 1990: 4.2

Method of Test: BS EN ISO: 17892-1: 2014 & BS 1377: 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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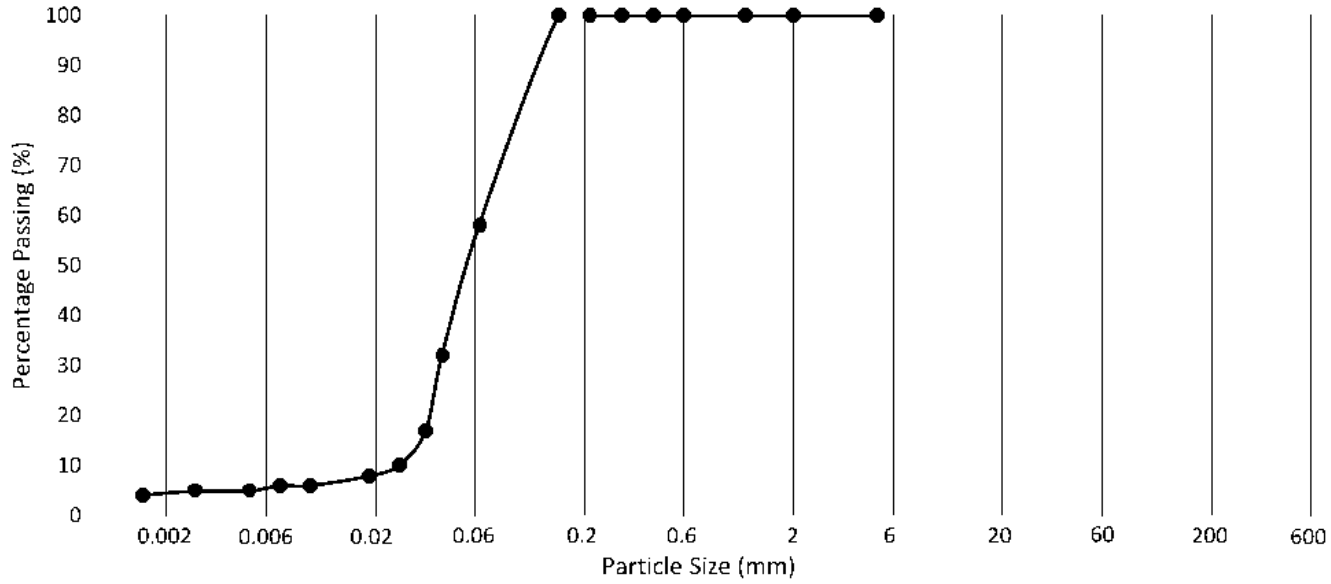
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Serial No.	**39021_1**

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
TP102	2.00	B	1	Dark brownish grey sandy SILT	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not required



Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0419	32	53	
	0.0347	17		
	0.0260	10		
	0.0187	8		5
	0.0098	6		
	0.0070	6		
	0.0050	5		
	0.0027	5		
	0.0015	4		

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

Fines By Dry Mass (%)	
<0.063mm	58

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		0
125		
90		
63		
50		
37.5		
28		
20		
14		
10		
6.3		
5	100	

Method of Preparation: BS1377: Part 1: 2016: 8.3 & 8.4.5
Method of test: BS1377: Part 2: 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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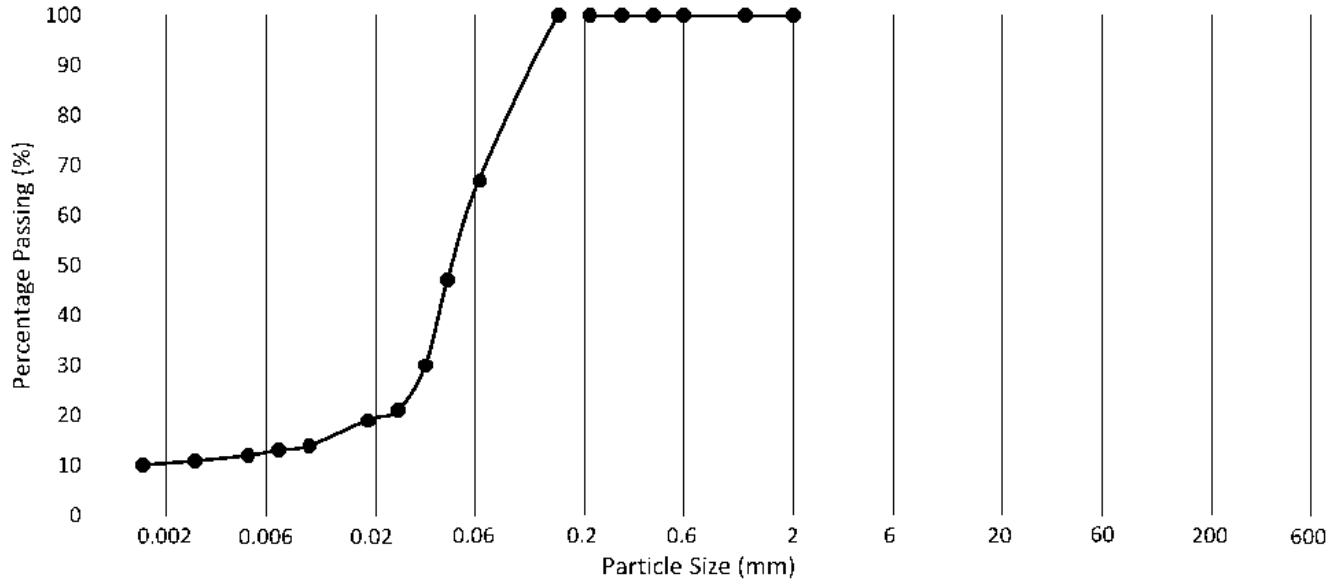
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DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample Type	Sample Reference	Description	Remarks
TP104	1.50	B	1	Yellowish brown slightly clayey slightly sandy SILT	

