



Report
Title:

Additional Geo- Environmental Site Investigation

Project
Name:

Bartons Road, Havant



Report
Reference:

BRD4469-OR4-A

Date:

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BRD Environmental Ltd

Hawthorne Villa, 1 Old Parr Road,
Banbury, Oxfordshire, OX16 5HT
01295 272244 info@brduk.com
www.brduk.com

REPORT CONTROL SHEET

REPORT TITLE	ADDITIONAL GEO-ENVIRONMENTAL SITE INVESTIGATION
PROJECT	BARTONS ROAD, HAVANT
CLIENT	STONEBOND

REPORT REFERENCE	ISSUE DETAIL	DATE	PREPARED BY	CHECKED BY
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BRD Environmental Limited

Geotechnical and Environmental Services

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

Hawthorne Villa, 1 Old Parr Road, Banbury, Oxfordshire. OX16 5HT

T: 01295 272244

www.brduk.com

info@brduk.com

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Additional Geo-Environmental Site Investigation
Bartons Road, Havant
BRD4469-OR4-A Havant Add SI

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 for any further work required. This section should only be relied upon in the context of the whole report and the detailed within 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 works completed and meet the information required by current guidance and practice. The Technical Report is written in a language that, in part, assumes knowledge of the subject matter so that it can be written in as concise a form as possible. Its primary audience is clients, peers, regulators and other professionals in related disciplines.

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<p>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.</p>		

APPENDICES

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

APPENDIX 1 SITE PLANS

Site Location Plan	Ref. BRD4469-OP2-A
Proposed Development Layout	'Proposed Block Plan - Former SSE Offices, Bartons Road, Havant', Edgingtons Architects, Job No. 6087, drawing No. 1110, revision E, dated 05/01/2026.
Exploratory Point Plan	Ref. BRD4469-OD1-D
Revised Conceptual Site Model	Ref. BRD4469-OP6-D
Preliminary Foundation Zoning Plan	Ref. BRD4469-OD2-A

APPENDIX 2 EXPLORATORY HOLE & MONITORING RECORDS

Logs of trial pits.	Ref. TP304-TP314
Photographic records of trial pits.	Ref. BRD4469-OP10-A
Logs of boreholes.	Ref. WS209-WS212 & BH201-BH202
Gas monitoring records.	1 x A4 page
Groundwater monitoring records.	3 x A4 pages

APPENDIX 3 LABORATORY TEST RESULTS

DETS reports 26-09010.1, 26-09981.1, 26-10343, 26-10344 and 26-12164	34 x A4 pages
SPT report 50140_1	21 x A4 pages



SUMMARY REPORT- GENERAL INFORMATION

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site is currently unoccupied and derelict. The former SSE offices have been demolished leaving a surface of demolition rubble across the site in the location of the former offices. A large stockpile of crushed concrete is located in the centre of the site.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed as a residential housing estate comprising 58No. semi-detached and terraced houses and an apartment block containing 32No. apartments, with private and shared gardens and off-street parking, all served by a network of estate roads.
HISTORICAL SUMMARY	<p>The earliest available map from 1867 shows the site as agricultural. A stream was shown in the eastern and southern areas of the site, however by 1957 it was no longer present. By 1972, office buildings had been constructed on site. By the same time, a petrol station had been constructed to the southwest and an electricity substation to the east.</p> <p>By 1991 the offices had been extended and an above ground fuel tank installed centrally. The offices were then demolished at some point between 2016 and 2019, with the crushed arisings remaining on site.</p>
PUBLISHED GEOLOGY	<p>No superficial deposits are indicated to be present. However, Head Deposits are shown adjacent to the east and River Terrace Deposits approximately 160m south. Both deposits can be composed of clay, silt, sand or gravel.</p> <p>The shallowest bedrock is shown to be the Bognor Sand Member, which is typically described as a fine- and medium-grained sand.</p> <p>The Bognor Sand Member is underlain by the London Clay Formation, which typically comprises grey-brown silty clay.</p>
ACTUAL GROUND CONDITIONS	<p>This investigation encountered a variable cover of Made Ground overlying Head Deposits across most of the site, in turn overlying the Bognor Sand Member. Alluvium was also encountered in an isolated area of the site in the centre west.</p> <p>The London Clay Formation was encountered underlying the Bognor Sand Member at depth, with one of the deep boreholes reaching the likely interface between the London Clay Formation and the underlying Lambeth Group.</p>
HYDROGEOLOGY	<p>The Bognor Sand Member is designated as a Secondary A Aquifer.</p> <p>The site is located within a groundwater Source Protection Zone 1 (Inner Protection Zone) - Subsurface activity only (1c). This means the aquifer is confined and will only be affected by deep subsurface activity such as deep drilling.</p>
HYDROLOGY	<p>The closest identified surface water feature to the site is a stream approximately 311m east of site.</p> <p>The site is not at risk from flooding.</p>

SUMMARY REPORT - GEOTECHNICAL

SUBJECT	COMMENTS
EXCAVATIONS	<p>It should be possible to forward excavations employing normal equipment. Whilst some substructures are still present in the ground, it is considered conventional hydraulic plant should be sufficient to progress excavations in the soils encountered. Should any existing substructures be encountered then the use of specialist break plant is likely to be required.</p> <p>Limited groundwater control in the form of pumping from sumps is likely to be required for some shallow excavations (<1.5m). For excavations below 1.5m bgl depth, groundwater ingress should be anticipated and provision made for its control. For deeper excavations, we would recommend consultation with a specialist groundwater control contractor.</p>
SLOPE STABILITY	It is considered that slope stability is unlikely to be a concern at this site.
PAVEMENT DESIGN	<p>Preliminary design California Bearing Ratios (CBR) are recommended for the following ground types,</p> <p>Made Ground - < 2%</p> <p>Fine-grained Head Deposits - 3%</p> <p>Coarse-grained Head Deposits & Bognor Sand Member - 20%</p>
SUB-SURFACE CONCRETE	<p>Design Sulphate Class of DS-1 and Aggressive Chemical Environment for Concrete (ACEC) class of AC-1 applies for all on site soils except the London Clay Formation. This classification will therefore apply to all situations apart from piling.</p> <p>The London Clay Formation has a Design Sulphate Class of DS-4 and Aggressive Chemical Environment for Concrete (ACEC) class of AC-3s, however, as the nature of piling does not lead to soil oxidation then a reduced classification of DS-1 / AC-1s will apply for piling.</p>
FOUNDATIONS	
LIKELY FOUNDATION TYPE	<p>Conventional shallow/trench fill foundations should be suitable for those parts of the site away from areas of deep Made Ground and tree influence. Reinforced footings will be required for those footings founding in the Head Deposits.</p> <p>In the site underlain by thicker Made Ground in excess of 1.5m depth or where tree influence dictates a deeper foundation, then an alternative deeper foundation solution such as piling is required.</p> <p>A preliminary foundation zoning plan is included within the main report identifying these areas.</p>
VOLUME CHANGE POTENTIAL	<p>Head Deposits - Assume a high-volume change potential given the variation in near surface soil type.</p> <p>Bognor Sand Member - Non-shrinkable soil.</p>

SUBJECT	COMMENTS
ESTIMATED FOUNDATION DEPTHS	<p>The minimum footing depth required is 1.0m, and generally 1.5m where required to allow for restricted new tree planting. Regardless, all foundations should be taken down through the Made Ground, and locally Alluvium, and into the Head Deposits or Bognor Sand Member.</p> <p>Should the foundation be emplaced entirely within the Bognor Sand Member then the non-shrinkable classification can be assumed and there will be no impact from tree influence.</p> <p>Pile lengths to be determined by specialist piling contractor.</p>
FOUNDATION HEAVE PROTECTION	Will be required for some plots.

SUMMARY REPORT - CONTAMINATION ISSUES

SUBJECT	COMMENTS
SOIL RISKS TO HUMAN HEALTH	<p>The investigation has identified some risks to future residents from microscopic asbestos insulation debris identified within the original site Made Ground around the former fuel tank location, located in the centre north of the site. No asbestos contamination has been identified anywhere else on the site.</p> <p>Likewise, there is the potential for some localised fuel contamination to still be present in the location of the fuel tank footprint, which potentially presents a risk to both future residents. This area requires some further investigation but requires part of the large stockpile to be moved.</p> <p>This investigation has also identified the need for barrier water supply pipes in the location of the former tank.</p>
ASBESTOS	
LANDFILL GAS	The gas monitoring completed previously has shown that landfill gas protection measures are not required.
RADON GAS	Radon gas protection measures are not required.
RISKS TO THE WATER ENVIRONMENT	A risk to water environment has been identified by this investigation from the elevated concentrations of fuel hydrocarbons recorded in the groundwater at the site as well as the potential area of fuel contamination around the former fuel tank location.
RISKS TO BUILDING MATERIALS AND SERVICES	Due to the concentrations of hydrocarbons recorded during this investigation it is considered likely that 'barrier' pipes incorporating an aluminium foil layer or plastic wrapped metal pipes will be required for water supplies in the location of the former tank.
OUTLINE REMEDIATION STRATEGY	The remediation requirement at the site will be dependent on the findings of the further investigation around the fuel tank (as discussed above). However, as any contamination around the tank location is likely to be localised and that this is the only contamination on the site, it is considered that the remediation will be limited to some targeted removal of the contaminated soils (asbestos and fuel contamination), potentially alongside some longer term monitoring of the underlying groundwater regime.

SUMMARY REPORT - KEY RECOMMENDATIONS

CONTAMINATION RECOMMENDATIONS

Further trial pits are required in the vicinity of the former above ground diesel tank, once the stockpile of crushed concrete has been moved, in order to investigate the full footprint of the former tank location and to delineate the extent of the identified asbestos and hydrocarbon contamination in this area.

As part of these further works, it is proposed that a further groundwater monitoring visit is undertaken to supplement the existing analytical dataset and identify any variation in the fuel contaminant concentrations.

Once the further investigation has been completed then a formal remediation strategy should therefore be developed by an experienced Geo-Environmental Consultant. This strategy will look to address the requirements of Condition 20 of the planning permission.

GEOTECHNICAL RECOMMENDATIONS

Generally, it is considered that no further geotechnical ground investigation is recommended at this stage.



1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Stonebond Properties (Guildford) Limited trading as Stonebond.
SITE	Land situated at the former SSE offices off Bartons Road, Havant.
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	Additional geo-environmental site investigation (i.e. combined geotechnical ground investigation and Phase 2 contamination assessment).
REPORT OBJECTIVES	<p>The site has been the subject of a desk study and two phases of ground investigation undertaken by BRD, referenced as follows:</p> <ul style="list-style-type: none">• 'Phase 1 Environmental Desk Study - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR1-A, dated August 2024.• 'Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.• 'Soakage Investigation - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025. <p>As part of the Phase 2 investigation, some uncertainties were identified that warranted further investigation in order to delineate areas of different ground conditions. As part of the review of this report by the Environmental Control Officer for Havant Borough Council, they also requested further investigation in the central area of the site around the location of a former above ground fuel tank that supplied a generator.</p> <p>The purpose of this report is to document the additional ground investigation works undertaken and to address the concerns of the Environmental Control Officer. This in turn will look to address the requirements of Condition 20 of planning permission ref. APP/25/00639, issued by Havant Borough Council.</p>

1.2. SCOPE OF WORKS

The agreed scope of works was:

1.2.1. Further Groundwater Monitoring (2024/2025)

Following, the issue of the Phase 2 investigation report, a total of 4No. further groundwater monitoring visits were undertaken through the winter period.

1.2.2. Additional Ground Investigation (2026)

- Mobilisation to site and production of health and safety documentation.
- Setting out of the exploratory points and determination of the accurate location and level of exploratory points by topographical grade GPS unit.



- One day of windowless sampling using a percussive drilling rig to provide approximately 4-5No. boreholes to a nominal depth of 3m-6m, ground conditions permitting. Undertake Standard Penetration Tests (SPT) at 1m intervals. Installation of a 3m-6m depth groundwater monitoring well (nominal 50mm diameter) into 4No. boreholes.
- One day of trial pitting using a mechanical excavator to provide approximately 10No. trial pits to a nominal depth of up to 3m, ground conditions permitting.
- Drilling of 2No. boreholes using cable percussive drilling techniques to a target depth of 25m depth, ground conditions permitting. Recovery of undisturbed and disturbed samples and in-situ Standard Penetration Testing (SPT) in general accordance with BS5930:2015+A1:2020.
- All exploratory points will be logged and sampled in general accordance with BS5930:2015+A1:2020 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.
- Geo-Environmental Technician to undertake a total of 2No. groundwater monitoring visits with the purging of monitoring wells on the first visit and the collection of groundwater samples for testing using sampling equipment dedicated to each well on the second visit.
- Chemical testing of soil samples with the budget based on the following testing schedule:
 - 3No. Metals Suite - As, Cd, Cr, CrVI, Hg, Pb, Se, Cu, Ni and Zn.
 - 3No. Inorganics Suite - water soluble sulphate, pH, organic matter.
 - 6No. Speciated Polycyclic Aromatic Hydrocarbons (PAH).
 - 6No. Banded aliphatic/aromatic Total Petroleum Hydrocarbons (TPH).
 - 6No. Benzene, Toluene, Ethylbenzene, Xylene (BTEX) and Methyl Tertiary Butyl Ether (MTBE) compounds.
 - 8No. Polychlorinated Biphenyls (PCB) - 7 Congeners.
 - 3No. Asbestos screen with quantification (if positive).
- Chemical testing of 4No. water samples for the following testing schedule:
 - 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 1No. soil sample for Waste Acceptance Criteria (WAC) to assist in establishing landfill type for soil disposal purposes.
- Geotechnical testing as appropriate to the nature of the ground conditions encountered, but the budget is based on the following testing schedule:
 - 10No. Moisture content.
 - 10No. Plasticity indices.
 - 4No. Particle size distribution by wet sieve and follow on hydrometer.
 - 12No. Shear strength by quick undrained triaxial compression test.
 - 2No. One dimensional consolidation tests by oedometer.
 - 10No. pH and water soluble sulphate analysis - soil.
 - 10No. Total sulphate and sulphur analysis - soil.

- Provision of a combined factual and interpretative additional investigation report. Factual findings to include all exploratory point records, monitoring and test results. Interpretative reporting to include an updated Generic Quantitative Contamination Risk Assessment (GQRA), waste classification and an updated Geotechnical Assessment providing comments on pavement design, concrete classification, foundation design recommendations.

After initial phase of site work and the results from the first monitoring visit, the scope was expanded to include the following items:

- Geo-Environmental Technician to undertake an additional groundwater monitoring visit.
- Chemical testing of a further 7No. water samples (taken from both the new and existing wells) for the following testing schedule:
 - 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 and other non-aqueous invasive weeds, 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. For excavations planned within six metres of a third part structure then separate professional advice should be sought in respect of the requirements of the Party Wall Act.

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, were 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	Former SSE offices, Bartons Road, Havant, Hampshire, PO9 5TH.
NATIONAL GRID REFERENCE	472160E, 108010N.

2.2. SITE DESCRIPTION

SUBJECT	COMMENTS
CURRENT SITE DESCRIPTION	<p>The site is currently unoccupied and derelict. The former SSE offices have been demolished leaving a surface of demolition rubble across most of the site and a large stockpile of crushed concrete in the centre of the site.</p> <p>The site slopes by just over 3m from the north to the south. However, the natural slope of the site has been changed due to the historical development and the also the recent demolition works.</p> <p>Along the northern edge is a retaining wall. The retaining wall is around 3m from the site boundary. The top of the wall is in line with the adjacent road level, which is around 1m higher than the general site level.</p> <p>The site starts to slope from the north; however, the central area of the site has previously been re-graded. The demolition area slopes by around 0.60m over approximately 90m. There is a steeper slope along the southern edge of the demolition arisings, in the central southern area of the site. The rest of the southern area gradually slopes by around 1m to the southern boundary.</p> <p>The boundaries of the site are generally overgrown with vegetation, with some areas of grass and other low vegetation and saplings across the site. Off-site, but bordering the northern boundary, are a number of mature trees.</p>
SURROUNDING LAND USE	<p>The site is set in a mixed residential and commercial area within Havant.</p> <p>Directly north of the site is Bartons Road, beyond which are residential houses. Directly east of the site is a football ground, with associated infrastructure, and an electric substation and office building. A storage tank is located next to the electric substation, but the contents are unknown.</p> <p>Directly south of the site is Martin Road, beyond which are residential houses and another small electric substation. There is a garage just to the southwest of the site with a road, the B2149, forming the rest of the western boundary. Beyond this road are residential houses and flats.</p>
PROPOSED DEVELOPMENT	<p>It is proposed that the site will be developed as a residential housing estate comprising 58No. semi-detached and terraced houses and an apartment block containing 32No. apartments, with private and shared gardens and off-street parking, all served by a network of estate roads.</p>

SUBJECT	COMMENTS
HISTORICAL SUMMARY	<p>The earliest available map from 1867 shows the site as agricultural. A stream was shown in the eastern and southern areas of the site, however by 1957 it was no longer present. By 1972, office buildings had been constructed on site. By the same time, a petrol station had been constructed to the southwest and an electricity substation to the east.</p> <p>By 1991 the offices had been extended and an above ground fuel tank installed centrally. The offices were then demolished at some point between 2016 and 2019, with the crushed arisings remaining on site.</p>
PUBLISHED GEOLOGY	<p>No superficial deposits are indicated to be present. However, Head Deposits are shown adjacent to the east of the site, and River Terrace Deposits approximately 160m to the south. Both of these deposits can be composed of clay, silt, sand or gravel.</p> <p>The shallowest bedrock is shown to be the Bognor Sand Member, which is typically described as fine- and medium-grained sand. The London Clay Formation underlies the Bognor Sand Member and typically comprises silty clay.</p>
HYDROGEOLOGY	<p>The Bognor Sand Member is designated as a Secondary A Aquifer.</p> <p>The site lies within a Zone 1 (Inner Protection Zone) - Subsurface activity only (1c). This means the aquifer is confined and will only be affected by subsurface activity such as deep drilling. As the aquifer is confined at depth, the risk to the SPZ from surface activities would typically be negligible, unless deep subsurface activity exposing the aquifer is to occur.</p> <p>Based on the BGS maps for the area, the SPZ1c will relate to the deeper Chalk aquifer which forms a drinking water resource. However, this is present at a significant depth beneath the site and is confined by the overlying Lambeth Group and London Clay Formation.</p>
HYDROLOGY	<p>The closest surface water feature to the site is a small stream located approximately 311m east of site.</p> <p>The site is outside of areas classified at risk from Extreme Flooding from Rivers or Seas without Defences.</p>

2.3. PREVIOUS INVESTIGATIONS

2.3.1. Introduction

The site has previously been subject to two ground investigations. The first was completed prior to the demolition of the on-site buildings and the second was completed following the demolition. These are referenced as follows:

- ‘Ground Investigation Report’, Soiltechnics, ref. STM3168D-GD1, dated May 2016.
- ‘Interpretive Site Investigation and Remedial Strategy Report’, Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1, Dated March 2020.

These two investigation reports have been reviewed within the BRD desk study report, which should be read in conjunction with this report, referenced as follows:

- 'Phase 1 Environmental Desk Study - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR1-B, dated July 2025.

BRD has then undertaken a Phase 2 geo-environmental site investigation and soakage investigation reports at the site, referenced as follows:

- 'Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,' BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.
- 'Soakage Investigation - Bartons Road, Havant', BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025.

2.3.2. BRD Phase 2 Geo-Environmental Site Investigation

The main BRD Phase 2 Geo-Environmental Site Investigation was undertaken in July and August 2024, with 6No. follow on gas and groundwater monitoring undertaken in September and October 2024. The investigation comprised 16No. trial pits (ref. TP201-TP216) to depths of between 2.90m below ground level (bgl) to 3.10m bgl and 8No. windowless sample boreholes (ref. WS201-WS208) to depths of between 3.00m bgl and 4.00m bgl. Chemical and geotechnical laboratory testing was also undertaken on soil and groundwater samples.

The ground conditions generally comprised a layer of crushed demolition waste across the northern and central areas, extending down to a typical depth of 0.4m bgl. From near surface in the southern area and beneath the demolition waste across the rest of the site, variable Made Ground soils were encountered, extending down to depths typically ranging from 0.4m to 1.4m bgl, but locally down to 2.3m bgl. The nature of the Made Ground ranged from slightly gravelly slightly sandy clay through to clayey sandy gravel, with the gravel including concrete, brick, plastic, metal, glass and ceramics. Some whole bricks and cobble sized fragments of concrete were encountered within the Made Ground.

The natural strata beneath the Made Ground generally comprised superficial Head Deposits, which varied from clayey sandy gravel to slightly gravelly slightly sandy clay, with the gravel generally comprising flint. In addition, in the central area some Alluvial clay, likely associated with the old ditch, was encountered between the Made Ground and Head Deposits. These superficial soils were collectively encountered down to depths between 0.7m and 2.6m bgl and were most prominent in the southern and western sections of the site.

The superficial deposits underlain by bedrock soil of the Bognor Sand Member, which extended down to the base of the investigation points, at 4.0m bgl. The Bognor Sand Member generally comprised slightly clayey fine sand.

Throughout the various phases of investigation, groundwater was recorded at depths ranging between 1.1m and 2.4m bgl depth.

The investigation did not identify any significant contamination risks at the site from the general site soils.

The report concluded that most of the site is suitable for conventional shallow/trench fill foundations, but due to the variation in the surface soils, the foundations should be reinforced. However, in localised areas of the site underlain by thicker Made Ground (in excess of 1.5m depth) then an alternative deeper foundation solution, such as piling, may be required. The minimum footing depth recommended was 1.0m, and generally 1.5m where required to allow for restricted new tree planting. Regardless, it was recommended that all foundations should be taken down through the Made Ground, and locally Alluvium, and into the Head Deposits or Bognor Sand Member

The report recommended further ground investigation to allow a more detailed assessment of the extent of the localised deeper Made Ground in the central and northwestern areas as well as to more accurately delineate the extent of the shallow Bognor Sand Member in the northeastern section and some peripheral areas. Should the need for piling be identified then the report also recommended further deep boreholes to determine pile design parameters. Finally, longer term groundwater monitoring over the winter months was recommended to allow record groundwater levels during the wetter months of the year.

This current report will look to address all these recommendations.

2.3.3. BRD Soakage Investigation

The BRD soakage investigation was undertaken in April 2025 and comprised 3No. trial pits (ref. TP301-TP303) to depths of between 1.80m bgl and 2.10m bgl with 2-3No. repeat BRE365 soakage tests undertaken in each trial pit.

The ground conditions encountered were in keeping with the previous investigations with a surface cover of Made Ground generally overlying superficial Head Deposits onto bedrock soils of the Bognor Sand Member. At TP302, Alluvium was encountered beneath the Made Ground and above the Head Deposits, and at TP301, no superficial deposits were encountered with the Made Ground extending to a greater depth and directly overlying the Bognor Sand Member.

The soakage tests were taken to depths from 1.8m to 2.1m bgl and targeted the silty fine sand of the Bognor Sand Member. The soakage testing from this investigation has recorded infiltration rates between 2.04×10^{-6} m/s and 2.51×10^{-5} m/s, with good repeatability at each test location. It was considered that the lower end of the infiltration rates (i.e. 2×10^{-6} m/s) would therefore be applicable for design purposes.

2.4. REGULATORY CORRESPONDENCE

The BRD Phase 2 Site Investigation report was submitted to Havant Borough Council in support of the planning application for the proposed development at the site.

In their review of the report, the Environmental Control Officer (ECO) for Havant Borough Council provided a memorandum (ref. PR202510-105034, dated 15th December 2025). This states that the ECO undertook additional research into the above ground tank previously identified by the previous reports, which showed it to be a large fuel storage tank serving an adjacent high-capacity containerised generator. The ECO noted that fuel derived contaminants were identified potentially down-gradient of the former diesel tank in 2020 Forge Environmental Management investigation.

The memorandum goes on to state that the ECO had not been provided with a copy of the 2016 Soiltechnics investigation report and whilst no significant contamination had been identified to date, the ECO considered that the former above ground diesel tank located in the centre north of the site had not sufficiently been investigated to date and required further assessment.

2.4.1. BRD Comments

One of the purposes of these additional investigation works is to address the requirements of the ECO, however, we have set out below some additional comments in relation to the review.

The 2016 Soiltechnics investigation report will be submitted to Havant Borough Council along with this report for the ECO to review. However, the borehole undertaken closest to the fuel tank location (ref. DTS07) did not identify any evidence of contamination. The soil and the groundwater testing from this borehole did not identify any contamination (albeit is noted that the groundwater sample was only analysed for PAH and not TPH).

In terms of the fuel contamination identified in the 2020 Forge report, this was discussed in the previous BRD desk study report. It is noted that the 'groundwater' sample referred to was in fact taken from trial pit TP2 after it had filled with water which had entered the trial pit from the surround to an abandoned pipe at 1.10m bgl. Therefore, this this water is not groundwater and is therefore not representative of the true groundwater contained within the natural aquifers underlying the site.

However, as part of this current phase of work, we are proposing to undertake further targeted investigation in the area of the former above ground diesel tank.

2.5. PRELIMINARY CONCEPTUAL MODEL

2.5.1. Potential Contamination Sources

Following all the previous phases of investigation works, it was considered that there were no contamination sources on site as the testing and site works had demonstrated that the soils and groundwater were all uncontaminated.

However, following the review by the council ECO, some additional investigation is required to assess the potential source that is the former above ground diesel tank located in the centre north of the site.

2.5.2. Preliminary Conceptual Model

SOURCES AND CONTAMINANTS	PATHWAYS	RECEPTORS	POTENTIAL RISK
Previous above ground fuel tank in centre of site. <ul style="list-style-type: none"> Petroleum hydrocarbons (known to store only diesel). 	Direct contact	Future residents	Moderate to low risk.
	Inhalation		
	Ingestion		
	Vertical and horizontal migration	Groundwater and surface water	Moderate to low risk.
	Direct contact	Building materials and services	Moderate to low risk.

3. GROUND INVESTIGATION

3.1. INVESTIGATION DESIGN

METHODOLOGY	<p>In the first instance following the initial investigation works by BRD in 2024, additional groundwater monitoring visits were undertaken to record groundwater levels over the winter period of 2024/2025.</p> <p>Then for the main phase of recent additional ground investigation in 2026, the following methods were proposed;</p> <ul style="list-style-type: none"> • Trial pits were selected as they expose more soils which enables a more reliable record of the varying ground conditions encountered. • Windowless sample boreholes were selected as monitoring installations were required to form a groundwater monitoring network around the former fuel tank location. • Cable percussive boreholes were selected to provide deep boreholes in order to inform the pile design parameters at the site. <p>Following the investigation works, additional groundwater monitoring visits were undertaken to collect water samples for laboratory chemical testing. Vapour monitoring was undertaken alongside this monitoring to confirm if there are any elevated concentrations of vapours present at the site as a consequence of any contamination from the fuel tank.</p>	
DATES OF SITE WORKS	<p>The initial groundwater level monitoring visits were undertaken on 12th December 2024, 29th January, 26th February and 2nd April 2025.</p> <p>The main additional investigation works were undertaken over two separate visits, with a single day visit on 14th April and then three consecutive days from 22nd to 24th April 2026.</p> <p>Subsequent groundwater sampling / vapour monitoring visits were then undertaken on 22nd & 28th April and 19th May 2026.</p>	
CONSTRAINTS TO EXPLORATORY HOLE LAYOUT	<p>No exploratory holes were undertaken in close proximity to any of the services present on the site.</p> <p>It was not possible to locate any boreholes on top of the stockpile of crushed concrete as the battered sides were too steep for the rig to climb.</p>	
EXPLORATORY HOLE SPACING	Varying between approximately 10m and 40m grid.	
LAYOUT RATIONALE	SOURCE / FEATURE	EXPLORATORY HOLE
CONTAMINATION SOURCES TARGETED	Former above ground fuel tank.	TP310-TP313 and WS209-WS212.
GROUND FEATURES TARGETED	Deep Made Ground in northwest of the site.	TP307, TP308, TP310 and BH202.
	Shallow Bognor Sand Member in northeast of the site.	TP305, TP309, TP311, TP314, WS210 and WS212.

	Deep ground conditions for pile design parameters.	BH201 and BH202.
CONTAMINATION SAMPLING PLAN	<p>The purpose of the additional contamination testing was to primarily target soils around the former fuel tank, however, some additional samples were also taken to bolster the contamination assessment for the general site soils.</p> <p>The general analysis is more biased towards the Made Ground samples as this stratum represents the soils most likely to be contaminated. Where applicable, the sampling has been focussed on soils displaying evidence of contamination as well as soils below or adjacent to such contamination to confirm the degree of migration, if any.</p> <p>The analytical frequency has been increased for samples around location of the former above ground fuel tank as this represents the most likely area for contamination.</p> <p>Groundwater samples were initially obtained from just the new boreholes, however, following the results of these initial samples, further groundwater samples were obtained from both the new and the existing monitoring wells.</p>	
ANALYSIS PLAN	<p>Selected general samples have been tested for a range of commonly occurring contaminants in soils including heavy metals, asbestos and polycyclic aromatic hydrocarbons (PAH).</p> <p>The samples from around the fuel tank area have been analysed for PAH, total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene and xylene (BTEX).</p> <p>Given the potential for fuel contamination, the groundwater from across the site has been analysed for PAH, TPH and BTEX compounds.</p>	

3.2. BRD FIELDWORK

TRIAL PITS	
REFERENCES	TP304 to TP314
DEPTH RANGE	From 0.80m to 3.80m bgl.
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	BH201 to BH202
DEPTH RANGE	<p>From 10.00m to 17.45m bgl.</p> <p>BH201 was terminated at a shallow depth due to refusal within a rock layer within the Bognor Sand Member preventing further progress.</p> <p>BH202 was terminated as the borehole breached into the sandy strata of the underlying Lambeth Group which in turn resulted in significant groundwater ingress. This unfortunately resulted in the termination of this borehole as it could not be drilled further using the drilling methods on site.</p>
RIG TYPE	Dando 3000.
INSTALLATION / BACKFILL	Boreholes BH201 and BH202 were backfilled with arisings only.

