



Main Investigation Report

at

19 Swaythling Road, West End, Hampshire SO30 3AE

for

Maidanbuild Homes Ltd

Reference: 20395/MIR

October 2022

Control Document

Project

19 Swaythling Road, West End, Hampshire SO30 3AE

Document Type

Main Investigation Report

Document Reference

20395/MIR

Document Status

FINAL

Date

October 2022

Prepared by

Deanne E. Windsor BSc.(Hons.)
(dee@soilslimited.co.uk)



First check by

Eur Ing R B Higginson BSc, PGDip, CEng, MICE, FGS.

A handwritten signature in black ink, appearing to be 'R B' followed by a stylized flourish.

Second check by

Nikos Sidiropoulos BSc. MSc.

A handwritten signature in black ink, appearing to be 'NS' followed by a stylized flourish.

This is not a valid document for use in the design of the project unless it is titled Final in the document status box.

Current regulations and good practice were used in the preparation of this report. The recommendations given in this report must be reviewed by an appropriately qualified person at the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.



Commission

Maidanbuild Homes Ltd commissioned Soils Limited to undertake an intrusive ground investigation and prepare a Main Investigation Report on land at 19 Swaythling Road, West End, Hampshire SO30 3AE. The scope of the investigation was outlined in the Soils Limited quotation reference Q26711, dated 10th August 2022.

This document comprises the Main Investigation Report (MIR) and incorporates the results, discussion, and conclusions to this intrusive works.

Limitations and Disclaimers

This Main Investigation Report relates to the site located at 19 Swaythling Road, West End, Hampshire SO30 3AE and was prepared for the sole benefit of Maidanbuild Homes Ltd (The “Client”). The report was prepared solely for the brief described in Section 1.1 of this report.

The contents, recommendations and advice given in the report are subject to the Terms and Conditions given in Quotation Q26711 dated 10th August 2022 accepted by the Client in their Purchase Order Q26711, dated 12th August 2022.

Soils Limited disclaims any responsibility to the Client and others in respect of any matters outside the scope of the above.

This report has been prepared by Soils Limited, with all reasonable skill, care and diligence within the terms of the Contract with the Client, incorporation of our General Conditions of Contract of Business and taking into account the resources devoted to us by agreement with the Client.

The report is personal and confidential to the Client and Soils Limited accept no responsibility of whatever nature to third parties to whom this report, or any part thereof, is made known. Any such party relies on the report wholly at its own risk.

The Client may not assign the benefit of the report or any part to any third party without the written consent of Soils Limited.

The ground is a product of continuing natural and artificial processes. As a result, the ground will exhibit a variety of characteristics that vary from place to place across a site, and also with time. Whilst a ground investigation will mitigate to a greater or lesser degree against the resulting risk from variation, the risks cannot be eliminated.

The investigation, interpretations, and recommendations given in this report were prepared for the sole benefit of the Client in accordance with their brief. As such these do not necessarily address all aspects of ground behaviour at the site.

Current regulations and good practice were used in the preparation of this report. An appropriately qualified person must review the recommendations given in this report at

the time of preparation of the scheme design to ensure that any recommendations given remain valid in light of changes in regulation and practice, or additional information obtained regarding the site.

If the term “competent person” is used in this report or any Soils Limited document, it means an engineering geologist or civil engineer with a minimum of three years post graduate experience in the understanding and application of the appropriate codes of practice.

Unless the site investigation works have been designed and specified in accordance with EC7, this report is a Geotechnical Investigation Report and is not necessarily a Ground Investigation Report as defined by EC7 (Eurocode 7 Part 1, §3.4, Part 2, §6.1) or a Geotechnical Design Report (Eurocode 7 Part 1, §2.8) as defined by Eurocode 7 and as such may not characterise the ground conditions and additional works may be required to comply with the requirements of EC7.

Within the report reference to ground level relates to the site level at the time of the investigation, unless otherwise stated.

Exploratory hole is a generic term used to describe a method of direct investigation. The term trial pit, borehole or window sample borehole implies the specific technique used to produce an exploratory hole.

The depth to roots and/or of desiccation may vary from that found during the investigation. The Client is responsible for establishing the depth to roots and/or of desiccation on a plot by plot basis prior to the construction of foundations. Supplied site surveys may not include substantial shrubs or bushes and is also unlikely to have data or any trees, bushes or shrubs removed prior to or following the site survey.

Where trees are mentioned in the text this means existing trees, substantial bushes or shrubs, recently removed trees (approximately 20 years to full recovery on cohesive soils) and those planned as part of the site landscaping).

The geotechnical laboratory testing was performed by GEO Site & Testing Services Ltd (GSTL) in accordance with the methods given in BS 1377:1990 Parts 1 to 8 and their UKAS accredited test methods.

For the preparation of this report, the relevant BS code of practice were adopted for the geotechnical laboratory testing technical specifications, in the absence of the relevant Eurocode specifications (ref: ISO TS 17892).

The chemical analyses were undertaken by Derwentside Environmental Testing Services (DETS) in accordance with their UKAS and MCERTS accredited test methods or their documented in-house testing procedures. This investigation did not comprise an environmental audit of the site or its environs.

Ownership of land brings with it onerous legal liabilities in respect of harm to the environment. “Contaminated Land” is defined in Section 57 of the Environment Act 1995 (as updated 2021) as:

“Land which is in such a condition by reason of substances in, on or under the land that significant harm is being caused or that there is a significant possibility of such harm being caused or that pollution of controlled waters is being, or is likely to be caused”.

It must be noted that a detailed survey of the possible presence or absence of invasive species, such as Japanese Knotweed, is outside of the scope of investigation.

Deleterious materials may be present in any Made Ground that pose a potential risk to site workers, end users and adjacent vulnerable receptors. These could include a range of contaminants, including asbestos, especially if the material includes large fractions of demolition derived materials.

The investigation, analysis or recommendations in respect of contamination are made solely in respect of the prevention of harm to vulnerable receptors, using where possible best practice at the date of preparation of the report. The investigation and report do not address, define or make recommendations in respect of environmental liabilities. A separate environmental audit and liaison with statutory authorities is required to address these issues.

All environmental works are undertaken in the context of, and in compliance with, BS10175+A2 2017 and LCRM (EA 2021) and all other pertinent planning, standards, documentation and guidance appropriate to the site at the time of production which may include, but are not necessarily limited to, documents provided by BS/CEN/ISO, NHBC, AGS, CIEH, CIRIA, SoBRA and CLAIRE.

Ownership of copyright of all printed material including reports, survey data, drawings, laboratory test results, trial pit and borehole log sheets, including drillers log sheets remains with Soils Limited. License is for the sole use of the client and may not be assigned, transferred or given to a third party. This license is only valid once we have been paid in full for this engagement. In the event of non-payment for our services, we reserve the right to retract the license for all project data, preventing their use and any reliance upon such data by the client or any other third party. We may also contact parties other than the client to notify them of this retraction.

Contents

Commission	i
Limitations and Disclaimers.....	i
Section 1 Introduction.....	1
1.1 Objective of Investigation.....	1
1.2 Location	1
1.3 Site Description.....	1
1.4 Proposed Development	1
1.5 Anticipated Geology.....	2
1.5.1 Wittering Formation	2
1.5.2 London Clay Formation	2
Section 2 Site Works	3
2.1 Proposed Project Works	3
2.1.1 Actual Project Works	3
2.2 Ground Conditions	3
2.3 Ground Conditions Encountered in Exploratory Holes	5
2.3.1 Made Ground.....	5
2.3.2 Weathered London Clay Formation	6
Table 2.4 Established Depth of Weathered London Clay Formation	6
2.3.3 London Clay Formation	6
Table 2.5 Established Depth of London Clay Formation	6
2.4 Roots	6
2.5 Groundwater	7
Section 3 Discussion of Geotechnical In-Situ and Laboratory Testing	8
3.1 Dynamic Probe Tests.....	8
3.2 Atterberg Limit Tests.....	9
3.3 Particle Size Distribution Tests	10
3.4 Sulphate and pH Tests	10
Section 4 Engineering Appraisal.....	11
4.1 Established Ground Conditions.....	11
4.1.1 Made Ground	11
4.1.2 Weathered London Clay Formation	11
4.1.3 London Clay Formation	12

4.1.4	Guidance on Shrinkable Soils.....	12
4.1.5	Groundwater.....	13
Section 5	Foundation Scheme	14
5.1	Foundation Recommendations	14
5.1.1	Shallow Foundations into the Weathered London Clay	14
5.1.2	Ground Floor Slab	15
5.1.3	Piled Foundations.....	15
5.2	Subsurface Concrete	15
5.3	Excavations	16

List of Figures

Figure 1 – Site Location Map	18
Figure 2 – Aerial Photograph	19
Figure 3 – Exploratory Hole Plan	20

List of Tables

Table 2.1 Final Depth of Exploratory Holes.....	4
Table 2.2 Ground Conditions	5
Table 2.3 Established Depth of Made Ground	5
Table 2.4 Established Depth of Weathered London Clay Formation.....	6
Table 2.5 Established Depth of London Clay Formation	6
Table 2.6 Established Depth of Root Penetration	7
Table 4.1 Established Volume Change Potential by Strata	12
Table 5.1 Allowable Bearing Capacities within Weathered London Clay.....	14
Table 5.2 Concrete Classification.....	16
Table C.1.1 SPT "N" Blow Count Cohesive Classification	
Table C.1.2 SPT "N" Blow Count Granular Classification	
Table C.2.1 Interpretation of DPSH Blow Counts	
Table C.2.2 Interpretation of Atterberg Limit Tests	
Table C.2.3 Interpretation of PSD Tests	

List of Appendices

Appendix A Standards and Resources

Appendix B Field Work

Appendix B.1 Engineers Logs

Appendix C Geotechnical In-Situ and Laboratory Testing

Appendix C.1 Classification

Appendix C.2 Interpretation

Appendix C.3 Geotechnical In-Situ and Laboratory Results

Appendix D Information Provided by the Client

Section I Introduction

I.1 Objective of Investigation

Maidanbuild Homes Ltd commissioned Soils Limited to undertake an intrusive ground investigation and to prepare a Main Investigation Report to supply the Client and their designers with information regarding ground conditions, to assist in preparing a foundation scheme for development that was appropriate to the settings present on the site.

The geotechnical investigation was to be undertaken to provide comment on appropriate foundation options for the proposed residential development. The investigation was to be made by means of in-situ testing and geotechnical laboratory testing undertaken on soil samples taken from the exploratory holes. Soils Limited have not been commissioned to undertake a Phase 1 Desk Study or to undertake contamination laboratory testing or subsequent reporting as part of this investigation.

I.2 Location

The site was located at 19 Swaythling Road, West End, Hampshire SO30 3AE and had an approximate O.S Land Ranger Grid Reference of SU 46100 14670.

The site location plan is given in Figure 1.

I.3 Site Description

The site was predominantly flat with a slight north easterly dip down $<3^{\circ}$ (Google Earth™). The site covering was predominantly gravel, brick and hardcore, with a rectangular concrete slab marking the footprint of a small demolished building to the east of the site. The site was bordered by shrubs to the north, wooden fences the north and west, and the neighbouring property to the south. There were mature trees at the northwest corner outside the site boundary, and sparse shrubs within the west boundary.

An aerial photograph of the site and its close environs has been included in Figure 2.

I.4 Proposed Development

The proposed development plans comprised the construction on 1No. four bedroom two storey residential property with an adjacent garage onsite. There was to be a hardstanding driveway at the front of the property, and soft landscaped gardens to the rear and side.

In compiling this report reliance was placed on drawing numbers A102, dated 15th March 2022, and A103 dated 19th June, 2022, prepared by Tycoh Design. The recommendations provided within this report are made exclusively in relation to the scheme outlined above, and must not be applied to any other scheme without further

consultation with Soils Limited. Soils Limited must be notified about any change or deviation from the scheme outlined.

Development plans provided by the Client are presented in Appendix D.