Method of Test:	Hydrometer + Pre-sieve	Method of Pretreatment:	Not required



Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)	Clay by Dry Mass (%)
	0.0442	47	57	
	0.0345	30		
	0.0256	21		
	0.0183	19		10
	0.0097	14		
	0.0069	13		
	0.0049	12		
	0.0027	11		
	0.0015	10		

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	33
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	100	
0.150	100	
0.063	67	

Fines By Dry Mass (%)	
<0.063mm	67

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		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: Part 2: 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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Serial No.	**39021_1**

DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASURMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)	Lateral Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	Mohrs Circle Analysis		Description
										Cu (kPa)	Ø degrees	
BH101	17.24	U	3	15.7	2.19	1.89	346 608 804	562 585 601	281 293 301	255	2.4	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert
BH101	20.24	U	4	15.2	2.17	1.88	404 599 798	576 594 612	288 297 306	258	2.5	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert
BH102	17.04	UT	2	15.7	2.23	1.93	338 605 800	623 644 645	312 322 323	310	0.3	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY with rare orange staining. Gravel is fine to coarse angular to subrounded chalk and chert
BH102	20.06	UT	3	15.6	2.21	1.91	400 604 802	640 658 669	320 329 335	295	2.1	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk/chert
BH102	23.05	UT	4	15.7	2.19	1.89	459 602 800	609 618 624	305 309 312	290	1.1	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subrounded and subangular chalk
BH103	16.79	UT	1	16.9	2.18	1.86	334 599 804	381 390 397	191 195 199	182	1.0	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert
BH103	19.75	UT	2	16.8	2.17	1.86	397 602 805	345 356 363	173 178 182	161	1.2	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse rounded to subangular chalk

Method of Preparation:	BS 1377: Part 1: 1990: 7.4.2 & 8, Part 2: 1990: 7.2, Part 7: 1990: 8.3
Method of Test:	BS 1377: Part 2: 1990:3 Determination of Moisture Content, Part2: 1990:7 Determination of Density, Part 7: 1990: 8 Undrained Shear Strenth, 9 Multistage Loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASURMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)	Lateral Pressure (kPa)	Deviator Stress (kPa)	Shear Stress (kPa)	Mohrs Circle Analysis		Description
										Cu (kPa)	Ø degrees	
BH103	22.74	UT	3	14.0	2.26	1.98	452	864	432			Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subrounded and subangular chalk

Method of Preparation:	BS 1377: Part 1: 1990: 7.4.2 & 8, Part 2: 1990: 7.2, Part 7: 1990: 8.3
Method of Test:	BS 1377: Part 2: 1990:3 Determination of Moisture Content, Part2: 1990:7 Determination of Density, Part 7: 1990: 8 Undrained Shear Strenth, 9 Multistage Loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
Remarks to Include:	Sample disturbance, loss of moisture, variation from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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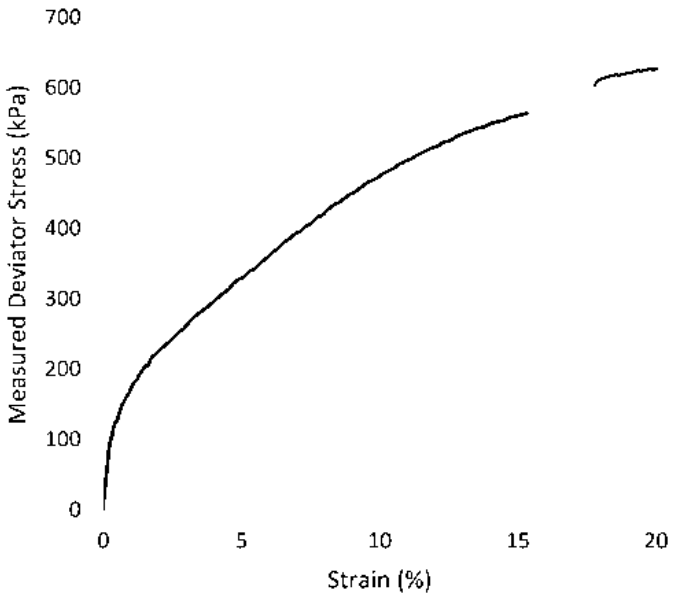
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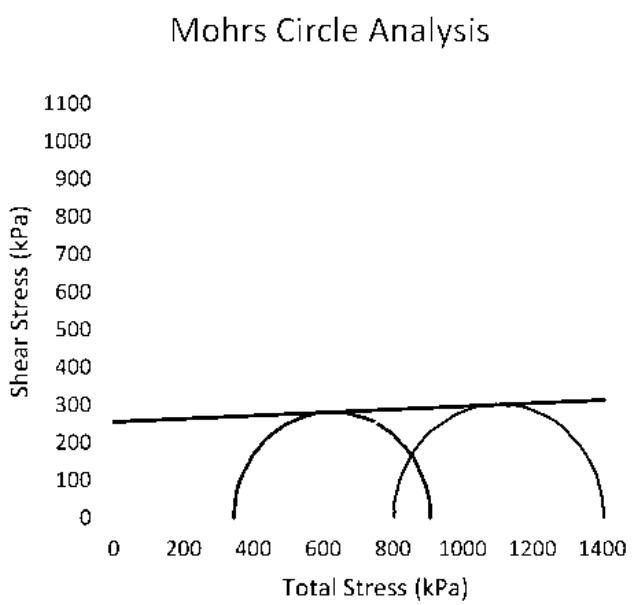
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH101	17.20	U	3	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 17.24	184.5	102.1	3302	15.7	2.19	1.89

