Geotechnical & geoenvironmental (ground investigation) assessment report

Land off Applefields, Wrawby (Second Phase)

Produced for Keigar Homes

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Ground investigation report

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EXECUTIVE SUMMARY

REVIEW OF DESK STUDY INFORMATION	
Proposed works	• A new low rise residential development (of about 20 to 30 dwellings) with associated infrastructure. • Second phase of development by the client (Keigar Homes) at Land off 0 Applefields, Wrawby (the ongoing first phase is immediately east).
Site location and size	• *Location:* west of Applefields, Wrawby, North Lincolnshire, DN20 8GB, roughly centred around grid reference 501680, 408780 • *Size:* about 150m by 90m in plan area
Site description	• The site is existing farm field except for the southeast corner which is currently used as a builder's compound. • The farm field is split into north and south halves by an existing row of hedge and trees. • The builder's compound is surfaced in imported white chalk fill.
Local geology and hydrogeology	• *Superficial*: Glacial deposits (glacial till, glaciofluvial and glaciolacustrine), which are a Secondary Aquifer – of clays, sands and gravels • *Bedrock*: Ampthill Clay Formation (AMC), which is Unproductive Strata – of mudstone (or clay) with rare limestone nodules • *Groundwater*: site is not in or near a Source Protection Zone (SPZ)
Topography	• The site is sloped up towards the northeast at an average gradient of about 1 in 25. • Ground levels range between about 18m and 24m AOD
History	• A former farm track crossed the site during the 19th and early 20th centuries. • For the last year or so, the southeast corner of the site has been a builder's compound.
Hydrology	• Adjacent drain (0m south) and balancing pond (0m east) • River Ancholme (2.5km west) • No significant flooding issues identified
Other information	• There are no nearby Historical Landfill Sites (within 1km) • No identified nearby potentially infilled land (within 250m) • No identified businesses nearby (within 150m) • The site is not affected by radon. No protection measures required • The site is in an area with a low historical bombing density
Previous nearby ground investigation	Previous HML ground investigation adjacent to the east revealed: • Topsoil – to a depth of 0.15m to 0.50m • Made ground – of soil with rubble – to a depth of 0.4m to 0.9m • Glacial deposits – of soft (becoming firm/stiff) sandy gravelly silts and clays, which localised shallow sands – to more than 2m depth • Possible Ampthill Clay Formation – firm dark grey clay – locally at a depth greater than 2.1m Previous soil contamination testing did not identify any concern to human health.

RECENT SITE INVESTIGATION WORKS	
Fieldwork (27th June 2025)	• Five dynamic sampler boreholes (WS1 to WS5) – to about 4m depth • Eight number trial pits (TPs 1 to 8) – with soakaway testing in TPs 1 to 5
Revealed ground conditions (in descending order)	• **Topsoil** • c. 0.35m-thickness of brown soily sand and silt • **Made ground** • c. 0.5m-thickness of imported chalk (in builder's compound) • **Glacial deposits – firm/stiff boulder clay** • Revealed across the site – usually to at least 4m depth • However, only reaches 0.9m depth in southwest area (TP205 & WS205) • Firm/stiff (often light-coloured) brown and grey sandy silty CLAY with variable amounts of chalk and flint gravel *(low shrinkability)* • **Possible Ampthill Clay Formation (AMC) – clay and mudstone** • Revealed at shallow depth (0.9m BEGL) in lower-lying southwest area of the site – typically revealed at elevations deeper than 18.0m to 18.5m AOD • Firm/stiff (thinly laminated) greenish or bluish grey CLAY *(high shrinkability)* • Includes occasional bands with limestone gravel or degraded rootlets • Clay could quickly become very stiff with depth and grade into mudstone
Groundwater observations	The recently revealed ground conditions appeared dry. No groundwater observations were recorded.
ENGINEERING ISSUES	
Foundations	• An allowable bearing pressure of 100kPa should be available to strip footings embedded into the revealed firm/stiff clays at about 0.9m depth. • Foundation soil will mostly be chalky light brown sandy clay (glacial boulder clay), but grey weathered mudstone clay is expected at shallow depth in the site's southwest corner. • Foundations may need to be deepened substantially near to existing trees and hedgerow. A tree survey is needed to evaluate the foundation depth (and heave protection) requirements. • If calculated required foundation depths are substantial (because of existing trees), some plots might need an alternative foundation solution, such as a raft or piles-and-ring-beam.
Excavations and groundwater control	• The findings of recent ground investigation works suggest that trenches could remain largely stable. However, appropriate safety precautions should be taken for all excavations and suitable shoring (or battering) provided where necessary. • Recent trial pits and boreholes saw no groundwater, so minimal groundwater control (such as sump pumping) might be needed. However, groundwater conditions can vary seasonally and can become much wetter following periods of high rainfall.

Floor slab design	• Suspended floors (such as beam and block) would be suitable. Subject to checks using the findings of a tree survey, an increased subfloor ventilation void height might be needed as heave protection. • Ground bearing slabs might be susceptible to movement near to existing trees, so would require further consideration.
Soakaways	• Percolation testing has shown that soakaways will not be feasible within the revealed ground conditions which are dominated by low permeability clays. • Alternative means of surface water management will be needed for the proposed development. This could include swales or an attenuation pond, for example, subject to review by a drainage engineer.
Slopes and retaining walls	• The site is on a slope, but the average gradient is only about 1 in 25. Therefore, no slope stability issues are anticipated. • Nevertheless, steepened slopes and retaining walls need to be suitably designed and constructed to mitigate any risk of failure (such as from sliding, deep rotational failure, foundation failure or overturning).
Road pavement design	• Recently recorded CBR values (on specimens at natural moisture content and in a soaked condition) are between 2.6% and 22%, as shown later (in Table 6). • Therefore, a modestly thick road pavement will be required, but there is no expected requirement for significant subgrade improvement works, subject to review by a highways engineer.
Buried concrete	• Recent geochemical testing has shown that buried concrete poured into the revealed glacial deposits could be designed to a BRE Special Digest 1 AC-1s classification because the ground conditions are not aggressive to concrete. • However, the grey weathered mudstone clays in the site's southwest corner could contain sulphides in pyritised fossils. Therefore, allowance to provide some sulphate resistance (for example, AC-3s) is recommended for concrete poured into excavations in this mudstone material.
Recommended further works	• Tree survey – followed by an evaluation of: 1. required footing depths for each proposed building, 2. heave protection requirements and 3. feasibility of strip footing solution
ENVIRONMENTAL ISSUES	
Results of soil contamination testing	• General contamination levels are very low with no human health (or plant health) GAC exceedances – for a residential development – detected in near surface topsoil for common contaminants such as PAHs, metals, asbestos, BTEX, VOCs and SVOCs • Detected levels of PAHs, BTEX, MTBE, VOCs and SVOCs in samples of topsoil ground material are acceptably below water industry threshold values for plastic water supply pipework

Revised contamination risk assessment	• There are no identified revised potential contamination linkages. There are no identified significant risks to human health, controlled waters, building materials or ecology. • There is some made ground in the existing builder's compound, but this is recently placed, natural clean chalk granular fill. Inspection of the compound shows it to be clean and well-managed and only used for the storage of inert materials and equipment, natural soils and well-maintained vehicles.
Proposed remediation	• No contamination remediation measures should be required for the proposed development. There are no identified significant contamination risks. • Contamination assessment and the scope of remediation measures are subject to review by the local planning authority's contaminated land team. No on-site building works should commence until any relevant contamination-related planning conditions have been discharged
Unforeseen contamination	• Work shall be halted in the area of any revealed unforeseen potential contamination and the contamination reported, investigated and assessed to the satisfaction of the local planning authority and any other relevant regulatory bodies.
Gas protection measures	• There are no identified credible sources of hazardous ground gas or vapours at or near to the site. No ground gas protection measures should be needed.
Water supply pipework	• Standard, plastic (polyethylene) water supply pipework should be suitable for below ground water supply pipework. However, this is subject to agreement with the local water authority (Anglian Water Services).
Reuse of site won material	• The revealed *in situ* natural (reworked) topsoil, glacial boulder clay and deeper mudstone clay could be generally suitable for reuse around the site, for example, within soft landscaping. These clean soils can be stockpiled and checked for suitability before being reused around the site. • The existing chalk fill could potentially be re-used on-site using a suitable exemption (for example a U1 exemption), permit or protocol (such as a Materials Management Plan, MMP), subject to appropriate checks. • Some surplus ground material is expected to require off-site removal. It is provisionally expected that such material will be suitable for an inert waste classification.
Further ground investigation	• No further trial holes recommended at this stage

1 Introduction

The client, Keigar Homes, has engaged Humberside Materials Laboratory Limited (HML) to undertake a geotechnical and geo-environmental (ground investigation) assessment in advance of a proposed low rise residential development on land off Applefields, Wrawby, North Lincolnshire. The land will be hereinafter referred to as *the site*.

This report addresses the second phase of development by Keigar Homes on land off Applefields, Wrawby. The first phase – located immediately east of the site – is currently under construction.

1.1 Aims

The aims of the ground investigation are threefold. The aims are to investigate the site's:

1. *Geo-environmental* ground conditions and carry out assessments to determine the nature and extent of contamination-related risks and possible required remediation measures. In this regard, this report is intended to provide a Stage 1 Tier 2: generic quantitative risk assessment (GQRA), as defined in the Environment Agency Land Contamination Risk Management (LCRM) guidance
2. *Geotechnical* ground conditions and carry out assessments to determine the engineering nature and behaviour of the ground material to facilitate engineering design and construction, including for foundations and other geo-structural elements, such as slopes and retaining walls
3. *Drainage* conditions and permeability to facilitate the design of soakaways or other infiltration systems

1.2 Scope

The scope of the investigation includes:

- A review of desk study information
- Intrusive investigation works (trial pits and boreholes)
- Analysis of revealed ground and groundwater conditions
- Geochemical & geotechnical laboratory testing
- Analysis and screening of ground contamination levels within the site
- Analysis of the ground conditions and geotechnical properties
- Revised conceptual site model of potential contamination linkages
- Revised assessment of contamination risks
- Recommendations for contamination remediation, where appropriate
- Assessment of ground engineering and drainage issues
- Recommendations for further investigation works, where appropriate

1.3 Conditions and Limitations

This report is produced solely for the client and should only be copied in full. When transmitted electronically, the definitive copy of the report is held by Humberside Materials Laboratory Ltd.

This report is prepared on the assumption that all facts have been disclosed.

The comments given in this report and the opinions expressed assume that conditions do not vary beyond the range revealed by this study and the information provided in the production of this report is complete and reliable.

2 Review of desk study information

Desk study information is presented in the HML Phase 1 (desk study) report (report ref. 0126/5708(2)/P/P1, dated Aug 2025) for the above site. A summary of the information is as follows.

2.1 Proposed development

The proposals consist of a new low rise residential development (of about 20 to 30 dwellings) with associated infrastructure. This is the second phase of development by the client (Keigar Homes) at Applefields, Wrawby (the ongoing first phase is immediately east).

2.2 Site description

The proposed residential development is located west of Applefields, Wrawby, North Lincolnshire, DN20 8GB, roughly centred around grid reference 501680, 408780.

The site is about 150m by 90m in plan area.

The site is existing farm field except for the southeast corner (about 15% of the total site area) which is currently used as a builder's compound. The farm field is split into north and south halves by an east-west oriented line of hedgerow and trees. Both halves are covered by short weeds and the ground surface is a stony, loamy topsoil throughout. The builder's compound, which is used to store construction materials, plant and cabins, is surfaced in imported chalk fill.

The site is sloped up towards the northeast at an average gradient of about 1 in 25. Ground levels range between about 18m and 24m AOD.

2.3 Site history

The site is farm fields which have never seen any previous significant development. Nonetheless, a former farm track crossed the site during the 19th and early 20th centuries and, for the last year or so, the southeast corner of the site has been a builder's compound.

There are no identified nearby historical landfills or mineworkings. The closest former gravel pits (possibly infilled around the 1960s) are about 370m south.

2.4 Geology, hydrology and hydrogeology

Based on published local geology and hydrogeology information, the provisionally anticipated ground conditions are as shown below (in Table 1).

Table 1: Published geology and hydrogeology (based on local mapping)

Strata	*Description*	*Anticipated depth to base (m BEGL)*	*Aquifer classification*
Made ground / Topsoil	For example, chalk fill in builder's compound	<1	-
Glaciofluvial deposits (GFD)	Sands and gravels, locally clayey and silty. More likely in higher-lying, northeast areas	0 – 3	Secondary Aquifer – A
Glacial Till	Boulder clay with layers of sand and gravel. Possible at shallow depth across most of the site and below the GFD.	2 – 8	Secondary Aquifer – Undifferentiated
Glaciolacustrine deposits (GLLD)	Sands and gravels. Could be present at shallow depth in the lower-lying southwest parts of the site – and possibly at depth below GFD and till deposits	2 – 10	Secondary Aquifer – A
	Clays and silts.	0 – 10	Unproductive Strata
Ancholme Group (AMG)	Mudstone with occasional nodules/bands of limestone. Ampthill Clay Formation (AMC) expected below the site, underlain by the West Walton Formation.	50+	Unproductive Strata
• No nearby groundwater Source Protection Zones (SPZs) • Nearest recorded (farm-related) groundwater abstraction is 268m south			

Hydrology:

- Adjacent drain (0m south) and balancing pond (0m east)
- River Ancholme (2.5km west)
- No significant flooding issues identified

2.5 Other environmental information

- No historical landfill sites have been identified near the site (from Defra online mapping), within 500m.
- No nearby potentially infilled land (within 250m)
- No identified nearby industry or commercial activity (within 150m)
- The site is not in a radon-affected area; no protection measures needed
- No significant hazard is anticipated from buried UXOs

2.6 Findings of previous nearby ground investigation works

HML previously carried out a ground investigation at the adjacent site (0m east) in January 2022. The revealed ground conditions consisted of:

- **Topsoil:**
- 0.15m- to 0.50m-thick layer of natural topsoil – across most of the site
- **Made ground:**
- Mainly revealed far to east of the site – to a depth of 0.40m to 0.90m

- Mainly comprised of sandy, silty and clayey soil with variable amounts of gravel sized particles of stone, brick, concrete and blast furnace slag
- **Glacial deposits:**
- Mainly comprised of soft (becoming firm/stiff) sandy gravelly silts and clays
- Includes some localised shallow sands (e.g. in BH4, TP2 and TP4)
- Probably at least 2m in thickness (across most of the site)
- **Possible Ampthill Clay Formation - mudstone:**
- Only revealed in BH4 (2.1m to 3.0m depth)
- Firm dark grey clay

Laboratory testing on samples of natural soil and made ground from the adjacent site did not identify any contamination levels of concern in a residential context.

2.7 Previous initial contamination assessment

The previous HML Phase 1 (desk study) report included a conceptual site model of potential contamination sources, pathways and receptors. The risks associated with possible contamination (source-pathway-receptor) linkages were assessed.

2.7.1 Initial conceptual site model (sources, pathways and receptors)

The following potential sources of contamination were identified for the site.

A. Former farm track
B. Current land use: builder's compound
C. Historical WWII bombing
D. Highly organic subsoils

However, none of the above sources (A to D) were considered potentially credible based on further analysis. The location of the former farm track is evidently surfaced in natural stone and soil. The existing builder's compound is used to store clean, inert materials and covered in imported clean chalk.

2.7.2 Preliminary risk assessment (PRA)

A previous preliminary risk assessment did not identify any potential contamination linkages with unacceptable risk. All risk ratings were Low (or Very Low). Therefore, all source-pathway-receptor contamination linkages were of acceptably low risk and not considered to require further attention.

3 Site Investigation Works

The procedures adopted for the site investigation were based on BS 5930 (2015 + A1:2020) – Code of Practice for Site Investigations and BS 10175 (2011 + A2, 2017). The soils and rocks encountered have been described based on BS5930 (2015 + A1:2020), BS EN ISO 14688-1 (2018), BS EN ISO 14688-2 (2018) and BS EN ISO 14689-1 (2018).

3.1 Fieldwork

Fieldwork took place on the following date.

- 27th June 2025:
  - *Eight number trial pits (TPs 201 to 208)*
  - *Five number dynamic sampler boreholes (WSs 201 to 205)*

The purpose of the site works was to investigate the ground conditions for several reasons, as detailed below (in Table 2). The objectives were to determine (1) the general shallow ground conditions and (2) geotechnical properties of the ground.

Table 2: Rationale for site works

Location	*Type*	*Rationale*
TP201, TP202, TP203, TP204, TP205,	Machine dug trial pits	• Reveal shallow ground conditions (to a depth of about 1m or 2m) • Provide soil samples for lab testing • *In situ* percolation testing
TP206, TP207, TP208		• Reveal shallow ground conditions (to a depth of about 1m or 2m) • Provide soil samples for lab testing
WS201, WS202, WS203, WS204, WS205	Dynamic sampler boreholes	• Reveal shallow and moderate depth ground conditions – to about 4m depth • Provide soil samples for lab testing • *In situ* penetration strength testing (SPTs)

Approximate locations of the site works are shown in the exploratory hole location plan which is presented later (in Appendix A).

The positions of the exploratory holes were established relative to existing site features and using GPS locating equipment. The depths to sub-strata and groundwater were measured from existing ground level. Ground levels were estimated from available topographical plans.

Logs for the exploratory holes are presented later (in Appendix B).

3.1.1 Machine dug trial pits (TPs 201 to 208)

Eight trial pits (TP201 to TP208) were excavated around the site. These were dug by a wheeled 8-tonne digger with a 450mm-wide toothed bucket under the supervision of an HML engineer to depths ranging between about 1.00m and 2.20m. The engineer logged the pits and took suitable samples for testing.

Five of the trial pits (TPs 201 to 205) were used for soakaway tests (also known as percolation or infiltration tests). Water was added to the trial pits and the level recorded until at least 75% drainage was achieved (or until either negligible infiltration or inward inflow was evident). Where possible, three consecutive fills were carried out as per BRE 365 (Garvin, 2016).

3.1.2 Dynamic (windowless) sampler boreholes (WS201 to WS205)

Five windowless sampler (i.e. dynamic sampler) boreholes (WSs 201 to 205) were drilled below the site by HML using a Dando Terrier (dynamic sampler) tracked drilling rig. This extracted 1m-long tubes of ground material which were between about 60mm and 110mm in diameter. No casing was used. The tubes of ground material were promptly logged and sub-sampled by an HML engineer.

The five boreholes (WS201 to WS205) were drilled around the site to try to encompass the proposed development area. The boreholes reached a maximum sampling depth of about 4m. The uncased boreholes were terminated at this depth because it was judged that reasonably competent shallow ground material was sufficiently proven.

A dip meter was used to check for the presence of groundwater during and after drilling.

Shear vane tests were carried out on suitable samples of cohesive clay soil (although potentially disturbed) within the sampling tubes, where available.

Standard Penetration Tests (SPTs) were carried out at 1m intervals within the boreholes (WS201 to WS205) using an automatic drop hammer. Based on depths, borehole diameter and expected hammer efficiency (c. 80%), corrected N_{60} values should be similar to recorded SPT *N* values.

3.2 Laboratory testing

Geotechnical testing was undertaken by Humberside Materials Laboratory (HML) at our UKAS accredited laboratory based on current best practice (such as BS1377, 1990). The scope of geotechnical testing comprised:

- Seven tests for plasticity index (PI) and moisture content (MC)
- Four tests for California Bearing Ratio (CBR) on remoulded soil samples at natural moisture content

- Four tests for California Bearing Ratio (CBR) on remoulded samples in a soaked condition

Geochemical testing was undertaken by Chemtech Environmental (Chemtech), a UKAS and MCERTS accredited laboratory. The scope of geochemical testing comprised:

- Three tests for a suite of metals and metalloids
- Three tests for a suite of polycyclic aromatic hydrocarbons (PAHs)
- Three tests for the presence of asbestos fibres
- Three number tests for a TRL suite of pH, sulphur, sulphates and other soluble metals salts
- One test for volatile organic compounds (VOCs) including tentatively identified compounds (TICs)
- One test for semi-volatile organic compounds (SVOCs) including tentatively identified compounds (TICs)

A schedule of testing is shown below (in Table 3). Results for all the laboratory testing undertaken are included later in this report (in Appendix C).

Table 3: Laboratory test schedule

Sample hole	*Sample location*	*HML Sample ref. (S/__)*	*Chemtech sample ref.*	*Depth (m BEGL)*	*Geotechnical*			*Geochemical*									
					PI & MC	*CBR (natural)*	*CBR (soaked)*	*Metals*	*PAHs*	*Asbestos*	*TPH by CWG*	*BTEX & MTBE*	*VOCs*	*SVOCs*	*TRL sulphate*	*WAC test*
WS201	WS201-2	75357	57120	0.50-1.00											✓	
	WS201-2	75396	-	0.50-1.00	✓											
	WS201-3	75397	-	1.20-1.50	✓											
WS202	WS202-1	75358	57121	0.10-0.40				✓	✓	✓						
	WS202-3	75398	-	1.20-1.60	✓											
WS203	WS203-1	75359	57122	0.10-0.45				✓	✓	✓						
	WS203-2	75360	57123	0.50-1.00											✓	
	WS203-2	75399	-	0.50-1.00	✓											
WS204	WS204-1	75361	57124	0.10-0.45				✓	✓	✓			✓	✓		
	WS204-3	75362	57125	1.50-2.00											✓	
	WS204-5	75400	-	3.50-4.00	✓											
	WS205-3	75401	-	0.70-0.90	✓											
WS205	WS205-4	75363	-	1.00-2.00											✓	
	WS205-4	75402	-	1.00-2.00	✓											
TP204	TP204-1	75392	-	0.50-0.90		✓	✓									
TP206	TP206-1	75393	-	0.50-1.00		✓	✓									
TP207	TP207-1	75394	-	0.50-1.00		✓	✓									
TP208	TP208-1	75395	-	0.50-1.00		✓	✓									

4 Revealed Ground and Groundwater Conditions

4.1 Sequence of sub-strata

The sub-strata as revealed at the site are summarised below (in Table 4). Copies of the exploratory hole logs are presented later (in Appendix B).

Table 4: Summary of revealed ground conditions

Strata		*Exploratory holes*												
		Boreholes					**Trial pits**							
		WS 201	**WS 202**	**WS 203**	**WS 204**	**WS 205**	**TP 201**	**TP 202**	**TP 203**	**TP 204**	**TP 205**	**TP 206**	**TP 207**	**TP 208**
		Depth to base of strata (m BEGL)												
TOPSOIL	Dark brown soily **SILT/SAND** with occasional flinty/chalky gravel and rootlets	0.30	0.40	0.40	0.45	0.40	0.31	0.40	0.35	0.25	0.22	0.31	0.32	0.27
GLACIAL DEPOSITS	Light brown slightly gravelly clayey **SAND**										0.54			
	Brown slightly gravelly sandy **SILT**					0.70								
	Firm/Stiff Boulder Clay	3.80	4.00 +	2.45	3.40	0.90	1.95 +	2.20 +	1.00 +	1.00 +	0.87	1.25 +	1.32 +	1.36 +
	Grey slightly sandy **SILT**			3.00										
	Firm grey slightly gravelly sandy **SILT**	4.00 +												
	Stiff/very stiff Boulder Clay			4.00 +										
Possible Ampthill Clay Formation (AMC)	**Firm/Stiff** (thinly laminated) (greenish) grey **CLAY** – with rare thin bands of gravelly clay or degraded rootlets					3.00					2.00 +			
	Stiff/very stiff grey **CLAY** (or extremely weak **MUDSTONE**)				4.00 +	4.00 +								
Boulder clay was typically revealed as: (light) brown mottled grey (slightly) sandy silty CLAY with (occasional / some / much) chalk and flint gravel														

The revealed ground conditions were generally as expected based on geological and historical desktop information. The ground conditions mainly consisted of (1) topsoil over (2) glacial deposits over (3) possible mudstone.

The ground conditions across the site seemed relatively consistent, but the glacial deposits became much thinner in the lower-lying southwest part of the site. Generally, the ground conditions varied quite predictably with the different topography around the site, for example, as shown later (in Appendix A), in geological cross-section sketches.

4.2 Topsoil

4.2.1 Extent and thickness of the topsoil

Topsoil was revealed in all exploratory holes around the site. The recorded thickness ranged between 0.22m and 0.45m. The average thickness was about 0.35m.

No exploratory holes were carried out within the existing builder's compound. No topsoil is anticipated in this area (except within existing heaps). The builder's compound is the only area where made ground is anticipated – in the form of imported chalk fill.

4.2.2 Nature of the topsoil

The revealed topsoil was found to comprise:

- Soily/humic dark brown silty SAND (or sandy SILT) with occasional gravel and rare rootlets

The topsoil has most likely being historically reworked by ploughing and tilling of the farm field. However, no anthropogenic material has been recorded and the soil could be natural residual topsoil in origin, so the topsoil has not been logged as made ground.

4.2.3 Visual or olfactory indicators of potential contamination in the topsoil

No signs of gross contamination were recorded. No asbestos containing materials (ACMs) or unusual odours or oily staining were recorded in the topsoil. No signs of any petroleum impacted ground material was identified.

Indeed, no signs of any potential contamination were recorded in the revealed topsoil. No anthropogenic material was logged, and the topsoil was consistent in appearance with a clean, natural topsoil.

4.3 Glacial deposits

4.3.1 Extent and thickness of the glacial deposits

Glacial deposits were logged across the site but became much thinner towards the low-lying southwest corner of the site:

- Within most exploratory holes, glacial deposits were recorded just below the topsoil and were revealed to the maximum depth of exploration of up to 4m below existing ground level (BEGL).
- However, within exploratory holes in the site's southwest corner (notably WS204, WS205 and TP205), the base of the glacial deposits was reached – at a depth ranging between 0.9m (in TP205 and WS205) and 3.4m (in WS204) BEGL.

Evidently, the base of the glacial deposits could be at an elevation of about 18.0m to 18.5m AOD. Based on rough estimated ground levels of exploratory holes, the revealed base of the glacial deposits ranged between 18.0m AOD (in WS204) and 18.5m AOD (in WS205 and TP205). Potentially, the base of the glacial deposits could be very roughly about 18m AOD across the site.

4.3.2 Nature of the glacial deposits

The glacial deposits were found to mostly comprise:

1. Firm/stiff gravelly sandy clay (possible boulder clay)
2. Occasional thin bands of sand or silt

Such above material is typical of glacial till deposits, which are shown in geology maps to outcrop below the site. The revealed soils are less likely to be glaciofluvial or glaciolacustrine deposits, which are also shown to outcrop below or near to the site.

Therefore, the revealed shallow soils (mainly sandy and gravelly clays) are most probably glacial till deposits. But they are almost definitely some form of glacial deposits.

4.4 Possible Ampthill Clay Formation (AMC) – clay and mudstone

4.4.1 Extent and thickness of the Possible Ampthill Clay Formation (AMC)

Possible AMC clays and mudstone were only recorded in exploratory holes in the site's lower-lying southwest corner. They were only logged in WS204, WS205 and TP205 – immediately below revealed glacial deposits.

The top of the AMC clays and mudstone was recorded at varying depth. The recorded depth to reach AMC material ranged between 0.9m (TP205, WS205) and 3.4m (WS204) BEGL and must be greater than 4m depth across most of the site.

However, the top of the AMC could be at a relatively consistent elevation around the site. It is estimated to range between 18.0m AOD (in WS204) and 18.5m AOD (in WS205 and TP205). It might be about or lower than 17.8m in WS201 (the next deepest exploratory hole in terms of elevation). Thus, subject to confirmation, the top of the AMC could be roughly 17m to 19m AOD across the site – and might deepen towards the northeast.

4.4.2 Nature of the Possible AMC clay and mudstone

The revealed possible AMC ground material was found to mainly consist of:

1. firm or stiff greenish or bluish grey CLAY and
2. stiff to very stiff thinly laminated CLAY / Extremely weak MUDSTONE

Within the more clay-like material (1, above), some localised bands of gravelly clay (possibly limestone or siltstone gravel) were noted as well as some degraded rootlets. A faint organic odour was noted locally in WS204.

The mudstone-like material was evidently on the cusp between a clay and a mudstone. Hence, it has been logged as CLAY / MUDSTONE. Such undifferentiated material,

indistinguishable as either a clay soil or mudstone bedrock, is common within many mudstone formations.

Such above clays and mudstone are typical of the Ampthill Clay Formation (AMC) and more generally, the Ancholme Clay Group (AMG). For example, descriptions in the local Brigg and Hull BGS geological memoir (by Gaunt *et al.*, 1992) note plant debris and organic odours within AMG mudstones.

