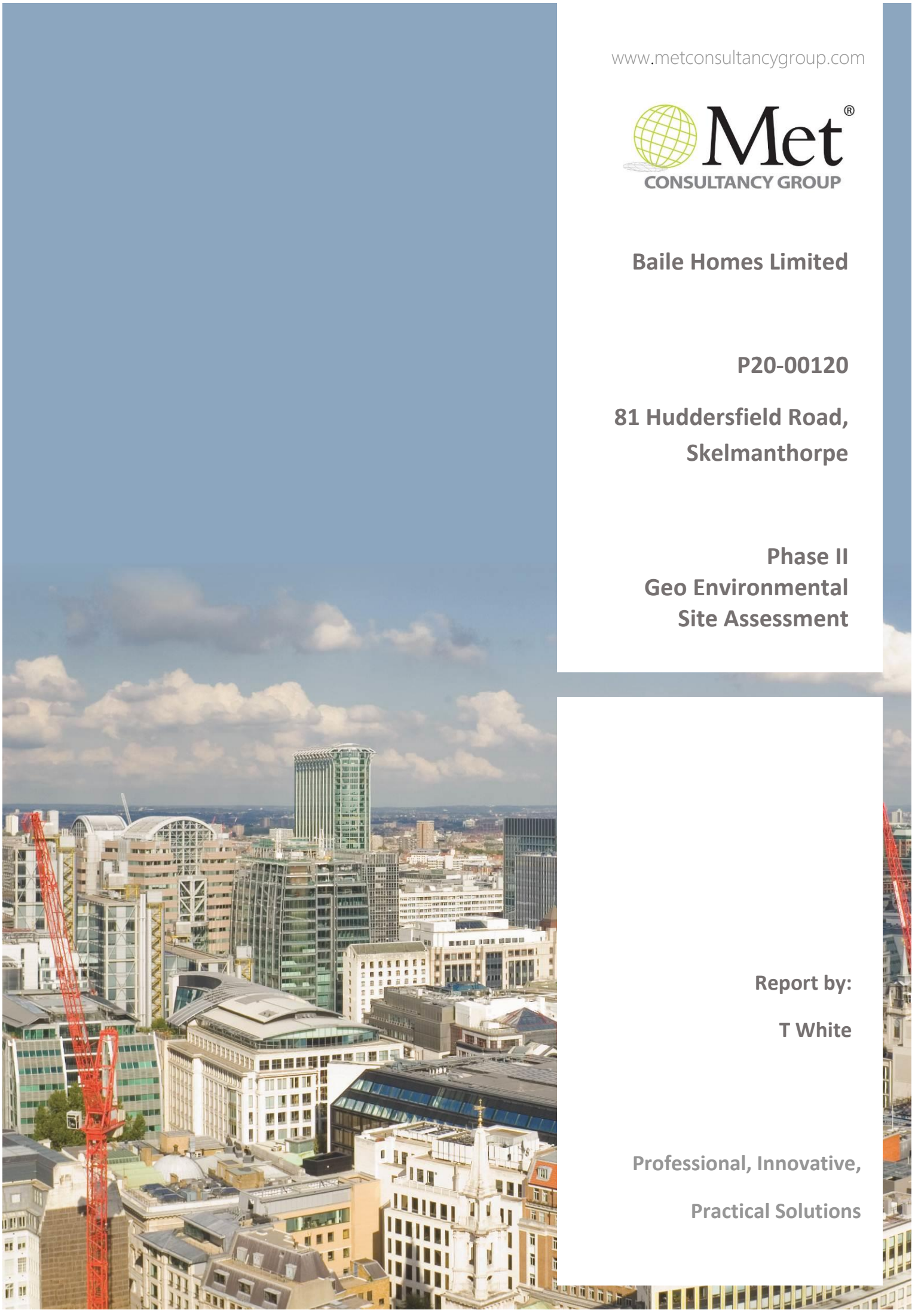

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CONSULTANCY GROUP

Baile Homes Limited

P20-00120

81 Huddersfield Road,
Skelmanthorpe

Phase II
Geo Environmental
Site Assessment

Report by:

T White

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Practical Solutions

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CONTENTS

1. REVISION RECORD

Report Ref: P20-00120 / Phase II					
Rev	**Description**	**Date**	**Originator**	**Checked**	**Approved**
1	Initial Issue	17/09/20	T White	AEC	RJS

Prepared For:	**Prepared By:**
Baile Homes Limited Connaught House Lofthouse Wakefield WF3 3HA	**Met Engineers Ltd** Southgate House Pontefract Road Leeds West Yorkshire LS10 1SW

2. INTRODUCTION

2.1. GENERAL INTRODUCTION

This Report presents the findings of a Phase II Geo-environmental assessment of a site at 81 Huddersfield Road, Skelmanthorpe, HD8 9AR (Grid Reference: 422425,410703) for Baile Homes Limited.

The Intrusive Site Investigation (Phase II) comprised of windowless sampler boreholes to establish the sub surface strata and remove samples for contamination and geotechnical testing. The test results combined with the findings of the intrusions will then be used to make recommendations for any remedial works which may be necessary. A site plan including positions of the boreholes can be found in Appendix I of this report.

2.2. OBJECTIVES

The intrusive investigation was conducted to assess and confirm the immediate sub-surface ground conditions and extract in-situ soil samples for laboratory testing as recommended in Phase I Report dated 5th February 2020 by Met Engineers Ltd, to determine the geotechnical and environmental position of the site.

2.3. SCOPE OF WORKS

Based upon the recommendations of the Desk Study and a visual assessment of the sub-surface materials during the intrusive works, soil samples were taken for laboratory testing. CLEA Guidelines and recommendations given in Land Quality Management General Assessment Criteria have been applied to establish a risk based CLEA Model to assess the likely contamination issues and to comment on potential constraints for development of the site.

Judgement is based strictly on the findings of the specific boreholes and soil samples tested and therefore may not be representative of the site as a whole. The findings of the intrusive investigation will also be used in conjunction with the findings of the Desk Study to establish parameters which may be used in formulating a foundation design.

2.4. LIMITATIONS OF THE REPORT

Baile Homes Limited. (the Client) has requested that a Phase II Site Investigation, CLEA Conceptual Model and Risk Assessment be undertaken in order to assess the suitability of the site for redevelopment. The report is not a comprehensive site characterisation and should not be construed as such.

This report has been prepared for the sole internal use and reliance of Baile Home Limited. The report shall not be relied upon or transferred to any other parties without the express written authority of Met Engineers Limited. If any unauthorised third party comes into possession of the report, they rely on it at their own risk and Met Engineers Limited owes them no duty of care.

The findings and opinions conveyed via this report are based on information obtained from a variety of sources as detailed within this report and which Met Engineers Limited, believes are reliable. Nevertheless, Met Engineers Limited, cannot and does not guarantee the authenticity or reliability of the information it has relied upon. The information contained in this report is to the

best of our knowledge accurate at the date of issue, however, sub-surface conditions, including ground water levels, may vary, especially with time.

In preparing this report it has been assumed that all past and present occupants and Third Parties have provided accurate information, especially relating to known or potential hazards. This report does not identify deficiencies or mistakes in the information provided by the user/owner, or from any other source, except where obvious in the light of other information.

This report is relevant at the date the report was written and should be read in the light of any subsequent changes in legislation, statutory requirement or industry practices.

The report represents the technical findings and opinions of Met Engineers Limited, and does not constitute any legal advice. As such, the advice of a Solicitor may also be required.

3. SITE HISTORY AND ENVIRONMENTAL SETTING

A detailed review of the published history, hydrological, geological and available environmental information was carried out by Met Engineers in a Phase I Desk Study report dated 5th February 2020 . The following is a brief summary of those findings.

The area of land referred to as 'The Site' within this document is indicated in Appendix I.