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	346	15.3	1.8	/	562	281		
	608	17.5	2.0	12.9	585	293	255	2.4
	804	20.1	2.3	23.9	601	301		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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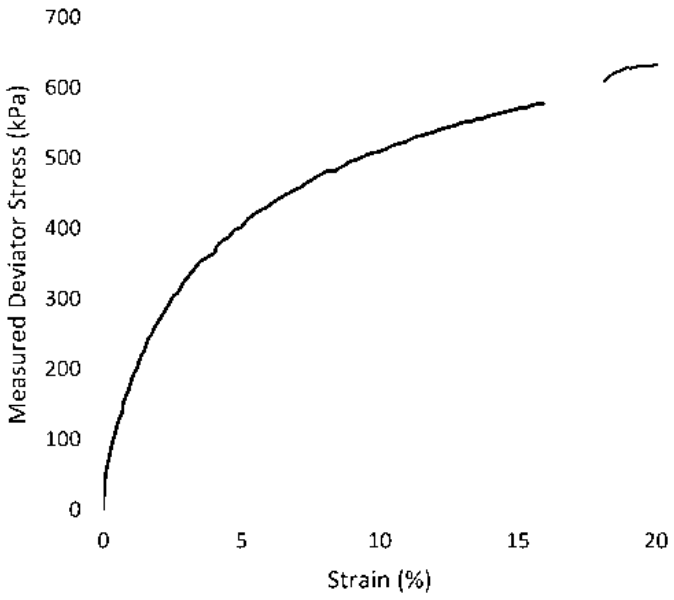
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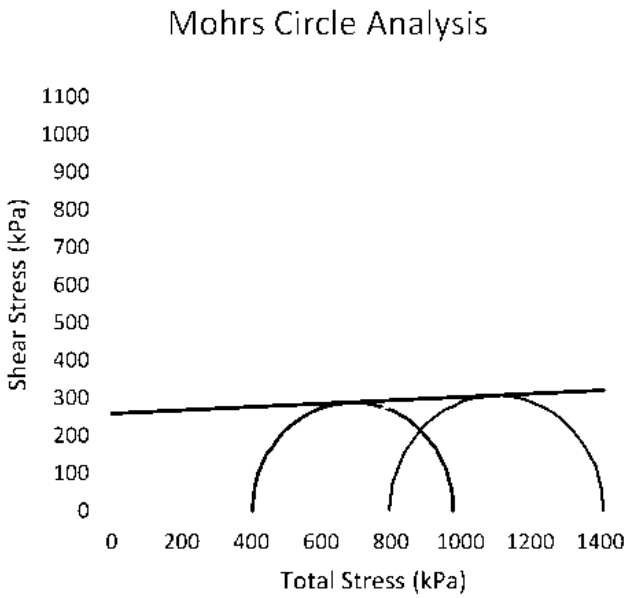
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH101	20.20	U	4	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 20.24	150.1	99.1	2516	15.2	2.17	1.88

TEST INFORMATION	Rate of Strain	1.9	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	404	15.9	1.9	/	576	288		
	599	17.9	2.1	9.7	594	297	258	2.5
	798	20.1	2.3	19.2	612	306		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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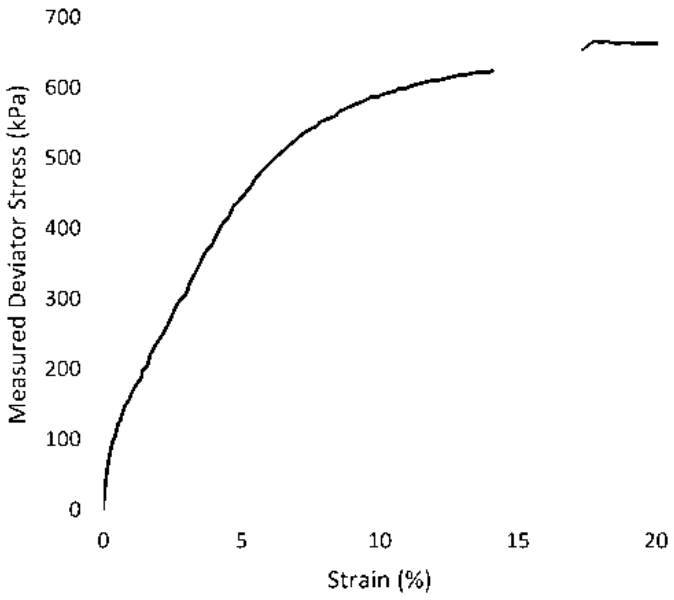
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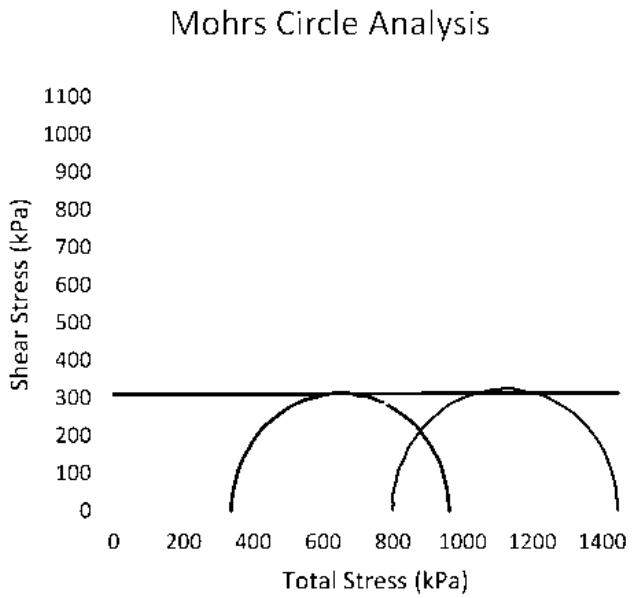
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH102	17.00	UT	2	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY with rare orange staining. Gravel is fine to coarse angular to subrounded chalk and chert	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 17.04	184.3	105.0	3563	15.7	2.23	1.93