1.5 Anticipated Geology

The 1:50,000 BGS map showed the site to be located directly upon the bedrock London Clay Formation close to the boundary with the overlying Wittering Formation, with no with overlying superficial deposits.

1.5.1 Wittering Formation

The Wittering Formation comprises greyish brown laminated clay; wavy- to lenticular-bedded sand interbedded with clay in equal proportions; and fine- to medium-grained sparsely glauconitic sand.

1.5.2 London Clay Formation

The London Clay Formation in the Hampshire region comprises silty and sandy clay, clayey and sandy silt, silty sand; sporadic claystones and thin beds of flint pebbles. The formation includes the Bognor Sand, Whitecliff Sand, Durley Sand, Portsmouth Sand and Nursling Sand Members. Crystals of gypsum (Selenite) are often found within the weathered part of the London Clay, and precautions against sulphate attack to concrete are sometimes required.

The lowest part of the London Clay Formation rests on the Reading Formation (Lambeth Group).

Section 2 Site Works

2.1 Proposed Project Works

The proposed intrusive investigation was designed to provide information on the ground conditions and to aid the design of foundations for the residential development. The intended investigation, as outlined within the Soils Limited quotation (Q26711, dated 10th August 2022), was to comprise the following items:

- Exploratory holes scanned with a Cable Avoidance Tool (C.A.T.) and GENNY
- 3No (up to) 4m windowless sampler boreholes;
- 3No (up to) 6m deep dynamic probe DPSH;
- Geotechnical laboratory testing.

2.1.1 Actual Project Works

The actual project works were undertaken on 19th August 2022, with subsequent sample logging, laboratory testing, and reporting. The actual works comprised:

- Exploratory holes scanned with a Cable Avoidance Tool (C.A.T.) and GENNY
- 3No. 4m windowless sampler boreholes;
- 3No. 6m deep dynamic probe DPSH;
- Geotechnical laboratory testing.

Three windowless sampler boreholes (WS1, WS2 and WS3) were backfilled with gravel following excavation.

All exploratory hole locations were selected by Soils Limited and have been presented in Figure 3.

Following completion of site works, soil cores were logged and sub sampled so that samples could be sent to the laboratory for geotechnical testing.

2.2 Ground Conditions

On 19th August 2022 three windowless sampler boreholes (WS1 – WS3) were drilled, using a Premier Compact Drilling Rig, to depths of 4.00m below ground level (bgl) at locations selected by Soils Limited using a development plan provided by the Client.

Three super heavy dynamic probes, (DP1 – DP3) were driven prior and adjacent to their corresponding windowless sampler borehole to depths of 6.00m bgl.

The maximum depths of exploratory holes have been included in Table 2.1.

All exploratory holes were scanned with a Cable Avoidance Tool (C.A.T.) and GENNY prior to excavation to ensure the health and safety of the operatives.

Table 2.1 Final Depth of Exploratory Holes

Exploratory Hole	Depth (m bgl)	Exploratory Hole	Depth (m bgl)
WS1	4.00	DP1	6.00
WS2	4.00	DP2	6.00
WS3	4.00	DP3	6.00

Note(s): The depths given in this table are taken from the ground level on-site at the time of investigation.

The approximate exploratory hole locations are shown on Figure 3.

The soil conditions encountered were recorded and soil sampling commensurate with the purposes of the investigation was carried out. The depths given on the exploratory hole logs and quoted in this report were measured from ground level.

The soils encountered from immediately below ground surface have been described in the following manner. Where the soil incorporated an organic content such as either decomposing leaf litter or roots or has been identified as part of the in-situ weathering profile, it has been described as Topsoil both on the logs and within this report. Where man has clearly either placed the soil, or the composition altered, with say greater than an estimated 5% of a non-natural constituent, it has been referred to as Made Ground both on the log and within this report.

For more complete information about the soils encountered within the general area of the site reference must be made to the detailed records given within Appendix B, but for the purposes of discussion, the succession of conditions encountered in the exploratory holes in descending order can be summarised as:

Made Ground (MG)
Weathered London Clay Formation (wLC)
London Clay Formation (LC)

The ground conditions encountered in the exploratory holes are summarised in Table 2.2.

Table 2.2 Ground Conditions

Strata	Epoch	Depth Encountered (m bgl)		Typical Thickness (m)	Typical Description
		Top	Bottom		
MG	Anthropocene	0.00	0.40–0.50	0.50	Gravel over dark brown clayey gravelly SAND, with brick, chalk and clinker. Variably greyish brown slightly sandy slightly gravelly CLAY (WS1). Occasional rootlets.
wLC	Palaeogene	0.40–0.50	2.60 – 2.90	2.25 – 2.95	Soft orangish brown/greyish brown multicoloured mottled/laminated slightly sandy silty CLAY. Occasional gravelly beds to 1.50 – 2.10m bgl.
LC	Palaeogene	2.60 – 2.90	>6.00 ^{1,2}	>3.40 ³	Soft orangish brown/greyish brown multicoloured mottled/laminated slightly sandy silty CLAY.

Note(s): ¹ Final depth of exploratory hole. ² Base of strata not encountered. The depths given in this table are taken from the ground level on-site at the time of investigation. ³ Not proven.

2.3 Ground Conditions Encountered in Exploratory Holes

The ground conditions encountered in exploratory holes have been described below in descending order. The engineering logs are presented in Appendix B.1.

2.3.1 Made Ground

Soils described as Made Ground were encountered in each of the three exploratory holes from ground level to depths ranging between 0.40 (WS1) and 0.50m bgl (WS2, WS3).

The Made Ground typically comprised gravel over dark brown clayey gravelly SAND. Gravel is flint, brick, chalk and clinker, with rare eggshell. WS1 comprised greyish brown slightly sandy slightly gravelly CLAY. Occasional rootlets.

The established depth of Made Ground found at each exploratory hole location have been included in Table 2.3.

Table 2.3 Established Depth of Made Ground

Exploratory Hole	Depth (m bgl)
WS/DPI	0.40
WS/DP2	0.50
WS/DP3	0.50

2.3.2 Weathered London Clay Formation

Soils described as Weathered London Clay Formation were encountered underlying the Made Ground from 0.40m to 0.50m bgl to depths between 2.60m bgl (WS/DP3) to 2.90m bgl (WS/DP1, WS/DP2).

The Weathered London Clay Formation typically comprised shallower beds of soft orangish brown multicoloured mottled slightly sandy slightly gravelly CLAY to around 1.5mbgl, over soft orangish brown/greyish brown multicoloured mottled slightly sandy silty CLAY. There were rare desiccated rootlets to 2.0m bgl in WS3, and occasional fine clinker within bioturbations.

Table 2.4 Established Depth of Weathered London Clay Formation

Exploratory Hole	Depth (m bgl)
WS/DPI	2.90
WS/DP2	2.90
WS/DP3	2.60

2.3.3 London Clay Formation

Soils described as London Clay Formation were encountered underlying the Weathered London Clay Formation Ground from 2.60m to 2.90m bgl, recorded to 4.00m bgl, and inferred to the full investigatory depth of 6.00m bgl.

The London Clay Formation typically comprised soft orangish brown/greyish brown multicoloured mottled slightly sandy silty CLAY which becomes soft blueish grey with frequent fine sand interlaminae at 3.70 –to 3.65m bgl in WS/DP1, and WS/DP2.

The established depth of the London Clay Formation found at each exploratory hole location has been included in Table 2.5.

Table 2.5 Established Depth of London Clay Formation

Exploratory Hole	Depth (m bgl)
WS/DPI	4.00/6.00 ¹
WS/DP2	4.00/6.00 ¹
WS/DP3	4.00/6.00 ¹

Note(s): ¹ Final depth of exploratory hole.

2.4 Roots

Roots were encountered in each of the three exploratory holes at depths ranging between 0.50 and 2.00m bgl.

The established depth of root penetration found at the exploratory hole locations has been included in Table 2.6.

Table 2.6 Established Depth of Root Penetration

Exploratory Hole	Depth (m bgl)
WS/DPI	1.55
WS/DP2	0.50
WS/DP3	2.00

Roots may be found to greater depth at other locations on the site particularly close to trees and/or trees that have been removed both within the site and its close environs.

It must be emphasised that the probability of determining the maximum depth of roots from a narrow diameter borehole is low. A direct observation such as from within a trial pit is necessary to gain a better indication of the maximum root depth.

The site walkover noted mature trees adjacent to the site but there were low levels of vegetation on the site itself and Historic Aerial photographs on Google Earth™ showed the site use as a car park for >15 years.

The rootlets encountered in WS/DP3 to 2.00m bgl are estimated to originate from a tree bordering within the grounds of the adjacent property, and estimated to be around 6.00m distance from WS/DP3. It is therefore anticipated that roots and rootlets are likely to be present in greater abundance within soils; and to a greater depth, as the distance to the tree reduces.

2.5 Groundwater

Groundwater was encountered within two exploratory holes (WS1 and WS2) and was struck at depths ranging between 2.70m and 3.00m bgl.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in August (2022), when groundwater levels should be falling from their annual maximum (highest) elevation, which typically occurs around March, to the annual minimum (lowest) which typically occurs around September. Prior to the site investigation period, the south of the UK had been experiencing low levels of rainfall and drought conditions which may have affected groundwater levels.

Section 3 Discussion of Geotechnical In-Situ and Laboratory Testing

3.1 Dynamic Probe Tests

Dynamic probing (DPSH) was undertaken at three locations (DP1 to DP3) adjacent and prior to the drilling of WS1 - WS3 to depths of 6.00 bgl. The results were converted to equivalent SPT “N60” values based on dynamic energy using commercial computer software (Geostru). The results were then interpreted based on the classifications outlined in Appendix C.1, Table C.1.1 to Table C.1.2.

The SPT “N60” values presented have been corrected in accordance with BS EN 22476 Part 3, to account for the rig’s trip hammer efficiency, borehole depth, overburden factors etc. Further correction of the ‘N’ values should therefore not be necessary. The energy ratio of the drilling rig was 90.53%. The energy ratio for each location is presented on the individual logs within Appendix B.1.

The shallow soils of the Weathered London Clay Formation 0.40 – 1.55m bgl recorded equivalent SPT “N60” values between <4 and 9. Classifying the cohesive soils as very low to medium strength and inferred undrained cohesive strength of <20kPa to 45kPa.

Very low (<4) equivalent SPT “N60” values achieved within WS/DP1 at 1.10 – 1.30, WS/DP2 at 0.80 – 1.10, and from 1.10 – 2.10 in WS/DP3 indicate the presence of potential ‘soft spots’.

Relatively elevated dynamic probing values within gravelly clays (WS2:0.50 – 1.50, WS3:0.50 – 1.50) and a gravel band within WS1:1.55 – 2.10 were anticipated to be as a result of gravel clasts.

Soils described as London Clay Formation were encountered underlying the Weathered London Clay Formation Ground from 2.60m to 2.90m bgl and persisted to the full investigatory depth of 6.00m bgl.

The soils of the London Clay Formation Bedrock recorded equivalent SPT “N60” values between 9 and 30 within cohesive beds. The cohesive beds were classified as medium to high strength with an inferred undrained cohesive strength of 45 - 150kPa, improving with depth.

There was a gradual and steady correlation between the increase in undrained cohesive strength and depth in each of the DPSH results within the London Clay Formation Bedrock onsite.

A full interpretation of the DPSH tests, are outlined in Appendix C.2, Table C.2.1.

3.2 Atterberg Limit Tests

Atterberg Limit tests were performed on six samples, five obtained from the Weathered London Clay Formation, and one from the London Clay formation Bedrock (WS3 :2.70m bgl). The results were classified in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2.

The Weathered London Clay Formation was classified as medium volume change potential in accordance with both BRE Digest 240, and NHBC Standards Chapter 4.2.

The London Clay Formation was classified as medium volume change potential in accordance with both BRE Digest 240, and NHBC Standards Chapter 4.2.

A full interpretation of the Atterberg Limit tests, are outlined in Table C.2.2, Appendix C.2 and the laboratory report in Appendix C.3.