3.1. SITE DESCRIPTION

Site Address	81 Huddersfield Road, Skelmanthorpe, Huddersfield, HD8 9AR
Location	Grid Reference: 422425,410703
Setting	The site is located in Skelmanthorpe, 9.75km south east of Huddersfield City Centre. The site is rectangular in shape and is approximately 0.144ha in size. It is accessed via a gated entrance off Huddersfield Road. The eastern and central area of the site is developed with a residential house and associated garage, with the remainder of the site covered by soft landscaping and overgrown vegetation. There are 2№ ponds and a partially collapsed shed in the southern area of the site. A burnt mattress was noted in the rear garden. The site is bound by a trees, bushes and a 2.6m wide gate to the north, a dry stone wall to the east, trees and bushes to the south, and a wire fence to the west. The site is generally flat, with a slight depression in the north eastern corner of the site in which a large puddle was present during the site walkover. The adjacent land uses are residential houses to the east, south and west, with farming land to the north west.
Development Proposal	The site is proposed to be developed with 4№ residential houses and associated driveways, garages and soft landscaped areas.
Site History	From the earliest maps until around 1959, the site remained undeveloped, by this time a residential house and associated garage had been developed on site, which remain on site until present.

3.2. GEOLOGY & SOILS

Geology	Artificial Ground – The Groundsure report identifies an area of Made Ground 137m north west of the site. Based on historical maps and the lack of significant development on site, there is not expected to be significant amounts of Made Ground present on site. Superficial Deposits – The Groundsure report does no identify any superficial developments on site or within 250m of the site. Bedrock Geology – The Groundsure report records geology of the Pennine Lower Coal Measures Formation as outcropping on site and in the surrounding area, including sandstone of the Penistone Flags Formation. Faults – There is a fault recorded 246m south of the site. Coal Outcrops – There are no coal seams recorded on site or within 250m of the site.
Radon	<1% of properties in the area are above the radon action level. Therefore radon specific protection measures are not required for new buildings in accordance with BRE publication BR211.
Ground Workings	There is 1№ area of ground working shown within 250m of the site. This is the reservoir located from 43m south of the site from the 1890's to present.
Mining	The site is within a Coal Mine Reporting Area therefore a Coal Report has been obtained from The Coal Authority, which can be found within the Phase I Desk Study. The Coal Authority confirm that the site is not within an area that could be affected by any past recorded underground coal mining. There are no recorded mine entries within 20m of the site. The site is not affected by any past, present or future opencast mining. The Coal Authority have not received a claim for coal mine related subsidence for any property within 50m of the site since 1994. The site is not within a Development High Risk Area with regards to shallow depth coal mining, therefore a formal coal mining risk assessment is not required.

Natural Ground Subsidence	Shrink-Swell Clay – The Groundsure Report records the hazard rating on site and in the immediate surrounding area as Negligible, and records the hazard rating 49m west as Very Low. No special actions are required. Landslides – The Groundsure Report records the maximum hazard rating on site and in the surrounding area as Very Low, therefore no special actions are required. Soluble Rocks – The Groundsure Report records the hazard rating on site and in the surrounding area as Negligible, therefore no special actions are required. Compressible deposits – The Groundsure Report records the hazard rating on site and in the surrounding area as Negligible, therefore no special actions are required. Collapsible Deposits – The Groundsure Report records the hazard rating on site and in the surrounding area as Very Low therefore no special actions are required. Running Sands – The Groundsure Report records the hazard rating on site and in the surrounding area as Negligible, therefore no special actions are required. No natural ground subsidence problems are envisaged.
Boreholes	22№ BGS borehole records are held for positions located within 250m of the site. These all appear to be associated with the school to the west of the site. The nearest, (ref.SE21SW74 located 124m west of the site) shows 0.3m of topsoil, 1.2m of sandy slightly gravelly clay, overlying partly weathered mudstone bedrock.

3.3. ENVIRONMENTAL OVERVIEW

Historical Land Use	There are 5№ potentially contaminative historical land uses shown within 250m of the site. These is a reservoir 43m south, tanks 166m west, 187m south west, and 201m west, and an electricity sub-station 162m east of the site.
Current Land Use	There are 2№ potentially contaminative current industrial land uses shown within 250m of the site. These is an electricity sub-station 179m east, and a tank 180m west of the site.
Invasive Species	No invasive species were noted during the site walkover, however it should be noted that Met Engineers are not invasive species specialist, therefore an ecology survey may be required.
Environmental Permits	There are no environmental permits shown within 250m of the site.
Pollution Incidents	There are no pollution incidents shown within 250m of the site.
Landfill Sites	There are no current landfills or historical landfills shown within 250m of the site.
Waste Transfer & Processing Stations	There are no waste transfer and processing stations shown within 250m of the site.

Hydrogeology	There is a Secondary A aquifer within the bedrock. The site is not within a source protection zone. There are no ground water abstractions within the vicinity of the site
Hydrology	There are no watercourses shown within 250m of the site.
Flooding	The site is not within a flood risk area.
Unexploded Ordnance	A review of online records indicates that the site is in a low risk area with regards to unexploded ordnance.
Environmental Sensitivity	The site is in a nitrate vulnerable zone. The site is not within an environmentally sensitive area however there is Greenbelt Land recorded 14m north of the site. It should be noted that there is a tree protection order (TPO) for a Beech Tree at the site entrance off Huddersfield Road. This should be taken into consideration during any future ground investigation and development works.

3.4. PHASE I PRELIMINARY RECOMMENDATIONS

The Phase I report identified a number of potential pollution linkages that may be present within the site, and recommended that representative soil samples were removed from the site and submitted for contamination analysis.

No risks associated with potential shallow coal workings were identified within the Phase 1 and therefore rotary boreholes were not required.

4. INTRUSIVE INVESTIGATION

4.1. FIELDWORK

The intrusive investigation consisted of 5№ windowless sampler boreholes. The intrusive investigations were carried out on Monday 24th August 2020; the locations of which can be found within Appendix I. The intrusions were spread evenly across the site to give a good overview of the underlying strata. The weather was clear.

No Made Ground was identified during the site investigation. WS01 found gravel fill in the driveway area to a depth of 0.3mbgl, on top of relict topsoil to a depth of 0.38mbgl. The remainder of the boreholes identified grass over topsoil to depths of between 0.25m (WS05) and 0.35mbgl (WS03).

Superficial deposits comprising soft light grey mottled with orangish brown clay were recorded in all borehole locations with typical thicknesses ranging between 0.55m (WS02) and 0.82m (WS01).

Bedrock was deepest in the central of the site and was encountered at between 0.9m (WS03) and 1.2mbgl (WS01). Bedrock comprised weak to medium strong mudstone and medium strong to strong sandstone.

Logs of the Boreholes can be found in Appendix II of this report.

Soil samples were removed for laboratory analysis from 4№ of the windowless sampler borehole locations.

4.2. GROUNDWATER

Groundwater was not identified during the site investigation.

4.3. SOAKAWAY TESTING

Groundwater monitoring equipment was installed in 2№ borehole positions (WS01 and WS03) to carry out borehole soakaway testing.

4.4. LABORATORY TESTING

The desk study recommended a regime of contamination testing on soil samples recovered from the intrusive investigation. Samples were obtained during the site investigation and tested at a UKAS accredited laboratory for contaminants including:

- *Heavy Metals*
- *Polycyclic Aromatic Hydrocarbons*
- *Total Petroleum Hydrocarbons*
- *Asbestos*

Geotechnical testing was also carried out on the soils. The samples were tested for:

- *pH*
- *Water Soluble Sulphate (2:1)*
- *Atterberg limits*

5. CONTAMINATION ASSESSMENT

5.1. GENERAL

Current Environmental Legislation, in particular Part IIA of the Environmental Protection Act 1990, adopts a risk-based approach to the evaluation of contaminated sites, based on the proposed end use of the site. The commonly accepted approach is to adopt a Source-Pathway-Receptor model where the Source of the contaminant is examined in relation to potential Receptors (i.e. humans, controlled waters etc.) to determine if there is a Pathway (i.e. contaminant linkage) connecting them. If any of these elements (i.e. contaminant, pathway or receptor) are absent or removed, then there is no risk.

The Department of the Environment, Food and Rural Affairs (DEFRA) have published a series of guidelines in connection with Risk Assessment. In addition The Environment Agency has produced the Contaminated Land Exposure Model (CLEA) which models guideline values for those elements which pose the greatest risk to human health.[1] Using values derived from CLEA, a site specific, conceptual model has been used to determine any significant contaminant linkages and identify suitable risk management proposals on which remediation design (if any required) can be based. The conceptual model is summarised at the end of this section in tabular form.

