

Geo-Environmental Assessment

Logicor Park Reading, Rose Kiln Court

Presented to: **Redwood (Light Industrial)**
Propco Sarl

Issued: April 2023

Delta-Simons Project No: 91193.557185

Report Details

Client	Redwood (Light Industrial) Propco Sarl
Report Title	Geo-Environmental Assessment
Site Address	Logicor Park Reading, Rose Kiln Court, Rose Kiln Lane, Reading, RG2 0BY
Report No.	91193.557185_V2_REP_Rose Kiln Court_GEA_2023-04.04
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Quality Assurance

Issue No.	Status	Issue Date	Comments	Author	Technical Review	Authorised
02	Final	04/04/2023	Updated to reflect client comments	 PP		
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Executive Summary

Brief	Delta-Simons was instructed by Savills on behalf of Redwood (Light Industrial) Propco Sarl to prepare a Geo-Environmental Risk Assessment for the land at Logicor Park Reading, Rose Kiln Court, Rose Kiln Lane, Reading, RG2 0BY (hereafter referred to as the 'Site'). The proposed redevelopment of the Site will comprise the demolition of the existing building and the construction of three buildings for Light Industrial / General Industrial / Storage or Distribution uses, including the provision of a new substation, parking, landscaping, and associated works. The proposed buildings (currently referenced as blocks A to C) will be split across eight units (A1, A2, B1, C1 to C4).
Site Setting	The Site currently comprises one commercial office building in the north-west, with the remainder of the Site occupied by vehicle parking, with limited soft landscaping around the Site peripheries. Based on a review of the compilation of historical sources dating back to 1879, it appears that the Site was undeveloped until circa. 1957 when unspecified works buildings were constructed in the centre of the Site. The works remained until circa.1991 when one building labelled as 'Rose Kiln Court' was constructed in the north-west, which remains to the present day. A surface water feature was present on Site until circa. 1899 when it is presumed infilled A drain was present in the east until around 1912 when this is also presumed infilled, and a second drain was shown culverted beneath the west of the Site from circa. 1963. The Site is likely underlain by a sequence of Made Ground (in locations of former buildings or infilled ground) underlain by Alluvium comprising clay, silt, sand and gravel (secondary A Aquifer), underlain by bedrock comprising the Seaford Chalk Formation and Newhaven Chalk Formation (Principal Aquifer). The nearest surface water feature is the Holy Brook located along the north-western Site boundary, which flows in a north-easterly direction towards the River Kennett. The Site is not located within a source protection area and there are no groundwater abstraction licences within 1.0 km of the Site.
Ground Conditions	The ground conditions generally comprised brick paving over sandy sub-base to 0.2 m bgl, underlain by a variable thickness of Made Ground, comprising either sandy gravels or gravelly clay with anthropogenic inclusions such as brick, glass and concrete up to 3.0 m bgl, underlain by superficial Alluvium deposits comprising very soft to soft silty clays up to 4.0 m bgl, underlain by loose to medium dense sandy gravels or silty sands to between 8.0 and 14.5 m bgl. The superficial deposits are underlain by the Seaford Chalk Formation comprising weathered chalk to between 9.7 and 15.0 m bgl, underlain by structureless chalk comprising gravelly silt (Anticipated Grade Dm) to the base of the boreholes.
Land Contamination Assessment	No elevated concentrations of any contaminants were identified within the shallow soils underlying the Site, when compared against the commercial end-use GACs, with respect to Human Health. Four soil samples (three Made ground samples and one sample of the Alluvium) detected chrysotile asbestos fibres. All samples were recorded at negligible concentrations of <0.001%. Marginal elevated concentrations of arsenic, copper, nickel and zinc were identified within the groundwater below the Site when compared against DWS, WFD and EQS assessment criteria. The marginally elevated metals are considered likely to be representative of natural background concentrations, and therefore, are considered not to pose a significant risk to controlled waters and no remedial actions are considered necessary.

	The Site has been classified as a CS2 based upon the results of four rounds of monitoring undertaken at the Site. Ground gas protections measures are necessary in new buildings under this scenario.
Geotechnical Assessment	Due to the low and variable strengths of the Made Ground and Alluvium, piled foundations may be considered for the proposed development, driven into the competent Seaford Chalk Formation. Ground improvement techniques may also be feasible; however, this should be confirmed by a specialist contractor. The Alluvium is considered to have a high to medium volume change potential. The volume change potential of soils should be considered as part of preliminary foundation design. It is considered that the significant thickness Made Ground and soft Alluvium deposits are too variable and compressible in their existing state for ground bearing floor slabs. It is recommended that floor loads should be transferred to ground improved soils, or to piles through concrete ground beams/concrete frame, or otherwise suspended. Aggressive ground conditions associated with elevated sulphates recorded locally in the soils and groundwater have the potential to attack buried concrete, particularly where the ground has the potential to be oxidised (e.g. through ground disturbance or addition of water). Buried concrete is recommended to be designed to concrete design class DS-3 and ACEC-3 within the Made Ground and Alluvium Deposits.
Data Gaps and Uncertainty	• The investigation scoped and geotechnical assessments provided are specific to the proposed commercial development and may not be relevant for other development schemes should these be considered in the future; and • One soil sample (CP101 at 2.3 m) could not be tested for Atterberg limits due to having an insufficient sample amount and only Atterberg 1 point testing could be achieved for one sample (CP102 at 3.2 m) due to the sampling needing to be 'washed out' to remove >425um before the analysis was performed.
Recommendations	The following recommendations for the development of the Site are made: • Preparation of a Remediation Strategy and verification to mitigate any unacceptable risks to human health/controlled waters receptors and as required as part of any future planning conditions; • The Site has been classified as a CS2 based upon the results of four rounds of monitoring undertaken at the Site. Ground gas protections measures are necessary in new buildings under this scenario and should achieve a score of 2.5 points (Type C building, e.g. ground floor enclosed spaces and office areas) and 1.5 (Type D building, e.g. the main warehouse area) in accordance with BS 8485:2015+A1:2019; • Made Ground is considered suitable to remain on Site beneath buildings or hardstanding. Where soft landscaped areas are proposed, it is recommended a suitable thickness of clean topsoil/subsoil is placed in any proposed landscaped areas to mitigate the risk to future site users coming into direct contact with contaminated soil; • Should it be proposed to dispose of materials from the Site then specific additional investigations may be needed to classify the materials in accordance with current regulatory requirements;

	• An asbestos survey should be undertaken prior to demolition by a specialist contractor and removed in accordance with legislation to prevent further contamination of the ground; • Unidentified localised areas of contamination may exist at the Site and an appropriate 'hotspot' protocol should be in place for groundworkers to act upon should such contamination be identified during the construction process; • Suitable dust suppression techniques and prevention of nuisance/environmental impacts will need to be implemented by the groundworkers during construction works; and • Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations, although this is considered to be unlikely.
This is intended as a summary only. Further detail and the limitations of the assessment are provided within the main body of the Report.	

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Appendix B – Borehole Logs and SPT Calibrations Certificate

Appendix C – Geotechnical Analysis Results

Appendix D – Soil Chemical Analysis Results

Appendix E – Groundwater Chemical Analysis Results

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1.0 Introduction

1.1 Appointment

Delta-Simons Limited ("Delta-Simons") was instructed by Savills on behalf of Redwood (Light Industrial) Propco Sarl (the "Client") to prepare a Geo-Environmental Assessment for a parcel of land located at Logikor Park Reading, Rose Kiln Court, Rose Kiln Lane, Reading, RG2 0BY (the "Site").

1.2 Context & Purpose

The aim of the study was to complete a geo-environmental assessment of the proposed development area. The investigation has obtained information regarding ground conditions, from which risks to end-users, the environment and structures have been assessed, with mitigation measures suggested where necessary. The investigation has also gathered geotechnical information to inform comment on the preliminary design of foundations and infrastructure. The Report provides recommendations for further work (where appropriate) based on the findings of the investigation.

1.3 Scope of Works

The scope of the investigation and layout of this Report has been designed with consideration of guidance on Land Contamination: Risk Management pages of the [GOV.UK](https://www.gov.uk) web pages, the relevant requirements of the National Planning Policy Framework (NPPF) (as revised 2021) (paragraphs 174 & 183-184)¹ and the Planning Practice Guidance (Land Affected by Contamination)²

The project was undertaken to an agreed brief as set out in Delta-Simons' fee proposal (ref: 22-1640), dated August 2022.

The detailed scope of works is outlined in Section 3.0.

Specific sections of this Report may generally follow guidance set out in Eurocode 7 for a Ground Investigation Report (GIR), as defined in BS EN 1997-1:2004 and BS EN 1997-2:2007. Eurocode 7 includes specific guidance on the number and spacing of investigation positions, methods of investigation and sample quality to be achieved which may not have been met by this investigation. The Report also includes information which may support a Geotechnical Design Report (GDR) as defined in BS EN 1997-1:2004; however, unless otherwise explicitly stated, the investigation has not been undertaken in accordance with Eurocode 7 and the preliminary geotechnical interpretation, assessments, risk register (if included) and recommendations presented within this Report may not meet the full requirements of a GDR.

1.4 Proposed Development

The Site currently comprises a commercial office building in the northwest, with the remainder of the Site occupied by vehicle parking, with limited soft landscaping around the Site peripheries.

The proposed redevelopment of the Site will comprise the demolition of the existing Class E(g)(i) (Office) building and the construction of three buildings for Class E(g)(iii) (Light Industrial) / Class B2 (General Industrial) / Class B8 (Storage or Distribution) uses, including the provision of a new substation, parking, landscaping, and associated works.

The proposed buildings (currently referenced as blocks A to C) will be split across eight units (A1, A2, B1, C1 to C4). The Site is proposed to be predominantly covered in buildings and hardstanding with areas of soft landscaping surrounding the peripheries of the buildings and car parking areas.

A Proposed Development Plan is included as Drawing 1.

No planning conditions have yet been granted for the proposed redevelopment to the knowledge of Delta-Simons.

1

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1004408/NPPF_JULY_2021.pdf

2 <https://www.gov.uk/guidance/land-affected-by-contamination>

1.5 Existing Information

This Report must be considered in the context of the previous Report undertaken by Delta-Simons:

- Preliminary Risk Assessment, Rose Kiln Court by Delta-Simons (Ref. 91193.557185), dated February 2023.

In addition, the following information was made available/obtained by Delta-Simons for review:

- Phase I Desk Study and Preliminary Geo-environmental Assessment, by WML Consulting, (Ref: 10334G-WML-XX-ZZ-RP-G-0001), dated January 2022; and
- Phase I Environmental Review, by Environ (Ref: 61C11563), dated March 2007.

A review of these third-party Reports is provided for information purposes only. No reliance on these Reports is assumed or inferred.

1.6 Limitations

The assessment is limited to the issues agreed within the proposal for the works. General notes on limitations associated with this assessment are provided in Appendix A.

1.7 Data Gaps and Uncertainty

In addition, the following specific data gaps and uncertainty apply to this assessment:

- The investigation scoped and geotechnical assessments provided are specific to the proposed commercial development and may not be relevant for other development schemes should these be considered in the future; and
- One soil sample (CP101 at 2.3 m) could not be tested for Atterberg limits due to having an insufficient sample amount and only Atterberg 1 point testing could be achieved for one sample (CP102 at 3.2 m) due to the sampling needing to be 'washed out' to remove >425um before the analysis was performed.

2.0 Site Details

2.1 Site Setting

A summary of the current Site status, environmental setting and key historical features is presented below. This has been summarised from the existing Reports listed in Section 1.5 which should be consulted for further detail.

Co-ordinates	Centred approximately at National Grid Reference 471310, 172330.	Elevation	38.0 - 39.0 m AOD
		Area	0.64 Ha
Site Address and Location	Land at Rose Kiln Court, Rose Kiln Lane, Reading, RG2 0BY. The Site is located in the south of Reading, approximately 1.4 km south of Reading train station and approximately 3.5 km north of the M4 motorway. Google Maps Link [Google, Imagery©2023 Getmapping plc, Inforterra Ltd & Bluesky, Maxar Technologies, The GeoInformation Group, Map data ©2023]		
Current Site Description	The Site currently comprises a commercial office building in the north-west, with the remainder of the Site occupied by vehicle parking, with limited soft landscaping around the Site peripheries. Delta-Simons conducted a Site visit on 19th January 2023. Pertinent information that was observed or reported on-Site is summarised below: • The Site was occupied with a two-storey (ground and first floor) rectangular shaped building in the north, which was previously utilised for office space; • The Site was noted to be at a lower elevation (by approximately 2m) to Rose Kiln Lane to the west and the A33 to the east; • The northern and western boundaries were delineated by metal fencing beyond which were areas of landscaping and Holy Brook to the north; • The eastern and southern boundaries were delineated by wooden fencing; • Surface water was noted to be pooling at the Site entrance to the west of the Site; • An outlet for an underground culvert was noted off-Site approximately 10 m north-east, associated with Holy Brook; • On the western portion of the Site, adjacent to the Site boundary was an electrical substation, a gas governor, a steel-banded aboveground storage tank (AST) within a concrete and wood enclosure with associated filling point, air conditioning units and an assumed water pumping station; • The tank was unable to be accessed and contents could not be confirmed. The concrete surround was in good condition however, the tank base was covered with debris and was unable to be assessed; • The tank was noted to be in good condition with small areas of surface rust and no evidence of spillages were noted around the tank;		

	• Empty blue drums containing unknown contents, were recorded adjacent to the AST on the western part of the Site; • Pipes from the AST exit the bunded area and appear to go underground to the filling point approximately 10 m east of the AST; • Evidence of potential historic spillages (staining of the ground) was observed by the filling point associated with the AST; • Additional air conditioning units were noted on the north-eastern part of the Site; • An unknown green metal unit was recorded to the rear of the office building on the northern part of the Site. It was assumed this was additional air conditioning infrastructure; and, • Hardstanding surfaces at the Site comprised block paving.
Physical Setting	British Geological Survey mapping (mapapps2.bgs.ac.uk/geoindex) indicates the ground conditions below the Site to comprise superficial deposits of Alluvium (secondary A Aquifer) comprising clay, silt, sand and gravel underlain by bedrock comprising the Seaford Chalk Formation and Newhaven Chalk Formation, comprising undifferentiated chalk (Principal Aquifer). The Site is not in a designated groundwater Source Protection Zone. According to the Envirocheck® Report, there are no groundwater abstraction licences within 1.0 km of the Site. The nearest surface water feature is the Holy Brook located along the north-western Site boundary, which flows in a north-easterly direction. The River Kennett is located approximately 90 m east of the Site, flowing in a general northerly direction. It is understood that there is also a large culvert beneath the Site, crossing from north-east to south-west across the north-western side of the Site. During the Site reconnaissance, an outlet point was observed off-Site approximately 10 m north-east of the Site. According to the Envirocheck® Report, there are two water abstraction licences within 1.0 km of the Site, one is used for industrial processing and the second for amenity uses (lake and pond throughflow). No radon protective measures are considered necessary in the construction of new buildings at the Site. According to the Envirocheck, there is one man made mining cavity within 250 m of the Site, located approximately 205 m north-east, recorded as a shaft for pillar and stall chalk mining. There are no natural cavities recorded within 250 m of the Site.
Key Historical Features	Historically, it appears that the Site was undeveloped until circa. 1957 when unspecified works buildings were constructed in the centre of the Site. The works remained until circa.1991 when one building labelled as 'Rose Kiln Court' was constructed in the north-west, which remains to the present day. A surface water feature was present on Site until circa. 1899 when it is presumed infilled. A drain was present in the east until around 1912 when this is also presumed infilled, and a second drain was shown culverted beneath the west of the Site from circa. 1963.

Summary of Preliminary Conceptual Site Model	Sources <u>On-Site:</u> • Residual contamination and Made Ground (encountered up to 2.4 m bgl on-Site) from the former works and infilled drain – potentially containing metals and metalloids, petroleum hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), volatile and semi-volatile organic compounds (VOCs and SVOCs) and asbestos-containing materials from the usage and/or demolition of the former buildings; • Potential for hazardous ground gases from Made Ground (including the infilled drain) and superficial deposits of Alluvium (if putrescible material is encountered); • Above ground storage tank with underground pipework and generator on Site – potential for petroleum hydrocarbons, and VOCs and SVOCs if a significant leak/spillage is encountered; <u>Off-Site:</u> • Potential for contaminants from the former industrial uses of the surrounding areas, including the railway line, kilns, factories, depots, sawmill and various works buildings with associated tanks and sub-stations – potential for metals and metalloids, petroleum hydrocarbons, PAH, VOCs and SVOCs; • Potential for ground gas from the historical landfill (190 m south) which is recorded by Reading Borough Council as having the following deposited waste; coal, clinker, brick and concrete with variable quantities of glass, pottery, rubber, wood, shoes, toothpaste, cloth, plastic and batteries, with maximum ground gas concentrations for methane of 2.3% and carbon dioxide of 21.9%; and • Potential for ground gas from historically infilled land features (clay pits) and water features (drains) surrounding the Site, especially if putrescible waste was used. Pathways • Direct contact, ingestion or inhalation of soil bound contaminants / dust during or following redevelopment; • Inhalation of organic vapours associated with contamination; • Migration of ground gas / vapours into on-Site buildings causing asphyxiation or risk of explosion; • Leaching of contamination into groundwater followed by migration of groundwater to the wider groundwater environment or discharge to surface waters; • Direct contact between aggressive ground conditions and new infrastructure. Receptors • Construction workers; • Third parties during construction (adjacent Site users and adjacent residents); • Future Site users and maintenance workers;
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	• The Holy Brook and River Kennett water courses; • The underlying superficial aquifers (Secondary A and Principal Aquifers); and • The Built Environment (new buildings and infrastructure / utilities). Summary The PRA identified a Low to Medium risk of soil/groundwater contamination and hazardous ground gas at the Site. Asbestos was considered may be present within any localised Made Ground.
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3.0 Ground Investigation

3.1 Intrusive Investigation

Delta-Simons carried out intrusive investigation work between 13th and 22nd February 2023 to assess the potential linkages identified in the outline conceptual model (see Section 2.2 above) and to provide geotechnical information.