3.3 Particle Size Distribution Tests

A Particle Size Distribution (PSD) test was performed on one granular sample from the Weathered London Clay Formation (WS1 at 1.70m bgl).

The PSD tests classified the granular bed of the Weathered London Clay Formation as having no volume change potential in accordance BRE Digest 240. The results from grading analysis showed that the granular sample tested had no volume change potential in accordance with NHBC Standards Chapter 4.2. Note that a cohesive soil is only classified as having a volume change potential if it is also plastic and an Atterberg Limit test can be conducted on the strata.

A full interpretation of the PSD tests, are outlined in Table C.2.3, Appendix C.2 and the laboratory report in Appendix C.3.

3.4 Sulphate and pH Tests

Three samples were taken from the Weathered London Clay Formation (WS1:1.70m bgl, WS2:0.90m, WS3:2.20m bgl) for water soluble sulphate (2:1) and pH testing in accordance with Building Research Establishment Special Digest 1, 2005, 'Concrete in Aggressive Ground'.

The tests recorded water soluble sulphate between <10mg/l and 157mg/l with pH values of 7.3 to 7.7.

The significance of the sulphate and pH Test results are discussed in Section 5.2 and the laboratory report in Appendix C.3.

Section 4 Engineering Appraisal

4.1 Established Ground Conditions

An engineering appraisal of the soil types encountered during the site investigation and likely to be encountered during the redevelopment of this site is presented. Soil descriptions are based on analysis of disturbed samples taken from the exploratory holes.

4.1.1 Made Ground

Foundations must not be placed on non-engineered fill unless such use can be justified on the basis of a thorough ground investigation and detailed design. Foundations must be taken through any Topsoil and/or Made Ground and either into, or onto a suitable underlying natural stratum of adequate bearing characteristics.

Soils described as Made Ground were encountered in each of the three exploratory holes from ground level to depths ranging between 0.40 (WS1) and 0.50m bgl (WS2,WS3).

4.1.2 Weathered London Clay Formation

Soils described as Weathered London Clay Formation were encountered underlying the Made Ground from 0.40m to 0.50m bgl to depths between 2.60m bgl (WS/DP3) to 2.90m bgl (WS/DP1, WS/DP2).

The results from the dynamic probing inferred that the Weathered London Clay was typically of a **very low to medium** inferred cohesive strength, with a direct correlation between cohesive strength increasing with depth.

The soils of the Weathered London Clay recorded equivalent SPT “N60” values between <4 and 9. Classifying the cohesive soils as very low to medium strength and inferred undrained cohesive strength of <20kPa to 45kPa.

High dynamic probing values within gravelly clays (WS2:0.50 – 1.50, WS3:0.50 – 1.50) and a gravel band within WS1:1.55 – 2.10 were anticipated to be as a result of gravel clasts.

Very low equivalent SPT “N60” values achieved within WS/DP1 at 1.10 – 1.30, WS/DP2 at 0.80 – 1.10, and from 1.10 – 2.10 in WS/DP3 indicate the presence of potential ‘soft spots’. Soft spots are unsuitable for founding, and potentially indicative of an issue across the wider site if encountered in relatively narrow window sampler holes at varying depths on two out of the three trial hole locations drilled. Given the presence of "potential soft spots" that might be more dominant elsewhere on site and are generally characterised by unpredictability in terms of structural behaviour, it is likely that soils of low or potentially lower bearing

capacities may underlie other areas of the site at various depths, thus resulting the adoption of shallow foundations problematic.

4.1.3 London Clay Formation

Soils described as London Clay Formation Bedrock were encountered underlying the Weathered London Clay Formation Ground from 2.60m to 2.90m bgl and persisted to the full investigatory depth of 6.00m bgl.

The results from the dynamic probing inferred that the London Clay Formation Bedrock was typically of a **Medium to High** inferred cohesive strength, with a direct correlation between cohesive strength increasing with depth.

The soils of the London Clay Formation Bedrock recorded equivalent SPT “N60” values between 9 and 30 within cohesive beds. The cohesive beds were classified as medium to high strength with an inferred undrained cohesive strength of 65 - 150kPa, steadily decreasing with reduction in depth.

4.1.4 Guidance on Shrinkable Soils

The ground conditions were established as Made Ground with a typical thickness off 0.50m, overlying the Weathered soils of the London Clay Formation to 2.60 – 2.90m bgl, overlying the London Clay Formation Bedrock, which was inferred to the full investigatory depth of 6.00m bgl.

Atterberg Limit and PSD testing were classified in accordance with BRE Digest 240 and NHBC Standards Chapter 4.2 to determine the volume change potential.

The volume change potential for each strata was established and presented in Table 4.1.

Table 4.1 Established Volume Change Potential by Strata

Strata	Volume Change Potential		Established Lower Boundary (m bgl)
	BRE	NHBC	
wLC	Medium	Medium	2.60 – 2.90
LC	Medium	Medium	Not determined

Atterberg tests carried out on fine soil particles are used to determine the volume change potential of soils. Moisture content due to seasonal fluctuations and the presence or removal of tree roots can affect the potential for soil movement resulting in subsidence or heave – potentially negatively impacting a development. The presence of rootlets observed to around 2.00m bgl (WS3) must be taken into account in addition to the soils volume change potential when designing foundations.

The rootlets encountered in WS/DP3 to 2.00m bgl are estimated from a tree bordering within the grounds of the adjacent property, and to be around 6.00m

distance from WS/DP3. It is therefore anticipated that roots and rootlets are to be present in greater abundance within soils; and to a greater depth, as the distance from the tree reduces.

In the absence of a tree survey, NHBC Chapter 4.2 states that minimum foundation depths are to be estimated assuming high demand broad-leaved trees are present.

4.1.5 Groundwater

Groundwater was encountered within two exploratory holes (WS1 and WS2) and was struck at depths ranging between 2.70m and 3.00m bgl.

Changes in groundwater level occur for a number of reasons including seasonal effects and variations in drainage. The investigation was conducted in August (2022), when groundwater levels should be falling from their annual maximum (highest) elevation, which typically occurs around March, to the annual minimum (lowest) which typically occurs around September. Prior to the site investigation period, the south of the UK had been experiencing low levels of rainfall and drought conditions which may have affected groundwater levels.

Section 5 Foundation Scheme

5.1 Foundation Recommendations

Foundations **must not** be constructed within any Made Ground and soils of the Weathered London Clay Formation due to the likely variability across site and potential for large load induced settlements both total and differential.

5.1.1 Shallow Foundations into the Weathered London Clay

Based on a 5.00 by 1.00m strip foundation, using commercial software Table 5.1 shows the calculated relatively low bearing values and anticipated settlement characteristics.

Table 5.1 Allowable Bearing Capacities within Weathered London Clay

Location	Depth (m bgl)	Size (m)	Bearing Capacity (kPa) ¹	Anticipated Settlement (mm)
DP2	2.00	5.00 x 1.00	60	10
DP2	2.50		70	10
DP3	2.50		90	10

Note(s): ¹ SAFE based on Factor Of Safety = 3

Relatively low bearing capacities were calculated at each of the trial hole locations. Given the presence of "potential soft spots" that might be more dominant elsewhere on site and are generally characterised by unpredictability in terms of structural behaviour, it is likely that soils of low or potentially lower bearing capacities may underlie other areas of the site at various depths, thus resulting the adoption of shallow foundations problematic.

Roots were encountered the exploratory holes at depths ranging between 0.50m bgl and 2.00m bgl. If roots are encountered during the construction phase foundations **must not be placed within any live root penetrated** or desiccated **cohesive soils or those with a volume change potential**. Should the foundation excavations reveal such materials, the excavations **must** be extended to greater depth in order to bypass these unsuitable soils. Excavations must be checked by a suitable person prior to concrete being poured.

The rootlets encountered in WS/DP3 to 2.00m bgl are estimated to originate from a tree bordering within the grounds of the adjacent property, and estimated to be around 6.00m distance from WS/DP3. It is therefore anticipated that roots and rootlets are likely to be present in greater abundance within soils; and to a greater depth, as the distance to the tree reduces. In the absence of a tree survey, NHBC Chapter 4.2 states that minimum foundation depths are to be estimated assuming high demand broad-leaved trees are present.

This in addition to the low DPSH values encountered to around 3.00m bgl in the

Weathered London Clay, potential soft spots at varying depths within each trial hole across the site which could therefore be heterogenous across the site; and medium volume change potential shrinkable soils, conclude that the ground conditions on site within the shallower soils are generally poor, and a piled foundation solution was therefore considered the most suitable.

5.1.2 Ground Floor Slab

NHBC Standards 2022 states ground floors should be constructed as suspended floors where:

- *“the foundation depth dictated by the NHBC Standards 2022, Chapter 4.2.10 would exceed 1.5m bgl;”*
- *“ground floor construction is undertaken when the surface soils are seasonally desiccated;”*
- *“the depth of fill exceeds 600mm;”*
- *“there is shrinkable soil that could be subject to movement, expansive material or other unstable soils;”*
- *“the ground has been subject to vibratory improvement;” or*
- *“ground or fill is not suitable to support ground-bearing slabs.”*

A suspended Ground Floor Slab could be considered for the proposed development at the site due to the foundation depth dictated by the NHBC Standards 2022, Chapter 4.2.10 would exceed 1.5m bgl, and there are shrinkable soils that could be subject to movement, expansive material or other unstable soils. In addition, poor bearing capacities obtained in shallow soils indicate settlements unsuitable for shallow foundation solutions.

5.1.3 Piled Foundations

Evaluating the poor ground conditions including low DPSH values and shrinkable soils described above, a piled foundation solution was considered the most suitable.

Prior to designing a piled foundation solution, deep in-situ and geotechnical testing is required in order to ascertain ground conditions and geology at depth. A deep borehole in the form of cable percussive exploratory hole is therefore recommended to undertake appropriate further ground investigation.

5.2 Subsurface Concrete

The sulphate and pH tests carried out in accordance with BRE Special Digest 1, 2005, ‘Concrete in Aggressive Ground’, established the site concrete classifications for each stratum as presented in Table 5.2.

Table 5.2 Concrete Classification

Stratum	Design Sulphate Class	ACEC Class
wLC	DS-I	AC-I

Concrete to be placed in contact with soil or groundwater must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, '*Concrete in Aggressive Ground*' taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

5.3 Excavations

Shallow excavations in the Made Ground and shallow soils of the London Clay Formation are likely to be marginally stable in the short term at best.

Deeper excavations taken into the London Clay Formation are likely to be stable in the short term. Unsupported earth faces formed during excavation may be liable to collapse without warning and suitable safety precautions must therefore be taken to ensure that such earth faces are adequately supported or battered back to a safe angle of repose.

Excavations beneath the groundwater table are likely to be unstable and dewatering of foundation trenches may be necessary.