By considering the Source-Pathway-Receptors Model, an assessment can be made as to whether the source contamination can reach a receptor. The degree and significance of any resulting risk is then determined. The categorisation of the risk is based on consideration of both:

- The likelihood or probability of an event (taking into account both the presence of the Source and the Receptor, and the integrity of the Pathway).

- The severity of the potential consequence (taking into account both the potential severity of the Source and the sensitivity of the Receptor).

The following categorisation of risk has been adopted in this report:

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

[1] Updated technical background to the CLEA model, Science Report SC050021/SR3, The Environment Agency, 2009

5.2. PRELIMINARY CONCEPTUAL SITE MODEL

The following table provides a list of the potential Sources, Pathways and Receptors that have potential to exist on this site as determined within the Phase I desk study.

Potential Source	Contaminants	Receptor	Pathway	Potential Risk
Soil based Contaminants (Solid)	Heavy Metals PAH TPH	Construction Workers Maintenance Workers End user	Direct contact with soil Ingestion of soils Inhalation of soil dust Inhalation of vapours (PAH/ TPH only)	Low to Moderate
		Flora & Fauna	Plant uptake	Low
		Buildings & Infrastructure	Direct Contact with soil	Low
Soil based Contaminants (as Leachate)	Heavy Metals PAH TPH	Flora & Fauna	Plant uptake	Low
		Aquifer	Leaching/ migration via groundwater	Low
Asbestos within building fabric	Asbestos Fibres	Construction Workers	Inhalation of asbestos fibres	High*
Asbestos within Made Ground	Asbestos Fibres	Construction Workers Maintenance Workers End user	Inhalation of asbestos fibres	Moderate
Land Gas		Construction Workers Maintenance Workers End user	Inhalation of gases	Low

*It is assumed that all proposed works will be carried out in accordance with current guidelines, and that any asbestos on site will be removed prior to any demolition works.

Based on the above conceptual site model, the following sources of contamination have been investigated;

- Soils
  - Heavy Metals
  - Poly Aromatic Hydrocarbons
  - Total Petroleum Hydrocarbons
  - Asbestos

5.3. CONTAMINATION CRITERIA FOR SOIL TESTING

Suitable 4 Use Levels (S4ULs) published by Land Quality Management, have been used to assess risk.[2] Where there are no S4ULs, Defra Category 4 Screening Levels (C4SLs) have been used as intervention values to assess risk.[3]

It is proposed that the site will be developed residential houses. Therefore the proposed land use can be classified as 'residential with home produce' in accordance with the CLEA Guidelines.

Soils were taken from site and tested for % Soil Organic Matter (SOM).

Location	**WS01**	**WS02**	**WS03**	**WS04**
Depth (m)	**0.1**	**0.2**	**0.3**	**0.2**
Strata	**FILL**	**Topsoil**	**Topsoil**	**Topsoil**
SOM (%)	5.6	8.7	8.7	13

Taking the lowest SOM recorded as the worst case scenario, the results of the chemical analysis on the soil samples are compared against the S4ULs for residential with home produce developments with 2.5% SOM (where there are published S4ULs) and C4SLs where there are no published S4ULs. These values are then used as Intervention Values (IV) to assess the risk.

5.4. RESULTS OF CONTAMINATION TESTING

The following tables are summaries of the laboratory test results. Please see the key below for the origin of each intervention value.

Intervention Value Key

Author	Type	Land Use
Land Quality Management	S4UL	Residential with home produce
DEFRA	C4SL	Residential with home produce

Heavy Metals

Location	**WS01**	**WS02**	**WS03**	**WS04**		
Depth (m)	**0.1**	**0.2**	**0.3**	**0.2**		
Strata	**FILL**	**Topsoil**	**Topsoil**	**Topsoil**		
Contaminant (mg/kg)					**IV**	**Number Exceeding**
Arsenic	5	11	9	10	37	0
Cadmium	1.5	1.2	1.1	1.1	11	0
Copper	23	26	32	35	2400	0
Chromium	21	20	19	25	910	0
Chromium (VI)	<1	<1	<1	<1	6	0
Lead	101	50	46	49	200	0
Mercury	<0.17	<0.17	1.2	<0.17	40	0

[2] The LQM/CIEH S4ULs for Human Health Risk Assessment, Land Quality Press, Nathanail et. al, 2015.
[3] SP1010, Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination, DEFRA 2014

Location	WS01	WS02	WS03	WS04		
Depth (m)	0.1	0.2	0.3	0.2		
Strata	FILL	Topsoil	Topsoil	Topsoil		
Contaminant (mg/kg)					**IV**	**Number Exceeding**
Nickel	21	18	20	25	130	0
Selenium	<1	<1	<1	<1	250	0
Zinc	126	102	134	119	3700	0

Polycyclic Aromatic Hydrocarbons

Location	WS01	WS02	WS03	WS04		
Depth (m)	0.1	0.2	0.3	0.2		
Strata	FILL	Topsoil	Topsoil	Topsoil		
Contaminant (mg/kg)					**IV**	**Number Exceeding**
Acenaphthene	<0.01	<0.01	0.03	0.21	510	0
Acenaphthylene	<0.01	<0.01	<0.01	0.06	420	0
Anthracene	<0.02	<0.02	0.05	0.29	5400	0
Benzo(a)anthracene	<0.04	0.13	0.16	0.91	11	0
Benzo(a)pyrene	<0.04	0.11	0.14	0.71	2.7	0
Benzo(b)fluoranthene	<0.05	0.2	0.21	1	3.3	0
Benzo(ghi)perylene	<0.05	<0.05	0.08	0.36	340	0
Benzo(k)fluoranthene	<0.07	<0.07	<0.07	0.34	93	0
Chrysene	<0.06	0.19	0.2	1.04	22	0
Dibenzo(ah)anthracene	<0.04	<0.04	<0.04	0.1	0.28	0
Fluoranthene	<0.08	0.24	0.28	1.72	560	0
Fluorene	<0.01	<0.01	0.02	0.2	400	0
Indeno(123-cd)pyrene	<0.03	0.07	0.1	0.47	36	0
Naphthalene	<0.03	<0.03	0.03	0.5	5.6	0
Phenanthrene	<0.03	0.13	0.23	1.72	220	0
Pyrene	<0.07	0.22	0.24	1.44	1200	0
Total PAH	<0.08	1.29	1.77	11.1	-	-

Total Petroleum Hydrocarbons

Location	WS01	WS02	WS03	WS04		
Depth (m)	0.1	0.2	0.3	0.2		
Strata	FILL	Topsoil	Topsoil	Topsoil		
Contaminant (mg/kg)					**IV**	**Number Exceeding**
Ali >C5-C6	<0.01	<0.01	<0.01	<0.01	78	0
Ali >C6-C8	<0.01	<0.01	<0.01	<0.01	230	0
Ali >C8-C10	<1	<1	<1	1	65	0
Ali >C10-C12	<1	<1	<1	<1	330	0
Ali >C12-C16	<1	<1	<1	5	2400	0
Ali >C16-C21	<1	3	<1	9	92000	0
Ali >C21-C35	<1	10	8	19	92000	0
Total Aliphatics	<1	13	8	34	-	-
Aro >C5-C7	<0.01	<0.01	<0.01	<0.01	140	0
Aro >C7-C8	<0.01	<0.01	<0.01	<0.01	290	0
Aro >C8-C9	<1	1	2	4	83	0
Aro >C9-C10	<1	<1	1	5	83	0
Aro >C10-C12	<1	6	5	16	180	0

Location	WS01	WS02	WS03	WS04		
Depth (m)	0.1	0.2	0.3	0.2		
Strata	FILL	Topsoil	Topsoil	Topsoil		
Contaminant (mg/kg)					IV	Number Exceeding
Aro >C12-C16	<1	17	7	46	330	0
Aro >C16-C21	<1	43	22	135	540	0
Aro >C21-C35	<1	67	37	206	1500	0
Total Aromatics	<1	80	45	240	-	-
TPH (Ali & Aro)	<0.01	<0.01	<0.01	<0.01	-	-
BTEX - Benzene	<0.01	<0.01	<0.01	<0.01	0.17	0
BTEX - Toluene	<0.01	<0.01	<0.01	<0.01	290	0
BTEX - Ethyl Benzene	<0.01	<0.01	<0.01	<0.01	110	0
BTEX - m & p Xylene	<0.01	<0.01	<0.01	<0.01	130	0
BTEX - o Xylene	<0.01	<0.01	<0.01	<0.01	140	0
MTBE	<0.01	<0.01	<0.01	<0.01	-	-

Asbestos

Location	WS01	WS02	WS03	WS04	
Depth (m)	0.1	0.2	0.3	0.2	
Strata	FILL	Topsoil	Topsoil	Topsoil	
Contaminant					Number Exceeding
Asbestos in Soil	NAD	NAD	NAD	NAD	0

The full test certificates are included in Appendix III of this report.