TEST INFORMATION	Rate of Strain	1.9	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	338	14.1	1.7	/	623	312		
	605	17.1	1.9	6.7	644	322	310	0.3
	800	18.1	2.0	18.0	645	323		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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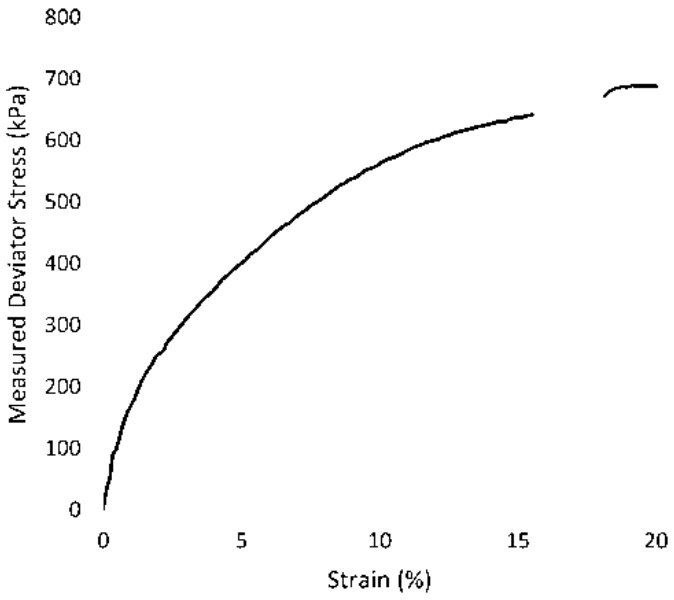
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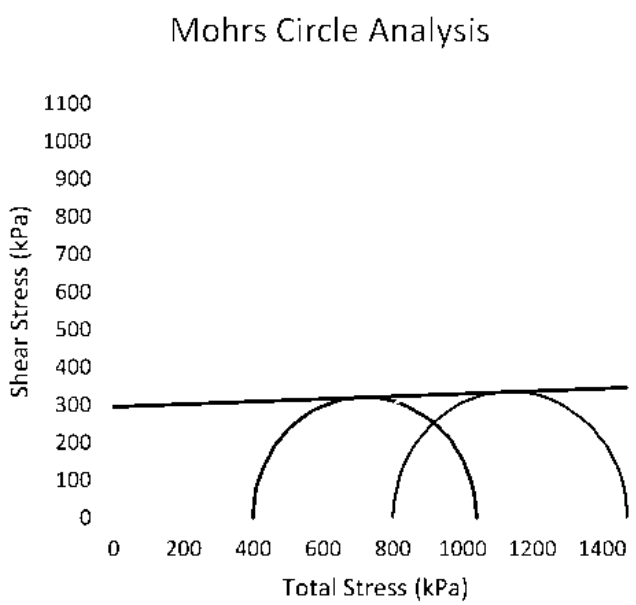
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH102	20.00	UT	3	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk/chert	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
Depth of Top of Specimen (m) 20.06	150.1	104.3	2834	15.6	2.21	1.91