List of Figures

Figure 1 – Site Location Map	18
Figure 2 – Aerial Photograph	19
Figure 3 – Exploratory Hole Plan	20

List of Appendices

Appendix A Standards and Resources

Appendix B Field Work

Appendix B.1 Engineers Logs

Appendix C Geotechnical In-Situ and Laboratory Testing

Appendix C.1 Classification

Appendix C.2 Interpretation

Appendix C.3 Geotechnical In-Situ and Laboratory Results

Appendix D Information Provided by the Client

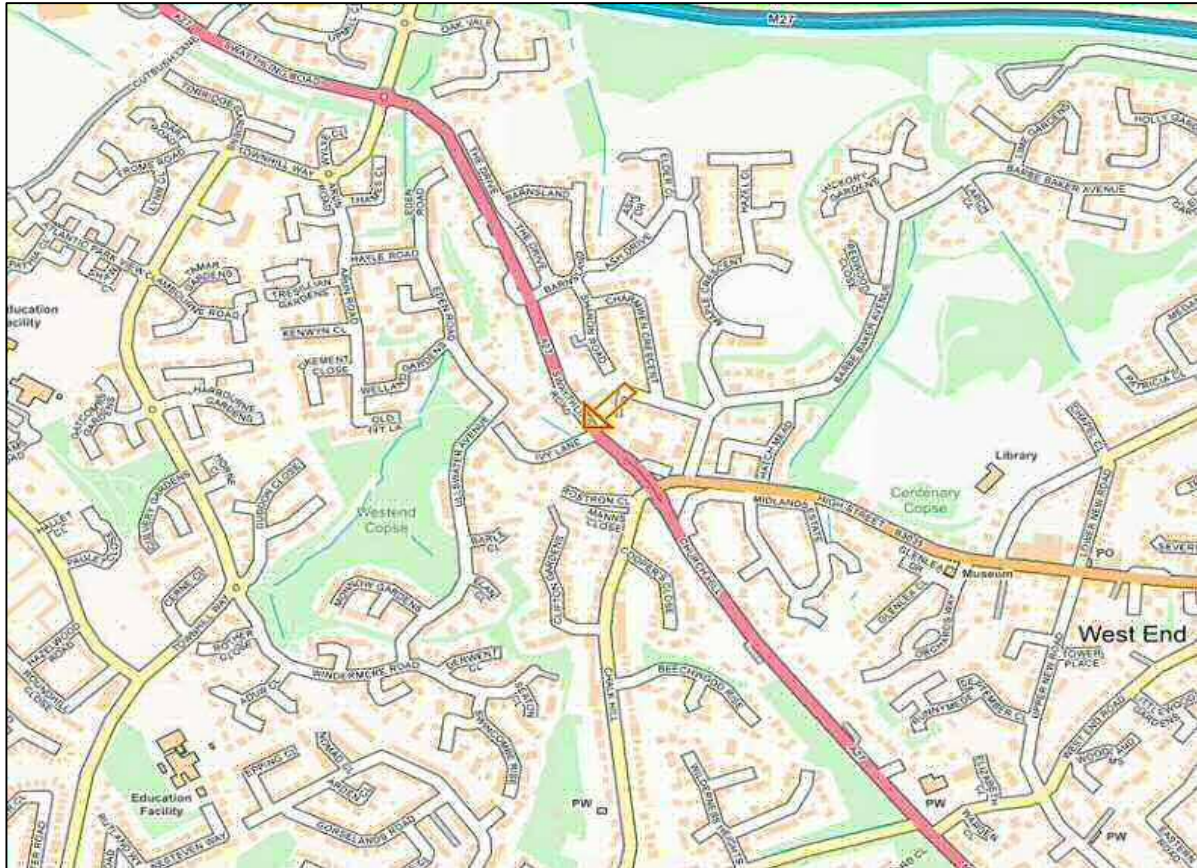


Figure 1 – Site Location Map



Job Number
20395

Project

19 Swaythling Road, West End, Hampshire, SO30
3AE

Client
Maidanbuild Homes Ltd

Date
October 2022

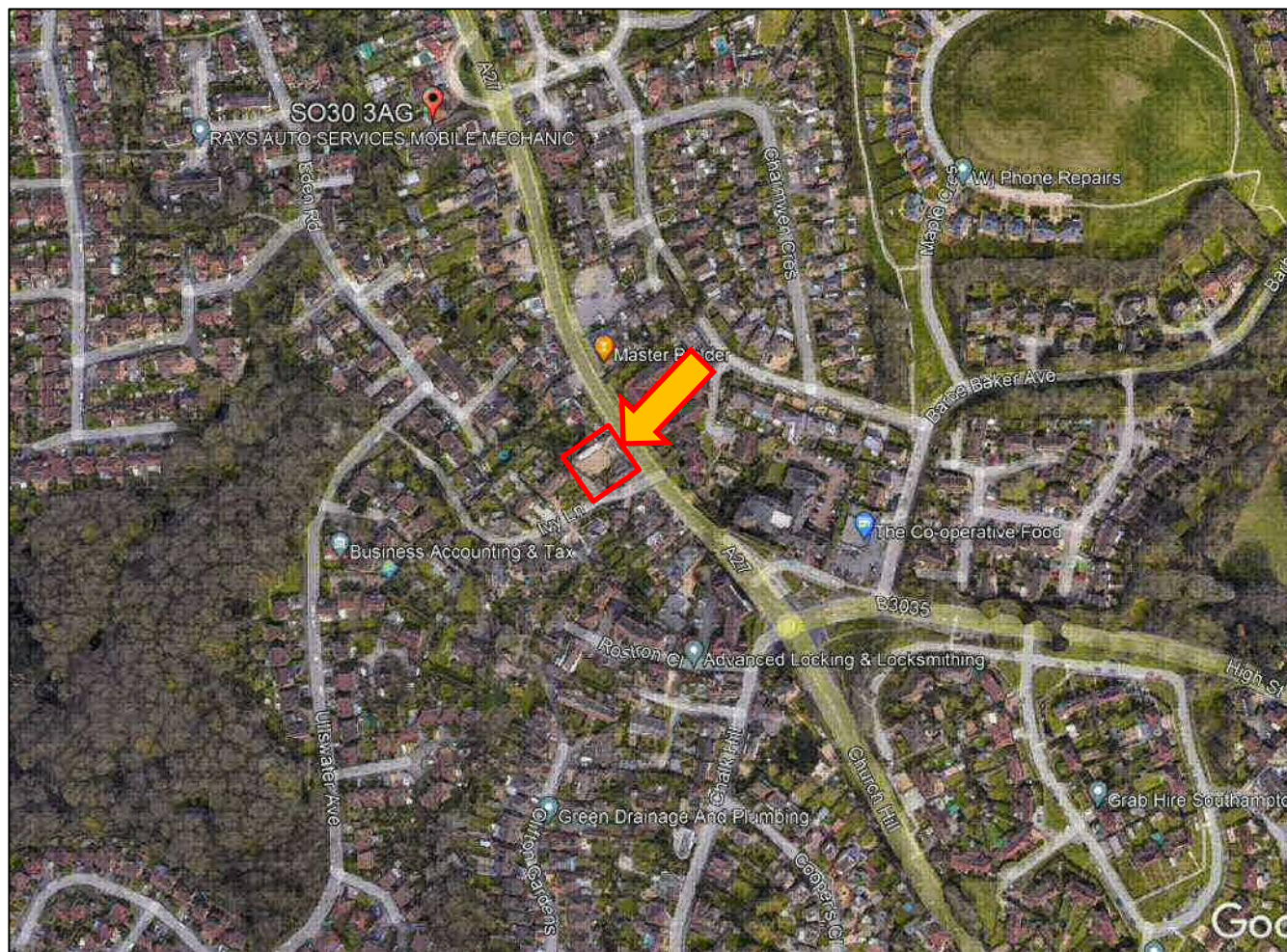


Figure 2 – Aerial Photograph

Project

19 Swaythling Road, West End,
Hampshire, SO30 3AE

Client

Maidanbuild Homes Ltd

Date

October 2022

Job Number

20395





Figure 3 – Exploratory Hole Plan

Project

19 Swaythling Road, West End,
Hampshire, SO30 3AE

Client

Maidanbuild Homes Ltd

Date

October 2022

Job Number

20395



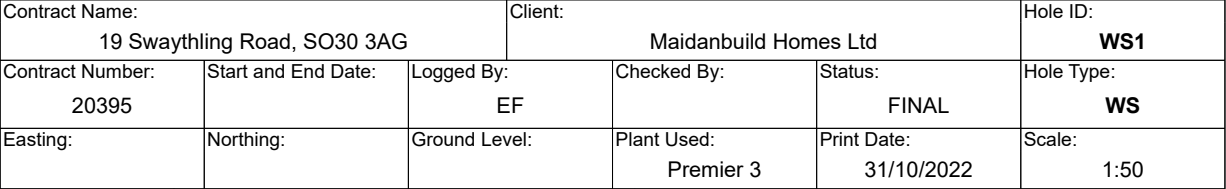
Appendix A Standards and Resources

The site works, soil descriptions and geotechnical testing was undertaken in accordance with the following standards were applicable:

- BS 5930:2015 and BS EN ISO 22476-2 2005+A1:2011
- BS 5930:2015 and BS EN ISO 22476-2&3:2005+A1:2011
- BS 5930:2015 and BS EN ISO 22476-3:2005+A1:2011
- BS EN 1997-1:2004+A1:2013 Eurocode 7. Geotechnical design
- BS EN ISO 14688-1:2018 - Geotechnical investigation and testing - Identification and description
- BS EN ISO 14688-2:2018 - Geotechnical investigation and testing - Principles for a classification
- BS 10175:2011+A2:2017 - Investigation of potentially contaminated sites
- LCRM 2021 Environment Agency
- BS 8004:2015 – Code of practice for foundations
- BS 1377:1990 Parts 1 to 8
- BRE Digest 241 “Low-rise buildings on shrinkable clay soils: Part 2
- BRE Special Digest 1, 2005, ‘Concrete in Aggressive Ground’
- Stroud, M. A. 1974, “The Standard Penetration Test – its application and interpretation”, Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.
- N.E. Simons, B.K. Menzies, “A Short Course in Foundation Engineering”
- NHBC Standards Chapter 4.2, January 2022.
- SP1010: Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination December 2014
- CIRIA C733, Asbestos in soil and made ground: a guide to understanding and managing risks and CAR2012 regulations.
- CIRIA C574, Engineering in Chalk; 2002
- Google Earth
- British Geological Survey Website & iGeology App

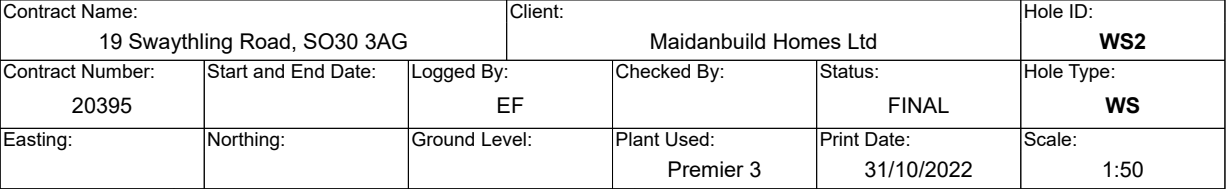
Appendix B Field Work

Appendix B.1 Engineers Logs



Samples & In Situ Testing	Strata Details	Groundwater
---------------------------	----------------	-------------

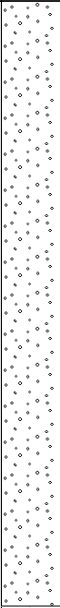
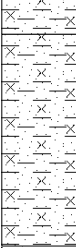
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Rootlets observed to 0.4m bgl.					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)						
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
									2.70			20	3.40	
Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.														