4.5 Groundwater observations

No groundwater was observed in any of the boreholes or trial pits during recent site investigation works. The exploratory holes were evidently found to be dry.

The dry ground conditions could reflect seasonal conditions and might be only temporary. The investigation works were carried out in June after an unusually dry spring (in 2025). Some pockets of groundwater would be more likely in colder, wetter seasons or years, for example, following a wet winter and spring.

4.6 Observations of exploratory hole stability

No instability was recorded during recent borehole drilling or trial pit digging. This is unsurprising because the ground conditions were dry and consisted mainly of firm/stiff clays.

5 Results of Percolation Tests

The results of water soakaway infiltration/percolation testing in exploratory holes allow an assessment of the soil infiltration rate. This reflects the permeability of the ground conditions and helps determine the drainage potential of the ground conditions.

5.1 Results

Percolation testing was carried out in five trial pits: TPs 1 to 5. The tests were carried out in the ground material at depths ranging between 0.38m and 2.20m below existing ground level (BEGL), as inferred from the information below (in Table 5). The tests involved soakage of glacial deposits of boulder clay – although the testing in TP205 was in the possible Ampthill Clay Formation (AMC) clays and mudstone.

Table 5: Example water level changes during percolation tests

Test pit	*Ground conditions (in descending order)*	*Test pit depth (m)*	*Fill 1*		*Fill 2*		*Fill 3*	
			Time (mins)	*Water level (m BEGL)*	*Time (mins)*	*Water level (m BEGL)*	*Time (mins)*	*Water level (m BEGL)*
TP201	TS, CL	1.95	0	1.41	Testing terminated due to persistent lack of infiltration			
			18	1.41				
			139	1.41				
TP202	TS, CL	2.20	0	1.60	Testing terminated due to persistent lack of infiltration			
			30	1.60				
			144	1.60				
TP203	TS, CL	1.00	0	0.38	Testing terminated due to persistent lack of infiltration			
			15	0.38				
			122	0.38				
TP204	TS, CL	1.00	0	0.45	Testing terminated due to persistent lack of infiltration			
			22	0.47				
			120	0.47				
TP205	TS, SA, CL	2.00	0	1.51	Testing terminated due to persistent lack of infiltration			
			32	1.51				
			151	1.51				

Note: CL – clay. Not all recorded water level changes necessarily shown above, only key data

Negligible infiltration was seen within all five trial holes (TPs 1 to 5). After the addition of water, the water levels in the pits remained generally static, as detailed above (in Table 5), so testing was terminated.

The results prove that the revealed glacial deposits and underlying AMC clays and mudstone are of very low permeability. This is normal for clayey ground conditions.

6 Geotechnical Properties

The results of recent site testing, soil sampling and logging and lab testing allow an assessment of the geotechnical properties of the encountered ground conditions. This includes an evaluation of ground material classification (such as plasticity or grain size) and engineering behaviour (such as undrained shear strength or friction angle).

6.1 Strength/compactability of shallow soils

Recent laboratory CBR tests indicate CBR values ranging between 2.6% and 22% for subsoil samples taken from depths between 0.50m and 1.00m, as shown below (in Table 6), tested at natural moisture content. These are moderate CBR values and indicate that the shallow glacial boulder clay has some limited strength and stiffness after compaction (and soakage).

Table 6: Summary of *recent* CBR test results

Hole	*Geology*	*Ground level (m AOD)*	*Depth (m BGL)*	*Moisture condition*	*Soil description*	***CBR (%)***		*Moisture content*		*Swelling (mm)*	*Bulk density (Mg/m³)*	*Dry density (Mg/m³)*
						Top	***Bottom***	*Top*	*Bottom*			
TP204	GD	21.4	0.50-0.90	Natural	Stiff light brown light grey mottled sandy CLAY with occasional coarse to fine flint gravels	**14**	**14**	11	11	-	1.80	1.62
				Soaked	Stiff light brown light grey mottled sandy CLAY with occasional coarse to fine flint gravels	**2.6**	**3.2**	21	18	*3.3*	2.58	2.16
TP206	GD	19.6	0.50-1.00	Natural	Firm/Stiff light grey/brown grey/brown mottled sandy CLAY with occasional coarse to fine chalk and flint gravels	**7.6**	**6.9**	13	14	-	2.17	1.91
				Soaked	Firm/Stiff light grey/brown grey/brown mottled sandy CLAY with occasional coarse to fine chalk and flint gravels	**20**	**22**	14	14	*0.03*	2.18	1.91
TP207	GD	21.0	0.50-1.00	Natural	Firm orange/brown grey mottled slightly sandy SILT/CLAY with coarse to fine gravels	**4.4**	**3.2**	15	16	-	2.13	1.85
				Soaked	Stiff light brown light grey mottled sandy CLAY with occasional coarse to fine gravels	**4.5**	**5.6**	16	17	*1.2*	2.30	1.98
TP208	GD	23.2	0.50-1.00	Natural	Light brown friable SILT with some coarse to fine chalk gravels	**7.7**	**9.1**	13	13	-	2.18	1.93
				Soaked	Stiff light brown light grey mottled sandy CLAY with occasional coarse to fine flint gravels	**4.7**	**5.2**	15	15	*0.07*	2.10	1.83

GD – glacial deposits

6.2 Glacial deposits – boulder clay

As discussed earlier (in Section 4.3), glacial deposits almost entirely consisting of firm/stiff sandy gravelly silty CLAY (known as boulder clay) was recorded in all exploratory holes to a minimum depth of 0.9m (in TP205 and WS105) – in the site's southwest corner – and much deeper elsewhere.

6.2.1 Plasticity index and moisture content

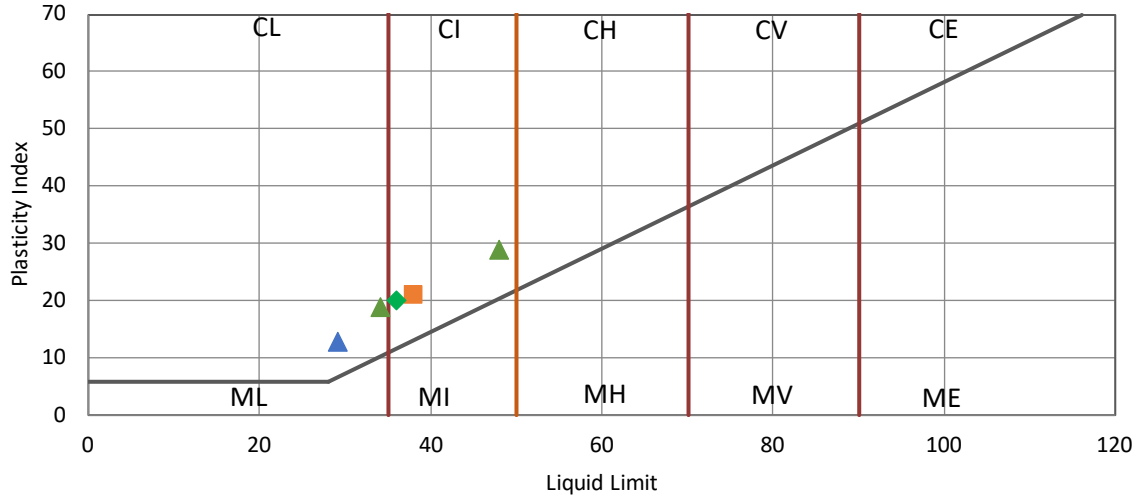
Five samples of glacial deposits of sandy, gravelly clay (boulder clay) were tested for plasticity index and moisture content, the results of which are shown later (in Appendix C). A summary is shown below (in Table 7).

Table 7: Plasticity and moisture content test results for glacial deposits

Recent test data									
Sample geology	*Sample location*	*Depth (m BEGL)*	*HML Sample reference*	*Natural moisture content (%)*	*Plastic limit (%)*	*Liquid limit (%)*	*Plasticity index (%)*	*% of sample passing 425µm sieve*	*Modified plasticity index (%)*
Glacial deposits	WS201	0.50-1.00	75396	11	17	38	21	95	**20**
	WS201	1.20-1.50	75397	18	16	36	20	95	**19**
	WS202	1.20-1.60	75398	14	16	29	13	73	**9.5**
	WS203	0.50-1.00	75399	14	15	34	19	79	**15**
	WS205	0.70-0.90	75401	16	19	48	29	72	**21**

The plasticity data for the boulder clay, as shown below (in Figure 1), suggests the soil material could be a low to intermediate plasticity clay. The location of the sample data points on the chart (just above the A-line) is indicative of a clay or a silty clay.

Figure 1: **Plasticity data for boulder clay glacial deposits**



The calculated modified plasticity index (i.e. the plasticity index multiplied by the fraction of sample passing a 425um sieve) of the boulder clay is between 9.5% and 21% as shown above (in Table 7). The mean average is 17%.

Previous HML sampling and testing on similar glacial clay material in 2022 adjacent to the site yielded modified plasticity indexes of between 6% and 10%. Therefore, while the glacial deposits material is shrinkable, it could be safely categorised as being of **low volume change potential** (for example, as defined by NHBC Standards) – which seems

reasonable for such a sandy and gravelly silty clay soil, as evidenced by photos in Appendix A.

6.2.2 *Anticipated unit weight*

No *in situ* bulk density testing has been carried out. Nevertheless, the unit weight of the revealed boulder clay soils, based on logged soil descriptions and historical correlation data, such as presented by Bond (2015), could typically range as follows.

- Dry unit weight: 17kN/m^3 – 22kN/m^3
- Saturated unit weight: 18kN/m^3 – 23kN/m^3

6.2.3 *Undrained shear strength*

The revealed boulder clay was found to be predominantly firm or stiff. Therefore, the undrained shear strength could be medium to high (that is, between 40kPa and 150kPa), based on typical correlations, as shown below (in Table 8).

Table 8: Clay undrained shear strength ranges and typical consistency

Strength descriptor (to BS5930)	*Undrained shear strength, c_u (kPa)*	*Typical consistency descriptor**	*Consistency field description⁺*	*Typical SPT N value**	*Typical SH DCP blowcount^ (/100mm)*
Extremely low	<10	*Very soft*	Finger easily pushed in by up to 25mm. exudes between fingers	0 – 1	0
Very low	10 – 20				
Low	20 – 40	*Soft*	Finger easily pushed in by up to 10mm. Moulds with light finger pressure	2 – 4	1 – 2
Medium	40 – 75	*Firm*	Thumb makes impression easily. Cannot be moulded by fingers. Rolls in the hand to a 3mm-thick thread without breaking or crumbling	4 – 10	3 – 4
High	75 – 150	*Stiff*	Can be indented slightly by thumb. Crumbles on rolling a 3mm-thick thread but can then be remoulded into a lump	10 – 20	5 – 8
Very high	150 – 300	*Very stiff*	Can be indented by thumb nail. Cannot be moulded. Crumbles under pressure	>20	>8
Extremely high	>300	*Hard*	-		

* Correlation based on findings of Terzaghi & Peck (1967) should be applied cautiously
^ Correlation based on findings of Huntley (1990) should be applied cautiously
⁺ based on British Standards, for example BS5930 (2015)

Very rough estimations of shallow boulder clay strength based on measured moisture content, liquid limit and plastic limit (from PI testing) are at least 93kPa, as shown below (in Table 9). This is not a reliable means of assessment, because samples that have been allowed to dry only very slightly might seem to have greater strength and samples that are wetted (a common occurrence during, say, shell and auger drilling when water is added to speed up the drilling) will seem to have much less strength.

Table 9: Boulder clay: estimated strength from plasticity & moisture tests							
Sample geology	*Sample location*	*Depth (m BEGL)*	*HML Sample reference*	*Natural moisture content (%)*	*Plastic limit (%)*	*Liquid limit (%)*	***Estimated undrained shear strength (kPa)***
Glacial deposits	WS201	0.50-1.00	75396	11	17	38	**>300**
	WS201	1.20-1.50	75397	18	16	36	**93**
	WS202	1.20-1.60	75398	14	16	29	**288**
	WS203	0.50-1.00	75399	14	15	34	**178**
	WS205	0.70-0.90	75401	16	19	48	**218**
* very roughly estimated only – based on findings of Vardanega & Haigh (2014)							

The strength results from hand vanes, as shown below (in Table 10), suggest the boulder clay of medium to very high strength. Measured strengths – after corrections for plasticity – are at least 69kPa.

Table 10: Shear hand vane (HV) test results in boulder clay			
Hole	*Depth (m BGL)*	*Raw un-drained shear strength (kPa)*	*Corrected undrained shear strength* (kPa)*
WS201	0.90	>190	>154
	2.90	130	105
WS202	2.90	>190	>154
	3.90	>190	>154
WS203	0.90	148	120
	2.90	70[&]	n/a
	3.90	156	126
WS204	0.90	>190	>154
	1.90	85	69
	2.90	>190	>154
WS205	0.90	>190	>154
	1.90	145[$]	n/a
* corrections based on findings of Morris and Williams (1994) using a plasticity index of 20% & reportedly in (possibly granular) coarse silt soil $ reportedly in AMC clay/mudstone			

Based on the findings of Stroud (1974), Terzaghi & Peck (1967) and HML historical data, an SPT *N* value correlation factor of about 6 could yield reasonable (possibly conservative) estimations of undrained clay shear strength (in kPa) for the local boulder clay. SPT *N* values tend to be of limited reliability in assessing clay strength. Nevertheless, calculated undrained shear strength could range between about 36kPa and 204kPa, as seen below (in Table 11).

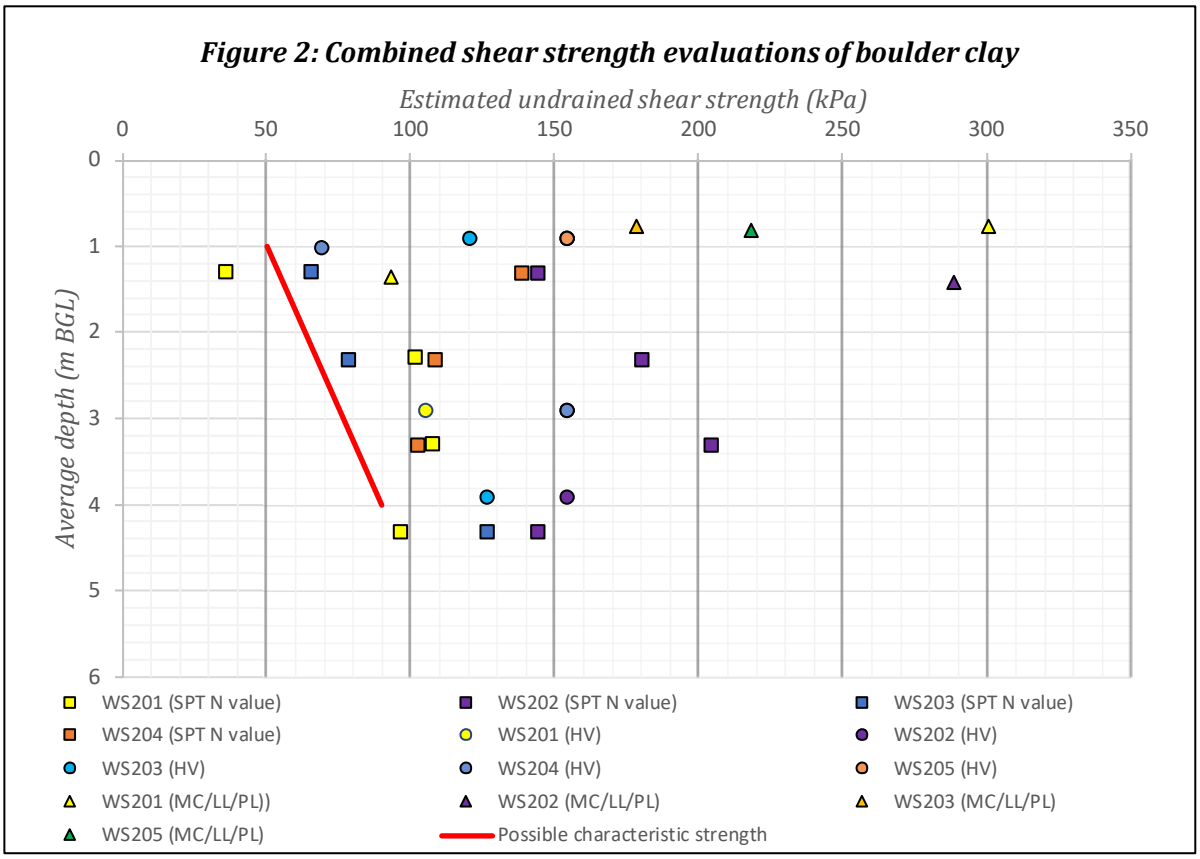
Overall, combined test results, as shown below (in Figure 2), with soil descriptions indicate the undrained shear strength of the boulder clay could mostly range between about 70kPa and 160kPa and the results are typical for a boulder clay.

A suitable characteristic undrained shear strength, $c_{u,k}$, could be about 50kPa, as shown below (in Figure 2), at a depth of about 1m within the revealed firm / stiff boulder clay. This strength could steadily decrease to about 90kPa by a depth of 4m.

Table 11: Boulder clay – estimated undrained shear strength from SPTs				
Borehole	*SPT start depth (m BEGL)*	*Average N value test depth (m BEGL)*	*SPT N value (blows/300mm)*	*Estimated undrained shear strength (kPa)*
WS201	1.00	1.30	6	**36**
	2.00	2.30	17	**102**
	3.00	3.30	18	**108**
	4.00	4.30	16	**96**
WS202	1.00	1.30	24	**144**
	2.00	2.30	30	**180**
	3.00	3.30	34	**204**
	4.00	4.30	24	**144**
WS203	1.00	1.30	11	**66**
	2.00	2.30	13	**78**
	4.00	4.30	21	**126**
WS204	1.00	1.30	23	**138**
	2.00	2.30	18	**108**
	3.00	3.30	17	**102**
	4.00	4.30	21⁺	**-**
WS205	1.00	1.30	11⁺	**-**
	2.00	2.30	12⁺	**-**
	3.00	3.30	16⁺	**-**
	4.00	4.30	22⁺	**-**

* The SPT was not carried out (mainly or wholly) in cohesive silt or clay; ⁺ The SPT was not carried out (mainly or wholly) in boulder clay

Figure 2: Combined shear strength evaluations of boulder clay



6.3 Possible Ampthill Clay Formation (AMC) – clay and mudstone

As discussed earlier (in Section 4.4), clay and mudstone possibly of the Ampthill formation (AMC) was recorded in a few lower-lying exploratory holes (WS204, WS205 and TP205) – in the site's southwest corner.

6.3.1 Plasticity index and moisture content

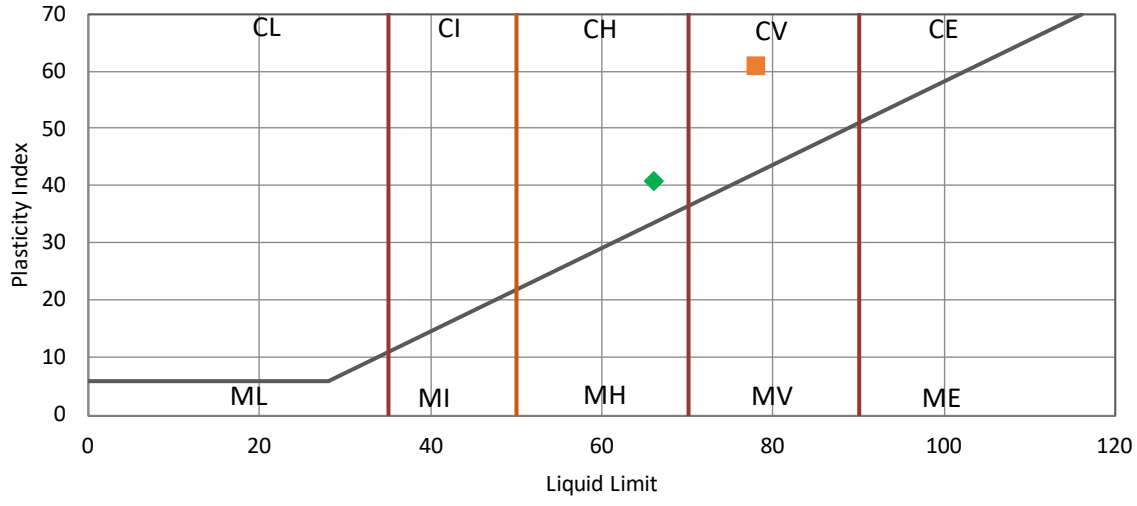
Two samples of possible AMC clay were tested for plasticity index and moisture content, the results of which are shown later (in Appendix C). A summary is shown below (in Table 12).

Table 12: Plasticity and moisture content test results for possible AMC clay

Recent test data									
Sample geology	*Sample location*	*Depth (m BEGL)*	*HML Sample reference*	*Natural moisture content (%)*	*Plastic limit (%)*	*Liquid limit (%)*	*Plasticity index (%)*	*% of sample passing 425µm sieve*	*Modified plasticity index (%)*
Possible AMC	WS204	3.50-4.00	75400	27	17	78	61	99	**60**
	WS205	1.00-2.00	75402	30	25	66	41	99	**41**

The plasticity data for the possible AMC clay, as shown below (in Figure 3), suggests the soil material could be a high to very high plasticity clay. The location of the sample data points on the chart (just above or far above the A-line) is indicative of a clay or a silty clay.

Figure 3: **Plasticity data for possible AMC clay**



The calculated modified plasticity index (i.e. the plasticity index multiplied by the fraction of sample passing a 425um sieve) of the possible AMC clay is between 41% and 60% as shown above (in Table 12). Therefore, the material is shrinkable and – using the

available data – and could be conservatively categorised as being of **high volume change potential** (for example, as defined by NHBC Standards).

6.3.2 Anticipated unit weight

No *in situ* bulk density testing has been carried out. Nevertheless, the unit weight of the revealed clay mudstone material, based on logged soil descriptions and historical correlation data, such as presented by Bond (2015), could typically range as follows.

- Dry unit weight: 17kN/m^3 – 22kN/m^3
- Saturated unit weight: 18kN/m^3 – 23kN/m^3

6.3.3 Undrained shear strength

The revealed possible AMC clay was found to be predominantly firm or stiff, or very stiff. Therefore, the undrained shear strength could be medium to very high (that is, between 40kPa and 300kPa), based on typical correlations, as shown above (in Table 8).

Very rough estimations of shallow boulder clay strength based on measured moisture content, liquid limit and plastic limit (from PI testing) are between 70kPa and 84kPa, as shown below (in Table 13). This is not a reliable means of assessment but can help support other strength measurements.

Table 13: AMC clay/mudstone: estimated strength from plasticity & moisture tests

Sample geology	*Sample location*	*Depth (m BEGL)*	*HML Sample reference*	*Natural moisture content (%)*	*Plastic limit (%)*	*Liquid limit (%)*	***Estimated undrained shear strength (kPa)***
AMC clay	WS204	3.50-4.00	75400	27	17	78	**70**
	WS205	1.00-2.00	75402	30	25	66	**84**

* very roughly estimated only – based on findings of Vardanega & Haigh (2014)

The strength results from hand vanes, as shown below (in Table 14), suggest the boulder clay of medium to high strength. Measured strengths – after corrections for plasticity – are between 66kPa and 84kPa.

Table 14: Shear hand vane (HV) test results in possible AMC clay

Hole	*Depth (m BGL)*	*Raw un-drained shear strength (kPa)*	*Corrected undrained shear strength* (kPa)*
WS105	1.90	145	84
TP205	1.10	128	74
		122	71
		120	70
	1.60	114	66
		124	72
		118	68

* corrections based on findings of Morris and Williams (1994) using a plasticity index of 60%

Based on the findings of Stroud (1974), Terzaghi & Peck (1967) and HML historical data, an SPT *N* value correlation factor of about 6 could yield reasonable (possibly conservative) estimations of undrained clay shear strength (in kPa) for the local possible AMC clay. SPT *N* values tend to be of limited reliability in assessing clay strength. Nevertheless, calculated undrained shear strength could range between about 66kPa and 132kPa, as seen below (in Table 15).

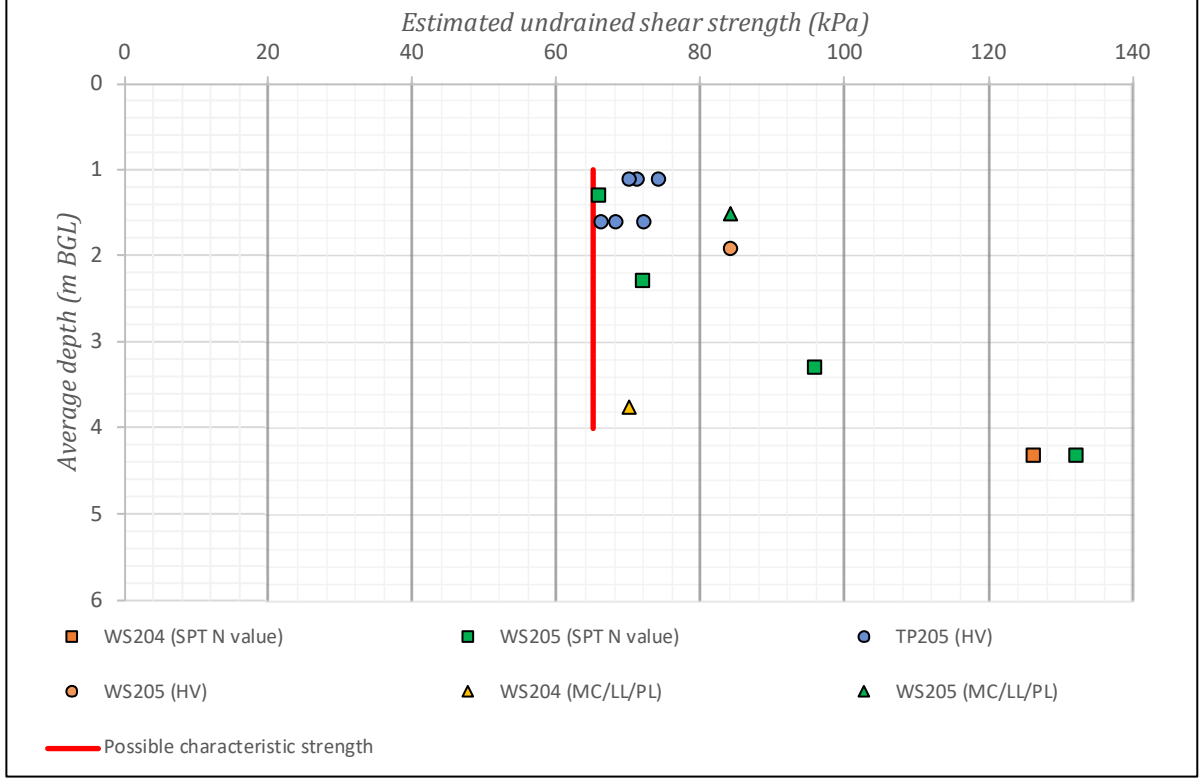
Table 15: possible AMC clay – estimated undrained shear strength from SPTs

Borehole	*SPT start depth (m BEGL)*	*Average N value test depth (m BEGL)*	*SPT N value (blows/300mm)*	*Estimated undrained shear strength (kPa)*
WS204	1.00	1.30	23+	-
	2.00	2.30	18+	-
	3.00	3.30	17+	-
	4.00	4.30	21	**126**
WS205	1.00	1.30	11	**66**
	2.00	2.30	12	**72**
	3.00	3.30	16	**96**
	4.00	4.30	22	**132**

* The SPT was not carried out (mainly or wholly) in cohesive silt or clay; + The SPT was not carried out (mainly or wholly) in boulder clay

Overall, combined test results, as shown below (in Figure 4), with soil descriptions indicate the undrained shear strength of the possible AMC clay could mostly range between about 65kPa and 85kPa and the results are typical for a residual clay from a weathered mudstone.

Figure 4: Combined shear strength evaluations of possible AMC clay



A suitable characteristic undrained shear strength, $c_{u,k}$, for the possible AMC clay could be about 65kPa, as shown above (in Figure 4). Possible higher strengths might be appropriate at greater depth, into less weathered mudstone.

7 Soil contamination screening

Detected soil contaminant concentrations (in made ground and natural ground) need to be compared against suitable assessment criteria to determine whether the contamination poses a potential hazard to the health of various receptors. Receptors include humans, ecology, building materials and controlled waters.

Generic assessment criteria (GAC) are taken from current best practice publications. The sources of the generic assessment criteria are detailed below (in Section 7.2) while subsequent sections within this chapter (Sections 7.3 to 7.4) compare these GAC against detected concentrations and provide detailed analysis of the findings.