TEST INFORMATION	Rate of Strain	1.9	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	400	15.5	1.8	/	640	320		
	604	17.9	2.0	9.6	658	329	295	2.1
	802	20.1	2.2	17.6	669	335		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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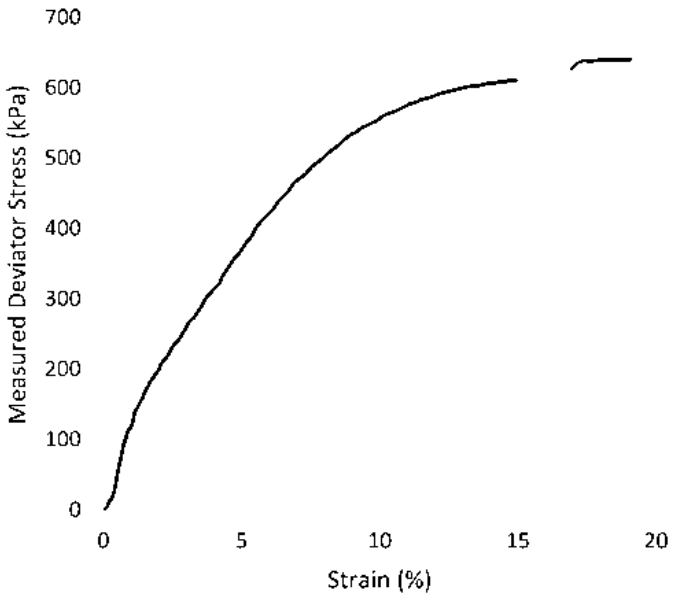
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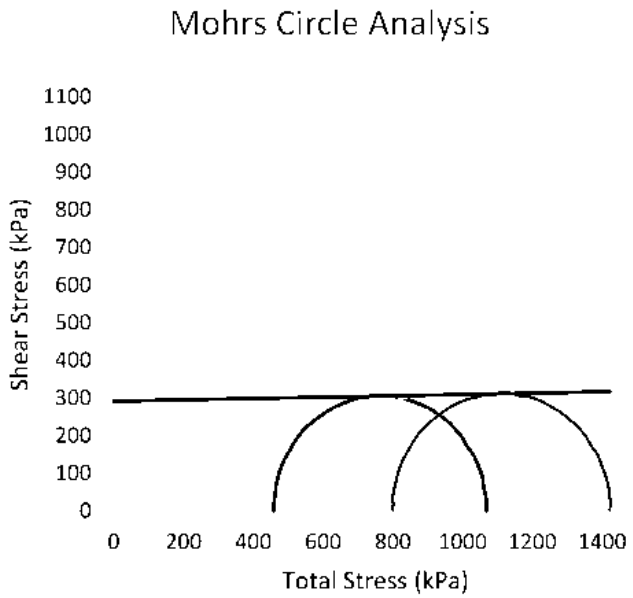
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH102	23.00	UT	4	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subrounded and subangular chalk	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 23.05	199.2	105.2	3795	15.7	2.19	1.89

TEST INFORMATION	Rate of Strain	1.9	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	459	14.9	1.7	/	609	305		
	602	16.7	1.9	5.7	618	309	290	1.1
	800	18.5	2.1	14.4	624	312		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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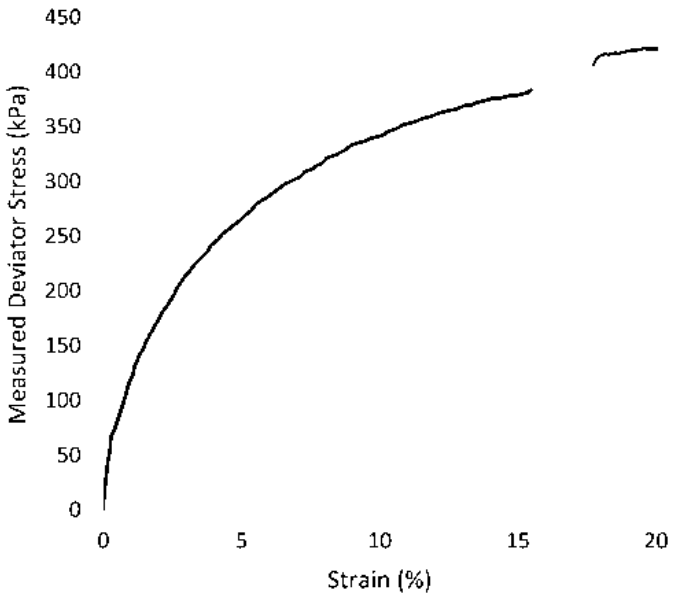
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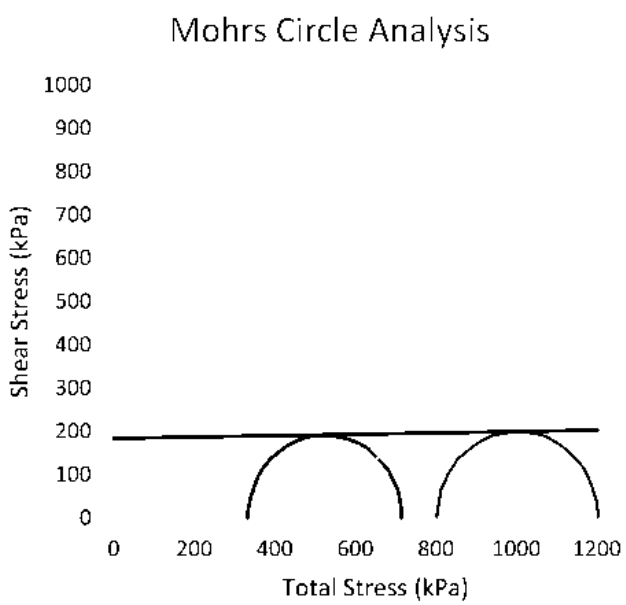
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

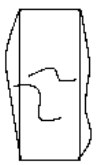
Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH103	16.70	UT	1	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 16.79	199.5	104.4	3734	16.9	2.18	1.86