Weather:	Termination:		Sheet 1 of 1
----------	--------------	--	--------------

[illegible]

Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks: Water Strikes <table><tr><th>Strike (m)</th><th>Casing (m)</th><th>Sealed (m)</th><th>Time (mins)</th><th>Rose to (m)</th><th>Remarks</th></tr><tr><td>3.00</td><td></td><td></td><td>20</td><td>2.63</td><td></td></tr></table> Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks	3.00			20	2.63	
Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks																
3.00			20	2.63																	
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)													
Chiselling					Installation																
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)													

	Contract Name: 19 Swaythling Road, SO30 3AG				Client: Maidanbuild Homes Ltd				Hole ID: WS3					
	Contract Number: 20395		Start and End Date:		Logged By: EF		Checked By:		Status: FINAL		Hole Type: WS			
	Easting:		Northing:		Ground Level:		Plant Used: Premier 3		Print Date: 31/10/2022		Scale: 1:50			
Weather:			Termination:					Sheet 1 of 1						
Samples & In Situ Testing					Strata Details							Groundwater		
Depth	Type	Results	Level (mAOD)	Depth (m) (Thickness)	Legend	Strata Description						Water Strike	Backfill/Installation	
0.10	D			0.10		Reddish brown sandy GRAVEL. Gravel is angular to sub-angular fine to medium flint, brick, slate and chalk. Sand is fine to medium. MADE GROUND.						1		
0.30	D			(0.40)		Dark brown clayey gravelly SAND. Sand is fine to medium. Gravel is angular to subangular fine to medium flint, brick, chalk and clinker. Rare paper. MADE GROUND.								
0.60	D			0.50		Soft greyish brown multicoloured mottled slightly gravelly slightly sandy CLAY. Sand is fine. Gravel is angular to subrounded fine to medium flint, with very rare fine brick and clinker within bioturbations (<5%). WEATHERED LONDON CLAY FORMATION.								
0.90	D			(1.10)										
1.40	D			1.60		Very soft brown grey mottled orangish brown slightly gravelly CLAY. Gravel is angular to well rounded flint. WEATHERED LONDON CLAY FORMATION.								
1.70	D			(0.30) 1.90		Soft blueish grey multicoloured mottled slightly sandy silty CLAY. Sand is fine. Rare desiccated rootlets. WEATHERED LONDON CLAY FORMATION.						2		
2.20	D			(0.70)										
2.70	D			2.60		Soft orangish brown mottled light grey slightly sandy silty CLAY. Sand is fine. LONDON CLAY FORMATION.						3		
3.30	D			(1.40)										
3.80	D			4.00		End of Borehole at 4.00m						4		
												5		
												6		
												7		
												8		
												9		
												10		
Start & End of Shift Observations					Borehole Diameter		Casing Diameter		Remarks:					
Date	Time	Depth (m)	Casing (m)	Water (m)	Depth (m)	Dia (mm)	Depth (m)	Dia (mm)	Desiccated rootlets observed to 2.0m bgl.					
Chiselling					Installation				Water Strikes					
From (m)	To (m)	Duration	Remarks		Top (m)	Base (m)	Type	Dia (mm)	Strike (m)	Casing (m)	Sealed (m)	Time (mins)	Rose to (m)	Remarks
												0	0.00	No groundwater encountered
									Hand vane (HV), Hand penetrometer (HP) reported in kPa. PID reported in ppm.					

Appendix C Geotechnical In-Situ and Laboratory Testing

Appendix C.1 Classification

Classification based on SPT “N” values:

The inferred undrained strength of the cohesive soils was based on the SPT “N” blow counts, derived from the relationship suggested by Stroud (1974) and classified using Table C.1.1. (Ref: Stroud, M. A. 1974, “The Standard Penetration Test – its application and interpretation”, Proc. ICE Conf. on Penetration Testing in the UK, Birmingham. Thomas Telford, London.).

Table C.1.1 SPT “N” Blow Count Cohesive Classification

Classification	Undrained Cohesive Strength C_u (kPa)
Extremely low	<10
Very low	10 – 20
Low	20 – 40
Medium	40 – 75
High	75 – 150
Very high	150 – 300
Extremely high	> 300

Note(s): (Ref: BS EN ISO 14688-2:2004+A1:2013 Clause 5.3.)

The relative density of granular soils was classified based of the relationship given in Table C.1.2.

The *UK National Annex to Eurocode 7: Geotechnical design – Part 2: Ground investigation and testing, NA 3.7 SPT test, BS EN 1997-2:2007, Annex F* states “Relative density descriptions on borehole records should also be based on uncorrected SPT N values, unless significantly disturbed, using the density classification in BS 5930:2015, Table 7.

Table C.1.2 SPT “N” Blow Count Granular Classification

Classification	SPT “N” blow count (blows/300mm)
Very loose	0 to 4
Loose	4 to 10
Medium dense	10 to 30
Dense	30 to 50
Very dense	Greater than 50

Note(s): (Ref: The Standard Penetration Test (SPT): Methods and Use, CIRIA Report 143, 1995)

Appendix C.2 Interpretation

Table C.2.1 Interpretation of DPSH Blow Counts

DP	Strata	Equivalent SPT N60 Blow Counts	Inferred Cohesive Strength
DPI	wLC 0.40 – 1.55 Silty Sandy Clay	<4 - 9	Very Low to Medium ($C_u = <20 - 45\text{kPa}$)
	wLC 1.55 – 2.10 Clayey sandy GRAVEL	4 - 22	Loose to Medium Dense
	wLC 2.10 – 2.90 Silty Sandy Clay	4 - 9	Low to Medium ($C_u = 20 - 45\text{kPa}$)
	LC 2.90 – 6.00 ¹ Silty Sandy Clay	9 - 22	Medium to High ($C_u = 45 - 90\text{kPa}$)
DP2	wLC 0.50 – 1.50 Sandy Gravelly CLAY	<4 - 9	Very Low to Medium ($C_u = <20 - 45\text{kPa}$)
	wLC 1.40 – 2.90 Silty Sandy CLAY	4 - 9	Low to Medium ($C_u = 20 - 45\text{kPa}$)
	LC ¹ 2.90 – 6.00 Silty Sandy CLAY	9 - 17	Medium to High ($C_u = 45 - 85\text{kPa}$)
DP3	wLC 0.50 – 2.00 Silty Sandy CLAY	<4 - 4	Very Low ($C_u = <20 - 20\text{kPa}$)
	wLC 2.00 – 2.60 Sandy Gravelly CLAY	4 - 9	Low to Medium ($C_u = 20 - 45\text{kPa}$)
	LC ¹ 2.60 – 6.00 Silty Sandy CLAY	9 - 30	Medium to High ($C_u = 45 - 150\text{kPa}$)

Note(s): ¹ Ground conditions inferred past the base of windowless sampler boreholes. ² High values anticipated to be gravel within clay.

Table C.2.2 Interpretation of Atterberg Limit Tests

Stratum	Moisture Content (%)	Plasticity Index (%)	Passing 425µm Sieve (%)	Modified Plasticity Index (%)	Soil Classification	Volume Change Potential	
						BRE	NHBC
wLC	16 - 31	16 - 34	89 - 100	14 - 34	CL - CH	Low to Medium	Medium
LC	31	32	100	32	CH	Medium	Medium

Note(s): BRE Volume Change Potential refers to BRE Digest 240 (based on Atterberg results)

NHBC Volume Change Potential refers to NHBC Standards Chapter 4.2

Soils Classification based on British Soil Classification System

The most common use of the term clay is to describe a soil that contains enough clay-sized material or clay minerals to exhibit cohesive properties. The fraction of clay-sized material required varies, but can be as low as 15%. Unless stated otherwise, this is the sense used in Digest 240. The term can be used to denote the clay minerals. These are specific, naturally occurring chemical compounds, predominately silicates. The term is often used as a particle size descriptor. Soil particles that have a nominal diameter of less than 2 µm are normally considered to be of clay size, but they are not necessarily clay minerals. Some clay minerals are larger than 2 µm and some particles, 'rock flour' for example, can be finer than 2 µm but are not clay minerals.

(The Atterberg Limit Tests were undertaken in accordance with BS 1377:Part 2:1990 Clauses 3.2, 4.3 and 5)

Table C.2.3 Interpretation of PSD Tests

Location	Depth (m bgl)	Soil Description	Volume Change Potential		Passing 63µm Sieve (%)
			BRE	NHBC	
WSI	1.70	Brown slightly silty/clayey sandy fine to coarse GRAVEL.	No	No	9

Note(s): BRE 240 states that a soil has a volume change potential when the clay fraction **exceeds 15%**. Only the silt and clay combined fraction are determined by sieving therefore the volume change potential is estimated from the percentage passing the 63µm sieve. NHBC Standards Chapter 4.2 states that a soil is shrinkable if the percentage of silt and clay passing the 63µm sieve is greater than 35% and the Plasticity Index is greater than 10%.

(The Particle Size Distribution Tests were undertaken in accordance with BS 1377: Part 2: 1990 Clause 9)

Appendix C.3 Geotechnical In-Situ and Laboratory Results

**Soils Limited**Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk**Probe Log**

Probe No.

WSDP1

Sheet 1 of 1

Project Name:	19 Swaythling Road, SO30 3AG	Project No.	20395	Co-ords:		Hole Type	DP
Location:	19 Swaythling Road, SO30 3AG	Level:	m AOD			Scale	1:50
Client:	Maidanbuild Homes Ltd	Dates:	19/08/2022			Logged By	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
1	3				5
	10				
	4				
	2				
	2				
	1				
	1				
	1				
	1				
	1				
2	0				15
	0				
	2				
	1				
	4				
	10				
	7				
	5				
	1				
	1				
3	1				20
	1				
	1				
	2				
	1				
	2				
	1				
	2				
	1				
	2				
4	1				10
	2				
	2				
	2				
	3				
	2				
	3				
	2				
	1				
	2				
5	2				40
	2				
	2				
	3				
	2				
	2				
	3				
	3				
	3				
	3				
6	4				70
	3				
	4				
	4				
	4				
	5				
	3				
	3				
	3				
	3				
7					
8					
9					
10					

Remarks	Fall Height	760mm	Cone Base Diameter	mm
	Hammer Weight	64kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	90.53%



AGS
REGISTERED USER 2023

**Soils Limited**

Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Probe Log

Probe No.

WSDP2

Sheet 1 of 1

Project Name:	19 Swaythling Road, SO30 3AG	Project No.	20395	Co-ords:		Hole Type	DP
Location:	19 Swaythling Road, SO30 3AG	Level:	m AOD			Scale	1:50
Client:	Maidanbuild Homes Ltd	Dates:	19/08/2022			Logged By	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	2				
0.1	3				
0.2	1				
0.3	1				
0.4	0				
0.5	1				
0.6	1				
0.7	0				
0.8	1				
0.9	1				
1.0	1				10
1.1	2				
1.2	3				
1.3	2				
1.4	2				
1.5	1				
1.6	1				
1.7	1				
1.8	1				
1.9	1				
2.0	1				10
2.1	1				
2.2	1				
2.3	1				
2.4	1				
2.5	1				
2.6	1				
2.7	1				
2.8	1				
2.9	1				
3.0	2				20
3.1	1				
3.2	2				
3.3	2				
3.4	2				
3.5	2				
3.6	2				
3.7	2				
3.8	2				
3.9	2				
4.0	3				40
4.1	3				
4.2	3				
4.3	3				
4.4	3				
4.5	2				
4.6	3				
4.7	3				
4.8	4				
4.9	3				
5.0	3				80
5.1	4				
5.2	4				
5.3	4				
5.4	4				
5.5	3				
5.6	4				
5.7	4				
5.8	4				
5.9	3				
6.0	3				80
6.1	4				
6.2	4				
6.3					
6.4					
6.5					
6.6					
6.7					
6.8					
6.9					
7.0					
7.1					
7.2					
7.3					
7.4					
7.5					
7.6					
7.7					
7.8					
7.9					
8.0					
8.1					
8.2					
8.3					
8.4					
8.5					
8.6					
8.7					
8.8					
8.9					
9.0					
9.1					
9.2					
9.3					
9.4					
9.5					
9.6					
9.7					
9.8					
9.9					
10.0					

Remarks	Fall Height	760mm	Cone Base Diameter	mm
	Hammer Weight	64kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	90.53%



**Soils Limited**

Newton House, Cross Road, Tadworth KT20 5SR
Tel: 01737 814221 Email: admin@soilslimited.co.uk

Probe Log

Probe No.