3.2 Ground Investigation and Rationale

3.2.1 Intrusive Works

The ground investigation comprised the following items:

- Service avoidance exercise and topographic survey of exploratory holes to x,y,z co-ordinates;
- Supervision of all works by a Delta-Simons Geo-Environmental engineer. All intrusive locations were logged to BS 5930:2015+A1:2020 Code of Practice for Ground Investigations and CIRIA C574 (Engineering in Chalk).
- Drilling of four cable percussive boreholes (CP101 – CP104) to a maximum depth of 20.00 m bgl;
- Drilling of five dynamic sampler boreholes (DS101 – DS105) to a maximum depth of 5.00 m bgl; and
- The installation of four gas and groundwater monitoring wells within DS101, CP102, CP103 and CP104 up to 6.00 m bgl.

An intrusive exploratory hole location plan is presented as Figure 2.

Specific limitations affecting the proposed scope of works are summarised in Section 1.7.

Delta-Simons' borehole logs are presented as Appendix B together with the Standard Penetration Test (SPT) Calibration Certificates, in accordance with BS EN ISO 22476-3:2005+A1:2011 (incorporating corrigendum No. 1 2007), Geotechnical investigation and testing - Field testing - Part 3: Standard penetration test.

3.2.2 Rationale

Location	Rationale	Key Contaminants of Concern
CP101 – CP104, DS102, DS104 and DS105	To provide geotechnical and geochemical data at depth, beneath the proposed building footprint.	Asbestos, heavy metals, hydrocarbon compounds, sulphates and hazardous ground gas.
DS101	Targeting the above ground storage tanks (AST)	
DS103	For general coverage of the Site.	Asbestos, heavy metals, hydrocarbon compounds, sulphates.

3.3 Geotechnical Sampling and In-Situ Testing

3.3.1 Sampling

Sampling comprised disturbed jar/tab and bulk samples as detailed on the borehole logs.

3.3.2 In-Situ Tests

SPT tests were undertaken in all boreholes at 1.00 m intervals until 5.00 m bgl, then every 1.5 m bgl thereafter. The results of these tests are presented on the borehole logs included as Appendix B.

3.3.3 Soakaway Tests

Soakage testing are not considered practical for the Site as the majority of groundwater levels from monitoring rounds have been recorded within the Made Ground and cohesive soils of the Alluvium, suggesting that the soils below the Site are saturated.

3.4 Geotechnical Laboratory Testing

A selection of soil and rock samples were submitted to the UKAS accredited laboratory for a range of geotechnical testing, the results of which are included in Appendix C. The rationale for the laboratory tests undertaken is provided in the table below.

Laboratory Test	Test Standard	Number of Samples Tested	Rationale
Classification			
Water Content	BS1377-2:3	10	To assess the potential for cohesive soils to shrink and swell due to changes in the water content of a soil associated with the presence, removal or addition of trees and shrubs.
Liquid and Plastic Limits	BS1377-2:4 - 5	8	
Particle Size Analysis (sedimentation)	BS1377-2:9.2 & 9.3	3	For classification of materials.
Geo-Chemical - Soil Samples			
pH	BRE Special Digest 1 or other	15	To assess the soil conditions of the Site in accordance with BRE Special Digest 1 Concrete in aggressive ground and specify an appropriate concrete class to resist chemical attack. The geology of the Site is potentially pyritic and there is the potential for this to be disturbed (oxidised) as part of the construction process, for example when excavating trenches for shallow foundations etc.
Water-Soluble Sulphate (2:1 water/soil extract)	BRE Special Digest 1 or other	15	
Acid Soluble Sulphate	BRE Special Digest 1 or other	9	
Total Sulphur	BRE Special Digest 1 or other	9	
Geo-Chemical - Water Samples			
pH	BRE Special Digest 1	4	To assess the groundwater conditions of the Site in accordance with BRE Special Digest 1 Concrete in aggressive ground and specify an appropriate concrete class to resist chemical attack. The geology of the Site is potentially pyritic and there is the potential for this to be disturbed (oxidised) as part of the construction process, for example when excavating trenches for shallow foundations etc
Soluble Sulphate	BRE Special Digest 1	4	

3.5 Environmental Sampling and Laboratory Analysis

Soils collected for laboratory analysis were placed in a variety of containers appropriate to the anticipated testing suite. Records of the samples taken as part of the Site investigation works, including their depths and location, are included within the exploratory hole records in Appendix B.

One groundwater sample was collected from each of the four boreholes on 24th February 2023. The groundwater samples were collected using a dedicated disposable bailer. Samples were stored in accordance with Delta-Simons' quality procedures to maintain sample integrity and preservation and to minimise the chance of cross contamination. Samples analysed for environmental purposes were placed

in chilled cool boxes on site and transported to the laboratory for analysis on completion of the Site investigation works/groundwater sampling visit.

The rationale for chemical analysis is presented in the table below and the results of the chemical laboratory testing are included in Appendix E.

Analytes	No. of Samples Tested		Rationale
	Soil	Ground-water	
Asbestos	10	-	Common potential contaminant - Analysed in all samples of Made Ground.
As, Cd, Cu, Cr, Hg, Pb, Ni, Zn, speciated Polycyclic Aromatic Hydrocarbons (PAH)	10	4	Potential contaminants of concern, common to many sites.
Total Petroleum Hydrocarbons, Criteria Working Group Method (TPHCWG), Benzene, Toluene, Ethylbenzene and Xylene (BTEX)	10	4	

3.6 Monitoring Programme

Four rounds of groundwater level and ground gas monitoring were undertaken on four newly installed wells (CP102, CP103, CP104 and DS101) between 24th and 16th March 2023.

Measurements of the depth to groundwater within the monitoring wells were taken using an electronic dip meter.

To characterise the ground gas regime at the Site, an infrared gas meter was used to measure gas flow, concentrations of carbon dioxide (CO₂), methane (CH₄) and oxygen (O₂) in percentage by volume. Initial and steady state concentrations were recorded. The atmospheric pressure before and during monitoring, together with the weather conditions, was recorded.

All monitoring results obtained to date are contained within Appendix F.

4.0 Ground Summary

4.1 Introduction

The sections below summarise the ground and groundwater conditions encountered during the Site investigation.

4.2 Ground Summary

A summary of the observed ground conditions at the Site is provided below.

Strata	Typical Strata Description	Depth Range of Strata Top (m)	Depth Range of Strata Base (m)	Thickness Range (m)	Comments
Made Ground	Brick paving underlain by orangish brown slightly gravelly sand. Gravel inclusions of flint and brick.	0.00	0.15 - 0.20	0.00 - 0.20	Encountered within all exploratory hole locations except DS0102 Concrete paving underlain by light brown sand encountered at DS105 (0.00-0.20m bgl).
Made Ground	Dark grey sandy gravel. Gravel inclusions of concrete, brick, shell fragments, flint and quartzite.	0.15 - 0.20	0.65 - 3.00	0.51 - 2.85	Black stained slightly sandy clayey gravel encountered at CP104 (0.70-3.00m bgl). Slight hydrocarbon odour encountered at CP104 (2.30-3.00m bgl). Light greyish brown slightly gravelly sand encountered at DS101 (0.30-0.60m bgl). Greyish brown slightly gravelly sandy silt underlain by yellowish brown sand encountered at DS105 (0.20-0.40m bgl). DS105 terminated at 0.40m bgl due to encountered service.
Made Ground	Soft dark grey slightly sandy gravelly clay. Gravel inclusions of concrete, brick, shell fragments and flint.	0.0 - 1.20	1.25 - 2.00	0.30 - 1.50	Encountered within all exploratory hole locations except CP104, DS101, DS103 and DS105.
Cohesive Alluvium	Soft grey slightly gravelly slightly silty clay. Or Very soft to soft silty clay with occasional organic matter.	1.20 - 2.00	3.00 - 4.00	1.50 - 2.75	Encountered within all exploratory hole locations except CP104 and DS105.
Granular Alluvium	Grey sandy gravel. Gravel inclusions of flint. Or Grey slightly gravelly silty sand.	3.00 - 4.00	8.00 - 14.50	5.00 - 10.50	Encountered within all exploratory hole locations except CP103 and DS105.

Weathered Seaford Chalk Formation	Whitish grey sandy gravel. Gravel inclusions of flint and chalk. Or Grey gravel with low cobble content of flint. Or Grey slightly gravelly slightly silty sand	4.00 – 14.50	9.70 – 15.00	0.50 – 5.70	Encountered within CP101, CP102 and CP103.
Seaford Chalk Formation	Structureless chalk composed of white slightly gravelly silt (Anticipated Grade Dm).	8.00 – 15.00	20.00 (Base not proven)	Not Proven	Encountered within all cable percussive boreholes.

The ground conditions encountered on Site were consistent with the mapped geology. The ground conditions generally comprised brick paving over sandy sub-base to 0.2 m bgl, underlain by a variable thickness of Made Ground, comprising either sandy gravels or gravelly clay with anthropogenic inclusions such as brick, glass and concrete up to 3.0 m bgl, underlain by superficial Alluvium deposits comprising very soft to soft silty clays up to 4.0 m bgl, underlain by loose to medium dense sandy gravels or silty sands to between 8.0 and 14.5 m bgl. The superficial deposits are underlain by the Seaford Chalk Formation comprising weathered chalk to between 9.7 and 15.0 m bgl, underlain by structureless chalk comprising gravelly silt (Anticipated Grade Dm) to the base of the boreholes.

4.3 Groundwater

4.3.1 Strikes During Investigations

The groundwater strikes during the ground investigation are summarised below.

Exploratory Hole	Water strike during drilling (m bgl)	Water strike during drilling (m AOD)	Stratum	Comment
CP101	4.30	34.33	Alluvium	Water level rose to 2.50 m after 20 minutes. Fast seepage.
CP102	3.50	35.03	Alluvium	Water level rose to 2.60 m after 20 minutes. Fast seepage.
CP103	4.00	34.76	Alluvium	Water level rose to 2.60 m after 20 minutes. Fast seepage.
CP104	3.80	34.74	Alluvium	Water level rose to 3.10 m after 20 minutes. Fast seepage.
DS101	1.50	37.22	Alluvium	Water level stayed at 1.50 m after 20 minutes. Fast seepage.
DS102	1.50	37.22	Alluvium	Water level stayed at 1.50 m after 20 minutes. Fast seepage.
DS103	2.00	36.58	Alluvium	Water level rose to 1.50 m after 20 minutes.

				Fast seepage.
DS104	4.00	34.66	Alluvium	Water level rose to 1.70 m after 20 m. Fast seepage.

4.3.2 Levels During Monitoring Programme

Groundwater levels were monitored on a total of four occasions between 24th February and 16th March 2023. Monitoring data is provided in Appendix F and summarised in the table below.

Exploratory Hole	Water level during monitoring Max to Min Range		LNAPL Y/N	Stratum
	m bgl	m AOD.		
DS101	1.13 - 1.63	37.59 - 37.09	N	Made Ground/Alluvium
CP102	1.38 - 1.56	37.15 - 36.97	N	Made Ground
CP103	1.52 - 1.74	37.24 - 37.02	N	Alluvium
CP104	1.37 - 1.57	37.17 - 36.97	N	Made Ground

Groundwater levels during monitoring varied between 1.13 and 1.74 m bgl (37.59 to 36.97 m AOD) within the Made Ground and Alluvium. The results of the groundwater monitoring indicate a preliminary flow direction towards the north-east.

4.4 Visual and Olfactory Evidence of Contamination

No visual or olfactory evidence of potential gross contamination was observed during the investigation.

4.5 Material Properties

The table below summarises the factual material properties based upon the results of in-situ and laboratory test data and where appropriate provides derived geotechnical parameters.

Parameter	Unit	Value or Range	Justification
Made Ground			
w (Water Content)	%	28	Laboratory classification testing
IP (Plasticity Index)	%	30	
PL (Plastic Limit)	%	38	
LL (Liquid Limit)	%	68	
IP' (Modified Plasticity Index)	%	20.4	Derived using: $IP' = (IP \times \% \text{passing } 425\mu\text{m}) / 100$
Volume Change Potential	-	Medium	NHBC
PSD (sedimentation)	%	Very coarse: 0 Gravel: 52 Sand: 34 Silt: 11 Clay: 3	Laboratory classification testing
Uncorrected SPT 'N'	Blows	2 - 6	In Situ Testing
Corrected SPT 'N60'	-	2 - 7	SPT N values corrected for energy ration (Er) after BS EN ISO

Parameter	Unit	Value or Range	Justification
			22476-3:2005. Er stated on borehole logs.
Alluvium			
w (Water Content)	%	20 - 149	Laboratory classification testing
IP (Plasticity Index)	%	35 - 104	
PL (Plastic Limit)	%	32 - 73	
LL (Liquid Limit)	%	21 - 177	
IP' (Modified Plasticity Index)	%	33 - 101	Derived using: $IP' = (IP \times \% \text{passing } 425\mu\text{m}) / 100$
Volume Change Potential	-	Medium to High	NHBC
PSD (sedimentation)	%	Very coarse: 0 Gravel: 8 Sand: 17 - 19 Silt: 40 - 41 Clay: 32 - 35	Laboratory classification testing
Uncorrected SPT 'N'	Blows	0 - 19	In Situ Testing
Corrected SPT 'N60'	-	0 - 22	SPT N values corrected for energy ration (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.
Cu (Derived undrained shear strength)	kPa	0 - 83	Derived using Stroud (1975) $Cu = f_1 \times N$. Assuming a $PI = 45\%$
Weathered Seaford Chalk Formation			
Uncorrected SPT 'N'	Blows	7 - 17	In Situ Testing
Corrected SPT 'N60'	-	8 - 20	SPT N values corrected for energy ration (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.
Seaford Chalk Formation			
Uncorrected SPT 'N'	Blows	2 - 39	In Situ Testing
Corrected SPT 'N60'	-	2 - 46	SPT N values corrected for energy ration (Er) after BS EN ISO 22476-3:2005. Er stated on borehole logs.

A plot of corrected SPT N value versus depth per strata is presented as Figure 3. Figure 3 generally shows variable soil strength in the Made Ground and Alluvium deposits and an increase in soil strength with depth for the Seaford Chalk Formation.

4.6 Geochemical Testing

Geochemical analysis was undertaken on 15 soil samples of Made Ground and Alluvium deposits, tested for selective contaminants (BRE Special Digest 1:2005 (3rd Edition), Concrete in Aggressive Ground, the results of which are summarised in the table below.

Tests	No. of Tests	Minimum	Maximum
Made Ground			
Soil - pH	10	7.8	11.5
Soil - Total Sulphur	5	0.1%	0.255%
Soil - Acid Soluble Sulphate	5	0.081%	0.335%
Soil - Water Soluble Sulphate	10	14.2 mg/L	376 mg/L
Alluvium			
Soil - pH	5	7.6	8.2
Soil - Total Sulphur	4	0.068%	0.253%
Soil - Acid Soluble Sulphate	4	0.037%	0.112%
Soil - Water Soluble Sulphate	5	60.7 mg/L	162 mg/L
Water - pH	4	7.2	7.4
Water - Sulphate	4	9.19 mg/L	79.9 mg/L

5.0 Geotechnical Assessment

5.1 Introduction

5.1.1 Summary of Development Proposals

The proposed redevelopment of the Site will comprise the demolition of the existing Class E(g)(i) (Office) building and the construction of three buildings for Class E(g)(iii) (Light Industrial) / Class B2 (General Industrial) / Class B8 (Storage or Distribution) uses, including the provision of a new substation, parking, landscaping, and associated works.

The proposed buildings (currently referenced as blocks A to C) will be split across eight units (A1, A2, B1, C1 to C4).

A Proposed Development Plan is included as Drawing 1.

The information provided below should be treated as preliminary and will be subject to review once a scheme and levels have been finalised, and further detailed assessment may be required.

5.1.2 Indicative Ground Model

The ground conditions encountered on Site were consistent with the mapped geology. They generally comprised brick paving over sandy sub-base to 0.2 m bgl, underlain by a variable thickness of Made Ground, comprising either sandy gravels or gravelly clay with anthropogenic inclusions such as brick, glass and concrete up to 3.0 m bgl, underlain by superficial Alluvium deposits comprising very soft to soft silty clays up to 4.0 m bgl, underlain by loose to medium dense sandy gravels or silty sands to between 8.0 and 14.5 m bgl. The superficial deposits are underlain by the Seaford Chalk Formation comprising weathered chalk to between 9.7 and 15.0 m bgl, underlain by structureless chalk comprising gravelly silt (Anticipated Grade Dm) to the base of the boreholes.

5.1.3 Preliminary Geotechnical Hazards

The geohazards listed below have been identified to follow guidance presented in the HE document CD622 'Managing Geotechnical Risk' (2020) which aims to identify and manage the geotechnical risks associated with a scheme throughout its lifespan, from planning to construction to maintenance.

The following geohazards are considered to be substantial ground related risks associated with the proposed development. A substantial risk is defined by Delta-Simons in Appendix G.