7.1 Scope of soil contamination testing

As detailed earlier (in Table 3), tests for the presence of contaminants of potential concern have been carried out on samples of ground material. This includes near surface made ground and natural soil material. Contaminants tested for include:

- Metals
- PAHs
- Asbestos
- Sulphur, pH, sulphate and other soluble salts
- VOCs including TICs
- SVOCs including TICs

The complete test results are presented later (in Appendix C).

7.2 Assessment criteria

Generic assessment criteria (GAC) for soil and made ground within the proposed site development are presented later (in Table 16). A rationale explaining the basis for these GAC is presented below (in Sections 7.2.1 to 7.2.4).

Where detected concentrations are consistently below the GAC then the hazard from the contaminant is usually considered to be acceptable. If a pollutant is recorded at concentrations higher than the GAC then an unacceptable hazard is not necessarily present, but it does indicate that further consideration is merited.

7.2.1 Human health

Several sources have been used to determine suitable generic acceptance criteria (GAC) for human health, including the following, shown in general order of selected preference.

- Category 4 Screening Levels (C4SLs) as produced by CL:AIRE, SAGTA and SOBRA which covers the original six (Phase 1) contaminants (benzo(a)pyrene, lead, benzene, cadmium, chromium VI and arsenic) and recently published batches of Phase 2 technical reports for contaminants (including vinyl chloride, naphthalene and PFAS) while other reports for contaminants including beryllium are currently awaiting completion
- *Land Quality Management Ltd/Chartered Institute of Environmental Health suitable for use levels* (LQM/CIEH S4ULs) report (Nathanial *et al.*, 2015). This reference provides several GAC for a wide range of contaminants (89 in total) and development scenarios based on the CLEA model and a negligible health risk
- Human health Soil GAC from EIC/AGS/CL:AIRE (2010)
- Atkins ATRISK™ Soil Screening Values
- US EPA Regional Screening Levels for Chemical Contaminants

The GAC are based on the context of a **residential with plant uptake** development scenario. This setting represents the proposed works.

7.2.2 Ecology

Some GAC have been adopted for zinc, copper and nickel relating to their effect on ecological health (of plants, trees and so on). The GAC are based on trigger values published in BS 16729: 2013: 'Soil quality – Determination of nitric acid soluble fractions of elements,' and applied within BS 8332:2015: 'Specification for Topsoil.'

7.2.3 Water supply pipework

Detected concentrations of contaminants have also been compared against trigger values to assess whether plastic water supply pipework might be suitable. Trigger values have been taken from the following (in order of preference):

1. Water UK (2014) Contaminated Land Assessment Guidance: Protocols published by agreement between Water UK and the Home Builders Federation. Published by Water UK, January 2014
2. UKWIR (2011) UK Water Industry Research: "Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites"

7.2.4 Buried concrete

BRE Special Digest 1 (2005) is used to evaluate the aggressivity of ground material to buried concrete especially with respect to sulphate attack.

7.3 Test results compared with ecology / human health GAC

A full comparison of detected contamination test results against adopted human health (and ecological health) GAC is presented below (in Table 16). There is no identified GAC exceedance.

Table 16: Soil contamination results screened against human health/ecology GAC

Location:		WS201	WS202	WS203	WS203	WS204	WS204	WS105
Depth (m BGL):		0.50-1.00	0.10-0.40	0.10-0.45	0.50-1.00	0.10-0.45	1.50-2.00	1.00-2.00
Date sampled:		27/06/2025	27/06/2025	27/06/2025	27/06/2025	27/06/2025	27/06/2025	27/06/2025
Soil type:		Boulder clay	Topsoil	Topsoil	Boulder clay	Topsoil	Boulder clay	AMC clay
HML sample ref.:		S/75357	S/75358	S/75359	S/75360	S/75361	S/75362	S/75363
Chemtech sample ref.:		57120	57121	57122	57123	57124	57125	
Element	*GAC* (mg/kg)*	*Concentration detected (mg/kg)*						
Metals								
Arsenic	***37***	-	**5.6**	**7.7**	-	**9.3**	-	-
Beryllium	***1.7***	-	**0.4**	**0.5**	-	**0.6**	-	-
Boron	***3#***	-	**0.59**	**0.58**	-	**0.69**	-	-
Cadmium	***11***	-	<1.6	<1.6	-	<1.6	-	-
Copper	***100/135/200#***	-	**13.0**	**13.0**	-	**12.8**	-	-
Lead	***200***	-	**27.6**	**28.3**	-	**28.0**	-	-
Mercury	***1.2***	-	<0.7	<0.7	-	<0.7	-	-
Nickel	***60/75/110 #***	-	**10.5**	**11.3**	-	**13.5**	-	-
Zinc	***200/200/300 #***	-	**53.0**	**54.3**	-	**49.9**	-	-
Other metals	***-***	-	NGED	NGED	-	NGED	-	-
pH	***-***	8.4	-	-	8.3	-	8.5	-
PAHs								
Naphthalene	***2.3***	-	<0.016	<0.016	-	<0.016	-	-
Benzo(a)pyrene	***5***	-	**0.082**	**0.052**	-	**0.133**	-	-
Total PAHs	***-***	-	**0.887**	**0.555**	-	**1.17**	-	-
Asbestos								
Asbestos	***-***	-	**NAD**	**NAD**	-	**NAD**	-	-
SVOCs *(including tentatively identified compounds, TICs)*								
Other individual SVOCs	***-***	-	-	-	-	<0.10	-	-
SVOC TICs	***-***	-	-	-	-	N/D	-	-
VOCs *(including tentatively identified compounds, TICs)*								
Bromomethane	***-***	-	-	-	-	<0.030	-	-
Benzene	0.087	-	-	-	-	<0.010	-	-
Toluene	130	-	-	-	-	<0.010	-	-
Ethylbenzene	47	-	-	-	-	<0.010	-	-
m-, p-xylene	56	-	-	-	-	<0.010	-	-
o-xylene	60	-	-	-	-	<0.010	-	-
MTBE	43	-	-	-	-	<0.010	-	-
Other individual VOCs	***-***	-	-	-	-	<0.010	-	-
Pentadecane (TIC)	***-***	-	-	-	-	**0.12**	-	-
Hexadecane (TIC)	***-***	-	-	-	-	**0.11**	-	-

* based on LQM/CIEH (2015) Suitable for Use Level (S4UL) for residential with potential for consumption of home grown produce with soil organic matter (SOM) of 1%, unless otherwise indicated

& based on CL:AIRE-published Category Four Screening Levels (C4SLs) based on an SOM of 6% or, for naphthalene, 1%/2.5%/6%, respectively

ecological GAC shown respectively for pHs of (a) less than 6, (b) between 6 and 7 and (c) greater than 7

^ - no units. Sum of detected TPH fractions divided by relevant GAC should be less than 1.0 to ensure no cumulative hazard

£ - GAC taken from "The EIC/AGS/CL:AIRE Soil Generic Assessment Criteria for Human Health Risk Assessment," published by CL:AIRE (2010)

$ - GAC taken from US EPA Regional Screening Level (RSL) for Resident Soil, based on a Target Hazard Quotient (THQ) of 1.0

Note: potential GAC exceedances shown in red

Abbreviations: k – 1000; M – million; **MGR** – made ground; Poss. - possible; NGED – no GAC exceedances detected, NAD – no asbestos detected; ND – not detected; Nat. – natural; SA – sand; GR – gravel; CL – clay; SI – silt; + also includes natural soil; LI/S – limestone

Therefore, there are no detected concentrations of potential concern (to human or local plant health) in the different made ground or shallow natural soil samples for any of the following types of contaminants:

- **Metals, PAHs, TPH, asbestos, VOCs, SVOCs**

The results have not identified any significant hazard to human health of future site users or ecology within the tested samples.

7.3.1 Metals – human health and ecology

Detected levels of metals do not pose a hazard to human health within a residential development context. Measured concentrations are below (S4UL) GAC for a residential setting.

7.3.2 VOCs and SVOCs – human health

No identified human health GAC exceedance of VOCs or SVOCs has been identified, as summarised above (in Table 16). In fact, concentrations were consistently below the limits of test detection for all tested VOCs and SVOCs and almost no tentatively identified compounds (TICs) were detected.

On the other hand, two VOC TICs were recorded in a sample of shallow topsoil (from WS204) at low concentrations:

- Pentadecane (0.12mg/kg)
- Hexadecane (0.11mg/kg)

These two VOCs are often associated with diesel and some lubricating oils. However, no visual or olfactory indicators of diesel or petrol have been recorded and no BTEX or MTBE has been detected. Therefore, the presence of these two VOCs is slightly anomalous and could be a result, for example, of very minor sample cross-contamination.

In any case, the detected VOC concentrations do not pose a potentially significant hazard to human health. The likelihood of a substantial hazard from VOCs or diesel is negligibly low.

7.3.3 Asbestos – human health

The test results show that no asbestos fibres were detected in any of the three tested topsoil samples. No fragments of potential ACMs were noted within the exploratory hole logs.

Given the absence of detected or suspected rubbly made ground within the site, there is negligible likelihood of encountering a significant amount of asbestos fibres.

7.3.4 PAHs – human health

No human (or ecological) health GAC exceedances of PAHs have been detected. The maximum detected concentration of benzo(a)pyrene (BaP), for example, is only 0.133mg/kg.

7.4 Hazard to plastic water pipe screening values

The results of chemical tests show that the near surface made ground could be suitable for standard polyethylene (PE) water supply pipework as there is no presence of elevated organic contamination, as detailed below (in Table 17).

Table 17: Soil contamination results screened against water supply pipework GAC

Location:		WS201	WS202	WS203	WS203	WS204	WS204	WS105
Depth (m BGL):		0.50-1.00	0.10-0.40	0.10-0.45	0.50-1.00	0.10-0.45	1.50-2.00	1.00-2.00
Date sampled:		27/06/2025						
Soil type:		Boulder clay	Topsoil	Topsoil	Boulder clay	Topsoil	Boulder clay	Possible AMC clay
HML sample ref.:		S/75357	S/75358	S/75359	S/75360	S/75361	S/75362	S/75363
Chemtech sample ref.:		57120	57121	57122	57123	57124	57125	
Element	*GAC^ (mg/kg)*	*Concentration detected (mg/kg)*						
VOCs								
Naphthalene	***-***	-	<0.016	<0.016	-	<0.016	-	-
Benzo(a)pyrene	***-***	**-**	**0.082**	**0.052**	**-**	**0.133**	**-**	**-**
Other VOCs	***-***	-	-	-	-	0.23	-	-
Total VOCs	***0.5^***	-	**0.08**	**0.05**	**-**	**0.36**	**-**	-
Total petroleum hydrocarbons (TPH)								
EC5-EC10	***2^***	-	-	-	-	-	-	-
EC>10-EC16	***10^***	-	-	-	-	-	-	-
EC>16-EC40	***500^***	-	-	-	-	-	-	-
BTEX & MTBE								
BTEX + MTBE	***0.1^***	-	-	-	-	<0.06	-	-
SVOCs								
Total SVOCs	***2^***	-	-	-	-	<3	-	-

^ - threshold/trigger values (or GAC) for polyethylene water supply pipework as per Water UK (2014) and/or UKWIR (2011) Guidance, detailed later (in References). Abbreviations: MGR – made ground; ND – not detected

7.5 Hazard to buried concrete

The results of sulphate (SO_4) and pH tests (full copies of which are included in Appendix C) provide information about the required sulphate resistance of buried concrete within the ground conditions at the site. The buried concrete should be designed in accordance with BRE Special Digest 1 (BRE, 2005) using these results.

The revealed ground conditions are almost entirely comprised of predominantly clay material. Therefore, it should be reasonable to assume a static groundwater regime.

A low maximum concentration of 22.8mg/kg of water-soluble sulphate was detected in ground material samples (of boulder clay glacial deposits), as shown below (in Table 18). pH was between 8.3 and 8.4. These conditions are not aggressive to concrete.

No significant quantity (more than 0.3%) of oxidisable sulphides was found to be present. Therefore, if the boulder clay ground is exposed to air (e.g. during trench excavations) then there are not substantial sulphides in the tested ground material to oxidise into sulphates which could attack any buried concrete.

The maximum measured total potential sulfate (or sulphate) is a very low 0.05%.

Table 18: Soil sulphate content										
Stratum	*Hole*	*HML sample ref. (S/_)*	*Chemtech ref.**	*Depth (m BEGL)*	*Water-soluble sulfate (mg/l)*	*pH*	*Total sulfur, [TS] (%)*	*Total (acid-soluble) sulfate, [AS] (%)*	*Total potential sulfate, [3TS] (%)*	*Oxidisable sulfides [3TS-AS] (%)*
Boulder clay	WS201	75357	57120	0.50-1.00	22.8	8.4	0.0164	0.0622	0.05	0.00*
Boulder clay	WS203	75360	57123	0.50-1.00	10.6	8.3	0.0118	0.0281	0.04	0.01
Boulder clay	WS204	75362	57125	1.50-2.00	12.5	8.5	0.0096	0.0231	0.03	0.01
* negative values discounted and assumed to be 0.00										

Accordingly, a **DS-1 Design Sulfate and an AC-1s ACEC classification** should be suitable (based on guidance in BRE Special Digest 1, 2005) for buried concrete in contact with the revealed and tested natural (boulder clay) ground material.

No testing has been carried out on samples of possible AMC clay/mudstone which could be reached in the southwest parts of the site. The Ancholme Clay Group is not identified by BRE Special Digest 1 (2005) in its list of UK geological formations known to contain pyrite, but the mudstone is noted in geological memoirs to contain bands of pyritised fossils, that might partly oxidise into sulphate. Therefore, the concrete for footings in the southwest corner of the site might require some degree of sulphate resistance, possibly AC-3s, subject to further checks.

7.6 Summary of contamination test results

The screened contamination test results indicate the following:

- General contamination levels are very low with no human health (or plant health) GAC exceedances detected in near surface made ground for common contaminants such as PAHs, metals, asbestos, BTEX, VOCs or SVOCs
- Detected levels of PAHs, BTEX, MTBE, VOCs and SVOCs in samples of ground material are below water industry threshold values for plastic water supply pipework
- Sulphate and pH tests indicate no sulphate protection needed (AC-1s) for buried concrete in the shallow natural boulder clay. AC-3s sulphate protection might be required for concrete in the southwest part of the site poured into excavations in the AMC clay and mudstone

8 Engineering Discussion

All foundations and other geo-structural elements should be designed by a competent engineer with consideration to all factors and the information within this report.

8.1 Summary of ground conditions and geotechnical properties

In descending order, the revealed and assessed on-site ground conditions from across the site consist of the following.

1. **Topsoil**
   - c. 0.35m-thickness of brown soily sand and silt
2. **Made ground**
   - c. 0.5m-thickness of imported chalk (in builder's compound)
3. **Glacial deposits – firm/stiff boulder clay**
   - Revealed across the site – usually to at least 4m depth
   - However, only reaches 0.9m depth in southwest area (TP205 & WS205)
   - Firm/stiff (often light-coloured) brown and grey sandy silty CLAY with variable amounts of chalk and flint gravel
   - Suggested characteristic undrained shear strength, c_u: 50kPa (1m BEGL)
   - Volume change potential: *low*
4. **Possible Ampthill Clay Formation (AMC) – clay and mudstone**
   - Revealed at shallow depth (0.9m BEGL) in lower-lying southwest area of the site – typically revealed at elevations deeper than 18.0m to 18.5m AOD
   - Firm/stiff (thinly laminated) greenish or bluish grey CLAY
   - Locally includes bands with limestone gravel or degraded rootlets
   - Clay could quickly become very stiff with depth and grade into mudstone
   - Suggested characteristic undrained shear strength, c_u: 65kPa (1m BEGL)
   - Volume change potential: *high*

8.2 Foundations

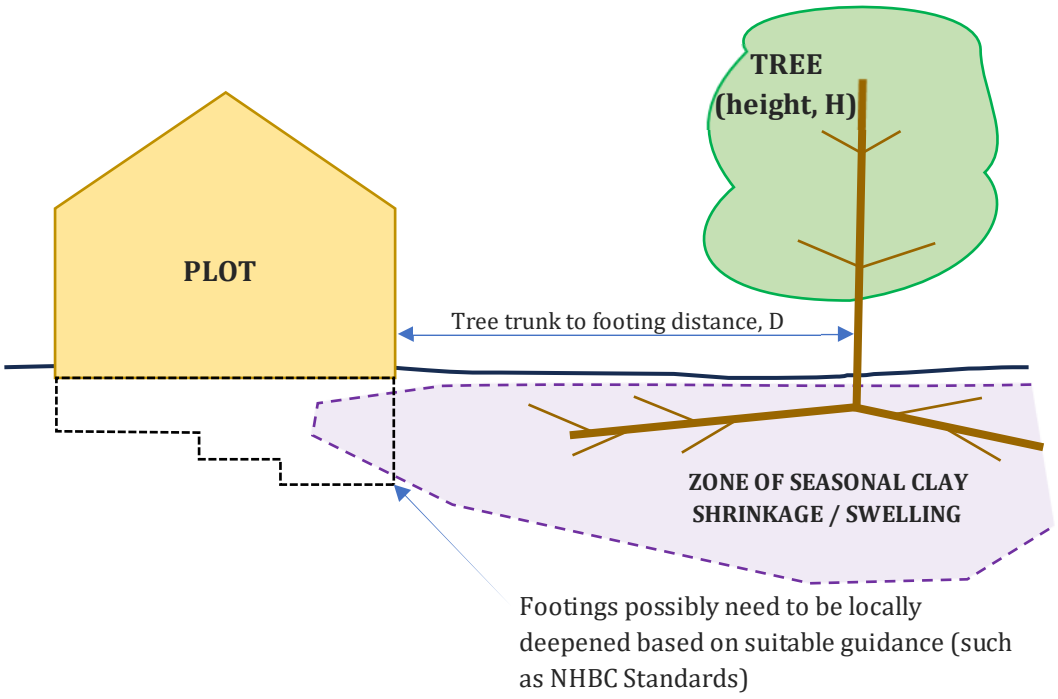
The anticipated foundation design is strip footings embedded into the revealed firm/stiff clays. An allowable bearing pressure of 100kPa should be available by a depth of about 0.9m, based on a tolerable total settlement of about 25mm.

The foundation soil for strip footings will mostly be glacial boulder clay – identifiable by the presence of chalky gravel within firm/stiff brown and grey sandy clay. But in the southwest corner of the site, the foundation soil is expected to be firm/stiff grey residual clays of weathered grey mudstone.

However, checks will need to be carried out to assess the impact of existing (or recently removed) trees on foundation design, as illustrated below (in Figure 5). If high water

demand trees are identified near to proposed dwellings, then the greater depth (potentially 2.5m), required to reach below the zone of seasonal clay shrinkage and swelling, could make strip footings expensive and difficult to build – and an alternative foundation solution (such as piles or rafts) might become more cost effective.

Figure 5: Possible requirement for local foundation deepening



Note: required footing deepening is subject to confirmation (using updated tree information and confirmed dwelling positions)

At this stage, no tall high water demand trees have been identified – so it is possible that strip footings might be suitable across the site. Nevertheless, there are existing trees and hedgerow, so it is recommended that a tree survey be carried out and required foundation depths evaluated (using suitable guidance, for example, NHBC Standards) on a plot-by-plot basis to check the feasibility of strip footings.

At this stage, it would be prudent to make budgetary allowance to provide raft foundations (or piles and ring beam foundations) to a small proportion of proposed dwellings.

In the southwest area of the site, there is a higher risk of adverse influence from trees on the clay foundation soils – and a subsequent requirement for expensive deep strip footings. The possible AMC clay in the southwest area is of high volume change potential (while the glacial clay deposits are assessed to be of low volume change potential).

There might also be increased risk of adverse foundation depths for houses built over or very close to the existing central dividing line of hedgerow and trees – if high water demand hawthorn is present.

Subject to further checks, heave protection measures could be required on the sides of foundations, for some plots. For example, as per NHBC Standards, void former is needed on the shallow insides of strips that need to be deeper than 1.5m because of existing trees.

8.3 Slab design

Suspended floors (such as beam and block) should be suitable across the site. Locally, subject to evaluation using the results of a tree survey, heave protection might be needed – so a standard 150mm subfloor ventilation void height might need to be increased.

Ground bearing slabs could potentially be susceptible to some seasonal clay shrinkage and swelling movement from the shallow clay subsoils, near to existing trees. Further consideration is recommended before a ground bearing slab is used.

8.4 Excavations

Based on the findings of the site works, conventional mechanical excavation plant should be suitable at the site. Most diggers would be expected to advance through the revealed shallow ground conditions – although some smaller mini-diggers might struggle with some of the stiff clay.

Recent vertical-sided trial pits and boreholes appeared to remain stable during the site investigation works. Therefore, shallow trenches and other steep-sided excavations could remain largely stable.

Nonetheless, appropriate safety precautions should be taken for all excavations (for example, as per CIRIA R97 Trenching Practice: 1993), especially where worker entry is required and where they are left open for prolonged periods. Suitable shoring (or battering of slopes) should be provided, where necessary.

Appropriate care should be taken to avoid excavation damage to underground utility infrastructure or existing structures. No existing on-site utilities have been identified during this investigation, but the absence or otherwise of services requires further checks.

8.5 Groundwater control

Little or no shallow groundwater was revealed during recent ground investigation works. Therefore, minimal groundwater control might be needed for shallow excavations.

On the other hand, some surface ponding could occur within clayey and silty excavations. This may require dewatering with sump pumps.

Also, ground conditions could become markedly wetter following periods of high rainfall. Thus, some groundwater control might be needed, depending on the season.

8.6 Slopes and retaining walls

As discussed earlier, the site is located on a west-facing slope which appears to have an average gradient of about 1 in 25. Such slopes are not expected to give rise to any instability issues.

Nevertheless, some terracing and short retaining walls to create level development plots are likely to be needed. Appropriate care should be taken adjacent to any terracing to ensure that excavations do not cause any instability or slope failure. Retaining walls need to be suitably designed and constructed to mitigate any risk of failure (such as sliding or overturning).

8.7 Soakaways

Soakaways will not be feasible within the revealed ground conditions, as evidenced by recent soakaway testing, described earlier (in Section 5). The ground conditions are dominated by clays whose permeability is very low.

It will be necessary to find alternative means to manage surface water run-off from the proposed development. This could include swales, below-ground storage or attenuation ponds. A drainage engineer should be able to provide further guidance.

8.8 Road design

The road design should reflect measured CBR values of the foundation soils, the moisture susceptibility of the foundation soils, the proposed adoption status and the requirements and highway specifications of the local highways authority, where relevant.

The recent recorded CBR values (from which subgrade surface moduli can be calculated) mean that a moderately thick road pavement will be required. However, there is no

expected requirement for subgrade improvement, such as lime/cement stabilisation or geogrid reinforcement.

Recently recorded CBR values (on specimens at natural moisture content and in a soaked condition) are between 2.6% and 22%, as shown earlier (in Table 6).

A competent highways engineer will need to complete the final road pavement design and should be able to provide further guidance.

9 Revised Contamination Assessment

9.1 Revised conceptual site model (CSM)

The sources, pathways and receptors of contamination at the site have been revised in light of the findings of recent site works. Generally, the same sources, pathways and receptors are still considered to be potentially relevant, as detailed previously (in report Section 2), although the additional information helps to determine the credibility of associated potential contamination linkages.

9.2 Revised contamination risk assessment

The results of the desk study review, initial contamination assessment, extensive site works and some contamination testing have been used to carry out a revised risk assessment, as shown below (in Table 19). Risks greater than very low or low are considered significant and require further consideration.

There are no identified revised potential contamination linkages with an unacceptable level of risk. There are no identified significant risks (rated higher than 'Low' or 'Very low') to human health, controlled waters, building materials or ecology.

9.2.1 Provisional proposed remediation

No contamination remediation measures should be required for the proposed development. There are no identified significant contamination risks.

Nevertheless, remediation measures are subject to local planning authority approval.

9.3 Ground gas risk assessment

There are no identified credible sources of hazardous ground gas or vapours at or near to the site. A ground gas assessment has concluded that risks from hazardous ground gas and vapours are acceptably low. This is explained as follows.

- Ground material is non-organic with no significant degradability
- There are no identified historical landfills or mineworkings in the local area
- No vapour producing contamination of significance has been detected or is now suspected around the site
- The site is not in a radon affected area

Accordingly, no requirement for ground gas protection measures is anticipated.

Table 19: Revised conceptual site model and risk assessment						
Revised conceptual site model			*Revised risk assessment*			
Potential source	*Potential pathway*	*Potential receptor*	*Probability*	*Severity*	*Risk rating*	*Comments / Rationale*
No credible source identified	Inhalation, ingestion, absorption	Future site users	Unlikely	Medium	Low	No credible source of significant toxic contamination. No human health GAC exceedances noted in recent contamination topsoil testing
		Ground workers	Unlikely	Medium	Low	
	UXO explosion	Ground workers	Negligible	Severe	Low	Likelihood of buried UXOs considered to be negligibly low
	Inhalation of vapours	Future site users	Unlikely	Medium	Low	No credible source of significant vapour-producing contamination. No significant volatile contamination detected in recent topsoil testing
		Ground workers	Unlikely	Medium	Low	
	Migration	Aquifer waters (such as in glacial deposits)	Unlikely	Medium	Low	Negligible contamination anticipated. There are no nearby groundwater Source Protection Zones (SPZs)
	Migration	Surface waters	Unlikely	Medium	Low	Negligible contamination anticipated. Nearest surface waters could be a drain adjacent to the south
	Absorption	Local flora and fauna	Unlikely	Medium	Low	No elevated levels of phytotoxic contamination (such as copper, nickel or zinc) are anticipated or have been detected
	Aggressive attack (by absorption)	Water supply pipework	Unlikely	Medium	Low	No suspected potential hydrocarbon contamination that might permeate standard (PE) plastic water supply pipe
		Buried concrete	Unlikely	Medium	Low	Ground expected to be low in sulphates and not aggressive to buried concrete

9.4 Water supply pipework

Standard, plastic (polyethylene) water supply pipework should be suitable for below ground water supply pipework. There is no identified credible hazard to water supply pipework within the site development area.

Nonetheless, water supply pipework is subject to agreement with the local water authority (Anglian Water Services) whose new connections team should be consulted at the earliest opportunity to agree specifications for the installation of water supply material.

Further guidance can be obtained from local water authorities, for example, via the following website addresses.

- https://www.anglianwater.co.uk/SysSiteAssets/developers/aws-contaminated-land-sm.pdf

- https://www.anglianwater.co.uk/SysSiteAssets/developers/water-services/laying-a-new-or-replacement-supply-pipe.pdf

9.5 Reuse of site won material

The revealed *in situ* natural topsoil, boulder clay and weathered mudstone/clay could be generally suitable for reuse around the site within soft landscaping or elsewhere. These clean soils can be stockpiled and checked for suitability before being reused around the site.

On the other hand, excavated made ground will only be suitable for on-site re-use if covered by a suitable exemption, permit or protocol. Existing recently imported chalk fill appears to be clean and uncontaminated, based on cursory visual inspection, so could potentially be re-used on-site (for example, using a U1 exemption or suitably administered Materials Management Plan, MMP), subject to appropriate checks.

Where waste is created during construction works, such as soil arisings from trench excavations, then waste regulations require the reuse is covered by an environmental permit or a suitable waste exemption (for example, a U1 or T5 Exemption) or protocol (such as the WRAP Protocol or the CL:AIRE Definition of Waste: Code of Practice). However, the revised Waste Framework Directive (2008/98/EC) explains that the following does not need to be classed as waste and can be reused on site: *"uncontaminated soil and other naturally occurring material excavated in the course of construction activities where it is certain that the material will be used for the purposes of construction in its natural state on the site from which it was excavated"*.

It is expected that some ground material will be surplus to needs and will require off-site removal as waste. Recent contamination tests suggest that on-site ground material could be classed as inert waste, but this is subject to further review by suitably authorised individual waste facilities.

9.6 Unforeseen contamination

Any unforeseen contamination (for example, petroleum odours or staining or asbestos containing materials) encountered during the development of the site must be monitored and immediately reported to the local authority. Work shall be halted in the area of any revealed potential contamination and the contamination investigated and assessed to the satisfaction of the local planning authority and any other relevant regulatory bodies.

10 SUMMARY & CONCLUSIONS

10.1 Desk study information

10.1.1 Proposed development

The proposals consist of a new low rise residential development (of about 20 to 30 dwellings) with associated infrastructure. This is the second phase of development by the client (Keigar Homes) at Applefields, Wrawby (the ongoing first phase is immediately east).

10.1.2 Site description

The proposed residential development is located west of Applefields, Wrawby, North Lincolnshire, DN20 8GB, roughly centred around grid reference 501680, 408780.