WINDOWLESS SAMPLING BOREHOLES	
REFERENCES	WS209 to WS212
DEPTH RANGE	From 2.00m to 4.00m bgl.
RIG TYPE	Premier Drilling Rig.
INSTALLATION / BACKFILL	<p>Boreholes WS209 and to WS212 had monitoring wells installed. These comprised 50mm nominal diameter standpipes fitted with a gas tap. 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.</p>

MONITORING	
TYPE	Ground gases and vapour. Groundwater monitoring.
DATES	<p>The initial programme of groundwater level monitoring visits over the winter period were undertaken on 12th December 2024, 29th January, 26th February and 2nd April 2025.</p> <p>Following the additional investigation works, groundwater sampling monitoring visits were undertaken on 22nd & 28th April and 19th May 2026, with gas and vapour monitoring also undertaken during the visit on 19th May 2026.</p>
GROUNDWATER SAMPLING METHOD	<p>Water samples were retrieved using a sampling bailer dedicated to each well.</p> <p>The boreholes were initially purged on the first visit (22nd April 2026) and then sampled on the subsequent two visits (28th April and 19th May 2026).</p>

3.3. LABORATORY TESTING

GEOTECHNICAL TESTING	
The soil samples for geotechnical testing were forwarded to the laboratory of Soil Property Testing Ltd with pH and sulphate analysis undertaken at the laboratory of 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.	8
Liquid and plastic limits.	8
Particle size distribution by wet sieve and hydrometer.	4
Quick undrained triaxial compression.	2
One dimensional consolidation.	1
pH and Water soluble Sulphate.	6
Total Sulphur and Sulphate.	6

SOIL CHEMICAL TESTING	
The soil samples for contamination 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.	2
Speciated Polycyclic Aromatic Hydrocarbons (PAH).	8
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split.	8
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE).	8
Asbestos Screen.	2
Asbestos Identification and Quantification.	1
Waste Acceptance Criteria (WAC) testing.	1

GROUNDWATER CHEMICAL TESTING

The water samples for contamination 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
Speciated Polycyclic Aromatic Hydrocarbons (PAH).	9
Total Petroleum Hydrocarbons (TPH) with full carbon banding and aliphatic/aromatic split.	9
Benzene, Toluene, Ethylbenzene and Xylenes (BTEX) plus Methyl Tert Butyl Ether (MTBE).	9

4. GROUND CONDITIONS

4.1. OVERVIEW

Generally, the ground conditions encountered were as anticipated from the previous investigations with a variable cover of Made Ground overlying Head Deposits across most of the site, in turn overlying the Bognor Sand Member. As with the previous investigation, alluvium was also encountered in an isolated area in the centre west of the site.

The deeper boreholes confirmed the deeper geological sequence. The London Clay Formation was encountered underlying the Bognor Sand Member at depth, with one of the deep boreholes reaching the likely interface between the London Clay Formation and the underlying Lambeth Group.

Alluvial soils were encountered within a localised region within the approximate centre of the site just west of the large stockpile.

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

4.2. ARTIFICIAL GROUND

4.2.1. Buried Structures

A disused / redundant electrical cable was encountered in trial pit TP305, located in the east of the site, at 0.60m bgl.

A possible concrete footing was encountered in trial pit TP311, located in the northeast of the site, at 0.80m bgl. Another possible concrete footing was identified at ground level, running from north to south approximately 2m to the east of the borehole BH201, in the south of the site.

A possible concrete slab was encountered in trial pit TP312, in the centre north of the site, between 1.00m and 1.20m bgl.

Trial pit TP306 targeted the reported location of a pile cap that had been identified on the as-built survey provided by the demolition contractor. Within the excavation, no pile cap was encountered, however, the progress of the excavation was hampered by the highly compacted nature of the backfilled arisings in this location, which prevented excavation beyond 1.40m bgl. It is possible that the pile cap does still remain at a greater depth.

4.2.2. Made Ground

Made Ground was encountered across the whole of the site to depths of between 0.30m to 1.70m bgl. Trial pit TP313 was progressed through the crushed demolition arisings stockpile and recorded Made Ground to in excess of 3.80m bgl, albeit 3.00m of this was the stockpiled material.

The majority of the Made Ground was relatively consistent in nature, comprising crushed demolition arisings, typically described as compacted, light brown, sandy, gravel and cobbles of concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments. As discussed above, in some localised areas of the site this Made Ground was heavily compacted making excavation very slow.

In the northeast and centre north of the site, a second deeper Made Ground strata was encountered in trial pits TP307, TP308, TP310, TP312, TP313 and boreholes WS209-WS211 to depths of between 0.65m to 1.30m bgl, as well as underlying the crushed demolition arisings stockpile in TP313. This strata was typically described as either firm, dark grey, silty clay with occasional flint gravel, a natural organic odour and rare brick fragments, or stiff, orange brown

mottled light grey, silty, gravelly clay with gravel of flint, rare brick and concrete, with rare concrete cobbles and boulders.

4.3. SUPERFICIAL DEPOSITS

4.3.1. Alluvium

Alluvium was only encountered in one exploratory holes during this phase of investigation (borehole WS211). The Alluvium was found underlying the Made Ground between 0.90m and 1.20m bgl and was described as stiff, grey, silty, slightly gravelly clay with gravel of flint.

4.3.2. Head Deposits

During this phase of investigation Head Deposits were encountered across the whole of the site in all of the exploratory holes where the Made Ground was penetrated. The Head Deposits extended to depths of between 0.70m and 2.85m bgl. The Head Deposits had previously been noted to be absent in some of the previous exploratory points in the northeast of the site.

The Head Deposits were typically encountered either as firm to stiff, orange brown mottled light grey, silty, slightly gravelly clay with gravel of flint and typically becoming gravelly to very gravelly with depth, or medium dense, orange brown, clayey gravel of flint and rare quartzite.

4.4. BEDROCK

4.4.1. Bognor Sand Member

The Bognor Sand Member was encountered across the whole of the site underlying the Head Deposits and was proven to depths of between 8.00m and >10.00m bgl in boreholes BH202 and BH201 respectively.

The Bognor Sand Member was typically initially encountered as a medium dense to dense, orange brown mottled light grey, silty, fine sand to depths of between 5.00m and 5.20m bgl, below which it became dense, dark grey, silty, fine sand.

In borehole BH201, located in the south of the site, the Bognor Sand Member was found to extend to a greater depth. Towards the base of this borehole, bands of slightly clayey, sandy silt were encountered from 8.50m bgl and then a dark grey, silty sandstone / sandy siltstone was recorded at 9.70m bgl, which prevented further drilling. This rock layer was chiselled for 300mm making the final borehole depth at 10.00m bgl.

4.4.2. London Clay Formation

The London Clay Formation was encountered in borehole BH202 below the Bognor Sand Member from 8.00m bgl. It was initially recorded as stiff, friable, dark grey, very silty clay with rare silt beds and rare fine shell fragments, becoming very stiff from 14.40m bgl.

At 16.50m bgl a significant water strike was encountered and the borehole was unable to be progressed beyond 17.45m bgl using this drilling method. It is considered this depth likely corresponds to the interface of the London Clay Formation with the sandier strata of the underlying Lambeth Group. The groundwater likely represents sub-artesian groundwater within these sands that were then breached by the borehole.

4.5. GEOTECHNICAL COMMENTS

During this phase of investigation, some side wall instability was encountered in two trial pits, TP307 and TP308, and some sand ingress was noted in three boreholes, WS209 to WS211. This instability generally occurs at around 2.3m to 3.0m bgl depth following encountering groundwater seepages or strikes.

4.6. CONTAMINATION OBSERVATIONS

Within the holes undertaken around the former fuel tank location, a slight hydrocarbon odour was noted in borehole WS209 at a depth of 1.20m bgl on encountering perched groundwater as well as in trial pit TP313 between 3.00m bgl and 3.30m bgl (which corresponds to the original ground level), also where wet soils were encountered underlying the stockpile of crushed demolition arisings. No evidence of any other hydrocarbon contamination was recorded in the other exploratory points targeting the location of the former above ground fuel tank.

In terms of the general Made Ground across the site, occasional tarmac fragments were encountered within the Made Ground. The presence of tarmac in soils can give rise to elevated concentrations of PAHs and TPH, albeit, that none has been recorded during the previous investigations.

4.7. OBSERVED GROUNDWATER BEHAVIOUR

During the forwarding of exploratory holes as part of the additional investigation works, the following groundwater observations were made.

A groundwater strike was recorded in borehole WS209 at 1.2m bgl in the Head Deposits.

Groundwater strikes and seepages were encountered in TP308, WS210 to WS212, BH201 and BH202 in the Bognor Sand Member at depths between 2.0m and 3.4m bgl. Within the deeper boreholes (BH201 and BH202), the groundwater was recorded to have risen from 2.65m and 3.45 m bgl to 2.40m and 3.10m bgl depth after twenty minutes. Deeper water strikes were recorded in the Bognor Sand Member soils in boreholes BH201 and BH202 at depths between 7.5m and 9.9m bgl.

As discussed above a more significant groundwater strike was also encountered at 16.5m bgl in borehole BH202 close to what is considered to be the boundary between the London Clay Formation and underlying Lambeth Group.

4.8. GROUNDWATER MONITORING

4.8.1. Groundwater Monitoring - Winter 2024/2025

DATE	RESTING GROUNDWATER RANGE	COMMENTS
12/12/24	From 1.47m to 2.30m bgl.	Groundwater recorded in all boreholes.
29/01/25	From 0.90m to 2.11m bgl.	When accounting for the Above Ordnance Datum (AOD) level of boreholes, the groundwater level was higher in the north of the site and lower in the south of the site. These groundwater monitoring visits followed a period of relatively wet weather, with groundwater levels rising across the winter period.
26/02/25	From 1.15m to 2.17m bgl.	

DATE	RESTING GROUNDWATER RANGE	COMMENTS
02/04/25	From 1.76m to 3.06m bgl.	<p>Groundwater recorded in all boreholes. As with the previous visits, the groundwater level was higher in the north of the site and lower in the south of the site.</p> <p>The groundwater levels were noted to have dropped across all monitoring wells, reflecting the period of relatively dry weather since the previous visit.</p>

4.8.2. Groundwater Monitoring - Spring 2026

DATE	RESTING GROUNDWATER RANGE	COMMENTS
22/04/26	From 1.74m to 2.76m bgl.	<p>For this initial visit, only the newly installed boreholes (ref. WS209-WS212) were monitored. Groundwater recorded in all boreholes.</p> <p>The recorded groundwater levels are similar to those recorded the year before (in April 2025). As with that visit, this current visit followed a period of relatively dry weather.</p>
28/04/26	From 1.77m to 3.11m bgl.	<p>For these subsequent visits, the groundwater was monitored in all boreholes. The levels remained similar to the previous monitoring visit.</p> <p>Groundwater monitoring visits followed a period of mixed weather.</p>
19/05/26	From 1.78m to 3.18m bgl.	

4.8.3. Discussion

There has been considerable amount of groundwater monitoring undertaken at the site over the course of the varying phases of BRD investigation works, including through the winter months of 2024/25.

All of the monitoring results indicate a groundwater gradient downwards from north to south across the site. This would fit with the groundwater levels reducing towards the coastline. It should be noted that shallow groundwater levels in the region of 1.0m bgl were recorded over the winter 2024/2025 period. Outside of the winter months, the resting groundwater level was generally between 1.5m and 2.1m bgl.

5. GEOTECHNICAL PROPERTIES

5.1. INTRODUCTION

From a geotechnical perspective, the purpose of this additional investigation was to delineate the extent of the deeper Made Ground and to more accurately delineate the extent of the shallow Bognor Sand Member. Two deeper boreholes were also drilled to provide information to assist with pile design.

As the testing for the general surface soils had previously been undertaken as part of the initial investigation works, this geotechnical testing has been primarily focussed on the two deeper boreholes with only cursory testing of the soils from the shallower exploratory holes, more to confirm the previous investigation findings. The following sections therefore just present the findings from this current phase of investigation. The previous investigation report should be referred to for the original geotechnical testing and assessment. However, comments are made where relevant to confirm whether the additional testing is all in keeping with the previous investigation.

5.2. HEAD DEPOSITS

5.2.1. Particle Size Distribution (PSD)

The grading curve of the one additional sample of the Head Deposits (BH202 at 1.20m) subject to PSD determination revealed the following result. This result differs from the PSD result from previous investigation but reflects the more variable nature of the Head Deposits. This current sample was taken from the more clayey beds whereas the previous sample was from the more gravelly beds.

GRADING RANGE (MM)	HEAD DEPOSITS (%)
<0.063 - Fines	33
0.063 to 2.0 - Sand	32
2.0 to 90.0 - Gravel	35

5.2.2. Index Property Testing

Only one additional sample from the clay beds of the Head Deposits was subject to index property testing (TP308 at 1.50m).

SOIL TYPE	Head Deposits (Clay beds).
WATER CONTENT	15.4% (1No. sample)
LIQUID LIMIT	36% (1No. sample)
PLASTIC LIMIT	15% (1No. sample)
PLASTICITY INDEX (I_p)	Not applicable as oversize particles present.
MODIFIED I_p	21% (1No. sample)
NHBC CLASS	Medium volume change potential.
COMMENT	The previous investigation recorded the clay beds to have a high volume change potential. Whilst, this result is medium, given the variability observed through these strata, it is considered that a high volume change potential should continue to be adopted for the clayey beds of the Head Deposits.

5.2.3. Undrained Shear Strength

The SPT N-values have been corrected to N_{60} -values and then correlated to an equivalent undrained shear strength (c_u) using the approach by Stroud (1985) based upon a relationship of $c_u=21N_{60}$, derived from an average I_p of 21%. A hammer efficiency value for the cable percussive rig of $E_r=78\%$ based on the annual calibration certificate provided by the sub-contractor. From this, the equivalent undrained shear strength value for the Head deposits was 85kPa.

A single undrained shear strength of 57kPa was recorded with the Hand Pocket Penetrometer test. Shear Vane Testing recorded undrained shear strengths of between 55kPa and 87kPa, averaging 71kPa.

Therefore, an undrained shear strength value representative of this soil has been considered:

$$c_u = 70\text{kPa}$$

The corrected results are in keeping with the previous phase of investigation and highlight that the cohesive dominated Head Deposits are of a medium to high strength soil type.

5.2.4. Relative Density

A total of 4No. SPTs were carried out in the coarse beds of the Head Deposits. N-values range from 7 to 46 and is indicative of a loose to a dense soil type. There was no direct correlation of increased relative density with depth, however, below 2.0m the N values were all recorded to be greater than 20.

Overall, an average N-value of 24 is considered representative of the coarse beds of the Head Deposits and is indicative of a medium dense soil type. This is in keeping with the previous phase of investigation and doesn't change the soil parameters in terms of a design perspective.

5.2.5. Shearing Resistance

For the cohesive deposits, the BS 8004:2015 allows for the estimation of the critical state effective angle of shearing resistance (ϕ') based on the soils Plasticity Index (eq: $\phi' = 42 - 12.5 \log_{10} I_P$). Therefore, based on the plasticity index recorded:

$$\phi' = 25^\circ$$

This result is slightly higher than the previous investigation and is attributed to the single sample returning a medium volume change potential. Many more samples were tested in the previous phase of investigation and recorded results up to and including a high-volume change potential. This directly influenced the lower bound critical state effective angle of shearing resistance. For design purposes, the lower value obtained in the previous phase of investigation should still be utilised as set out below.

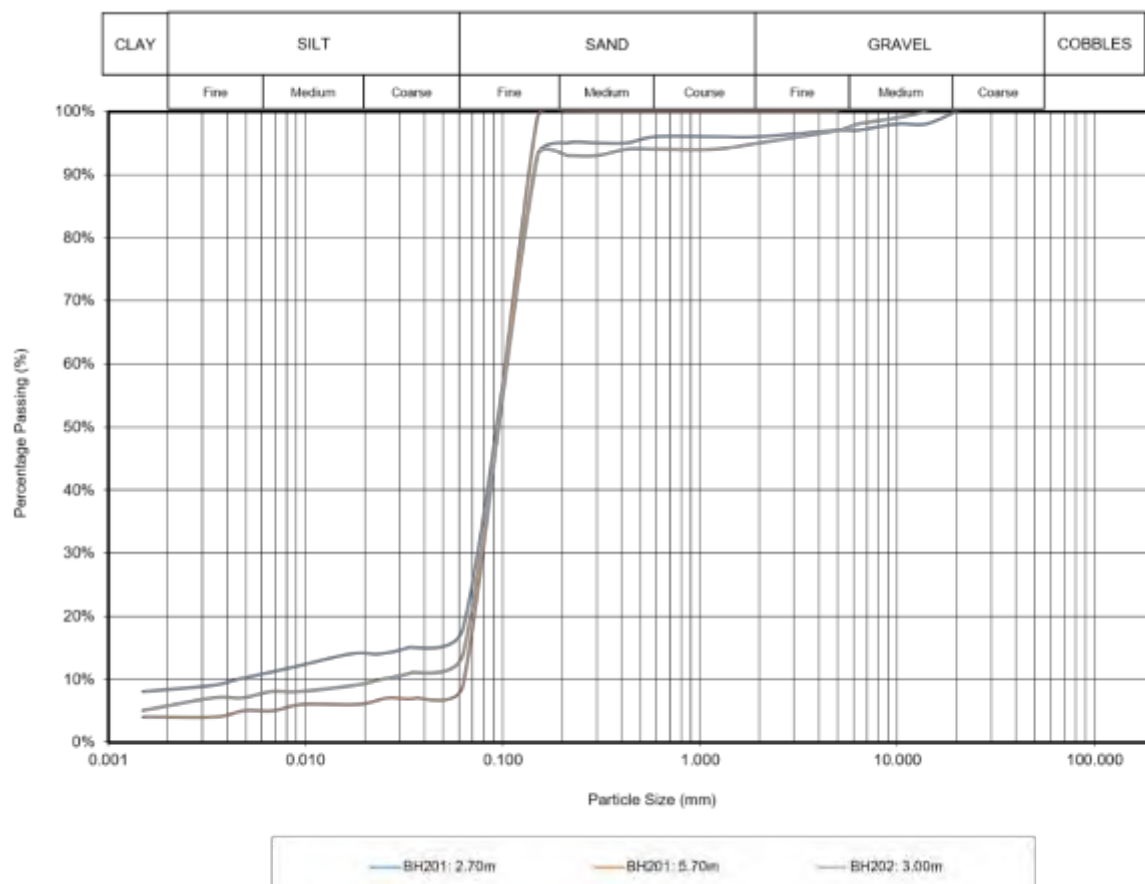
For the coarse deposits, Thomlinson (2001) (Figure 2.13 - Seventh Edition) allows for derivation of ϕ' using SPT results. Using the average uncorrected 'N' values:

$$\phi' = 34^\circ.$$

5.3. BOGNOR SAND MEMBER

5.3.1. Particle Size Distribution (PSD)

The grading curves of the three samples of the Bognor Sand Member from the additional investigation subject to PSD determination revealed the soil to be a poorly graded silty slightly clayey predominantly fine SAND. A fines content between 9% and 18% was recorded which classifies this stratum as non-shrinkable. The PSD results from this phase of investigation are in keeping with the previous investigation.



5.3.2. Index Property Testing

SOIL TYPE	Bognor Sand Member
WATER CONTENT	18.5 to 25.0 (4No. samples)
LIQUID LIMIT	33% (Only 1No. of the 4No. samples could be subject to index property testing. The other 3No. samples were deemed non shrinkable).
PLASTIC LIMIT	27% (Only 1No. of the 4No. samples could be subject to index property testing. The other 3No. samples were deemed non shrinkable).
PLASTICITY INDEX (I_p)	6% (Only 1No. of the 4No. samples could be subject to index property testing. The other 3No. samples were deemed non shrinkable).
MODIFIED I_p	Not applicable.
NHBC CLASS	Non shrinkable / Non plastic soil type.
COMMENT	The additional testing confirms that the Bognor Sand Member can be considered as a non-shrinkable soil type given that all results have recorded a fines content below the 35% threshold as per NHBC guidance. This is in keeping with the previous phase of investigation.

5.3.3. Relative Density

A total of 21No. SPTs were carried out in the coarse deposits. N-values range from 18 to >50 (refusal). A total of 5No. tests, were finished at 50 blows as the tests were unable to penetrate the required 300mm. Below the correlated N_{300} values are provided:

CORRELATED SPT N-VALUES >50: BOGNOR SAND MEMBER				
HOLE	DEPTH (m bgl)	N	PENETRATION (mm)	N_{300}
WS209	4.00	50	265	57
WS212	2.00	50	265	57
BH201	6.70	50	-	50
BH201	9.70	50	-	50
BH201	10.00	50	-	50

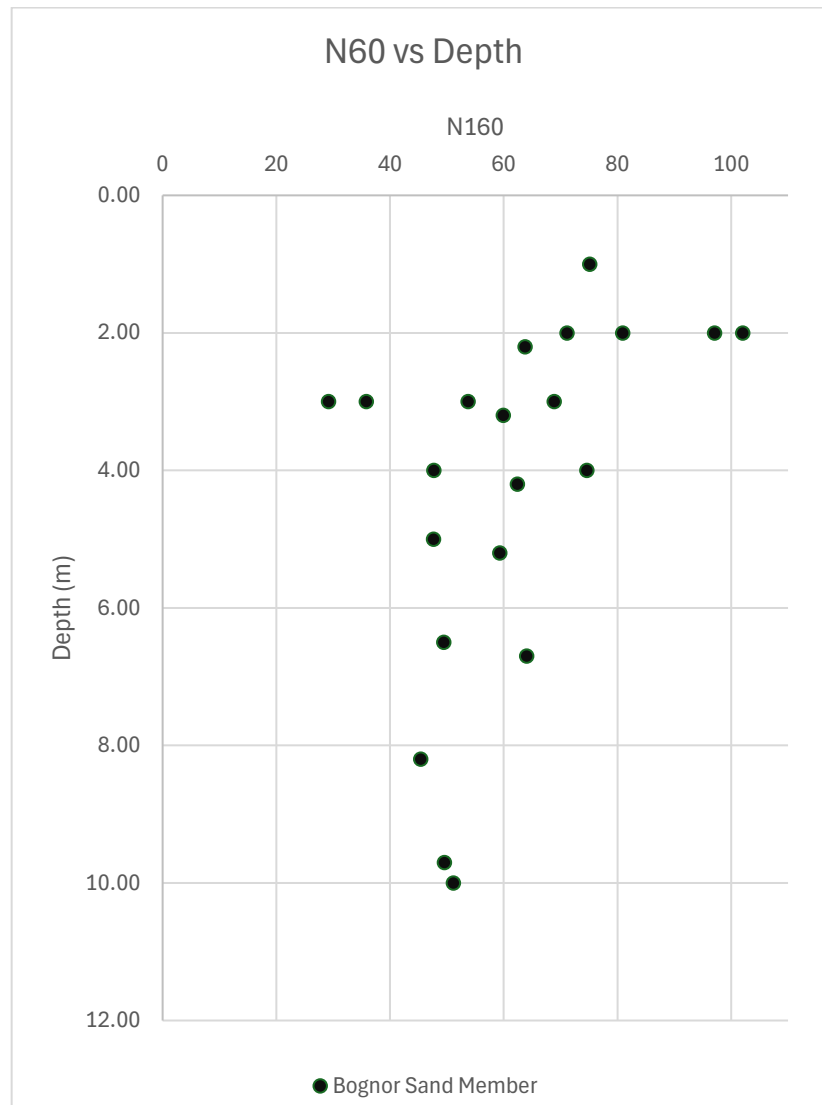
Overall, an average N-value of 39 is considered representative of the Bognor Sand Member and is indicative of a dense soil type. This is in keeping with the previous phase of investigation.

5.3.4. Shearing Resistance

For the coarse deposits, Thomlinson (2001) (Figure 2.13 - Seventh Edition) allows for derivation of ϕ' using SPT results. Using the average uncorrected 'N' values:

$$\phi' = 38^\circ.$$

Below is a graph showing the N60 normalised blow count for SPT results after (Skempton, 1986). This correction factor is utilised within coarse deposits to account for the overburden pressure and account for the natural increase with stress level as SPTs are progressed, which may mask smaller changes in constitutive properties. The N number is further corrected for rod length and borehole size.



5.4. LONDON CLAY FORMATION

It should be noted that the London Clay Formation was not encountered by the previous investigation as it is only encountered by one deep borehole (BH102) at depth beneath the Bognor Sand Member.

5.4.1. Index Property Testing

SOIL TYPE	London Clay Formation
WATER CONTENT	20.2% to 28.0% (3No. samples)
LIQUID LIMIT	42% to 48% (3No. samples)
PLASTIC LIMIT	18% to 19% (3No. samples)
PLASTICITY INDEX (I_p)	24% to 29% (3No. samples)
MODIFIED I_p	Not applicable as no oversize particles present.
NHBC CLASS	Medium volume change potential.
COMMENT	The London Clay Formation is typically a high-volume change soil, however, all 3No. samples from BH202 record a medium volume change potential as per NHBC guidance. This may reflect an increased silty or sandy content close to the base of the Formation.

5.4.2. Undrained Shear Strength

The SPT N-values have been corrected to N_{60} -values and then correlated to an equivalent undrained shear strength (c_u) using the approach by Stroud (1985) based upon a relationship of $c_u = 27N_{60}$, derived from an average I_p of 27%. A hammer efficiency value for the windowless sample rig of $E_r = 78\%$ based on the annual calibration certificate provided by the sub-contractor.

The equivalent undrained shear strengths values for the London Clay Formation range between 130kPa and 314kPa, averaging 232kPa.

A single undrained shear strength of 57kPa was recorded with the Hand Pocket Penetrometer.

The 2No. undisturbed samples (traditional U100 plastic sample tubes) of London Clay Formation subjected to triaxial compression without measurement of pore water recorded undrained shear strength in the range of 250 to 263 kPa, indicating a very high strength soil type.

Therefore, an undrained shear strength value representative of this soil has been considered:

$$c_u = 250\text{kPa}$$

5.4.3. Compressibility

A single one-dimensional consolidation test was performed on a specimen of London Clay Formation, from borehole BH202 at a depth of 14.00m. The test results show this soil to be a normally consolidated to a lightly over-consolidated clay.

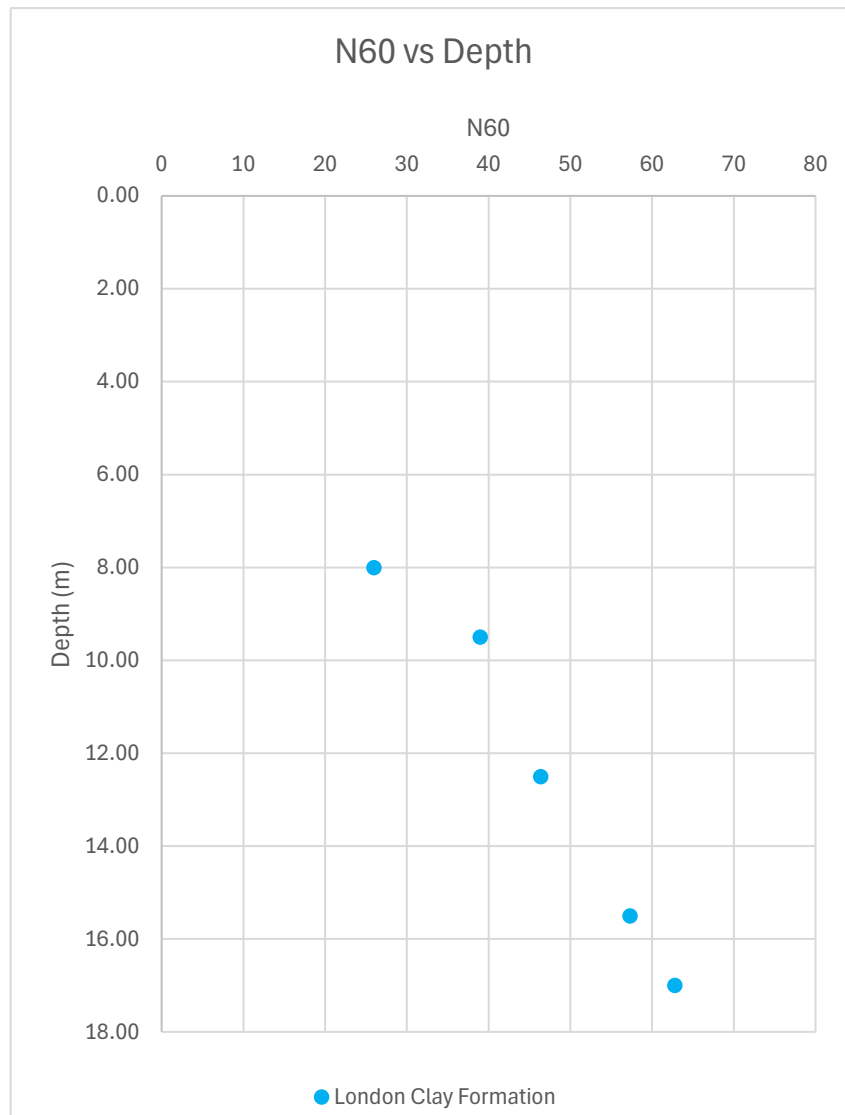
The measured Coefficient of compressibility (m_v) were between $0.029 \text{ m}^2/\text{MN}$ and $0.15 \text{ m}^2/\text{MN}$ indicative of very low to medium compressibility.

5.4.4. Shearing Resistance

For the cohesive deposits, the BS 8004:2015 allows for the estimation of the critical state effective angle of shearing resistance (ϕ') based on the soils Plasticity Index (eq: $\phi' = 42 - 12.5 \log_{10} I_P$). Therefore, based on the modified plasticity index recorded:

$$\phi' = 24^\circ$$

Below is the N60 vs depth plot for the London Clay Formation.



6. GEOTECHNICAL ASSESSMENT

6.1. INTRODUCTION

The development proposals comprise mainly two-storey housing with associated infrastructure. However, there is also one three-story apartment building included in the northwestern area of the site. The Proposed Development Plan is included in Appendix 1.

Following the additional investigation, the advice contained in the previous geotechnical assessment (as presented in investigation report, referenced BRD4469-OR2-C) is still largely valid as the findings are largely unchanged. However, for clarity the complete geotechnical assessment is reproduced with updated sections as and where applicable.