- Made Ground: Encountered within all exploratory hole locations to a maximum depth of 3.0 m bgl. Made Ground is typically variable in nature and strength with a potentially low bearing capacity and unacceptable levels of total/differential settlement may occur;
- Cohesive soils: Localised Cohesive soils have been encountered across the entire Site at shallow depths within the Alluvium and as slightly gravelly silt / silty clay within the weathered bedrock. Cohesive soils can change volume, creating "shrink/swell" problems on the Site. Cohesive soils are also generally unsuitable for traditional soakaways to be constructed;
- Shallow groundwater: The ground investigation encountered groundwater within all exploratory hole locations during drilling (except DS105 due to early termination) at depths ranging from between 1.50 m and 4.30 m bgl, rising to between 1.50 m and 3.1 m bgl, with subsequent monitoring rounds recording groundwater between 1.13 m and 1.74 m bgl;
- Poor drainage characteristics - The groundwater levels were generally either recorded within the Made Ground or cohesive Alluvium deposits, reflective of saturated ground, therefore it is considered that the potential for drainage to land e.g. soakaways may not be feasible as an adoptable surface water drainage strategy;
- Soft Ground - The superficial Alluvial deposits recorded corrected N values of between 0 and 22, with the cohesive alluvial deposits recorded as very soft to soft with N values generally <4 and the granular deposits recorded as very loose to medium dense. The variable nature and strength of the superficial

deposits can potentially result in a low bearing capacity and unacceptable levels of total/differential settlement may occur;

- Chalk: Chalk bedrock underlies the Site. Chalk has the potential to contain natural and man-made cavities as well as dissolution features. Based on the available historical mapping and BGS data purchased as part of the Envirocheck there is one man made mining cavity within 250 m of the Site, located approximately 205 m north-east, recorded as a shaft for pillar and stall chalk mining. There are no natural cavities recorded within 250 m of the Site, and given the shallow groundwater recorded at the Site, the presence of cavities is considered unlikely.

5.2 Earthworks

At the time of writing, finished levels were unclear, although it is understood that significant cut and fill earthworks are not anticipated due to the relatively level nature of the Site area.

Shallow earthworks on the Site will likely predominantly encounter Made Ground or alluvium. Enabling earthworks are likely to involve the Site wide removal of Made Ground to a specified depth.

Should localised areas of imported fill be required, materials used as fill will need to be placed to a suitable engineering specification with the degree of compaction required dependent on end usage and serviceability criteria. For example, a lesser degree of compaction may be suitable for paved areas / highways than for building platforms supporting foundations and ground bearing slabs. Any imported engineered material should be suitable for the proposed end-use, both in a chemical and geotechnical context.

5.3 Foundations

5.3.1 Spread Foundations

The Made Ground and Alluvium deposits are considered to be too unpredictable, variable, weak and compressible in their existing condition for conventional shallow foundations for the proposed development, and an alternative founding solution should be considered.

For information purposes a preliminary assessment for a safe bearing capacity is considered at a minimum of 2.0 m bgl within the Alluvium. Assuming a minimum N value of '0 to 4' for both the cohesive and granular alluvium, and pad dimensions up to 2.0 m x 2.0 m, a serviceable limit state bearing capacity of <25 kPa may be suitable (limited to less than 25 mm of settlement).

5.3.2 Volume Change Potential

The volume change potential should be considered in any foundation schedule for structures and services located within the influence zone of trees or bushes (proposed, existing or to be removed) and appropriate precautions and/or founding depths should be designed accordingly. In cohesive soils, it is recommended that foundations should be designed in accordance with NHBC Standard Chapter 4.2 "*Building Near Trees*".

The liquid limit and plasticity index results / A-Line Plot are within the Geotechnical Laboratory Results in Appendix C.

Based on the modified plasticity index, the cohesive Alluvium is considered to have a medium to high volume change potential.

5.3.3 Ground Improvement Techniques

Given the depth of Made Ground encountered during the investigation (up to 3.0 m bgl), and the presence of very soft to soft cohesive Alluvium deposits (up to 4.0 m bgl), consideration may be given to transferring loads to deeper strata / improving the bearing capacities of shallow soils, through ground improvement of existing soils.

Ground improvement will be required for the floor slab and foundations, if considered to be a viable option by a specialist contractor.

The precise ground improvement technique/proprietary methods, suitability of the ground, suitability of fill materials and allowable bearing capacity that can be achieved would need to be confirmed by discussions with a suitably experienced contractor; whose design should be warranted.

Examples of ground improvement techniques are provided below.

Vibro Replacement & Vibro Compaction

Vibro replacement involves the use of a long and heavy vibrating poker to form stone columns over the depth of soil requiring treatment. Vibro replacement utilises top feed or bottom feed techniques in which coarse grained material is fed into columns within the ground to a required depth and then compacted and pressured into the surrounding soil. Structural loads may then be supported, on shallow, nominally reinforced pad and strip footings. The placement of columns under the slabs may allow a traditional ground bearing construction to be adopted. Vibro replacement is considered to be a suitable method of ground improvement up to an approximate depth of 12 m bgl.

Vibro compaction involves the compaction of granular soils using a suspended vibrator which penetrates the underlying soils to the required depth with the aid of pressurised water. Under the influence of vibration, the soil particles are rearranged and compacted into a denser state. Sand is used to backfill the void left by the vibrator. The compaction result is dependent on the effectiveness of the vibrator and the soils conditions.

Vibro Concrete Columns (VCC)

Vibro concrete columns involves the use of a long and heavy vibrating poker to penetrate a shaft in the ground to a competent stratum. The poker is fitted with a concrete feeder pipe in which pumpable concrete is fed to the competent strata, forming a column toe. The toe of the column is enlarged by the repeated retraction and re-penetration of the vibrator, but the shaft is built in a single pull due to the high internal strength of the concrete. A high degree of improvement can be achieved at the toe of the column, leading to a particularly high bearing capacity and low deformation underload.

Dynamic compaction

Dynamic compaction involves the controlled impact of a crane hoisted weight, of around 10 to 12 tonnes, which falls in a predetermined grid pattern to densify and improve the underlying soils. This method can compact soils to depths as great as 12.5 m bgl, dependant on Site specific ground conditions. The craters which resulting from the ground improvement are then filled with granular soils.

5.3.4 Piling

A piled foundation solution using driven/ traditional bored or continuous flight auger (CFA) piles transferring loads to competent geology (Seaford Chalk Formation) may be suitable for the proposed or anticipated design loads, utilising both skin friction and end bearing capacity.

The precise method of pile installation and applicability of proprietary systems, diameters and depths required would need to be informed based on the results of this investigation, by discussions with a piling contractor with suitable experience, whose design should be warranted.

Individual pile/pile group loads will be a function of the surface area of the piles to be employed at the Site and their method of construction.

Normal static and dynamic load testing (including uplift tests) should be considered to achieve satisfactory quality control/assurance in accordance with good practice.

There will be a requirement for the placement of a suitably engineered piling mat, which should be designed and validated by a suitably qualified and experienced engineer.

5.3.5 Floor Slabs

It is considered that the significant thickness Made Ground and soft Alluvium deposits are too variable and compressible in their existing state for ground bearing floor slabs. It is recommended that floor loads should be transferred to ground improved soils, or to piles through concrete ground beams/concrete frame, or otherwise suspended.

The likely requirement for ground gas protection measures within the proposed development should be considered as part of the slab design.

5.4 Roads and Pavements

It is recommended that a conservative CBR value of 4% should be adopted for the shallow natural soils, for preliminary pavement design for external areas. It is recommended that plate CBR tests are undertaken at formation level after demolition prior to finalising pavement design.

5.5 Excavations & Obstructions

It is expected that conventional mechanical excavators will readily remove the Made Ground likely to be encountered in shallow excavations although a breaker may be required to remove any existing concrete hardstanding and macadam, or underground obstructions / existing foundations.

Due to the presence of shallow groundwater and soft soils all shallow foundation or services excavations, it would be prudent to assume that all shallow foundation or services excavations may be considered unstable, therefore, temporary support of all excavations should be considered when excavating on-Site in accordance with CIRIA 97 – Trenching Practice.

5.6 Groundwater

Groundwater strikes were recorded between 1.4 m and 4.3 m (37.22 – 34.33 m AOD) rising to between 1.50 m and 3.1 m bgl after 20 minutes. Subsequent groundwater monitoring rounds recorded groundwater in the standpipes between 1.31 m and 1.74 m bgl (37.59 – 36.97 m AOD).

Should any perched groundwater be encountered, then local dewatering via sump and pump should be suitable, however, treatment prior to disposal to sewer may be required.

5.7 Drainage

Soakaway drainage is not considered practical for the Site as the majority of groundwater levels from monitoring rounds have been recorded within the Made Ground or cohesive soils of the Alluvium, suggesting that the soils below the Site are saturated. Alternative methods of drainage should therefore be considered.

5.8 Chemical Attack on Buried Concrete

Made Ground

In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the shallow soils at the Site would therefore be classified as Design Sulphate Class DS-3 and ACEC Class AC-3 for soils and groundwater, when considering the most appropriate type of concrete to be used at the Site for shallow foundations in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in potentially pyritic soils).

Alluvium

In accordance with the recommendations of BRE Special Digest 1, 'Concrete in Aggressive Ground' 2005, the conditions of the shallow soils at the Site would therefore be classified as Design Sulphate Class DS-3 and ACEC Class AC-3 for soils and groundwater, when considering the most appropriate type of concrete to be used at the Site for shallow foundations in order to resist chemical attack from elevated sulphate present in the soils (assuming mobile groundwater in potentially pyritic soils).

6.0 Generic Quantitative Risk Assessment

6.1 Introduction

The presence of hazardous substances in or on a Site is generally only of concern if an actual or potential unacceptable risk exists. Legislation and guidance on the assessment of contaminated sites, consistent with UK best practice, acknowledges the need for a tiered risk-based approach. This section represents a Generic Quantitative Risk Assessment (GQRA) being a comparison of Site contaminant levels against Generic Assessment Criteria.

6.2 Human Health GQRA

The assessment of risks in relation to human health has been undertaken using Generic Assessment Criteria (GAC) as detailed within the appropriate tables. Risks from soil, groundwater and Non-Aqueous Phase Liquids (NAPL) have been considered. The GAC are predominantly based on long term (chronic) risk to health. However, in the limited circumstances where short-term (acute) risks are more pronounced, these GAC have been utilised to ensure a thorough and conservative initial assessment is undertaken.

Based on the proposed use, the soil and groundwater chemical data has been compared against a commercial/industrial end use GAC for 1% soil organic matter (SOM) content.

6.2.1 Risks from Soil Sources

None of the contaminant concentrations reported in soil exceeded the relevant Generic Assessment Criteria (GAC). Therefore, the soil contaminant concentrations are not considered likely to represent a risk to human health.

Loose asbestos fibres (Chrysotile) were recorded within the Made Ground soils collected from CP104 (1.0 m), DS101 (0.4-0.5 m) and DS102 (0.3 m) and within the shallow Alluvium deposits collected at DS101 (1.5-1.6 m). This sample was however collected at the interface of the Made Ground and Alluvium therefore it is considered likely that the identified ACM was from the overlying Made Ground soils. Quantification of all four samples indicated asbestos to be present at negligible concentrations of <0.001%.

Visual and olfactory evidence of contamination was not recorded within any of the exploratory holes.

6.2.2 Risks from Non-Aqueous Phase Liquids (NAPL)

Soil and groundwater exposure models used in generating Generic Assessment Criteria do not account for the potential for NAPL to represent a source of risk to human health, principally due to the production of vapours. Whilst it is possible to calculate theoretical soil saturation limits, in reality, due to co-solubility effects, these are not an appropriate indicator of the presence of NAPL. In order to assess the presence of NAPL, for petroleum hydrocarbons, an assessment criterion of 5,000 mg/kg for Total Petroleum Hydrocarbons has been applied based on professional experience.

The following has been identified in relation to NAPL at the Site:

- No observations of NAPL were made within the soils observed during drilling;
- No concentrations of Total Petroleum Hydrocarbons in excess of 5,000 mg/kg were recorded;
- No NAPL was measured during groundwater monitoring works.

On this basis, there is no evidence of NAPL being present on the Site.

6.3 Controlled Waters/Water Environment GQRA

The approach adopted to assessing risks to Controlled Waters/Water Environment is based principally on considering the concentrations of contaminants identified within the groundwater samples obtained in comparison to relevant GAC.

Given the 'prevent and limit' approach of the Water Framework Directive (2000/60/EC) and the identified receptors, a range of Water Quality Standards (WQS) have been applied as Generic Assessment Criteria

(GAC), these include Water Framework Directive standards and thresholds (WFD), the Freshwater Environmental Quality Standards (EQS), the UK Drinking Water Quality Standards (DWQS), WHO Guidelines for Drinking Water Quality or SEPA resource protection values which have been used as initial conservative GAC to assess whether groundwater contamination requires further assessment or discussion in terms of the risks to controlled waters. Where specific water quality standards are not available, Delta-Simons has adopted surrogate values based on professional judgement (DS GAC).

6.3.1 Groundwater Results

The identified controlled water receptors are the Holy Brook adjacent north-east of the Site, the River Kennet approximately 90 m east of the Site, the Alluvium classified as a Secondary A Aquifer and the Seaford Chalk Formation classified as a Principal Aquifer and as such, the results of groundwater analysis have been compared to the GAC for the protection of surface waters and potable water. Where Surface water criteria are not available, GAC for potable water have been used, as the Holy Brook and River Kennet are considered to be the primary receptors, especially given the Site is not located within a Source Protection Zone.

Laboratory results above relevant the applied GAC are summarised in the table below.

Contaminant	Max Conc. (µg/l)	GAC (µg/l)	GAC Source	No. Exceed GAC / No. of samples	Location of Exceedances = Concentration (µg/l)
Metals					
Arsenic	37.2	10	DWQS 2016	3/4	DS101 - 37.2 CP103 - 12.2 CP104 - 14.7
Copper	3.5	1	WFD 2015b	3/4	DS101 - 3.5 CP103 - 1.3 CP104 - 1.1
Nickel	6.7	4	WFD 2015b	2/4	CP103 - 6.7
Zinc	14	12.1	WFD 2015b	2/4	CP102 - 13 CP104 - 14
Notes: DWQS 2016 = The Water Supply (Water Quality) Regulations 2016 [UK Drinking Water Standards] WFD 2015b = Water Framework Directive (Standards and Classifications) Directions (England and Wales) 2015. Schedule 3 Part 2 Table 1 - Standards for Specific Pollutants					

6.3.2 Groundwater Results Summary

Marginally elevated concentrations of arsenic and copper have been identified within DS101, CP103 and CP104, one marginally elevated nickel concentration was identified within CP103 and marginally elevated zinc concentrations have been identified within CP102 and CP104. Given the fact that there are no elevated contaminants identified within the soil samples tested and no apparent source for these contaminants, these marginal concentrations are considered likely to be reflective of normal background concentrations within the groundwater in the Site area.

It is also considered that these marginal exceedances do not pose a significant risk to controlled waters on the basis that the underlying cohesive superficial deposits are likely to be low permeability up to at least 4.0 m bgl, thereby limiting lateral migration of on-site groundwater to the Holy Brook and subsequently the River Kennet. In addition to this, the Site is not located within a groundwater SPZ and there are no groundwater abstraction points reported within 1.0 km of the Site.

No remedial measures are considered necessary to address the marginally elevated heavy metal contaminants identified.

6.4 Built Environment

6.4.1 Potable Water Supply Pipes

The investigation requirements for the selection of potable water pipe material are set out in UKWIR Report 10/WM/03/21. Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites (UKWIR, 2010). This Report has very specific and onerous investigation requirements and as such the detailed investigation of each utility route was not within the scope of this investigation. The relevant water supply company needs to be contacted at an early stage to confirm its requirements for assessment, which may not necessarily be the same as those recommended by UKWIR.

A preliminary review of the results indicates that a relevant linkage is unlikely to exist associated with organic contaminants and therefore contaminant polyethylene (PE) and/or polyvinyl chloride (PVC) water supply pipes may be suitable for use on the development subject to discussions with the relevant Local Water Authority.

6.4.2 Building Materials

Risks to building materials associated with aggressive ground conditions is addressed in Section 5.7.

6.5 Waste Management

In recent years a number of mechanisms have aimed to change the way in which waste materials have traditionally been managed (*i.e.* a move away from less sustainable options such as landfill disposal). These include:

- Legislation and guidance (e.g. the Waste Framework Directive [2008, as amended]; the Waste [England and Wales] Regulations, 2011; the Definition of Waste: Development Industry Code of Practice, Version 2 [DoWCoP; CL:AIRE, 2011]).
- Fiscal drivers (e.g. the landfill tax escalator).
- Corporate responsibility campaigns (e.g. WRAP: Halving waste to landfill & Quality Protocol projects; Ellen Macarthur Foundation).

There is now a greater focus on waste re-use, treatment and recovery as organisations try and move their waste materials up the Waste Hierarchy and move to more circular models of material supply and re-use.

In accordance with current industry best practice, guidance and legislation Delta-Simons would always recommend options including managing materials on site through the DoWCoP, waste treatment and waste recovery be considered ahead of landfill disposal. Landfill disposal should be seen as an option of last resort given that in terms of cost, environment and social outcomes it is less sustainable. However, the availability of alternatives to landfill disposal depends on the timescales of the project, proactive involvement of qualified advisors and the nature and status of the materials being considered.

6.6 Preliminary Waste Classification

In general, the predominant waste material encountered during the construction phase of development schemes will likely be construction and demolition waste, predominantly waste soils and crushed demolition arisings. These may be found *in situ* in the ground or stockpiled on sites and they may be contaminated which may have implications for their classification and subsequent management.

This investigation was not undertaken to advise on the classification or potential management routes for such waste materials. Classification and management of these types of wastes either on site, off site or within the development are likely to require further investigation and assessment. The extent of such work will depend on the particular management option that is being considered and could, for example, involve the use of waste acceptance criteria analyses.

7.0 Bulk Ground Gas Risk Assessment

7.1 Ground Gas Conceptual Site Model

7.1.1 Sources

The following potential sources of ground gas have been identified:

- Made Ground encountered within all exploratory hole locations (maximum thickness of 3.00 m bgl);
- Natural Alluvial deposits with organic content;
- Potential for ground gas from the historical landfill (190 m south) which is recorded by Reading Borough Council as having the following deposited waste; coal, clinker, brick and concrete with variable quantities of glass, pottery, rubber, wood, shoes, toothpaste, cloth, plastic and batteries, with maximum ground gas concentrations for methane of 2.3% and carbon dioxide of 21.9%; and
- Potential for ground gas from historically infilled land features (clay pits) and water features (drains) surrounding the Site, especially if putrescible waste was used.

7.1.2 Pathways

- Vertical and lateral migration of ground gas through permeable strata;
- Potential for gases to enter current and future buildings through voids in the floor including service entry points and cracks and accumulate in confined spaces.
- Future maintenance/construction workers may come into contact with hazardous ground gases via entry into below ground confined spaces such as excavations or service entries/inspection points.