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	334	15.5	1.8	/	381	191		
	599	17.5	2.0	12.9	390	195	182	1.0
	804	19.9	2.2	21.6	397	199		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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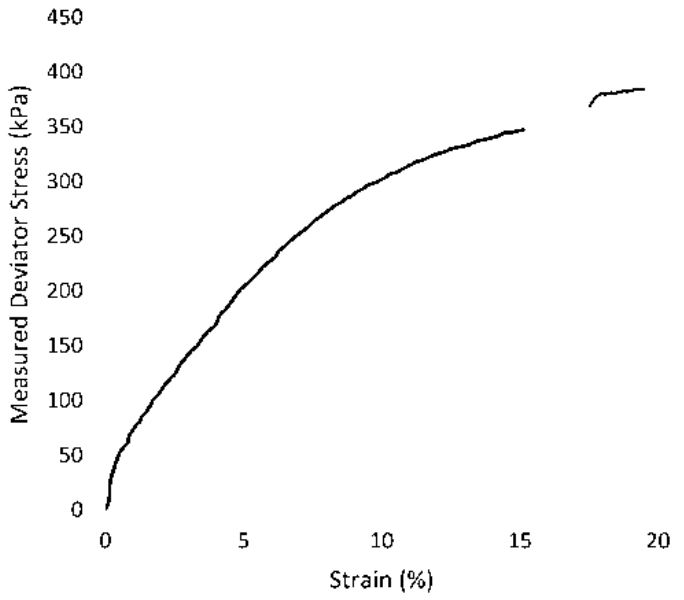
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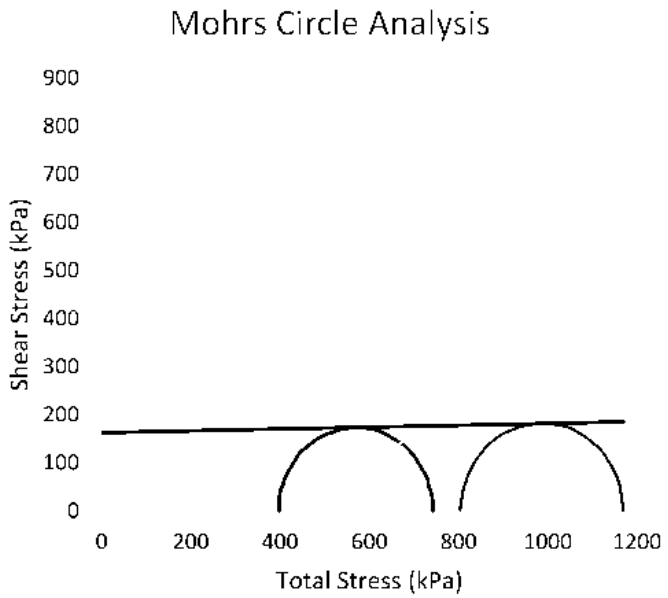
DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH103	19.70	UT	2	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse rounded to subangular chalk	

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 19.75	155.1	105.4	2935	16.8	2.17	1.86

TEST INFORMATION	Rate of Strain	2.0	% per Min	Rubber Membrane Thickness	0.6	mm





Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	397	15.1	1.7	/	345	173		
	602	16.9	1.9	8.7	356	178	161	1.2
	805	19.3	2.1	18.7	363	182		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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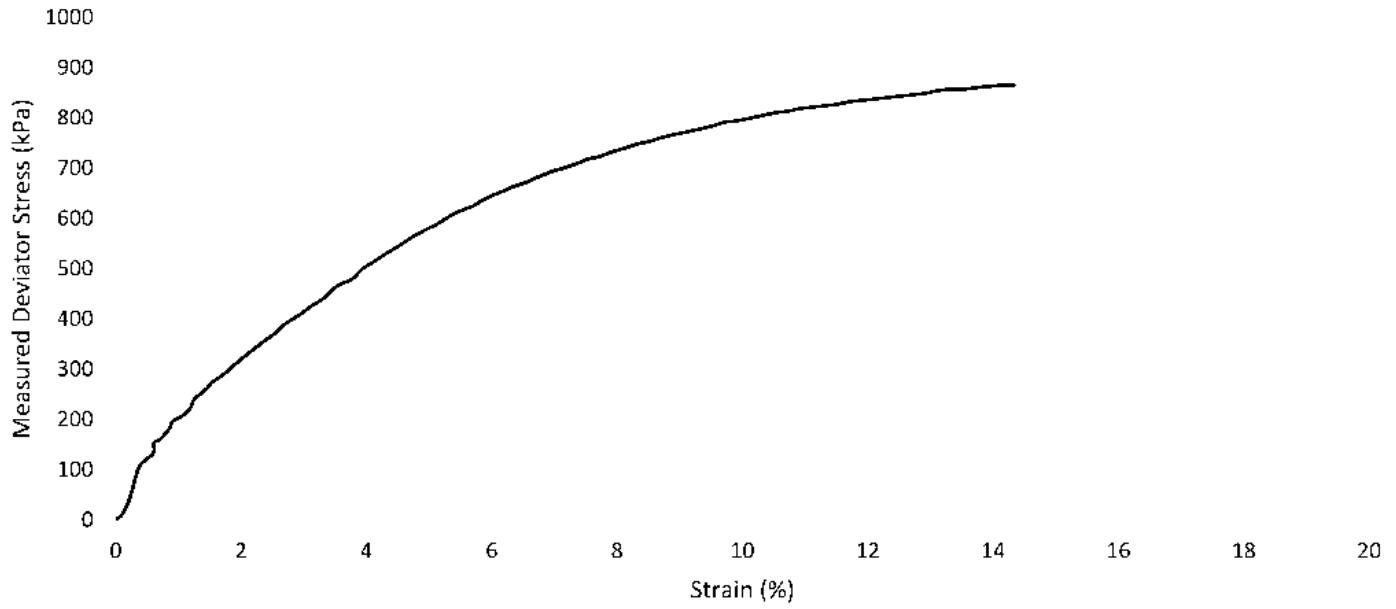
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DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH103	22.70	UT	3	Hard (extremely high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine and medium subrounded and subangular chalk	Load measuring device nearing maximum deflection during first confining pressure - Test Terminated

Initial Specimen	Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m^3)	Dry Density (Mg/m^3)
Depth of Top of Specimen (m) 22.74	199.4	105.0	3896	14.0	2.26	1.98