From assessment of the nature of the ground conditions and the type of proposed structures, it is considered that the situation falls within EC7 Geotechnical Category 1.

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

6.2. EXCAVATIONS

STABILITY	<p>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.</p> <p>Some side wall collapse of the trial pits and in the boreholes was encountered following ingress of groundwater. On this basis, it is anticipated narrow trench excavations should remain stable in the short-term down to the groundwater, which is anticipated to be in the region of 1.5m-3.0m bgl depth for most of the year (see below). However, it should be noted that groundwater levels are likely to be shallower in the wetter winter months at around 1.0m-2.0m bgl. For deeper excavations, or if groundwater is encountered at a shallower depth than expected, then side wall supports will be required.</p> <p>In addition, in localised areas Made Ground was encountered to depths below 1.5m. Whilst Made Ground is typically variable in nature and strength, side wall instability was not encountered at all these locations, most likely due to the compacted nature of the soils. However, we would recommend side wall supports be used where deeper Made Ground is encountered.</p>
EQUIPMENT	<p>Whilst some substructures are still present in the ground, for example a concrete slab was encountered in TP202 at 0.8m depth, based on the number of holes undertaken across the site, it is considered conventional hydraulic plant should be sufficient to progress excavations in the soils encountered. Should any existing substructures be encountered then the use of specialist break plant is likely to be required.</p>

GROUNDWATER CONTROL	<p>Groundwater strikes and seepages were encountered at most of the test locations, typically at depths below 2.0m bgl, albeit a seepage at 1.2m was recorded in WS209. The groundwater monitoring programme has recorded standing water levels between 0.9m and 3.2m bgl depth through the year, with levels typically between 1.5m and 3.0m bgl during most of the year, but more like 1.0m to 2.0m bgl during the wetter winter months.</p> <p>Therefore, under typical conditions for excavations down to approximately 1.5m bgl depth then specific groundwater control, beyond limited pumping from sumps or bailing out to deal with slight seepages or surface water ingress during periods of inclement weather, is unlikely to be required at this site.</p> <p>However, for excavations needing to extend below 1.5m bgl depth then groundwater ingress should be anticipated and provision made for its control. In this eventuality, we would recommend consultation with a specialist groundwater control contractor.</p> <p>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.</p>
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6.3. SLOPE STABILITY

The site slopes by just over 3m from the north to the south, however, due to historical development the natural slope has been altered to allow for development. No obvious signs of instability were noted during the investigation, and it is assumed that at its current angle the slope is stable.

6.4. RETAINING WALLS

It is likely that some re-grading of the slope or the use of retaining structures will be required in order to accommodate the proposed development. Parameters to aid the design of temporary and permanent retaining walls are given in the table below.

Stratum	Bulk Density γ_B (kN/m ³)	Undrained Shear Strength S_u (kPa)	Angle of Shearing Resistance $\phi'_{peak}/\phi'_{crit}$ (°)	Apparent Cohesion c' (kPa)
Made Ground	-	-	-	-
Head Deposits - Clay	17	60	22	0
Head Deposits - Gravel	19	-	30	-
Alluvium	17	60	22	0
Bognor Sand Member (up to 1m depth)	19	-	30	-
Bognor Sand Member (below 1m depth)	19	-	34	-
London Clay Formation	20	250	24	-

6.5. EARTHWORKS

It is likely that some earthworks will be required on site due to the existing site levels and the proposed development that will require some form of cut and fill to form development platforms. An Earthworks Specification should be developed for the Contractor to work in accordance with informed by a Geotechnical Design Report (GDR). Further classification tests will be required to develop the earthworks specification.

Where a Method based specification is adopted then it is an inherent requirement of such an approach that professional supervision of the contractor is needed.

6.6. PAVEMENT CONSTRUCTION

Made Ground thicker than 0.5m covers much of the site, and for these soils it is recommended that a preliminary design California Bearing Ratio (CBR) of less than 2% is assumed at this stage.

Across the rest of the site variable Head Deposits, ranging from sandy gravelly clay to clayey sandy gravel were encountered at 0.5m depth. Based on the classification testing results, for pavement formations in the clay Head Deposits, a preliminary design California Bearing Ratio (CBR) of 3% is recommended, and for the gravel Head Deposits and Bognor Sands Member, a preliminary design CBR of 20% is recommended.

Some of the soils at formation depth will be frost susceptible, therefore a minimum total pavement construction of 450mm is required. The cohesive deposits will be prone to rapid degradation during wet weather working and this should be avoided where possible.

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. SUB-SURFACE CONCRETE

6.7.1.1. Sulphate and pH

ALL ON-SITE SOILS, EXCEPT LONDON CLAY FORMATION				
	Sulphate		pH	
Characteristic Value	300 mg/l		6.9 units	
Justification	Mean of highest 20% results rounded to nearest 100mg/l.		Lowest groundwater result.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	23	10 - 335 mg/l	23	6.9 - 9.9 units
Groundwater	6	14 - 170 mg/l	6	6.9 - 7.5 units
Total Potential Sulphate	8	Not applicable as pyrite unlikely in the samples tested.		

LONDON CLAY FORMATION				
	Sulphate		pH	
Characteristic Value	TPS : 2.16% Water soluble SO ₄ : 400 mg/l		8.2 units	
Justification	Based on Total Potential Sulphate. Highest measured SO ₄ concentration rounded to nearest 100mg/l.		Lowest measured value.	
	No. of tests	Results Range	No. of tests	Results Range
Soil	3	240 - 360 mg/l	3	8.2 - 8.4 units
Groundwater	-	Not tested	-	Not tested
Total Potential Sulphate	3	Pyrite potentially present in two of the three samples		

6.7.1.2. Aggressive Chemical Environment for Concrete (ACEC) Class

Classification of the ACEC has been undertaken in accordance with the BRE SD1:2005 Concrete in Aggressive Ground.

ALL ON-SITE SOILS, EXCEPT LONDON CLAY FORMATION	
SITE / SOIL CATEGORY	Natural ground.
DESIGN SULPHATE CLASS	DS-1
GROUNDWATER REGIME	Mobile.
ACEC CLASS	AC-1

LONDON CLAY FORMATION	
SITE / SOIL CATEGORY	Natural ground containing pyrite.
DESIGN SULPHATE CLASS	DS-4 (DS-1 for piling)
GROUNDWATER REGIME	Static.
ACEC CLASS	AC-3s (AC-1s for piling)
COMMENTS	<p>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.</p> <p>Given the depth to the London Clay, only piled foundations will encounter this stratum. As piling will not expose these soils to oxidation, then the lower sulphate classification based on water soluble sulphate can be employed. This is provided above.</p>

6.8. PRELIMINARY FOUNDATION RECOMMENDATIONS

6.8.1. Introduction

The development proposals are mainly for houses but there is one large apartment building in the northwest. All the buildings are typically two to three storeys in height.

The investigation has shown the ground conditions to generally comprise Made Ground over Head Deposits onto the Bognor Sand Member. In some locations the Head Deposits were not present. In one location, TP204, a thin band of Alluvium, comprising some organic clay, was encountered between the Made Ground and Head Deposits.

The Made Ground soils were generally encountered down to less than 1.0m depth, however locally they were encountered down to depths between 1.5m and 2.3m bgl. The Head Deposits generally comprised medium dense, becoming dense with depth, clayey sandy gravel, however locally they also contained beds of a stiff slightly gravelly slightly sandy clay with a high-volume change potential. The Bognor Sand Member generally comprised medium dense slightly clayey sand and was shown to be a non-shrinkable soil. The London Clay is present at depth beneath the site and will only be encountered by piled foundations.

6.8.2. Floor Slabs

Due to the depth of Made Ground across the site, fully suspended floor slabs designed and constructed in accordance with NHBC Standards are recommended at this development.

6.8.3. Traditional Footings

It is considered the Head Deposits and Bognor Sand Member are suitable as a founding material and, therefore, except for areas of deeper Made Ground (see below), the site is considered suitable for the adoption of shallow strip/trench fill footings. Foundations should be taken through Made Ground and the localised Alluvium to bear in either the underlying Head Deposits or Bognor Sand Member.

Considering the variable nature of the Head Deposits encountered across the site and the high-volume change classification for the fine-grained Head Deposits, it is considered that this classification should be assumed for this stratum and therefore a minimum founding depth of 1.0m is recommended. Given the variation in soil type, the use of reinforcement to avoid differential settlement is also required for all foundations in this stratum.

Where the Head Deposits are absent and/or the Made Ground is thinner, then the Bognor Sand Member is also present at a shallow enough depth for shallow strip/trench fill footings. Although the Bognor Sand Member has been shown to be a non-shrinkable soil type, given the surface disturbance and near-surface variation in soils, a minimum founding depth of 1.0m is also recommended for foundations in this stratum. It should be noted that reinforcement is not required for any foundations emplaced entirely within the Bognor Sand Member.

The additional investigation has enabled the areas where the Bognor Sand Member is present at founding depth to be better delineated and this is identified on the Preliminary Foundation Zoning Plan included in the Appendices.

At 1.0m depth a presumed bearing value of 100kN/m² is considered appropriate for foundations up to 1m wide, regardless of whether the bearing strata are the Head Deposits or the Bognor Sand Member. Immediate and long-term settlement should be within tolerable limits with most taking place during the construction period and the rest over several years.

As noted above, the fine-grained Head Deposits have been classified as having a high-volume change potential when assessed against NHBC standards and therefore the minimum foundation depth required is 1.0m, but 1.5m where required to allow for restricted new tree planting. The granular Bognor Sand Member has been classified as having a low volume change potential and therefore require a minimum foundation depth of 0.75m, or 1.0m where required to allow for restricted new tree planting. However, as noted above a minimum founding depth of 1.0m is recommended to negate surface disturbance and the near surface variation in the soils observed. The Bognor Sand Member has been shown to be non-shrinkable and therefore will not be subject to tree influence.

Under the NHBC Standards, foundation depths have to be increased if they are within the influence zone of felled trees, existing trees or proposed tree planting. It should be noted that where trees are in groups the resulting competition for resources can lead to deeper root systems than allowed for in the NHBC Standards. In any event, foundations should be taken below any roots encountered in foundation trench excavation. Where the required foundation depth varies around a structure, this can be accommodated by forming steps in the foundation as per NHBC Standards.

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

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

6.8.3.1. Areas of Deeper Made Ground

In the northwest quadrant of the site, coincident with the former building footprint, Made Ground in excess of 1.5m depth was encountered. In this area taking conventional spread foundations down through the Made Ground and into the underlying Head Deposits or Bognor Sand Member will potentially cause issues with shallow groundwater ingress, particularly during winter months when the groundwater levels have been shown to remain shallow (typically 1.0m to 1.5m bgl).

As a consequence of this, it is considered that traditional strip or trench fill foundations are unlikely to be viable in this area, albeit will be dependent upon actual groundwater levels present at the time of construction. Therefore, a specialist foundation solution in the form of piling is recommended for the proposed plots in this area.

Given its larger footprint and line loads, the apartment building in particular is likely to require piled foundations. However, depending upon actual groundwater levels present at the time of construction, a 'dig and pour' approach could be attempted for the individual houses in this area, particularly in those areas where the Made Ground is not as deep (as identified on the Preliminary Foundation Zoning Plan).

It is an inherent risk of 'dig and pour' that spoil disposal and concrete volumes could increase and professional supervision is also required. To minimise instability, the length of trench open at any one time can be reduced by adopting a two-part solution. The first part is the construction of a mass pour trench fill using a semi-dry concrete that can be progressed segmentally around the plot and left at a lower level. The second phase is constructing a thin steel mesh reinforced strip footing bearing upon the mass fill element once it has set. Alternatively, a piled solution could be adopted for these houses as well as the apartment building.

6.8.4. Piling

Piling is an appropriate solution in order to transfer the structural loads through the Made Ground and into the underlying competent natural strata. Required pile lengths may vary across the site due to the irregular thickness of Made Ground.

The Made Ground is variable in composition and density, comprising reworked clay and gravel with anthropogenic inclusions including brick, concrete and tarmac with occasional large concrete obstructions. It is possible that obstructions within the Made Ground may prevent the forwarding of piles at some locations and so due contingency allowance should be made for additional piles to replace those affected.

For the purposes of pile design, skin friction from the Made Ground should be ignored. The working load is calculated from a combination of skin friction and end bearing within the underlying Bognor Sand Member / London Clay Formation. The Bognor Sand Member is anticipated to provide suitable pile support through shaft friction. Beneath this the London Clay Formation is interpreted as a stiff to very stiff, marine clay, comprising silty clay and is also considered to represent a competent founding horizon for piled foundations.

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 Bognor Sand Member / London Clay Formation. 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.

CFA piles are likely to represent an appropriate preliminary solution for the proposed development, although the final pile type should be selected by a specialist piling contractor based on confirmed structural loading, obstruction risk and detailed ground conditions. Pile testing and installation verification should be undertaken as part of the detailed design and construction process.

The existing trees may cause soil heave. 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 using 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 likely 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.

6.9. RECOMMENDATIONS FOR FURTHER GEOTECHNICAL WORK

Generally, it is considered that no further geotechnical ground investigation is recommended at this stage.

However, once the detailed foundation design has been completed, it may be that a further deep borehole is required to collect pile design parameters from the deeper strata. Of the two deep boreholes undertaken during the additional investigation, one (BH201) refused in dense sands in the Bognor Sands Member and the other (BH202) encountered what is inferred to be sand strata of the deeper Lambeth Group. Given these ground conditions, any additional borehole will need to be drilled using a combination of rotary and percussive drilling methods. The depth of the borehole will be dependent on the proposed pile lengths and therefore will be dependent on the detailed foundation design.

If areas of earthworks are proposed, then further ground investigation will be required to classify materials for the Earthworks Specification. A Geotechnical Design Report (GDR) will also be required to develop an Earthworks Specification for the cut and fill required for the development platforms.

7. RISK ESTIMATION - SOILS

7.1. HUMAN HEALTH

In the first instance, the soil results are compared to Generic Assessment Criteria (GAC) to establish if the soils are contaminated or not. The GAC employed below are for residential land use as this is appropriate to the proposed form of development. It should be noted that the table below only summarises the results from this additional phase of investigation.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
Arsenic	mg/kg	2	9.7	37	0
Cadmium	mg/kg	2	1.0	22	0
Chromium (total)	mg/kg	2	19	910	0
Chromium (hexavalent)	mg/kg	2	<1	21	0
Copper	mg/kg	2	28	2,400	0
Lead	mg/kg	2	120	200	0
Mercury	mg/kg	2	0.11	11	0
Nickel	mg/kg	2	11	180	0
Selenium	mg/kg	2	<0.5	250	0
Zinc	mg/kg	2	84	3,700	0
pH	Units	8	9.8	<5-10>	0
Naphthalene	mg/kg	8	<0.1	2.3	0
Acenaphthylene	mg/kg	8	<0.1	170	0
Acenaphthene	mg/kg	8	<0.1	210	0
Fluorene	mg/kg	8	<0.1	170	0
Phenanthrene	mg/kg	8	<0.1	95	0
Anthracene	mg/kg	8	<0.1	2,400	0
Fluoranthene	mg/kg	8	<0.1	280	0
Pyrene	mg/kg	8	<0.1	620	0
Benzo(a)anthracene	mg/kg	8	<0.1	7.2	0
Chrysene	mg/kg	8	<0.1	15	0
Benzo(b)fluoranthene	mg/kg	8	<0.1	2.6	0
Benzo(k)fluoranthene	mg/kg	8	<0.1	77	0
Benzo(a)pyrene	mg/kg	8	<0.1	2.2	0
Indeno(1,2,3-cd)pyrene	mg/kg	8	<0.1	27	0
Dibenzo(a,h)anthracene	mg/kg	8	<0.1	0.24	0
Benzo(ghi)perylene	mg/kg	8	<0.1	320	0
TPH Aliphatic C5-C6	mg/kg	8	<0.01	42	0
TPH Aliphatic C6-C8	mg/kg	8	0.01	100	0
TPH Aliphatic C8-C10	mg/kg	8	1.7	27	0
TPH Aliphatic C10-C12	mg/kg	8	57	130	0
TPH Aliphatic C12-C16	mg/kg	8	17	1,100	0

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
TPH Aliphatic C16-C35	mg/kg	8	47.1	65,000	0
TPH Aromatic C5-C7	mg/kg	8	<0.01	70	0
TPH Aromatic C7-C8	mg/kg	8	<0.01	130	0
TPH Aromatic C8-C10	mg/kg	8	<0.01	34	0
TPH Aromatic C10-C12	mg/kg	8	<0.9	74	0
TPH Aromatic C12-C16	mg/kg	8	4.5	140	0
TPH Aromatic C16-C21	mg/kg	8	30	260	0
TPH Aromatic C21-C35	mg/kg	8	17	1,100	0
Benzene	mg/kg	8	<0.01	0.87	0
Toluene	mg/kg	8	<0.01	130	0
Ethylbenzene	mg/kg	8	0.05	47	0
Xylene (total of all types)	mg/kg	8	0.08	56	0
Methyl Tert Butyl Ether (MTBE)	mg/kg	8	<0.01	49	0
Asbestos Quantification	%	2	0.024	0.001	1
Hydrocarbon Vapour (PID)	ppm	24	0.4	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.					

DISCUSSION OF RESULTS	
METALS	None of the metal compounds are elevated above the human health assessment criteria.
PAH	None of the PAH compounds are elevated above the human health assessment criteria.
TPH	<p>Although some slight fuel odours were noted in WS209 and TP313, no elevated odours were detected associated with these and none of the TPH compounds are elevated above the human health assessment criteria.</p> <p>However, whilst no significant soil contamination has been identified, it is acknowledged that some slightly TPH concentrations were recorded along with some fuel odours noted in the surface soils around the location of the former fuel tank. The level of investigation around this area has been limited by the presence of the overlying stockpile and therefore the full footprint of the fuel tank has not been exposed. As such it may be that some more elevated contamination is still present elsewhere around the fuel tank footprint.</p>
BTEX & MTBE	None of the BTEX or MTBE compounds are elevated above the human health assessment criteria.

DISCUSSION OF RESULTS

ASBESTOS

Whilst asbestos was not visually identified in any of the soils at the site, one of the two laboratory asbestos quantification tests (WS209 at 0.6m) identified Chrysotile asbestos fibres to present as microscopic insulation debris with a quantification of 0.024%. This sample was from the deeper Made Ground strata that correlates to the Made Ground associated with the previous development (as opposed from the recent demolition).

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.

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 contaminant concentrations recorded in the soils at the site are not considered to be at such levels that they would present any significant risk to the underlying water environment. As discussed above, there is evidence of some trace fuel contamination in the location of the former fuel tank but the ability to fully investigate it has been limited by the presence of the stockpile. As such, it may be that some more elevated contamination is still present elsewhere around the fuel tank footprint.

7.3. BUILDING MATERIALS

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	GAC	NUMBER EXCEEDING GAC
pH	units	8	7.8	<5.5	0
Sulphate (w/s)	mg/l	8	360	500	0
Sum of SVOC + Aliphatic TPH >C5-C10 + Aromatic TPH >C5-C10 above detection limits	mg/kg	8	1.71	2	0
Sum of Aliphatic TPH >C10-C21 + Aromatic TPH >C10-C21 above detection limits	mg/kg	8	95	10	2
Sum of Aliphatic TPH >C21-C34 + Aromatic TPH >C10-C35 above detection limits	mg/kg	8	39	500	0
Sum of BTEX + MTBE above detection limits	mg/kg	8	0.13	0.1	1
Naphthalene	mg/kg	8	<0.1	0.5	0
Benzo(a)pyrene	mg/kg	8	<0.1	0.5	0

RESULTS EXCEEDING BUILDING MATERIALS ASSESSMENT CRITERIA

TPH	The concentrations of TPH recorded in borehole WS209 at 1.20m and trial pit TP313 at 3.10m (both where slight hydrocarbon odours were noted) are above the limits for the use of conventional polyethylene (PE) water supply pipes.
BTEX	The total concentrations of the BTEX compounds recorded in borehole WS209 at 1.20m (where a slight hydrocarbon odour was noted) are above the limits for the use of conventional polyethylene (PE) water supply pipes.

8. RISK ESTIMATION - WATER

8.1. GROUNDWATER

It should be noted that the following table summarises the results from the two monitoring visits. On the first visit, only boreholes WS209 and WS210 around the former fuel tank could be sampled (WS211 and WS212 were found to contain insufficient water to collect a sample). On the second visit 7No. boreholes were sampled (WS209 & WS210 again and also WS201, WS203, WS204, WS206 & WS207) in order to get a better indication of the groundwater geochemistry across the site.

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	AQUEOUS SOLUBILITY	GAC	NUMBER EXCEEDING SOLUBILITY / GAC
Naphthalene	µg/l	9	<0.50	25,000	130	0/0
Acenaphthylene	µg/l	9	0.17	3,800	-	0/-
Acenaphthene	µg/l	9	0.2	16,100	-	0/-
Fluorene	µg/l	9	0.22	1,900	-	0/-
Phenanthrene	µg/l	9	0.47	1,100	-	0/-
Anthracene	µg/l	9	0.13	45	-	0/-
Fluoranthene	µg/l	9	0.48	230	-	0/-
Pyrene	µg/l	9	0.49	130	-	0/-
Benzo(a)anthracene	µg/l	9	0.3	3.8	-	0/-
Chrysene	µg/l	9	0.22	2	-	0/-
Benzo(b)fluoranthene	µg/l	9	0.34	2	-	0/-
Benzo(k)fluoranthene	µg/l	9	0.16	0.8	-	0/-
Benzo(a)pyrene	µg/l	9	0.27	3.8	0.27	0/0
Indeno(1,2,3-cd)pyrene	µg/l	9	0.25	0.2	-	3/-
Dibenzo(a,h)anthracene	µg/l	9	0.06	0.006	-	1/-
Benzo(ghi)perylene	µg/l	9	0.25	0.26	-	0/-
Total PAH	µg/l	9	3.4	-	-	-/-
TPH Aliphatic C5-C6	µg/l	9	<0.1	36,000	15,000	0/0
TPH Aliphatic C6-C8	µg/l	9	<0.1	5,400	15,000	0/0
TPH Aliphatic C8-C10	µg/l	9	<0.1	430	300	0/0
TPH Aliphatic C10-C12	µg/l	9	330	34	300	2/1
TPH Aliphatic C12-C16	µg/l	9	260	0.76	300	2/0
TPH Aliphatic C16-C21	µg/l	9	590	0.003	-	-
TPH Aliphatic C21-C35	µg/l	9	330	-	-	-
TPH Aromatic C5-C7	µg/l	9	<0.1	1,800,000	10	0/0
TPH Aromatic C7-C8	µg/l	9	<0.1	590,000	700	0/0
TPH Aromatic C8-C10	µg/l	9	<0.1	65,000	300	0/0
TPH Aromatic C10-C12	µg/l	9	12	25,000	90	0/0
TPH Aromatic C12-C16	µg/l	9	45	5,800	90	0/0
TPH Aromatic C16-C21	µg/l	9	230	650	90	0/2
TPH Aromatic C21-C35	µg/l	9	170	6.6	90	3/3

CONTAMINANT	UNITS	NUMBER OF TESTS	MAXIMUM CONCENTRATION	AQUEOUS SOLUBILITY	GAC	NUMBER EXCEEDING SOLUBILITY / GAC
Benzene	µg/l	9	<1.0	1,800,000	50	0/0
Toluene	µg/l	9	<1.0	590,000	380	0/0
Ethylbenzene	µg/l	9	<1.0	180,000	300	0/0
Xylene (total of all types)	µg/l	9	<1.0	200,000	30	0/0
Methyl tert-butyl ether (MTBE)	µg/l	9	<1.0	-	15	-/0

RESULTS EXCEEDING GROUNDWATER ASSESSMENT CRITERIA

PAH	<p><u>First Monitoring Visit - 28/04/2026</u></p> <p>During the first groundwater monitoring visit no elevated concentrations of PAH were recorded.</p> <p><u>Second Monitoring Visit - 09/05/2026</u></p> <p>During the second groundwater monitoring visit marginally elevated concentrations of PAH compounds Indeno(1,2,3-c,d)pyrene were recorded in WS201, WS206 and WS209 at concentrations of between 0.21µg/l and 0.25µg/l with Dibenzo(a,h)anthracene also recorded in WS201 at a concentration of 0.06µg/l.</p> <p>It should be noted that the GAC used are the highly stringent drinking water standards. Given the minor exceedances, these elevated concentrations of PAH are not considered to present any significant cause for concern.</p>
TPH	<p><u>First Monitoring Visit - 28/04/2026</u></p> <p>During the first groundwater monitoring visit, elevated concentrations of TPH above their respective GAC were recorded in WS209 in the following carbon bandings (recorded concentrations in brackets): TPH Aliphatic C10-C12 (330 µg/l), C12-C16 (260µg/l) and C16-C21 (590µg/l), and TPH Aromatic C16-C21 (150µg/l) and C21-C35 (120µg/l). The total TPH concentration was 1,710µg/l.</p> <p>As these elevated concentrations had been recorded close by the fuel tank, this prompted the second groundwater monitoring visit, including the boreholes across the wider site with a view to determining the background concentration / state of the wider aquifer. The results of which are detailed below.</p> <p><u>Second Monitoring Visit - 09/05/2026</u></p> <p>During the second groundwater monitoring visit, elevated concentrations of TPH above their respective GAC were recorded in WS203, WS206 and WS209.</p> <p>The elevated concentrations of TPH in WS209 were recorded in the following carbon bandings (concentrations in brackets): TPH Aliphatic C12-C16 (72µg/l), C16-C21 (180µg/l), and TPH Aromatic C16-C21 (230µg/l) and C21-C35 (140µg/l). The total TPH concentration had reduced to 784µg/l during this visit.</p>

RESULTS EXCEEDING GROUNDWATER ASSESSMENT CRITERIA

	<p>The elevated concentrations of TPH in WS206 were recorded in carbon bandings TPH Aliphatic C10-C12 at a concentration of 96µg/l and TPH Aliphatic C16-C21 at a concentration of 22µg/l.</p> <p>The elevated concentrations of TPH in borehole WS203 were recorded in carbon banding TPH Aromatic C21-C35 at a concentration of 170µg/l.</p> <p>Whilst the highest concentrations of TPH have been recorded in WS209, which targeted the location of the former above ground diesel tank, some elevated concentrations of TPH have also been recorded sporadically to the north (WS206) and to the south (WS203). Likewise, WS204 and WS210, located between WS209 and WS203 and WS206 have not recorded any TPH. Furthermore, WS210 also targeted the location of the former above ground diesel tank yet did not record any elevated TPH concentrations.</p> <p>This would suggest that the elevated concentrations of TPH recorded in the groundwater are not likely to be from the same contamination source and potentially reflects the state of the wider aquifer in the local area. However, there clearly is some fuel contamination in the groundwater around the former above ground diesel tank, albeit it appears to be relatively localised. The implication of this contamination is discussed further in Section 10.</p>
BTEX & MTBE	<p>None of the BTEX or MTBE compounds were found to be elevated above their aqueous solubility or above their respective GAC during either of the groundwater monitoring visits.</p>

9. RISK ESTIMATION - GAS

9.1. RADON GAS

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

9.2. VOLATILE ORGANIC COMPOUNDS

There is no evidence that the site is affected by significant Volatile Organic Compounds (VOC) contamination.

9.3. GROUND GAS SOURCES

The previous BRD Phase 2 Site Investigation included a programme of 6No. gas, vapour and groundwater monitoring visits that was undertaken through September and October 2024. These visits and subsequent assessment demonstrated that landfill gas protection measures are not required at the site.

It is considered that this assessment is still valid, however, given that some fuel odours were noted and that hydrocarbon contamination has been identified in the groundwater underlying the location of the former fuel tank, an additional gas and vapour monitoring visit has undertaken (including the new boreholes around the tank; WS209-WS212) in order to confirm that there are no significant concentrations of vapours present at this location, or the wider site.

9.4. GROUND GAS MONITORING

9.4.1. Summary of Results

The following table summarises the results from the additional monitoring visit undertaken on 19th May 2026.

PARAMETER	MINIMUM	MAXIMUM	COMMENTS
Methane	0.0%	0.0%	No significant concentrations recorded.
Carbon Dioxide	0.0%	2.4%	No significant concentrations recorded.
Oxygen	13.4%	20.2%	The oxygen levels were typically depleted as carbon dioxide concentrations increased.
Hydrogen Sulphide	0.0ppm	0.0ppm	No significant concentrations recorded.
Carbon Monoxide	0.0ppm	0.0ppm	No significant concentrations recorded.
VOC & SVOC (by PID)	0.0ppm	0.2ppm	No significant concentrations recorded.
Atmospheric pressure	1001mB	1002mB	Monitoring visit undertaken within a period of slight falling to steady pressure.
Groundwater levels	1.78m	3.18m	Groundwater recorded in all boreholes except borehole WS202.

PARAMETER	MINIMUM	MAXIMUM	COMMENTS
Flow rate	0.0 l/hr	0.0l/hr	No significant flow rates recorded.

9.4.2. Evaluation of Gas Monitoring Results

No significant concentrations of landfill gases or vapours were recorded during the additional gas and vapour monitoring visit for both the existing and new boreholes. These findings are in keeping with the previous gas and vapour monitoring visits undertaken in 2024.

It is therefore considered that the previous assessment of “Characteristic situation 1 - Very low” remains valid and as such ground gas or vapour protection measures are not required in the new dwellings.