7.1.3 Receptors

The principal receptors under consideration are future Site users.

7.2 Duration & Extent of Monitoring

Tables 5.5a and 5.5b within CIRIA C665 detail current recommended monitoring duration and frequency for sites in the UK. Based on the identification of potential sources, the gas generation potential is considered to be low, whilst the sensitivity of the proposed development is low. On this basis, CIRIA C665 recommends four to six visits over a minimum period of two months.

Gas monitoring has been carried out upon the Site on an initial four occasions for a preliminary assessment of the ground gas regime.

The locations of the monitoring wells are highlighted on Figure 3 and indicate representative coverage across the whole study area.

Barometric pressures during the gas monitoring period ranged from 989 mBar to 1022 mBar, of which one visit (round 3) was completed during a period of falling pressure.

7.3 Ground Gas Risk Assessment

7.3.1 Background

Based on the proposed commercial end use, the following documents have been consulted when assessing the gas regime at the Site:

- CIRIA C665 (2007), Assessing risks posed by hazardous ground gases to buildings.
- British Standards Institute (BSI, 2019): Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings, BS:8485:2015+A1:2019.

The presence of a source of hazardous gas within the ground does not necessarily indicate a risk will be present. Consideration of recorded gas flows together with source concentrations can allow an initial assessment to be made of the potential both for generation and subsequent migration of gas. A Characteristic Situation (CS) is derived from an assessment of the ground gas data and forms the basis of determining mitigation measures.

7.3.2 Gas Screening Value (GSV)

The Gas Screening Value (gas concentration as a fraction x maximum recorded flow) is used to provide an initial assessment of risks to future Site users. The GSVs calculated for the monitoring wells are presented in the following table.

Location	Maximum Steady Methane (%v/v)	Maximum Steady Carbon Dioxide (%v/v)	Maximum Steady Flow Rate (l/hr)	GSV/Classification				Flooded?
				Methane		Carbon Dioxide		
				GSV	Classification	GSV	Classification	
DS101	<0.1	0.6	<0.1	0.0001	CS1	0.0006	CS1	N (0/4)
CP102	1.8	0.4	0.9	0.0016	CS2*	0.0036	CS1	N (0/4)
CP103	3.3	1.2	<0.1	0.0033	CS2*	0.0012	CS1	N (0/4)
CP104	<0.1	0.3	<0.1	0.0001	CS1	0.0003	CS1	N (0/4)
* Peak methane exceeds 1% v/v and/or carbon dioxide exceeds 5% v/v.								

The preliminary data indicates that the Site can be provisionally classified as CS2 (low hazard potential) in accordance with BS 8485:2015 Table 2 for the proposed development. The GSV for the site-wide worst-case flow rate and ground gas concentration (either CO₂ or CO₄) has been assessed which indicates that the Site may be classified as CS1, however, methane has been recorded at concentrations above 1% in more than one location and on more than one occasion. The CS2 classification is consistent with the CSM for the Site, which indicates a low ground gas potential.

Based on the results of the preliminary assessment, further ground gas monitoring is not considered to be required, as it is considered unlikely that further monitoring would result in a different classification of the ground gas regime at the Site.

7.4 Ground Gas Risk Mitigation

The ground gas regime at the Site has been classified as CS2 in accordance with the CIRIA guidance, and it is recommended that CS2 situation is assumed for design purposes.

BS:8485 provides a scoring system to determine the appropriate protection measures for a proposed development in accordance with the identified ground gas regime. Table 3 of BS:8485 summarises typical UK building types, which for this development will comprise Type D (commercial / industrial) with Type C enclosed spaces. Table 4 details the points required for the Characteristic Situation, which for CS2 is 2.5 (Type C, e.g. ground floor enclosed spaces and office areas) and 1.5 (Type D, e.g. the main warehouse area). This can be achieved by a combination of the following:

Structural barriers (Table 5)

Ventilation (Table 6)

Gas Membrane (Table 7)

The above should be considered in conjunction with the proposed foundation/floorslab design to achieve the minimum score required within BS:8485.

The above assessment relates solely to future Site users. Given the nature of the ground gas regime at the Site, no further works are considered necessary to protect 3rd parties/surrounding occupiers. Entry to excavations/confined spaces should be restricted to personnel with relevant Confined Spaces training and with prior confirmation of atmospheric conditions.

7.5 Radon

The Site is located within an area where radon protective measures are not required.

While a detailed radon assessment falls outside of the scope of this Report, a commentary based on UK Health Security Agency guidance (as at ukradon.org.uk) and data presented in the Envirocheck report, is provided. However, it cannot be precluded that further assessment might be required by the Local Authority.

7.6 Organic Vapours

No sources of volatile vapours have been identified as part of the ground investigation.

8.0 Revised Conceptual Site Model

A revised CSM is presented in the table below, and has been formulated taking into account all of the available data from the Delta-Simons intrusive investigation, suitable for a site with a proposed commercial/industrial end-use.

Revised Conceptual Site Model				
Source	Pathways	Receptors	Pollutant Linkage?	Discussion and Mitigation
Loose asbestos fibres (<0.001%) within the Made Ground soils Marginally elevated concentrations of arsenic, copper, zinc and nickel within the groundwater.	Consumption of home grown produce and attached soil	Human health - future residents/site users	Yes	As part of the development plans, it is understood that the current building is to be demolished. Four out of ten soil samples (three Made Ground samples and one sample of the Alluvium) detected asbestos, albeit with <0.01% fibres within the samples. Asbestos fibres detected within the Alluvium from DS101 were considered to be from the overlying Made Ground deposits. The contaminants found in shallow Made Ground are expected to remain on-Site. It is recommended that the Made Ground is kept below buildings and hardstanding to limit exposure to future end users. The current proposed development plans show soft landscaping around the Site peripheries and it is recommended that a suitable thickness of clean topsoil/subsoil is placed in any new landscaped areas to mitigate the risk to future site users coming into direct contact with contaminated soils. There is the potential for ACMs within the current building on-Site. An asbestos survey should be undertaken prior to demolition by a specialist contractor and removed in accordance with legislation to prevent further contamination of the ground during the demolition phase.
	Direct contact, ingestion and/or inhalation of soil/dust	Human health - construction workers	Yes	Site workers may become exposed to localised contaminated soils and asbestos fibres during intrusive groundworks undertaken at the Site. Mitigation to include safe working practices should be undertaken including the use of appropriate Personal Protective Equipment (PPE).
	Migration of contaminants into groundwater	Secondary A Aquifer (Alluvium) and Principal Aquifer (Seaford Chalk Formation)	No	Marginally elevated concentrations of arsenic, copper, zinc and nickel have been identified within the groundwater. The elevated contaminants are considered likely to be representative of natural background concentrations, and therefore, are considered unlikely to pose a significant risk to controlled waters. In addition to this, the Site is not located within a groundwater Source Protection Zone, and there are no potable groundwater abstractions located within 1.0 km of the Site.
	Migration of contaminants into surface waters	Holy Brook (adjacent to north east of Site)		

Revised Conceptual Site Model				
Source	Pathways	Receptors	Pollutant Linkage?	Discussion and Mitigation
		and River Kennet (approx. 90 m east of Site)		The proposed development of the Site will also predominantly be covered with buildings and hardstanding which will limit the infiltration of rainfall (and therefore reduce the potential for leaching and migration of any contamination, if present). As such no remedial measures are considered necessary.
Organic contamination in soils and groundwater	Direct infiltration in water supply pipes	Drinking water supply pipes	Yes	Hydrocarbons, especially aromatics, are known to permeate plastic pipes. Assessment of the risk to water pipes for any new supply will have to be undertaken as a requirement of the statutory undertakers, who should be provided with a copy of this Assessment and provide recommendations for upgrading of potable water supply pipes. Based on the findings of this assessment, upgraded pipes would not be anticipated.
Hazardous ground gas	Indoor exposure/explosive hazard via enclosed space accumulation of ground gas	Future residents/Site users	Yes	The Site has been classified as a CS2 based upon the results of four rounds of monitoring undertaken at the Site. Ground gas protections measures are necessary in new buildings under this scenario and should achieve a score of 2.5 points (Type C building, e.g. ground floor enclosed spaces and office areas) and 1.5 (Type D building, e.g. the main warehouse area) in accordance with BS 8485:2015+A1:2019. The Site is located within an area where radon protective measures are not required.
Potentially unidentified 'hotspots' of contamination, which may be present in areas of the Site that have not been directly investigated	All pathways	All receptors	Unknown	As with all redevelopments works, a 'hotspot' protocol should be in place for groundworkers to act upon during any future redevelopment of the Site. Safe working procedures should be implemented, good standards of personal hygiene should be observed, and appropriate levels of PPE provided and utilised. This recommendation should be captured in Site health and safety documentation and in maintenance plans.

9.0 Conclusions & Recommendations

9.1 Ground Model Summary

Ground conditions underlying the Site were found to comprise up to 3.00 m of Made Ground underlain by superficial deposits comprising cohesive and granular Alluvium deposits to a maximum depth of 14.50 m bgl, over an unproven thickness of the Seaford Chalk Formation.

Groundwater strikes were recorded between 1.4 m and 4.3 m (37.22 – 34.33 m AOD) rising to between 1.50 m and 3.1 m bgl after 20 minutes. Subsequent groundwater monitoring rounds recorded groundwater in the standpipes between 1.31 m and 1.74 m bgl (37.59 – 36.97 m AOD). The results of the groundwater monitoring recorded a preliminary flow direction to the north-east.

9.2 Geotechnical Summary

Due to the low and variable strengths of the Made Ground and Alluvium, piled foundations should be considered for the proposed development, driven into the competent Seaford Chalk Formation.

Ground improvement techniques may also be feasible; however this should be confirmed by a specialist contractor.

The Alluvium is considered to have a high to medium volume change potential. The volume change potential of soils should be considered as part of preliminary foundation design.

It is considered that the significant thickness Made Ground and soft Alluvium deposits are too variable and compressible in their existing state for ground bearing floor slabs. It is recommended that floor loads should be transferred to ground improved soils, or to piles through concrete ground beams/concrete frame, or otherwise suspended.

9.3 Contamination Summary

The investigation has been carried out in order to provide information on the quality of the soil and groundwater beneath the Site in the context of land contamination and provide information on the ground gas regime beneath the Site for a commercial end use. The assessment is being completed prior to the proposed redevelopment of the Site.

Data gaps and uncertainties remain as outlined within Section 1.7.

9.3.1 Human Health

No elevated concentrations of any contaminants were identified within the shallow soils underlying the Site, when compared against the commercial end-use GACs, with respect to Human Health. Therefore, it is reasonable to discount the reported concentrations from presenting an elevated risk to human health.

Four soil samples (three Made ground samples and one sample of the Alluvium) detected chrysotile asbestos fibres. All samples were recorded at negligible concentrations of <0.001%.

9.3.2 Controlled Waters

The elevated concentrations of arsenic, copper, nickel and zinc within groundwater samples are considered likely to be representative of natural background concentrations, and therefore, are considered not to pose a significant risk to controlled waters. In addition to this, the Site is not located within a groundwater Source Protection Zone, and there are no potable groundwater abstractions located within 1.0 km of the Site. The proposed development of the Site will also predominantly be covered with buildings and hardstanding which will limit the infiltration of rainfall (and therefore reduce the potential for leaching and migration of any contamination, if present). The risk to controlled waters is considered to be low.

9.3.3 Ground Gas

The Site has been classified as a CS2 based upon the results of four rounds of monitoring undertaken at the Site. Ground gas protections measures are necessary in new buildings under this scenario. This should be confirmed by the local planning authority.

9.3.4 Volatile Vapours

No sources of significant volatile vapours have been identified as part of the ground investigation.

9.3.5 Built Environment

The ground investigation was not designed to assess ground conditions in full accordance with the UKWIR guidance for water supply pipes. However, based on the general absence of petroleum hydrocarbons including hydrocarbons in the ground, the use of standard plastic infrastructure is likely to be suitable in the event that new water supply pipes are required.

Aggressive ground conditions associated with elevated sulphates recorded locally in the soils and groundwater have the potential to attack buried concrete, particularly where the ground has the potential to be oxidised (e.g. through ground disturbance or addition of water). Buried concrete is recommended to be designed to concrete design class DS-3 and ACEC-3 within the Made Ground and Alluvium Deposits.

9.4 Recommendations

Based on the findings of this Report, the following recommendations for supplementary investigation / assessment are made:

- Preparation of a Remediation Strategy and verification to mitigate any unacceptable risks to human health/controlled waters receptors and as required as part of any future planning conditions.

The following recommendations for the development of the Site are made:

- The Site has been classified as a CS2 based upon the results of four rounds of monitoring undertaken at the Site. Ground gas protections measures are necessary in new buildings under this scenario and should achieve a score of 2.5 points (Type C building, e.g. ground floor enclosed spaces and office areas) and 1.5 (Type D building, e.g. the main warehouse area) in accordance with BS 8485:2015+A1:2019;
- Made Ground is considered suitable to remain on Site beneath buildings or hardstanding. Where soft landscaped areas are proposed, it is recommended a suitable thickness of clean topsoil/subsoil is placed in any proposed landscaped areas to mitigate the risk to future site users coming into direct contact with contaminated soil;
- Groundworkers and sub-surface maintenance workers should be made aware of the possibility of encountering contaminated soils through toolbox talks and in particular the potential presence of asbestos and an appropriate protocol and risk assessments to mitigate exposure of the workforce and general public should be in place. Good standards of personal hygiene should be observed, and appropriate levels of PPE / RPE utilised where necessary;
- Should it be proposed to dispose of materials from the Site then specific additional investigations may be needed to classify the materials in accordance with current regulatory requirements;
- An asbestos survey should be undertaken prior to demolition of the building on Site by a specialist contractor and removed in accordance with legislation to prevent further contamination of the ground.
- Unidentified localised areas of contamination may exist at the Site and an appropriate 'hotspot' protocol should be in place for groundworkers to act upon should such contamination be identified during the construction process;
- Suitable dust suppression techniques and prevention of nuisance/environmental impacts will need to be implemented by the groundworkers during construction works; and
- Confirmation should be sought from the Local Water Authority as to whether they will require upgraded pipework to be installed for new service installations.

Drawings

Drawing 1 - The Proposed Development Plan



Block A

- A1 Unit 279sqm / 3,000sqft GIA
inc. 70sqm / 750sqft mezz office 25% office content
- A2 Unit 264sqm / 2,850sqft GIA
inc. 70sqm / 750sqft mezz office 26% office content
- A2 Unit 325sqm / 3,500sqft GIA
inc. 74sqm / 800sqft mezz office 23% office content

TOTAL UNIT 868 sqm / 9,350sqft

Block B

- B1 Unit 697sqm / 7,500sqft GIA
inc. 139sqm / 1,500sqft mezz office 21% office content

TOTAL UNIT 697sqm / 7,500sqft

Block C

- C1 Unit 437sqm / 4,700sqft GIA
inc. 93sqm / 1,000sqft mezz office 21% office content
- C2 Unit 321sqm / 3,450sqft GIA
inc. 74sqm / 800sqft mezz office 23% office content
- C3 Unit 321sqm / 3,450sqft GIA
inc. 74sqm / 800sqft mezz office 23% office content
- C4 Unit 437sqm / 4,700sqft GIA
inc. 93sqm / 1,000sqft mezz office 21% office content

TOTAL UNIT 1,516sqm / 16,300sqft

TOTAL 3,081sqm / 33,150sqft GIA

33 car parking spaces
All units 7.5m u/s of haunch

- Tree removed
- Tree retained green

SCHEDULE OF MATERIALS
EXTERNAL WORKS

- 1 - CONCRETE BLOCK PAVING
- LAID IN HERRINGBONE PATTERN
- COLOUR - BRINDLE
- 2 - CONCRETE SURFACING
- COLOUR - LIGHT GREY SELF COLOUR
- 3 - RAILING FENCING 2.4M HIGH ON
SQUARE SECTION POSTS
- POLYESTER POWDER COATED FINISH
- COLOUR - BLACK
- 4 - STRUCTURED LANDSCAPING
- (PLEASE REFER TO SEPARATE
DRAWING BY LANDSCAPER)
- 5 - NO DIG PATH WAY SYSTEM WITH
- GRAVEL INFILL TO PROTECT TREE
- ROOTS

ADOPTED HIGHWAY WITH
LOGICOR OWNERSHIP

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SURVEY AND GROUND INVESTIGATION WORK.

IT HAS BEEN ASSUMED THAT OTHER THAN WHERE SHOWN THE SITE IS ESSENTIALLY FLAT
WITH NO EASEMENTS TO ABOVE OR BELOW GROUND SERVICES.

ALL PROPOSALS ARE SUBJECT TO CONFIRMATION FOLLOWING LIAISONS WITH RELEVANT
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SOURCES, THE ACCURACY OF WHICH CANNOT BE GUARANTEED.

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GENERAL GUIDANCE ONLY, WHILST PLOTTED WITH REFERENCE TO LAND REGISTRY DATA
WHERE AVAILABLE AND INTERPOLATED AS PHYSICAL FEATURES ON SITE WHERE POSSIBLE,
THEY ARE NOT INTENDED TO REPRESENT DEFINITIVE SITE EXTENTS OR LEGAL OWNERSHIP.

ALL DIMENSIONS AND SETTING OUT COORDINATES TO BE CHECKED ON THE PROJECT SITE
BEFORE WORK IS COMMENCED OR MAKING ANY SHOP DRAWINGS.

IF THIS DRAWING HAS BEEN RECEIVED ELECTRONICALLY IT IS THE RECIPIENTS
RESPONSIBILITY TO PRINT THE DOCUMENT TO THE CORRECT SCALE.
ALL DIMENSIONS ARE IN MILLIMETRES UNLESS STATED OTHERWISE IT IS
RECOMMENDED THAT INFORMATION IS NOT SCALED OFF THIS DRAWING.
THIS DRAWING SHOULD BE READ IN CONJUNCTION WITH ALL OTHER RELEVANT
DRAWINGS AND SPECIFICATIONS.