5.5. RADON AND LAND GAS

<1% of properties in the area are above the radon action level. Therefore radon specific protection measures are not required for new buildings in accordance with BRE publication BR211.

The Phase I Desk Study identified the potential risk from land gas on site as low and as no Made Ground was identified on site, gas monitoring is not considered necessary.

5.6. CONTAMINATION SOURCES

No elevated levels have been identified for the sources tested for.

Source	Elevated Levels Present?
Heavy Metals	No
Poly Aromatic Hydrocarbons	No
Total Petroleum Hydrocarbons	No
Asbestos	No
Land Gas and Radon	No

5.7. PATHWAYS

Based on the proposed land use, the possible pathways that exist on site for any possible source of contamination are as follows;

Pathway	Pathway Present	Comments
Direct Contact with soil/ water	Yes	Potential for contact with soil/ water during future landscaping/ development works
Incidental ingestion	Yes	Potential for ingestion of soils/ water during future landscaping/ development works
Inhalation of soil dust/ asbestos fibres	Yes	Potential for inhalation of soil dust/ asbestos during future landscaping/ development works and ground disturbance
Leaching/ migration of liquids	Yes	Potential for leaching to aquifer as the site will be developed with areas of soft, vegetative cover
Surface water run-off	No	Site will be covered in either soft landscaping, increasing infiltration, or with buildings or hardstanding, the runoff from which will be controlled into drainage
Migration/ emission/ accumulation inhalation of land gas/ vapours	Yes	Migration and emission of land gas/ vapours possible, and accumulation possible in proposed buildings
Plant uptake/ plant uptake followed by ingestion	Yes	Site is to be developed with areas of soft landscaping

5.8. RECEPTORS

Based on the identified sources of contamination, and the present pathways, the potential receptors for the development are:-

Receptor	Receptor Present	Comments
Site worker	Yes	Staff involved in construction and demolition works and underground utility works at the site
Maintenance staff	Yes	Carrying out routine maintenance in the future (assumes workers will visit the site on an infrequent basis and will not carry out intrusive works)
Long term site user/ future resident	Yes	Long term site users/ future residents
Off-site resident	Yes	Adjacent residential housing
Flora & Fauna	Yes	Flora on landscaped areas
Aquifer	Yes	Bedrock is a Secondary A Aquifer, however there are no groundwater abstractions or source protection zones in the vicinity of the site
Surface water	No	No surface waters within 250m of the site
Buildings & Infrastructure	Yes	Proposed building substructure/ services, drainage etc.

5.9. SITE SPECIFIC MODEL

Source	Contaminant	Receptor	Pathway	Risk
Soil based contaminants (Solid)	*Heavy Metals*[2]	**A – Construction Workers**[1] **B – Maintenance Worker**[1] **C – Future End user**[1] **E – Flora & Fauna**[1]	**a – Direct contact with soil/ water**[1] **b – Incidental ingestion**[1] **c – Inhalation of soil dust/ asbestos fibres**[1] **d – Leaching/ migration**[1] *e – Surface water run off*[2] **g – Plant uptake/ plant uptake followed by ingestion**[1]	Negligible
	Polycyclic Aromatic Hydrocarbons[2]	**A – Construction Workers**[1] **B – Maintenance Worker**[1] **C – Future End user**[1] **D – Off-Site Resident**[1] **E – Flora & Fauna**[1]	**a – Direct contact with soil/ water**[1] **b – Incidental ingestion**[1] **c – Inhalation of soil dust/ asbestos fibres**[1] **d – Leaching/ migration**[1] *e – Surface water run off*[2] **f – Migration/ emission/ inhalation of land gas/ vapours**[1] **g – Plant uptake/ plant uptake followed by ingestion**[1]	Negligible
	Total Petroleum Hydrocarbon[2]	**A – Construction Workers**[1] **B – Maintenance Worker**[1] **C – Future End user**[1] **D – Off-Site Resident**[1] **E – Flora & Fauna**[1]	**a – Direct contact with soil/ water**[1] **b – Incidental ingestion**[1] **c – Inhalation of soil dust/ asbestos fibres**[1] **d – Leaching/ migration**[1] *e – Surface water run off*[2] **f – Migration/ emission/ inhalation of land gas/ vapours**[1] **g – Plant uptake/ plant uptake followed by ingestion**[1]	Negligible
Asbestos in Made Ground	*Asbestos fibres* [2]	**A – Construction Workers**[1] **B – Maintenance Worker**[1] **C – Future End user**[1] **D – Off-Site Resident**[1]	**c – Inhalation of soil dust/ asbestos fibres**[1]	Negligible
Land Gas and Radon[2]		**C – Future End user**[1]	**f – Inhalation of gases**[1]	Negligible

[1] **Source/ Pathway/ Receptor PRESENT on site**
[2] *Source/ Pathway/ Receptor NOT PRESENT on site*

5.10. CONTAMINATION ISSUES

Based upon the conceptual site model, there are no contamination linkages present for the sources tested for.

5.11. ASSESSED RISKS AND MANAGEMENT

No elevated levels have been identified on site for the sources tested for.

It is assumed that all proposed works will be carried out in accordance with current guidelines, and that any asbestos on site will be removed from the existing building prior to any demolition works.

All ground works should be monitored by a suitably qualified person and significant deviation from the findings of this document is to be reported to the Engineer immediately prior to commencing any further works.

5.12. ENVIRONMENTAL SUMMARY

The Phase I Desk Study identified the potential risk from land gas on site as low and as no Made Ground was identified on site, gas monitoring is not considered necessary.

No elevated levels of soil based contamination have been identified on site for the sources tested for.

It is assumed that all proposed works will be carried out in accordance with current guidelines, and that any asbestos on site will be removed from the existing building prior to any demolition works.

All ground works should be monitored by a suitably qualified person and any significant deviation from the findings of this document is to be reported to the Engineer immediately prior to commencing any further works.

6. GEOTECHNICAL ASSESSMENT

6.1. GENERAL

Soakaway testing was required to determine the viability of utilising soakaways for the proposed development. To achieve this aim 2№ of the windowless sampler boreholes (WS01 and WS03) were installed with water level monitoring wells and borehole soakaway testing was carried out in each. The boreholes were then filled to the top with water and the level monitored over a 2 hour period.

6.2. RESULTS

During the 2 hour period the water level did not fall in either of the boreholes.

	Water level below top of pipe (mm)	
Time (mins)	WS01	WS03
1	0	0
2	0	0
3	0	0
4	0	0
5	0	0
10	1	0
15	1	0
20	1	0
25	1	0
30	1	0
45	1	1
60	2	1
90	2	1
120	2	1

6.3. INTERPETATION

As the water level did not fall during the 2 hour monitoring period, it is determined that soakaways are not suitable for the proposed development. The lack of infiltration is attributed to the impermeable nature of the clay superficial deposits, and intact nature mudstone and sandstone bedrock. Some fractured mudstone bedrock was identified in WS01 between 1.2m and 1.4mbgl, however the fractures were filled with clay, mitigating and potential secondary permeability of the bedrock.

7. GEOTECHNICAL ASSESSMENT

7.1. GENERAL

The site investigation was required to make recommendations as to a suitable foundation solution for the development. 5№ boreholes were undertaken to depths of between 0.97m (WS02) and 2.03mbgl (WS04) in order to achieve this aim.

7.2. GEOLOGICAL ASSESSMENT

Artificial Deposits

No Made Ground was identified during the site investigation. WS01 found gravel fill in the driveway area to a depth of 0.3mbgl, on top of relict topsoil to a depth of 0.38mbgl. The remainder of the boreholes identified grass over topsoil to depths of between 0.25m (WS05) and 0.35mbgl (WS03).