TEST INFORMATION	Rate of Strain	1.7	% per Min	Rubber Membrane Thickness	0.6	mm



Specimen at failure	Measured Cell Pressure, σ3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, (σ1-σ3)f (kPa)	Shear Stress Cu, ½(σ1-σ3)f (kPa)	Mohrs Circle Analysis	
			Rubber Membrane	Piston Friction			Cu (kPa)	PHI (degrees)
	452	14.3	1.7	\	864	432		

Method of Preparation:	BS 1377: Part 1: 1990
Method of Test:	BS 1377: Part 7: 1990: 8 Definitive Method, 1990: 9 Multi-stage loading
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Tested in Vertical Condition
	UKAS Calibration - loads from 0.2 to 10kN
Remarks to Include:	Sample disturbance, loss of moisture, variation form test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C

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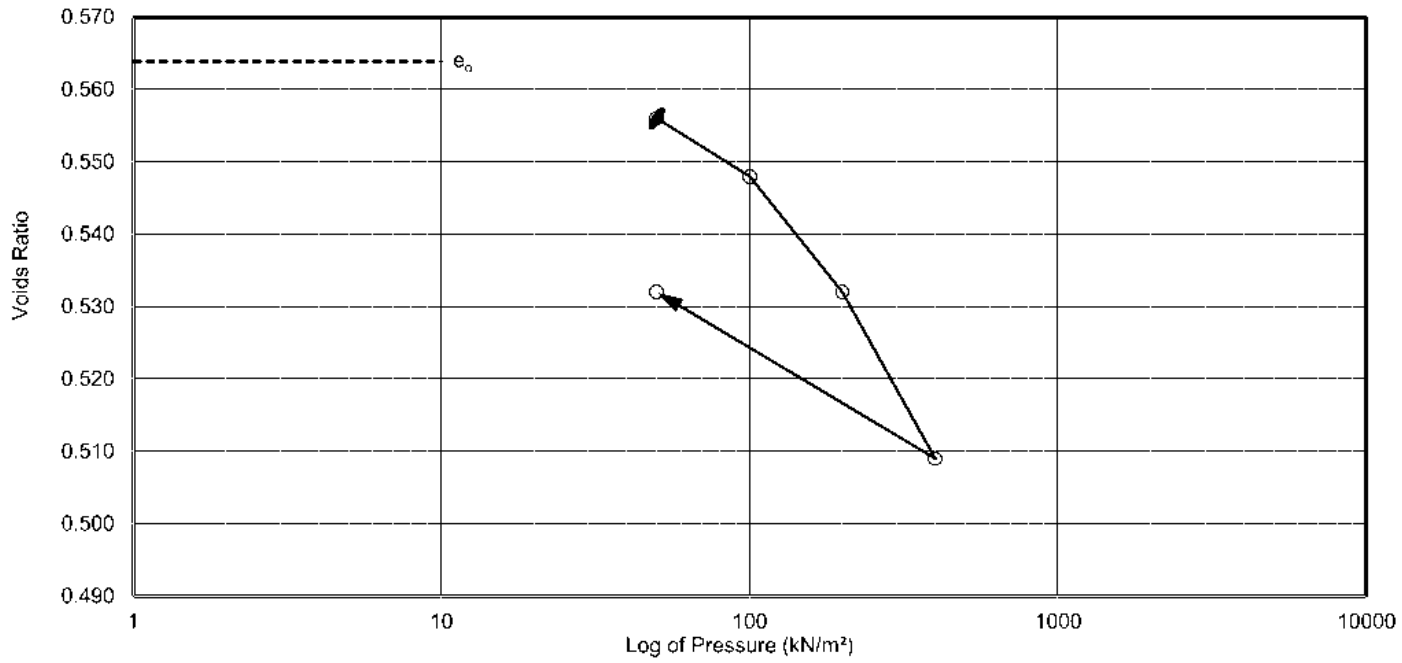
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DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description	Remarks
BH101	11.20	U	1	11.26 Horizontal	19.4	Very stiff olive brown slightly gravelly slightly sandy silty CLAY with occasional bluish grey mottling and decayed roots. Gravel is fine to coarse angular to subrounded chalk and chert	Visible gravel removed and replaced with matrix material.

Initial Conditions			
Height	mm	18.83	
Diameter	mm	75.01	
Wet Weight	g	177.88	
Water Content	%	19.4	
Bulk Density	Mg/m³	2.14	
Particle Density		Assumed	2.80
Voids Ratio		0.564	
Degree of Saturation	%	96	
Swelling Pressure	kN/m²		
Dry Density	Mg/m³	1.79	

Increment No.	Load (kN/m²)	Change in Height (mm)	Void Ratio	Cv (m²/yr)	Mv (m²/MN)	Temp (°C)	Corrected Cv
1	50	0.095	0.556	66.67	0.10	23	62.00
2	100	0.189	0.548	0.68	0.10	23	0.63
3	200	0.382	0.532	0.64	0.10	22	0.61
4	400	0.665	0.509	0.58	0.08	23	0.54
5	50	0.384	0.532		0.04	22	



Method of Preparation:	BS 1377: Part 5: 1990: 3.3 & 3.4
Method of Test:	BS 1377: Part 5: 1990: 3.5
Method of Time Fitting Used:	Square root
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
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 105-110 °C.