WSDP3

Sheet 1 of 1

Project Name:	19 Swaythling Road, SO30 3AG	Project No.	20395	Co-ords:		Hole Type	DP
Location:	19 Swaythling Road, SO30 3AG	Level:	m AOD			Scale	1:50
Client:	Maidanbuild Homes Ltd	Dates:	19/08/2022			Logged By	

Depth (m)	Blows/100mm				Torque (Nm)
	10	20	30	40	
0	2	8	6	4	
1	1	1	1	1	10
2	1	1	1	1	20
3	3	3	3	3	50
4	4	4	4	4	60
5	4	4	4	4	100
6	6	6	6	6	220
7					
8					
9					
10					

Remarks	Fall Height	760mm	Cone Base Diameter	mm
	Hammer Weight	64kg	Final Depth	6m
	Probe Type	DPSH-B	Energy Ratio (Er)	90.53%





Laboratory Report



Contract Number: 61386

Client Ref: **20395**

Client PO: **20395**

Date Received: **15-09-2022**

Date Completed: **30-09-2022**

Report Date: **30-09-2022**

Client: **Soils Limited**
Newton House
Cross Road
Tadworth
Surrey
KT20 5SR

This report has been checked and approved by:

Brendan Evans
Office Administrator

Contract Title: **19 Swaythling Road**

For the attention of: **Tom Rees-Blanchard**

Test Description	Qty
Moisture Content of Soil BS1377 : Part 2 : Clause 3.2 : 1990 - * UKAS	6
1 Point Liquid & Plastic Limit BS 1377:1990 - Part 2 : 4.4 & 5.3 - * UKAS	6
PSD Wet & Dry Sieve method BS 1377:1990 - Part 2 : 9.2 - * UKAS	1
Disposal of samples for job	1

Notes: Observations and Interpretations are outside the UKAS Accreditation

* - denotes test included in laboratory scope of accreditation

- denotes test carried out by approved contractor

@ - denotes non accredited tests

This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This test report/certificate shall not be reproduced except in full, without the approval of GEO Site & Testing Services Ltd. Any opinions or interpretations stated - within this report/certificate are excluded from the laboratories UKAS accreditation.

Approved Signatories:

Brendan Evans (Office Administrator) - Paul Evans (Director) - Richard John (Quality/Technical Manager)

Shaun Jones (Laboratory manager) - Shaun Thomas (Site Manager) - Wayne Honey (Human Resources/ Health and Safety Coordinator)

GEO Site & Testing Services Ltd

Units 3-4, Heol Aur, Dafen, Llanelli, Carmarthenshire, Wales SA14 8QN

Tel: 01554 784040 Fax: 01554 784041 info@gstl.co.uk gstl.co.uk

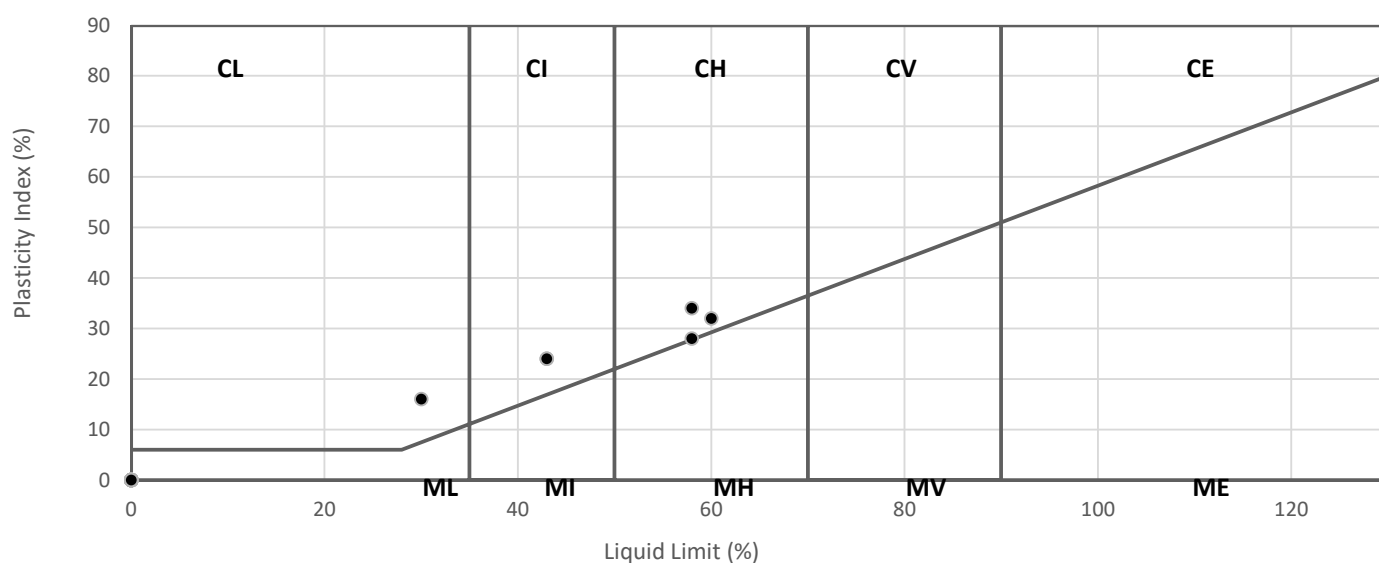
**NATURAL MOISTURE, LIQUID LIMIT, PLASTIC LIMIT AND
PLASTICITY INDEX
(BS 1377:1990 - Part 2 : 4.4 & 5.3)**

Contract Number	61386	
Project Location	19 Swaythling Road	
Date Tested	27/09/2022	

[illegible]

Symbols: NP : Non Plastic # : Liquid Limit and Plastic Limit Wet Sieved

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION



Operators
Clayton Jenkins



2788



**PARTICLE SIZE DISTRIBUTION
BS 1377 Part 2:1990
Wet Sieve, Clause 9.2**

Contract Number 61386

Borehole/Pit No. WS1

Site Name 19 Swaythling Road

Sample No.

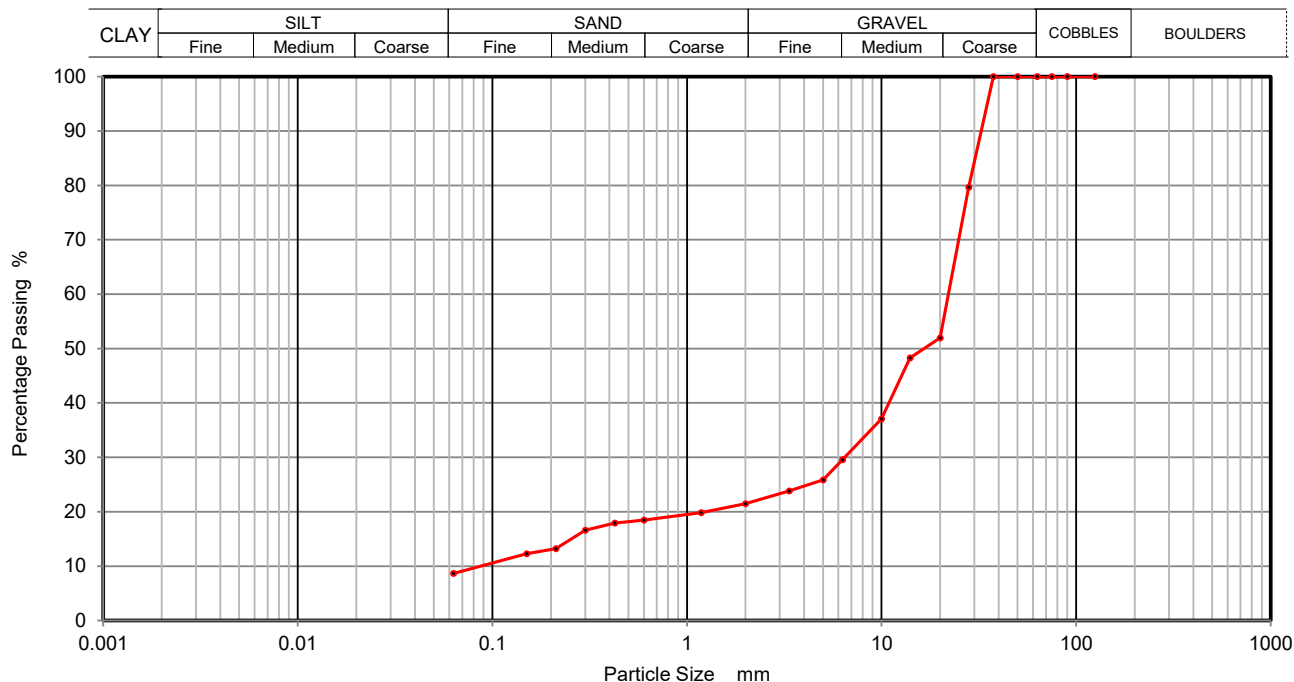
Soil Description Brown slightly silty/ clayey fine to coarse sandy fine to coarse GRAVEL

Depth Top 1.70

Depth Base

Date Tested 28/06/2022

Sample Type



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	100		
28	80		
20	52		
14	48		
10	37		
6.3	30		
5	26		
3.35	24		
2	21		
1.18	20		
0.6	18		
0.425	18		
0.3	17		
0.212	13		
0.15	12		
0.063	9		

Sample Proportions	% dry mass
Cobbles	0
Gravel	79
Sand	12
Silt and Clay	9

Remarks

Preparation and testing in accordance with BS1377 unless noted below

Operator

David Edwards



2788



Tom Rees-Blanchard
Soils Ltd
Thomas Telford House - Unit 11
Sun Valley Business Park
Winnall Close
Winchester
SO23 0LB

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

DETS Report No: 22-07732

Site Reference: 19 Swaythling Road

Project / Job Ref: 20395

Order No: 20395

Sample Receipt Date: 14/09/2022

Sample Scheduled Date: 14/09/2022

Report Issue Number: 1

Reporting Date: 21/09/2022

Authorised by:

Dave Ashworth
Technical Manager

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

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



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate						
DETS Report No: 22-07732	Date Sampled	None Supplied	None Supplied	None Supplied		
Soils Ltd	Time Sampled	None Supplied	None Supplied	None Supplied		
Site Reference: 19 Swaythling Road	TP / BH No	WS1	WS2	WS3		
Project / Job Ref: 20395	Additional Refs	None Supplied	None Supplied	None Supplied		
Order No: 20395	Depth (m)	1.70	0.90	2.20		
Reporting Date: 21/09/2022	DETS Sample No	612706	612707	612708		

Determinand	Unit	RL	Accreditation				
pH	pH Units	N/a	MCERTS	7.7	7.6	7.3	
Total Sulphate as SO ₄	mg/kg	< 200	MCERTS	< 200	< 200	499	
Total Sulphate as SO ₄	%	< 0.02	MCERTS	< 0.02	< 0.02	0.05	
W/S Sulphate as SO ₄ (2:1)	mg/l	< 10	MCERTS	14	< 10	157	
W/S Sulphate as SO ₄ (2:1)	g/l	< 0.01	MCERTS	0.01	< 0.01	0.16	
Total Sulphur	%	< 0.02	NONE	< 0.02	< 0.02	0.03	
Ammonium as NH ₄	mg/kg	< 0.5	ISO17025	0.9	1	320	
Ammonium as NH ₄	mg/l	< 0.05	ISO17025	0.09	0.10	32	
W/S Chloride (2:1)	mg/kg	< 1	MCERTS	11	9	10	
W/S Chloride (2:1)	mg/l	< 0.5	MCERTS	5.6	4.7	4.9	
Water Soluble Nitrate (2:1) as NO ₃	mg/kg	< 3	MCERTS	8	24	3	
Water Soluble Nitrate (2:1) as NO ₃	mg/l	< 1.5	MCERTS	4.2	12.2	1.5	
W/S Magnesium	mg/l	< 0.1	NONE	1	0.5	1.7	

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



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Sample Descriptions

DETS Report No: 22-07732	
Soils Ltd	
Site Reference: 19 Swaythling Road	
Project / Job Ref: 20395	
Order No: 20395	
Reporting Date: 21/09/2022	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 612706	WS1	None Supplied	1.70	4.9	Brown gravelly sand with stones
^ 612707	WS2	None Supplied	0.90	14.9	Brown sandy clay
^ 612708	WS3	None Supplied	2.20	20.9	Brown sandy clay

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

Insufficient Sample ^{U/S}

Unsuitable Sample ^{U/S}

^ no sampling date provided; unable to confirm if samples are within acceptable holding times



DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



Soil Analysis Certificate - Methodology & Miscellaneous Information

DETS Report No: 22-07732

Soils Ltd

Site Reference: 19 Swaythling Road

Project / Job Ref: 20395

Order No: 20395

Reporting Date: 21/09/2022

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazide followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	Fraction Organic Carbon (FOC)	Determination of TOC by combustion analyser.	E027
Soil	D	Organic Matter (SOM)	Determination of TOC by combustion analyser.	E027
Soil	D	TOC (Total Organic Carbon)	Determination of TOC by combustion analyser.	E027
Soil	AR	Exchangeable Ammonium	Determination of ammonium by discrete analyser.	E029
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCS	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