The site is about 150m by 90m in plan area.

The site is existing farm field except for the southeast corner which is currently used as a builder's compound. The farm field is split into north and south halves by an existing row of hedge and trees. The builder's compound is surfaced in imported white chalk fill.

The site is sloped up towards the northeast at an average gradient of about 1 in 25. Ground levels range between about 18m and 24m AOD.

10.1.3 Site history

A former farm track crossed the site during the 19th and early 20th centuries and, for the last year or so, the southeast corner of the site has been a builder's compound.

10.1.4 Geology, hydrology and hydrogeology

Published local geology and hydrogeology information indicates local ground conditions consist of (in descending order):

- Glacial deposits (glacial till, glaciofluvial and glaciolacustrine), which are a *Secondary Aquifer* – of clays, sands and gravels
- Ampthill Clay Formation (AMC) which is *Unproductive Strata* – of mudstone (or clay) with rare limestone nodules

Hydrology:

- Adjacent drain (0m south) and balancing pond (0m east)
- River Ancholme (2.5km west)

- No significant flooding issues identified

10.1.5 Other environmental information

- No nearby historical landfill sites (within 1km)
- No nearby potentially infilled land (within 250m)
- No identified nearby industry or commercial activity (within 150m)
- The site is not in a radon-affected area
- No significant hazard is anticipated from buried UXOs

10.1.6 Findings of previous nearby ground investigation works

Previous HML ground investigation adjacent to the east revealed:

- **Topsoil** – to a depth of 0.15m to 0.50m
- **Made ground** – of soil with rubble – to a depth of 0.4m to 0.9m
- **Glacial deposits** – of soft (becoming firm/stiff) sandy gravelly silts and clays, which localised shallow sands – to more than 2m depth
- **Possible Ampthill Clay Formation** – firm dark grey clay – locally at a depth greater than 2.1m

Previous soil contamination testing did not identify any concern to human health.

10.2 Recently revealed (on-site) ground conditions

Recently revealed ground conditions (in descending order) are summarised as follows.

1. **Topsoil**
   - c. 0.35m-thickness of brown soily sand and silt
2. **Made ground**
   - c. 0.5m-thickness of imported chalk (in builder's compound)
3. **Glacial deposits – firm/stiff boulder clay**
   - Revealed across the site – usually to at least 4m depth
   - However, only reaches 0.9m depth in southwest area (TP205 & WS205)
   - Firm/stiff (often light-coloured) brown and grey sandy silty CLAY with variable amounts of chalk and flint gravel
4. **Possible Ampthill Clay Formation (AMC) – clay and mudstone**
   - Revealed at shallow depth (0.9m BEGL) in lower-lying southwest area of the site – typically revealed at elevations deeper than 18.0m to 18.5m AOD
   - Firm/stiff (thinly laminated) greenish or bluish grey CLAY
   - Includes occasional bands with limestone gravel or degraded rootlets
   - Clay could quickly become very stiff with depth and grade into mudstone

10.3 Engineering issues

10.3.1 Foundations

An allowable bearing pressure of 100kPa should be available to strip footings embedded into the revealed firm/stiff clays at about 0.9m depth.

Foundation soil will mostly be chalky light brown clay (glacial boulder clay), but grey weathered mudstone clay is expected at shallow depth in the site's southwest corner.

Foundations may need to be deepened substantially near to existing trees and hedgerow. A tree survey is needed to evaluate the foundation depth (and heave protection) requirements.

If calculated required foundation depths are substantial (because of existing trees), some plots might need an alternative foundation solution, such as a raft or piles-and-ring-beam.

10.3.2 Slab design

Suspended floors (such as beam and block) would be suitable. Subject to checks using the findings of a tree survey, an increased subfloor ventilation void height might be needed as heave protection.

Ground bearing slabs might be susceptible to movement near to existing trees, so would require further consideration.

10.3.3 Excavations and groundwater control

The findings of recent ground investigation works suggest that trenches could remain largely stable. However, appropriate safety precautions should be taken for all excavations and suitable shoring (or battering) provided where necessary.

Recent trial pits and boreholes saw no groundwater, so minimal groundwater control (such as sump pumping) might be needed. However, ground conditions can vary seasonally and can become much wetter following periods of high rainfall.

10.3.4 Slopes and retaining walls

The site is on a slope, but the average gradient is only about 1 in 25. Therefore, no slope stability issues are anticipated.

Nevertheless, steepened slopes and retaining walls need to be suitably designed and constructed to mitigate any risk of failure (such as from sliding, deep rotational failure, foundation failure or overturning).

10.3.5 Soakaways and surface water management

Percolation testing has shown that soakaways will not be feasible within the revealed ground conditions which are dominated by low permeability clays.

Alternative means of surface water management will be needed for the proposed development. This could include swales or an attenuation pond, for example, subject to review by a drainage engineer.

10.3.6 Road design

Recently recorded CBR values (on specimens at natural moisture content and in a soaked condition) are between 2.6% and 22%, as shown earlier (in Table 6). Therefore, a modestly thick road pavement will be required, but there is no expected requirement for significant subgrade improvement works, subject to review by a highways engineer.

10.3.7 Buried concrete sulphate resistance

Recent geochemical testing has shown that buried concrete poured into the revealed glacial deposits could be designed to a BRE Special Digest 1 AC-1s classification because the ground conditions are not aggressive to concrete.

However, the grey weathered mudstone clays in the site's southwest corner, which have not been tested, could contain sulphides in pyritised fossils. Therefore, allowance to provide some sulphate resistance (for example, AC-3s) is recommended for concrete in this mudstone material.

10.4 Environmental issues

10.4.1 Results of contamination testing

The results of soil contamination test results indicate the following:

- General contamination levels are very low with no human health (or plant health) GAC exceedances – for a residential development – detected in near surface topsoil for common contaminants such as PAHs, metals, asbestos, BTEX, VOCs or SVOCs
- Detected levels of PAHs, BTEX & MTBE, VOCs and SVOCs in samples of ground material are acceptably below water industry threshold values for plastic water supply pipework

10.4.2 Revised contamination risk assessment

There are no identified revised potential contamination linkages. There are no identified significant risks to human health, controlled waters, building materials or ecology.

There is some made ground in the existing builder's compound, but this is recently placed, natural clean chalk granular fill. Inspection of the compound shows it to be clean and managed and only used for the storage of inert materials and equipment, natural soils and well-maintained vehicles.

10.4.3 Provisional proposed remediation

No contamination remediation measures should be required for the proposed development. There are no identified significant contamination risks. However, this is subject to review by the local planning authority's contaminated land team and no on-site building works should commence without the team's approval.

10.4.4 Ground gas risk assessment

There are no identified credible sources of hazardous ground gas or vapours at or near to the site. No ground gas protection measures should be needed.

10.4.5 Water supply pipework

Standard, plastic (polyethylene) water supply pipework should be suitable for below ground water supply pipework. However, this is subject to agreement with the local water authority (Anglian Water Services).

10.4.6 Reuse of site won material

The revealed *in situ* natural (reworked) topsoil and revealed clays and mudstone could be generally suitable for reuse around the site, for example, within soft landscaping. These clean soils can be stockpiled and checked for suitability before being reused around the site.

The existing chalk fill could potentially be re-used on-site using a suitable exemption (for example a U1 exemption), permit or protocol (such as a Materials Management Plan, MMP), subject to appropriate checks.

Some surplus ground material is expected to require off-site removal. It is provisionally expected that such material will be suitable for an inert waste classification.

10.4.7 Unforeseen contamination

Work will need to be immediately halted in the area of any revealed unforeseen potential ground contamination and the contamination promptly reported, investigated and assessed to the satisfaction of the local planning authority and any other relevant regulatory bodies.

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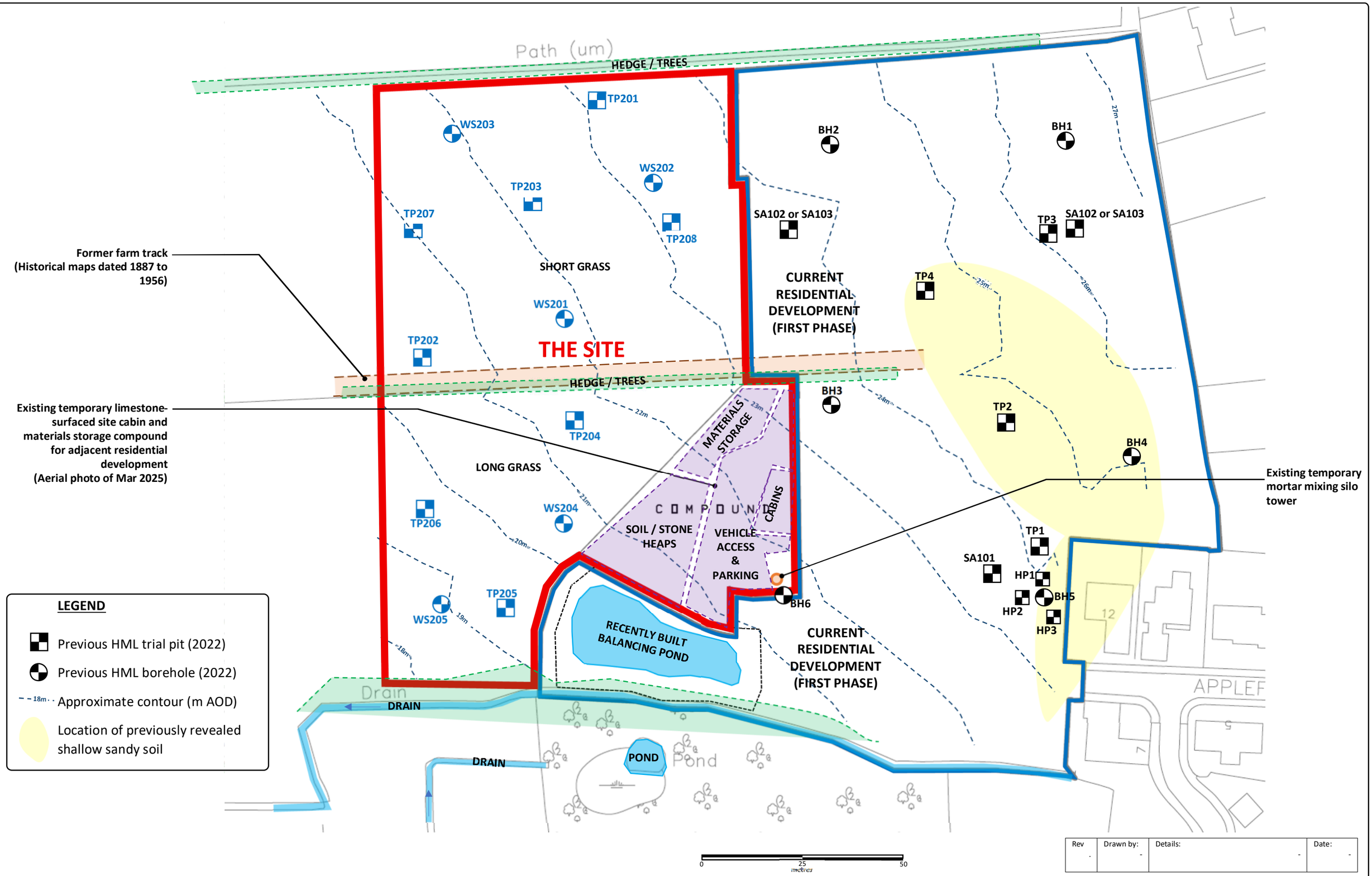
Appendix A

Plans & Photographs



Rev	Drawn by:	Details:	Date:
.	-	-	-

HUMBERSIDE MATERIALS LABORATORY LIMITED
Atherton Way
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North Lincolnshire
DN20 8AR
Telephone: 01652 652753
www.humbersidematerialslab.co.uk

Notes:
1. Do not scale
2. All locations are approximate only
3. This drawing must be read in conjunction with HML Phase 1 (ground investigation) report, report ref: 0126/5708(2)/P/P2
4. SA101 to SA103 carried out by others (not HML) c. 2017

Drawing Title: **Exploratory hole location plan**
Site: Land off Applefields, Wrawby (Second Phase)
Client: Keigar Homes
Project No.: 0126/5708(2)/P

Drawn by: **RL**
Checked by: **DD**
Scale: **As shown**
Size: **A3**
Date: **15 Aug 2025**

Drawing number: **0126-5708(2)-P1-01**
Revision: **-**

The site

SOUTHWEST — SOUTHEAST

WS205 — TP205 — WS204

Elevation (m AOD)

21.0 / 20.5 / 20.0 / 19.5 / 19.0 / 18.5 / 18.0 / 17.5 / 17.0 / 16.5 / 16.0 / 15.5

TOPSOIL

BOULDER CLAY: Firm/Stiff light brown mottled grey slightly gravelly sandy silty CLAY with variable chalk and flint gravel *(GLACIAL DEPOSITS)*

GLACIAL DEPOSITS

Possible Ampthill Clay Formation (AMC)

Firm/Stiff greenish/bluish grey CLAY

Rare thin bands include limestone gravel or degraded rootlets

(Possible Ampthill Clay Formation, AMC)

Stiff/very stiff grey CLAY (or Extremely weak MUDSTONE)

(Possible Ampthill Clay Formation, AMC)

Stiff/very stiff thinly laminated grey CLAY (or Extremely weak MUDSTONE)

(Possible Ampthill Clay Formation, AMC)

Legend

- Recorded groundwater strike
- Recorded standing groundwater level

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Notes:
1. Do not scale
2. All locations are approximate only
3. Strata boundaries, ground surface and groundwater levels are inferred or imagined only, highly speculative and subject to confirmation
4. Strata descriptions are typical and could vary

N

Drawing Title: **Recent geological cross section sketch 1 of 2**
Site: Land off Applefields, Wrawby (Second Phase)
Client: Keigar Homes
Project No.: 0126/5708(2)/P

Drawn by: **RL**
Checked by: **MD**
Scale: **As shown**
Size: **A3**
Date: **22 Aug 2025**

Drawing number: **0126-5708(2)-P2-02**
Revision: **-**

The site

SOUTHWEST — NORTHEAST

WS205 — TP204 — WS201 — WS202

Elevation (m AOD)

TOPSOIL

BOULDER CLAY: Firm/Stiff light brown mottled grey slightly gravelly sandy silty CLAY with variable chalk and flint gravel *(GLACIAL DEPOSITS)*

GLACIAL DEPOSITS

Possible Ampthill Clay Formation (AMC)

Firm/Stiff greenish/bluish grey CLAY
Rare thin bands include limestone gravel or degraded rootlets
(Possible Ampthill Clay Formation, AMC)

~~Stiff/very stiff~~ thinly laminated grey CLAY (or Extremely weak MUDSTONE)
(Possible Ampthill Clay Formation, AMC)

Legend

- Recorded groundwater strike
- Recorded standing groundwater level

Rev	Drawn by:	Details:	Date:

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Notes:
1. Do not scale
2. All locations are approximate only
3. Strata boundaries, ground surface and groundwater levels are inferred or imagined only, highly speculative and subject to confirmation
4. Strata descriptions are typical and could vary

N

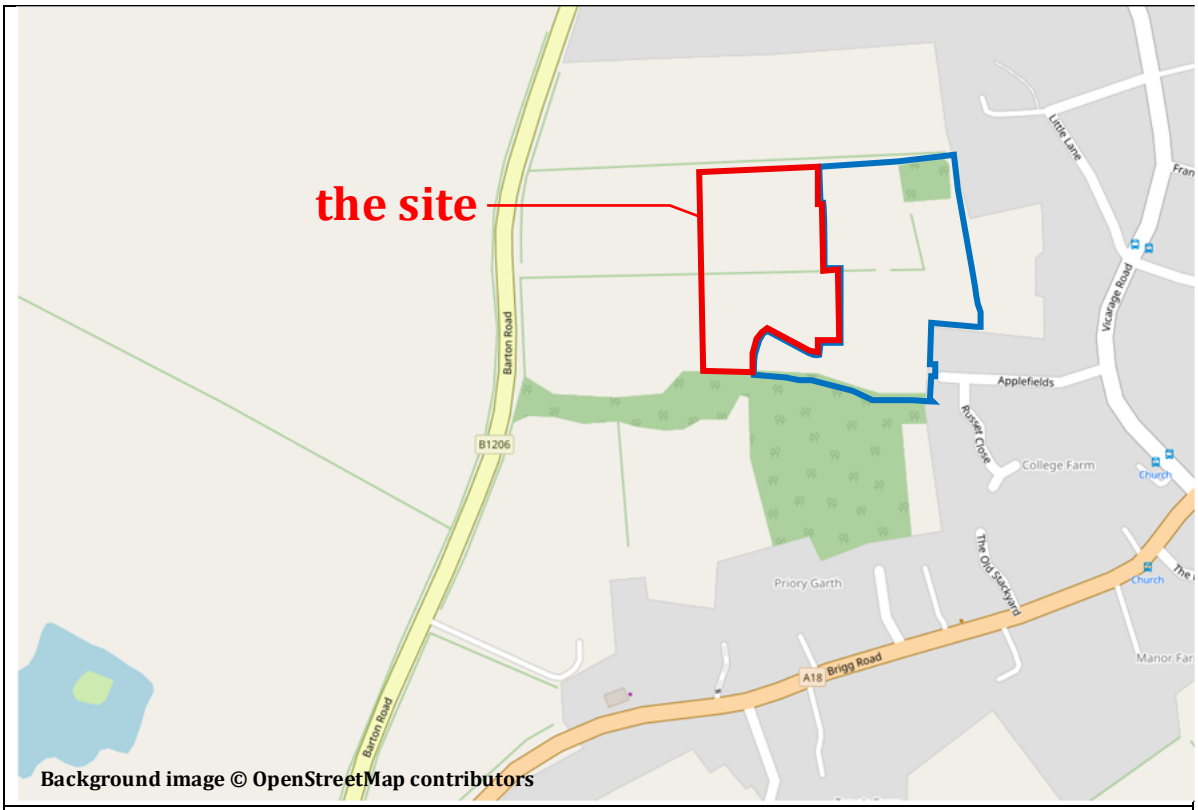
Drawing Title: **Recent geological cross section sketch 2 of 2**
Site: Land off Applefields, Wrawby (Second Phase)
Client: Keigar Homes
Project No.: 0126/5708(2)/P

Drawn by: **RL**
Checked by: **MD**
Scale: **As shown**
Size: **A3**
Date: **22 Aug 2025**

Drawing number: **0126-5708(2)-P2-03**
Revision: **-**

Appendix A

Plans & Photographs



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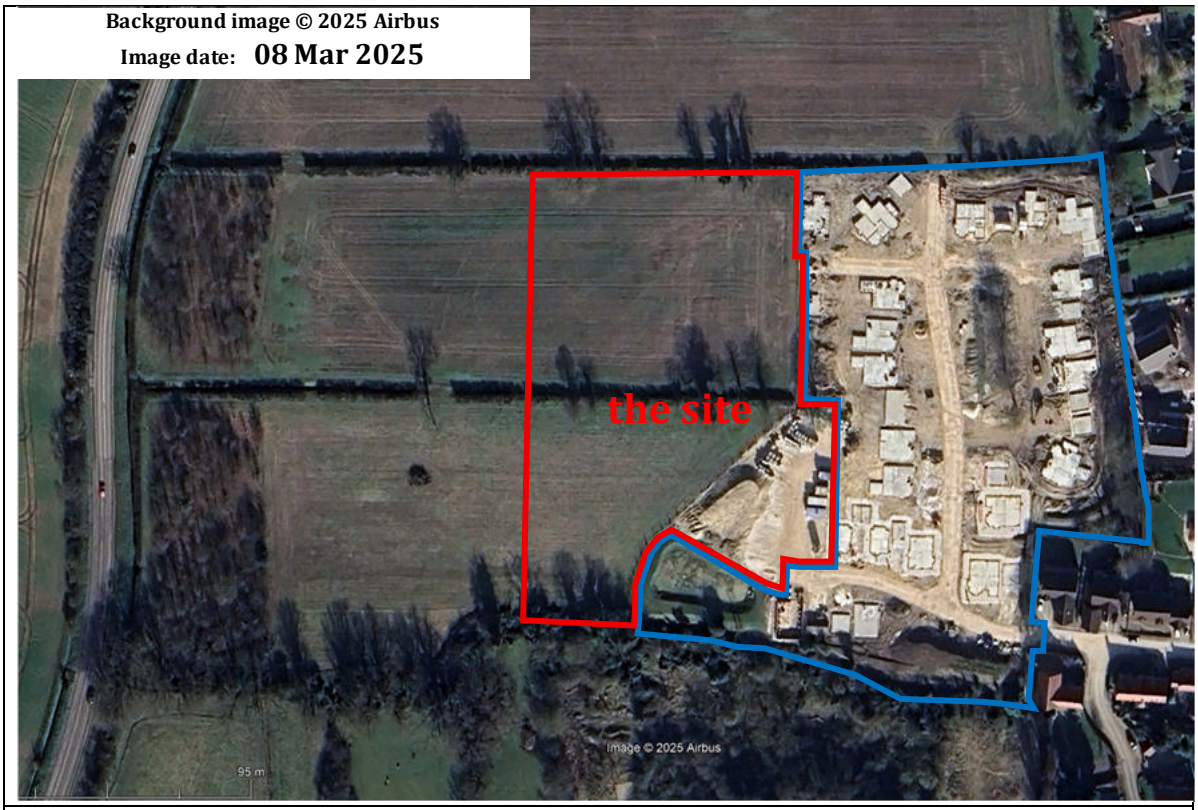

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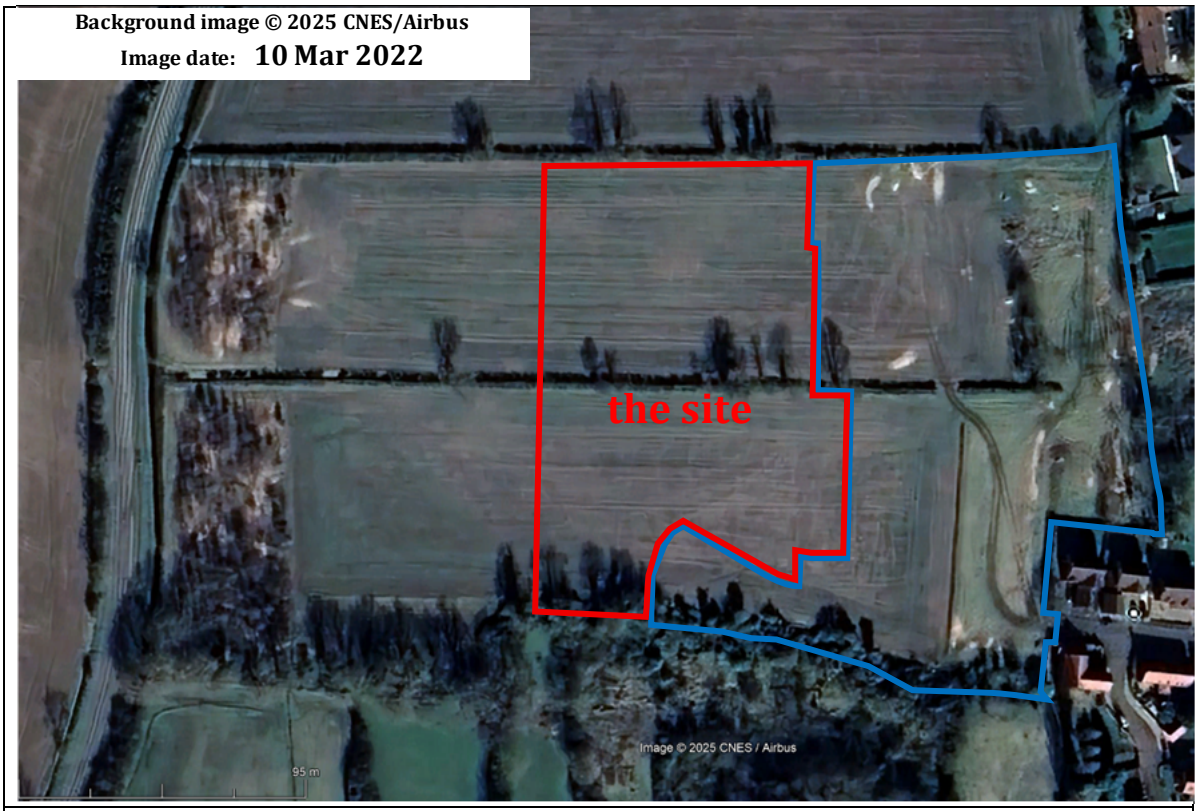

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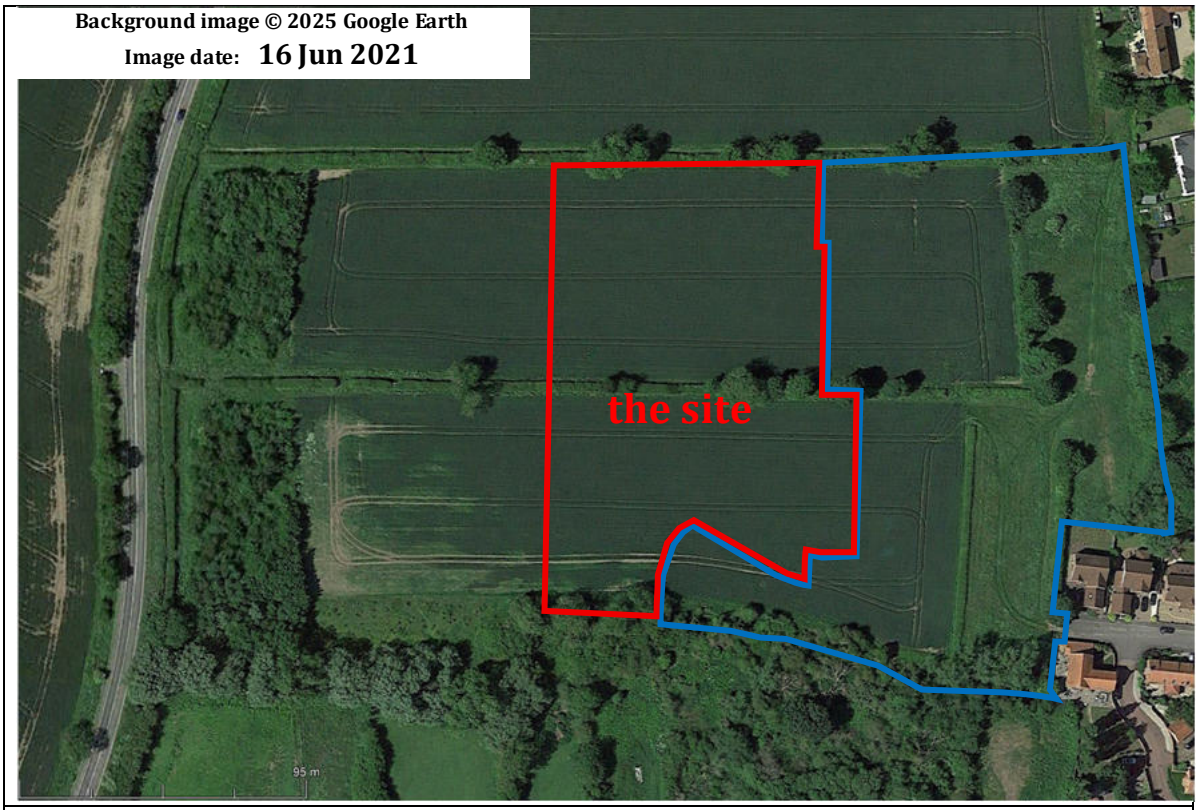