10. RISK EVALUATION

10.1. REVISED CONCEPTUAL MODEL

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

INVALID CONTAMINANT LINKAGES	<p>No significant hydrocarbon contamination has been identified with regards to human health in the location of the former fuel tank, albeit is noted that the investigation of the soils all around the former fuel tank location has been limited by the presence of the overlying stockpile.</p> <p>All of the other potential contamination linkages identified at the start of this additional ground investigation were proven to be valid.</p>
ADDITIONAL CONTAMINANT LINKAGES	<p>During the ground investigation, microscopic asbestos insulation debris has been identified within the deeper original Made Ground strata in borehole WS209 at 0.60m bgl in the location of the former fuel tank.</p>
LIMITATIONS AND UNCERTAINTIES	<p>Due to access restrictions around the stockpile of crushed arisings, it was not possible to fully investigate the full footprint of the former fuel tank location. Whilst the existing boreholes and trial pits have confirmed the lack of any significant contamination in this location, there is evidence that some localised fuel contamination may be present. As such, it is considered that some further investigation of the full tank footprint is still required to ensure that there is not some buried hotspot of fuel contamination still present.</p> <p>The current level of groundwater monitoring is limited as only 2No. monitoring visits have been undertaken. It is considered that additional groundwater monitoring would increase confidence in the results.</p>

10.2. UPDATED CONTAMINATION RISK ASSESSMENT

The contamination 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
<p>Previous above ground fuel tank in centre of site.</p> <ul style="list-style-type: none"> Petroleum hydrocarbons (known to store only diesel). 	Direct contact	Future residents	Low risk.
	Inhalation of vapours		
	Ingestion (1)		
	Vertical and horizontal migration (2)	Groundwater and surface water	Moderate to Low risk.
<ul style="list-style-type: none"> Asbestos fibres within the Made Ground around the fuel tank footprint. 	Direct contact (3)	Building materials and services	Moderate to Low risk.
	Inhalation of fibres (4)	Future residents	Moderate risk.

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

SOIL RISKS TO HUMAN HEALTH

Although no fuel contamination has been identified that exceeds the GAC for human health, there is evidence that there may be more localised contamination present. As such a low contamination risk remains until this can be determined.

A moderate risk to future residents has been identified from the microscopic asbestos insulation debris identified within the Made Ground strata in WS209 around the fuel tank footprint. No asbestos contamination has been identified anywhere else on the site to date.

GROUND GAS RISKS

No risks from ground gases or vapours have been identified at the site.

RISK TO WATER ENVIRONMENT

A moderate to low risk to the water environment has been identified from the elevated TPH concentrations recorded in the groundwater in WS203, WS206 and WS209.

Whilst the highest concentrations of TPH have been recorded in WS209, which targeted the location of the former above ground diesel tank, elevated concentrations of TPH have also been recorded sporadically in the north (WS206) and in the south (WS203) of the site. However, boreholes WS204 and WS210, located between borehole WS209 and boreholes WS203 and WS206 have not recorded any elevated TPH. Furthermore, borehole WS210 also targeted the location of the former above ground diesel tank and did not record any TPH.

This would suggest that the elevated concentrations of TPH recorded in the groundwater are likely to be from several sources and not all related to the same contamination plume from the former fuel tank. Based on the testing to date the more significant TPH contamination is localised to the location of the former above ground diesel tank.

RISK TO BUILDING MATERIALS AND SERVICES

A moderate to low risk to water supply pipes has been identified at the site from the elevated concentrations of TPH and BTEX recorded in WS209 and TP313 where slight hydrocarbon odours were noted. Both of these exploratory holes were in the location of the former above ground diesel tank in the centre north of the site.

The presence of hydrocarbons 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. 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 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

This investigation has identified some risks to future residents from microscopic asbestos insulation debris identified within the original site Made Ground around the former fuel tank location, located in the centre north of the site. No asbestos contamination has been identified anywhere else on the site.

Likewise, there is the potential for some localised fuel contamination to still be present in the location of the fuel tank footprint, which potentially presents a risk to both future residents and the underlying water environment. This area requires some further investigation but requires part of the large stockpile to be moved.

This investigation has also identified the need for barrier water supply pipes in the location of the former tank.

It is recommended that this report is submitted to the planning department of Havant Borough Council so that the findings can be reviewed by the Environmental Control Officer (in connection with Condition 20 of planning permission ref. APP/25/00639). As the findings are such that some further investigation is still required around the former tank location, this report is not looking to address the requirements of Condition 20 at this stage.

10.3.2. Further Contamination Assessment

In order to provide further confidence in the risk assessment and to address the limitations and uncertainties identified within the existing conceptual model, it is recommended that the following additional investigation elements are completed for contamination assessment purposes:

- Further trial pits are required in the vicinity of the former above ground diesel tank, once the stockpile of crushed concrete has been moved, in order to investigate the full footprint of the former tank location and to delineate the extent of the identified asbestos and hydrocarbon contamination in this area.
- As part of these further works, it is proposed that a further groundwater monitoring visit is undertaken to supplement the existing analytical dataset and identify any variation in the fuel contaminant concentrations.

10.3.3. Outline Remediation Strategy

The remediation requirement at the site will be dependent on the findings of the further investigation around the fuel tank (as discussed above). However, as any contamination around the tank location is likely to be localised and that this is the only contamination on the site, it is considered that the remediation will be limited to some targeted removal of the contaminated soils (asbestos and fuel contamination), potentially alongside some longer term monitoring of the underlying groundwater regime.

Once the further investigation has been completed then a formal remediation strategy should therefore be developed by an experienced Geo-Environmental Consultant. This strategy will look to address the final requirements for Condition 20.

11. SOIL RE-USE AND WASTE SOIL DISPOSAL

11.1. OVERVIEW

It is considered that uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated is not waste. Accordingly, the planned re-use of such soils on site to form the development landform that has been determined through the planning process is excluded from waste regulation by the Waste Framework Directive (2008).

Made Ground and other materials such as recycled aggregate are also not waste unless they are discarded, intended to be discarded or required to be discarded.

Any soils that are surplus to requirements and/or are unsuitable for re-use to be disposed of from site are recognised as 'waste' according to the Environment Agency and the European Waste Framework Directive.

To allow the transfer of surplus soil for use at other developments it is recommended that a Materials Management Plan (MMP) is formulated in general accordance with the CLAIRE 'Definition of Waste: Development Industry Code of Practice'. Such a MMP is also of use for the re-use of the excavated materials on site, such as for:

- Demonstrating that stockpiled soils have a use.
- Facilitating the import of soils if there is a shortfall of fill material.

It is a legal requirement to correctly assess and classify waste. There are specific technical requirements for waste sampling such that it is proportionate to the volume of the waste type in question and its nature. The preliminary waste assessment provided below is based only upon the available data and may not be sufficient to adequately classify the waste.

11.2. SUB-SOIL

It is considered that the natural and Made Ground 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'. Waste Acceptance Criteria (WAC) has been completed and the results are in the Appendices, which confirm the soil tested complies with the inert waste limits.

On the basis of the quantification testing and the lack of visible fragments, it is considered that the asbestos contaminated Made Ground soils around the fuel tank location would also be classified as 'non-hazardous waste'. However, given the presence of the asbestos in the soils, this soil cannot be sent to an inert landfill.

The waste code from the European Waste Catalogue (EWC) 2002 for all the soils would be 17 05 04 'Soil and Stones, not containing dangerous substances'. The chemical results should always be forwarded to the proposed landfill site and the waste classification confirmed prior to disposing of any surplus soils.

12. HEALTH AND SAFETY FILE INFORMATION

12.1. 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.

12.2. HAZARDS

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

12.2.1. Contamination

Contaminated soils and groundwater 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 those conditions revealed by this investigation, then expert environmental advice should be sought.

12.2.2. Asbestos

Whilst asbestos has not been visually identified in any of the soils at the site, asbestos quantification tests found Chrysotile asbestos fibres present in microscopic insulation debris present at a quantification of 0.024% within the deeper Made Ground strata in borehole WS209, located in the centre north of the site, at a depth of 0.60m bgl. This soil is proposed for remediation but requires further investigation in the first instance to determine its remediation and any implications to the construction works going forward.

As discussed above, no asbestos contamination has been identified anywhere else on the site.

12.2.3. Other Issues

During the BRD works the following safety hazards were identified:

- There are multiple slip, trip and fall hazards around the site.
- There are covers missing from manholes.

12.3. EXISTING STRUCTURES

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

12.4. 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.

12.5. UTILITY SERVICES

A disused electrical cable was encountered in trial pit TP305, located in the east of the site, at 0.60m bgl.

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 316 “Fareham” Solid and Drift edition (1:50,000) published 1972.
- ‘Ground Investigation Report’, Soiltechnics, ref. STM3168D-GD1, dated May 2016.
- ‘Interpretive Site Investigation and Remedial Strategy Report’, Forge Environmental Management Ltd, ref. HAV164.D/SI/002, rev. 1, Dated March 2020.
- ‘Phase 1 Environmental Desk Study - Bartons Road, Havant’, BRD Environmental Ltd, report ref. BRD4469-OR1-B, dated July 2025.
- ‘Phase 2 Geo-Environmental Investigation - Bartons Road, Havant,’ BRD Environmental Ltd, report ref. BRD4469-OR2-C and dated July 2025.
- ‘Soakage Investigation - Bartons Road, Havant’, BRD Environmental Ltd, report ref. BRD4469-OR3-C, dated July 2025.



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+A1:2020 (BSi, 2020). 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' (CIRIA, 2002). 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. It is worth noting that due to the disturbance of the ground, this technique will leave visible pits scars, localised surface disturbance and may leave a mound of soils that can settle over time.

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 generally retrieves excellent samples. Some rigs also allow dynamically driven 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, 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 into an approximate California Bearing Ratio (CBR) value employing the correlation proposed by TRL.

Light Weight Deflectometer

The falling Light Weight Deflectometer (LWD) test is a dynamic plate load test. It is a surface testing instrument and does not involve any penetration of the underlying soils. The plate used is 300mm diameter and so the results achieved are effectively an average of the ~450mm to 600mm soils beneath the plate. The LWD result can be correlated to a California Bearing Ratio (CBR) value and BRD's experience is that these results compare well with other insitu CBR test methods.

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	LOG SYMBOL	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 a common approach 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, 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 on the logs indicates that the test was performed with a solid cone rather than a split spoon sampler.

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

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

Sulphate

In order to compare the laboratory soil test results with 'Concrete in aggressive ground. BRE Special Digest 1: 2005' (BRE, 2005) laboratory results are converted to SO_4 mg/l. 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 1m 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.

<i>Instrument Reading (uncompressive strength in kg/cm²)</i>	<i>Indicative Undrained Shear Strength (kN/m²)</i>	<i>Indicative Consistency</i>	<i>Indicative strength</i>
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.

Contaminant Linkages

For a contamination risk to exist there must be a 'contaminant linkage' from the source (contaminant or pollutant) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a source, pathway or receptor breaks the contaminant 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.
- Atmospheric deposition.

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified contaminant 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 contaminant 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’, (BSi, 2017).
- Land Contamination Risk Management (LCRM) website, (Environment Agency, 2023).
- ‘Guidance for the safe development of housing on land affected by contamination - R&D66: 2008’, (NHBC/Environment Agency, 2008).

Land Contamination Risk Management: Stage 1 Risk Assessment

In line with the technical guidance, the contamination risk assessment follows a series of steps for each tier of risk assessment:

- *Identify the hazard* - A preliminary stage of risk assessment concerned with identifying and characterising the contamination source that may be associated with a particular site.
- *Assess the hazard* - Use a source-pathway-receptor (S-P-R) linkage approach to find out if there is the potential for unacceptable risk.
- *Estimate the risk* - predict what degree of harm or pollution might result and how likely it is to occur by using the tiered approach to risk assessment.
- *Evaluate the risk* - Decide whether a risk is unacceptable, 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.

The separate staged tiers of risk assessment are as follows:

TIER	DESCRIPTION
TIER 1: PRELIMINARY RISK ASSESSMENT	Generally limited to desk based research and a site walkover survey (site reconnaissance) to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site. Occasionally it may include assessment of a limited exploratory ground investigation or previous investigation data.
TIER 2: GENERIC QUANTITATIVE RISK ASSESSMENT	This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the magnitude of the associated risks with test results compared to generic assessment criteria.
TIER 3: DETAILED QUANTITATIVE RISK ASSESSMENT	To further evaluate risks the development of site-specific assessment criteria are values for concentrations of contaminants derived using risk estimation models

Risk Classification

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

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

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

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

These risk classifications are defined as follows:

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

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

TIER 2 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, 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 only produced limited results to date. 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 deemed appropriate, the results have also been assessed with reference to the required statistical tests presented within CL:AIRE Professional Guidance: 'Comparing Soil Contamination Data with a Critical Concentration'.

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

ANALYSIS	GENERIC ASSESSMENT CRITERIA (mg/kg unless stated)			SOURCE
	RESIDENTIAL WITH PLANT UPTAKE	RESIDENTIAL WITHOUT PLANT UPTAKE	COMMERCIAL / INDUSTRIAL	
TPH Aliphatic C35-C44	65,000	65,000	1,600,000	
TPH Aromatic C5-C7	70	370	26,000	
TPH Aromatic C7-C8	130	860	56,000	
TPH Aromatic C8-C10	34	47	3,500	
TPH Aromatic C10-C12	74	250	16,000	
TPH Aromatic C12-C16	140	1,800	36,000	
TPH Aromatic C16-C21	260	1,900	28,000	
TPH Aromatic C21-C35	1,100	1,900	28,000	
TPH Aromatic C35-C44	1,100	1,900	28,000	
Benzene	0.87	3.3	98	C4SL
Toluene	130	880	56,000	S4UL
Ethylbenzene	47	83	5,700	
Xylene [^]	56	79	5,900	
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	

TIER 2 RISK ESTIMATION - SURFACE WATER AND GROUNDWATER

The initial assessment of the contamination risk to groundwater is by comparing dissolved groundwater concentrations with screening values (GAC) that are protective of surface water resources. Surface waters are supplied with a baseflow from groundwater and so shallow groundwater often enters the surface water. It is therefore appropriate to compare groundwater to these GAC.

The reference source for the target concentrations is generally the Environment Agency's maximum allowable concentration Environmental Quality Standard (EQS) (as accessed February 2025: <https://www.gov.uk/guidance/surface-water-pollution-risk-assessment-for-your-environmental-permit#screening-tests-freshwaters>), the Water Supply (Water Quality) Regulations 2016 (WSR) 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 annual average)
Cadmium	50 µg/l	DW1
Chromium (total)	32 µg/l	EQS
Chromium (VI)	3.4 µg/l	EQS
Copper	50 µg/l	DW1
Nickel	34 µg/l	EQS
Lead	14 µg/l	EQS
Mercury	1 µg/l	WSR
Selenium	10 µg/l	WSR
Zinc	10.9 mg/l	EQS annual average bioavailable
Cyanide	50 µg/l	WSR
pH	6 to 9 units	-
Benzene	50 µg/l	EQS
Toluene	380 µg/l	EQS
Ethylbenzene	300 µg/l	WHO guideline
Xylene	30 µg/l	EQS (annual average)
Methyl tert-butyl ether (MTBE)	15 µg/l	Taste and odour threshold.
Naphthalene	130 µg/l	EQS
Benzo(a)pyrene	0.27 µg/l	EQS
Total PAH	-	Benzo(a)pyrene can be considered as a marker for the other PAHs
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	

TIER 2 RISK ESTIMATION - GROUND GAS

Introduction

A variety of potentially hazardous gases occur 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 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', (CIRIA, 2007) and 'BS8485:2015+A1:2019 - Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings' (BSi, 2019).

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:

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

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

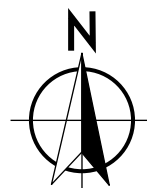
Characteristic Gas Situation

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 (CH ₄ or CO ₂ 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	Quantitative risk assessment required to evaluate the scope of protection measures.
CS5	High risk	15 to <70	-
CS6	Very high risk	>70	-

APPENDIX 1

Site Location Plan

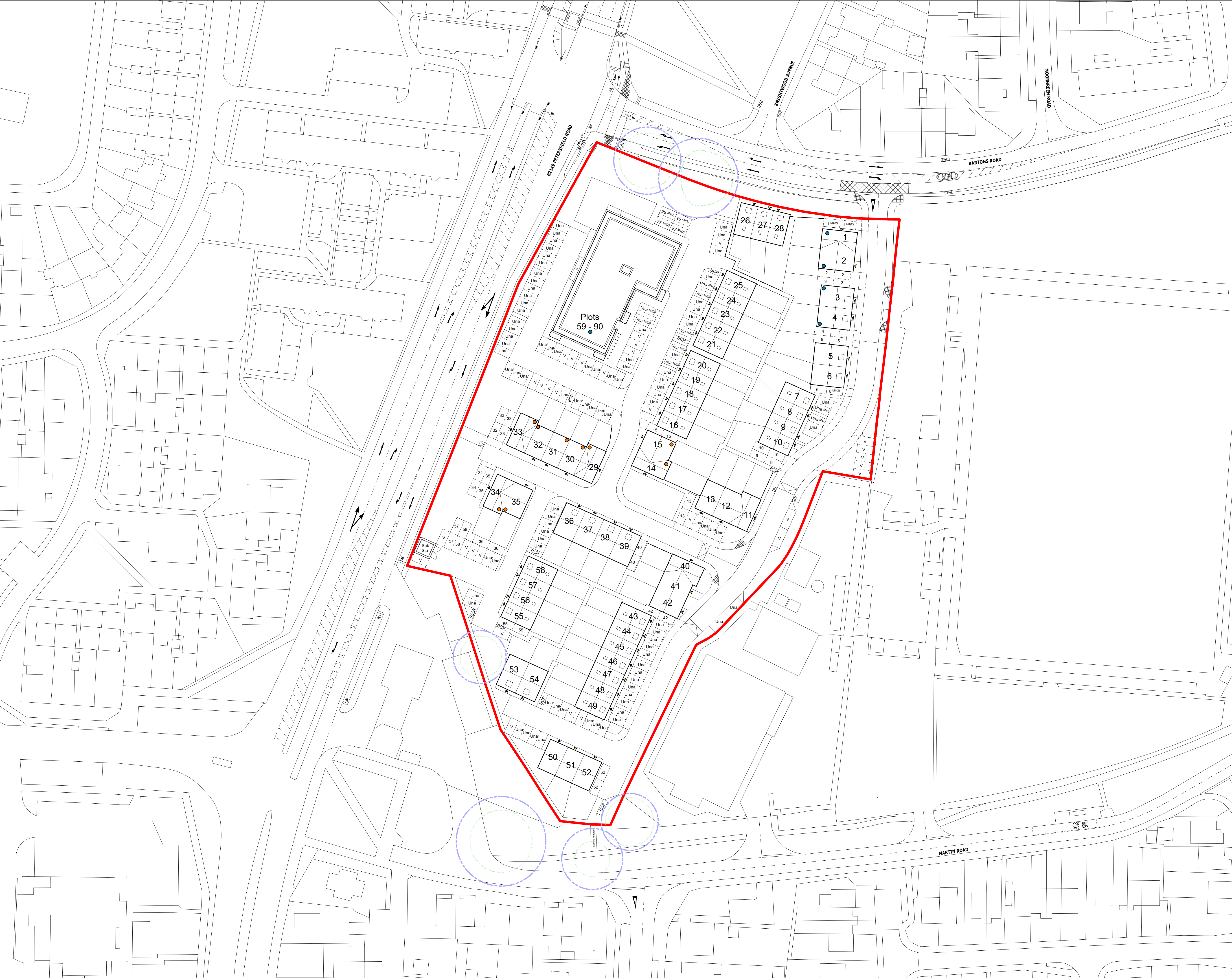


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Not to scale.

Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP2-A
Date Issued: July 2024





NOTES
ERRORS AND OMISSIONS TO BE REPORTED TO THE ARCHITECT.
THIS DRAWING IS COPYRIGHT.

REVISIONS		
A	Issue for Planning	31/07/2025
B	Issue for Planning	01/08/2025
C	Issue for Planning	05/08/2025
D	Issue for Planning	04/12/2025
E	Parking numbers amended	05/01/2025

Key

- Application Site Boundary
- AR / SR Plot
- SO Plot

N

0m 10m 20m 30m 40m

SCALE 1:500 @ A1

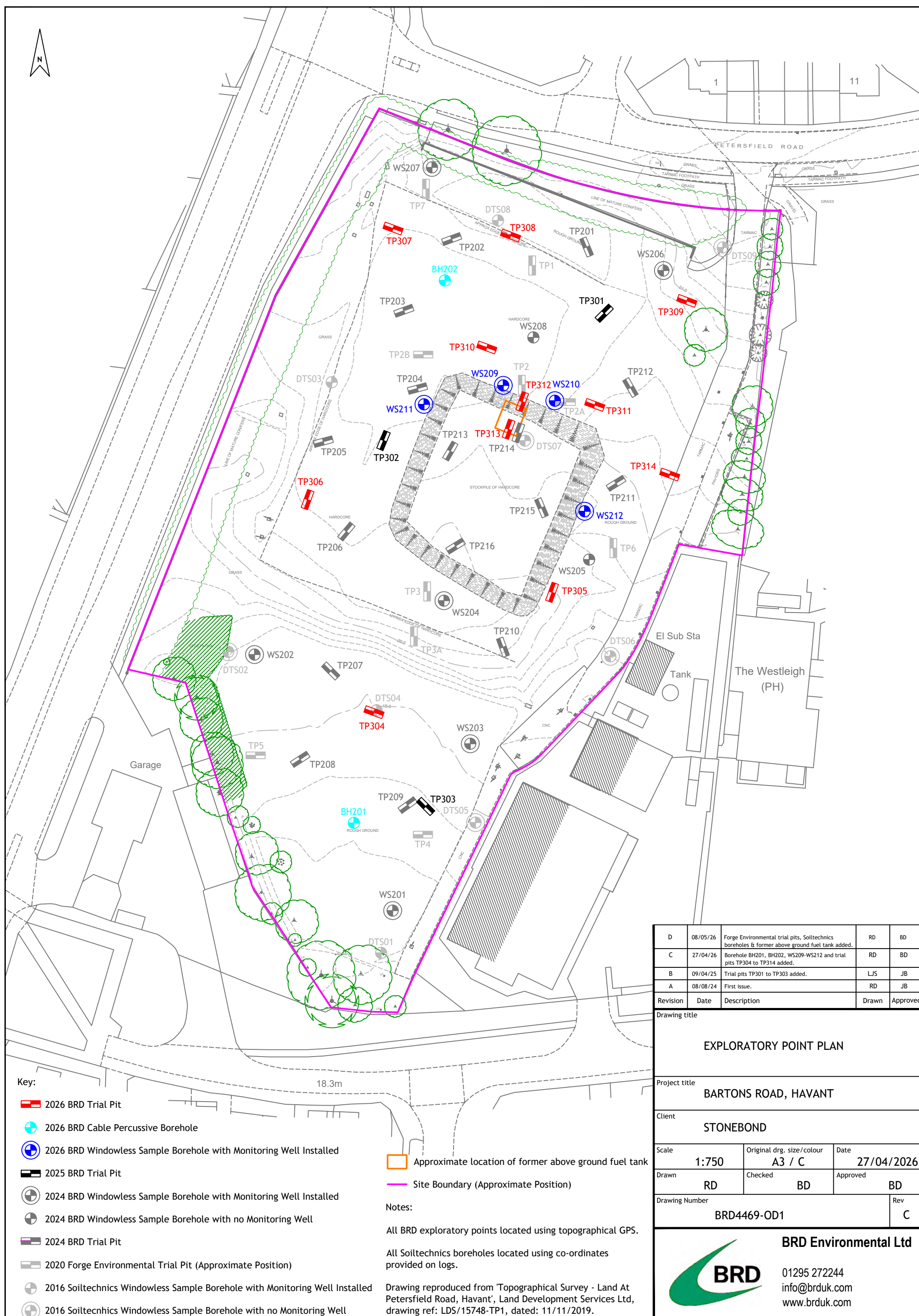
EDGINGTONS
ARCHITECTS

meridian house | 2 russell street | windsor | berkshire | SL4 1HQ
t: +44 (0)1753 857092 | e: mail@edgingtons.co.uk
web: http://www.edgingtons.co.uk

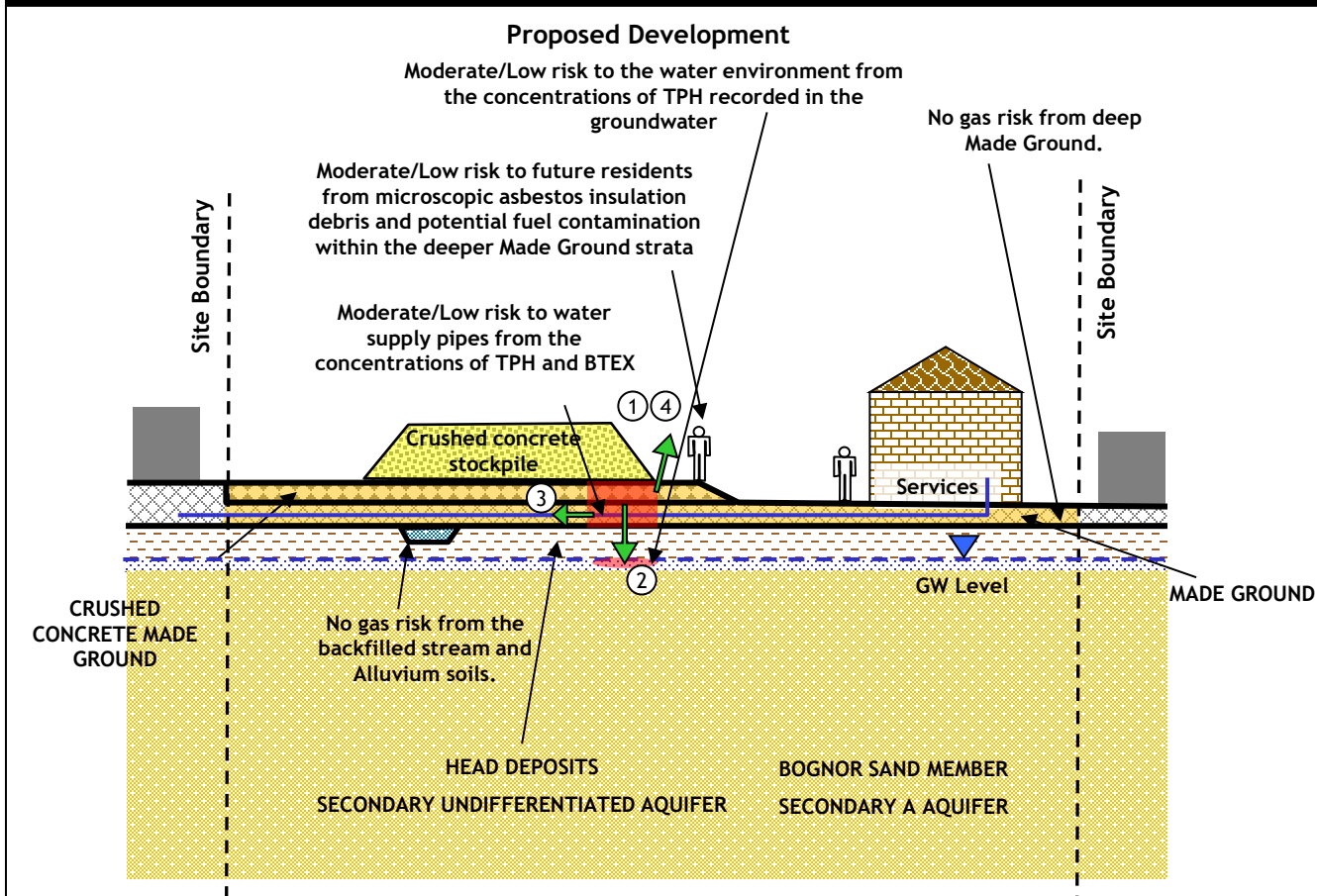
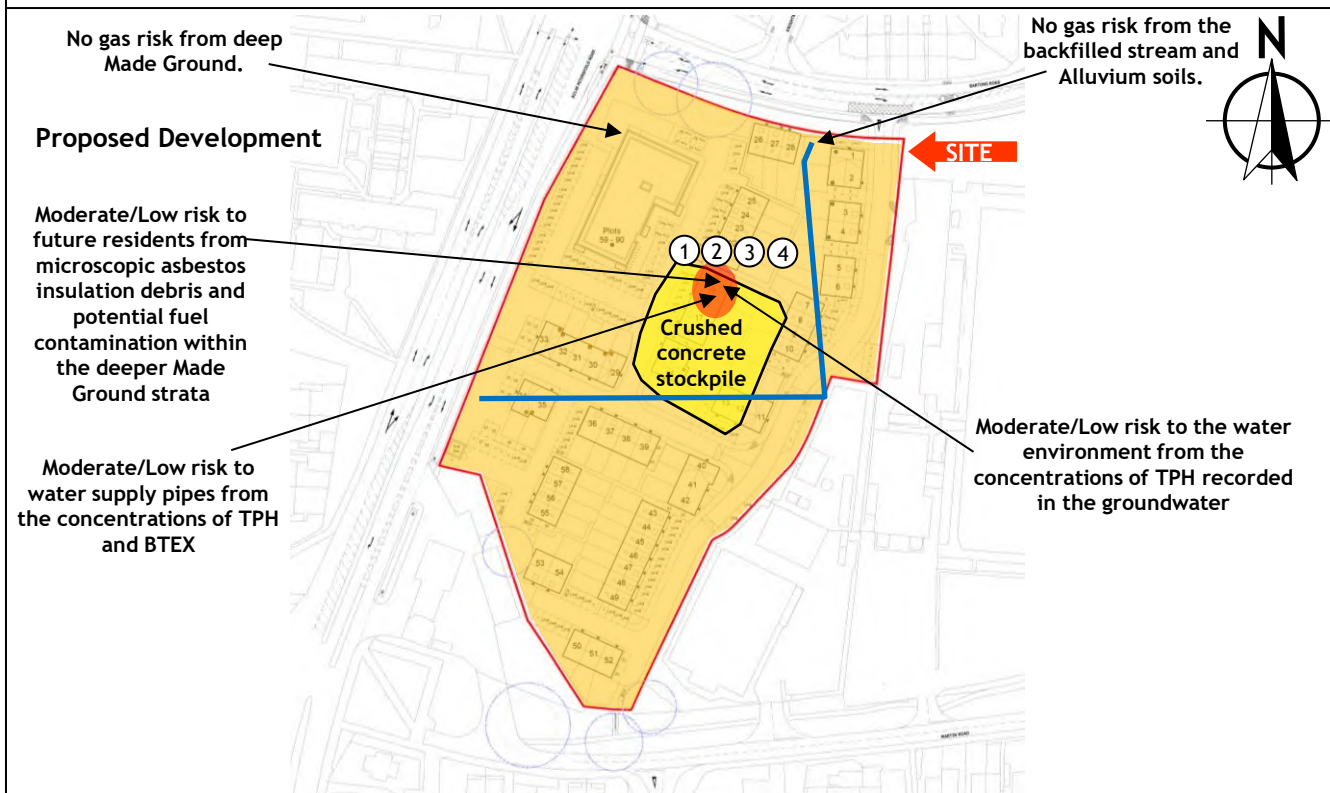
Stonebond Properties (Guildford) Limited
Former SSE Offices
Barton's Road, Havant

Proposed Block Plan

PROJECT STATUS	Planning				
SCALE (A1)	1 : 500				
DATE	31/07/2025	DRAWN	AG		
JOB No.	6087	DWG No.	1110	REV.	E



Revised Conceptual Model



Project Title: Bartons Road, Havant
 Client: Stonebond
 BRD Reference: BRD4469-OP6-D
 Date Issued: June 2026



Preliminary Foundation Key:

- Piling due to Made Ground extending below groundwater at 1.00m bgl in wetter months.
- Piling due to Made Ground extending below groundwater at 1.00m bgl in wetter months. But if levels reduced by 0.5m or more, reinforced shallow footings may be possible but subject to tree influence of existing and removed trees.
- Reinforced shallow footings due to variable ground but subject to tree influence of existing and removed trees. Potential for dig and pour during wetter months.
- Conventional shallow footings due to shallow Bognor Sand Member but subject to tree influence of existing and removed trees.