Client:



Project:

Rose Kiln Court
Reading

Drawing Title:
SITE LAYOUT PLAN

Webb Gray Ltd
Chartered Architects
75-77 Colmore Row
Birmingham B3 2AP
t: 0121 616 6030
e: architecture@webbgray.co.uk
w: www.webbgray.co.uk

Scale @ A1: 1:500 Date: MARCH 23 Drafted: DLD Checked: LA

Job No: 8758 Origin: WGA Vol: EX Level: XX Type: DR Role: A No: 002 Status: P Revision:

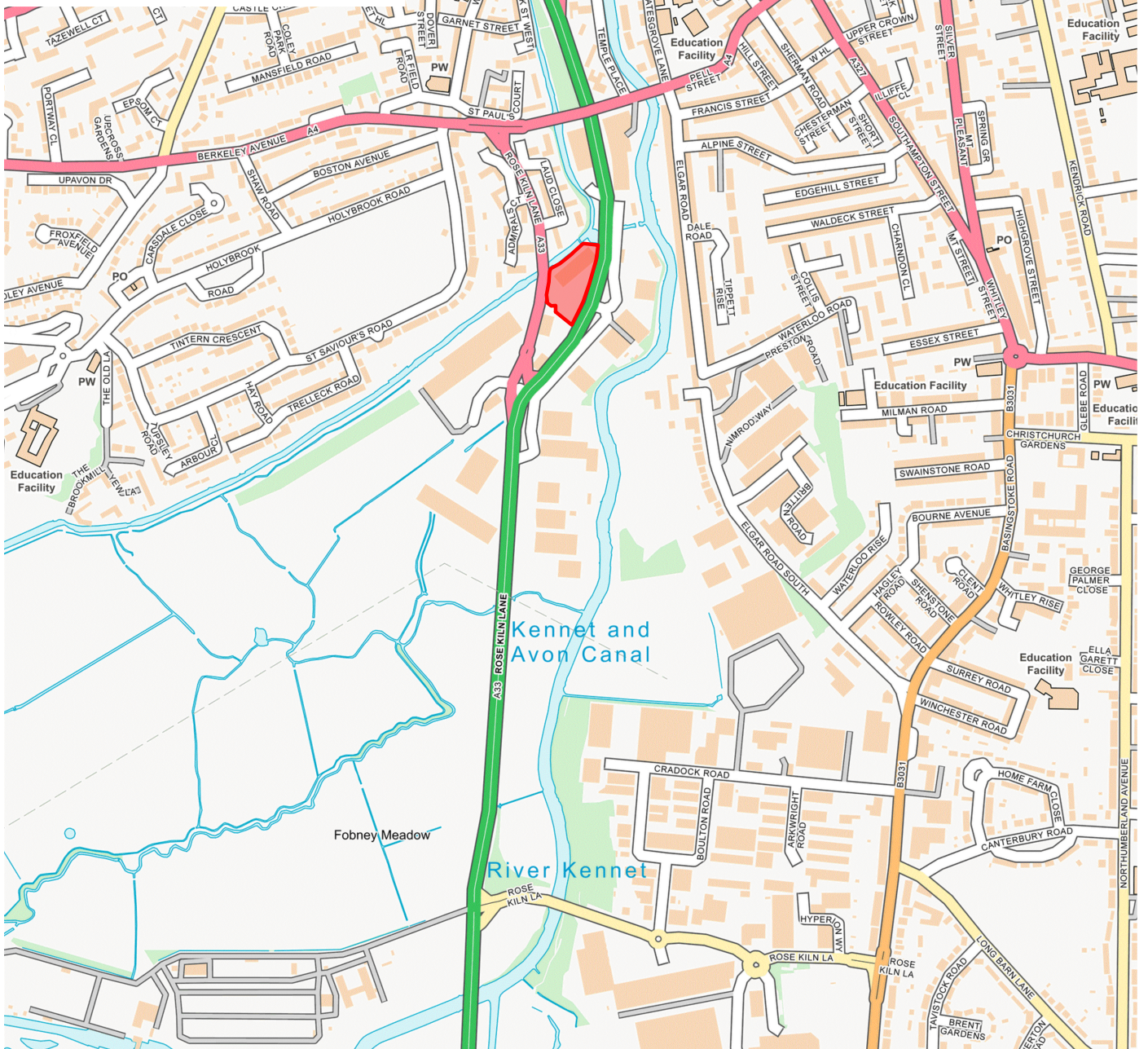
Figures

Figure 1 - Site Location Map



LEGEND

 Site Boundary



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Figure 2 - Exploratory Hole Location Plan



LEGEND

-  Site Boundary
-  CPx Cable Percussive Borehole
-  DSx Dynamic Sampler Borehole

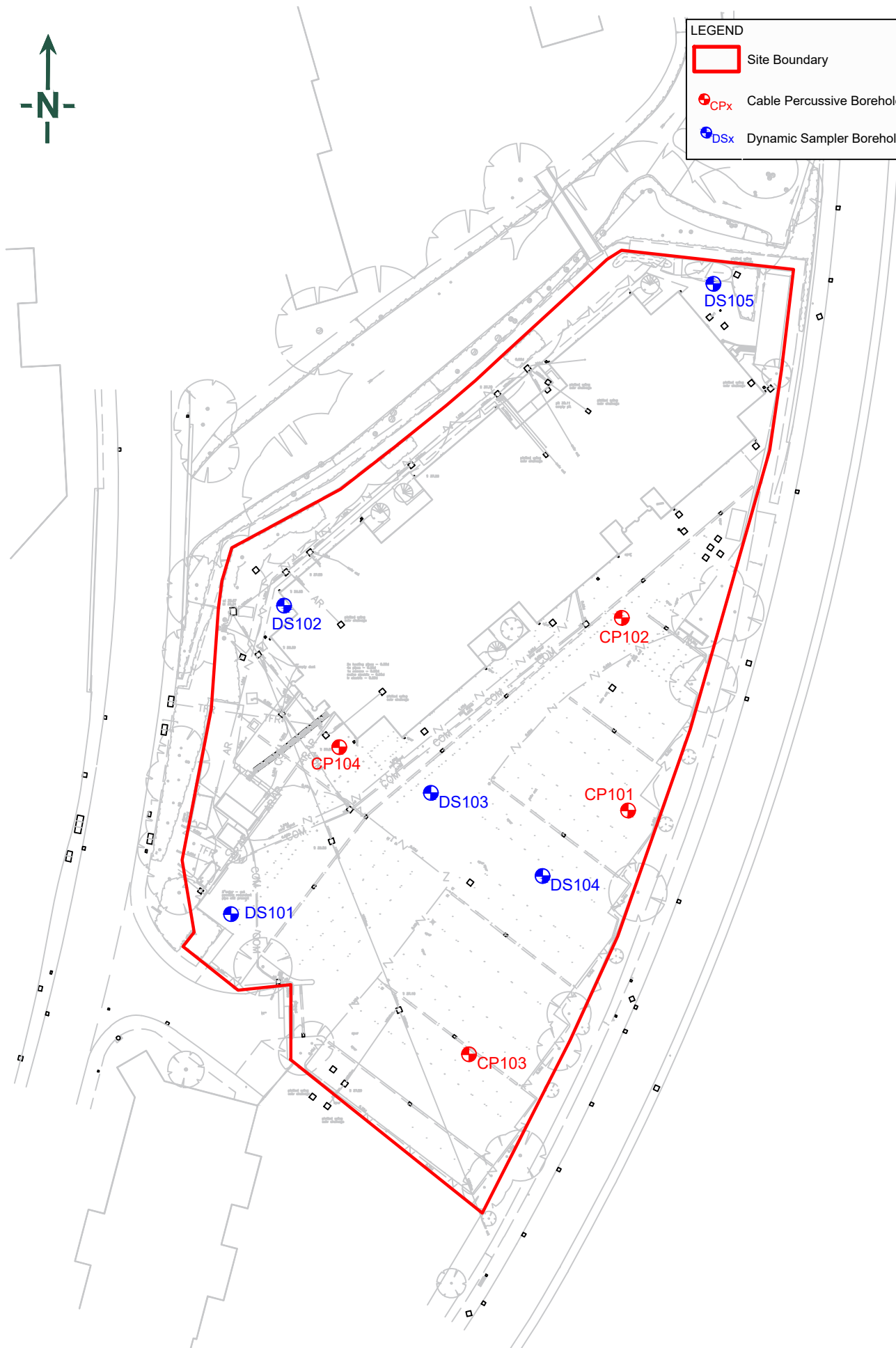


Figure 3 - Corrected SPT vs Depth Graph

Appendices

Appendix A - Limitations

Limitations

This Report was prepared by Delta-Simons Ltd (Delta-Simons) for the sole and exclusive use of the Client and for the specific purpose for which Delta-Simons was instructed. Nothing contained in this Report shall be construed to give any rights or benefits to anyone other than the Client and Delta-Simons, and all duties and responsibilities undertaken are for the sole and exclusive benefit of the Client and not for the benefit of any other party. Delta-Simons does not intend, without its written consent through a formal letter of reliance or warranty, for this Report to be disseminated to any party other than the named Client or to be used or relied upon by any party other than the named Client. Use of the Report by any other party is unauthorised and such use is at the sole risk of the user. Any party using or relying upon this Report, other than the Client, agrees by virtue of its use to indemnify and hold harmless Delta-Simons from and against all claims, losses and damages (of whatsoever nature and howsoever or whensoever arising), arising out of or resulting from the performance of the work by Delta-Simons. Unless explicitly agreed otherwise, in writing, this Report has been prepared under Delta-Simons' Standard Terms and Conditions as included within our proposal to the Client.

The recommendations contained within this Report represent Delta-Simons professional opinions, based upon the information detailed within the Report, exercising the reasonable skill and care to be expected of a professional consultant holding itself out as having the competence, experience and resources necessary for the purpose of carrying out similar work in scope and character to the services performed. The Report needs to be considered in the light of the proposal and associated limitations of scope. The Report needs to be read and considered in full and isolated sections cannot be used without full reference to other elements of the Report and any previous works referenced within the Report.

Where Delta-Simons has obtained, reviewed and evaluated information in preparing this Report from the Client and others and Delta-Simons conclusions, opinions and recommendations has been reasonably determined using this information, Delta-Simons does not warrant the accuracy of the third-party information provided to it and cannot be responsible for any opinions which Delta-Simons has expressed, or conclusions which it has reached in reliance upon information which is subsequently proven to be inaccurate.

Site surveys document the conditions encountered at the time of survey only and conditions may change due to natural processes or human intervention. As such, surveys represent an assessment at a specific point in time and Delta-Simons cannot be responsible for adverse conditions which arise or become apparent after the time of the survey or for conditions which sit outside the scope for which the survey or Report was commissioned.

Where intrusive investigations have been completed, information, comments and opinions given in this Report are based on the ground conditions encountered during the site work period and on the results of laboratory and field tests performed during the investigation. Ground conditions are inherently variable such that no investigation can be exhaustive to the extent that all adverse conditions are revealed. Conditions may therefore be present beneath the site that were not apparent in the data reviewed or obtained as part of this assessment. It should be noted that groundwater levels vary due to seasonal and other effects and may at times differ to those measured during the investigation. Delta-Simons does not warrant or guarantee that the Site is free of hazardous or potentially hazardous materials or conditions. Where risk assessment is undertaken, this is based upon the standards, guidance and common practice at the time of the assessment and Delta-Simons cannot be responsible for conditions which become apparent following changes in guidance or practice or advancements in scientific knowledge which change the position in relation to assessment of risk.

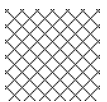
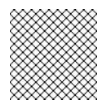
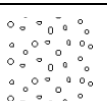
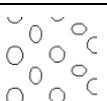
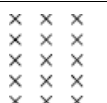
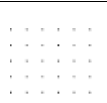
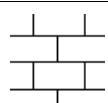
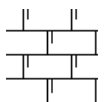
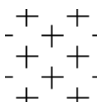
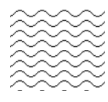
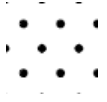
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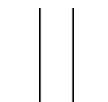
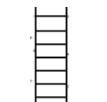
Appendix B - Borehole Logs and SPT Calibrations Certificate

KEY TO BOREHOLE AND TRIAL PIT LOGS

MATERIAL LEGENDS

	Topsoil		Made Ground		Bituminous Material
	Concrete		Clay		Silt
	Sand		Gravel		Peat
	Cobbles		Boulders		Mudstone
	Siltstone		Sandstone		Limestone
	Chalk		Coal		Breccia
	Conglomerate		Igneous		Metamorphic
	Pyroclastic (volcanic ash)		Gypsum		Shale
	Ironstone		Bedrock (Unidentified)		Void

INSTALLATION/BACKFILL LEGENDS

	Sand		Gravel		Bentonite/Grout
	Arisings		Concrete		Plain Pipe
	Slotted Pipe				

Legend symbols in general accordance with BS 5930:2015+A1:2020 and standard industry practice.

SAMPLE TYPES

ACM	Asbestos Containing Material Sample
B	Bulk Disturbed Sample
BLK	Block Sample
C	Core Sample
CBR	Undisturbed Sample for California Bearing Ratio Test - 154mm diameter
D	Disturbed Sample - Tub
ES	Soil Sample for Environmental Testing
EW	Water Sample for Environmental Testing
G	Gas Sample
U	Undisturbed Driven Tube Sample - 70/102mm diameter, 450mm long
W	Water Sample

TEST TYPES

CPT	Cone Penetrometer Test (kN/m ²)
FID	Flame Ionisation Detector Test (ppm)
HV	In-Situ Hand Shear Vane Test (kN/m ²)
PID	Photoionisation Detector Test (ppm)
SPT (S)	Standard Penetration Test - Split Spoon Sampler
SPT (C)	Standard Penetration Test - Solid 60 Degree Cone

CORE DETAILS

If	Fracture Spacing (mm) - Minimum, Average, Maximum
NI	Non-Intact where >25 fracture spacings per metre
TCR	Total Core Recovery (%)
SCR	Solid Core Recovery (%)
RQD	Rock Quality Designation (%)
AF	Air Flush Return (%)
WF	Water Flush Return (%)
NIDD	Non-Intact - Drilling Disturbed
AZCL	Assessed Zone of Core Loss

WATER COLUMN DETAILS

	Water Strike
	Water Level

SPT Hammer Energy Test Report

in accordance with BSEN ISO 22476-3:2005+A1:2011

James and Milton Drilling Ltd
63 Fakenham Road
Great Ryburgh
NR21 7AW

SPT Hammer Ref: 110-148
Test Date: 10/01/2023
Report Date: 10/01/2023
File Name: 110 148.spt
Test Operator: ML

Instrumented Rod Data

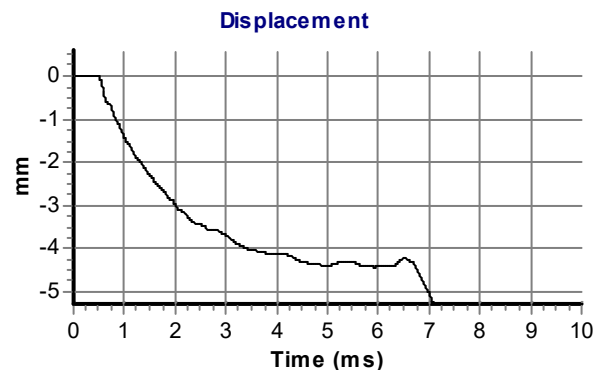
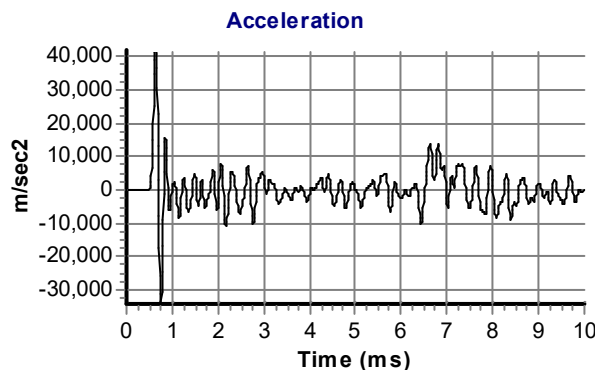
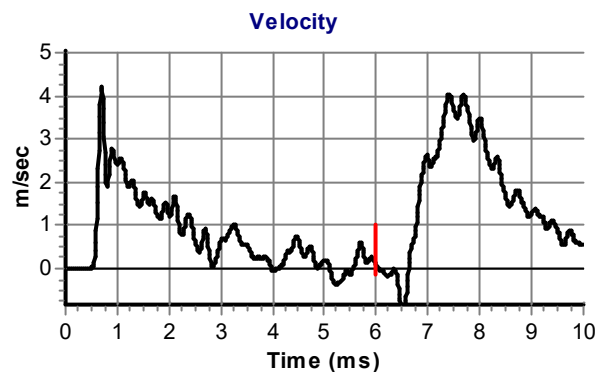
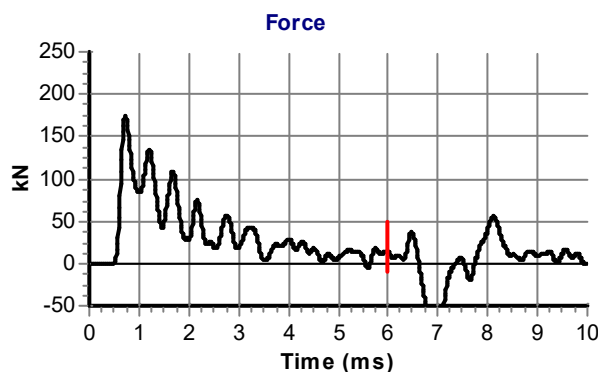
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.6
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 63177
Accelerometer No.2: 63178