Superficial Deposits

Superficial deposits comprising soft light grey mottled with orangish brown clay were encountered across the site with typical thicknesses ranging between 0.55m (WS02) and 0.82m (WS01).

Bedrock

Bedrock was deepest in the central of the site and was encountered at between 0.9m (WS03) and 1.2mbgl (WS01). Bedrock comprised weak to medium strong mudstone and medium strong to strong sandstone.

7.3. MINING

No evidence of mining was uncovered during the site investigation and no further consideration to this matter is necessary.

7.4. FOUNDATIONS AND SUBSTRUCTURES

Based on the geological conditions found below the site, strip foundations are suitable for the proposed development. Foundations should be onto the medium strong mudstone or medium strong to strong sandstone identified beneath the site at top depths of between 0.9mbgl and 1.4mbgl. In some areas of the site (WS01) it is noted that the mudstone is significantly weathered from rockhead, therefore foundation excavations should extend through this weathered rock (approximately 0.2m thick) into the solid rock below. A maximum allowable bearing pressure of 250kN/m^2 should be assumed.

Foundations should be entirely onto the same strata to prevent differential settlement.

Anecdotal evidence suggests that the residential building adjacent to the west of the site is founded upon the natural clays identified in the area, and as such has experience substantial subsidence. Consequently, it is recommended that foundations are **NOT** founded upon these clays.

7.5. GEOTECHNICAL TEST RESULTS

Soil samples were taken from site and submitted for the following geotechnical testing.

Location	WS01	WS02	WS03
Depth (m)	0.4	1.0	1.0
pH	8.04	7.85	7.9
SO4 (2:1)	0.03	0.03	0.03
Plasticity Index	28	34	35
% <425µm	97	96	93
Modified Plasticity	27.16	23.64	32.55

Based on the soil sulphate concentrations and pH levels, AC-1s conditions exist for buried concrete in accordance with BRE Special Digest 1:2005 – Concrete in Aggressive Ground.[4]

The Plasticity Index for the soils tested, have been modified as per chapter 4.2 of NHBC guidelines. The results show medium volume change soils exist on site. As trees already exist around the perimeter of the site, foundations should be designed in accordance with chapter 4.2 of NHBC guidelines.[5]

7.6. GROUND FLOOR CONSTRUCTION

Suspended ground floors are preferable for the ground floor of the development.

7.7. GEOTECHNICAL SUMMARY

Strip foundations are deemed suitable for the development.

The foundations should be founded onto the medium strong mudstone or medium strong to strong sandstone found under the site. A maximum allowable bearing pressure of 250kN/m^2 should be assumed. Foundations should be taken through the significantly weathered mudstone encountered in WS01 at rockhead and onto the medium strong mudstone below.

Suspended ground floors are preferable for the proposed buildings.

Based on the soluble sulphate levels found, AC-1s conditions exist on site in accordance with BRE Special Digest 1:2005 – Concrete in Aggressive Ground.

Medium volume change soils exist below the site. Foundations should be designed in accordance with chapter 4.2 of NHBC guidelines.

All ground works should be monitored by a suitably qualified person and any significant deviation from the findings of this document is to be reported to the Engineer immediately prior to commencing any further.

[4] BRE Special Digest 1, Concrete in Aggressive Ground, BRE Press, 2005
[5] NHBC Standards, Chapter 4.2 Building Near Trees, NHBC, 2014

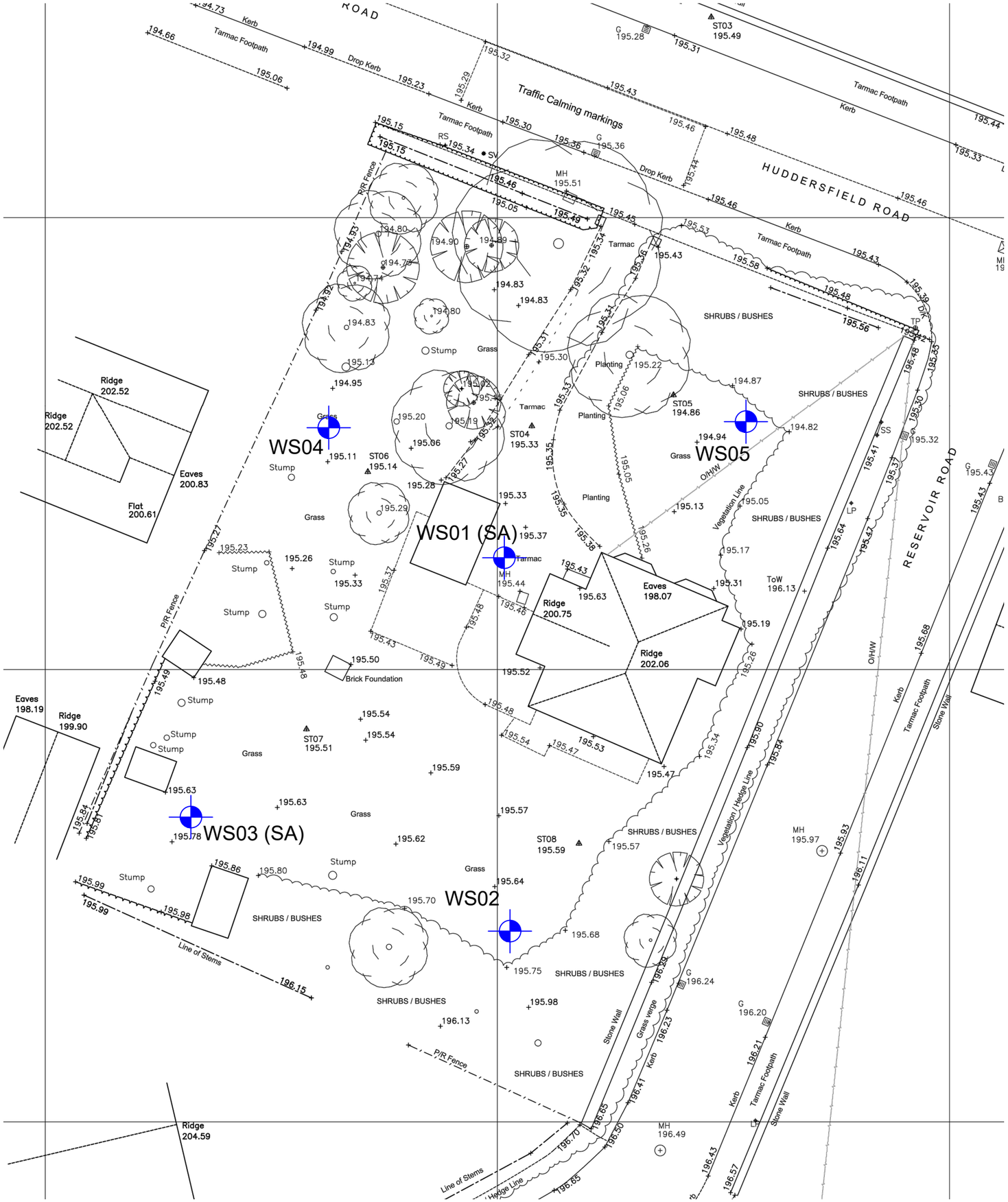
8. CONCLUSIONS AND RECOMMENDATIONS

In conclusion:

- No contamination linkages are deemed exist on the site.
- The Phase I Desk Study identified the potential risk from land gas on site as low and as no Made Ground was identified on site, therefore gas monitoring is not considered necessary.
- The site is underlain by soft light grey mottled with orangish brown clay above mudstone and sandstone of the Pennine Lower Coal Measures.
- Strip foundations are deemed suitable for the proposed development.
- Foundations should be onto the medium strong mudstone or medium strong to strong sandstone identified beneath the site at depths of between 0.95m (WS02) and 1.4mbgl (WS01) with a maximum allowable bearing pressure of 250kN/m^2.
- Borehole soakaway testing results determine that soakaways are not suitable for the proposed development.

Appendix I

Site Investigation Plan



1. Do not scale dimensions from this drawing in either paper or electronic format.
2. To be read in conjunction with all relevant Engineer's, Architect's and Other drawings and specifications.
3. All building products to be used in strict accordance with the manufacturer's recommendations.
4. Any discrepancies are to be reported to the Engineer immediately.
5. Main Contractor to provide a detailed method statement for all works prior to commencement on site.