Preliminary Foundation Notes:

All preliminary foundation advice is subject to revision following the receipt of finished floor levels and outstanding additional geotechnical testing.

All conventional shallow and trench fill footings would be best attempted during the summer months when the groundwater levels should be in excess of around 1.50m bgl.

All conventional shallow and trench fill footings should be subject to tree influence of existing, removed trees and proposed trees.

Proposed zoning areas are for indicative purposes only. Boundaries are not definitive and will vary depending on time of year and groundwater depth.

Exploratory Point Key:

- BRD Trial Pit
- BRD Cable Percussive Borehole
- BRD Windowless Sample Borehole with Monitoring Well Installed
- BRD Windowless Sample Borehole with no Monitoring Well
- 2020 Forge Environmental Trial Pit (Approximate Position)
- 2016 Soiltechnics Windowless Sample Borehole with Monitoring Well Installed
- 2016 Soiltechnics Windowless Sample Borehole with no Monitoring Well
- Site Boundary (Approximate Position)

General Notes:

All BRD exploratory points located using topographical GPS.

All Soiltechnics boreholes located using co-ordinates provided on logs.

Drawing reproduced from 'Topographical Survey - Land At Petersfield Road, Havant', Land Development Services Ltd, drawing ref: LDS/15748-TP1, dated: 11/11/2019.

A	20/05/26	First Issue.	RD	JB
Revision	Date	Description	Drawn	Approved
Drawing title				
PRELIMINARY FOUNDATION ZONING PLAN				
Project title				
BARTONS ROAD, HAVANT				
Client				
STONEBOND				
Scale	Original drg. size/colour	Date		
1:750	A3 / C	20/05/2026		
Drawn	Checked	Approved		
RD	JB	JB		
Drawing Number				Rev
BRD4469-OD2				A
<div><div></div><div>BRD Environmental Ltd</div><div>01295 272244 info@brduk.com www.brduk.com</div></div>				

APPENDIX 2

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP304</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60 0.70 0.90	SV D1 D2	50/58/59 kPa	MADE GROUND: Grass over brown, sandy, clayey gravel and cobbles of brick, concrete, flint, quartzite, rare ceramic and slate with rare metal fragments.	0.40 (18.58) 0.80 (18.18) 1 1.20 (17.78) 2 2.00 (16.98) 3 4	MG HEAD DEPOSITS BOGNOR SAND M.	
			Firm, orange brown mottled light grey, silty, slightly gravelly CLAY. Gravel of fine to coarse, rounded to subrounded flint.			
			Firm to stiff, light grey mottled orange brown, slightly silty, very gravelly CLAY / very clayey GRAVEL. Gravel of fine to coarse, rounded to subrounded flint and rare quartzite.			
1.90	D3		Medium dense, beige, laminated orange brown and light grey, slightly silty, fine SAND.			
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level: 18.981 mAOD		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.00m bgl. Relative density based on visual assessment only.		All dimensions in metres Log Scale 1:25 	
					Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond			Trial Pit No. TP305	
Project Title: Bartons Road, Havant				
Project No: BRD4469			Sheet 1 of 1	
Logged By: R Davies				
Date Completed: 23/04/2026				
Method Used: 180° Backhoe excavator (JCB 3CX type)				

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.70 0.80	SV D1	97/83/86 kPa	MADE GROUND: Grass over loose, light brown, sandy gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, flint, rare tarmac and ceramic with rare plastic fragments.	0.60 (19.41)	MADE GROUND	
			Stiff, orange brown mottled light grey with rare dark orange brown specks / deposits, silty, slightly gravelly CLAY. Gravel of fine to coarse, rounded flint. 0.60 m: Disused electrical cable running from Face A - Face C.			
1.20	D2		Firm to stiff, light grey mottled orange brown, slightly silty, very gravelly CLAY / very clayey GRAVEL. Gravel of fine to coarse, rounded to subrounded flint and rare quartzite.	1 (19.11)	HEAD DEPOSITS	
2.00	D3	Medium dense, beige, laminated orange brown and light grey, slightly silty, fine SAND.	1.40 (18.61)	BOGNOR SAND M.		
			2 (17.91)			
				2.10 (17.91)		
				3		
				4		

Pit Stability: Generally stable throughout		Surface Elevation Level: 20.006 mAOD
Groundwater: Not encountered		

Plan of Trial Pit: 	General Remarks: Trial pit terminated at 2.10m bgl. Relative density based on visual assessment only.	All dimensions in metres Log Scale 1:25
		 BRD Telephone: 01295 272244 Email: info@brduk.com

TRIAL PIT RECORD

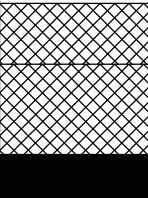
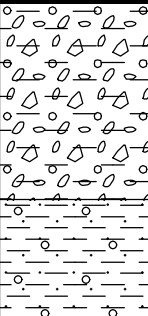
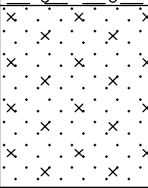
Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <div>TP306</div>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Heavily compacted / very dense, light brown, sandy gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic and flint with occasional metal and plastic fragments and rare wood fragments. 0.50 - 0.90 m: Orange brown in colour and clayey.	1 1.40 (19.28) 2 3 4	MADE GROUND	
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level: 20.675 mAOD		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.40m bgl due to slow progress in heavily compacted Made Ground and time constraints. Trial pit undertaken in recorded location of pile cap. No pile cap encountered. Relative density based on visual assessment only.			All dimensions in metres Log Scale 1:25
			Telephone: 01295 272244 Email: info@brduk.com			

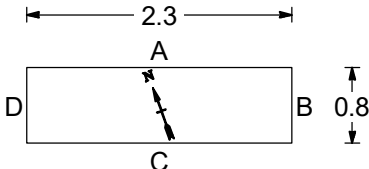
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP307</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
1.00	D1		MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments.	0.40 (20.47)	MADE GROUND	
			MADE GROUND: Stiff, orange brown mottled light grey, silty, gravelly clay. Gravel of fine to coarse, angular to rounded flint, rare brick and concrete with rare cobbles and boulders of concrete.	0.80 (20.07)		
2.20	D2		Medium dense, orange brown, clayey GRAVEL of fine to coarse, rounded to subrounded flint and rare quartzite. 0.80 - 1.70 m: Face A: Large pocket of Made Ground: Light brown, sandy, gravel and cobbles of concrete, brick, ceramic, flint and rare tarmac. with occasional plastic and metal fragments.	1.60 (19.27)	HEAD DEPOSITS	
			Medium dense, moist, orange brown mottled light grey, silty, fine SAND.	2.30 (18.57)		
				2.30 (18.57)	BOGNOR SAND M.	
				3		
				4		
Pit Stability: See General Remarks Groundwater: Not encountered				Surface Elevation Level: 20.865 mAOD		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.30m bgl. Slight spalling of sides in pocket of Made Ground at 0.8-1.7m depth. Relative density based on visual assessment only.		All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

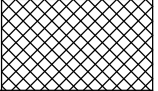
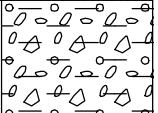
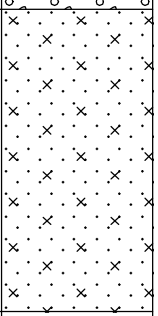
TRIAL PIT RECORD

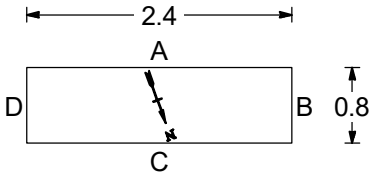
Client: Stonebond			<div>Trial Pit No.</div> <div>TP308</div>	
Project Title: Bartons Road, Havant				
Project No: BRD4469				
Logged By: R Davies			<div>Sheet 1 of 1</div>	
Date Completed: 23/04/2026				
Method Used: 180° Backhoe excavator (JCB 3CX type)				

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.90	D1		MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments.	0.20 (20.40)	MADE GROUND	
			MADE GROUND: Medium dense, dark red brown, slightly clayey, sandy gravel and cobbles of brick, concrete, flint and slate with rare boulders of concrete.	0.50 (20.10)		
			Flinty TARMAC	0.65 (19.95)		
1.50	D2		Medium dense, orange brown, clayey GRAVEL of fine to coarse, rounded to subrounded flint and rare quartzite.	1 1.30 (19.30)	HEAD DEPOSITS	
			Firm to stiff, light grey, silty, sandy, gravelly CLAY. Gravel of fine to coarse, rounded to subrounded flint.	1.70 (18.90)		
			Medium dense, moist, orange brown mottled light grey, silty, fine SAND.	2 2.30 (18.30)		
2.20	D3			3 4	BOGNOR SAND M	

Pit Stability: Slight spalling of sides on encountering groundwater			Surface Elevation Level:	
Groundwater: Slight seepage at 2.3m			20.603 mAOD	
Plan of Trial Pit:			General Remarks:	
			Trial pit terminated at 2.30m bgl. Relative density based on visual assessment only.	
			All dimensions in metres Log Scale 1:25	
				
			Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP309</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
1.50	D1		MADE GROUND: Medium dense, light brown, sandy gravel of fine to coarse, angular to rounded concrete, flint and brick with rare plastic fragments.	0.30 (20.70)	MG	
			Stiff, dry, friable, orange brown, very clayey GRAVEL / very gravelly CLAY. Gravel of fine to coarse, rounded to subrounded flint and rare quartzite.		HEAD	
			Medium dense, orange brown, silty, fine SAND.	0.70 (20.30)	BOGNOR SAND MEMBER	
				1.70 (19.30)		
				2		
				3		
				4		

Pit Stability: Generally stable throughout Groundwater: Not encountered		Surface Elevation Level: 20.997 mAOD
Plan of Trial Pit: 	General Remarks: Trial pit terminated at 1.70m bgl. Relative density based on visual assessment only.	
		All dimensions in metres Log Scale 1:25  Telephone: 01295 272244 Email: info@brduk.com

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP310</h2>		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.60 0.60	PID J1	0.0 ppm	MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments.	0.50 (20.45)	MADE GROUND	
			MADE GROUND: Medium dense, orange brown with some dark brown, clayey gravel of fine to coarse, rounded to angular flint, rare quartzite, brick and tarmac.			
1.00 1.00	PID J2	0.4 ppm	MADE GROUND: Firm, dark grey, silty CLAY with occasional flint gravel and a natural organic odour and rare brick fragments.	0.90 (20.05)		
1.30 1.30	PID J3	0.0 ppm	Firm to stiff, light grey mottled orange brown, slightly silty, very gravelly CLAY / very clayey GRAVEL. Gravel of fine to coarse, rounded to subrounded flint and rare quartzite.	1.20 (19.75)	HEAD	
			Medium dense, orange brown, silty, fine SAND with rare, thin beds of light grey, slightly clayey, silty, fine sand.	1.60 (19.35)	BOGNOR SM.	
				2.10 (18.85)		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level: 20.954 mAOD		
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.10m bgl. Relative density based on visual assessment only.		All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

TRIAL PIT RECORD

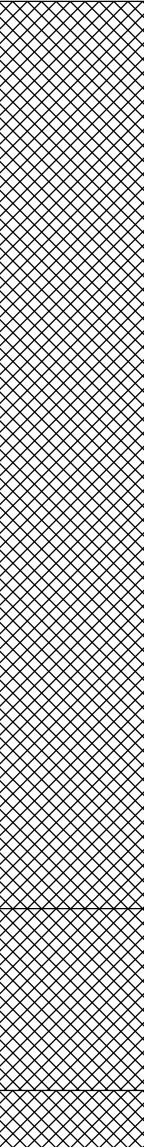
Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)			Trial Pit No. <div>TP311</div>	
			Sheet 1 of 1	
Samples & Tests			Description of Strata	
Depth	Type & No	Value	Depth / (Level)	Geology
			0.0m to 0.8m - Face B end of pit: MADE GROUND: Loose, brown to light brown, sandy gravel, cobbles and boulders of fine to coarse, angular to rounded concrete, brick, ceramic and flint with occasional fragments of plastic and metal. 0.0m to 0.2m: Face D end of pit: MADE GROUND: Heavily compacted / very dense, light brown, sandy gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic and flint with occasional metal and plastic fragments and rare wood fragments.	MADE GROUND
			0.80 m: Obstruction, possible concrete footing.	
			0.80 (19.68)	
			1	
			2	
			3	
			4	
Pit Stability: Generally stable throughout Groundwater: Not encountered			Surface Elevation Level: 20.475 mAOD	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 0.80m bgl due to obstruction, possible concrete footing. Relative density based on visual assessment only.	
			All dimensions in metres Log Scale 1:25	
			Telephone: 01295 272244 Email: info@brduk.com	

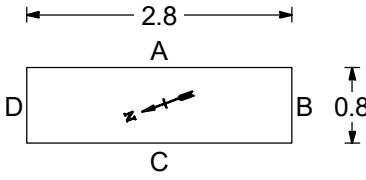
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP312</h2>		
Sheet 1 of 1						
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.40 0.40	PID J1	0.1 ppm	MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments. 0.00 m: Face B end of pit: Edge of crushed demolition arising stockpile, ~ 0.60m high (gravel and cobbles of concrete and brick). MADE GROUND: Firm, dark brown, slightly organic, silty, gravelly clay. Gravel of fine to coarse, angular to rounded brick and flint with slight natural organic odour.	0.30 (20.55)	MADE GROUND	
0.90 0.90	PID J2	0.1 ppm	MADE GROUND: Firm, dark grey, silty clay with occasional flint gravel and a natural organic odour and rare brick fragments. 1.00 m: Face B end of pit: Concrete obstruction, possible concrete slab.	0.80 (20.05)		
1.30 1.30	PID J3	0.0 ppm	Medium dense, orange brown, clayey GRAVEL of fine to coarse, rounded to subrounded flint and rare quartzite.	1.20 (19.65)	HEAD	
			Medium dense, orange brown mottled light grey, silty, fine SAND.	1.60 (19.25)	BOGNOR SAND MEMBER	
2.60 2.70 2.70	D1 PID J4	0.0 ppm		2.80 (18.05)		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level: 20.850 mAOD	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 2.80m bgl. Relative density based on visual assessment only.			
All dimensions in metres Log Scale 1:25 						
Telephone: 01295 272244 Email: info@brduk.com						

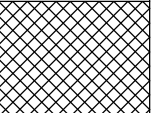
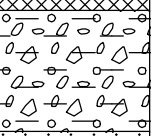
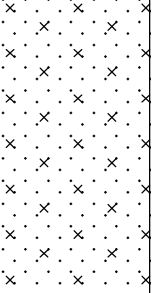
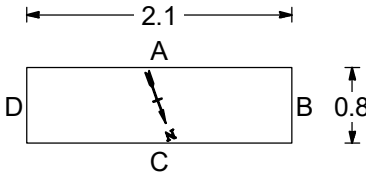
TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP313</h2>	
				Sheet 1 of 1	

Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
			MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments.		MADE GROUND	
3.10	PID J1	0.0 ppm	MADE GROUND: Firm, dark grey to black in parts, slightly organic to organic in parts, silty, gravelly clay with occasional decaying plant remains with a natural organic odour. 3.00 - 3.30 m: Wet, with slight organic / hydrocarbon odour.	3.00 (20.31)		
3.50	PID J2	0.3 ppm	MADE GROUND: Grey gravel of coarse, rounded flint.	3.60 (19.71)		
				3.80 (19.51)		

Pit Stability: Generally stable throughout Groundwater: Not encountered				Surface Elevation Level: 23.310 mAOD	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 3.8m bgl. Trial pit undertaken through mound of crushed demolition arisings. Relative density based on visual assessment only.		
			 Telephone: 01295 272244 Email: info@brduk.com		

TRIAL PIT RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Completed: 23/04/2026 Method Used: 180° Backhoe excavator (JCB 3CX type)				Trial Pit No. <h2>TP314</h2>		
				Sheet 1 of 1		
Samples & Tests			Description of Strata	Depth / (Level)	Geology	Legend
Depth	Type & No	Value				
0.70	D1	0.0 ppm	MADE GROUND: Heavily compacted / very dense, light brown, sandy gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic and flint with occasional metal and plastic fragments and rare wood fragments.	0.40 (19.80)	MG	
			Medium dense, orange brown, clayey GRAVEL of fine to coarse, rounded to subrounded flint and rare quartzite.	0.80 (19.40)	HEAD	
1.00 1.00	PID J1		Medium dense, orange brown, silty, fine SAND.	1 (18.40)	BOGNOR SAND MEMBER	
1.70	D2			1.80 (18.40)		
				2		
				3		
				4		
Pit Stability: Generally stable throughout Groundwater: Not encountered					Surface Elevation Level: 20.199 mAOD	
Plan of Trial Pit: 			General Remarks: Trial pit terminated at 1.8m bgl. Relative density based on visual assessment only.			
					All dimensions in metres Log Scale 1:25	
					 Telephone: 01295 272244 Email: info@brduk.com	

Trial Pit Photographs

TP304



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP305



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP306



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP307



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP308



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP309



Trial Pit Photographs

TP310



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP311



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP312



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP313



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

Trial Pit Photographs

TP314



Project Title: Bartons Road, Havant
Client: Stonebond
BRD Reference: BRD4469-OP10-A
Date Issued: June 2026



01295 272244
info@brduk.com

PROBEHOLE RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Commenced: 14/04/2026 Date Completed: 14/04/2026 Method Used: Windowless Percussive Sampling Rig				Borehole No. <h2>WS209</h2>				
				Sheet 1 of 1				
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: Brown, sandy gravel of fine to coarse, angular to subrounded concrete, brick, tarmac, flint and quartzite. Rare plastic and glass fragments and rare concrete cobbles.			MADE GROUND	
0.60 0.60	PID J2	0.3 ppm		MADE GROUND: Firm, dark grey brown, organic, slightly sandy, silty, gravelly clay with occasional decaying plant remains and rare plastic fragments. Gravel of fine to coarse, angular to subrounded flint and rare brick and concrete.	0.50 (20.34)			
1.00	SPT	7 N		Loose, grey, slightly sandy GRAVEL of fine to coarse, subangular to subrounded flint. 1.00 m: SPT: 2,3/2,1,2,2	0.80 (20.04)		HEAD DEPOSITS	
1.20 1.20	PID J3	0.4 ppm		1.20 m: Groundwater strike with slight hydrocarbon odour.				
				Beige brown, silty, fine SAND.	1.40 (19.44)		BOGNOR SAND MEMBER	
1.80 1.80	PID J4	0.0 ppm		Dense, orange brown, slightly silty, fine SAND.	1.70 (19.14)			
2.00	SPT	33 N		2.00 m: SPT: 3,4/6,9,9,9	2.0			
3.00	SPT	37 N		3.00 m: Becoming silty. 3.00 m: SPT: 11,10/9,8,10,10	3.0		BOGNOR SAND MEMBER	
4.00	SPT	>50 N		4.00 m: Becoming very dense. 4.00 m: SPT: 9,10/11,12,16,11 for 40mm	4.0 4.00 (16.84)			
General Remarks: Borehole terminated at 4.0m bgl due to refusal in SPT. Borehole collapsed to 3.0m on withdrawal of sampling tube.				Surface Elevation Level: 20.842 mAOD				
				All dimensions in metres Log Scale 1:25				

PROBEHOLE RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Commenced: 14/04/2026 Date Completed: 14/04/2026 Method Used: Windowless Percussive Sampling Rig						Borehole No. <h2>WS210</h2>			
						Sheet 1 of 1			
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: Brown, sandy gravel of fine to coarse, angular to subrounded concrete, brick, tarmac, flint and quartzite. Rare plastic and glass fragments and rare concrete cobbles. TARMAC. MADE GROUND: Stiff, grey, silty, gravelly clay with rare rootlets. Gravel of fine to medium, angular to subrounded flint, quartzite and rare brick.	0.20 (20.51) 0.30 (20.41)		MADE GROUND		
0.40 0.40	PID J2	0.1 ppm		1.00 m: SPT: 7,10/9,9,9,10	1.30 (19.41)				
1.80 1.80	PID J3	0.0 ppm		2.00 m: SPT: 7,8/7,7,8,8	2.0				
2.00 2.00	SPT	30 N		2.30 m: No further light grey mottling and becoming moist.			BOGNOR SAND MEMBER		
2.70 2.70	PID J4	0.0 ppm							
3.00 3.00	SPT	21 N		3.00 m: SPT: 3,5/5,5,5,6	3.0 3.00 (17.71)				
					4.0				

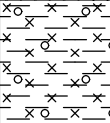
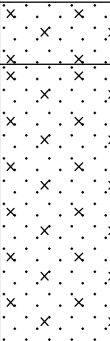
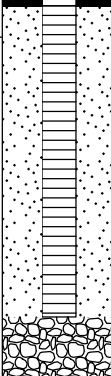
General Remarks: Borehole terminated at 3.0m bgl.	Surface Elevation Level: 20.710 mAOD	
	All dimensions in metres Log Scale 1:25	

PROBEHOLE RECORD

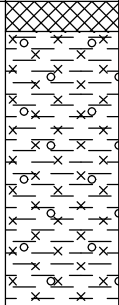
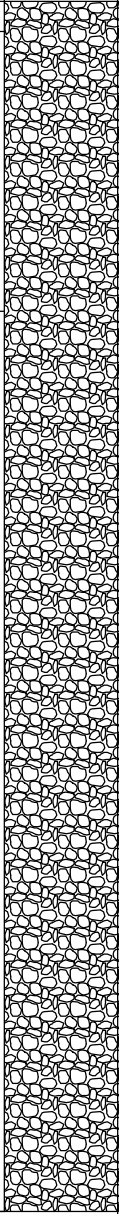
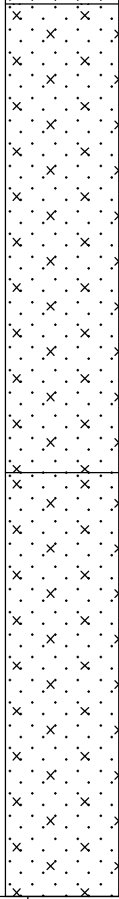
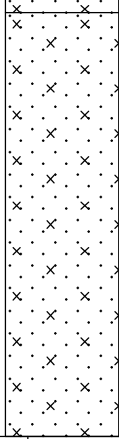
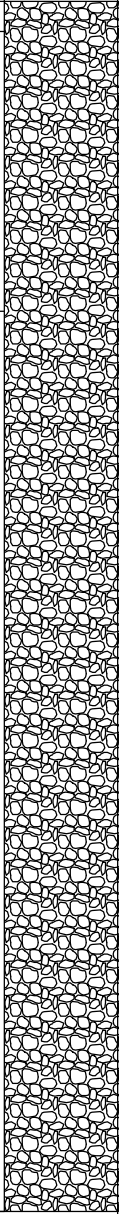
Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Commenced: 14/04/2026 Date Completed: 14/04/2026 Method Used: Windowless Percussive Sampling Rig						Borehole No. <h2>WS211</h2>			
						Sheet 1 of 1			
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill	
Depth	Type & No	Value							
0.10 0.10	PID J1	0.0 ppm		MADE GROUND: Brown, sandy gravel of fine to coarse, angular to subrounded concrete, brick, tarmac, flint and quartzite. Rare plastic and glass fragments and rare concrete cobbles.	0.35 (20.46)		MADE GROUND		
0.40 0.40	PID J2	0.0 ppm		MADE GROUND: Stiff, orange brown mottled grey, silty, gravelly clay with rare wire fragments. Gravel of fine to coarse, angular to subrounded flint and rare brick.	0.65 (20.16)				
0.70 0.70	PID J3	0.0 ppm		MADE GROUND: Firm, dark grey to black in parts, slightly organic in parts, silty, gravelly clay. Gravel of fine to coarse, angular to subrounded flint and rare brick.	0.90 (19.91)				
0.90 1.00	PEN SPT	3.5/3.75/3.0 kg/cm² 46 N		Stiff, grey, silty, slightly gravelly CLAY. Gravel of fine to coarse, subrounded to subangular flint. 1.00 m: SPT: 9,11/11,12,12,11	1.0 (19.61)		AL		
				Dense, orange brown, slightly sandy, very clayey GRAVEL of fine to coarse, subangular to subrounded flint.	1.20 (19.61)				
				Dense, orange brown mottled light grey, silty, fine SAND.	1.80 (19.01)		HEAD DEPOSITS		
2.00	SPT	45 N		2.00 m: SPT: 4,8/10,11,11,13	2.0				
				2.30 m: No further light grey mottling. 2.50 m: Becoming moist.					
2.80 2.80	PID J4	0.0 ppm							BOGNOR SAND MEMBER
3.00	SPT	47 N			3.00 m: SPT: 7,8/10,11,13,13	3.0 (17.81)			
					4.0				

General Remarks: Borehole terminated at 3.0m bgl. Borehole collapsed to 2.8m.	Surface Elevation Level: 20.811 mAOD	
	All dimensions in metres Log Scale 1:25	

PROBEHOLE RECORD

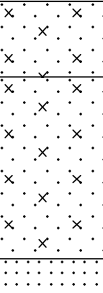
<div><div><div>Client: Stonebond</div><div>Project Title: Bartons Road, Havant</div><div>Project No: BRD4469</div><div>Logged By: R Davies</div><div>Date Commenced: 14/04/2026</div><div>Date Completed: 14/04/2026</div><div>Method Used: Windowless Percussive Sampling Rig</div></div><div><div>Borehole No.</div><div>WS212</div><div>Sheet 1 of 1</div></div></div>																										
<div>Samples & Tests</div> <table><thead><tr><th>Depth</th><th>Type & No</th><th>Value</th></tr></thead><tbody><tr><td>0.10 0.10</td><td>PID J1</td><td>0.0 ppm</td></tr><tr><td>0.40 0.40</td><td>PID J2</td><td>0.0 ppm</td></tr><tr><td>1.00</td><td>SPT</td><td>33 N</td></tr><tr><td>1.80 1.80</td><td>PID J3</td><td>0.0 ppm</td></tr><tr><td>2.00</td><td>SPT</td><td>>50 N</td></tr></tbody></table>			Depth	Type & No	Value	0.10 0.10	PID J1	0.0 ppm	0.40 0.40	PID J2	0.0 ppm	1.00	SPT	33 N	1.80 1.80	PID J3	0.0 ppm	2.00	SPT	>50 N	<div>Water</div> <div>↓</div>	<div>Description of Strata</div> <div>MADE GROUND: Grass over brown, sandy, gravelly clay with many rootlets and rare fragments of charcoal and wood. Gravel of fine to coarse, angular to subrounded brick, flint, concrete and tarmac.</div> <div>MADE GROUND: Red brown, sandy gravel of fine to coarse, angular to subrounded brick, concrete, flint, rare tarmac and occasional cobbles of brick and concrete.</div> <div>Stiff, orange brown mottled light grey, silty, very gravelly CLAY. Gravel of fine to coarse, subangular to subrounded flint.</div> <div>Dense, beige to yellow brown, slightly silty, fine SAND. 1.00 m: SPT: 5,6/7,8,8,10</div> <div>Dense, beige to yellow brown mottled orange brown and light grey, silty, fine SAND.</div> <div>1.50 m: Becoming moist.</div> <div>2.00 m: SPT: 6,8/12,12,14,12 for 40mm</div>	<div>Depth / (Level)</div> <div>0.20 (19.50)</div> <div>0.50 (19.20)</div> <div>0.90 (18.80)</div> <div>1.0 (18.60)</div> <div>2.0 (17.70)</div> <div>3.0</div> <div>4.0</div>	<div>Legend</div> <div></div> <div>MG</div> <div></div> <div>HEAD</div> <div></div> <div>BOGNOR SAND MEMBER</div>	<div>Geology</div> <div>MG</div> <div>HEAD</div> <div>BOGNOR SAND MEMBER</div>	<div>Installation /Backfill</div> <div></div> <div></div>
Depth	Type & No	Value																								
0.10 0.10	PID J1	0.0 ppm																								
0.40 0.40	PID J2	0.0 ppm																								
1.00	SPT	33 N																								
1.80 1.80	PID J3	0.0 ppm																								
2.00	SPT	>50 N																								
<div>General Remarks:</div> <div>Borehole terminated at 2.0m bgl due to refusal in SPT.</div>					<div>Surface Elevation Level:</div> <div>19.699 mAOD</div> <div>All dimensions in metres</div> <div>Log Scale 1:25</div>	<div></div> <div>Telephone: 01295 272244</div> <div>Email: info@brduk.com</div>																				