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 12.6

Comments / Location

Premier Compact 110. Serial No
110-148
J&M Yard



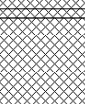
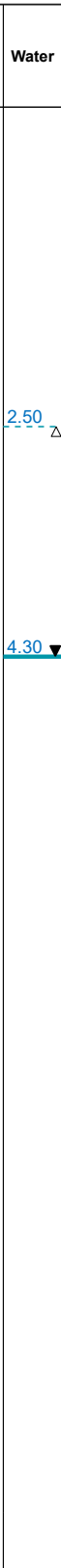
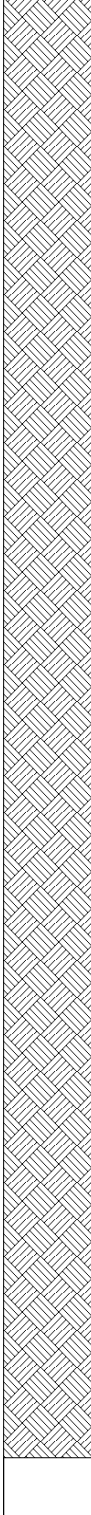
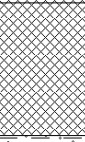
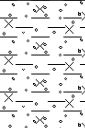
Calculations

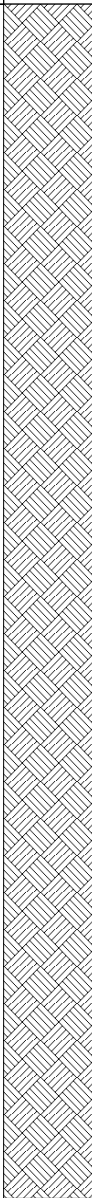
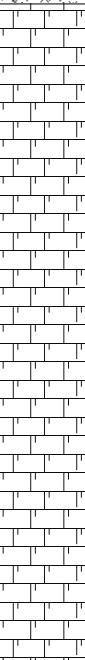
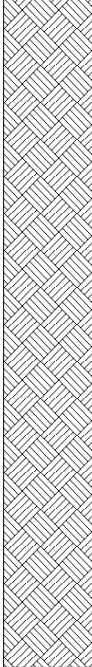
Area of Rod A (mm²): 983
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 338

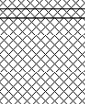
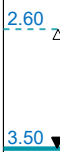
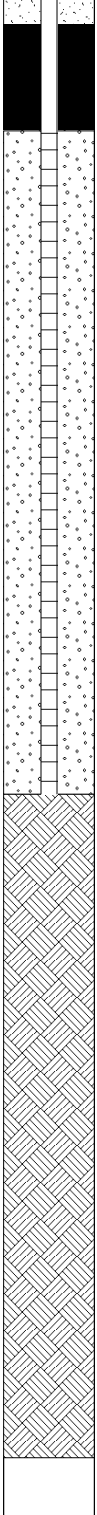
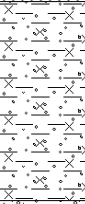
Energy Ratio E_r (%): **72**

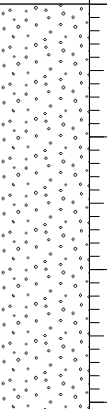
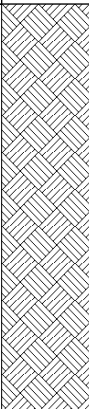
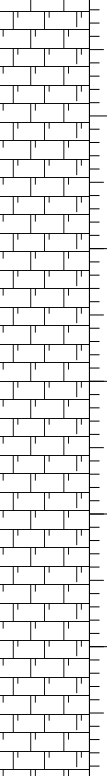
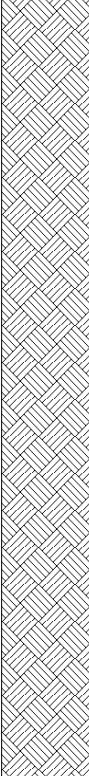


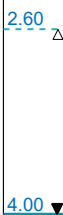
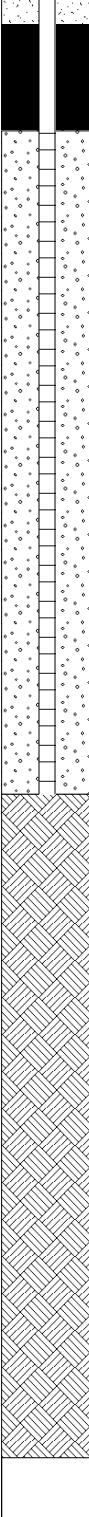
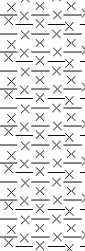
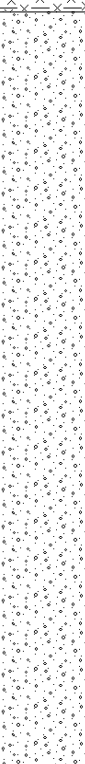
Signed: Mark Lane
Title: Operations Manager

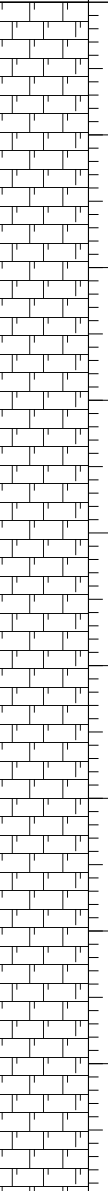
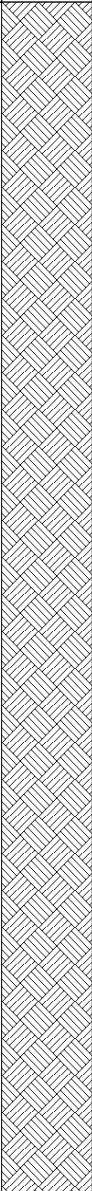
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 91193.557185		Hole ID: CP101		Page: 1 of 2			
Cable Percussive Borehole Log					Project: Rose Kiln Court New Development, Reading		Client: Redwood (Light Industrial) Propco Sarl					
					Date: 14/02/2023 - 15/02/2023							
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill	
							Depth (m)	Type & Ref	Depth (m)	Results		
MADE GROUND: Brick paving.		0.08		38.55			0.50	ES1	1.20	SPT(C)N=4 (1,0/1,1,1,1)		
MADE GROUND: Orangish brown slightly gravelly fine to coarse SAND. Gravel is subangular fine to medium flint and brick.		0.15	(0.85)	38.48								
MADE GROUND: Dark grey sandy GRAVEL. Gravel is angular to subrounded fine to coarse concrete and brick. Sand is fine to coarse.		1.00		37.63								
MADE GROUND: Soft dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse concrete, brick and shell fragments. Slight organic odour.			(1.00)				1.30	D1				
MADE GROUND: Soft dark grey slightly sandy gravelly CLAY. Gravel is angular fine to coarse concrete, brick and shell fragments. Slight organic odour.		2.00		36.63								
Soft grey slightly gravelly CLAY. Gravel is subangular fine to coarse flint and shell fragments. Occasional pockets of black organic matter. (ALLUVIUM)			(1.00)				2.30	D2	2.20	SPT(S)N=2 (1,0/1,0,1,0)		
		3.00		35.63								
Very soft dark bluish grey slightly gravelly slightly silty CLAY. Gravel is subrounded fine to medium flint and shell fragments. (ALLUVIUM)			(1.00)						3.20	SPT(S)N=0 (0,0/0,0,0,0)		
		4.00		34.63								
Medium dense dark grey GRAVEL. Gravel is angular fine to coarse flint. (ALLUVIUM)			(4.00)				4.30		4.20	SPT(S)N=16 (1,2/3,4,4,5)		
									5.20	SPT(C)N=12 (2,2/2,3,3,4)		
									6.50	SPT(C)N=19 (2,4/7,4,4,4)		
		8.00		30.63								
Loose grey silty fine to coarse SAND. (ALLUVIUM)									8.00	SPT(C)N=8 (1,1/1,2,2,3)		
									9.50	SPT(S)N=8 (1,1/2,2,2,2)		
									11.00	SPT(S)N=4 (1,0/1,1,1,1)		
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 3, Energy Ratio 71 %. 5. Groundwater encountered at 4.30 m bgl, rose to 2.50 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole backfilled with arisings.					Water Strikes		Water Level		Chiselling			
					Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration	
					14/02/2023	4.30		20 min	2.50			
Coordinates: E471329.31 N172320.24		Elevation (mAOD): 38.63		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57	

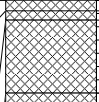
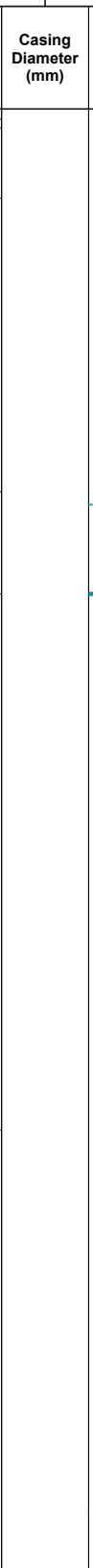
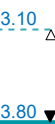
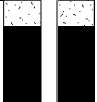
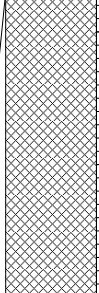
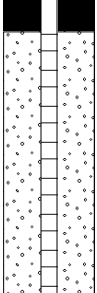
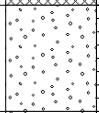
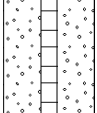
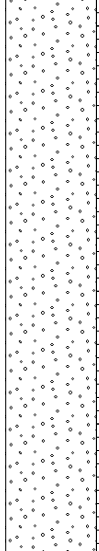
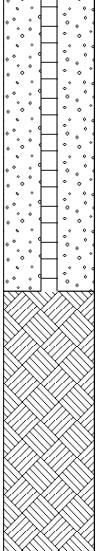
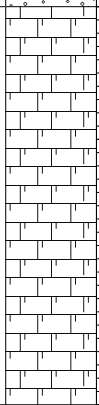
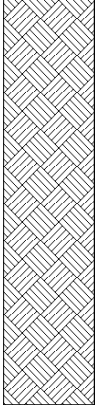
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com						Project No: 91193.557185		Hole ID: CP101		Page: 2 of 2		
						Project: Rose Kiln Court New Development, Reading						
Cable Percussive Borehole Log						Date: 14/02/2023 - 15/02/2023			Client: Redwood (Light Industrial) Propco Sarl			
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill	
							Depth (m)	Type & Ref	Depth (m)	Results		
Loose grey silty fine to coarse SAND. (ALLUVIUM)										12.50	SPT(S)N=13 (1,2/3,3,3,4)	
			(6.50)							14.00	SPT(S)N=8 (1,1/1,1,2,4)	
		14.50		24.13								
Grey slightly gravelly slightly silty fine to coarse SAND. Gravel is subangular fine to medium chalk, flint and shell fragments. (WEATHERED SEAFORD CHALK FORMATION)		15.00	(0.50)	23.63								
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)			(5.00)							15.50	SPT(S)N=8 (8,1/1,1,2,4)	
										17.00	SPT(S)N=13 (1,2/2,2,3,6)	
										18.50	SPT(S)N=24 (4,6/5,6,5,8)	
		20.00		18.63								
Borehole complete at 20.00 m bgl.										20.00	SPT(S)N=31 (3,4/5,7,9,10)	
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 3, Energy Ratio 71 %. 5. Groundwater encountered at 4.30 m bgl, rose to 2.50 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole backfilled with arisings.						Water Strikes			Water Level		Chiselling	
						Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration
						14/02/2023	4.30		20 min	2.50		
Coordinates: E471329.31 N172320.24		Elevation (mAOD): 38.63		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57	

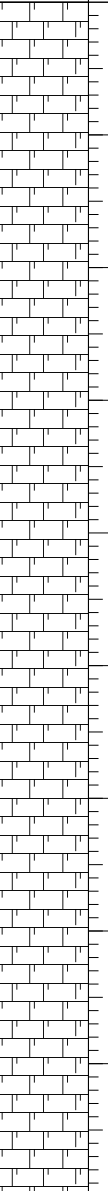
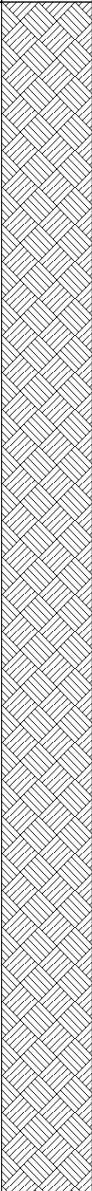
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 91193.557185		Hole ID: CP102		Page: 1 of 2				
					Project: Rose Kiln Court New Development, Reading								
Cable Percussive Borehole Log					Date: 15/02/2023 - 16/02/2023		Client: Redwood (Light Industrial) Propco Sarl						
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill		
							Depth (m)	Type & Ref	Depth (m)	Results			
MADE GROUND: Brick paving.		0.08		38.45									
MADE GROUND: Orangish brown gravelly fine to coarse SAND. Gravel is subangular fine to coarse flint, brick and concrete.		0.15	(1.05)	38.38									
MADE GROUND: Dark grey sandy GRAVEL. Gravel is angular to subangular fine to coarse concrete and brick. Sand is fine to coarse.		1.20	(0.80)	37.33									
MADE GROUND: Firm dark grey gravelly CLAY. Gravel is angular to subangular fine to coarse brick and concrete.		2.00		36.53									
Very soft grey slightly gravelly silty CLAY. Gravel is subrounded fine to medium flint and shell fragments. (ALLUVIUM)			(1.50)				2.30	ES2 D2	2.20	SPT(S)N=2 (1,0/1,0,1,0)			
							2.50						
Medium dense grey slightly sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint. (ALLUVIUM)		3.50		35.03					3.20	SPT(S)N=4 (1,0/1,1,1,1)			
			(4.70)						4.20	SPT(C)N=14 (2,3/3,3,4,4)			
								5.20	SPT(C)N=14 (2,2/2,3,3,6)				
								6.50	SPT(C)N=8 (1,1/1,2,2,3)				
Medium dense grey slightly silty fine to coarse SAND. (ALLUVIUM)		8.20		30.33					8.00	SPT(C)N=6 (1,1/1,1,2,2)			
			(2.00)						9.50	SPT(C)N=15 (1,2/2,3,4,6)			
		10.20		28.33									
Medium dense grey GRAVEL with a low cobble content. Gravel and cobbles are angular to subrounded flint. (WEATHERED SEAFORD CHALK)										11.00		SPT(C)N=16 (2,2/3,4,4,5)	
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio 71%. 5. Groundwater encountered at 3.50 m bgl, rose to 2.60 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover.					Water Strikes			Water Level		Chiselling			
					Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration		
					15/02/2023	3.50		20 min	2.60				
Coordinates: E471328.77 N172345.14		Elevation (mAOD): 38.53		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57		

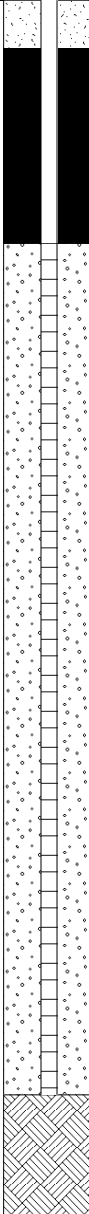
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com						Project No: 91193.557185		Hole ID: CP102		Page: 2 of 2			
						Project: Rose Kiln Court New Development, Reading							
Cable Percussive Borehole Log						Date: 15/02/2023 - 16/02/2023		Client: Redwood (Light Industrial) Propco Sarl					
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill		
							Depth (m)	Type & Ref	Depth (m)	Results			
Medium dense grey GRAVEL with a low cobble content. Gravel and cobbles are angular to subrounded flint. (WEATHERED SEAFORD CHALK FORMATION)			(3.90)						12.50	SPT(C)N=17 (3,5/7,3,3,4)			
		14.10		24.43					14.00	SPT(C)N=7 (1,1/1,1,2,3)			
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)			(5.90)						15.50	SPT(S)N=10 (1,1/1,2,3,4)			
									17.00	SPT(S)N=31 (1,2/14,4,6,7)			
									18.50	SPT(S)N=22 (2,2/2,5,6,9)			
		20.00		18.53					20.00	SPT(S)N=27 (3,4/9,5,6,7)			
Borehole complete at 20.00 m bgl.													
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio 71%. 5. Groundwater encountered at 3.50 m bgl, rose to 2.60 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover.							Water Strikes			Water Level		Chiselling	
							Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration
							15/02/2023	3.50		20 min	2.60		
Coordinates: E471328.77 N172345.14		Elevation (mAOD): 38.53		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57		

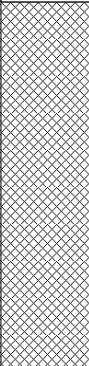
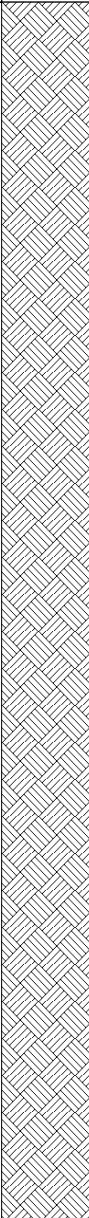
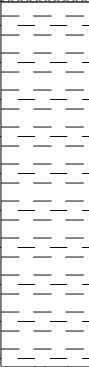
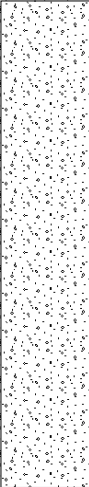
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 91193.557185		Hole ID: CP103		Page: 1 of 2									
					Project: Rose Kiln Court New Development, Reading													
Cable Percussive Borehole Log					Date: 13/02/2023 - 14/02/2023		Client: Redwood (Light Industrial) Propco Sarl											
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill							
							Depth (m)	Type & Ref	Depth (m)	Results								
MADE GROUND: Brick paving.		0.08		38.68			1.20 1.20	D1 ES1	1.20	SPT(C)N=4 (1,0/1,1,1,1)								
MADE GROUND: Orangish brown slightly gravelly fine to coarse SAND. Gravel is subangular fine to medium flint and brick.		0.15	(0.51)	38.61														
		0.66		38.10														
MADE GROUND: Dark grey sandy GRAVEL. Gravel is angular to subangular fine to coarse concrete and brick. Sand is fine to coarse.		1.25	(0.59)	37.51														
MADE GROUND: Firm slightly sandy gravelly CLAY with a low cobble content. Gravel and cobbles are angular to subangular brick.			(2.75)															
Very soft slightly silty CLAY. (ALLUVIUM)																		
Occasional black organic matter and organic odour between 3.3 and 4.0m bgl.																		
		4.00		34.76														
Loose white and grey sandy GRAVEL. Gravel is angular to subrounded fine to coarse flint and chalk. (WEATHERED SEAFORD CHALK FORMATION)				(5.70)														
		9.70		29.06														
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)																		
									11.00	SPT(C)N=4 (1,3/1,0,1,2)								
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio 71%. 5. Groundwater encountered at 4.00 m bgl, rose to 2.60 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover.					Water Strikes		Water Level		Chiselling									
					Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration							
					13/02/2023	4.00		20 min	2.60									
Coordinates: E471307.80 N172285.25		Elevation (mAOD): 38.76		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57							