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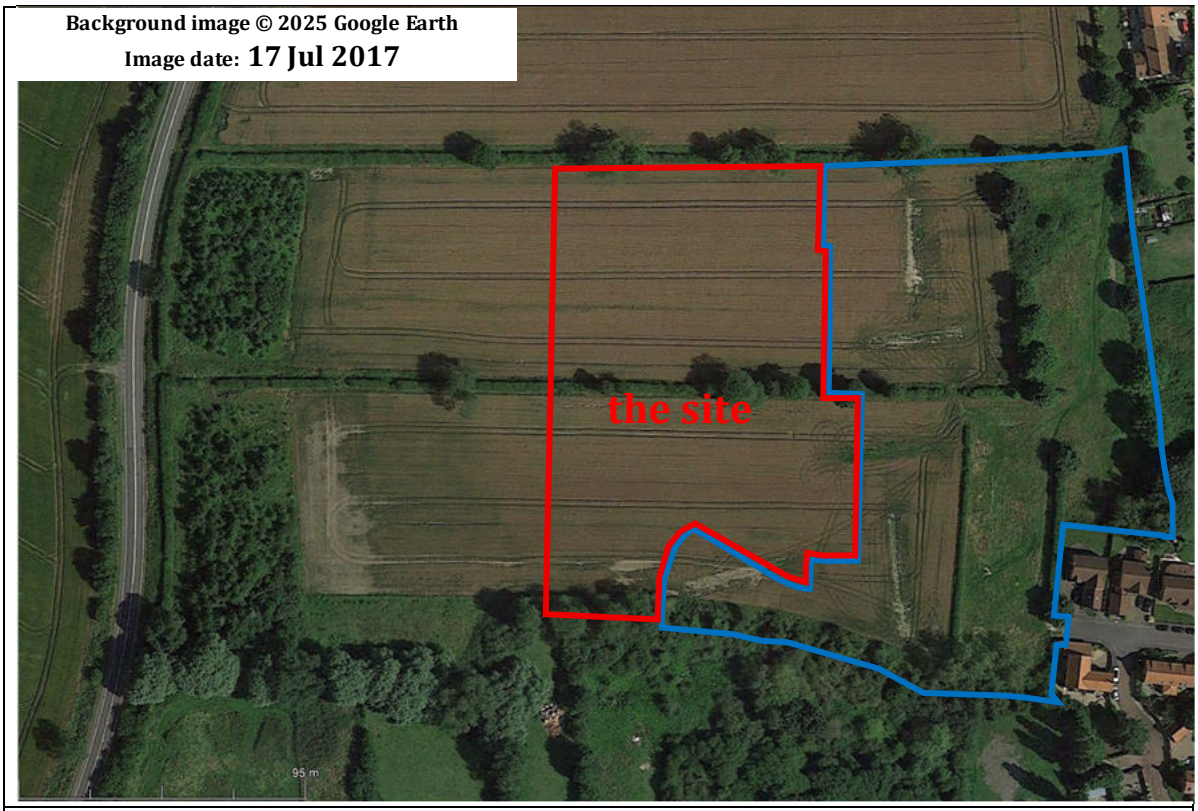

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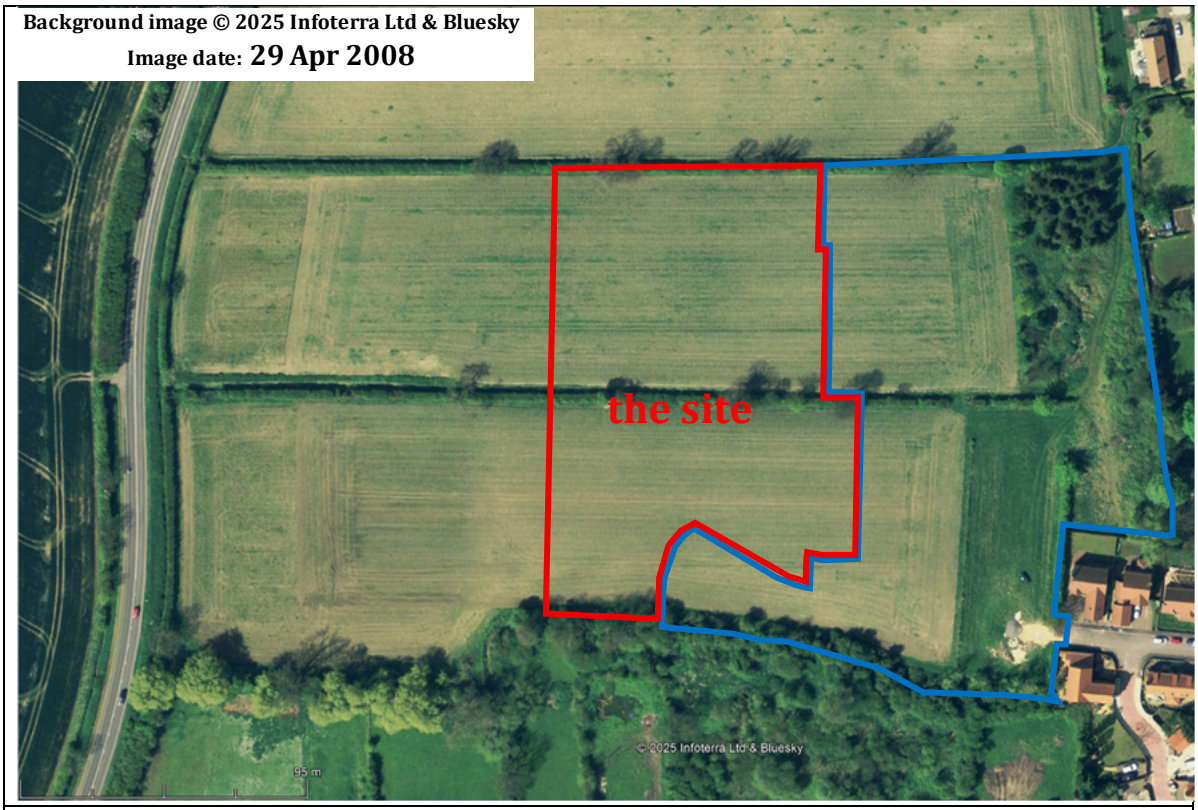

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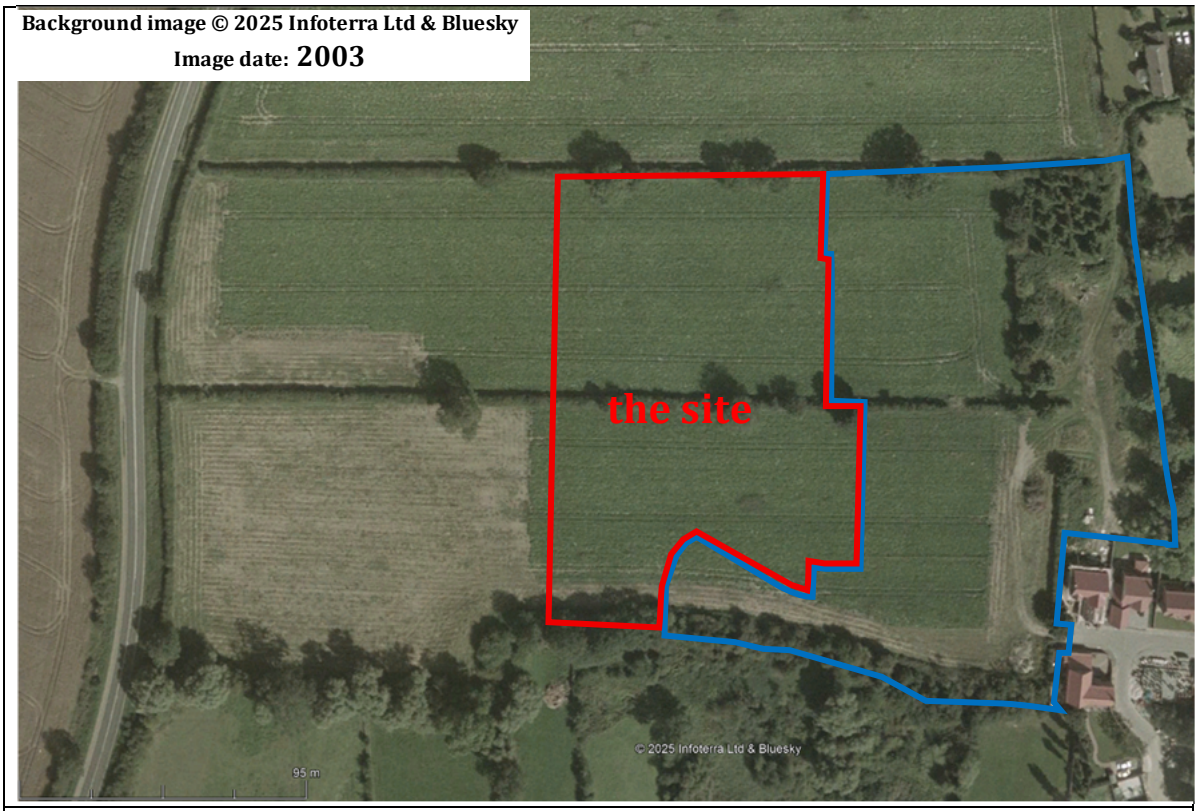

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Site investigation photo: 1 *Date:* 27 Jun 2025
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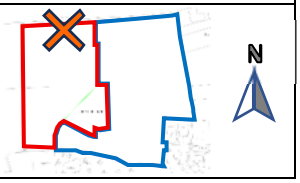
Description: TP201

Camera position:



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Description: TP201

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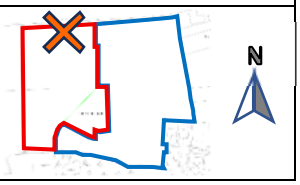

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Photo direction: -
Description: Topsoil/subsoil from TP201

Camera position:

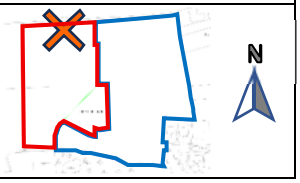

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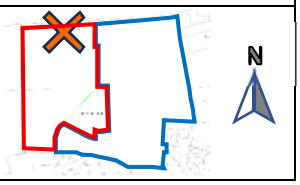
Photo direction: -
Description: Glacial deposits from TP201

Camera position:



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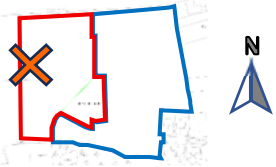

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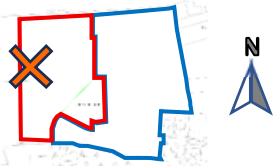

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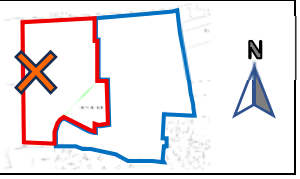
Photo direction: -
Description: TP202

Camera position:



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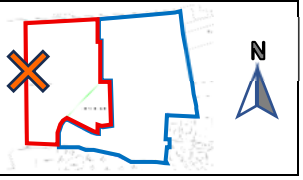

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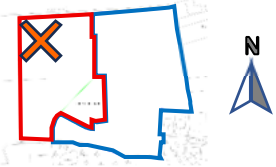
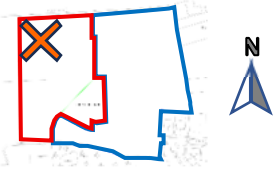
Photo direction: -
Description: TP203

Camera position:



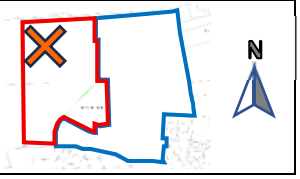
Site investigation photo: 10 *Date:* 27 Jun 2025
Photo direction: -
Description: Topsoil/subsoil from TP203

Camera position:



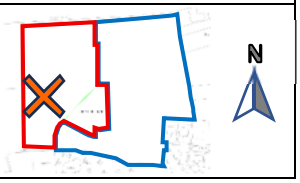
Site investigation photo: 11 *Date:* 27 Jun 2025
Photo direction: -
Description: Light brown sandy gravelly silt and clay glacial deposits from TP203

Camera position:



Site investigation photo: 12 *Date:* 27 Jun 2025
Photo direction: -
Description: TP204

Camera position:



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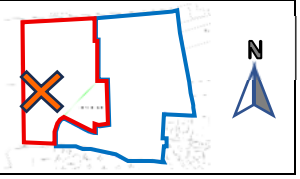
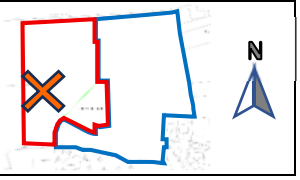
Description: TP204

Camera position:



Site investigation photo: 14 *Date:* 27 Jun 2025
Photo direction: -
Description: spoil from TP204

Camera position:

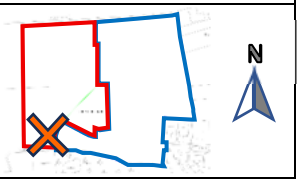


Site investigation photo: 15 *Date:* 27 Jun 2025
Photo direction: -
Description: TP205

Camera position:

Site investigation photo: 16 *Date:* 27 Jun 2025
Photo direction: -
Description: TP205

Camera position:

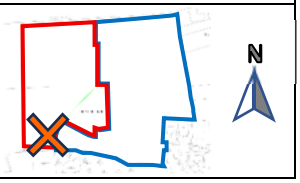


Site investigation photo: 17 *Date:* 27 Jun 2025
Photo direction: -
Description: TP205 – close up of possible weathered mudstone / stiff clay

Camera position:

Site investigation photo: 18 *Date:* 27 Jun 2025
Photo direction: -
Description: Topsoil/subsoil from TP205

Camera position:

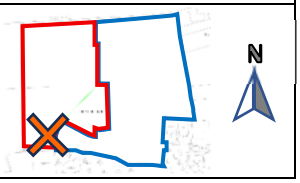


Site investigation photo: 19 *Date:* 27 Jun 2025
Photo direction: -
Description: Light brown glacial deposits and deeper grey possible weathered mudstone clay from TP205

Camera position:

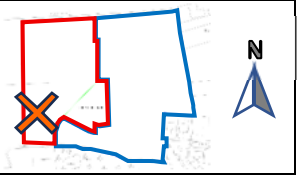
Site investigation photo: 20 *Date:* 27 Jun 2025
Photo direction: -
Description: Light brown glacial deposits and deeper grey possible weathered mudstone clay from TP205

Camera position:



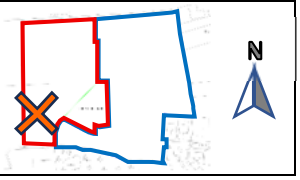
Site investigation photo: 21 *Date:* 27 Jun 2025
Photo direction: -
Description: TP206

Camera position:



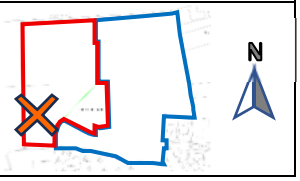
Site investigation photo: 22 *Date:* 27 Jun 2025
Photo direction: -
Description: TP206 – close-up of light brown sandy gravelly boulder clay

Camera position:



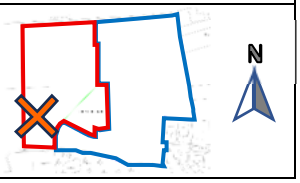
Site investigation photo: 23 *Date:* 27 Jun 2025
Photo direction: -
Description: TP206 – close-up of light brown sandy gravelly boulder clay

Camera position:



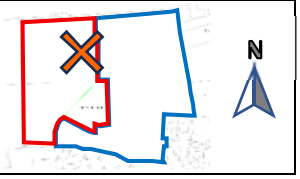
Site investigation photo: 24 *Date:* 27 Jun 2025
Photo direction: -
Description: TP206 – spoil

Camera position:



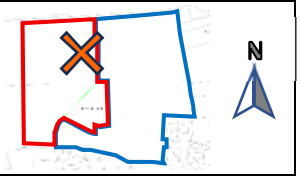
Site investigation photo: 25 *Date:* 27 Jun 2025
Photo direction: -
Description: TP208

Camera position:



Site investigation photo: 26 *Date:* 27 Jun 2025
Photo direction: -
Description: TP208

Camera position:



Appendix B

HML exploratory hole logs

HUMBERSIDE MATERIALS LABORATORY Ltd.
Atherton Way, Brigg
North Lincs DN20 8AR
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BOREHOLE LOG

Borehole No
WS201

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501674 N: 408797
Elevation :- 21.8
Excavated by :- Dando Terrier
Drilled by :- HML

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples		Water level & well	SPT / SH DCP	Notes
0.0	Friable humic dark greyish brown sandy SILT with occasional flinty gravel and rootlets. (TOPSOIL)		0.30	1	D			
	0.30	21.5						
0.5	Stiff multicoloured (pale brown, orangish brown, white and grey) slightly sandy gravelly silty CLAY. Gravel is medium to coarse of chalk and flint. (GLACIAL DEPOSITS)		0.70	2	D			HV at 0.90m: >190kPa
	1.00	21.0					6	SPT at 1.00m: 1,2,1,2,1,2
1.0	Firm brown mottled grey slightly sandy to sandy silty CLAY with some fine to coarse chalk and flint gravel. (GLACIAL DEPOSITS)		0.70	3	D			
1.5	1.70	20.5						
	Firm brown mottled grey sandy silty CLAY with much fine to coarse chalk and flint gravel. (GLACIAL DEPOSITS)		0.30	4	D			
	2.00	20.0					17	SPT at 2.00m: 3,4,4,4,4,5
2.0	Firm to stiff light brown mottled grey and orangish brown slightly sandy locally sandy to very sandy silty CLAY with some rounded fine to coarse chalky gravel. (GLACIAL DEPOSITS)							
2.5		19.5						
			1.10	5	D			
		19.0						HV at 2.90m: 130kPa
3.0	3.10						18	SPT at 3.00m: 4,4,4,4,5,5
	Firm to stiff grey slightly sandy to sandy silty CLAY with some chalky gravel. (GLACIAL DEPOSITS)	18.5						
3.5			0.70	6	D			
	3.80	18.0						
	Firm grey sandy SILT with some to much chalk gravel. (GLACIAL DEPOSITS)		0.20					
4.0	4.00						16	SPT at 4.00m: 4,4,3,4,4,5
		17.5						
4.5								
		17.0						
5.0								

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-4.00
Casing depth :-

File Ref :- 126/ 5708
Logged by :- RL (HML)

HUMBERSIDE MATERIALS LABORATORY Ltd.
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BOREHOLE LOG

Borehole No
WS202

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501699 N: 408838
Elevation :- 23.2
Excavated by :- Dando Terrier
Drilled by :- HML

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Friable humic dark greyish brown sandy SILT with occasional flinty gravel and rootlets. (TOPSOIL)	23.0	0.40	1 D			
0.40	Firm light brown sandy clayey SILT with some to much fine to coarse chalk gravel. (GLACIAL DEPOSITS)	22.5	0.60	2 D			
1.00	Firm light brown sandy silty CLAY with some to much fine to coarse chalk gravel. (GLACIAL DEPOSITS)	22.0	0.20			24	SPT at 1.00m: 2,4,5,6,8,5
1.20	Stiff pale grey mottled light brown slightly sandy locally sandy silty CLAY with much fine to coarse white chalk and flint gravel. (GLACIAL DEPOSITS)		0.80	3 D			
2.00	Stiff light brown slightly sandy to sandy silty CLAY with some fine to coarse chalk gravel. (GLACIAL DEPOSITS)	21.0		4 D		30	SPT at 2.00m: 4,14,11,7,6,6
3.00		20.5	1.50				HV at 2.90m: >190kPa
						34	SPT at 3.00m: 6,6,8,8,10,8
3.50	Very stiff grey slightly sandy silty CLAY with some to much fine to coarse chalk gravel. (GLACIAL DEPOSITS)	19.5	0.50				
4.00		19.0					HV at 3.90m: >190kPa
						24	SPT at 4.00m: 6,6,5,6,6,7
5.0		18.0					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-4.00
Casing depth :-

File Ref :- 126/ 5708
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No
WS203

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501650 N: 408844
Elevation :- 22.0
Excavated by :- Dando Terrier
Drilled by :- HML

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Friable humic dark greyish brown sandy SILT with occasional flinty gravel and rootlets. (TOPSOIL)	22.0	0.40	1 D			
0.40	Stiff brown slightly sandy to sandy silty CLAY with some chalk gravel. (GLACIAL DEPOSITS)	21.5	0.60	2 D			HV at 0.90m: 148kPa
1.00	Firm to stiff becoming firm brown mottled grey slightly sandy silty CLAY with some chalk gravel. (GLACIAL DEPOSITS)	21.0	0.40	3 D		11	SPT at 1.00m: 2,2,2,3,3,3
1.40	Firm to stiff light brown mottled grey slightly sandy silty CLAY with much chalk gravel. (GLACIAL DEPOSITS)	20.5	0.80				
2.0		20.0				13	SPT at 2.00m: 2,2,3,3,4,3
2.20	Firm to stiff dark greenish grey slightly sandy silty CLAY with rare fine to medium chalky gravel and occasional gravel sized pockets of orangish brown silty fine sand. (GLACIAL DEPOSITS)	19.5	0.25	4 D			
2.45	Grey slightly sandy SILT with many thick laminations of firm grey clayey silt. (GLACIAL DEPOSITS)		0.55	5 D			HV at 2.90m: 70kPa
3.00	Stiff to very stiff grey slightly sandy silty CLAY with some to much chalk gravel. (GLACIAL DEPOSITS)	19.0	1.00				
4.00		18.0				21	HV at 3.90m: 156kPa SPT at 4.00m: 5,5,5,6,5,5
5.0		17.0					

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-4.00
Casing depth :-

File Ref :- 126/ 5708
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No
WS204

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501674 N: 408750
Elevation :- 21.4
Excavated by :- Dando Terrier
Drilled by :- HML

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Friable humic dark greyish brown sandy SILT with occasional flinty gravel and rootlets. (TOPSOIL)		0.45	1 D			
0.45		21.0					
0.5	Very stiff light brown mottled light grey sandy silty CLAY with some to much chalk gravel. (GLACIAL DEPOSITS)		0.55	2 D			
1.00		20.5					HV at 0.90m: >190kPa
1.0	Firm to stiff light brown mottled grey slightly sandy silty CLAY with some locally much chalk and flint gravel. COBBLE of flint at 1.55m depth. (GLACIAL DEPOSITS)					23	SPT at 1.00m: 3,4,5,5,5,8
1.5		20.0					
			1.60	3 D			
2.0		19.5				18	HV at 1.90m: 85kPa SPT at 2.00m: 4,4,4,4,5,5
2.5		19.0					
2.60	Stiff to very stiff greenish brown mottled orangish brown slightly sandy to sandy silty CLAY with some to much chalk gravel. (GLACIAL DEPOSITS)		0.40	4 D			
3.00		18.5					HV at 2.90m: >190kPa
3.0	Stiff to very stiff dark grey slightly sandy to sandy silty CLAY with some to much chalk gravel. (GLACIAL DEPOSITS)					17	SPT at 3.00m: 5,4,3,4,5,5
3.40		18.0	0.40				
3.5	Stiff to very stiff grey thinly laminated silty CLAY/Extremely weak grey MUDSTONE. Faint organic odour. (Possible Ampthill Clay Formation)		0.60	5 D			
4.00		17.5				21	SPT at 4.00m: 4,4,5,5,5,6
4.0							
4.5		17.0					
		16.5					
5.0							

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-4.00
Casing depth :-

File Ref :- 126/ 5708
Logged by :- RL (HML)

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BOREHOLE LOG

Borehole No
WS205

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501642 N: 408725
Elevation :- 19.4
Excavated by :- Dando Terrier
Drilled by :- HML

Depth (m)	Lithology / Description / Depth (m)	Elevation	Thickness (m)	Samples	Water level & well	SPT / SH DCP	Notes
0.0	Friable humic dark greyish brown sandy SILT with occasional flinty gravel and rootlets. (TOPSOIL)		0.40	1 D			
	0.40	19.0					
0.5	Friable brown sandy SILT with some chalk gravel. Sand is fine. (GLACIAL DEPOSITS)		0.30	2 D			
	0.70						
	Very stiff grey mottled brown silty CLAY with much chalk and flint gravel. (GLACIAL DEPOSITS)		0.20	3 D			
	0.90	18.5					HV at 0.90m: >190kPa
1.0	Firm to stiff becoming stiff thinly laminated grey mottled light brown CLAY. (Possible Ampthill Clay Formation)					11	SPT at 1.00m: 2,2,2,2,3,4
		18.0	1.10	4 D			
1.5							
		17.5					HV at 1.90m: 145kPa
2.0	2.00 Stiff greenish grey mottled grey CLAY. (Possible Ampthill Clay Formation)					12	SPT at 2.00m: 2,2,3,3,3,3
		17.0	0.60	5 D			
2.5	2.60 Stiff greenish grey mottled grey CLAY with occasional degraded relic rootlets. (Possible Ampthill Clay Formation)		0.20				
	2.80		0.01				
	2.81 Stiff brown gravelly slightly sandy CLAY with occasional degraded relic rootlets. Gravel is fine to medium of medium strong siltstone or limestone. (Possible Ampthill Clay Formation)	16.5	0.19				
3.0	3.00 Stiff greenish grey mottled grey CLAY. (Possible Ampthill Clay Formation)					16	SPT at 3.00m: 2,2,3,4,4,5
	Stiff to very stiff thinly laminated grey CLAY (or Extremely weak MUDSTONE). (Possible Ampthill Clay Formation)	16.0	1.00				
3.5							
		15.5					
4.0	4.00					22	SPT at 4.00m: 5,5,4,6,6,6
		15.0					
4.5							
		14.5					
5.0							

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
U undisturbed
DCP SHDCP
HV Hand Vane

Notes :-

Depth drilled :-4.00
Casing depth :-

File Ref :- 126/ 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No **TP201**

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501682 N: 408853
Elevation (m AOD) :- 23.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Dark brown slightly silty fine to medium soily SAND with occasional fine to medium chalk and flint gravel. (TOPSOIL) (0.31)	23				
0.31	Stiff friable brown sandy CLAY with occasional fine to medium flint and chalk gravel. (GLACIAL DEPOSITS) (0.19)					
0.5		22.5				
0.50	Stiff creamy brown mottled light grey slightly sandy CLAY with occasional fine to coarse gravel of chalk and flint. (GLACIAL DEPOSITS) (0.53)					
1		22				
1.03	Firm to stiff light brown mottled orangish brown and light grey slightly sandy (locally sandy and silty) CLAY with occasional fine to coarse gravel of chalk and flint. (GLACIAL DEPOSITS) (0.92)					
1.5		21.5				
1.95						
2		21				
2.5		20.5				
3		20				
3.5		19.5				
4		19				
4.5		18.5				
5		18				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No **TP202**

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501643 N: 408791
Elevation (m AOD) :- 20.4
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 / 50 / 100 / 150)	Notes
0	Dark brown silty fine to medium soily SAND with occasional fine to medium chalk and flint gravel. (TOPSOIL) (0.40)	20				
0.40						
0.5	Firm/stiff light brown mottled orangish brown and light grey slightly sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.52)	19.5				
0.92						
1	Firm/stiff light greyish brown mottled orangish brown and light grey slightly sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS)	19				
1.5	(1.28)	18.5				
2						
2.20		18				
2.5						
3		17.5				
3.5		17				
4		16.5				
4.5		16				
5		15.5				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No

TP203

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501664 N: 408829
Elevation (m AOD) :- 22.2
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Dark brown silty fine to medium soily SAND with rare fine to medium chalk and flint gravel. (TOPSOIL) (0.35) 0.35	22				
0.5	Stiff friable light grey mottled creamy brown, grey and light brown slightly sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.65) 1.00	21.5				
1		21				
1.5		20.5				
2		20				
2.5		19.5				
3		19				
3.5		18.5				
4		18				
4.5		17.5				
5		17				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No

TP204

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501654 N: 408770
Elevation (m AOD) :- 20.8
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0, 50, 100, 150)	Notes
0	Brown silty fine to medium soily SAND with rare fine to medium chalk and flint gravel. (TOPSOIL) (0.25)	20.5				
0.25	Brown to light brown sandy CLAY with rare fine to medium chalk and flint gravel. (GLACIAL DEPOSITS) (0.09)					
0.34	Stiff light brown mottled light grey sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.56)	20	1 B			
0.5						
0.90	Stiff creamy brown mottled light grey sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.10)					
1.00		19.5				
1						
1.5		19				
2		18.5				
2.5		18				
3		17.5				
3.5		17				
4		16.5				
4.5		16				
5						

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No **TP205**

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501660 N: 408726
Elevation (m AOD) :- 19.4
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Dark brown silty fine to medium soily SAND with rare fine to medium chalk and flint gravel. (TOPSOIL) 0.22 (0.22)					
0.5	Light brown clayey SAND with occasional fine to medium chalk gravel. (GLACIAL DEPOSITS) 0.54 (0.32)	19				
	Firm brown mottled light grey slightly sandy CLAY with occasional fine to coarse chalk and flint gravel. (GLACIAL DEPOSITS) 0.87 (0.33)					
1	Firm to stiff bluish grey mottled greenish grey and brown CLAY. Includes a 50mm-thick band with much fine to medium siltstone or limestone gravel. (Possible Ampthill Clay Formation)	18.5				HV at 1.10m: 128kPa, 122kPa & 120kPa
1.5	(1.13)	18				HV at 1.60m: 114kPa, 124kPa & 118kPa
2	2.00	17.5				
2.5		17				
3		16.5				
3.5		16				
4		15.5				
4.5		15				
5		14.5				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