BOREHOLE RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Commenced: 22/04/2026 Date Completed: 23/04/2026 Method Used: Cable Percussive Drilling Rig						Borehole No. <h2>BH201</h2>				
						Sheet 1 of 2				
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill		
Depth	Type & No	Value								
0.25	B1			MADE GROUND: Grass over light brown, sandy gravel of fine to coarse, rounded to angular flint and occasional concrete with rootlets.	0.20 (18.49)		MG			
0.80	PEN	2.25x3		Stiff, orange brown mottled grey, slightly gravelly, silty CLAY with rare rootlets. Gravel of fine to medium, rounded to subangular flint and occasional quartzite.	1					BOGNOR SAND MEMBER
0.85	D1	kg/cm²								
1.20	SPT	13 N		1.20 m: SPT: 4 for 150mm/3,3,3,4						
1.20	D2									
1.70	B2			1.60 m: Becoming gravelly to very gravelly.						
2.05	D3				2					
2.20	SPT	34 N		Light grey, silty, fine SAND with rare fine flint gravel.	2.05 (16.64)					
2.20	D4			Dense, orange brown, slightly silty, fine SAND with rare fine flint gravel.	2.10 (16.59)					
2.70	B3			2.20 m: SPT: 7 for 150mm/7,8,9,10	3					
3.20	SPT	45 N								
3.20	D5									
4.20	SPT	45 N								
4.20	D6									
5.20	SPT	46 N		Dense, dark grey, silty, fine SAND.	5.20 (13.49)		BOGNOR SAND MEMBER			
5.20	D7			5.20 m: SPT: 14 for 150mm/9,10,12,15	6					
5.70	B4									
6.70	SPT	50 N								
6.70	D8			6.70 m: SPT: 13 for 150mm/10,12,13,15	7					
					8					
					8.00					

Drilling Progress						Chiselling			General Remarks:	Surface Elevation Level:	
Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins / Type of test	From	To	Hours		18.693 mAOD	All dimensions in metres Log Scale 1:50
22-04-26	1.20	1.20	150	Dry	2.40				Borehole terminated at 10.0m bgl due refusal at rock layer. Borehole hand dug to 1.20m bgl for service clearance.		
22-04-26	2.20	1.60	150	Dry							
22-04-26	2.65	1.60	150	2.65							
22-04-26	3.20	3.20	150	Wet							
22-04-26	4.20	4.20	150	3.00							
22-04-26	5.20	5.20	150	3.00							
22-04-26	6.70	6.70	150	3.00							

BOREHOLE RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: R Davies Date Commenced: 22/04/2026 Date Completed: 23/04/2026 Method Used: Cable Percussive Drilling Rig										Borehole No. <h2>BH201</h2>	
Sheet 2 of 2											
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill			
Depth	Type & No	Value									
8.20	SPT D9	38 N		Continued from 5.20m: Dense, dark grey, silty, fine SAND. 8.20 m: SPT: 14 for 150mm/8,10,9,11	(10.69)		BOGNOR SAND MEMBER				
8.20					8.50 (10.19)						
8.70	B5			Dense, dark grey, silty, fine SAND with bands of slightly clayey, sandy SILT.	9						
9.70	SPT D10	>50 N		Dark grey, silty SANDSTONE / sandy SILTSTONE.	9.70 (8.99)						
9.70					10 10.00 (8.69)						
10.00	SPT	>50 N		9.70 m: SPT: 25 for 25mm/25 for 0mm 10.00m: SPT: 25 for 0mm							
					11						
					12						
					13						
					14						
					15						
					16						

Drilling Progress						Chiselling			General Remarks: Borehole terminated at 10.0m bgl due refusal at rock layer. Borehole hand dug to 1.20m bgl for service clearance.	Surface Elevation Level:	
Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins / Type of test	From	To	Hours		18.693 mAOD	
23-04-26	8.20	8.20	150	3.00		9.70	10	01:00		All dimensions in metres Log Scale 1:50	
23-04-26	9.00	8.80	150	9.00	5.10						
23-04-26	9.70	9.70	150	Dry							
23-04-26	9.90	9.70	150	9.90	9.15						
23-04-26	10.00	9.70	150	9.00							



BRD
 Telephone: 01295 272244
 Email: info@brduk.com

BOREHOLE RECORD

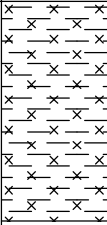
Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: G O'Keeffe Date Commenced: 24/04/2026 Date Completed: 24/04/2026 Method Used: Cable Percussive Drilling Rig						Borehole No. <h2>BH202</h2>		
						Sheet 1 of 3		
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill
Depth	Type & No	Value						
0.50	D1			MADE GROUND: Compacted, light brown, sandy, gravel and cobbles of fine to coarse, angular to subrounded concrete, brick, ceramic, flint and rare tarmac with occasional plastic, metal fragments and rare wood fragments.			MG	
1.00	PEN	2.5/2.75/2.5		Stiff, orange brown mottled light grey, silty, gravelly CLAY with rare dark orange brown specks / deposits. Gravel of fine to coarse, rounded to subangular flint.	1 0.90 (20.02)		HEAD DEPOSITS	
1.00	D2	kg/cm ²			1.20 (19.72)			
1.20	SPT	22 N		Medium dense, light brown, mottled grey, with orange sandy partings, slightly sandy clayey GRAVEL. Gravel of fine to coarse subangular to rounded flint and rare quartzite.				
1.20	B1			1.20 m: SPT: 6 for 150mm/4,5,6,7				
2.20	SPT	22 N		Medium dense, light grey, slightly clayey, silty, sandy GRAVEL of fine to coarse, rounded to subangular flint.	2 2.10 (18.82)			
2.20	B2			2.20 m: SPT: 9 for 150mm/6,5,5,6				
3.00	SPT	18 N	1	Medium dense, orange brown, silty, fine SAND with rare fine flint gravel.	3 2.85 (18.07)		BGNOR SAND MEMBER	
3.00	B3			3.00 m: SPT: 5 for 150mm/4,5,4,5				
3.00	D3							
4.00	SPT	30 N		4.00 m: SPT: 8 for 150mm/6,7,8,9	4			
4.00	D4							
5.00	SPT	37 N	2	Dense, dark grey, silty, fine SAND.	5 5.00 (15.92)			
5.00	D5			5.00 m: SPT: 10 for 150mm/7,9,10,11				
6.00	B4				6			
6.50	SPT	38 N		6.50 m: SPT: 12 for 150mm/9,9,10,10	7			
6.50	D6							
					8 8.00			

Drilling Progress						Chiselling			General Remarks:	Surface Elevation Level:	
Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins / Type of test	From	To	Hours		20.921 mAOD	All dimensions in metres Log Scale 1:50
23-04-26	1.20	1.20	150	Dry					Borehole terminated at 17.45m bgl due to ingress of groundwater preventing further drilling with only 150mm diameter casing. Borehole hand dug to 1.20m bgl for service clearance.		
23-04-26	2.20	2.20	150	Dry							
23-04-26	3.00	3.00	150	Dry							
23-04-26	3.45	3.00	150	3.45	3.10						
23-04-26	4.00	4.00	150	2.00							
23-04-26	5.00	5.00	150	2.00							
23-04-26	6.50	6.20	150	2.00							
24-04-26	7.50	7.30	150	7.50	5.60						
24-04-26	8.00	8.00	150	3.00							

BOREHOLE RECORD

[illegible]

BOREHOLE RECORD

Client: Stonebond Project Title: Bartons Road, Havant Project No: BRD4469 Logged By: G O'Keeffe Date Commenced: 24/04/2026 Date Completed: 24/04/2026 Method Used: Cable Percussive Drilling Rig										Borehole No. <h2>BH202</h2>	
Sheet 3 of 3											
Samples & Tests			Water	Description of Strata	Depth / (Level)	Legend	Geology	Installation /Backfill			
Depth	Type & No	Value									
16.50	D17	46 N		Continued from 14.40m bgl: Very stiff, friable, dark grey, very silty CLAY with rare silt beds and rare fine shell fragments.	(4.92)		LONDON CLAY FM				
17.00 17.00	SPT D18			17.00 m: SPT: 12 for 150mm/9,10,12,15	17						
					17.45 (3.47)						
					18						
					19						
					20						
					21						
					22						
					23						
					24						
Drilling Progress						Chiselling			General Remarks:		
Date	Hole Depth	Casing Depth	Casing Dia (mm)	Water Depth	Water depth after 20mins / Type of test	From	To	Hours	Borehole terminated at 17.45m bgl due to ingress of groundwater preventing further drilling with only 150mm diameter casing. Borehole hand dug to 1.20m bgl for service clearance.		
24-04-26 24-04-26	16.50 17.00	8.50 8.50	150 150	16.50 16.00	15.25						
									Surface Elevation Level: 20.921 mAOD		
									All dimensions in metres Log Scale 1:50		
											
									Telephone: 01295 272244 Email: info@brduk.com		



Gas Monitoring Record

Project Name: Bartons Road, Havant
 Client: Stonebond
 Project No: BRD4469
 Recorded by: GO
 Weather Station: Thorney Island
 Monitor serial no: SN14430

Date: 19/05/2026
 Time at start: 09:15:00
 Time at finish: 15:30:00
 Weather conditions: Overcast, light showers
 Ground conditions: Dry
 Air Temperature (°C): 14
 Pressure Trend: Steady

The gas monitoring equipment is a Gas Data GM25-4 portable analyser. As per manufacturers recommendations this is factory calibrated every 12 months and in addition BRD undertake calibration checks against bottled standard gases on at least a monthly basis. Gas monitor pump is run until the readings stabilise. Peak concentrations are noted during the 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 WeatherOnline at the nearest reported weather station. The GSV is not recorded (NR) if the response zone at the well is flooded.

GWL = Groundwater level measured from ground surface and top of standpipe. Base = Base of standpipe measured from ground surface. RZ = Borehole Response Zone (Pipe)
 CH₄ = Methane LEL = Lower Explosive Limit CO₂ = Carbon Dioxide O₂ = Oxygen CO = Carbon Monoxide H₂S = Hydrogen Sulphide Hex = Hexane
 PID = Photo Ionisation Detector GSV = Gas Screening Value NR = Not Recorded

Monitoring point					Gas Concentration										Pressure	Flow Rate		Vapour	GSV		Flooded Response Zone?
Borehole	GWL	GWL	Base	Top of	Steady				Peak					Min	Baro-metric	Steady	Peak	PID	CH ₄	CO ₂	
	Ground	Pipe	Ground	RZ	CH ₄	LEL	CO ₂	O ₂	H ₂ S	CO	Hex	CH ₄	CO ₂	O ₂							
	(m)	(m)	(m)	(m)	(%)	(%)	(%)	(%)	(ppm)	(ppm)	(%)	(%)	(%)	(%)	(mbar)	(l/hr)	(l/hr)	(ppm)	(l/hr)	(l/hr)	
WS201	1.95	1.84	2.26	1.05	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	No
WS202	Dry	Dry	2.10	1.05	0.0	0.0	2.4	18.6	0.0	0.0	0.000	0.0	2.4	18.6	1001.0	0.0	2.4	0.0	0.00	0.00	No
WS203	2.07	1.95	2.39	1.05	0.0	0.0	1.5	19.4	0.0	0.0	0.000	0.0	1.5	19.4	1002.0	0.0	0.0	0.0	0.00	0.00	No
WS204	3.18	3.06	3.61	1.05	0.0	0.0	0.0	17.2	0.0	0.0	0.000	0.0	0.0	17.1	1001.0	0.0	0.0	0.0	0.00	0.00	No
WS206	2.14	2.00	2.95	1.05	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	NR	No
WS207	1.78	1.61	1.99	1.05	0.0	0.0	0.9	20.2	0.0	0.0	0.000	0.0	0.9	20.2	1002.0	0.0	0.0	0.1	0.00	0.00	No
WS209	2.67	2.87	2.84	1.05	0.0	0.0	0.6	17.6	0.0	0.0	0.000	0.0	0.6	17.6	1002.0	0.0	0.0	0.0	0.00	0.00	No
WS210	2.52	2.74	2.85	1.05	0.0	0.0	0.4	13.4	0.0	0.0	0.000	0.0	0.4	13.4	1002.0	0.0	0.0	0.0	0.00	0.00	No
WS211	2.91	3.06	2.92	1.05	0.0	0.0	0.5	19.0	0.0	0.0	0.000	0.0	0.5	19.0	1001.0	0.0	0.0	0.2	0.00	0.00	No
WS212	1.83	2.03	1.84	1.05	0.0	0.0	1.2	15.3	0.0	0.0	0.000	0.0	1.2	15.3	1002.0	0.0	0.0	0.1	0.00	0.00	No

Comments: WS201 and WS206 bungs dislodged.



Groundwater Monitoring Record

Project: Bartons Road, Havant
 Client: Stonebond
 Project No: BRD4469

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
WS201	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS202	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS203	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS204	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS206	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS207	22/04/2026	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Levels not taken on this visit
WS209	22/04/2026	RD	2.88	n/a	2.54	2.71	1.00	3.03	Orange brown, silty, slight hydrocarbon odour/sheen
WS210	22/04/2026	RD	2.87	n/a	2.41	2.61	1.00	3.07	Orange brown, silty, no odour or sheen.
WS211	22/04/2026	RD	2.94	n/a	2.76	3.00	0.40	3.08	Orange brown, slightly sandy and silty, no odour/sheen.
WS212	22/04/2026	RD	1.86	n/a	1.74	1.93	0.50	2.03	Orange brown, silty, no odour or sheen.



Groundwater Monitoring Record

Project: Bartons Road, Havant
Client: Stonebond
Project No: BRD4469

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
WS201	28/04/2026	GO	n/a	n/a	n/a	n/a	n/a	n/a	Unable to reach standpipe due to ant infestation.
WS202	28/04/2026	GO	2.10	n/a	2.09	1.95	n/a	n/a	Only GW levels measured
WS203	28/04/2026	GO	2.38	n/a	2.05	1.94	n/a	n/a	Only GW levels measured
WS204	28/04/2026	GO	3.61	n/a	3.11	2.98	n/a	n/a	Only GW levels measured
WS206	28/04/2026	GO	n/a	n/a	n/a	n/a	n/a	n/a	Unable to reach standpipe due to ant infestation.
WS207	28/04/2026	GO	2.00	n/a	1.77	1.59	n/a	n/a	Only GW levels measured
WS209	28/04/2026	GO	2.85	n/a	2.57	2.77	1.00	3.03	Orange brown, slightly sandy with slight hydrocarbon odour
WS210	28/04/2026	GO	2.85	n/a	2.43	2.65	1.00	3.07	Orange brown, slightly sandy and silty, no odour/sheen.
WS211	28/04/2026	GO	2.93	n/a	2.90	3.05	0.40	3.08	Orange brown, slightly sandy and silty, no odour/sheen.
WS212	28/04/2026	GO	1.84	n/a	1.79	1.99	0.50	2.03	Orange brown, slightly sandy and silty, no odour/sheen.



Groundwater Monitoring Record

Project: Bartons Road, Havant
Client: Stonebond
Project No: BRD4469

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
WS201	19/05/2026	GO	2.26	n/a	1.95	1.84	1.20	2.10	Light brown slightly silty water
WS202	19/05/2026	GO	2.10	n/a	Dry	Dry	n/a	n/a	
WS203	19/05/2026	GO	2.39	n/a	2.07	1.95	0.00	2.20	Black silty water with organic odour
WS204	19/05/2026	GO	3.61	n/a	3.18	3.06	0.00	3.40	Yellow brown silty water
WS206	19/05/2026	GO	2.95	n/a	2.14	2.00	1.50	2.72	Light brown silty water
WS207	19/05/2026	GO	1.99	n/a	1.78	1.61	0.00	1.77	Yellow brown slightly silty water
WS209	19/05/2026	GO	2.84	n/a	2.67	2.87	0.00	2.87	Orange brown slightly silty water
WS210	19/05/2026	GO	2.85	n/a	2.52	2.74	0.00	2.74	Orange brown slightly silty water
WS211	19/05/2026	GO	2.92	n/a	2.91	3.06	0.00	n/a	
WS212	19/05/2026	GO	1.84	n/a	1.83	2.03	0.00	n/a	

APPENDIX 3

Certificate of Analysis

Certificate Number 26-09010

Issued: 24-Apr-26

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

Our Reference 26-09010

Client Reference ~ brd4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 3 Soil samples.

Date Received 16-Apr-26

Date Started 16-Apr-26

Date Completed 24-Apr-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By



Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Matrix Descriptions

Our Ref 26-09010

Client Ref ~ brd4469

Contract Title ~ Bartons Road, Havant

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
WS209	J2	0.6	2671271	24/04/2026	Dark brown sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 26-09010

Client Ref ~ brd4469

Contract Title ~ Bartons Road, Havant

Lab No	2671271	2671272	2671273
Sample ID ~	WS209	WS209	WS210
Depth ~	0.60	1.20	2.70
Other ID ~	J2	J3	J4
Sample Type ~	SOIL	SOIL	SOIL
Sampling Date ~	14/04/2026	14/04/2026	14/04/2026
Sampling Time ~	n/s	n/s	n/s

Test	Method	LOD	Units			
Asbestos Quantification (Gravimetric)	DETSC 1102	0.001	%	0.024		
Preparation						
Moisture Content	DETSC 1004	0.1	%	19		
Metals						
Arsenic	DETSC 2301#	0.2	mg/kg	7.9		
Cadmium	DETSC 2301#	0.1	mg/kg	1.0		
Chromium	DETSC 2301#	0.15	mg/kg	16		
Chromium, Hexavalent	DETSC 2204*	1	mg/kg	< 1.0		
Copper	DETSC 2301#	0.2	mg/kg	28		
Lead	DETSC 2301#	0.3	mg/kg	120		
Mercury	DETSC 2325#	0.05	mg/kg	0.11		
Nickel	DETSC 2301#	1	mg/kg	9.4		
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5		
Zinc	DETSC 2301#	1	mg/kg	84		
Inorganics						
pH	DETSC 2008#		pH	9.8		
Total Organic Carbon	DETSC 2084#	0.5	%	2.2		
Organic matter	DETSC 2002#	0.1	%	3.7		
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l	270		
Petroleum Hydrocarbons						
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	1.7	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	7.5	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	17	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	36	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	11	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	73	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	4.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	30	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	17	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	52	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	120	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	0.05	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	0.08	< 0.01

Summary of Chemical Analysis Soil Samples

Our Ref 26-09010

Client Ref ~ brd4469

Contract Title ~ Bartons Road, Havant

Lab No	2671271	2671272	2671273
Sample ID ~	WS209	WS209	WS210
Depth ~	0.60	1.20	2.70
Other ID ~	J2	J3	J4
Sample Type ~	SOIL	SOIL	SOIL
Sampling Date ~	14/04/2026	14/04/2026	14/04/2026
Sampling Time ~	n/s	n/s	n/s

Test	Method	LOD	Units			
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01
PAHs						
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6

Summary of Asbestos Analysis Soil Samples

Our Ref 26-09010

Client Ref ~ brd4469

Contract Title ~ Bartons Road, Havant

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2671271	WS209 J2 0.60	SOIL	Chrysotile	Chrysotile fibres present in microscopic insulation debris	Darryl Fletcher

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 26-09010

Client Ref ~ brd4469

Contract Title ~ Bartons Road, Havant

Lab No	2671271
Sample ID ~	WS209
Depth ~	0.60
Other ID ~	J2
Sample Type ~	
Sampling Date ~	14/04/2026
Sampling Time ~	

Test	Method	LOQ	Units	
Total Mass% Asbestos (a+b+c)	DETSC 1102	< 0.001	Mass %	0.024
Gravimetric Quantification (a)	DETSC 1102	< 0.001	Mass %	0.024
Detailed Gravimetric Quantification (b)	DETSC 1102	< 0.001	Mass %	na
Quantification by PCOM (c)	DETSC 1102	< 0.001	Mass %	na
Potentially Respirable Fibres (d)	DETSC 1102	< 0.001	Fibres/g	na

Breakdown of Gravimetric Analysis (a)

Mass of Sample			g	1160.59
ACMs present*			type	Insulation
Mass of ACM in sample			g	0.3312
% ACM by mass			%	0.029
% asbestos in ACM			%	85
% asbestos in sample			%	0.024

Breakdown of Detailed Gravimetric Analysis (b)

% Amphibole bundles in sample			Mass %	na
% Chrysotile bundles in sample			Mass %	na

Breakdown of PCOM Analysis (c)

% Amphibole fibres in sample			Mass %	na
% Chrysotile fibres in sample			Mass %	na

Breakdown of Potentially Respirable Fibre Analysis (d)

Amphibole fibres			Fibres/g	na
Chrysotile fibres			Fibres/g	na

* Denotes test or material description outside of UKAS accreditation.
 % asbestos in Asbestos Containing Materials (ACMs) is determined by
 by reference to HSG 264.
 Recommended sample size for quantification is approximately 1kg
 # denotes deviating sample
 The results are based on dry weight.

Information in Support of the Analytical Results

Our Ref 26-09010
 Client Ref ~ brd4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2671271	WS209 0.60 SOIL	14/04/26	GJ 250ml, PT 1L		
2671272	WS209 1.20 SOIL	14/04/26	GJ 250ml, PT 1L		
2671273	WS210 2.70 SOIL	14/04/26	GJ 250ml, PT 1L		

Key: G-Glass P-Plastic J-Jar T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve

Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.

The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det

Aliphatic C5-C6

Acronym

HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
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Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report

Certificate of Analysis

Certificate Number 26-09981

Issued: 07-May-26

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

Our Reference 26-09981

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Artons Road, Havant

Description 5 Soil samples, 1 Leachate prepared by DETS sample.

Date Received 27-Apr-26

Date Started 27-Apr-26

Date Completed 07-May-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By




Louise Cook
Contracts Manager



Normec DETS Limited

Summary of Chemical Analysis

Matrix Descriptions

Our Ref 26-09981

Client Ref ~ BRD4469

Contract Title ~ Artons Road, Havant

Sample ID	Other ID	Depth	Lab No	Completed	Matrix Description
TP313	J1	3.1	2677109	07/05/2026	Dark brown very gravelly, sandy CLAY including odd rootlets

Summary of Chemical Analysis

Soil Samples

Our Ref 26-09981

Client Ref ~ BRD4469

Contract Title ~ Artons Road, Havant

Lab No	2677106	2677107	2677108	2677109	2677110
Sample ID ~	TP310	TP312	TP312	TP313	TP313
Depth ~	1.30	0.90	1.30	3.10	3.50
Other ID ~	J3	J2	J3	J1	J2
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	23/04/2026	23/04/2026	23/04/2026	23/04/2026	23/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
Preparation								
Moisture Content	DETSC 1004	0.1	%			7.4	15	
Metals								
Arsenic	DETSC 2301#	0.2	mg/kg				9.7	
Cadmium	DETSC 2301#	0.1	mg/kg				0.1	
Chromium	DETSC 2301#	0.15	mg/kg				19	
Chromium, Hexavalent	DETSC 2204*	1	mg/kg				< 1.0	
Copper	DETSC 2301#	0.2	mg/kg				13	
Lead	DETSC 2301#	0.3	mg/kg				44	
Mercury	DETSC 2325#	0.05	mg/kg				0.06	
Nickel	DETSC 2301#	1	mg/kg				11	
Selenium	DETSC 2301#	0.5	mg/kg				< 0.5	
Zinc	DETSC 2301#	1	mg/kg				46	
Inorganics								
pH	DETSC 2008#		pH				8.4	
Total Organic Carbon	DETSC 2084#	0.5	%				1.4	
Organic matter	DETSC 2002#	0.1	%				1.0	
Sulphate Aqueous Extract as SO4 (2:1)	DETSC 2076#	10	mg/l				170	
Petroleum Hydrocarbons								
Aliphatic C5-C6: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C6-C8: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C8-C10: HS_1D_AL	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	57	< 1.5
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072#	1.2	mg/kg	< 1.2	< 1.2	< 1.2	9.6	< 1.2
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072#	1.5	mg/kg	< 1.5	< 1.5	< 1.5	6.1	< 1.5
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072#	3.4	mg/kg	< 3.4	< 3.4	< 3.4	39	< 3.4
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	110	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C7-C8: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C8-C10: HS_1D_AR	DETSC 3321*	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072#	0.9	mg/kg	< 0.9	< 0.9	< 0.9	< 0.9	< 0.9
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072#	0.6	mg/kg	< 0.6	< 0.6	< 0.6	< 0.6	< 0.6
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072#	1.4	mg/kg	< 1.4	< 1.4	< 1.4	< 1.4	< 1.4
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	< 10	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	mg/kg	< 10	< 10	< 10	110	< 10
Benzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Ethylbenzene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Toluene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Xylene	DETSC 3321#	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
MTBE	DETSC 3321	0.01	mg/kg	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01

Summary of Chemical Analysis

Soil Samples

Our Ref 26-09981

Client Ref ~ BRD4469

Contract Title ~ Artons Road, Havant

Lab No	2677106	2677107	2677108	2677109	2677110
Sample ID ~	TP310	TP312	TP312	TP313	TP313
Depth ~	1.30	0.90	1.30	3.10	3.50
Other ID ~	J3	J2	J3	J1	J2
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	23/04/2026	23/04/2026	23/04/2026	23/04/2026	23/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units					
PAHs								
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluorene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Chrysene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6

Summary of Asbestos Analysis

Soil Samples

Our Ref 26-09981

Client Ref ~ BRD4469

Contract Title ~ Artons Road, Havant

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2677109	TP313 J1 3.10	SOIL	NAD	none	Ben Barsby

Crocidolite = Blue Asbestos, Amosite = Brown Asbestos, Chrysotile = White Asbestos. Anthophyllite, Actinolite and Tremolite are other forms of Asbestos. Samples are analysed by DETSC 1101 using polarised light microscopy in accordance with HSG248 and documented in-house methods. NAD = No Asbestos Detected. Where a sample is NAD, the result is based on analysis of at least 2 sub-samples and should be taken to mean 'no asbestos detected in sample'. Key: * -not included in laboratory scope of accreditation.

WASTE ACCEPTANCE CRITERIA TESTING v20.25.02.03

Our Ref 26-09981

Client Ref BRD4469

Contract Title Artons Road, Havant

Sample Id TP312 J3 1.30

Sample Numbers 2677108 2677111

Date Analysed 07/05/2026

Test Results On Waste			WAC Limit Values		
Determinand and Method Reference	Units	Result	Inert Waste	SNRHW	Hazardous Waste
DETSC 2084# Total Organic Carbon	%	< 0.5	3	5	6
DETSC 2003# Loss On Ignition	%	2.3	n/a	n/a	10
DETSC 3321# BTEX	mg/kg	< 0.04	6	n/a	n/a
DETSC 3401# PCBs (7 congeners)	mg/kg	< 0.01	1	n/a	n/a
DETSC 3311* Mineral Oil (C10 - C40)	mg/kg	< 10	500	n/a	n/a
DETSC 3301 PAHs	mg/kg	< 1.6	100	n/a	n/a
DETSC 2008# pH	pH Units	9.2	n/a	>6	n/a
DETSC 2073* Acid Neutralisation Capacity (pH4)	mol/kg	< 1.0	n/a	TBE	TBE
DETSC 2073* Acid Neutralisation Capacity (pH7)	mol/kg	< 1.0	n/a	TBE	TBE

Test Results On Leachate			WAC Limit Values		
Determinand and Method Reference	Conc in Eluate ug/l	Amount Leached mg/kg	Limit values for LS10 Leachate		
	10:1	LS10	Inert Waste	SNRHW	Hazardous Waste
DETSC 2306 Arsenic as As	1.288	0.01	0.5	2	25
DETSC 2306 Barium as Ba	66.63	0.7	20	100	300
DETSC 2306 Cadmium as Cd	< 0.0300	< 0.02	0.04	1	5
DETSC 2306 Chromium as Cr	2.254	< 0.1	0.5	10	70
DETSC 2306 Copper as Cu	5.867	0.06	2	50	100
DETSC 2306 Mercury as Hg	< 0.0100	< 0.002	0.01	0.2	2
DETSC 2306 Molybdenum as Mo	< 1.10	< 0.1	0.5	10	30
DETSC 2306 Nickel as Ni	4.355	< 0.1	0.4	10	40
DETSC 2306 Lead as Pb	4.3	< 0.05	0.5	10	50
DETSC 2306 Antimony as Sb	< 0.1700	< 0.05	0.06	0.7	5
DETSC 2306 Selenium as Se	0.4761	< 0.03	0.1	0.5	7
DETSC 2306 Zinc as Zn	68.94	0.69	4	50	200
DETSC 2055 Chloride as Cl	310	< 100	800	15,000	25,000
DETSC 2055* Fluoride as F	460	4.6	10	150	500
DETSC 2055 Sulphate as SO4	5700	< 100	1000	20,000	50,000
DETSC 2009* Total Dissolved Solids	43000	430	4000	60,000	100,000
DETSC 2130 Phenol Index	< 100	< 1	1	n/a	n/a
DETSC 2085 Dissolved Organic Carbon	4500	< 50	500	800	1000

Additional Information	
DETSC 2008 pH	8.3
DETSC 2009 Conductivity uS/cm	61.0
* Temperature*	18.0

Mass of Sample Kg	0.097
Mass of dry Sample Kg	0.090

Stage 1	
Volume of Leachant L2	0.893
Volume of Eluate VE1	0.8

TBE - To Be Evaluated
SNRHW - Stable Non-Reactive
Hazardous Waste

Disclaimer: The WAC limit values are provided for guidance only. Normec DETS does not accept responsibility for errors or omissions.
Values are correct at time of issue.

Information in Support of the Analytical Results

Our Ref 26-09981
 Client Ref ~ BRD4469
 Contract ~ Artons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2677106	TP310 1.30 SOIL	23/04/26	GJ 250ml, PT 1L		
2677107	TP312 0.90 SOIL	23/04/26	GJ 250ml, PT 1L		
2677108	TP312 1.30 SOIL	23/04/26	GJ 250ml x2, PT 1L		
2677109	TP313 3.10 SOIL	23/04/26	GJ 250ml, PT 1L		
2677110	TP313 3.50 SOIL	23/04/26	GJ 250ml, PT 1L		
2677111	TP312 1.30 LEACHATE	23/04/26	GJ 250ml x2, PT 1L		

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det

Aliphatic C5-C6

Acronym

HS_1D_AL

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2311	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	As Received	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3321	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3321	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3521	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3521	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3521	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3521	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3521	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3521	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes

Method details are shown only for those determinands listed in Annex A of the MCERTS standard. Anything not included on this list falls outside the scope of MCERTS. No Recovery Factors are used in the determination of results. Results reported assume 100% recovery. Full method statements are available on request.