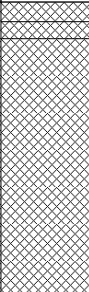
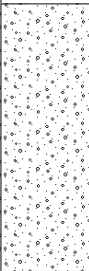
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com						Project No: 91193.557185		Hole ID: CP103		Page: 2 of 2					
						Project: Rose Kiln Court New Development, Reading									
Cable Percussive Borehole Log						Date: 13/02/2023 - 14/02/2023		Client: Redwood (Light Industrial) Propco Sarl							
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill				
							Depth (m)	Type & Ref	Depth (m)	Results					
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)				(10.30)			14.00	D2	12.50	SPT(C)N=13 (2,5/1,4,4,4)					
									14.00	SPT(C)N=19 (6,9/2,6,5,6)					
									15.50	SPT(S)N=21 (3,4/4,6,6,5)					
									17.00	SPT(S)N=22 (2,4/5,5,6,6)					
									18.50	SPT(S)N=36 (5,6/10,9,8,9)					
Borehole complete at 20.00 m bgl.		20.00		18.76					20.00	SPT(S)N=39 (4,7/10,9,9,11)					
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio 71%. 5. Groundwater encountered at 4.00 m bgl, rose to 2.60 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 20.00m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover.						Water Strikes			Water Level		Chiselling				
						Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration			
						13/02/2023	4.00		20 min	2.60					
Coordinates: E471307.80 N172285.25						Elevation (mAOD): 38.76		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57

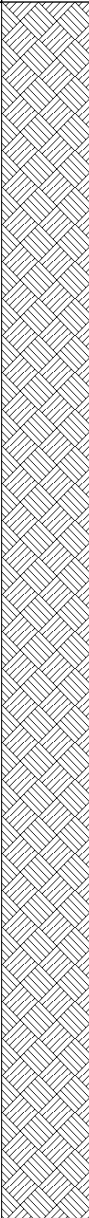
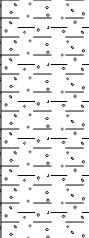
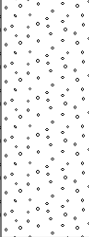
 DeltaSimons Protecting people and planet Head Office 3 Henley Way, Doddington Road Lincoln, LN6 3QR Tel: +44 (0) 1522 882555 Email: info@deltasimons.com					Project No: 91193.557185		Hole ID: CP104		Page: 1 of 2				
Cable Percussive Borehole Log					Project: Rose Kiln Court New Development, Reading								
					Date: 16/02/2023 - 20/02/2023		Client: Redwood (Light Industrial) Propco Sarl						
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill		
							Depth (m)	Type & Ref	Depth (m)	Results			
MADE GROUND: Brick paving.		0.08		38.46									
MADE GROUND: Orangish brown slightly gravelly fine to coarse SAND. Gravel is subangular fine to medium flint and brick.		0.15	(0.55)	38.39									
MADE GROUND: Dark grey sandy GRAVEL. Gravel is angular to subangular fine to coarse concrete and brick. Sand is fine to coarse.		0.70		37.84									
MADE GROUND: Black stained slightly sandy clayey GRAVEL. Gravel is angular fine to coarse brick, concrete and flint. Slight hydrocarbon odour.			(2.30)				1.00	ES1 B1	1.20	SPT(C)N=2 (1,0/1,0,1,0)			
							1.20						
Very loose dark grey GRAVEL. Gravel is angular fine to coarse flint. (ALLUVIUM)		3.00		35.54			3.30	D1 ES2	3.20	SPT(S)N=2 (1 for 200mm/2 for 400mm)			
			(0.80)				3.30			SPT(S)N=0 (1 for 500mm/0 for 0mm)			
		3.80		34.74									
Medium dense light grey GRAVEL. Gravel is angular fine to coarse flint. (ALLUVIUM)			(4.20)						4.20	SPT(C)N=9 (1,2/2,2,3)			
									5.20	SPT(C)N=11 (1,1/2,2,3,4)			
									6.50	SPT(C)N=16 (2,2/2,2,4,8)			
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)		8.00		30.54					8.00	SPT(C)N=12 (1,2/2,3,3,4)			
									9.50	SPT(C)N=3 (1,0/1,0,1,1)			
									11.00	SPT(C)N=2 (1,0/1,0,1,0)			
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio (Er) 71%. 5. Groundwater encountered at 3.80 m bgl, rose to 3.10 m bgl after 20 minutes. 6. Slight hydrocarbon odour noted between 2.30 m and 3.00 m bgl. 7. Borehole terminated at target depth, 20.0m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover. 8. Borehole terminated at target depth, 20.00m bgl.							Water Strikes			Water Level		Chiselling	
						Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration	
						20/02/2023	3.80		20 min	3.10			
Coordinates: E471289.99 N172327.38		Elevation (mAOD): 38.54		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57		

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						Project: Rose Kiln Court New Development, Reading						
Cable Percussive Borehole Log						Date: 16/02/2023 - 20/02/2023		Client: Redwood (Light Industrial) Propco Sarl				
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill	
							Depth (m)	Type & Ref	Depth (m)	Results		
Structureless CHALK composed of white slightly gravelly SILT with a low cobble content. Gravel and cobbles are subrounded weak white chalk with occasional grey speckling. (Anticipated Grade Dm) (SEAFORD CHALK FORMATION)							14.00	D2	12.50	SPT(C)N=5 (1,0/1,1,1,2)		
									14.00	SPT(C)N=9 (1,1/1,2,2,4)		
									15.50	SPT(S)N=24 (2,5/5,7,5,7)		
									17.00	SPT(S)N=21 (3,2/3,5,6,7)		
									18.50	SPT(S)N=30 (3,6/7,9,7,7)		
Borehole complete at 20.00 m bgl.		20.00		18.54					20.00	SPT(S)N=38 (2,5/9,8,9,12)		
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020 and CIRIA C574 (2002). Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 6, Energy Ratio (Er) 71%. 5. Groundwater encountered at 3.80 m bgl, rose to 3.10 m bgl after 20 minutes. 6. Slight hydrocarbon odour noted between 2.30 m and 3.00 m bgl. 7. Borehole terminated at target depth, 20.0m bgl. 8. Borehole installed with a 63 mm HDPE standpipe, gas bung and flush cover. 9. Borehole terminated at target depth, 20.00m bgl.						Water Strikes			Water Level		Chiselling	
						Date	Depth (m)	Remarks	Duration	Standing	Depth Top	Duration
						20/02/2023	3.80		20 min	3.10		
Coordinates: E471289.99 N172327.38		Elevation (mAOD): 38.54		Drilled By: Southeastern Drilling		Plant Used: D4000		Logged: LL	Checked: SI	Approved: TH	Scale (m): 1:57	

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					Project: Rose Kiln Court New Development, Reading						
Dynamic Sampler Log					Date: 22/02/2023		Client: Redwood (Light Industrial) Propco Sarl				
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill
							Depth (m)	Type & Ref	Depth (m)	Results	
MADE GROUND: Brick paving.		0.10	(0.10)	38.62	50	1.50 1.50	0.40 - 0.50	ES1	1.20	SPT(C) N=4 (1,3/1,1,1,1)	
MADE GROUND: Orangish brown fine to coarse SAND.		0.20	(0.10)	38.52							
MADE GROUND: Concrete slab recovered as whitish light grey gravelly fine to coarse SAND. Gravel is angular to subangular fine to coarse concrete and quartzite.		0.30	(0.10)	38.42							
MADE GROUND: Light greyish brown slightly gravelly fine to coarse SAND. Gravel is angular to subrounded fine to medium brick, concrete and quartzite.	0.60	(0.30)	38.12								
MADE GROUND: Greyish brown sandy GRAVEL. Gravel is angular to subangular fine to coarse brick, concrete and quartzite. Sand is fine to coarse.											
Soft greenish dark grey silty CLAY with occasional shell fragments. Slight organic odour. (ALLUVIUM)		1.50	(0.90)	37.22							
No recovery.		2.00	(0.50)	36.72							
	2.50	(0.50)	36.22								
Soft greenish dark grey silty CLAY with occasional shell fragments. Slight organic odour. (ALLUVIUM)		2.70	(0.20)	36.02							
No recovery.		3.00	(0.70)	35.32							
Soft greenish dark grey silty CLAY with occasional shell fragments. Slight organic odour. (ALLUVIUM)		3.40	(0.20)	35.12							
From 3.50 m to 3.60 m bgl: Very soft.		4.00	(0.40)	34.72							
Grey gravelly fine to coarse SAND. Gravel is angular to subangular fine to medium flint and chalk. (ALLUVIUM)											
No recovery.											
	4.40	(0.40)	34.32								
Light grey slightly sandy GRAVEL. Gravel is angular to subangular fine to medium flint and shell fragments. Sand is fine to coarse. (ALLUVIUM)		5.00	(0.60)	33.72							
Borehole complete at 5.00 m bgl.											
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110-148, Energy Ratio (Er) 72%. 5. Slight organic odour noted between 1.50 m to 3.60 m bgl. 6. Borehole encountered groundwater at 1.50 m bgl. 7. Borehole terminated at target depth, 5.00 m bgl. 8. Borehole installed with a 50 mm HDPE standpipe, gas bung and flush cover.					Water Strike			Water Level		Borehole Diameter	
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter
					23/02/2023	1.50		20	1.5		
Coordinates: E471274.84 N172306.12		Elevation (mAOD): 38.72		Drilled By: Delta Drilling		Plant Used: Premier Compact 110		Logged: MOK	Checked: SI	Approved: TH	Scale: 1:32

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					Project: Rose Kiln Court New Development, Reading													
Dynamic Sampler Log					Date: 21/02/2023		Client: Redwood (Light Industrial) Propco Sarl											
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill							
							Depth (m)	Type & Ref	Depth (m)	Results								
MADE GROUND: Firm dark brown slightly sandy gravelly CLAY. Gravel is subrounded fine to coarse flint, concrete, brick and glass. Frequent rootlets.			(1.50)				0.30	ES1	1.20	SPT(C) N=4 (1,1/1,1,1,1)								
Very soft grey CLAY with frequent rootlets. (ALLUVIUM)		1.50		37.22		1.50 ▼ 1.50 ▲	1.80	D1	2.00	SPT(C) N=4 (1,1/1,1,1,1)								
Loose grey slightly gravelly medium to coarse SAND. Gravel is subangular fine to coarse flint and shell fragments. (ALLUVIUM)		3.00	(1.50)	35.72					3.00	SPT(C) N=6 (1,1/1,1,2,2)								
			(2.00)						4.00	SPT(C) N=4 (1,1/1,1,1,1)								
Borehole complete at 5.00 m bgl.		5.00		33.72					5.00	SPT(C) N=4 (1,1/1,1,1,1)								
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110-148, Energy Ratio (Er) 72%. 5. Groundwater encountered at 1.50 m bgl, rose to 1.50 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 5.00m bgl. 8. Borehole backfilled with arisings.					Water Strike			Water Level		Borehole Diameter								
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter							
					21/02/2023	1.50		20	1.5									
Coordinates: E471282.40 N172346.78					Elevation (mAOD): 38.72		Drilled By: Delta Drilling		Plant Used: Premier Compact 110		Logged: LL		Checked: SI		Approved: TH		Scale: 1:32	

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					Project: Rose Kiln Court New Development, Reading													
Dynamic Sampler Log					Date: 21/02/2023		Client: Redwood (Light Industrial) Propco Sarl											
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill							
							Depth (m)	Type & Ref	Depth (m)	Results								
MADE GROUND: Brick paving. MADE GROUND: Orangish brown fine to coarse SAND. MADE GROUND: Brown sandy GRAVEL. Gravel is angular to subangular fine to coarse concrete.		0.08 0.15		38.51 38.44														
			(1.05)															
		1.20		37.38						1.20	SPT(C) N=4 (1,1/1,1,1,1)							
Soft grey CLAY with occasional black organic matter. (ALLUVIUM)						1.50 1.50		1.50 1.50	D1 ES1									
			(2.70)			2.00				2.00	SPT(C) N=8 (2,2/2,2,1,3)							
										3.00	SPT(C) N=4 (1,1/1,1,1,1)							
		3.90		34.68														
Loose grey slightly sandy GRAVEL. Gravel is angular to subangular fine to coarse flint. (ALLUVIUM)										4.00	SPT(C) N=9 (2,2/2,3,2,2)							
			(1.10)															
		5.00		33.58						5.00	SPT(C) N=10 (2,2/3,3,2,2)							
Borehole complete at 5.00 m bgl.																		
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110-148, Energy Ratio (Er) 72%. 5. Groundwater encountered at 2.00 m bgl, rose to 1.50 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 5.00m bgl. 8. Borehole backfilled with arisings.					Water Strike			Water Level		Borehole Diameter								
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter							
					21/02/2023	2.00		20	1.5									
Coordinates: E471302.55 N172321.08					Elevation (mAOD): 38.58		Drilled By: Delta Drilling		Plant Used: Premier Compact 110		Logged: LL		Checked: SI		Approved: TH		Scale: 1:32	

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					Project: Rose Kiln Court New Development, Reading													
Dynamic Sampler Log					Date: 21/02/2023		Client: Redwood (Light Industrial) Propco Sarl											
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill							
							Depth (m)	Type & Ref	Depth (m)	Results								
MADE GROUND: Brick paving.		0.08		38.58			0.45	ES1	1.20	SPT(C) N=4 (1,1/1,1,1,1)								
MADE GROUND: Orangish brown fine to coarse SAND.		0.15		38.52														
MADE GROUND: Dark grey sandy GRAVEL. Gravel is angular fine to coarse concrete and brick. Sand is fine to coarse.			(0.95)															
	1.10		37.56															
MADE GROUND: Firm black sandy gravelly CLAY. Gravel is angular fine to coarse concrete and brick. Sand is fine to coarse.		1.40	(0.30)	37.26				1.30				D1						
Soft dark bluish grey CLAY with occasional back organic matter and odour. (ALLUVIUM)			(1.60)					1.70				D2						
		3.00		35.66									2.00	SPT(C) N=4 (1,1/1,1,1,1)				
Soft grey very gravelly CLAY. Gravel is angular fine to coarse flint. (ALLUVIUM)			(1.00)										3.00	SPT(C) N=16 (1,3/3,5,4,4)				
		4.00		34.66		4.00			4.00	SPT(C) N=8 (2,3/1,3,2,2)								
Loose grey GRAVEL. Gravel is angular fine to medium flint. (ALLUVIUM)			(1.00)															
		5.00		33.66					5.00	SPT(C) N=9 (4,3/2,3,2,2)								
Borehole complete at 5.00 m bgl.																		
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area spot cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 1.20 m bgl. 4. SPT Hammer Ref. 110-148, Energy Ratio (Er) 72%. 5. Groundwater encountered at 4.00 m bgl, rose to 1.70 m bgl after 20 minutes. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at target depth, 5.00m bgl. 8. Borehole backfilled with arisings.					Water Strike		Water Level		Borehole Diameter									
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter							
					21/02/2023	4.00		20	1.7									
Coordinates: E471317.90 N172309.68					Elevation (mAOD): 38.66		Drilled By: Delta Drilling		Plant Used: Premier Compact 110		Logged: LL		Checked: SI		Approved: TH		Scale: 1:32	

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					Project: Rose Kiln Court New Development, Reading								
Dynamic Sampler Log					Date: 22/02/2023		Client: Redwood (Light Industrial) Propco Sarl						
Description of Strata	Legend	Strata Depth (m bgl)	Strata Thickness (m)	Reduced Level (mAOD)	Casing Diameter (mm)	Water	Sample Details		Test Details		Backfill		
							Depth (m)	Type & Ref	Depth (m)	Results			
		MADE GROUND: Grey concrete paving.		0.06				38.68	0.20 - 0.35	ES1			
		MADE GROUND: Light brown fine to coarse SAND.		0.20			(0.14)	38.54					
		MADE GROUND: Greyish brown slightly gravelly sandy SILT. Gravel is angular to subangular fine to medium brick, sandstone, coal, quartzite and concrete. Sand is fine to coarse.		0.35			(0.15)	38.39					
MADE GROUND: Yellowish brown fine to medium SAND.		0.40	38.34										
Borehole complete at 0.40 m bgl.													
Remarks: 1. Logged in general accordance with BS 5930:2015+A1:2020. Consistency is based on finger test as defined by BS EN ISO 14688-1:2002. 2. Area cleared for services prior to excavation by a specialist third-party contractor. 3. Hand dug pit advanced to 0.40 m bgl. 4. SPT Hammer Ref. 110-148 Energy Ratio (Er) 72%. 5. Borehole remained dry upon completion. 6. No visual or olfactory evidence of contamination noted. 7. Borehole terminated at 0.40 m bgl due to encountered service. 8. Borehole backfilled with arisings.													
					Water Strike		Water Level		Borehole Diameter				
					Date	Depth (m)	Remarks	Duration (min)	Depth	Depth Base	Diameter		
Coordinates: E471341.33 N172390.96		Elevation (mAOD): 38.74		Drilled By: Delta Drilling		Plant Used: Premier Compact 110		Logged: MOK	Checked: SI	Approved: TH	Scale: 1:32		