D Dried
AR As Received



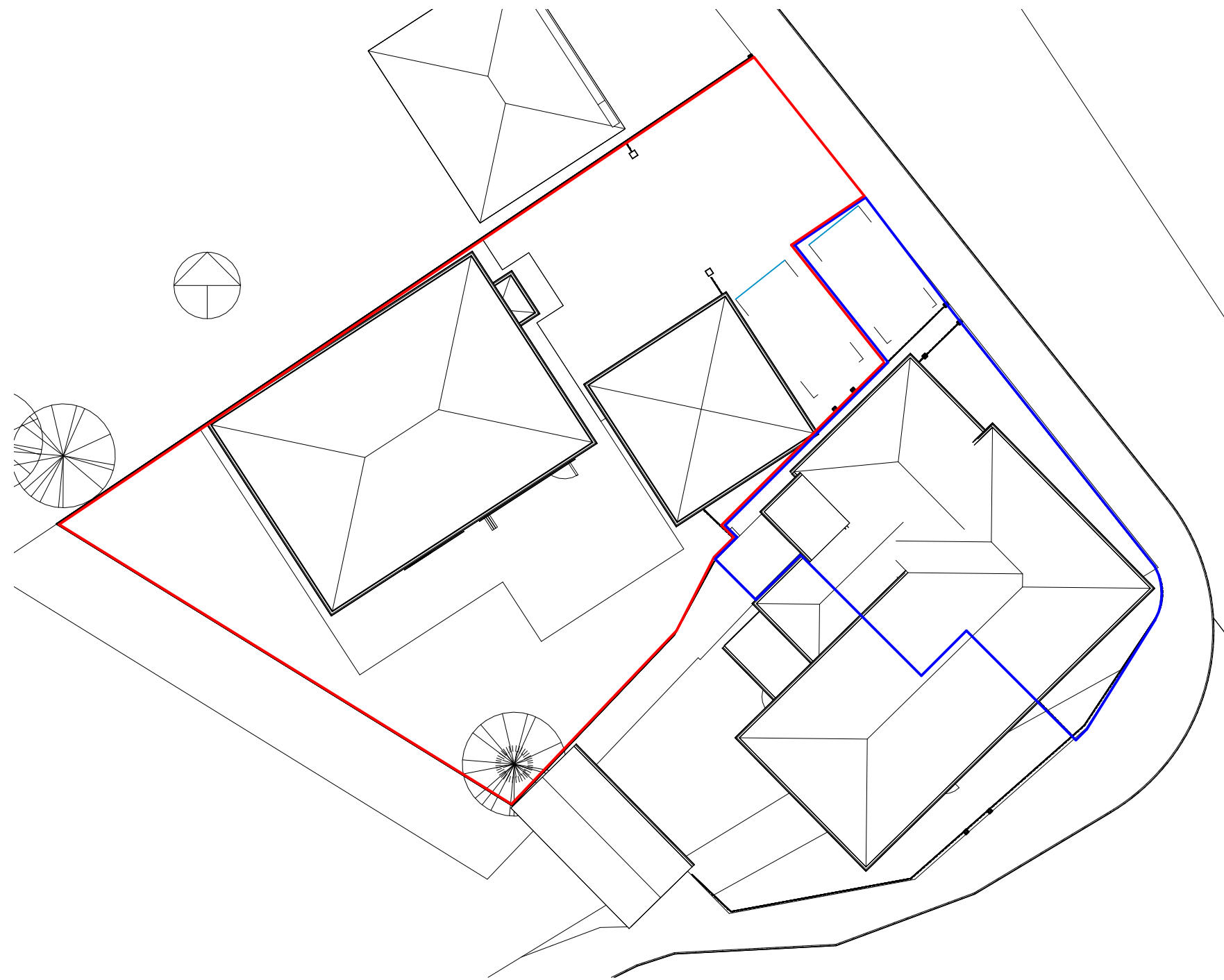
DETS Ltd
Unit 1, Rose Lane Industrial Estate
Rose Lane
Lenham Heath
Maidstone
Kent ME17 2JN
Tel : 01622 850410



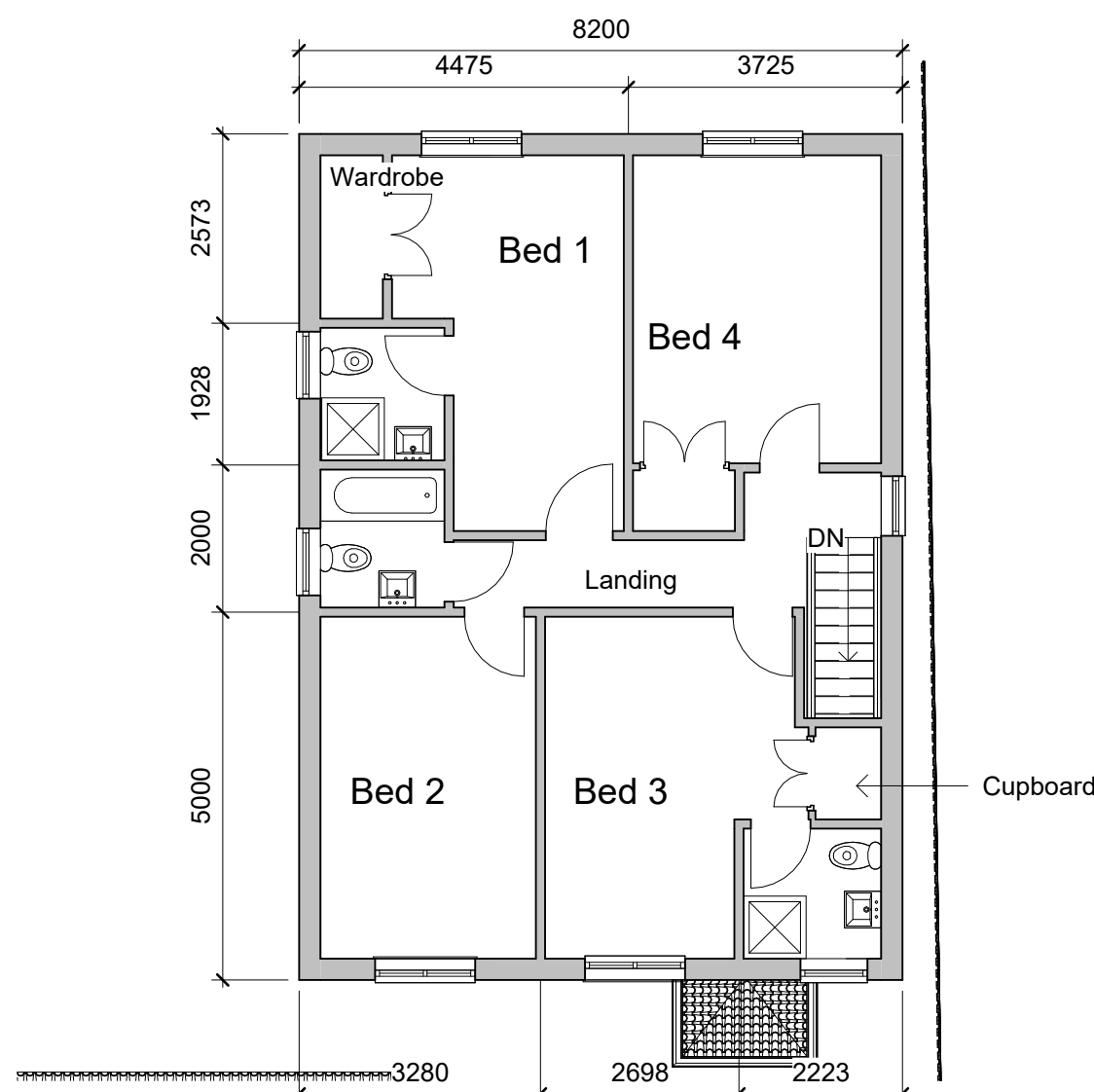
List of HWOL Acronyms and Operators	
DETS Report No: 22-07732	
Soils Ltd	
Site Reference: 19 Swaythling Road	
Project / Job Ref: 20395	
Order No: 20395	
Reporting Date: 21/09/2022	

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

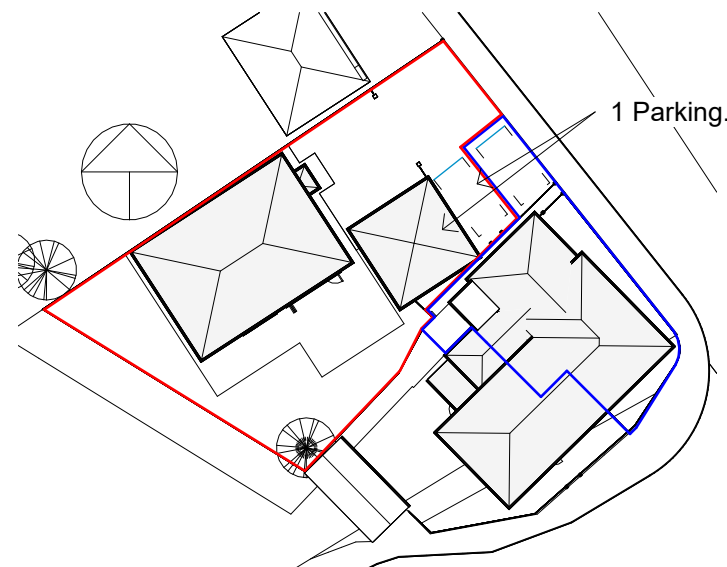
Appendix D Information Provided by the Client



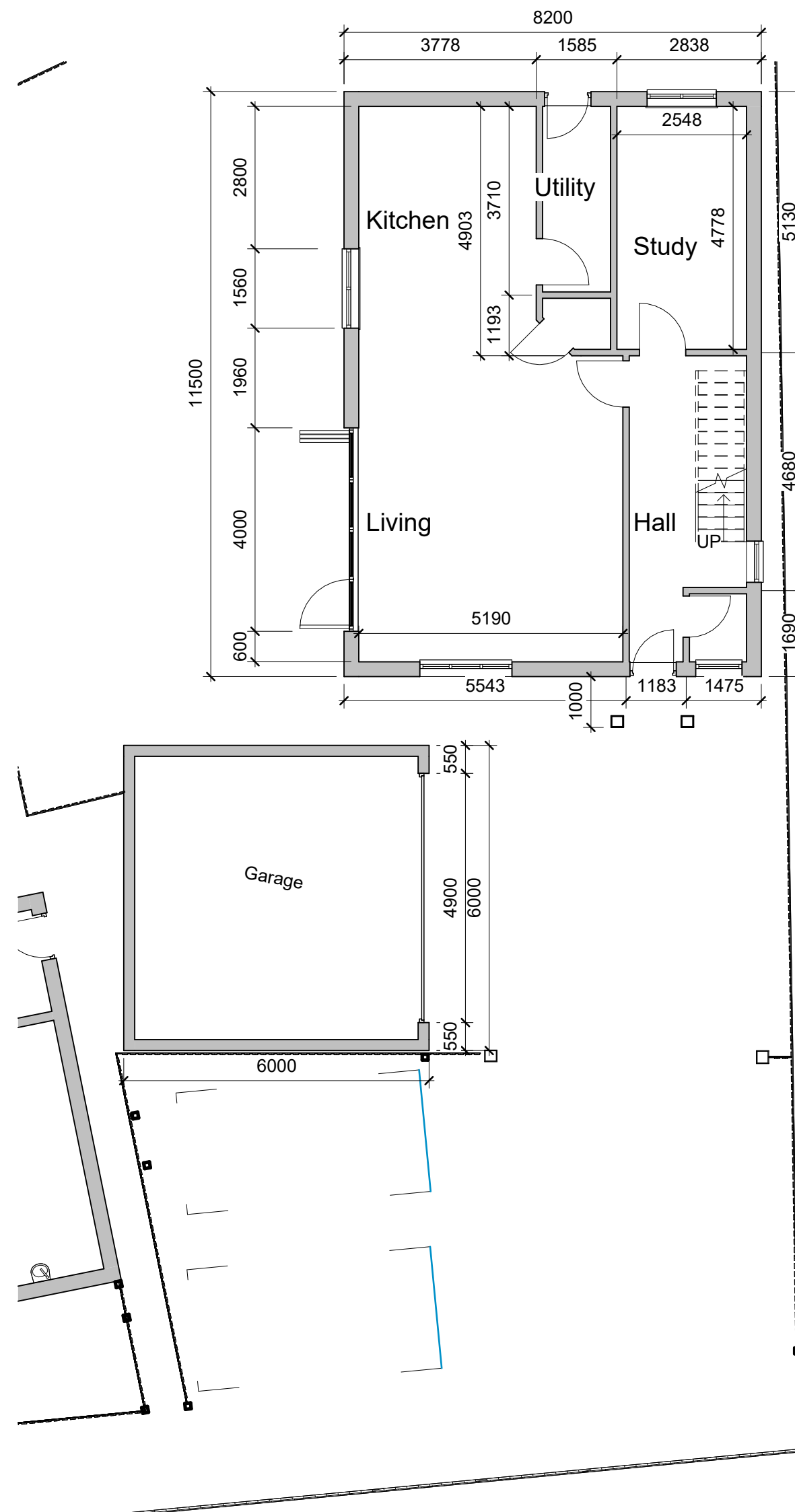
1 Site Proposed / Ajoining property line update
1 : 200