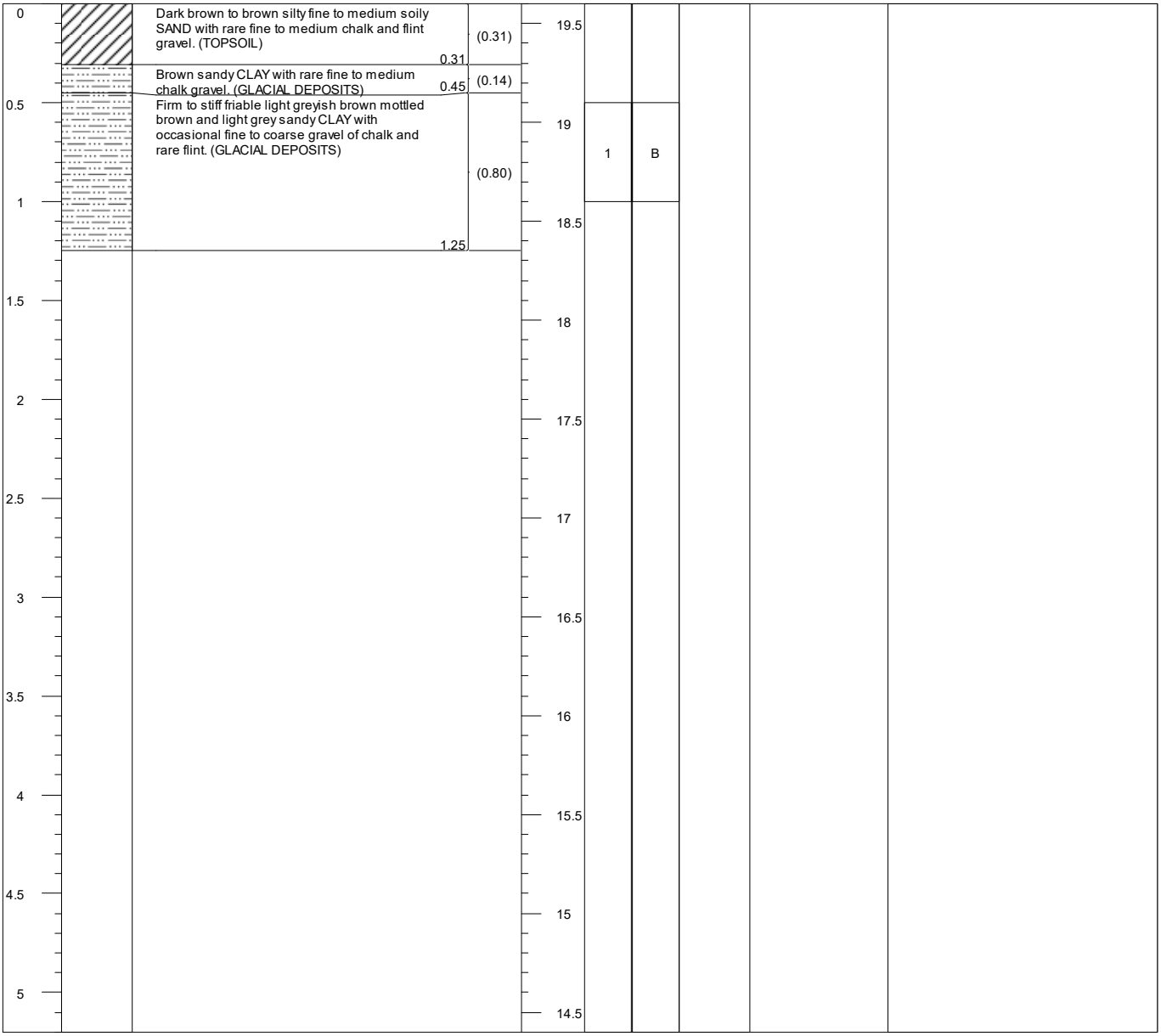
Trial pit No

TP206

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501640 N: 408749
Elevation (m AOD) :- 19.6
Excavated by :- Wheeled digger



Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No

TP207

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501638 N: 408824
Elevation (m AOD) :- 21.0
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Dark brown slightly silty slightly clayey fine to medium soily SAND with rare fine to medium chalk and flint gravel. (TOPSOIL) (0.32)	21				
0.32	Soft to firm brown to orangish brown sandy CLAY with occasional fine gravel of chalk and flint. (GLACIAL DEPOSITS) (0.18)					
0.5	Firm to stiff light grey mottled brown orangish brown and grey slighlty sandy CLAY with occasional gravel sized pockets of sandy CLAY with occasional fine to coarse chalk gravel. (GLACIAL DEPOSITS) (0.82)	20.5	1 B			
1.32		20				
1						
1.5		19.5				
2		19				
2.5		18.5				
3		18				
3.5		17.5				
4		17				
4.5		16.5				
5		16				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

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TRIAL PIT LOG

Trial pit No

TP208

Client :- Keigar Homes
Site :- Land off Applefields, Wrawby (Second Phase)
Project No :- 5708

Location :- see site plan
Date :- 27 Jun 2025

Coordinates E: 501698 N: 408822
Elevation (m AOD) :- 23.2
Excavated by :- Wheeled digger

Depth (m)	Lithology / Description / Depth / (thickness)	Elevation	Samples	Water level	Mackintosh Probe (0 50 100 150)	Notes
0	Dark brown to brown silty fine to medium soily SAND with rare fine to medium chalk and flint gravel. (TOPSOIL) (0.27)	23				
0.27	Firm to stiff friable creamy brown mottled light grey sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.78)	22.5	1 B			
1.05	Firm to stiff friable creamy brown mottled light grey sandy CLAY with much fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.15)	22				
1.20	Stiff creamy brown mottled light grey sandy CLAY with occasional fine to coarse chalk and rare flint gravel. (GLACIAL DEPOSITS) (0.16)	21.5				
1.36		21				
		20.5				
		20				
		19.5				
		19				
		18.5				
5		18				

Sample Key
B Bulk
D Disturbed
W Water
SS Split spoon
C Cone

Notes :-

File Ref :- 126 / 5708
Logged by :- RL (HML)

Appendix C

Laboratory test results

ANALYTICAL TEST REPORT

Report Number	25-06641, issue number 1
Contract name:	Applefields Wrawby
Client reference:	0126/5708
Clients name:	Humberside Materials Laboratory
Clients address:	Humberside Materials Laboratory Atherton Way Brigg North Lincolnshire DN20 8AR
Samples received:	04/07/2025
Analysis started:	04/07/2025
Analysis completed:	11/07/2025
Report issued:	11/07/2025

Key	U UKAS accredited test M MCERTS & UKAS accredited test I/S Insufficient sample to carry out test U/S Sample not suitable for testing NAD No Asbestos Detected
Approved by:	[redacted] Sam Rogerson Receipt and Reporting Manager

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample ID	Depth (m)	Sample description	Material removed	% Removed	% Moisture
57120	S/75357	0.5 - 1.0	Beige Clay with Gravel.	-	-	11.4
57121	S/75358	0.1 - 0.4	Brown Loamy Clayey Sand with Gravel and Vegetation.	-	-	11.4
57122	S/75359	0.1 - 0.4	Brown Loamy Clayey Sand with Gravel and Vegetation.	-	-	13.0
57123	S/75360	0.5 - 1.0	Brown Clay with Gravel.	-	-	12.8
57124	S/75361	0.1 - 0.45	Brown Loamy Clayey Sand with Gravel and Vegetation.	-	-	10.5
57125	S/75362	1.0 - 2.0	Brown Clay with Gravel.	-	-	11.4

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

a	Sampling date not provided
b	Sampling time not provided (waters only)
c	Sample not received in appropriate containers
d	Storage Temperature
e	Headspace present in sample container
f	Sample exceeded sampling to receipt
g	Sample exceeded holding time(s)

Lab ref	Sample ID	Depth (m)	Deviating	Tests (Reason for deviation)
57120	S/75357	0.5 - 1.0	N	
57121	S/75358	0.1 - 0.4	N	
57122	S/75359	0.1 - 0.4	N	
57123	S/75360	0.5 - 1.0	N	
57124	S/75361	0.1 - 0.45	N	
57125	S/75362	1.0 - 2.0	N	

SOILS

Lab Number					57120	57121	57122	57123	57124
Client Reference					SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID					S/75357	S/75358	S/75359	S/75360	S/75361
Depth (m)					0.5 - 1.0	0.1 - 0.4	0.1 - 0.4	0.5 - 1.0	0.1 - 0.45
Sampling Date					27/06/2025	27/06/2025	27/06/2025	27/06/2025	27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**					
Asbestos									
Asbestos Identification	SUBCON	SU	0	-	n/t	NAD	NAD	n/t	NAD
Metals									
Water Soluble Magnesium	CE061	N	1	mg/l	2.09	n/t	n/t	< 1.00	n/t
Water Soluble Sulphate	CE061	M	10	mg/l	22.8	n/t	n/t	10.6	n/t
Acid Soluble Sulphate (SO4)	CE062	M	100	mg/kg	622	n/t	n/t	281	n/t
Water Soluble Boron	CE063	N	0.5	mg/kg	n/t	0.59	0.58	n/t	0.69
Arsenic	CE264	U	1.8	mg/kg	n/t	5.6	7.7	n/t	9.3
Beryllium	CE264	M	0.2	mg/kg	n/t	0.4	0.5	n/t	0.6
Cadmium	CE264	M	1.6	mg/kg	n/t	< 1.6	< 1.6	n/t	< 1.6
Copper	CE264	M	1.6	mg/kg	n/t	13.0	13.0	n/t	12.8
Lead	CE264	U	2.3	mg/kg	n/t	27.6	28.3	n/t	28.0
Mercury	CE264	U	0.7	mg/kg	n/t	< 0.7	< 0.7	n/t	< 0.7
Nickel	CE264	M	2.1	mg/kg	n/t	10.5	11.3	n/t	13.5
Selenium	CE264	U	3	mg/kg	n/t	< 3.0	< 3.0	n/t	< 3.0
Sulphur	CE264	N	32	mg/kg	164	n/t	n/t	118	n/t
Vanadium	CE264	N	1.8	mg/kg	n/t	28.7	33.5	n/t	40.4
Zinc	CE264	M	4	mg/kg	n/t	53.0	54.3	n/t	49.9
Colourimetric									
Water Soluble Chloride	CE261	U	1.5	mg/l	4.40	n/t	n/t	3.70	n/t
Nitrate as N	CE261	U	1	mg/l	2.03	n/t	n/t	1.88	n/t
Water Soluble Chromium VI	CE263	N	0.04	mg/kg	n/t	< 0.040	< 0.040	n/t	< 0.040
Nitrite as N	CE261	U	1	mg/l	< 1.00	n/t	n/t	< 1.00	n/t
Chromium III	CE208	N	2	mg/kg	n/t	12.4	13.8	n/t	16.9
Combustion									
Moisture Content	CE001	N	0.1	%	11.4	11.4	13.0	12.8	10.5
Polyaromatic hydrocarbons									
Naphthalene	CE087	M	0.016	mg/kg	n/t	< 0.016	< 0.016	n/t	< 0.016
Acenaphthylene	CE087	M	0.015	mg/kg	n/t	< 0.015	< 0.015	n/t	< 0.015
Acenaphthene	CE087	M	0.013	mg/kg	n/t	< 0.013	< 0.013	n/t	< 0.013
Fluorene	CE087	U	0.013	mg/kg	n/t	< 0.013	< 0.013	n/t	< 0.013

SOILS

Lab Number					57120	57121	57122	57123	57124
Client Reference					SOIL	SOIL	SOIL	SOIL	SOIL
Sample ID					S/75357	S/75358	S/75359	S/75360	S/75361
Depth (m)					0.5 - 1.0	0.1 - 0.4	0.1 - 0.4	0.5 - 1.0	0.1 - 0.45
Sampling Date					27/06/2025	27/06/2025	27/06/2025	27/06/2025	27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**					
Phenanthrene	CE087	M	0.014	mg/kg	n/t	0.053	0.037	n/t	0.045
Anthracene	CE087	U	0.017	mg/kg	n/t	0.017	< 0.017	n/t	0.022
Fluoranthene	CE087	M	0.017	mg/kg	n/t	0.149	0.097	n/t	0.172
Pyrene	CE087	M	0.016	mg/kg	n/t	0.131	0.083	n/t	0.149
Benzo(a)anthracene	CE087	U	0.012	mg/kg	n/t	0.083	0.059	n/t	0.133
Chrysene	CE087	M	0.028	mg/kg	n/t	0.075	0.047	n/t	0.112
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	n/t	0.113	0.066	n/t	0.154
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	n/t	0.044	0.029	n/t	0.059
Benzo(a)pyrene	CE087	U	0.019	mg/kg	n/t	0.082	0.052	n/t	0.133
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	n/t	0.075	0.047	n/t	0.097
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	n/t	< 0.017	< 0.017	n/t	0.020
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	n/t	0.065	0.037	n/t	0.080
Total PAH(16)	CE087	N	0.28	mg/kg	n/t	0.887	0.555	n/t	1.17
Wet Chem									
pH	CE004	M	0.1	pH units	8.4	n/t	n/t	8.3	n/t

SOILS

Lab Number					57125
Client Reference					SOIL
Sample ID					S/75362
Depth (m)					1.0 - 2.0
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
Asbestos					
Asbestos Identification	SUBCON	SU	0	-	n/t
Metals					
Water Soluble Magnesium	CE061	N	1	mg/l	1.19
Water Soluble Sulphate	CE061	M	10	mg/l	13.5
Acid Soluble Sulphate (SO4)	CE062	M	100	mg/kg	231
Water Soluble Boron	CE063	N	0.5	mg/kg	n/t
Arsenic	CE264	U	1.8	mg/kg	n/t
Beryllium	CE264	M	0.2	mg/kg	n/t
Cadmium	CE264	M	1.6	mg/kg	n/t
Copper	CE264	M	1.6	mg/kg	n/t
Lead	CE264	U	2.3	mg/kg	n/t
Mercury	CE264	U	0.7	mg/kg	n/t
Nickel	CE264	M	2.1	mg/kg	n/t
Selenium	CE264	U	3	mg/kg	n/t
Sulphur	CE264	N	32	mg/kg	96
Vanadium	CE264	N	1.8	mg/kg	n/t
Zinc	CE264	M	4	mg/kg	n/t
Colourimetric					
Water Soluble Chloride	CE261	U	1.5	mg/l	3.20
Nitrate as N	CE261	U	1	mg/l	1.33
Water Soluble Chromium VI	CE263	N	0.04	mg/kg	n/t
Nitrite as N	CE261	U	1	mg/l	< 1.00
Chromium III	CE208	N	2	mg/kg	n/t
Combustion					
Moisture Content	CE001	N	0.1	%	11.4
Polyaromatic hydrocarbons					
Naphthalene	CE087	M	0.016	mg/kg	n/t
Acenaphthylene	CE087	M	0.015	mg/kg	n/t
Acenaphthene	CE087	M	0.013	mg/kg	n/t
Fluorene	CE087	U	0.013	mg/kg	n/t

SOILS

Lab Number					57125
Client Reference					SOIL
Sample ID					S/75362
Depth (m)					1.0 - 2.0
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
Phenanthrene	CE087	M	0.014	mg/kg	n/t
Anthracene	CE087	U	0.017	mg/kg	n/t
Fluoranthene	CE087	M	0.017	mg/kg	n/t
Pyrene	CE087	M	0.016	mg/kg	n/t
Benzo(a)anthracene	CE087	U	0.012	mg/kg	n/t
Chrysene	CE087	M	0.028	mg/kg	n/t
Benzo(b)fluoranthene	CE087	M	0.02	mg/kg	n/t
Benzo(k)fluoranthene	CE087	M	0.025	mg/kg	n/t
Benzo(a)pyrene	CE087	U	0.019	mg/kg	n/t
Indeno(1,2,3-cd)pyrene	CE087	M	0.019	mg/kg	n/t
Dibenzo(a,h)anthracene	CE087	M	0.017	mg/kg	n/t
Benzo(g,h,i)perylene	CE087	M	0.019	mg/kg	n/t
Total PAH(16)	CE087	N	0.28	mg/kg	n/t
Wet Chem					
pH	CE004	M	0.1	pH units	8.5

SOIL VOCS

Lab Number					57124
Client Reference					SOIL
Sample ID					S/75361
Depth (m)					0.1 - 0.45
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
VOC					
Benzene	CE174	N	0.01	mg/kg	< 0.010
Toluene	CE174	N	0.01	mg/kg	< 0.010
Ethylbenzene	CE174	N	0.01	mg/kg	< 0.010
m,p-Xylene	CE174	N	0.01	mg/kg	< 0.010
o-xylene	CE174	N	0.01	mg/kg	< 0.010
1,1-Dichloroethane	CE174	N	0.01	mg/kg	< 0.010
Chloroform	CE174	N	0.01	mg/kg	< 0.010
Tetrachloromethane	CE174	N	0.01	mg/kg	< 0.010
1,1,1-Trichloroethane	CE174	N	0.01	mg/kg	< 0.010
Trichloroethylene	CE174	N	0.01	mg/kg	< 0.010
Tetrachloroethylene	CE174	N	0.01	mg/kg	< 0.010
Chlorobenzene	CE174	N	0.01	mg/kg	< 0.010
Bromobenzene	CE174	N	0.01	mg/kg	< 0.010
Bromodichloromethane	CE174	N	0.01	mg/kg	< 0.010
1,1-Dichloro-1-propene	CE174	N	0.01	mg/kg	< 0.010
Trans - 1-2 -dichloroethylene	CE174	N	0.01	mg/kg	< 0.010
2,2-Dichloropropane	CE174	N	0.01	mg/kg	< 0.010
Bromochloromethane	CE174	N	0.01	mg/kg	< 0.010
1,2-Dichloroethane	CE174	N	0.01	mg/kg	< 0.010
Dibromomethane	CE174	N	0.01	mg/kg	< 0.010
1,2-Dichloropropane	CE174	N	0.01	mg/kg	< 0.010
1,1,2-Trichloroethane	CE174	N	0.01	mg/kg	< 0.010
Dibromochloromethane	CE174	N	0.01	mg/kg	< 0.010
1,3-Dichloropropane	CE174	N	0.01	mg/kg	< 0.010
1,2-dibromoethane	CE174	N	0.01	mg/kg	< 0.010
Styrene	CE174	N	0.01	mg/kg	< 0.010
Propylbenzene	CE174	N	0.01	mg/kg	< 0.010
2-Chlorotoluene	CE174	N	0.01	mg/kg	< 0.010
1,2,4-Trimethylbenzene	CE174	N	0.01	mg/kg	< 0.010
4-Chlorotoluene	CE174	N	0.01	mg/kg	< 0.010

SOIL VOCS

Lab Number					57124
Client Reference					SOIL
Sample ID					S/75361
Depth (m)					0.1 - 0.45
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
t-butylbenzene	CE174	N	0.01	mg/kg	< 0.010
1,3,5-Trimethylbenzene	CE174	N	0.01	mg/kg	< 0.010
1,3-Dichlorobenzene	CE174	N	0.01	mg/kg	< 0.010
Butylbenzene	CE174	N	0.01	mg/kg	< 0.010
Hexachlorobutadiene	CE174	N	0.01	mg/kg	< 0.010
1-2-3 - Trichlorobenzene	CE174	N	0.01	mg/kg	< 0.010
Naphthalene	CE174	N	0.01	mg/kg	< 0.010
1-2-4 - Trichlorobenzene	CE174	N	0.01	mg/kg	< 0.010
1,4-Dichlorobenzene	CE174	N	0.01	mg/kg	< 0.010
1,2-Dichlorobenzene	CE174	N	0.01	mg/kg	< 0.010
Bromoform	CE174	N	0.01	mg/kg	< 0.010
1,2-Dibromo-3-Chloropropane	CE174	N	0.01	mg/kg	< 0.010
4-Isopropyltoluene_(p-Cymene)	CE174	N	0.01	mg/kg	< 0.010
1,1,1,2-Tetrachloroethane	CE174	N	0.01	mg/kg	< 0.010
Bromomethane	CE174	N	0.03	mg/kg	< 0.030
Chloroethane	CE174	N	0.01	mg/kg	< 0.010
Chloromethane	CE174	N	0.01	mg/kg	< 0.010
Cis-1,2-Dichloroethene	CE174	N	0.01	mg/kg	< 0.010
cis-1,3-Dichloro-1-Propene	CE174	N	0.01	mg/kg	< 0.010
1,1,2,2-Tetrachloroethane	CE174	N	0.01	mg/kg	< 0.010
Dichlorodifluoromethane_(CFC-12)	CE174	N	0.01	mg/kg	< 0.010
Dichloromethane	CE174	N	0.01	mg/kg	< 0.010
Isopropylbenzene_(Cumene)	CE174	N	0.01	mg/kg	< 0.010
MTBE	CE174	N	0.01	mg/kg	< 0.010
sec-Butylbenzene	CE174	N	0.01	mg/kg	< 0.010
trans-1,3-Dichloro-1-Propene	CE174	N	0.01	mg/kg	< 0.010
Trichlorofluoromethane_(CFC-11)	CE174	N	0.01	mg/kg	< 0.010
Vinyl chloride	CE174	N	0.01	mg/kg	< 0.010
1,1-Dichloroethene	CE174	N	0.01	mg/kg	< 0.010
1,2,3-Trichloropropane	CE174	N	0.01	mg/kg	< 0.010

SOIL SVOCS

Lab Number					57124
Client Reference					SOIL
Sample ID					S/75361
Depth (m)					0.1 - 0.45
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
SVOC					
Phenol	CE189	N	0.1	mg/kg	< 0.10
Bis(2-chloroethyl)ether	CE189	N	0.1	mg/kg	< 0.10
2-Chlorophenol	CE189	N	0.1	mg/kg	< 0.10
1-3-Dichlorobenzene	CE189	N	0.1	mg/kg	< 0.10
1-4-Dichlorobenzene	CE189	N	0.1	mg/kg	< 0.10
1-2-Dichlorobenzene	CE189	N	0.1	mg/kg	< 0.10
2-Methylphenol	CE189	N	0.1	mg/kg	< 0.10
Bis(2-chloroisopropyl)ether	CE189	N	0.1	mg/kg	< 0.10
3 and 4-methylphenol	CE189	N	0.1	mg/kg	< 0.10
N-Nitrosodi-n-propylamine	CE189	N	0.1	mg/kg	< 0.10
Hexachloroethane	CE189	N	0.1	mg/kg	< 0.10
Nitrobenzene	CE189	N	0.1	mg/kg	< 0.10
Isophorone	CE189	N	0.1	mg/kg	< 0.10
2- Nitrophenol	CE189	N	0.1	mg/kg	< 0.10
2-4-Dimethylphenol	CE189	N	0.1	mg/kg	< 0.10
Bis(2-chloroethoxy)methane	CE189	N	0.1	mg/kg	< 0.10
2-4-Dichlorophenol	CE189	N	0.1	mg/kg	< 0.10
4-Chloroaniline	CE189	N	0.1	mg/kg	< 0.10
Hexachloro- 1-3-butadiene	CE189	N	0.1	mg/kg	< 0.10
4-Chloro-3-methylphenol	CE189	N	0.1	mg/kg	< 0.10
2-Methylnaphthalene	CE189	N	0.1	mg/kg	< 0.10
1-Methylnaphthalene	CE189	N	0.1	mg/kg	< 0.10
Hexachlorocyclopentadiene	CE189	N	0.1	mg/kg	< 0.10
2.4.6-Trichlorophenol	CE189	N	0.1	mg/kg	< 0.10
2.4.5-Trichlorophenol	CE189	N	0.1	mg/kg	< 0.10
2-Nitroaniline	CE189	N	0.1	mg/kg	< 0.10
Dimethyl phthalate	CE189	N	0.1	mg/kg	< 0.10
2-6-dinitrotoluene	CE189	N	0.1	mg/kg	< 0.10
3-Nitroaniline	CE189	N	0.1	mg/kg	< 0.10
4-nitrophenol	CE189	N	0.1	mg/kg	< 0.10

SOIL SVOCS

Lab Number					57124
Client Reference					SOIL
Sample ID					S/75361
Depth (m)					0.1 - 0.45
Sampling Date					27/06/2025
Test	**Method**	**Accred**	**LoD**	**Units**	
Dibenzofuran	CE189	N	0.1	mg/kg	< 0.10
Diethyl phthalate	CE189	N	0.1	mg/kg	< 0.10
4-Nitroaniline	CE189	N	0.1	mg/kg	< 0.10
2-Methyl-4,6-dinitrophenol	CE189	N	0.1	mg/kg	< 0.10
Azobenzene	CE189	N	0.1	mg/kg	< 0.10
Hexachlorobenzene	CE189	N	0.1	mg/kg	< 0.10
Pentachlorophenol	CE189	N	0.1	mg/kg	< 0.10
Carbazole	CE189	N	0.1	mg/kg	< 0.10
Di-n-butyl phthalate	CE189	N	0.1	mg/kg	< 0.10
Butyl benzyl phthalate	CE189	N	0.1	mg/kg	< 0.10
Di-n-octyl phthalate	CE189	N	0.1	mg/kg	< 0.10
Bis(2-ethylhexyl)phthalate	CE189	N	0.1	mg/kg	< 0.10
4-Bromophenylphenylether	CE189	N	0.1	mg/kg	< 0.10
4-Chlorophenylphenylether	CE189	N	0.1	mg/kg	< 0.10
1,2,4-Trichlorobenzene	CE189	N	0.1	mg/kg	< 0.10
Naphthalene, 2-chloro-	CE189	N	0.1	mg/kg	< 0.10
N-Nitrosodimethylamine	CE189	N	0.1	mg/kg	< 0.10
2,4-Dinitrophenol	CE189	N	0.1	mg/kg	< 0.10
2,4-Dinitrotoluene	CE189	N	0.1	mg/kg	< 0.10

SOLID SVOC TICs

Lab Reference	Client Reference	Client ID	Units	Result
57124	SOIL	S/75361	mg/kg	N/D

Identified compounds have >80% match against library spectra

Semi-quant results based on single point calibration of internal standards

SOLID VOC TICs

Lab Reference	Client Reference	Client ID	Units	Result
57124	SOIL	S/75361	µg/kg	Pentadecane 0.12 mg/L Hexadecane 0.11 mg/L

Identified compounds have >80% match against library spectra

Semi-quant results based on single point calibration of internal standards

METHOD DETAILS

METHOD	TESTNAME	METHOD SUMMARY	ANALYSIS BASIS
SUBCON	Asbestos Soil	HSG248	Air Dried Sample
CE061	W. Sol Metals	ICPOES	Air dried sample
CE004	pH of Soil	Potentiometric	As submitted sample
CE174	VOC in Soil	HS-GCMS	As submitted sample
CE062	Acid Soluble Sulphate in Soils	HCl Extract and ICPOES	Air dried sample
CE063	Water soluble boron	ICPOES	Air dried sample
CE189	SVOC in solids	DCM Extraction and GCMS	As submitted sample
CE264	Metals by ICP in Soil	ICPOES	Air dried sample
CE261	Anions by Discrete Analyser in Soils	Gallery	Air dried sample
CE263	ChromiumVI by Discrete Analyser in Soil	Gallery	Air dried sample
CE087	PAH in Soil	DCM Extraction and GCMS	As submitted sample
CE208	Chromium Hexavalent in Soil	Colorimetry	Air dried sample

REPORT INFORMATION

Report No.:25-06641, issue number 1

Key	
U	ISO17025 Accredited Result
M	ISO17025 and MCERTS Accredited Result
N	Do not currently hold accreditation
^	MCERTS accreditation not applicable for sample matrix. Result is unaccredited.
*	ISO17025 accreditation not applicable for sample matrix. Result is unaccredited.
S	Subcontracted
I/S	Insufficient Sample
U/S	Unsuitable sample
N/T	Not tested
<	Means "less than"
>	Means "greater than"

LOD refers to limit of detection, except in the case of pH soils and pH waters where it means limit of discrimination.

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

The results relate only to the sample received.

Unless otherwise stated, sample information has been provided by the client. This may affect the validity of the results.

Moisture Content Calculated on a Wet Weight basis

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

Sampling was undertaken by Chemtech Environmental Limited and is outside the UKAS accreditation scope.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

BTEX compounds are identified by retention time only and may include interference from co-eluting compounds.

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying

For soils and solids, analytical results are inclusive of stones, where applicable.