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: 3
Test Date: 14/05/2022
Report Date: 14/05/2022
File Name: 3.spt
Test Operator: STU

Instrumented Rod Data

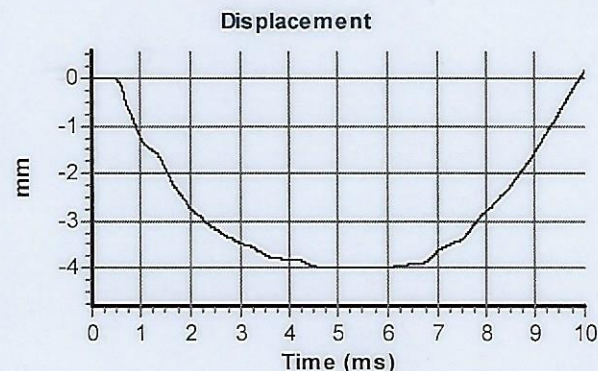
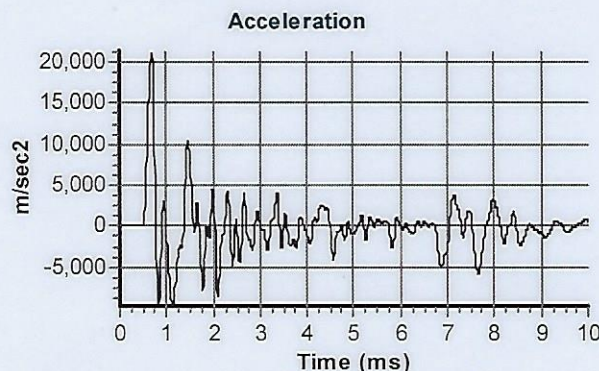
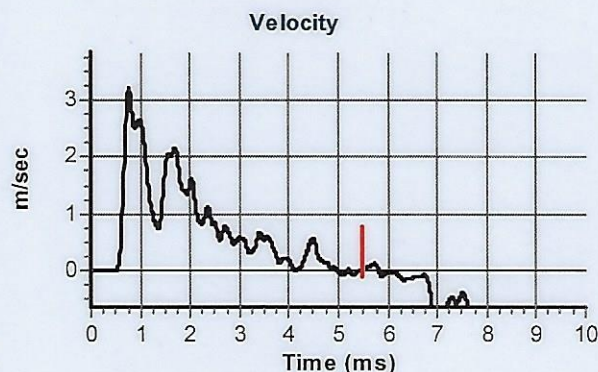
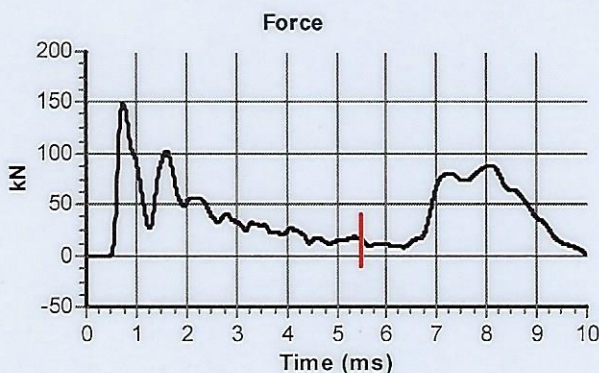
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.7
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.8

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm^2): 996
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 302

Energy Ratio E_r (%): **64**

Signed: *S Simmonds*
Title: Field Operations Tech

The recommended calibration interval is 12 months

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: 4
Test Date: 14/05/2022
Report Date: 14/05/2022
File Name: 4.spt
Test Operator: STU

Instrumented Rod Data

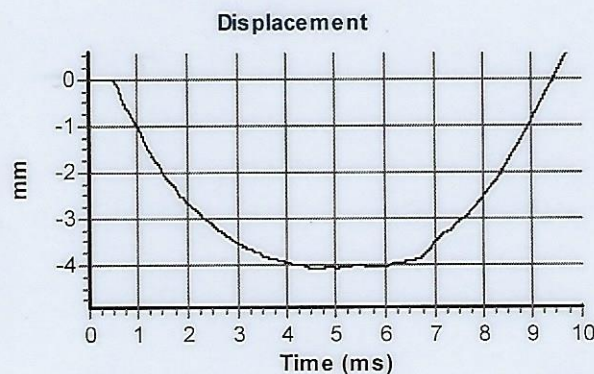
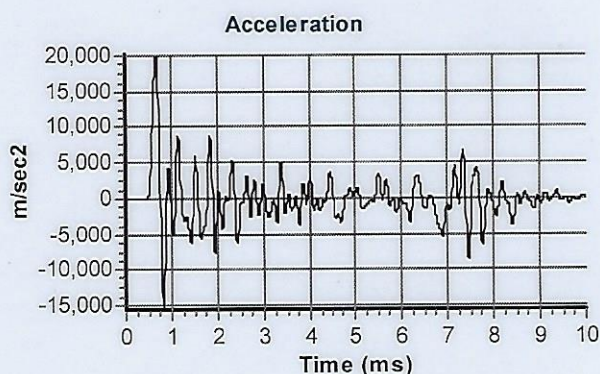
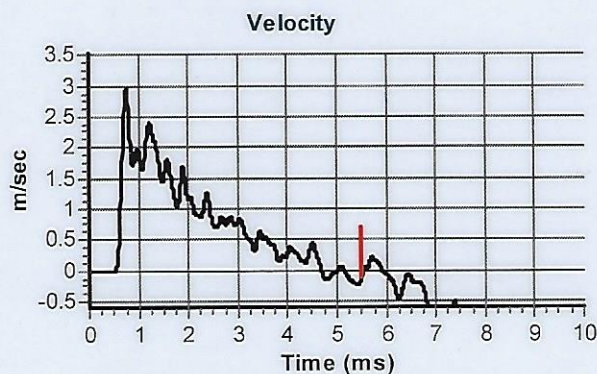
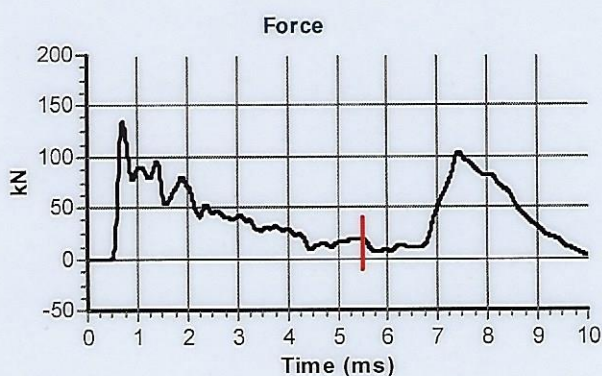
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.7
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.8

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm^2): 996
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 296

Energy Ratio E_r (%): **63**

Signed: S Simmonds
Title: Field Operations Tech

The recommended calibration interval is 12 months

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: 6
Test Date: 14/05/2022
Report Date: 14/05/2022
File Name: 6.spt
Test Operator: STU

Instrumented Rod Data

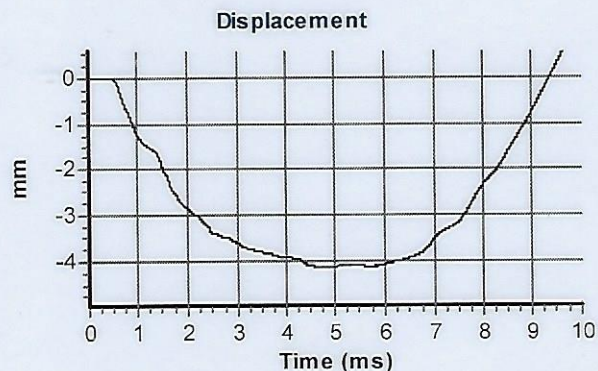
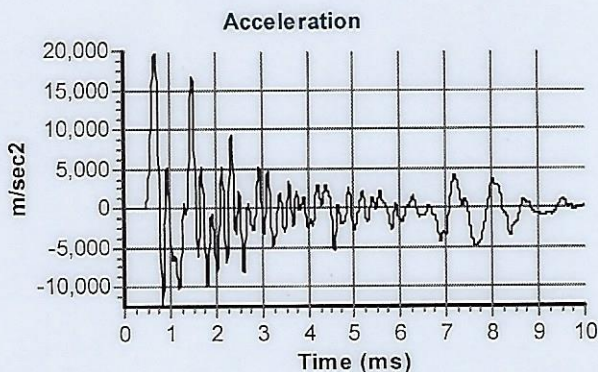
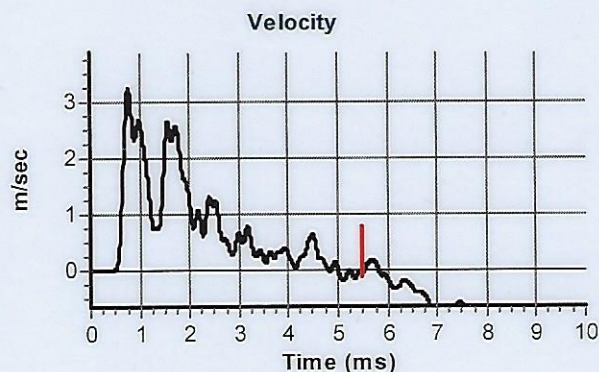
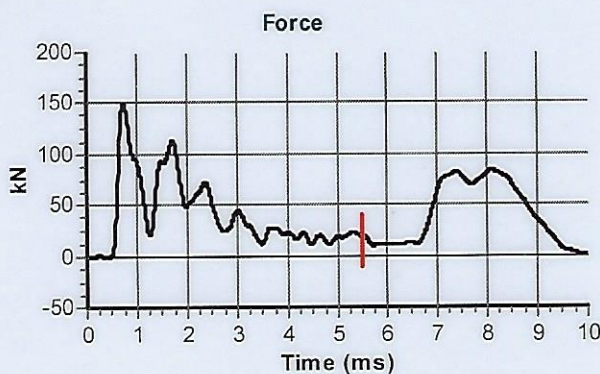
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.7
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.8

Comments / Location

CHARLWOODS



Calculations

Area of Rod A (mm^2): 996
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 338

Energy Ratio E_r (%):

71

Signed: *S Simmonds*

Title: Field Operations Tech

The recommended calibration interval is 12 months

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: 7
Test Date: 14/05/2022
Report Date: 14/05/2022
File Name: 7.spt
Test Operator: STU

Instrumented Rod Data

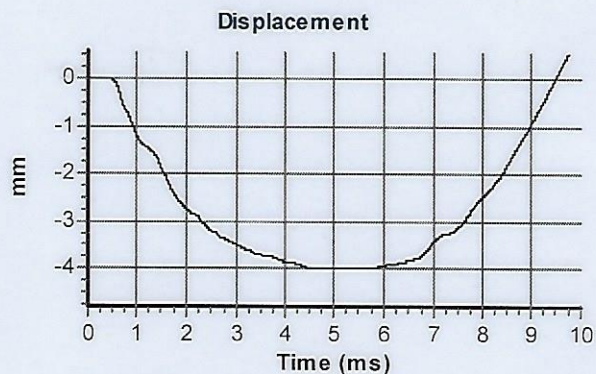
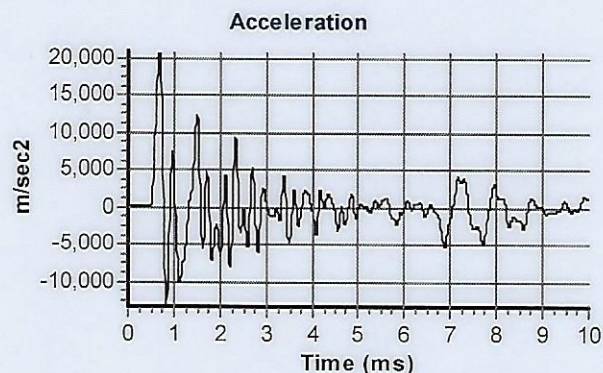
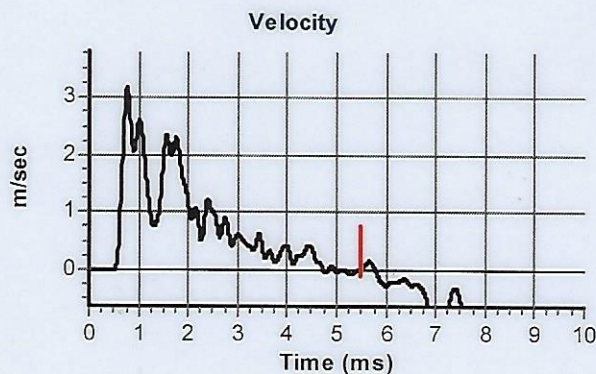
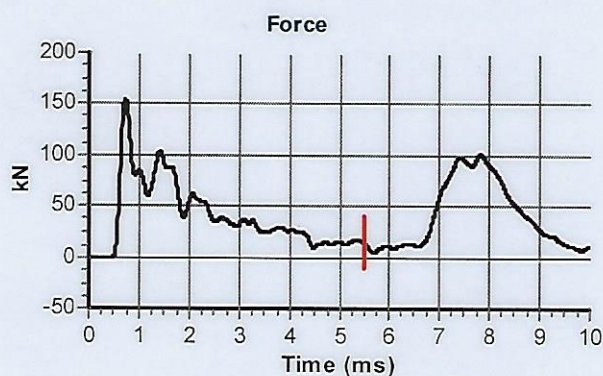
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.7
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.8

Comments / Location

CHARLWOODS

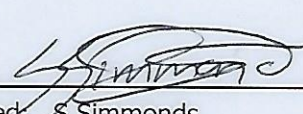


Calculations

Area of Rod A (mm²): 996
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 313

Energy Ratio E_r (%):

66

Signed:  S Simmonds

Title: Field Operations Tech

The recommended calibration interval is 12 months

Southern Testing
Unit 11
Charlwoods Road
East Grinstead
West Sussex
RH19 2HU

SPT Hammer Ref: 8
Test Date: 14/05/2022
Report Date: 14/05/2022
File Name: 8.spt
Test Operator: STU

Instrumented Rod Data

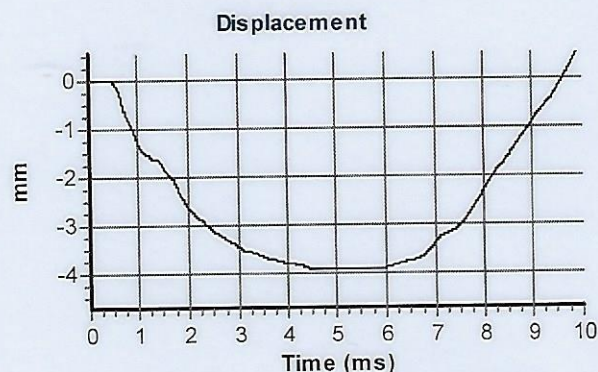
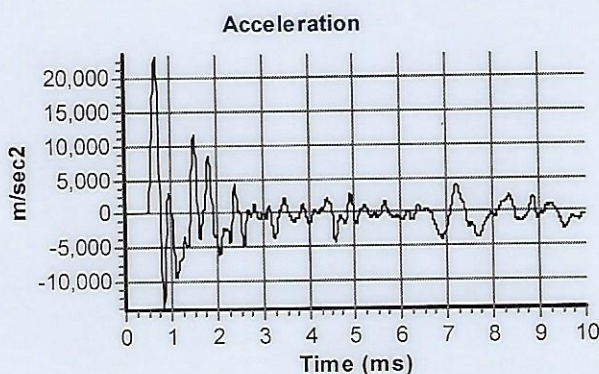
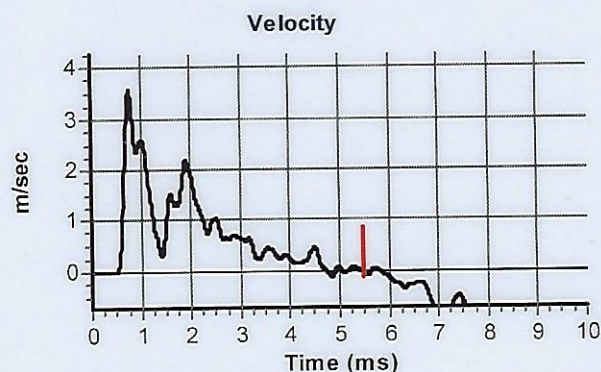
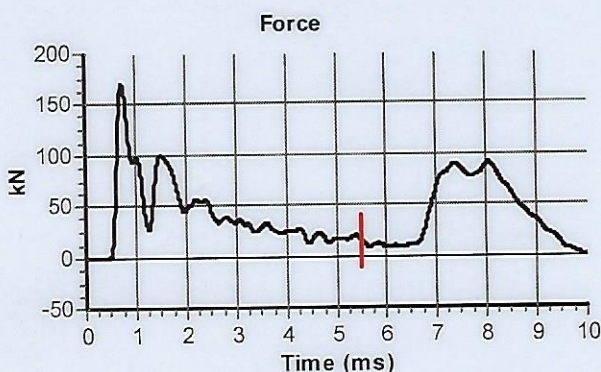
Diameter d_r (mm): 54
Wall Thickness t_r (mm): 6.7
Assumed Modulus E_a (GPa): 208
Accelerometer No.1: 64786
Accelerometer No.2: 64789

SPT Hammer Information

Hammer Mass m (kg): 63.5
Falling Height h (mm): 760
SPT String Length L (m): 14.8

Comments / Location

CHARLWOODS

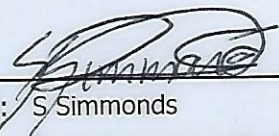


Calculations

Area of Rod A (mm^2): 996
Theoretical Energy E_{theor} (J): 473
Measured Energy E_{meas} (J): 336

Energy Ratio E_r (%)

71

Signed: 
Title: Field Operations Tech

The recommended calibration interval is 12 months