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
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Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report

Certificate of Analysis

Certificate Number 26-10343

Issued: 08-May-26

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

Our Reference 26-10343

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 6 Soil samples.

Date Received 30-Apr-26

Date Started 30-Apr-26

Date Completed 08-May-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

A handwritten signature in black ink, appearing to read "Louise".

Louise Cook
Contracts Manager



Summary of Chemical Analysis

Soil Samples

Our Ref 26-10343

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2679439	2679440	2679441	2679442	2679443	2679444
Sample ID ~	BH201	BH201	BH202	BH202	BH202	BH202
Depth ~	3.20	8.20	5.00	9.50	12.50	17.00
Other ID ~						
Sample Type ~	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date ~	24/04/2026	24/04/2026	24/04/2026	24/04/2026	24/04/2026	24/04/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Inorganics									
pH	DETSC 2008#		pH	8.7	8.0	7.8	8.2	8.4	8.3
Sulphate Aqueous Extract as SO ₄ (2:1)	DETSC 2076#	10	mg/l	< 10	310	160	360	240	290
Sulphur as S, Total	DETSC 2320	0.01	%	< 0.01	0.29	0.19	0.72	0.42	0.30
Sulphate as SO ₄ , Total	DETSC 2321#	100	mg/kg	< 100	1170	772	1340	1240	859

Information in Support of the Analytical Results

Our Ref 26-10343
 Client Ref ~ BRD4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2679439	BH201 3.20 SOIL	24/04/26	PT 1L		
2679440	BH201 8.20 SOIL	24/04/26	PT 1L		
2679441	BH202 5.00 SOIL	24/04/26	PT 1L		
2679442	BH202 9.50 SOIL	24/04/26	PT 1L		
2679443	BH202 12.50 SOIL	24/04/26	PT 1L		
2679444	BH202 17.00 SOIL	24/04/26	PT 1L		

Key: P-Plastic T-Tub

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 250µm sieve
 Organic soil analysis was carried out on an 'as received' sample. Organics results are corrected for moisture and expressed on a dry weight basis.
 The Loss on Drying, used to express organics analysis on an air dried basis, is carried out at a temperature of 28°C +/-2°C.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Key:

~ Sample details are provided by the client and can affect the validity of the results
 * -not accredited.
 # -MCERTS (accreditation only applies if report carries the MCERTS logo).
 \$ -subcontracted.
 n/s -not supplied.
 I/S -insufficient sample.
 U/S -unsuitable sample.
 t/f -to follow.
 nd -not detected.

End of Report Ver 26.03.15

Certificate of Analysis

Certificate Number 26-10344

Issued: 11-May-26

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

Our Reference 26-10344

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 2 Groundwater samples.

Date Received 30-Apr-26

Date Started 30-Apr-26

Date Completed 11-May-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Water Samples

Our Ref 26-10344

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2679445	2679446
Sample ID ~	WS209	WS210
Depth ~	2.77	2.65
Other ID ~	B1	B1
Sample Type ~	GROUND WATER	GROUND WATER
Sampling Date ~	28/04/2026	28/04/2026
Sampling Time ~	n/s	n/s

Test	Method	LOD	Units		
Petroleum Hydrocarbons					
Aliphatic C5-C6: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETSC 3072*	1	ug/l	330	< 2.0
Aliphatic C12-C16: EH_CU_1D_AL	DETSC 3072*	1	ug/l	260	< 2.0
Aliphatic C16-C21: EH_CU_1D_AL	DETSC 3072*	1	ug/l	590	< 2.0
Aliphatic C21-C35: EH_CU_1D_AL	DETSC 3072*	1	ug/l	210	< 2.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETSC 3072*	10	ug/l	< 1386.1	< 10
Aromatic C5-C7: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETSC 3322	0.1	ug/l	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETSC 3072*	1	ug/l	12	< 2.0
Aromatic C12-C16: EH_CU_1D_AR	DETSC 3072*	1	ug/l	42	< 2.0
Aromatic C16-C21: EH_CU_1D_AR	DETSC 3072*	1	ug/l	150	< 2.0
Aromatic C21-C35: EH_CU_1D_AR	DETSC 3072*	1	ug/l	120	< 2.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETSC 3072*	10	ug/l	< 324.0	< 10
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETSC 3072*	10	ug/l	< 1710.0	< 16.6
Benzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Toluene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Ethylbenzene	DETSC 3322	1	ug/l	< 1.0	< 1.0
Xylene	DETSC 3322	1	ug/l	< 1.0	< 1.0
MTBE	DETSC 3322	1	ug/l	< 1.0	< 1.0
PAHs					
Naphthalene	DETSC 3304	0.05	ug/l	< 0.25	< 0.50
Acenaphthylene	DETSC 3304	0.01	ug/l	0.09	< 0.10
Acenaphthene	DETSC 3304	0.01	ug/l	< 0.05	< 0.10
Fluorene	DETSC 3304	0.01	ug/l	< 0.05	< 0.10
Phenanthrene	DETSC 3304	0.01	ug/l	0.19	0.24
Anthracene	DETSC 3304	0.01	ug/l	< 0.05	< 0.10
Fluoranthene	DETSC 3304	0.01	ug/l	0.19	0.16
Pyrene	DETSC 3304	0.01	ug/l	0.37	0.17
Benzo(a)anthracene	DETSC 3304	0.01	ug/l	0.13	< 0.10
Chrysene	DETSC 3304	0.01	ug/l	0.11	< 0.10
Benzo(b)fluoranthene	DETSC 3304	0.01	ug/l	0.19	0.12
Benzo(k)fluoranthene	DETSC 3304	0.01	ug/l	0.09	< 0.10
Benzo(a)pyrene	DETSC 3304	0.01	ug/l	0.12	< 0.10
Indeno(1,2,3-c,d)pyrene	DETSC 3304	0.01	ug/l	0.13	< 0.10
Dibenzo(a,h)anthracene	DETSC 3304	0.01	ug/l	< 0.05	< 0.10
Benzo(g,h,i)perylene	DETSC 3304	0.01	ug/l	0.10	< 0.10
PAH Total	DETSC 3304	0.2	ug/l	1.7	< 2.00

Information in Support of the Analytical Results

Our Ref 26-10344
 Client Ref ~ BRD4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2679445	WS209 2.77 GROUND WATER	28/04/26	GB 1L, G(other)		
2679446	WS210 2.65 GROUND WATER	28/04/26	GB 1L, G(other)		

Key: G-Glass B-Bottle

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-
 Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det	Acronym
Aliphatic C5-C6	HS_1D_AL
Aliphatic C6-C8	HS_1D_AL
Aliphatic C8-C10	HS_1D_AL
Aliphatic C10-C12	EH_CU_1D_AL
Aliphatic C12-C16	EH_CU_1D_AL
Aliphatic C16-C21	EH_CU_1D_AL
Aliphatic C21-C35	EH_CU_1D_AL
Aliphatic C5-C35	EH_CU+HS_1D_AL
Aromatic C5-C7	HS_1D_AR
Aromatic C7-C8	HS_1D_AR
Aromatic C8-C10	HS_1D_AR
Aromatic C10-C12	EH_CU_1D_AR
Aromatic C12-C16	EH_CU_1D_AR
Aromatic C16-C21	EH_CU_1D_AR
Aromatic C21-C35	EH_CU_1D_AR
Aromatic C5-C35	EH_CU+HS_1D_AR
TPH Ali/Aro Total C5-C35	EH_CU+HS_1D_Total

Key:

~ Sample details are provided by the client and can affect the validity of the results

* -not accredited.

-MCERTS (accreditation only applies if report carries the MCERTS logo).

\$ -subcontracted.

n/s -not supplied.

I/S -insufficient sample.

U/S -unsuitable sample.

t/f -to follow.

nd -not detected.

End of Report Ver 26.03.15

Certificate of Analysis

Certificate Number 26-12164

Issued: 04-Jun-26

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

Our Reference 26-12164

Client Reference ~ BRD4469

Order No ~ (not supplied)

Contract Title ~ Bartons Road, Havant

Description 7 Groundwater samples.

Date Received 21-May-26

Date Started 21-May-26

Date Completed 04-Jun-26

Test Procedures Identified by prefix DETSn (details on request).

Notes 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.

Approved By

A handwritten signature in black ink, appearing to read "R. Irfan".

Reyhan Irfan
Operations Manager



Summary of Chemical Analysis

Water Samples

Our Ref 26-12164

Client Ref ~ BRD4469

Contract Title ~ Bartons Road, Havant

Lab No	2690030	2690031	2690032	2690033	2690034	2690035	2690036
Sample ID ~	WS201	WS203	WS204	WS206	WS207	WS209	WS210
Depth ~	2.10	2.20	3.40	2.72	3.40	2.87	2.74
Other ID ~	B1	B1	B1	B1	B1	B1	B1
Sample Type ~	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER	GROUND WATER
Sampling Date ~	19/05/2026	19/05/2026	19/05/2026	19/05/2026	19/05/2026	19/05/2026	19/05/2026
Sampling Time ~	n/s	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units							
Petroleum Hydrocarbons										
Aliphatic C5-C6: HS_1D_AL	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C6-C8: HS_1D_AL	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C8-C10: HS_1D_AL	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aliphatic C10-C12: EH_CU_1D_AL	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	96	< 5.0	27	< 5.0
Aliphatic C12-C16: EH_CU_1D_AL	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	72	< 5.0
Aliphatic C16-C21: EH_CU_1D_AL	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	22	< 5.0	180	< 5.0
Aliphatic C21-C35: EH_CU_1D_AL	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	330	< 5.0	75	< 5.0
Aliphatic C5-C35: EH_CU+HS_1D_AL	DETS 3072*	10	ug/l	< 10	< 20.3	< 20.3	< 452.7	< 20.3	< 358.0	< 20.3
Aromatic C5-C7: HS_1D_AR	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C7-C8: HS_1D_AR	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C8-C10: HS_1D_AR	DETS 3322	0.1	ug/l	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Aromatic C10-C12: EH_CU_1D_AR	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Aromatic C12-C16: EH_CU_1D_AR	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	45	< 5.0
Aromatic C16-C21: EH_CU_1D_AR	DETS 3072*	1	ug/l	< 1.0	< 5.0	< 5.0	< 5.0	< 5.0	230	< 5.0
Aromatic C21-C35: EH_CU_1D_AR	DETS 3072*	1	ug/l	< 1.0	170	< 5.0	< 5.0	< 5.0	140	< 5.0
Aromatic C5-C35: EH_CU+HS_1D_AR	DETS 3072*	10	ug/l	< 10	< 180.4	< 20.3	< 20.3	< 20.3	< 426.4	< 20.3
TPH Ali/Aro Total C5-C35: EH_CU+HS_1D_Total	DETS 3072*	10	ug/l	< 10	< 200.7	< 40.6	< 473.0	< 40.6	< 784.4	< 40.6
Benzene	DETS 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Toluene	DETS 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Ethylbenzene	DETS 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Xylene	DETS 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
MTBE	DETS 3322	1	ug/l	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
PAHs										
Naphthalene	DETS 3304	0.05	ug/l	< 0.25	< 0.50	< 0.50	< 0.50	< 0.50	< 0.50	< 0.05
Acenaphthylene	DETS 3304	0.01	ug/l	0.07	< 0.10	0.12	< 0.10	< 0.10	0.17	< 0.01
Acenaphthene	DETS 3304	0.01	ug/l	0.07	0.18	0.17	0.16	0.20	0.16	0.01
Fluorene	DETS 3304	0.01	ug/l	0.07	0.19	0.22	0.16	0.16	0.18	0.01
Phenanthrene	DETS 3304	0.01	ug/l	0.21	0.37	0.43	0.38	0.30	0.47	0.03
Anthracene	DETS 3304	0.01	ug/l	0.08	0.12	0.13	0.12	0.12	< 0.10	0.01
Fluoranthene	DETS 3304	0.01	ug/l	0.37	0.14	0.13	0.48	0.10	< 0.10	0.02
Pyrene	DETS 3304	0.01	ug/l	0.42	0.14	0.14	0.44	0.11	0.49	0.02
Benzo(a)anthracene	DETS 3304	0.01	ug/l	0.24	< 0.10	< 0.10	0.30	< 0.10	0.22	< 0.01
Chrysene	DETS 3304	0.01	ug/l	0.18	< 0.10	< 0.10	0.22	< 0.10	0.13	< 0.01
Benzo(b)fluoranthene	DETS 3304	0.01	ug/l	0.32	< 0.10	< 0.10	0.34	< 0.10	0.21	< 0.01
Benzo(k)fluoranthene	DETS 3304	0.01	ug/l	0.11	< 0.10	< 0.10	0.16	< 0.10	< 0.10	< 0.01
Benzo(a)pyrene	DETS 3304	0.01	ug/l	0.27	< 0.10	< 0.10	0.25	< 0.10	0.18	< 0.01
Indeno(1,2,3-c,d)pyrene	DETS 3304	0.01	ug/l	0.25	< 0.10	< 0.10	0.22	< 0.10	0.21	< 0.01
Dibenzo(a,h)anthracene	DETS 3304	0.01	ug/l	0.06	< 0.10	< 0.10	< 0.10	< 0.10	< 0.10	< 0.01
Benzo(g,h,i)perylene	DETS 3304	0.01	ug/l	0.25	< 0.10	< 0.10	0.19	< 0.10	0.20	< 0.01
PAH Total	DETS 3304	0.2	ug/l	3.0	< 2.00	< 2.00	3.4	< 2.00	2.6	< 0.20

Information in Support of the Analytical Results

Our Ref 26-12164
 Client Ref ~ BRD4469
 Contract ~ Bartons Road, Havant

Containers Received & Deviating Samples

Lab No	Sample ID ~	Date Sampled ~	Containers Received	Holding time exceeded for tests	Incorrect container for tests
2690030	WS201 2.10 GROUND WATER	19/05/26	GB 1L x2, GB to 500ml		
2690031	WS203 2.20 GROUND WATER	19/05/26	GB 1L, GB to 500ml x2		
2690032	WS204 3.40 GROUND WATER	19/05/26	GB 1L, GB to 500ml		
2690033	WS206 2.72 GROUND WATER	19/05/26	GB 1L, GB to 500ml x2		
2690034	WS207 3.40 GROUND WATER	19/05/26	GB to 500ml x3		
2690035	WS209 2.87 GROUND WATER	19/05/26	GB to 500ml x2		
2690036	WS210 2.74 GROUND WATER	19/05/26	GB to 500ml x2		

Key: G-Glass B-Bottle

Normec DETS cannot be held responsible for the integrity of samples received whereby the laboratory did not undertake the sampling. In this instance samples received may be deviating. Deviating Sample criteria are based on British and International standards and laboratory trials in conjunction with the UKAS note 'Guidance on Deviating Samples'. All samples received are listed above. However, those samples that have additional comments in relation to hold time, inappropriate containers etc are deviating due to the reasons stated. This means that the analysis is accredited where applicable, but results may be compromised due to sample deviations. If no sampled date (soils) or date+time (waters) has been supplied then samples are deviating. However, if you are able to supply a sampled date (and time for waters) this will prevent samples being reported as deviating where specific hold times are not exceeded and where the container supplied is suitable.

Disposal

From the issue date of this test certificate, samples will be held for the following times prior to disposal :-

Soils - 1 month, Liquids - 2 weeks, Asbestos (test portion) - 6 months

Information in Support of the Analytical Results

List of HWOL Acronyms and Operators

Acronym	Description
HS	Headspace analysis
EH	Extractable Hydrocarbons - i.e. everything extracted by the solvent
CU	Clean-up - e.g. by florisil, silica gel
1D	GC - Single coil gas chromatography
2D	GC-GC - Double coil gas chromatography
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
#1	EH_2D_Total but with humics mathematically subtracted
#2	EH_2D_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative eg. EH+HS_Total or EH_CU+HS_Total

Det

Aliphatic C5-C6

Acronym

HS_1D_AL



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant		
Serial No.	50140_1		
Client: BRD Environmental Ltd BRD Environmental Ltd Hawthorne Villa 1 Old Parr Road Banbury Oxfordshire OX16 5HT		<i>Soil Property Testing Ltd</i> 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: Bartons Road, Havant		Approved Signatories: ☐ J.C. Garner B.Eng (Hons) FGS Technical Director ☒ G. Ferguson Operations Manager ☐ M. Stevenson Site Services Manager 	
Date Received: 28/04/2026		Samples Tested Between: 28/04/2026 and 22/05/2026	
Remarks: For the attention of Rob Davies Your Reference No: BRD4469			
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: 22/05/2026



Contract			Bartons Road, Havant																						
Serial No.			50140_1										Target Date			28/05/2026									
Scheduled By			BRD Environmental Ltd																						
Schedule Remarks																									
Bore Hole No.	Type	Sample Ref.	Top Depth	Particle Size Distribution (BS1377) Water Content (BSEN) Liquid/Plastic Limits Wet Sieve Preparation Triaxial Test One Dimensional Consolidation																					Sample Remarks
BH201	B	3	2.70	1																					
BH201	B	4	5.70	1																					
BH201	D	8	6.70		1	1																			
BH202	B	1	1.20	1																					
BH202	B	3	3.00	1																					
BH202	D	4	4.00		1	1	1																		
BH202	D	9	10.50		1	1																			
BH202	U	1	11.00					1																	
BH202	D	13	13.50		1	1																			
BH202	U	2	14.00					1	1																
BH202	D	17	16.50		1	1																			
TP305	D	3	2.00		1	1	1																		
TP308	D	2	1.50		1	1	1																		
TP309	D	1	1.50		1	1	1																		
Totals				4	8	8	4	2	1										End of Schedule						



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant					
Serial No.	50140_1					
SUMMARY OF WATER CONTENT						
Borehole /Pit No.	Depth (m)	Type	Ref.	Water Content (%)	Description	Remarks
BH201	6.70	D	8	25.0	Dark greyish brown silty fine SAND.	
BH202	4.00	D	4	23.3	Yellowish brown slightly gravelly silty SAND. Gravel is fine angular chert.	
BH202	10.50	D	9	20.7	Firm dark grey silty CLAY with rare shell traces.	
BH202	13.50	D	13	20.2	Firm dark grey silty CLAY with rare shell traces.	
BH202	16.50	D	17	28.0	Soft dark grey silty CLAY.	
TP305	2.00	D	3	21.7	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
TP308	1.50	D	2	15.4	Firm mottled bluish grey and brownish yellow slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to rounded chert and quartzite.	
TP309	1.50	D	1	18.5	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
Method Of Preparation: BS EN ISO: 17892-1: 2014+A1:2022						
Method of Test: BS EN ISO: 17892-1: 2014+A1:2022						
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 105-110C						



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant					
Serial No.	50140_1					
DETERMINATION OF THE PLASTIC LIMIT						
Borehole /Pit No.	Depth (m)	Type	Reference	Water Content	Description	Remarks
BH202	4	D	4	23.3	Yellowish brown slightly gravelly silty SAND. Gravel is fine angular chert.	
Preparation:		Wet Sieved		Percentage of mass passing 0.425mm sieve:		95
TEST CONDITIONS						
1	Can a 20g ball be formed and dried between the palms of the hands?					YES
2	Do slight cracks appear on its surface as it is being hand dried?					NO
3	Is it possible to form 5g subsamples into a thread of approximately 6mm diameter?					NO
4	Is it possible to reduce 6mm threads to 3mm diameter in between 5-10 complete rolls (10-15 for heavy clays)?					NO
5	After alternately forming into threads and rolling out is it possible to shear the thread both longitudinally and transversely when it is rolled to about 3mm?					NO
NOTE: For soils that are marginally plastic it is often difficult to obtain the correct crumbling conditions (if "difficult" define as non-plastic)						DIFFICULT YES
NON-PLASTIC BY BS1377: PART 1: 1990: 2.2.10 A soil with a plasticity of zero, or one on which the plastic limit cannot be determined						
All conditions 1-5 must be achievable for material to be deemed plastic; if achieved, measure water content.						
Plastic Limit (%)						
Non-Plastic				YES		
If plastic limit is obtainable, does $liquid\ limit - plastic\ limit = zero$: if so material is defined as non-plastic.						
Liquid Limit (%)						
Liquid Limit - Plastic Limit (%)						
Method of Preparation: BS1377: Part 1: 1990: 7.4.3 & BS1377: Part 2: 1990:4.2						
Method of Test: BS1377: Part 2: 1990: 5.3						
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						



TEST REPORT

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DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant					
Serial No.	50140_1					
DETERMINATION OF THE PLASTIC LIMIT						
Borehole /Pit No.	Depth (m)	Type	Reference	Water Content	Description	Remarks
TP305	2	D	3	21.7	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
Preparation:		Wet Sieved		Percentage of mass passing 0.425mm sieve:		94
TEST CONDITIONS						
1	Can a 20g ball be formed and dried between the palms of the hands?					YES
2	Do slight cracks appear on its surface as it is being hand dried?					NO
3	Is it possible to form 5g subsamples into a thread of approximately 6mm diameter?					NO
4	Is it possible to reduce 6mm threads to 3mm diameter in between 5-10 complete rolls (10-15 for heavy clays)?					NO
5	After alternately forming into threads and rolling out is it possible to shear the thread both longitudinally and transversely when it is rolled to about 3mm?					NO
NOTE: For soils that are marginally plastic it is often difficult to obtain the correct crumbling conditions (if "difficult" define as non-plastic)						DIFFICULT YES
NON-PLASTIC BY BS1377: PART 1: 1990: 2.2.10 A soil with a plasticity of zero, or one on which the plastic limit cannot be determined						
All conditions 1-5 must be achievable for material to be deemed plastic; if achieved, measure water content.						
Plastic Limit (%)						
Non-Plastic				YES		
If plastic limit is obtainable, does $liquid\ limit - plastic\ limit = zero$: if so material is defined as non-plastic.						
Liquid Limit (%)						
Liquid Limit - Plastic Limit (%)						
Method of Preparation: BS1377: Part 1: 1990: 7.4.3 & BS1377: Part 2: 1990:4.2						
Method of Test: BS1377: Part 2: 1990: 5.3						
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						



TEST REPORT

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Contract	Bartons Road, Havant					
Serial No.	50140_1					
DETERMINATION OF THE PLASTIC LIMIT						
Borehole /Pit No.	Depth (m)	Type	Reference	Water Content	Description	Remarks
TP309	1.5	D	1	18.5	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
Preparation:		Wet Sieved		Percentage of mass passing 0.425mm sieve:		96
TEST CONDITIONS						
1	Can a 20g ball be formed and dried between the palms of the hands?					YES
2	Do slight cracks appear on its surface as it is being hand dried?					NO
3	Is it possible to form 5g subsamples into a thread of approximately 6mm diameter?					NO
4	Is it possible to reduce 6mm threads to 3mm diameter in between 5-10 complete rolls (10-15 for heavy clays)?					NO
5	After alternately forming into threads and rolling out is it possible to shear the thread both longitudinally and transversely when it is rolled to about 3mm?					NO
NOTE: For soils that are marginally plastic it is often difficult to obtain the correct crumbling conditions (if "difficult" define as non-plastic)						DIFFICULT YES
NON-PLASTIC BY BS1377: PART 1: 1990: 2.2.10 A soil with a plasticity of zero, or one on which the plastic limit cannot be determined						
All conditions 1-5 must be achievable for material to be deemed plastic; if achieved, measure water content.						
Plastic Limit (%)						
Non-Plastic				YES		
If plastic limit is obtainable, does $liquid\ limit - plastic\ limit = zero$: if so material is defined as non-plastic.						
Liquid Limit (%)						
Liquid Limit - Plastic Limit (%)						
Method of Preparation: BS1377: Part 1: 1990: 7.4.3 & BS1377: Part 2: 1990:4.2						
Method of Test: BS1377: Part 2: 1990: 5.3						
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						



TEST REPORT

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Contract		Bartons Road, Havant												
Serial No.		50140_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)		
BH201	6.70	D	8	25.0	33	27	6	-0.33	From Natural	0 (A)		24	Dark greyish brown silty fine SAND.	ML
BH202	4.00	D	4	23.3	Non-plastic				Wet Sieved	5 (M)	24.5*	N/A	Yellowish brown slightly gravelly silty SAND. Gravel is fine angular chert.	
BH202	10.50	D	9	20.7	42	18	24	0.11	From Natural	0 (A)		24	Firm dark grey silty CLAY with rare shell traces.	CI
BH202	13.50	D	13	20.2	48	19	29	0.04	From Natural	0 (A)		24	Firm dark grey silty CLAY with rare shell traces.	CI
BH202	16.50	D	17	28.0	46	19	27	0.33	From Natural	0 (A)		24	Soft dark grey silty CLAY.	CI
TP305	2.00	D	3	21.7	Non-plastic				Wet Sieved	6 (M)	23.1*	N/A	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
TP308	1.50	D	2	15.4	36	15	21	0.02	Wet Sieved	25 (M)	20.5*	24	Firm mottled bluish grey and brownish yellow slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to rounded chert and quartzite.	CI
TP309	1.50	D	1	18.5	Non-plastic				Wet Sieved	4 (M)	19.3*	N/A	Yellowish brown slightly gravelly silty SAND. Gravel is fine to medium angular to sub rounded chert and quartzite.	
Method Of Preparation: BS EN ISO: 17892-1: 2014+A1:2022 & BS 1377: Part 2:1990:4.2														
Method of Test: BS EN ISO: 17892-1: 2014+A1:2022 & BS 1377: Part 2:1990:3.2, 4.3, 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

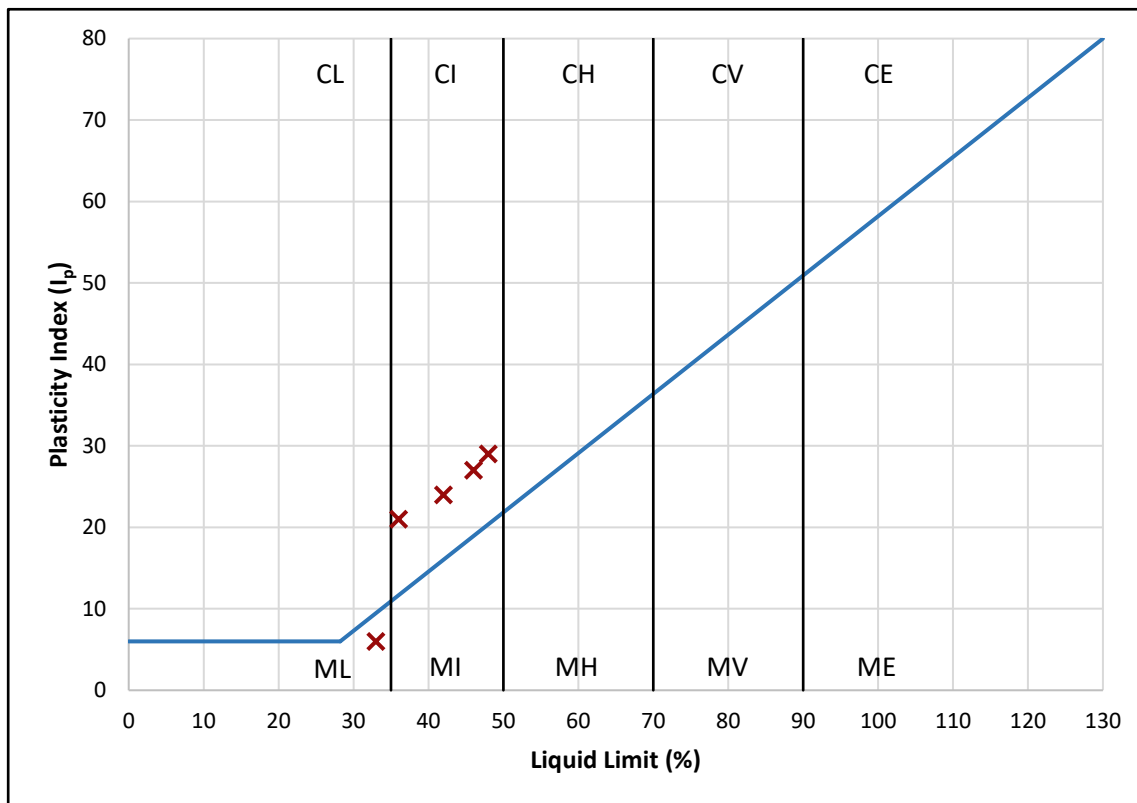
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DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant
Serial No.	50140_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

High	NHBC Volume Change Potential
Medium	
Low	

Method of Preparation:	BS 1377: Part 2: 1990: 4.2
Method of Test:	BS1377: Part 2: 3.2, 4.4, 4.3/4.4, 5.3, 5.4
Type of Sample Key:	U = Undisturbed, B = Bulk, D = Disturbed, J = Jar, W = Water, SPT = Split Spoon Sample, C = Core Cutter
Comments:	Volume Change Potential: NHBC Standards Chapter 4.2 Unmodified Plasticity Index



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DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant						
Serial No.	50140_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 Reference		Water Content (W) %	Description	Remarks	
BH201	6.70	D	8	25.0	Dark greyish brown silty fine SAND.		
PREPARATION					Liquid Limit	33 %	
Method of preparation					From natural	Plastic Limit	27 %
Sample retained 0.425mm sieve (Assumed)					0 %	Plasticity Index	6 %
Corrected water content for material passing 0.425mm						Liquidity Index	-0.33
Sample retained 2mm sieve (Assumed)					0 %	NHBC Modified (I'p)	n/a
Curing time		24 hrs		Clay Content	Not analysed	Derived Activity	Not analysed
<div><div>C=CLAY</div><div>M=SILT</div><div>Plasticity Index % (Ip)</div></div> <div><div>High</div><div>Medium</div><div>Low</div><div>NHBC Volume Change Potential</div></div> <div>Liquid Limit %</div>							

Plasticity Chart BS5930: 2015: Figure 8



TEST REPORT

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Contract	Bartons Road, Havant						
Serial No.	50140_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 Reference		Water Content (W) %	Description	Remarks	
BH202	10.50	D	9	20.7	Firm dark grey silty CLAY with rare shell traces.		
PREPARATION					Liquid Limit	42 %	
Method of preparation					From natural	Plastic Limit	18 %
Sample retained 0.425mm sieve (Assumed)					0 %	Plasticity Index	24 %
Corrected water content for material passing 0.425mm						Liquidity Index	0.11
Sample retained 2mm sieve (Assumed)					0 %	NHBC Modified (I'p)	n/a
Curing time		24 hrs		Clay Content	Not analysed	Derived Activity	Not analysed
<div><div>C=CLAY</div><div>M=SILT</div><div>Plasticity Index % (Ip)</div></div> <div><div>High</div><div>Medium</div><div>Low</div><div>NHBC Volume Change Potential</div></div> <div>Liquid Limit %</div>							