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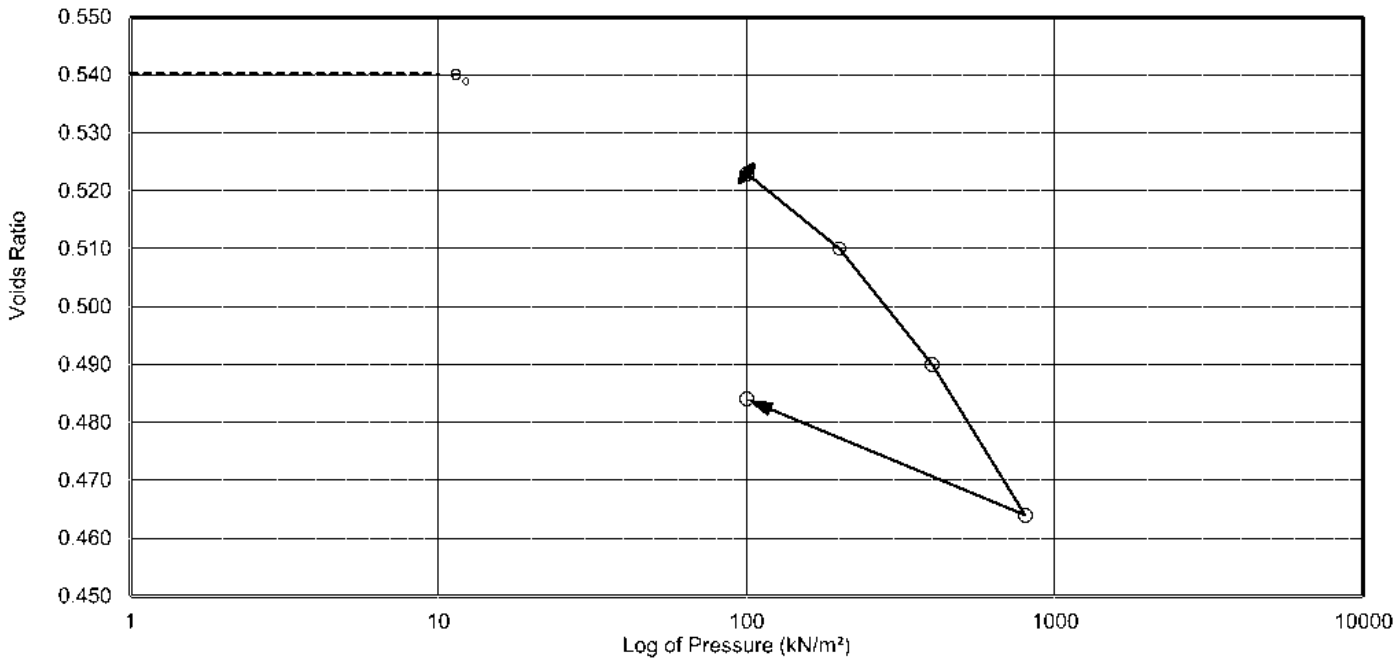
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DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description	Remarks
BH103	16.70	UT	1	16.76 Horizontal	18.6	Very stiff (very high strength) dark grey slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to subrounded chalk and chert	Visible gravel removed and replaced with matrix material.

Initial Conditions			
Height	mm	18.69	
Diameter	mm	50.02	
Wet Weight	g	78.60	
Water Content	%	18.6	
Bulk Density	Mg/m³	2.14	
Particle Density		Assumed	2.78
Voids Ratio		0.540	
Degree of Saturation	%	96	
Swelling Pressure	kN/m²		
Dry Density	Mg/m³	1.81	

Increment No.	Load (kN/m²)	Change in Height (mm)	Void Ratio	Cv (m²/yr)	Mv (m²/MN)	Temp (°C)	Corrected Cv
1	100	0.206	0.523	84.96	0.11	23	79.00
2	200	0.369	0.510	0.89	0.09	23	0.83
3	400	0.612	0.490	1.00	0.07	22	0.95
4	800	0.929	0.464	0.86	0.04	23	0.80
5	100	0.677	0.484		0.02	22	



Method of Preparation:	BS 1377: Part 5: 1990: 3.3 & 3.4
Method of Test:	BS 1377: Part 5: 1990: 3.5
Method of Time Fitting Used:	Square root
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	
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 105-110 °C.

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DETERMINATION OF THE MASS LOSS ON IGNITION

Borehole /Pit No.	Depth (m)	Sample		Loss on Ignition of Original Mass Passing 2mm Sieve		Percentage of Sample Passing 2mm Sieve	Description	Remarks
		Type	Reference	*Dried at 50°C	**Dried at 220°C			
BH101	8.20	D	8	**6.8**	4.9	100	Very soft dark grey organic silty CLAY locally oxidised to brown with rare shell debris	
BH102	6.50	D	7	**4.8**	3.4	100	Very soft dark grey slightly organic silty CLAY locally oxidised to brown with rare shell debris	
BH103	3.20	D	4	**2.1**	1.6	100	Very soft very dark grey slightly organic silty CLAY locally oxidised to brown with rare shell debris	

Method of Preparation:	BS1377: Part 3: 1990: 4.3.2
Method of Test:	BS1377: Part 3: 1990: 4.3.3
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	***Due to the temperature involved (440°C) some held water and clay mineral may be burnt off.** ****Deviation to test procedure (Ref. BS3882 Topsoil Analysis) - test specimen dried at 220°C to remove held water before loss on ignition at 440°C.** **Test not UKAS accredited.**
Remarks to Include:	Sample disturbance, loss of moisture, variation of test procedure, location and origin of test specimen within original sample