⌖ = Windowless Sampler Borehole Location

(SA) = Borehole Soakaway Test Location

Issue	Date	Drawn	Description	Ch'k'd
--	-/-/--	--	--	--

Met Engineers Ltd
Southgate House
Pontefract Road
Stourton, Leeds
West Yorkshire
LS10 1SW
Tel: 0113 200 8900
Fax: 0113 200 8901
email: admin@metengineers.com
www.metengineers.com

Client: Baile Homes Limited

Project: 81 Huddersfield Road, Skelmanthorpe
P20-00120

Title: Site Investigation Location Plan

Drawn	TAW	Checked		Scale
Date	16.09.20	Date		NTS
Status				Original Size A3

Drawing No: P20-00120-Met-M2-GE-001 | Version: 1

Appendix II

Windowless Sampler Logs

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Windowless Sampler Borehole Log

Borehole No. **WS01**
Sheet 1 of 1

Project Name:	81 Huddersfield Road	Project No. P20-00120	Co-ords:	422424E - 410712N	Hole Type WS
Location:	81 Huddersfield Road, Skelmanthorpe, HD8 9AR		Level:	198.00	Scale 1:25
Client:	Baile Homes Limited		Dates:	24/08/2020	Logged By TAW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.30	197.70		FILL. Loose multicoloured very sandy GRAVEL. Sand is fine to medium, gravel is angular to rounded fine to coarse sandstone and mudstone.
					0.38	197.62		Loose dark brown very clayey medium SAND. RELICT TOPSOIL
					0.45	197.55		Soft light brown sandy CLAY. Sand is fine.
		0.80	B					Soft light orangish brown mottled with light grey CLAY.
		1.00	SPT	N=23 (1,3/5,5,6,7)	1.00	197.00		Firm light grey CLAY.
					1.20	196.80		Weak heavily fractured grey MUDSTONE with orangish brown staining on fracture surface. Fractures filled with clay.
					1.40	196.60		Medium strong light grey thinly laminated MUDSTONE.
		1.70	SPT	50 (25 for 40mm/50 for 30mm)	1.65	196.35		Strong light grey fine SANDSTONE.
					1.77	196.23		End of Borehole at 1.77m

Remarks
Terminated due to refusal. Borehole dry.

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Windowless Sampler Borehole Log

Borehole No. **WS02**
Sheet 1 of 1

Project Name:	81 Huddersfield Road	Project No. P20-00120	Co-ords:	422425E - 410714N	Hole Type WS
Location:	81 Huddersfield Road, Skelmanthorpe, HD8 9AR		Level:	198.00	Scale 1:25
Client:	Baile Homes Limited		Dates:	24/08/2020	Logged By TAW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.15	ES					Grass over soft dark brown sandy CLAY. Sand is fine. Occasional rounded fine gravel of sandstone. TOPSOIL.
					0.30	197.70		Soft light grey mottled with orangish brown CLAY.
		0.90 0.95	B SPT	50 (25 for 75mm/50 for 90mm)	0.95 0.97	197.05 197.03		Medium strong heavy fractured ark orangish brown mottled with light grey SANDSTONE. End of Borehole at 0.97m

Remarks
Terminated due to refusal. Borehole dry.

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Windowless Sampler Borehole Log

Borehole No. **WS03**
Sheet 1 of 1

Project Name:	81 Huddersfield Road	Project No. P20-00120	Co-ords:	422420E - 410716N	Hole Type WS
Location:	81 Huddersfield Road, Skelmanthorpe, HD8 9AR		Level:	198.00	Scale 1:25
Client:	Baile Homes Limited		Dates:	24/08/2020	Logged By TAW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.35	197.65		Grass over soft dark brown sandy CLAY. Occasional rounded fine sandstone gravels. TOPSOIL.
		0.60	B					Soft light grey mottled with orangish brown CLAY.
		0.95	SPT	50 (22 for 105mm/50 for 45mm)	0.90	197.10		Strong light brown SANDSTONE.
					1.10	196.90		End of Borehole at 1.10m

Remarks
Terminated due to refusal. Borehole dry.

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Windowless Sampler Borehole Log

Borehole No. **WS04**

Sheet 1 of 1

Project Name:	81 Huddersfield Road	Project No. P20-00120	Co-ords:	422422E - 410722N	Hole Type WS
Location:	81 Huddersfield Road, Skelmanthorpe, HD8 9AR		Level:	198.00	Scale 1:25
Client:	Baile Homes Limited		Dates:	24/08/2020	Logged By TAW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.10	ES					Grass over soft dark brown sandy CLAY. Occasional rounded fine sandstone gravels. TOPSOIL
					0.30	197.70		Soft light grey mottled with orangish brown CLAY.
		1.00	SPT	N=25 (3,4/6,5,6,8)	1.00	197.00		Medium strong thinly laminated dark grey MUDSTONE.
		1.70	SPT	50 (25 for 75mm/50 for 15mm)	1.70	196.30		Strong brown silty SANDSTONE.
					2.03	195.97		End of Borehole at 2.03m

Remarks

Terminated due to refusal. Borehole dry.

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Windowless Sampler Borehole Log

Borehole No. **WS05**

Sheet 1 of 1

Project Name:	81 Huddersfield Road	Project No. P20-00120	Co-ords:	422428E - 410727N	Hole Type WS
Location:	81 Huddersfield Road, Skelmanthorpe, HD8 9AR		Level:	198.00	Scale 1:25
Client:	Baile Homes Limited		Dates:	24/08/2020	Logged By TAW

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	Results				
		0.20	ES		0.25	197.75		Soft dark brown sandy CLAY. Occasional rounded fine gravels of sandstone. TOPSOIL
		1.00	SPT	N=29 (2,6,7,7,8,7)	1.00	197.00		Soft light grey mottled with orangish brown CLAY.
		1.75	SPT	50 (25 for 20mm/50 for 12mm)	1.70 1.79	196.30 196.21		Medium strong light grey MUDSTONE. Strong light brown SANDSTONE. End of Borehole at 1.79m

Remarks

Terminated due to refusal. Borehole dry.

Appendix III

Soil Test Results

STRUCTURAL SOILS LTD

TEST REPORT

Report No. 784624 r1

1774

Date 11-September-2020 Contract 20/07185

Client Envirolab Ltd
Address Units 7 & 8 Sandpits Business Park
Mottram Road
Hyde
SK14 3AR

For the Attention of Holly Neary-King

Samples submitted by client	28/08/2020	Client Reference	20/07185
Testing Started	28/08/2020	Client Order No.	
Testing Completed	11/09/2020	Instruction Type	Written

Tests marked 'Not UKAS Accredited' in this report are not included in the UKAS Accreditation Schedule for our Laboratory.

UKAS Accredited Tests Undertaken

Moisture Content (oven drying method) BS1377:Part 2:1990,clause 3.2 (superseded) **
Liquid Limit (definitive method) BS1377:Part 2:1990,clause 4.3
Plastic Limit BS1377:Part 2:1990,clause 5.3
Plasticity Index Derivation BS1377:Part 2:1990,clause 5.4

* This clause of BS1377 is no longer the most up to date method due to the publication of ISO17892

Please Note: Remaining samples will be retained for a period of one month from today and will then be disposed of.
Test were undertaken on samples 'as received' unless otherwise stated.
Opinions and interpretations expressed in this report are outside the scope of accreditation for this laboratory.