Sample Retention and Disposal

All soil samples will be retained for a period of 4 weeks from the point of receipt

All water samples will be retained for a period of 2 weeks from the point of Reporting

Charges may apply to extended sample storage

TPH Classification - HWOL Acronym System

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
Total	Aliphatics & Aromatics
AL	Aliphatics only
AR	Aromatics only
2D	GC-GC - Double coil gas chromatography
#1	EH_Total but with humics mathematically subtracted
#2	EH_Total but with fatty acids mathematically subtracted
_	Operator - underscore to separate acronyms (exception for +)
+	Operator to indicate cumulative e.g. EH+HS_Total or EH_CU+HS_Total
MS	Mass Spectrometry

ANALYTICAL TEST REPORT

Contract no: 133897

Contract name: Land off Appletrees, Wrawby

Client reference: 0126/5708/P

Clients name: Humberside Materials Laboratory

Clients address: Atherton Way
Brigg
North Lincolnshire
DN20 8AR

Samples received: 03 June 2024

Analysis started: 03 June 2024

Analysis completed: 12 June 2024

Report issued: 12 June 2024

Key

U	UKAS accredited test
M	MCERTS & UKAS accredited test
$	Test carried out by an approved subcontractor
I/S	Insufficient sample to carry out test
N/S	Sample not suitable for testing
NAD	No Asbestos Detected

Approved by: [redacted]

Abbie Neasham-Bourn
Senior Reporting Administrator

Chemtech Environmental Limited

SAMPLE INFORMATION

MCERTS (Soils):

Soil descriptions are only intended to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions. MCERTS accreditation applies for sand, clay and loam/topsoil, or combinations of these whether these are derived from naturally occurring soils or from made ground, as long as these materials constitute the major part of the sample. Other materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

Lab ref	Sample id	Depth (m)	Sample description	Material removed	% Removed	% Moisture
133897-1	S/71570 - Subsoil stock	-	Clayey Loamy Sand with Gravel & Roots	-	-	11.9

Chemtech Environmental Limited

SOILS

Lab number			133897-1
Sample id			S/71570 - Subsoil stock
Depth (m)			-
Date sampled			31/05/2024
Test	**Method**	**Units**	
Antimony (total)	CE264	mg/kg Sb	<5
Arsenic (total)	CE264^{M}	mg/kg As	5.3
Barium (total)	CE264^{U}	mg/kg Ba	47.0
Cadmium (total)	CE264^{M}	mg/kg Cd	<1.6
Chromium (total)	CE264^{U}	mg/kg Cr	20.5
Copper (total)	CE264^{M}	mg/kg Cu	12.2
Lead (total)	CE264^{U}	mg/kg Pb	13.7
Mercury (total)	CE264^{U}	mg/kg Hg	<0.7
Molybdenum (total)	CE264	mg/kg Mo	1.7
Nickel (total)	CE264^{M}	mg/kg Ni	15.9
Selenium (total)	CE264	mg/kg Se	<3
Zinc (total)	CE264^{M}	mg/kg Zn	43.7

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE001	Moisture Content	Gravimetry, reported on Wet Weight basis	As received		0.1	% w/w
CE264	Antimony (total)	Aqua Regia Extraction, ICPOES	Dry		5	mg/kg Sb
CE264	Arsenic (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.8	mg/kg As
CE264	Barium (total)	Aqua Regia Extraction, ICPOES	Dry	U	1.9	mg/kg Ba
CE264	Cadmium (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cd
CE264	Chromium (total)	Aqua Regia Extraction, ICPOES	Dry	U	2	mg/kg Cr
CE264	Copper (total)	Aqua Regia Extraction, ICPOES	Dry	M	1.6	mg/kg Cu
CE264	Lead (total)	Aqua Regia Extraction, ICPOES	Dry	U	2.3	mg/kg Pb
CE264	Mercury (total)	Aqua Regia Extraction, ICPOES	Dry	U	0.7	mg/kg Hg
CE264	Molybdenum (total)	Aqua Regia Extraction, ICPOES	Dry	U	1.6	mg/kg Mo
CE264	Nickel (total)	Aqua Regia Extraction, ICPOES	Dry	M	2.1	mg/kg Ni
CE264	Selenium (total)	Aqua Regia Extraction, ICPOES	Dry	U	3	mg/kg Se
CE264	Zinc (total)	Aqua Regia Extraction, ICPOES	Dry	M	4	mg/kg Zn

Chemtech Environmental Limited

DEVIATING SAMPLE INFORMATION

Comments
Sample deviation is determined in accordance with the UKAS note "Guidance on Deviating Samples" and based on reference standards and laboratory trials.
For samples identified as deviating, test result(s) may be compromised and may not be representative of the sample at the time of sampling.
Chemtech Environmental Ltd cannot be held responsible for the integrity of sample(s) received if Chemtech Environmental Ltd did not undertake the sampling. Such samples may be deviating.

Key

N	No (not deviating sample)
Y	Yes (deviating sample)
NSD	Sampling date not provided
NST	Sampling time not provided (waters only)
EHT	Sample exceeded holding time(s)
IC	Sample not received in appropriate containers
HP	Headspace present in sample container
NCF	Sample not chemically fixed (where appropriate)
OR	Other (specify)

Lab ref	Sample id	Depth (m)	Deviating	Tests (Reason for deviation)
133897-1	S/71570 - Subsoil stock	-	N	

Chemtech Environmental Limited

ADDITIONAL INFORMATION

Notes

Opinions and interpretations expressed herein are outside the UKAS accreditation scope.

Unless otherwise stated, Chemtech Environmental Ltd was not responsible for sampling.

All testing carried out at Unit 6 Parkhead, Stanley, DH9 7YB, except for subcontracted testing.

Methods, procedures and performance data are available on request.

Results reported herein relate only to the material supplied to the laboratory.

This report shall not be reproduced except in full, without prior written approval.

Soil/Solid samples will be disposed of 4 weeks from initial receipt unless otherwise agreed.

Waters and leachate samples will be disposed of 2 weeks from report issue unless otherwise agreed.

DEFRA Licence for the introduction and movement within England of prohibited soil for chemical and physical analysis Licence No: 132693/469907-0

For soils and solids, all results are reported on a dry basis. Samples dried at no more than 30°C in a drying cabinet.

For soils and solids, analytical results are inclusive of stones, where applicable.

Moisture Content Calculated on a Wet Weight basis

Waste Acceptance Criteria Testing
BS EN 12457-Part 3, 2 Stage Process

CHEMTECH environmental part of Cawood

Sample Details		Test Values	
Contract Name	Land off Appletrees, Wrawby	Mass of Raw Test Portion (MW) kg	0.199
Lab Number	133897-1	Mass of Dried Test Portion (MD) kg	0.175
Sample ID	S/71570 - Subsoil stock	Moisture Content Ratio (MC) %	13.48
Date Sampled	31 May 2024	Dry Matter Content Ratio (DR) %	88.12
Date Received	3 June 2024	Leachant Volume (1) (L2) Litre	0.326
Particle Size (<4mm)	-	Leachant Volume (2) (L8) Litre	1.400
Method of size reduction	N/A	Eluate Volume (1) (VE1) Litre	0.190
Non-crushable matter	N/A	Eluate Volume (2) (VE2) Litre	1.140

Eluate Analysis	Conc in Eluate		Amount Leached		Council Decision 2003/33/EC Limit Values mg/kg at L:S 10:1		
Liquid : Waste Ratio	2:1	8:1					
pH (units)[2]	7.3	8.6			Inert Waste	Non-reactive Hazardous Waste	Hazardous Waste
Temperature (°C)	20	20	2:1	10:1			
Conductivity (µS/cm)[2]	267	167	mg/kg	mg/kg			
Antimony (µg/l Sb)	0.81	<0.8	0.002	**<0.008**	*0.06*	*0.7*	*5*
Arsenic (µg/l As)[2]	1.05	1.88	0.002	**0.018**	*0.5*	*2*	*25*
Barium (µg/l Ba)[2]	11.5	0.9	0.023	**0.021**	*20*	*100*	*300*
Cadmium (µg/l Cd)[2]	<0.1	<0.1	<0.0002	**<0.001**	*0.04*	*1*	*5*
Chromium (µg/l Cr)[2]	1.0	<0.5	0.002	**<0.006**	*0.5*	*10*	*70*
Copper (µg/l Cu)[2]	6.6	2.3	0.013	**0.028**	*2*	*50*	*100*
Lead (µg/l Pb)[2]	<0.6	<0.6	<0.0012	**<0.006**	*0.5*	*10*	*50*
Mercury (µg/l Hg)	<0.05	<0.05	<0.0001	**<0.0005**	*0.01*	*0.2*	*2*
Molybdenum (µg/l Mo)	17.3	10.3	0.035	**0.111**	*0.5*	*10*	*30*
Nickel (µg/l Ni)[2]	1.9	0.6	0.004	**0.008**	*0.4*	*10*	*40*
Selenium (µg/l Se)[2]	<1.1	<1.1	<0.0022	**<0.011**	*0.1*	*0.5*	*7*
Zinc (µg/l Zn)[2]	<3.2	<3.2	<0.006	**<0.03**	*4*	*50*	*200*
Chloride (mg/l Cl)[2]	2.5	2.5	2.5	**25**	2.5	*15000*	*25000*
Fluoride (mg/l F)[2]	0.6	0.6	0.6	**5.6**	0.6	*150*	*500*
Sulphate (mg/l SO_4)[2]	21	1.9	43	**40**	*1000*	*20000*	*50000*
Total Dissolved Solids (mg/l TDS)	203	127	406	**1354**	*4000*	*60000*	*100000*
Phenol Index (µg/l PhOH)	<10	<10	<0.02	**<0.1**	*1*		
Dissolved Organic Carbon (mg/l C)	22	10	44	**115**	*500*	*800*	*1000*

Waste Analysis	Units	Result			
Total Organic Carbon	% w/w	**0.6**	3%	5%	6%
Loss on Ignition	% w/w	**2.2**			10%
BTEX	mg/kg	**<0.06**	6		
PCBs (7 congeners)	mg/kg	**<0.035**	1		
Mineral Oil (C10 - C40)	mg/kg	**10**	500		
PAH (total)	mg/kg	**<0.36**	100		
pH[1]	pH units	**7.9**		>6	
Acid Neutralisation Capacity (pH4)	mol/kg	**7.73**		To be evaluated	
Acid Neutralisation Capacity (pH7)	mol/kg	**0.18**		To be evaluated	

[1] Results are accredited to MCERTS if matrix confirmed as soil

[2] Results in leachate are accredited to ISO17025

Disclaimer: The Landfill Waste Acceptance Criteria limits in this report are provided for guidance only and values are transcribed from the Council Decision annex 2003/33/EC
Chemtech Environmental Ltd does not take responsibility for any errors or omissions in the transcription, and all data should be verified by the end user.
Results will be colour flagged to the lowest threshold value breached. Any assessments made are based on the published results from the Laboratory and make no assessment of uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. Method uncertainty levels can be provided
Interpretation/assessment is outside the scope of the laboratory's UKAS accreditation.
Moisture Content Calculated on Wet Weight Basis

Comments

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Vat Reg No. 772 5703 18 Registered in England number 4284013

Chemtech Environmental Limited

METHOD DETAILS

METHOD	SOILS	METHOD SUMMARY	SAMPLE	STATUS	LOD	UNITS
CE001	Moisture Content	Gravimetry, reported on Wet Weight basis	As received		0.1	% w/w
CE004	pH	Based on BS 1377, pH Meter	As received	M	-	units
CE083	Acid Neutralisation Capacity	Titration	Dry		0.01	mol/kg
CE144	Ammoniacal Nitrogen as N	KCl extraction, Colorimetry	As received		1	mg/kg N
CE007	Electrical conductivity	Conductivity Meter	As received	U	10	µS/cm
CE197	Total Organic Carbon (TOC)	Carbon Analyser	Dry		0.1	% w/w C
CE006	Loss On Ignition at 440°C	Based on BS 1377, Gravimetry	Dry	U	0.1	% w/w
CE087	PAH (total of 17)	Solvent extraction, GC-MS	As received		0.36	mg/kg
CE192	BTEX (total)	Headspace GC-FID	As received		0.06	mg/kg
CE194	Mineral Oil (>C10-C40) silica clean up	Solvent extraction, clean-up, GC-FID	As received		16	mg/kg
CE137	PCB (total of ICES 7)	Solvent extraction, GC-MS	As received		0.035	mg/kg
CE264	Antimony (dissolved)	ICP-MS			0.8	µg/l Sb
CE264	Arsenic (dissolved)	ICP-MS		U	0.1	µg/l As
CE264	Barium (dissolved)	ICP-MS		U	0.9	µg/l Ba
CE264	Cadmium (dissolved)	ICP-MS		U	0.1	µg/l Cd
CE264	Chromium (dissolved)	ICP-MS		U	0.5	µg/l Cr
CE264	Copper (dissolved)	ICP-MS		U	0.6	µg/l Cu
CE264	Lead (dissolved)	ICP-MS		U	0.6	µg/l Pb
CE264	Mercury (dissolved)	ICP-MS			0.05	µg/l Hg
CE264	Molybdenum (dissolved)	ICP-MS			0.9	µg/l Mo
CE264	Nickel (dissolved)	ICP-MS		U	0.4	µg/l Ni
CE264	Selenium (dissolved)	ICP-MS		U	1.1	µg/l Se
CE264	Zinc (dissolved)	ICP-MS		U	3	µg/l Zn
CE213	pH	Based on BS 1377, pH Meter		U	-	units
CE214	Electrical conductivity	Conductivity Meter		U	10	µS/cm
CE049	Chloride	Dsicerete Analyser		U	0.4	mg/l Cl
CE049	Fluoride	Dsicerete Analyser		U	0.1	mg/l F
CE049	Sulphate	Dsicerete Analyser		U	0.3	mg/l SO4
CE148	Phenols (total)	Continuous Flow Colorimetry			10	µg/l PhOH
CE039	Total dissolved solids	TDS meter			10	mg/l TDS
CE247	Total Organic Carbon	Filtration, TOC analyser			5	mg/l C

Statement of Conformity
Where Chemtech reports a statement of conformity to a specification, the decision rules applied are derived from the Ilac document ILAC G8:09/2019.
Acceptance limits (AL), applied are derived from the tolerance limits (TL) by you the client or applicable standard (e.g. 2003.33.EC Council Decision, BS3882, BS8601)

Agreed and reported Decision Rule:
"PASS" if the result < TL, and the bias / precision values for the process meet the targets defined within the methodology and/or applied accreditation.

Reported Decisions:
Result < TL for determinands: PASS
Result > TL for determinands: FAIL

Definitions Used:
Acceptance limit (AL) Specified upper or lower bounds of permissible measured quantity values.
Tolerance limit (TL) Specified upper or lower bound of permissible values of a property.

Accreditation of WAC/BS3882/BS8601
Accreditation in Soil to MCERTS is only applicable for specific matrix types identified as soil (Sand/Loam/Clay) during the sample assessment
If the sample is classified as not soil, not accreditation is conveyed

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75401 Client Keigar Homes

Site	Land Off Applefields, Wrawby
Location	WS205-3
Date/Time sampled	27/06/25
Client sample No	WS205-3
Sample Method / Point	not stated / Trial pit
Sampled by	D. Driver (HML)
Trial pit / Bore hole No	n/a
Depth	0.7-0.9 m
Sample type	n/a
Description	Very Stiff Grey/Beige SILT/CLAY, with sand pockets and coarse to fine chalk and flint Gravels.
comments	

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**16**

Liquid limit, Plastic limit and Plasticity
Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	28
% passing 0.425mm sieve	72
Liquid limit	**48**
Plastic limit	**19**
Plasticity Index	**29**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 08/08/25

D.A. Driver M.W. Driver C. Driver
Directors

Certificates of sampling when submitted are retained by the Laboratory and is available upon request
Subject to their suitability, all samples are tested as received at the laboratory.
The results detailed in this report relate only to the samples submitted to the laborattory
Samples will normally be kept for 14 days from the date reported

End of Report

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75402

Client Keigar Homes

Site Land Off Applefields, Wrawby

Location WS205-4

Date/Time sampled 27/06/25 Client sample No WS205-4

Sample Method / Point not stated / Trial pit

Sampled by D. Driver (HML)

Trial pit / Bore hole No n/a Depth 1.0-2.0 m Sample type n/a

Description Firm Grey/Brown, grey mottled SILT/CLAY, with sand pockets, and medium to fine Gravels.

comments

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**30**

Liquid limit, Plastic limit and Plasticity

Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	1
% passing 0.425mm sieve	99
Liquid limit	**66**
Plastic limit	**25**
Plasticity Index	**41**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 08/08/25

D.A. Driver M.W. Driver C. Driver
Directors

Certificates of sampling when submitted are retained by the Laboratory and is available upon request
Subject to their suitability, all samples are tested as received at the laboratory.
The results detailed in this report relate only to the samples submitted to the laborattory
Samples will normally be kept for 14 days from the date reported

End of Report

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75396

Client Keigar Homes

Site Land Off Applefields, Wrawby

Location WS201-2

Date/Time sampled 27/06/25 Client sample No WS201-2

Sample Method / Point not stated / Trial pit

Sampled by D. Driver (HML)

Trial pit / Bore hole No n/a Depth 0.5-1.0 m Sample type n/a

Description Soft Light Brown, grey mottled SILT/CLAY, with occ coarse to fine Gravels, and rare rootlets.

comments

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**11**

Liquid limit, Plastic limit and Plasticity

Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	5
% passing 0.425mm sieve	95
Liquid limit	**38**
Plastic limit	**17**
Plasticity Index	**21**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 18/07/25

D.A. Driver M.W. Driver C. Driver
Directors

Certificates of sampling when submitted are retained by the Laboratory and is available upon request
Subject to their suitability, all samples are tested as received at the laboratory.
The results detailed in this report relate only to the samples submitted to the laborattory
Samples will normally be kept for 14 days from the date reported

End of Report

HUMBERSIDE MATERIALS LABORATORY LTD

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75398

Client Keigar Homes

Site Land Off Applefields, Wrawby

Location WS202-3

Date/Time sampled 27/06/25 Client sample No WS202-3

Sample Method / Point not stated / Trial pit

Sampled by D. Driver (HML)

Trial pit / Bore hole No n/a Depth 1.2-1.6 m Sample type n/a

Description Very Stiff Light Brown/Beige, light grey mottled SILT/CLAY, with coarse to fine Gravels.

comments

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**14**

Liquid limit, Plastic limit and Plasticity

Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	27
% passing 0.425mm sieve	73
Liquid limit	**29**
Plastic limit	**16**
Plasticity Index	**13**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 15/08/25

D.A. Driver M.W. Driver C. Driver
Directors

Certificates of sampling when submitted are retained by the Laboratory and is available upon request
Subject to their suitability, all samples are tested as received at the laboratory.
The results detailed in this report relate only to the samples submitted to the laborattory
Samples will normally be kept for 14 days from the date reported

End of Report

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75400

Client Keigar Homes

Site Land Off Applefields, Wrawby

Location WS204-5

Date/Time sampled 27/06/25 Client sample No WS204-5

Sample Method / Point not stated / Trial pit

Sampled by D. Driver (HML)

Trial pit / Bore hole No n/a Depth 3.5-4.0 m Sample type n/a

Description Firm/Stiff Dark Grey SILT/CLAY, with coarse to fine Gravels.

comments

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**27**

Liquid limit, Plastic limit and Plasticity

Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	1
% passing 0.425mm sieve	99
Liquid limit	**78**
Plastic limit	**17**
Plasticity Index	**61**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 08/08/25

D.A. Driver M.W. Driver C. Driver
Directors

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End of Report

HUMBERSIDE MATERIALS LABORATORY LTD
Atherton Way, Brigg
North Lincolnshire, DN20 8AR
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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75399 Client Keigar Homes

Site	Land Off Applefields, Wrawby
Location	WS203-2
Date/Time sampled	27/06/25
Client sample No	WS203-2
Sample Method / Point	not stated / Trial pit
Sampled by	D. Driver (HML)
Trial pit / Bore hole No	n/a
Depth	0.5-1.0 m
Sample type	n/a
Description	Firm Dark Brown/Grey/Beige, light grey mottled SILT/CLAY, with much coarse to fine Gravels.
comments	

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**14**

Liquid limit, Plastic limit and Plasticity
Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	21
% passing 0.425mm sieve	79
Liquid limit	**34**
Plastic limit	**15**
Plasticity Index	**19**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 07/08/25

D.A. Driver M.W. Driver C. Driver
Directors

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UKAS TESTING 1890

SOIL CLASSIFICATION TESTS

Sample Ref S 75397 Client Keigar Homes

Site Land Off Applefields, Wrawby

Location WS201-3

Date/Time sampled 27/06/25 Client sample No WS201-3

Sample Method / Point not stated / Trial pit

Sampled by D. Driver (HML)

Trial pit / Bore hole No n/a Depth 1.2-1.5 m Sample type n/a

Description Firm Dark Grey, Beige mottled SILT/CLAY, with sand pockets, and coarse to fine Gravels.

comments

Moisture Test method BS 1377- 2:2022 @ Permanent

Portion No	02
Method	Oven dried
% Moisture	**18**

Liquid limit, Plastic limit and Plasticity

Test method BS 1377-2:2022 Single point cone pen @ Permanent Laboratory

Portion No	01
Test condition	Sieved
% retained 0.425mm sieve	5
% passing 0.425mm sieve	95
Liquid limit	**36**
Plastic limit	**16**
Plasticity Index	**20**

File ref 0126 / 5708 / P
Date received 04/07/25
Date Tested 04/07/25
Date reported 07/08/25

D.A. Driver M.W. Driver C. Driver
Directors

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UKAS TESTING 1290

DETERMINATION OF CALIFORNIA BEARING RATIO

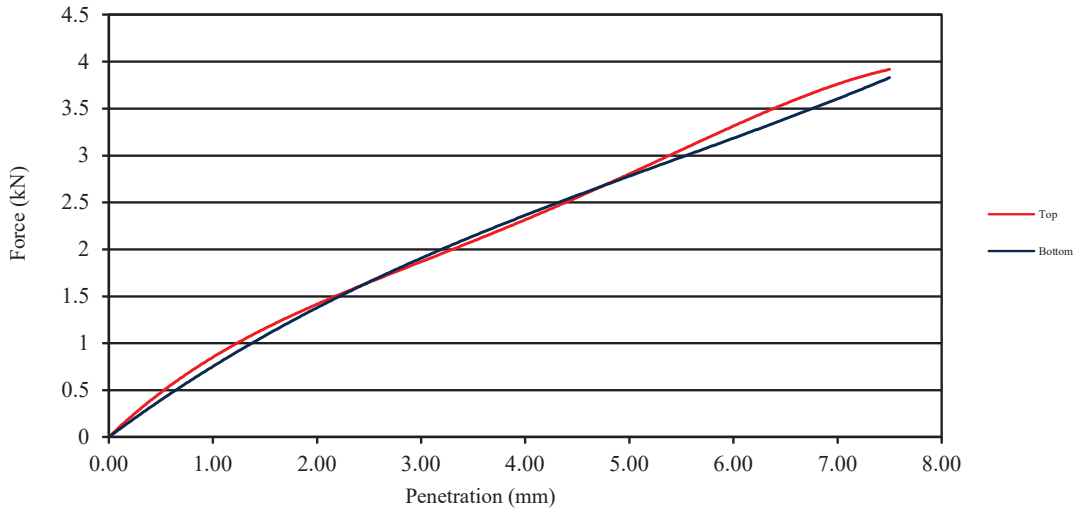
Sample Ref S/75392/01 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP204-1		
Date/Time sampled	27/06/2025	Date received	27/06/2025
Sample No	TP204-1	TP/BH	n/a
Sampled by	Not Stated	Depth (m)	0.5-0.9
Sample Method	Not Stated	Sample Type	N/A

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Compaction 2.5kg rammer @ permanent Laboratory

Description Stiff Light Brown Light Grey Mottled sandy CLAY with occasional Coarse to fine Flint Gravels

Compaction method	2.5kg hand rammer				
Surcharge wt.	12kg			Top	Bottom
Bulk density	1.80 Mg/m^3	Moisture (%)		11	11
Dry density	1.62 Mg/m^3	**C.B.R. (%)**		**14**	**14**



Comments

Percent retained 20mm test sieve and removed - 0.0%
Sample tested in unsoaked condition

File ref	0216/5708
Date tested	27/06/2025
Date reported	04/08/2025

Signed:- M. Driver D. Driver C. Driver
Director

Certificate of sampling when submitted is retained by the Laboratory and available upon request
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The results detailed in this report relate only to the materials submitted to the laboratory.
Sampling data supplied by the client may affect the validity of the test.

[Test Reports-1CBR2.5compactionBLANK-22/06/2021/CD]

End of Report

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UKAS TESTING 1290

DETERMINATION OF CALIFORNIA BEARING RATIO

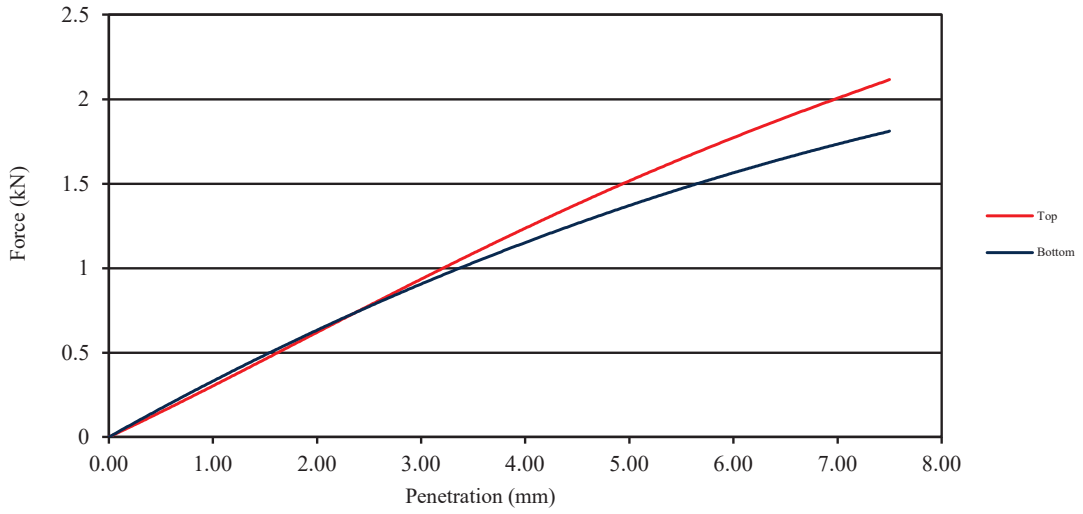
Sample Ref S/75393/01 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP206-1		
Date/Time sampled	27/06/2025	Date received	27/06/2025
Sample No	TP206-1	TP/BH	n/a
Sampled by	Not Stated	Depth (m)	0.5-1.0
Sample Method	Not Stated	Sample Type	N/A

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Compaction 2.5kg rammer @ permanent Laboratory

Description Firm/Stiff Light Grey/Brown Grey/Brown Mottled sandy CLAY with occasional Coarse to Fine Chalk and Flint Gravels

Compaction method	2.5kg hand rammer				
Surcharge wt.	12kg			Top	Bottom
Bulk density	2.17 Mg/m^3		Moisture (%)	13	14
Dry density	1.91 Mg/m^3		**C.B.R. (%)**	**7.6**	**6.9**



Comments

Percent retained 20mm test sieve and removed - 0.0%
Sample tested in unsoaked condition

File ref	0216/5708
Date tested	27/06/2025
Date reported	04/08/2025

Signed:- M. Driver D. Driver C. Driver
Director

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[Test Reports-1CBR2.5compactionBLANK-22/06/2021/CD]

End of Report

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UKAS TESTING 1290

DETERMINATION OF CALIFORNIA BEARING RATIO

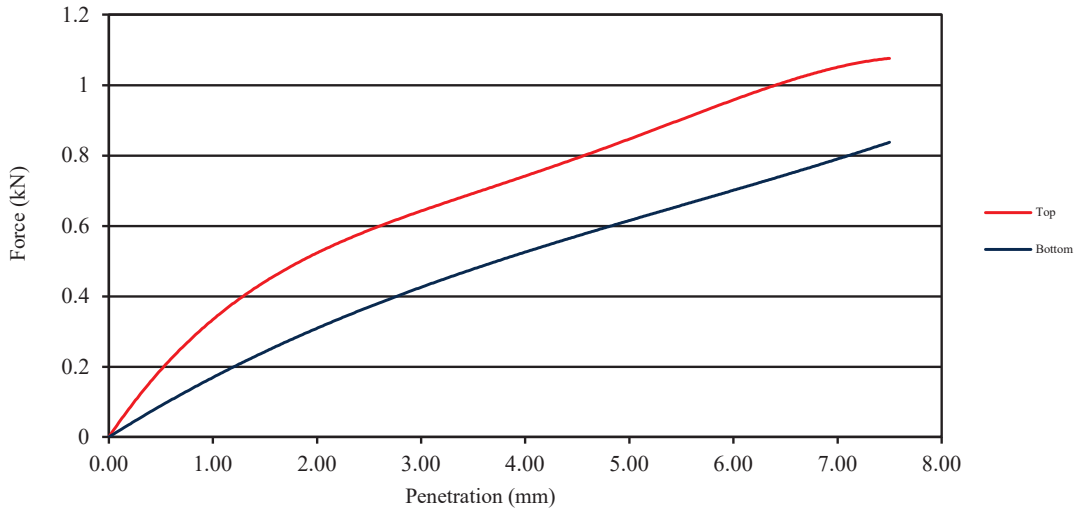
Sample Ref S/75394/01 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP207-1		
Date/Time sampled	27/06/2025	Date received	27/06/2025
Sample No	TP207-1	TP/BH	n/a
Sampled by	Not Stated	Depth (m)	0.5-1.0
Sample Method	Not Stated	Sample Type	N/A

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Compaction 2.5kg rammer @ permanent Laboratory

Description Firm Orange/Brown, grey mottled slightly sandy SILT/CLAY with coarse to fine Gravels.