3 1 st floor
1 : 100



4 Parking allocation
1 : 500



2 0 Groundfloor
1 : 100

Builder to check and clarify all levels, dimensions, drainage construction and specification prior to any works on site and to bring to the clients attention any variation or deviations for written confirmation before being carried out on site.

Do not scale from these drawings - If in doubt always ask first

Report any discrepancies and omissions to owner. These drawings are copyright ©

Drawings are prepared for the purpose of obtaining Town & Country Planning Permission and building regulations approval only.

All materials shall be fixed applied or mixed in accordance with all of the manufacturers instructions, recommendations & specifications. All materials shall be fit for the purpose that they are to be used for.

The contractor shall take into account everything necessary for the proper execution of the works and to the satisfaction of the Local Authority Building Surveyor, whether or not indicated on the drawings or in specification.

It is the responsibility of the owner / client to serve a notice on the adjoining or adjacent neighbours for the proposed works under 'The Party Wall Act 1996' Explanatory booklets can be obtained free of charge from the D.O.E. publications dispatch centre. Blackhorse Road, London. SE99 6TT

PROJECT

Swaythling Road

TITLE

Proposed Floor Plans

CLIENT

Maidan Build Ltd

DRAWN BY
GB

CHECKED BY
GB

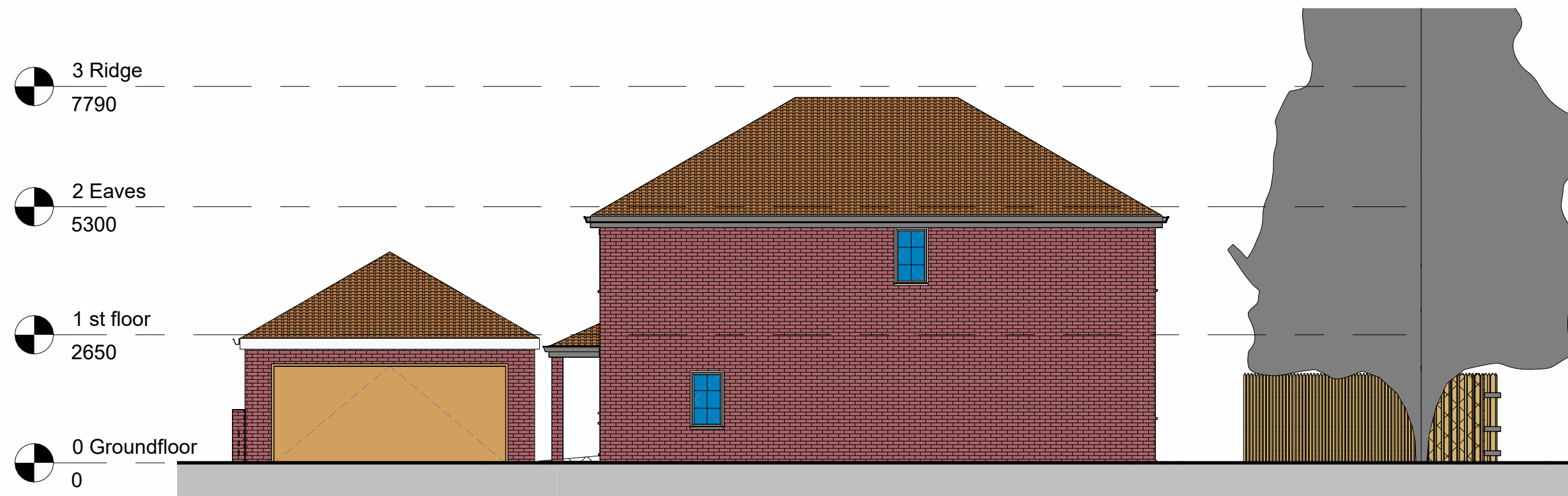
DATE
16/05/22

SCALE (@A2)
As indicated

PROJECT NUMBER
0066

DRAWING NUMBER
A102

REV
4



1 North
1 : 100



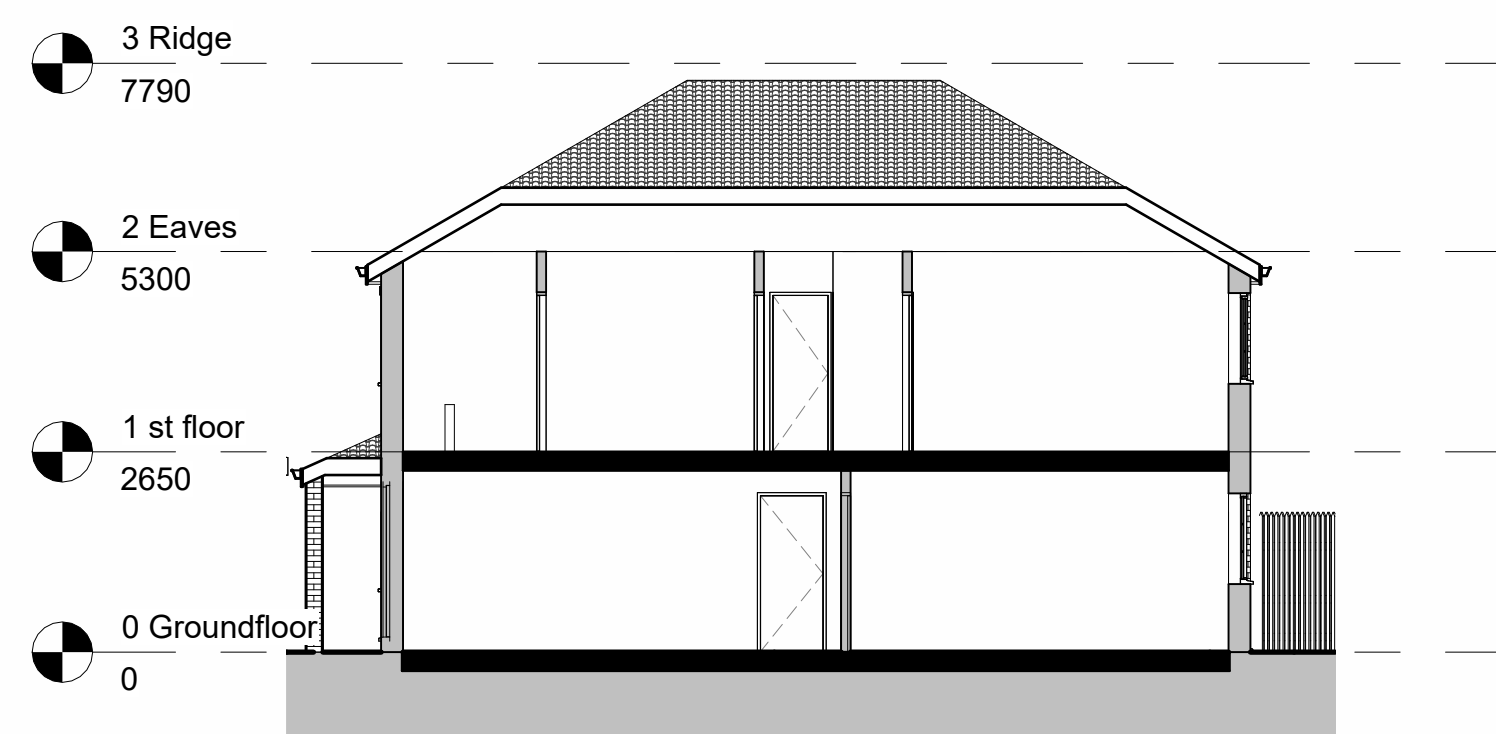
2 South
1 : 100



3 East
1 : 100



4 West
1 : 100



5 Section 1
1 : 100

Builder to check and clarify all levels, dimensions , drainage construction and specification prior to any works on site and to bring to the clients attention any variation or deviations for written confirmation before being carried out on site.

Do not scale from these drawings - If in doubt always ask first

Report any discrepancies and omissions to owner. These drawings are copyright ©

Drawings are prepared for the purpose of obtaining Town & Country Planning Permission and building regulations approval only.

All materials shall be fixed applied or mixed in accordance with all of the manufacturers instructions, recommendations & specifications. All materials shall be fit for the purpose that they are to be used for.

The contractor shall take into account everything necessary for the proper execution of the works and to the satisfaction of the Local Authority Building Surveyor, whether or not indicated on the drawings or in specification.

It is the responsibility of the owner / client to serve a notice on the adjoining or adjacent neighbours for the proposed works under 'The Party Wall Act 1996' Explanatory booklets can be obtained free of charge from the D.O.E. publications dispatch centre. Blackhorse Road, London. SE99 6TT

PROJECT

19 Swaythling Road

TITLE

Proposed/Elevations/Section

CLIENT

Maidan Build Ltd

DRAWN BY
GB

CHECKED BY
GB

DATE
19/06/22

SCALE (@A2)
1 : 100

PROJECT NUMBER
0066

DRAWING NUMBER
A103

REV
7



www.tycoh.co.uk

E: Info @tycoh.co.uk

Tel. 07399604559

Builder to check and clarify all levels, dimensions , drainage construction and specification prior to any works on site and to bring to the clients attention any variation or deviations for written confirmation before being carried out on site.

Do not scale from these drawings - If in doubt always ask first

Report any discrepancies and omissions to owner. These drawings are copyright ©

Drawings are prepared for the purpose of obtaining Town & Country Planning Permission and building regulations approval only.

All materials shall be fixed applied or mixed in accordance with all of the manufacturers instructions, recommendations & specifications. All materials shall be fit for the purpose that they are to be used for.

The contractor shall take into account everything necessary for the proper execution of the works and to the satisfaction of the Local Authority Building Surveyor, whether or not indicated on the drawings or in specification.

It is the responsibility of the owner / client to serve a notice on the adjoining or adjacent neighbours for the proposed works under 'The Party Wall Act 1996' Explanatory booklets can be obtained free of charge from the D.O.E. publications dispatach centre. Blackhorse Road, London. SE99 6TT

PROJECT

Swaythling Road

TITLE

Imagery

CLIENT

Maidan Build Ltd

DRAWN BY

GB

CHECKED BY

GB

DATE

Issue Date

SCALE (@A2)

PROJECT NUMBER

0066

DRAWING NUMBER

A104

REV

Soils Limited
Geotechnical & Environmental Consultants

Newton House
Cross Road, Tadworth
Surrey KT20 5SR

T 01737 814221
W soilslimited.co.uk