Plasticity Chart BS5930: 2015: Figure 8



TEST REPORT

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Contract	Bartons Road, Havant						
Serial No.	50140_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 Reference		Water Content (W) %	Description	Remarks	
BH202	13.50	D	13	20.2	Firm dark grey silty CLAY with rare shell traces.		
PREPARATION					Liquid Limit	48 %	
Method of preparation					From natural	Plastic Limit	19 %
Sample retained 0.425mm sieve (Assumed)					0 %	Plasticity Index	29 %
Corrected water content for material passing 0.425mm						Liquidity Index	0.04
Sample retained 2mm sieve (Assumed)					0 %	NHBC Modified (I'p)	n/a
Curing time		24 hrs		Clay Content	Not analysed	Derived Activity	Not analysed
<div><div>C=CLAY</div><div>M=SILT</div><div>Plasticity Index % (I_p)</div><div>Liquid Limit %</div></div>						<div>High</div> <div>Medium</div> <div>Low</div> <div>NHBC Volume Change Potential</div>	
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

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DATE ISSUED: 22/05/2026



Contract	Bartons Road, Havant						
Serial No.	50140_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 Reference		Water Content (W) %	Description	Remarks	
BH202	16.50	D	17	28.0	Soft dark grey silty CLAY.		
PREPARATION					Liquid Limit	46 %	
Method of preparation					From natural	Plastic Limit	19 %
Sample retained 0.425mm sieve (Assumed)					0 %	Plasticity Index	27 %
Corrected water content for material passing 0.425mm						Liquidity Index	0.33
Sample retained 2mm sieve (Assumed)					0 %	NHBC Modified (I'p)	n/a
Curing time		24 hrs		Clay Content	Not analysed	Derived Activity	Not analysed
<div><div>C=CLAY</div><div>M=SILT</div><div>Plasticity Index % (I_p)</div><div>70 60 50 40 30 20 10 0</div><div>0 10 20 30 40 50 60 70 80 90 100 110 120</div><div>CL CI CH CV CE ML MI MH MV ME</div><div>Plasticity Chart BS5930: 2015: Figure 8</div><div>High Medium Low NHBC Volume Change Potential</div><div>Liquid Limit %</div></div>							
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: 22/05/2026



Contract	Bartons Road, Havant							
Serial No.	50140_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 Reference		Water Content (W) %	Description	Remarks		
TP308	1.50	D	2	15.4	Firm mottled bluish grey and brownish yellow slightly gravelly slightly sandy silty CLAY. Gravel is fine to coarse angular to rounded chert and quartzite.			
PREPARATION					Liquid Limit	36 %		
Method of preparation					Wet sieved over 0.425mm sieve	Plastic Limit	15 %	
Sample retained 0.425mm sieve (Measured)					25 %	Plasticity Index	21 %	
Corrected water content for material passing 0.425mm					20.5 %	Liquidity Index	0.02	
Sample retained 2mm sieve (Measured)					24 %	NHBC Modified (I'p)	16 %	
Curing time				24 hrs	Clay Content	Not analysed	Derived Activity	Not analysed
<div><div>C=CLAY</div><div>M=SILT</div><div>Plasticity Index % (Ip)</div></div> <div><div>High</div><div>Medium</div><div>Low</div><div>NHBC Volume Change Potential</div></div> <div>Liquid Limit %</div>								

Plasticity Chart BS5930: 2015: Figure 8



TEST REPORT

ISSUED BY SOIL PROPERTY TESTING LTD
DATE ISSUED: 22/05/2026

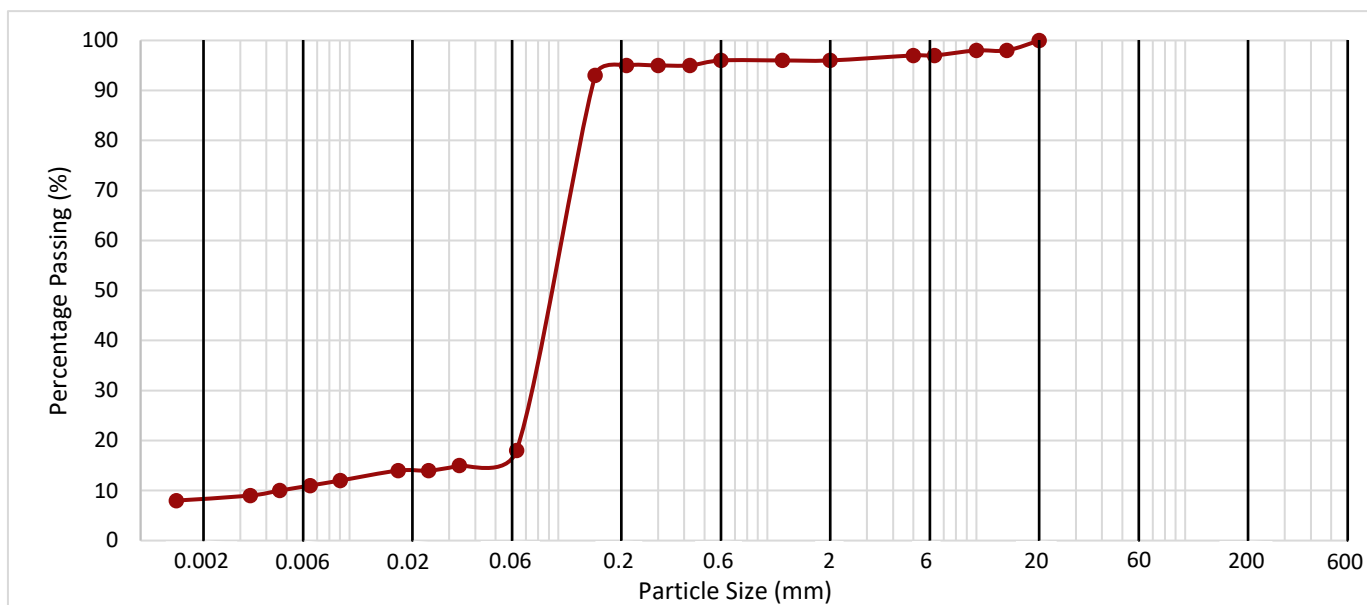


Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
BH201	2.70	B	3	Yellowish brown slightly gravelly clayey SAND. Gravel is white and black angular to rounded chert.	

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



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

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0335	15	10
	0.0239	14	
	0.0171	14	
	0.0090	12	Clay by Dry Mass (%)
	0.0065	11	
	0.0046	10	
	0.0034	9	8
	0.0015	8	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	96	78
1.18	96	
0.600	96	
0.425	95	
0.300	95	
0.212	95	
0.150	93	
0.063	18	

Fines By Dry Mass (%)	
<0.063mm	18

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		4
125		
90		
63		
50		
37.5		
28		
20	100	
14	98	
10	98	
6.3	97	
5	97	

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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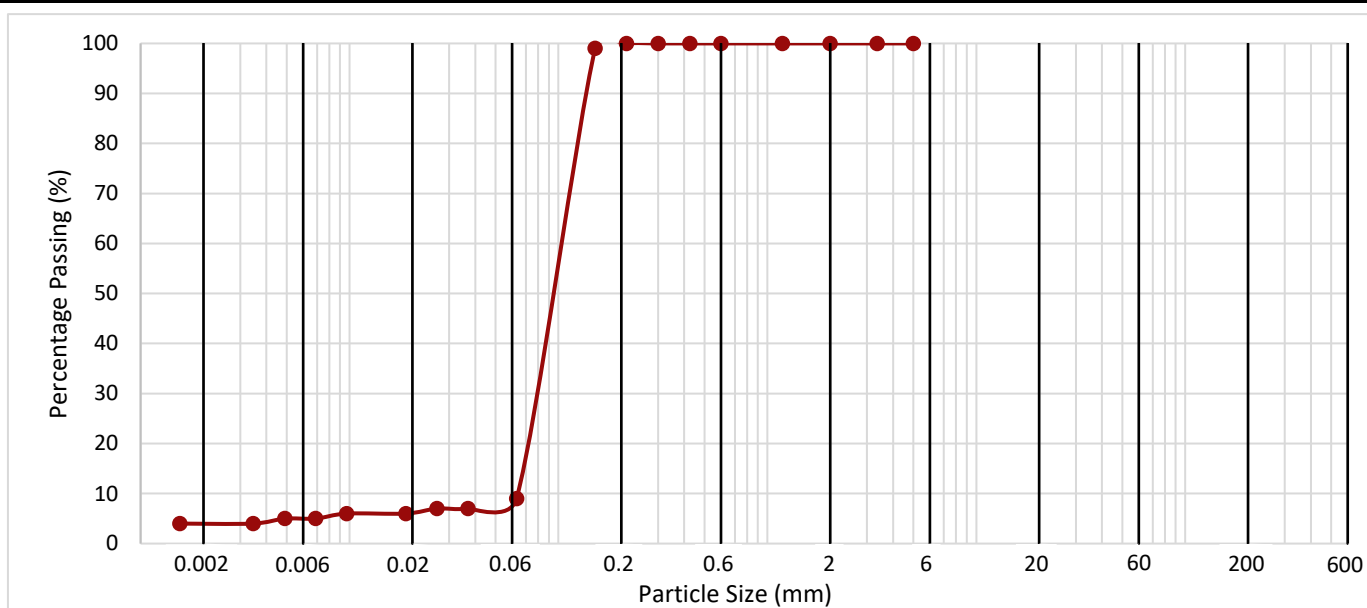


Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
BH201	5.70	B	4	Mottled light olive brown, grey and greyish brown slightly clayey silty SAND.	

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



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0369	7	5
	0.0262	7	
	0.0186	6	
	0.0097	6	Clay by Dry Mass (%)
	0.0069	5	
	0.0049	5	
	0.0035	4	4
	0.0015	4	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	100	91
1.18	100	
0.600	100	
0.425	100	
0.300	100	
0.212	100	
0.150	99	
0.106	99	
0.075	9	

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

Fines By Dry Mass (%)	
<0.063mm	9

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:



TEST REPORT

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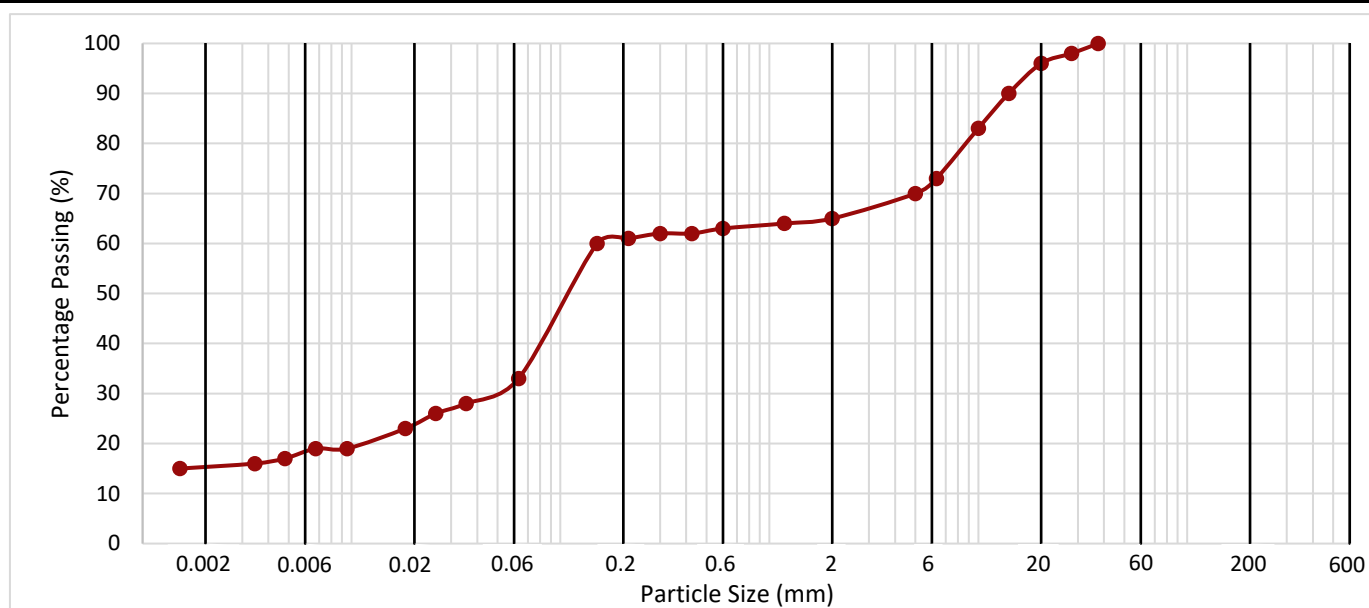


Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
BH202	1.20	B	1	Mottled light greenish grey and yellowish brown slightly sandy gravelly silty CLAY with occasional wood fragments. Gravel is white, black and brown angular to rounded chert with rare brown and white quartzite.	Description based on possible engineering behaviour.

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



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

H y d r o m e t e r	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0354	28	18
	0.0253	26	
	0.0181	23	
	0.0095	19	Clay by Dry Mass (%)
	0.0067	19	
	0.0048	17	
	0.0034	16	15
	0.0015	15	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	65	32
1.18	64	
0.600	63	
0.425	62	
0.300	62	
0.212	61	
0.150	60	
0.063	33	

Fines By Dry Mass (%)	
<0.063mm	33

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		35
125		
90		
63		
50		
37.5	100	
28	98	
20	96	
14	90	
10	83	
6.3	73	
5	70	

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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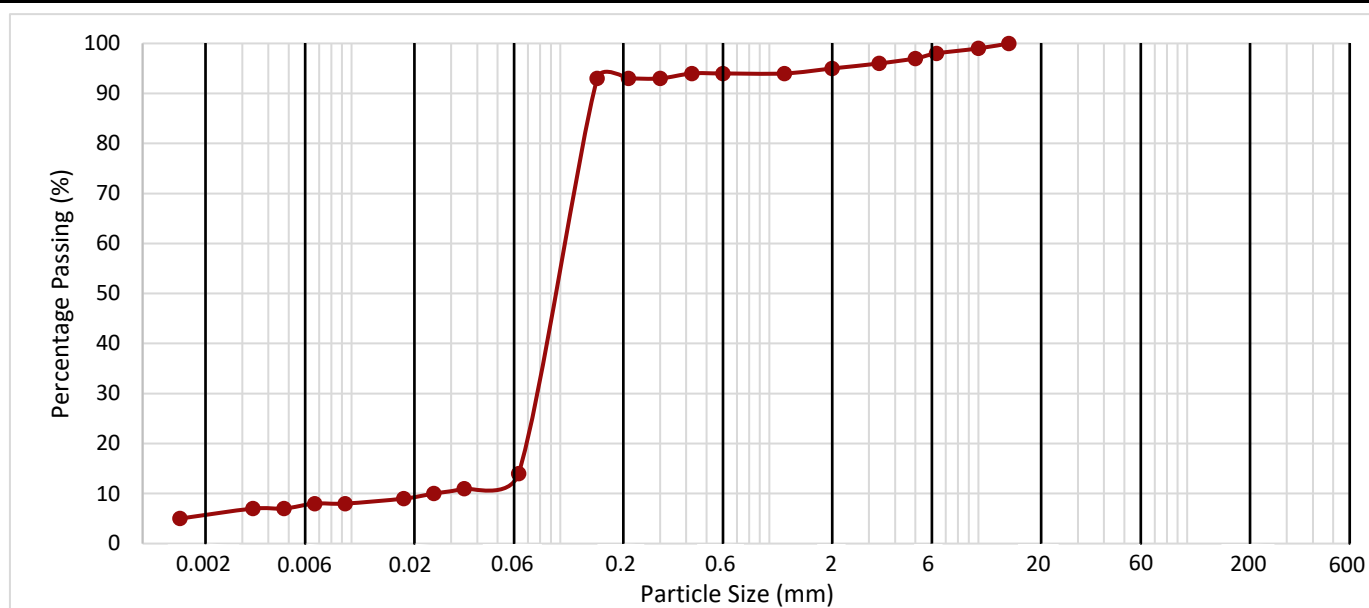


Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF PARTICLE SIZE DISTRIBUTION

Borehole / Pit No.	Depth (m)	Sample		Description	Remarks
		Type	Reference		
BH202	3.00	B	3	Mottled light grey and brownish yellow slightly gravelly slightly clayey silty SAND. Gravel is white, grey and brown angular to sub rounded chert.	

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



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

Hydrometer	Particle Size (mm)	Passing (%)	Silt by Dry Mass (%)
	0.0346	11	8
	0.0248	10	
	0.0178	9	
	0.0093	8	Clay by Dry Mass (%)
	0.0067	8	
	0.0048	7	
	0.0034	7	6
	0.0015	5	

Sieve Size (mm)	Passing (%)	Sand By Dry Mass (%)
2.00	95	81
1.18	94	
0.600	94	
0.425	94	
0.300	93	
0.212	93	
0.150	93	
0.075	93	
0.063	14	

Fines By Dry Mass (%)	
<0.063mm	14

Sieve Size (mm)	Passing (%)	2mm+ By Dry Mass (%)
300		5
125		
90		
63		
50		
37.5		
28		
20		
14	100	
10	99	
6.3	98	
5	97	

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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Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF DENSITY, WATER CONTENT AND UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT 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	
BH202	11.05	U	1	20.4	2.06	1.71	219	499	250			Very stiff very dark greyish brown silty CLAY.
BH202	14.12	U	2	19.7	2.02	1.69	280	525	263			Very stiff dark greyish brown silty CLAY.

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 Strength, 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



TEST REPORT

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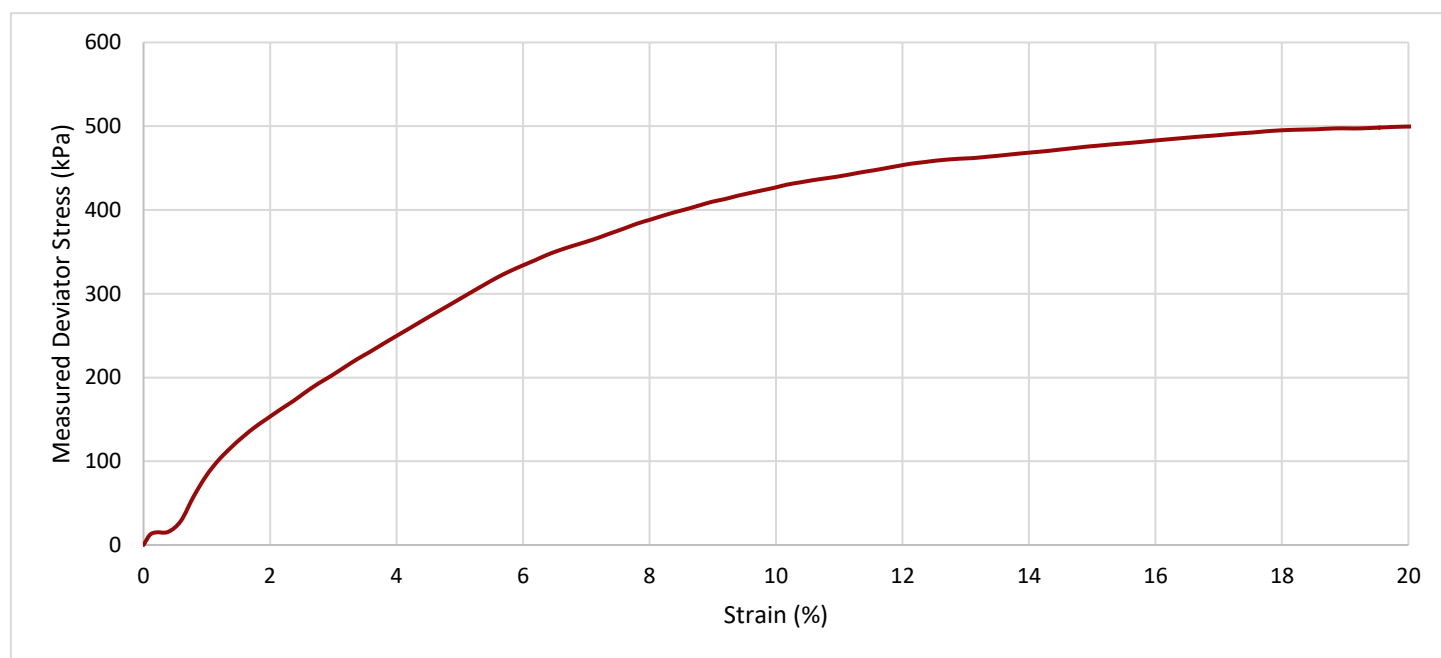
Contract	Bartons Road, Havant
Serial No.	50140_1

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

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH202	11.00	U	1	Very stiff very dark greyish brown silty CLAY.	

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) 11.05	199.0	102.8	3401	20.4	2.06	1.71

TEST INFORMATION	Rate of Strain	0.8	% per Min	Rubber Membrane Thickness	0.3	mm
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Specimen at failure 	Measured Cell Pressure, σ_3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, $(\sigma_1 - \sigma_3)_f$ (kPa)	Shear Stress C_u , $\frac{1}{2}(\sigma_1 - \sigma_3)_f$ (kPa)	Mohr's Circle Analysis	
			Rubber Membrane	Piston Friction			C_u (kPa)	PHI (degrees)
	219	20.1	1.1	\	499	250		

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 from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C



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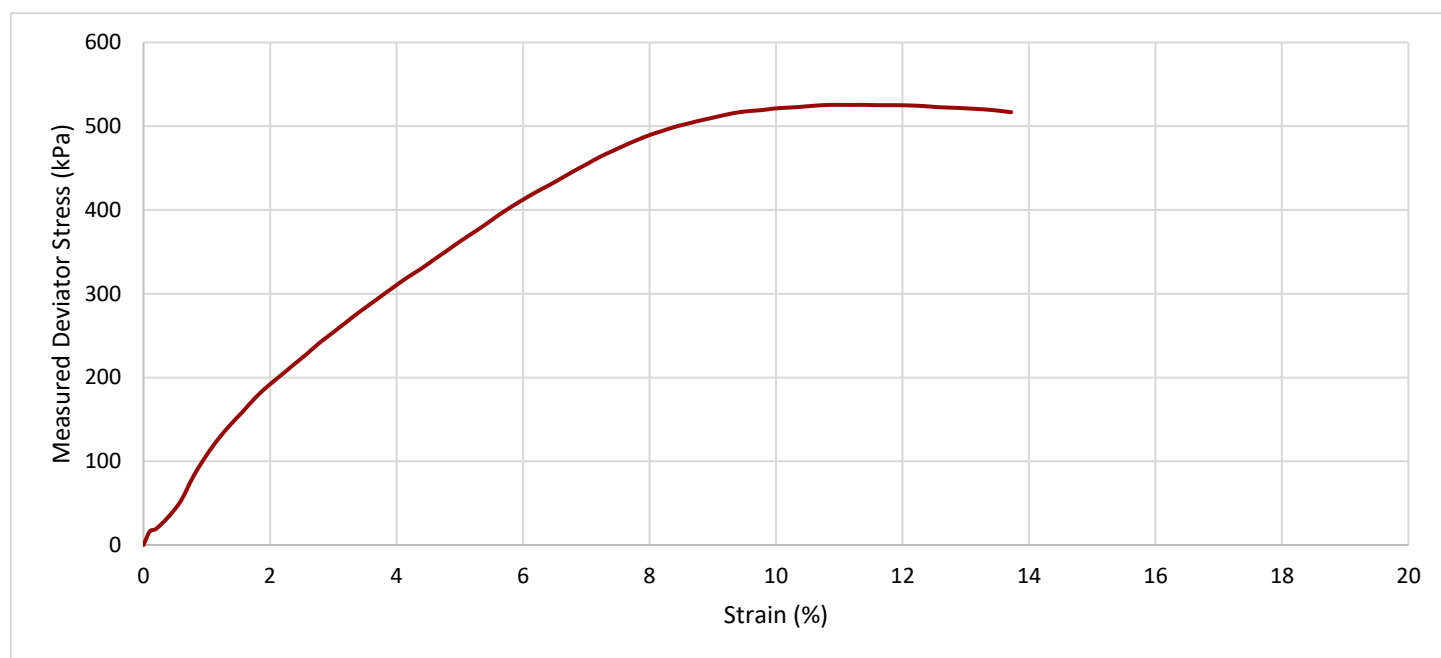
Contract	Bartons Road, Havant
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DETERMINATION OF UNDRAINED SHEAR STRENGTH IN TRIAXIAL COMPRESSION WITHOUT MEASUREMENT OF PORE PRESSURE

Borehole /Pit No.	Depth (m)	Type	Reference	Description	Remarks
BH202	14.00	U	2	Very stiff dark greyish brown silty CLAY.	

Initial Specimen		Height (mm)	Diameter (mm)	Weight (g)	Water Content (%)	Bulk Density (Mg/m³)	Dry Density (Mg/m³)
	Depth of Top of Specimen (m) 14.12	199.0	102.8	3338	19.7	2.02	1.69

TEST INFORMATION	Rate of Strain	1.0	% per Min	Rubber Membrane Thickness	0.3	mm
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Specimen at failure 	Measured Cell Pressure, σ_3 (kPa)	Strain at Failure (%)	Stress Corrections (kPa)		Corrected Max. Deviator Stress, $(\sigma_1 - \sigma_3)_f$ (kPa)	Shear Stress C_u , $\frac{1}{2}(\sigma_1 - \sigma_3)_f$ (kPa)	Mohr's Circle Analysis	
			Rubber Membrane	Piston Friction			C_u (kPa)	ϕ (degrees)
	280	11.0	0.7	\	525	263		

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 from test procedure, location and origin of test specimen within original sample, oven drying temperature if not 105-110°C



TEST REPORT

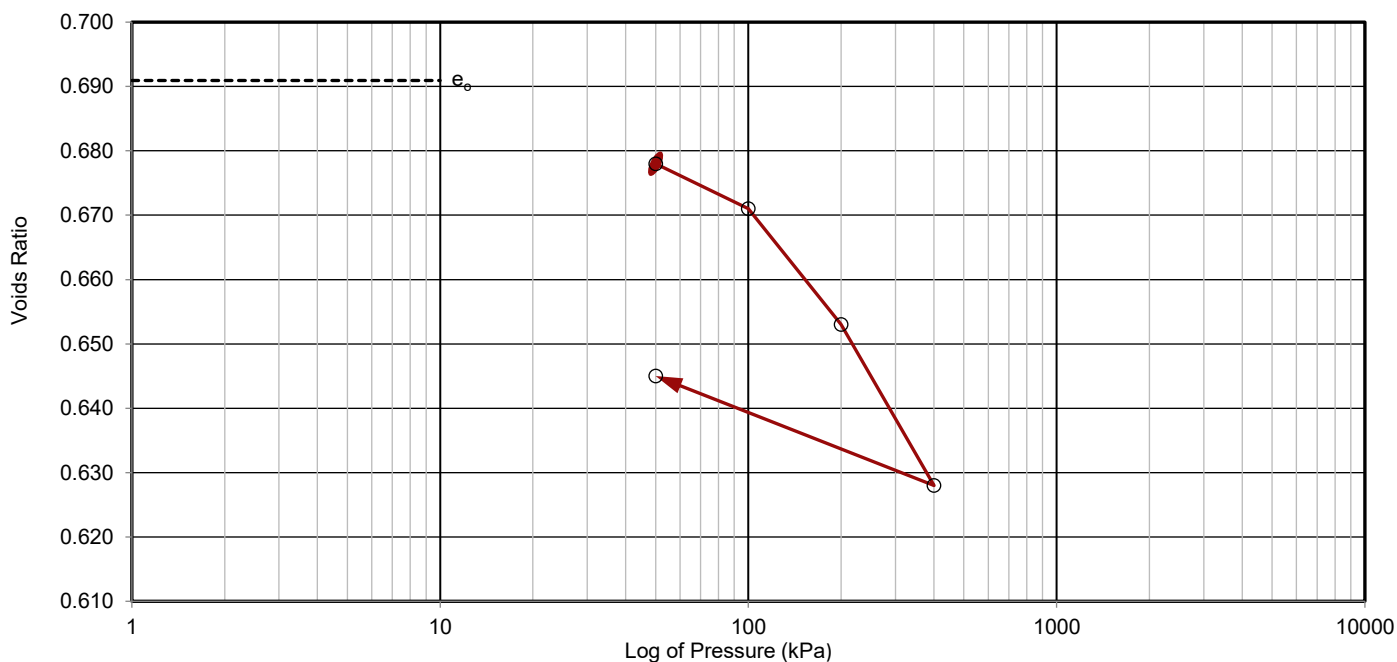
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Contract	Bartons Road, Havant
Serial No.	50140_1

DETERMINATION OF THE ONE-DIMENSIONAL CONSOLIDATION PROPERTIES

Borehole/ Pit No.	Depth (m)	Type	Ref.	Specimen Depth (m) and Orientation	Water Content (%)	Description				Remarks		
BH202	14.00	U	2	14.02	23.2	Very stiff dark greyish brown silty CLAY.						
Initial Conditions					Increment No.	Load (kPa)	Change in Height (mm)	Void Ratio	Cv (m ² /yr)	Mv (m ² /MN)	Temp (°C)	Corrected Cv
Height	mm			18.54	1	50	0.137	0.678	7.23664	0.15	21	7.0
Diameter	mm			50.06	2	100	0.220	0.671	1.44733	0.090	21	1.4
Wet Weight	g			72.84	3	200	0.412	0.653	2.42718	0.10	19	2.5
Water Content	%			23.2	4	400	0.692	0.628	1.84466	0.077	19	1.9
Bulk Density	Mg/m ³			2.00	5	50	0.509	0.645		0.029	19	
Particle Density				Assumed 2.74								
Voids Ratio				0.691								
Degree of Saturation	%			92								
Swelling Pressure	kPa											
Dry Density	Mg/m ³			1.62								



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.