Compaction method	2.5kg hand rammer				
Surcharge wt.	12kg			Top	Bottom
Bulk density	2.13 Mg/m^3	Moisture (%)		15	16
Dry density	1.85 Mg/m^3	**C.B.R. (%)**		**4.4**	**3.2**



Comments

Percent retained 20mm test sieve and removed - 6.2%
Sample tested in unsoaked condition

File ref	0216/5708
Date tested	27/06/2025
Date reported	07/08/2025

Signed:- M. Driver D. Driver C. Driver
Director

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The results detailed in this report relate only to the materials submitted to the laboratory.
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[Test Reports-1CBR2.5compactionBLANK-22/06/2021/CD]

End of Report

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UKAS TESTING 1290

Test Report - Sheet 1 of 1

DETERMINATION OF CALIFORNIA BEARING RATIO

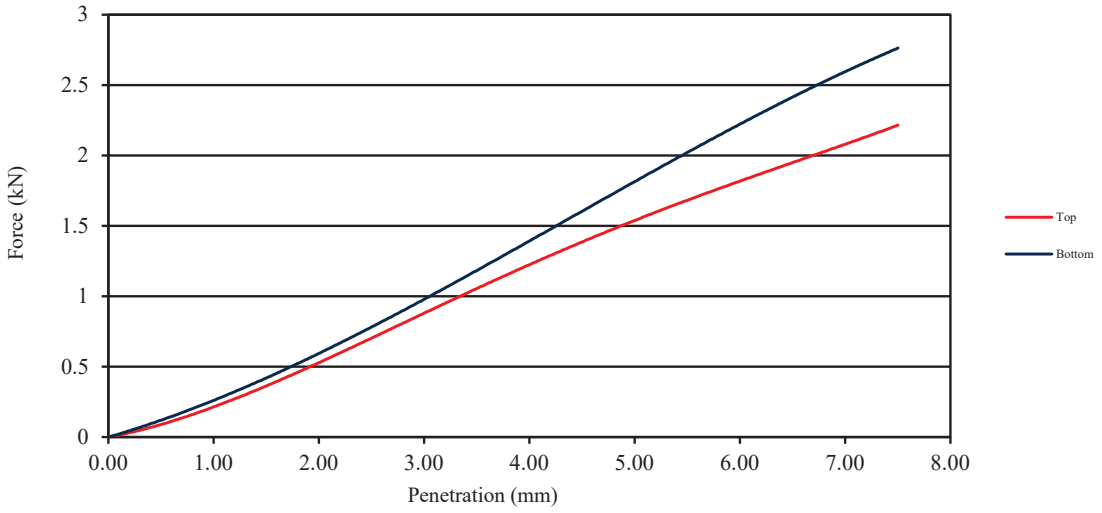
Sample Ref	S/75395/01	**Client**	Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP208-1		
Date/Time sampled	27/06/2025	Date received	27/06/2025
Sample No	TP208-1	TP/BH	N/A
Sampled by	Not Stated	Depth (m)	0.5-1.0
Sample Method	Not Stated	Sample Type	N/A

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Compaction 2.5kg rammer @ permanent Laboratory

Description Light Brown friable SILT, with some coarse to fine chalk Gravels.

Compaction method	2.5kg hand rammer				
Surcharge wt.	12kg			Top	Bottom
Bulk density	2.18 Mg/m^3	Moisture (%)		13	13
Dry density	1.93 Mg/m^3	**C.B.R. (%)**		**7.7**	**9.1**



Comments

Percent retained 20mm test sieve and removed - 10.0%
Sample tested in unsoaked condition

File ref	0126/5708
Date tested	27/06/2025
Date reported	15/07/2025

Signed:- M. Driver D. Driver C. Driver
Director

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[Test Reports-1CBR2.5compactionBLANK-22/06/2021/CD]

End of Report

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UKAS TESTING 1290

Test report - Sheet 1 of 2
DETERMINATION OF CALIFORNIA BEARING RATIO

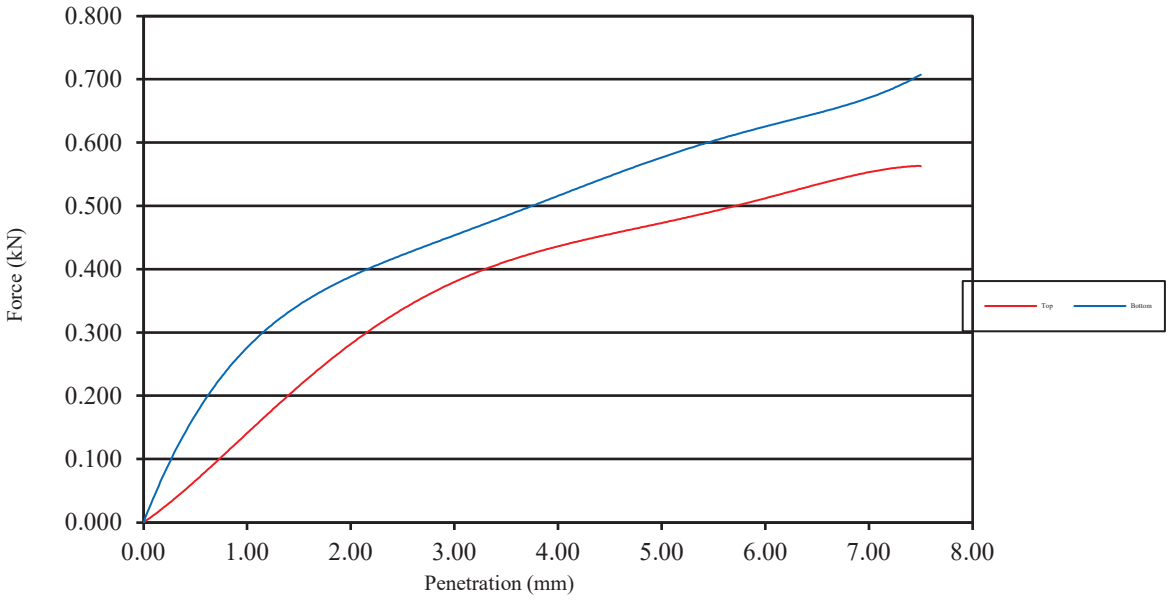
Sample Ref S/75392/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP204-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Site sample No	TP204-1	Depth (m)	0.5-0.9
Sampled by	Not Stated	Sample Type	N/A
Sample Method	Not Stated		

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Test Method Compaction - 2.5kg rammer & Soaked @ Permanent Laboratory

Description Stiff Light Brown Light Grey Mottled sandy CLAY with occasional Coarse to fine Flint Gravels

			Top	Bottom
Surcharge wt.	12kg			
Bulk density	2.58 Mg/m^3	Moisture (%)	21	18
Dry density	2.16 Mg/m^3	**C.B.R. (%)**	**2.6**	**3.2**



Comments

Percentage retained 20mm removed 5.0%
Sample tested in a soaked condition

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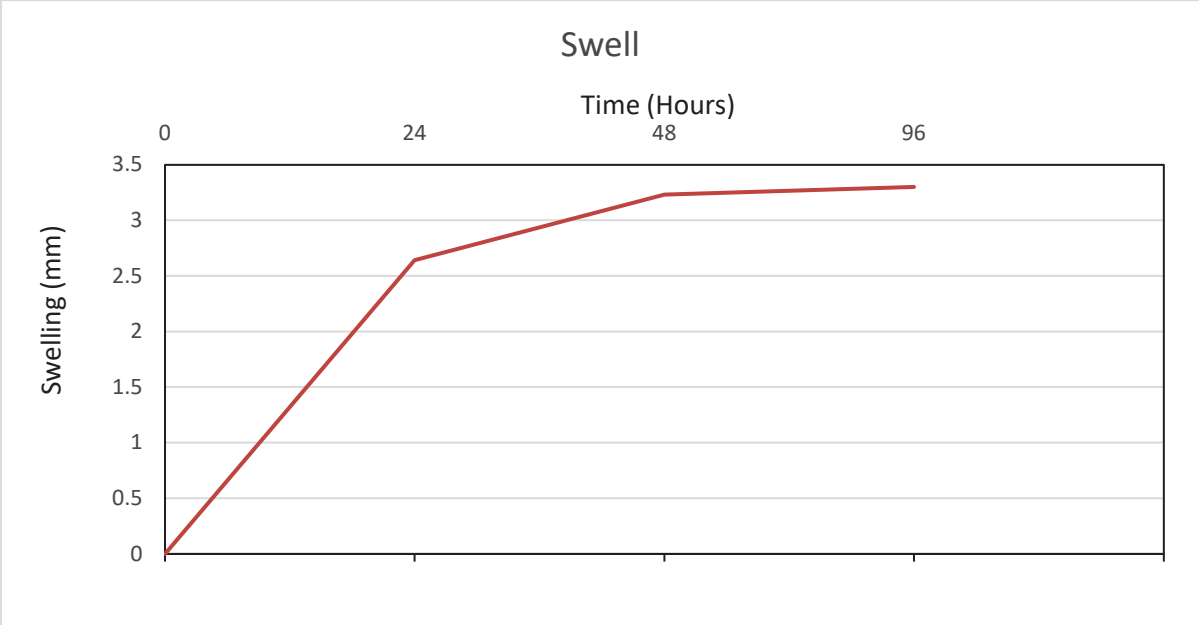
DETERMINATION OF CALIFORNIA BEARING RATIO

Sample Ref S/75392/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP204-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Client sample No	TP204-1	Depth (m)	0.5-0.9
Sampled by	Not Stated	Sample Type	N/A
Sample Method	Not Stated		



Comments
Water not visible in top of sample after 72 hourse, sample flooded.

File ref	0216/5708
Date tested	27/06/2025
Date reported	07/08/2025

Signed M. Driver, D. Driver, C. Driver
Director

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UKAS TESTING 1290

Test report - Sheet 1 of 2
DETERMINATION OF CALIFORNIA BEARING RATIO

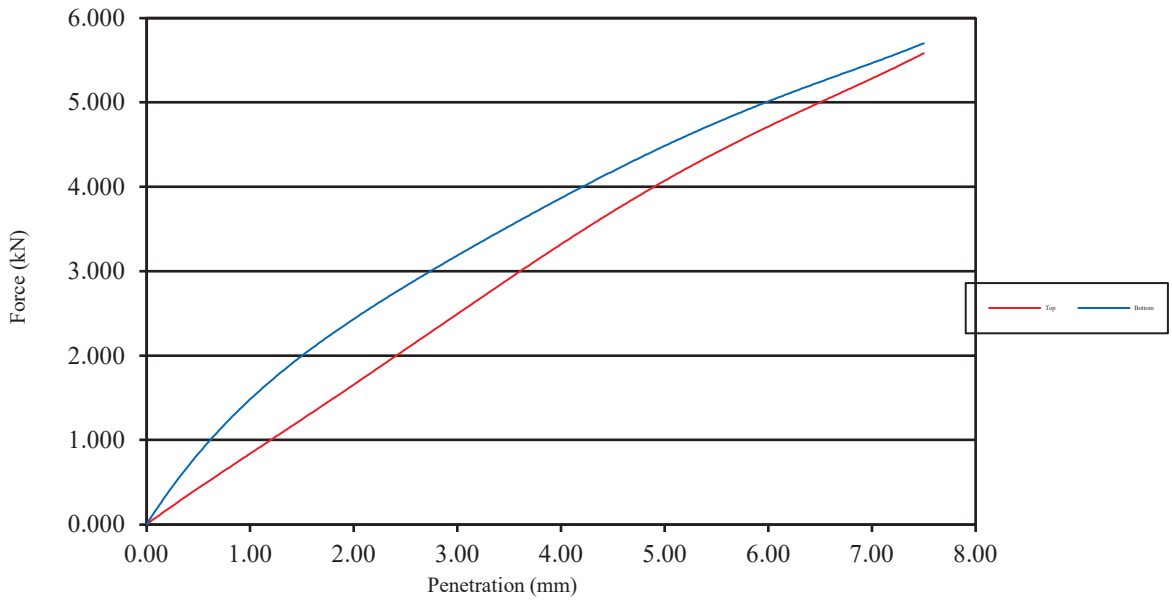
Sample Ref S/75393/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP206-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Site sample No	TP206-1	Depth (m)	0.5-1.0
Sampled by	Not Stated	Sample Type	N/A
Sample Method	Not Stated		

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Test Method Compaction - 2.5kg rammer & Soaked @ Permanent Laboratory

Description Firm/Stiff Light Grey/Brown Grey/Brown Mottled sandy CLAY with occasional Coarse to Fine Chalk and Flint Gravels

				Top	Bottom
Surcharge wt.	12kg				
Bulk density	2.18 Mg/m^3	Moisture (%)		14	14
Dry density	1.91 Mg/m^3	**C.B.R. (%)**		**20**	**22**



Comments

Percentage retained 20mm removed 3.5%
Sample tested in a soaked condition

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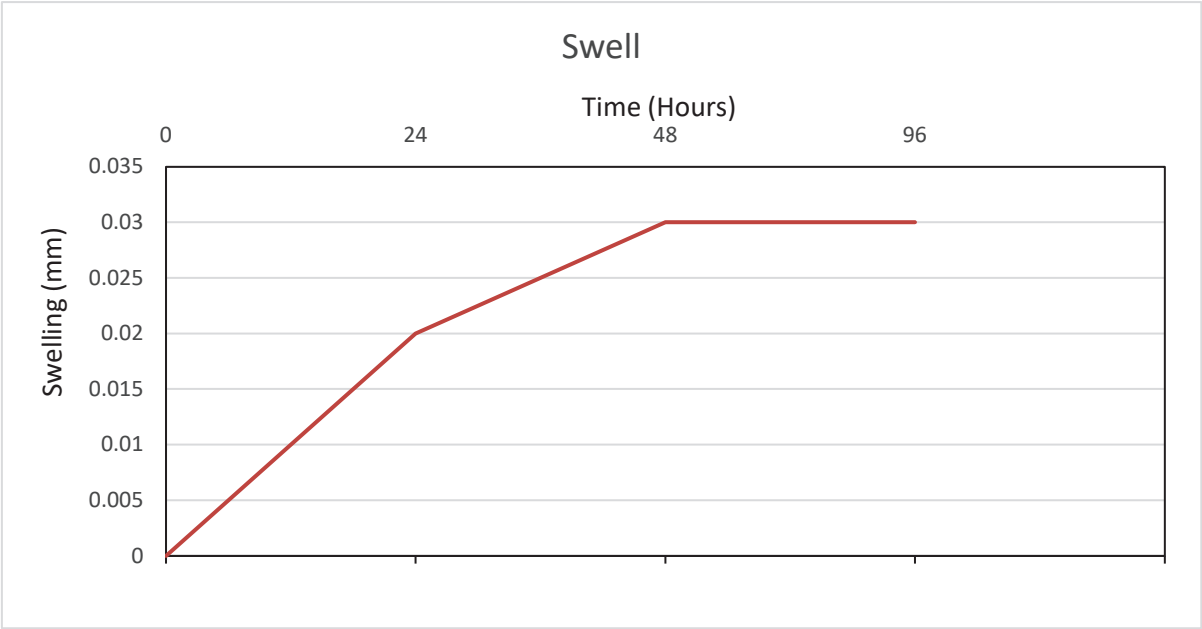
DETERMINATION OF CALIFORNIA BEARING RATIO

Sample Ref	S/75393/02	**Client**	Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP206-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Client sample No	TP206-1	Depth (m)	0.5-1.0
Sampled by	Not Stated	Sample Type	N/A
Sample Method	Not Stated		



Comments
Water not visible in top of sample after 72 hourse, sample flooded.

File ref	0216/5708
Date tested	27/06/2025
Date reported	07/08/2025

Signed M. Driver, D. Driver, C. Driver
Director

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UKAS TESTING 1290

Test report - Sheet 1 of 2

DETERMINATION OF CALIFORNIA BEARING RATIO

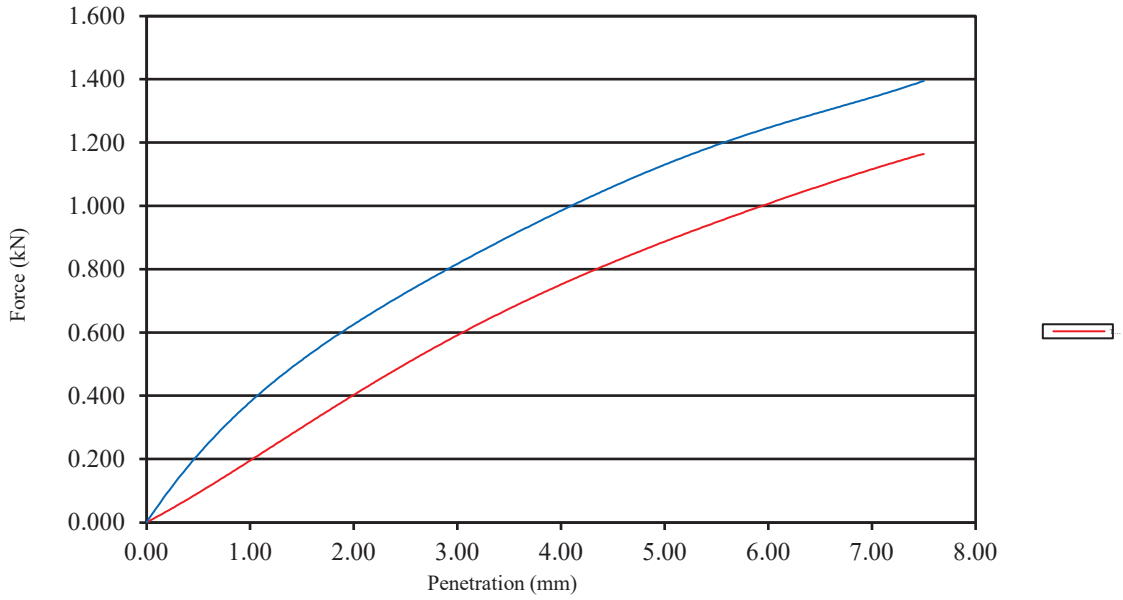
Sample Ref S/75394/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP207-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Site sample No	TP207-1	Depth (m)	0.5-1.0
Sampled by	DD (HML Ltd)	Sample Type	N/A
Sample Method	Not Stated		

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Test Method Compaction - 2.5kg rammer & Soaked @ Permanent Laboratory

Description Stiff Light Brown Light Grey Mottled sandy CLAY with occasional Coarse to fine Flint Gravels

				Top	Bottom
Surcharge wt.	12kg				
Bulk density	2.30 Mg/m^3	Moisture (%)		16	17
Dry density	1.98 Mg/m^3	**C.B.R. (%)**		**4.5**	**5.6**



Comments

Percentage retained 20mm removed 0.0%
Sample tested in a soaked condition

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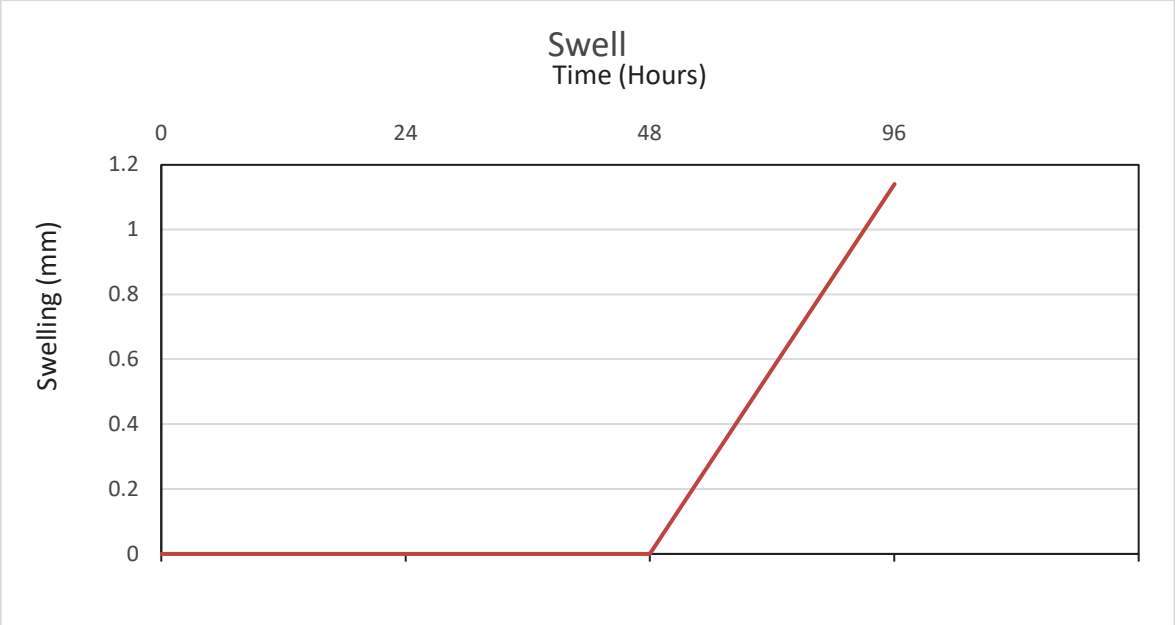
DETERMINATION OF CALIFORNIA BEARING RATIO

Sample Ref S/75394/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP207-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Client sample No	TP207-1	Depth (m)	0.5-1.0
Sampled by	DD (HML Ltd)	Sample Type	N/A
Sample Method	Not Stated		



Comments
Water not visible in top of sample after 72 hourse, sample flooded.

File ref	0126/5708
Date tested	27/06/2025
Date reported	12/08/2025

Signed M. Driver, D. Driver, C. Driver
Director

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UKAS TESTING 1290

Test report - Sheet 1 of 2

DETERMINATION OF CALIFORNIA BEARING RATIO

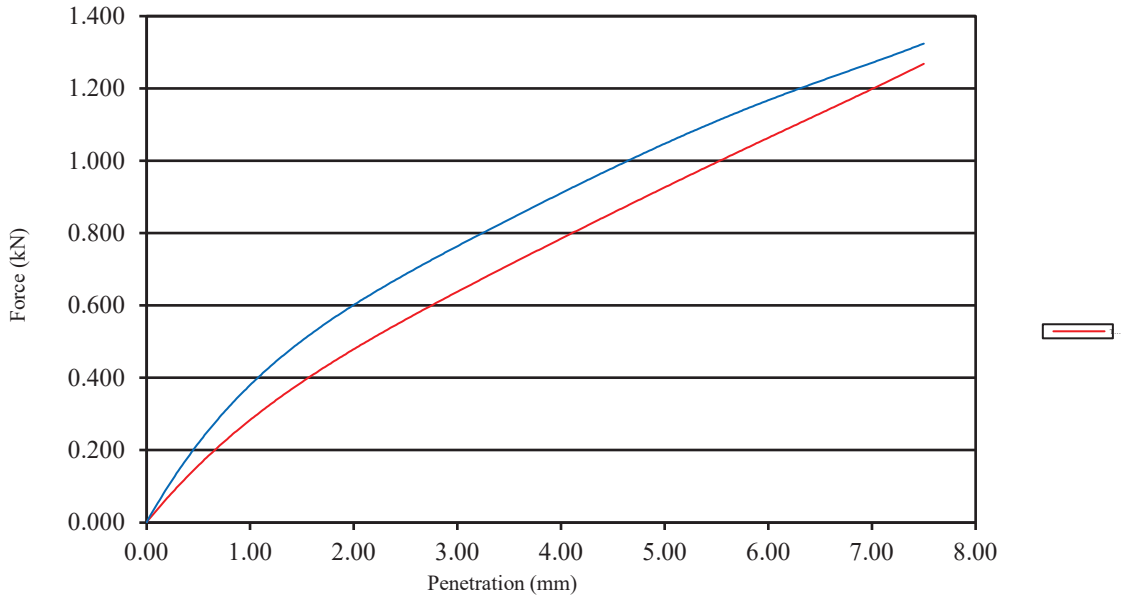
Sample Ref S/75395/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP208-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Site sample No	TP208-1	Depth (m)	0.5-1.0
Sampled by	Dd (HML Ltd)	Sample Type	N/A
Sample Method	Not Stated		

Determination of California Bearing Ratio Test method BS 1377 Part 4 1990
Test Method Compaction - 2.5kg rammer & Soaked @ Permanent Laboratory

Description Stiff Light Brown Light Grey Mottled sandy CLAY with occasional Coarse to fine Flint Gravels

				Top	Bottom
Surcharge wt.	12kg				
Bulk density	2.10 Mg/m^3	Moisture (%)		15	15
Dry density	1.83 Mg/m^3	**C.B.R. (%)**		**4.7**	**5.2**



Comments

Percentage retained 20mm removed 1.0%
Sample tested in a soaked condition

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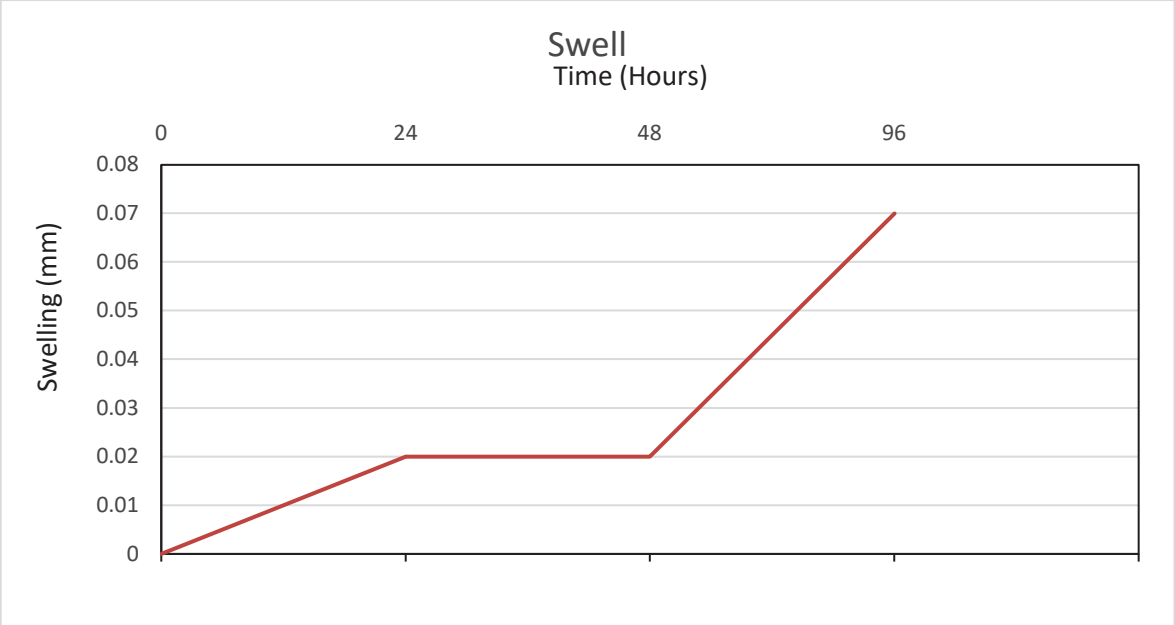
DETERMINATION OF CALIFORNIA BEARING RATIO

Sample Ref S/75395/02 **Client** Keigar Homes

Site	Land off Applefields, Wrawby		
Location	TP208-1		
Date/Time sampled	27/06/2025	TP/BH	N/A
Client sample No	TP208-1	Depth (m)	0.5-1.0
Sampled by	Dd (HML Ltd)	Sample Type	N/A
Sample Method	Not Stated		



Comments
Water not visible in top of sample after 72 hourse, sample flooded.

File ref	0126/5708
Date tested	27/06/2025
Date reported	12/08/2025

Signed M. Driver, D. Driver, C. Driver
Director

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End of Report