Structural Soils Ltd, The Potteries, Pottery Street, Castleford, WF10 1NJ Tel.01977 552255. E-mail luke.fisher@soils.co.uk

SUMMARY OF SOIL CLASSIFICATION TESTS

In accordance with clauses 3.2,4.3,4.4,5.3,5.4,7.2,8.2,8.3 of BS1377:Part 2:1990

Exploratory Position ID	Sample Ref	Sample Type	Depth (m)	Moisture Content %	Liquid Limit %	Plastic Limit %	Plasticity Index	% <425µm	Description of Sample
WS01	20/07185/2	D	0.80	36	70	30	40	100	Grey brown CLAY
WS02	20/07185/4	D	0.90	38	73	31	42	99	Brown mottled slightly gravelly CLAY
WS03	20/07185/6	D	0.60	35	68	29	39	98	Brown mottled CLAY

STRUCTURAL SOILS LTD

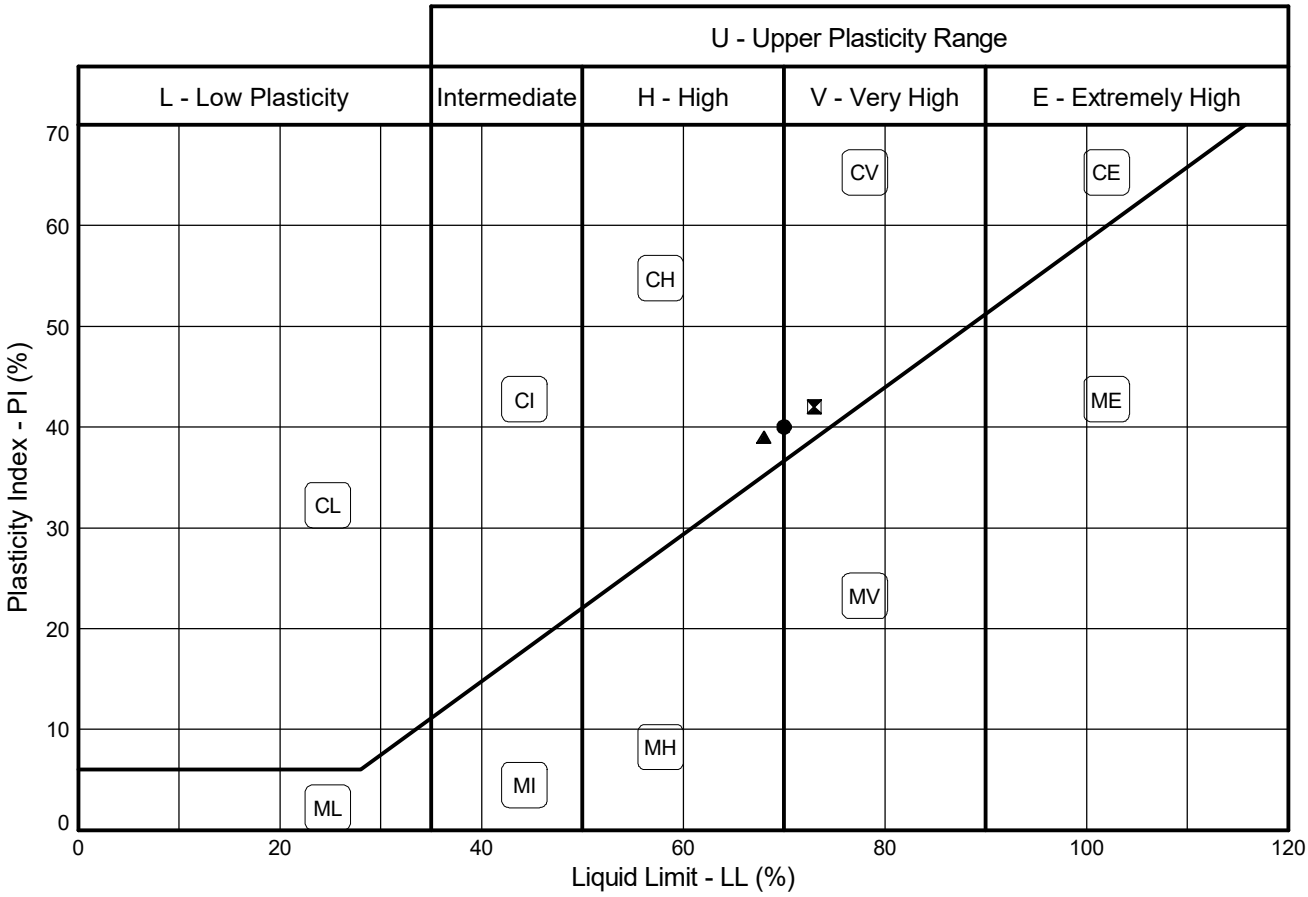
Contract: **20/07185**

Contract Ref: **784624**

AGS

PLASTICITY CHART - PI Vs LL

In accordance with BS5930:2015
Testing in accordance with BS1377-2:1990



Sample Identification				BS Test Method #	Preparation Method +	MC	LL	PL	PI	<425µm	Lab location	Notes
Exploratory Position ID		Sample	Depth (m)			%	%	%	%	%		
●	WS01	20/07185/2D	0.80	3.2/4.3/5.3/5.4	4.2.4	36	70	30	40	100	C	
⊠	WS02	20/07185/4D	0.90	3.2/4.3/5.3/5.4	4.2.4	38	73	31	42	99	C	
▲	WS03	20/07185/6D	0.60	3.2/4.3/5.3/5.4	4.2.4	35	68	29	39	98	C	

Tested in accordance with the following clauses of BS1377-2:1990.

3.2 - Moisture Content
4.3 - Cone Penetrometer Method
4.4 - One Point Cone Penetrometer Method
4.6 - One Point Casagrande Method
5.3 - Plastic Limit Method
5.4 - Plasticity Index

+ Tested in accordance with the following clauses of BS1377-2:1990.

4.2.3 - Natural State
4.2.4 - Wet Sieved

Key: * = Non-standard test, NP = Non plastic.

Lab location: B = Bristol (BS3 4AG), C = Castleford (WF10 1NJ), H = Hemel Hempstead (HP3 9RT), T = Tonbridge (TN11 9HU)

STRUCTURAL SOILS
The Potteries
Pottery Street
Castleford
W. Yorkshire WF10 1NJ

Compiled By		Date
	LORNA WHITWORTH	11/09/20

Contract	Contract Ref:
20/07185	784624

TESTING VERIFICATION CERTIFICATE

1774

The test results included in this report are certified as:-

ISSUE STATUS: **FINAL**

In accordance with the Structural Soils Ltd Laboratory Quality Management System, results sheets and summaries of results issued by the laboratory are checked by an approved signatory. The integrity of the test data and results are ensured by control of the computer system employed by the laboratory as part of the Software Verification Program as detailed in the Laboratory Quality Manual.

This testing verification certificate covers all testing compiled on or before the following datetime: **14/09/2020 13:38:12**.

Testing reported after this date is not covered by this Verification Certificate.

Approved Signatory
Luke Fisher (Laboratory Manager)

(Head Office)
Bristol Laboratory
Unit 1A, Princess Street
Bedminster
Bristol
BS3 4AG

Castleford Laboratory
The Potteries, Pottery Street
Castleford
West Yorkshire
WF10 1NJ

Hemel Laboratory
18 Frogmore Road
Hemel Hempstead
Hertfordshire
HP3 9RT

Tonbridge Laboratory
Anerley Court, Half Moon Lane
Hildenborough
Tonbridge
TN11 9HU

STRUCTURAL SOILS LTD	Contract: **20/07185**	Job No: **784624**

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

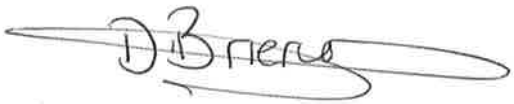
FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 20/07185
Issue Number: 1 **Date:** 15 September, 2020

Client:
MET Engineers Ltd
Southgate House
Pontefract Road
Leeds
LS10 1SW

Project Manager: Thomas White
Project Name: 81 Huddersfield Road
Project Ref: P20-00120
Order No: PO-04447
Date Samples Received: 26/08/20
Date Instructions Received: 28/08/20
Date Analysis Completed: 14/09/20

Prepared by:



Danielle Brierley
Client Manager

Approved by:

Richard Wong
Client Manager

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/1	20/07185/2	20/07185/3	20/07185/4	20/07185/5	20/07185/6	20/07185/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.15	0.90	0.20	0.60	0.10			
Depth To Bottom										
Date Sampled	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6ABE	5A	6ABE	5A	6AE	5A	6AE			
% Stones >10mm$_A$	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH$_D^{M\#}$	-	7.15	-	7.31	-	7.38	-	pH	0.01	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	-	0.06	-	0.04	-	0.10	-	g/l	0.01	A-T-026s
Sulphate (acid soluble)$_D^{M\#}$	-	<200	-	<200	-	680	-	mg/kg	200	A-T-028s
Organic matter$_D^{M\#}$	12.7	-	9.6	-	10.4	-	11.4	% w/w	0.1	A-T-032 OM
Arsenic$_D^{M\#}$	8	-	15	-	21	-	19	mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	0.7	-	0.7	-	1.5	-	1.0	mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	30	-	48	-	62	-	52	mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	24	-	59	-	52	-	43	mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1	-	<1	-	<1	-	<1	mg/kg	1	A-T-040s
Lead$_D^{M\#}$	35	-	81	-	141	-	264	mg/kg	1	A-T-024s
Mercury$_D$	0.20	-	<0.17	-	0.64	-	<0.17	mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	25	-	24	-	28	-	31	mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	3	-	4	-	5	-	5	mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	66	-	122	-	240	-	143	mg/kg	5	A-T-024s
1.02 Atterburg 4Pt BS1377 1990 pt2 cl4.4,5.3+5.4$_A^{\#}$	-	Appended	-	Appended	-	Appended	-	%	1	Subcon SS
1.01 % Moisture BS1377 1990 pt2 cl3.2$_A^{\#}$	-	Appended	-	Appended	-	Appended	-	%	0.1	Subcon SS

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/1	20/07185/2	20/07185/3	20/07185/4	20/07185/5	20/07185/6	20/07185/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.15	0.90	0.20	0.60	0.10			
Depth To Bottom										
Date Sampled	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6ABE	5A	6ABE	5A	6AE	5A	6AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_D^{\#}$	NAD	-	NAD	-	NAD	-	NAD			A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	-	N/A	-	N/A	-	N/A			A-T-045

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/1	20/07185/2	20/07185/3	20/07185/4	20/07185/5	20/07185/6	20/07185/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.15	0.90	0.20	0.60	0.10			
Depth To Bottom										
Date Sampled	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6ABE	5A	6ABE	5A	6AE	5A	6AE			
PAH-16MS										
Acenaphthene$_A^{M\#}$	0.06	-	0.11	-	0.01	-	<0.01	mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	0.01	-	<0.01	-	<0.01	-	<0.01	mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	0.18	-	0.19	-	0.04	-	<0.02	mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.76	-	0.39	-	0.22	-	0.08	mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.67	-	0.27	-	0.19	-	0.07	mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.86	-	0.34	-	0.26	-	0.10	mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	0.31	-	0.09	-	0.09	-	<0.05	mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	0.29	-	0.14	-	<0.07	-	<0.07	mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	0.70	-	0.43	-	0.25	-	0.10	mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	0.07	-	<0.04	-	<0.04	-	<0.04	mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	1.54	-	1.20	-	0.41	-	0.15	mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	0.07	-	0.11	-	0.01	-	<0.01	mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	0.37	-	0.13	-	0.10	-	<0.03	mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03	-	<0.03	-	<0.03	-	<0.03	mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	0.84	-	1.07	-	0.20	-	0.10	mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	1.30	-	0.94	-	0.36	-	0.14	mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	8.03	-	5.41	-	2.14	-	0.74	mg/kg	0.01	A-T-019s

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/1	20/07185/2	20/07185/3	20/07185/4	20/07185/5	20/07185/6	20/07185/7	Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS01	WS01	WS02	WS02	WS03	WS03	WS04			
Depth to Top	0.20	0.80	0.15	0.90	0.20	0.60	0.10			
Depth To Bottom										
Date Sampled	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20	24-Aug-20			
Sample Type	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES	Soil - ES			
Sample Matrix Code	6ABE	5A	6ABE	5A	6AE	5A	6AE			
TPH CWG										
Ali >C5-C6$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C6-C8$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Ali >C8-C10$_A$	<1	-	-	-	<1	-	<1	mg/kg	1	A-T-055s
Ali >C10-C12$_A^{M\#}$	<1	-	-	-	<1	-	<1	mg/kg	1	A-T-055s
Ali >C12-C16$_A^{M\#}$	1	-	-	-	<1	-	<1	mg/kg	1	A-T-055s
Ali >C16-C21$_A^{M\#}$	1	-	-	-	<1	-	<1	mg/kg	1	A-T-055s
Ali >C21-C35$_A$	10	-	-	-	7	-	8	mg/kg	1	A-T-055s
Total Aliphatics$_A$	12	-	-	-	7	-	8	mg/kg	1	A-T-055s
Aro >C5-C7$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C7-C8$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
Aro >C8-C10$_A$	2	-	-	-	1	-	1	mg/kg	1	A-T-055s
Aro >C10-C12$_A^{M\#}$	1	-	-	-	<1	-	<1	mg/kg	1	A-T-055s
Aro >C12-C16$_A$	4	-	-	-	3	-	3	mg/kg	1	A-T-055s
Aro >C16-C21$_A^{M\#}$	16	-	-	-	6	-	6	mg/kg	1	A-T-055s
Aro >C21-C35$_A^{M\#}$	61	-	-	-	28	-	29	mg/kg	1	A-T-055s
Total Aromatics$_A$	85	-	-	-	38	-	39	mg/kg	1	A-T-055s
TPH (Ali & Aro >C5-C35)$_A$	97	-	-	-	45	-	47	mg/kg	1	A-T-055s
BTEX - Benzene$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Toluene$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - Ethyl Benzene$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - m & p Xylene$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
BTEX - o Xylene$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s
MTBE$_A^{\#}$	<0.01	-	-	-	<0.01	-	<0.01	mg/kg	0.01	A-T-022s

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	24-Aug-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
% Stones >10mm$_A$	<0.1							% w/w	0.1	A-T-044
Organic matter$_D^{M\#}$	8.1							% w/w	0.1	A-T-032 OM
Arsenic$_D^{M\#}$	8							mg/kg	1	A-T-024s
Cadmium$_D^{M\#}$	1.1							mg/kg	0.5	A-T-024s
Copper$_D^{M\#}$	41							mg/kg	1	A-T-024s
Chromium$_D^{M\#}$	66							mg/kg	1	A-T-024s
Chromium (hexavalent)$_D$	<1							mg/kg	1	A-T-040s
Lead$_D^{M\#}$	82							mg/kg	1	A-T-024s
Mercury$_D$	<0.17							mg/kg	0.17	A-T-024s
Nickel$_D^{M\#}$	28							mg/kg	1	A-T-024s
Selenium$_D^{M\#}$	6							mg/kg	1	A-T-024s
Zinc$_D^{M\#}$	140							mg/kg	5	A-T-024s

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	**20/07185/8**							**Units**	**Limit of Detection**	**Method ref**
Client Sample No										
Client Sample ID	**WS05**									
Depth to Top	**0.20**									
Depth To Bottom										
Date Sampled	**24-Aug-20**									
Sample Type	**Soil - ES**									
Sample Matrix Code	**6AE**									
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_{D}^{\#}$	**NAD**									A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_{D}$	**N/A**									A-T-045

Envirolab Job Number: 20/07185

Client Project Name: 81 Huddersfield Road

Client Project Ref: P20-00120

Lab Sample ID	20/07185/8							Units	Limit of Detection	Method ref
Client Sample No										
Client Sample ID	WS05									
Depth to Top	0.20									
Depth To Bottom										
Date Sampled	24-Aug-20									
Sample Type	Soil - ES									
Sample Matrix Code	6AE									
PAH-16MS										
Acenaphthene$_A^{M\#}$	<0.01							mg/kg	0.01	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.01							mg/kg	0.01	A-T-019s
Anthracene$_A^{M\#}$	<0.02							mg/kg	0.02	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.04							mg/kg	0.04	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.04							mg/kg	0.04	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.05							mg/kg	0.05	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.05							mg/kg	0.05	A-T-019s
Benzo(k)fluoranthene$_A^{M\#}$	<0.07							mg/kg	0.07	A-T-019s
Chrysene$_A^{M\#}$	<0.06							mg/kg	0.06	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.04							mg/kg	0.04	A-T-019s
Fluoranthene$_A^{M\#}$	<0.08							mg/kg	0.08	A-T-019s
Fluorene$_A^{M\#}$	<0.01							mg/kg	0.01	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.03							mg/kg	0.03	A-T-019s
Naphthalene $_A^{M\#}$	<0.03							mg/kg	0.03	A-T-019s
Phenanthrene$_A^{M\#}$	<0.03							mg/kg	0.03	A-T-019s
Pyrene$_A^{M\#}$	<0.07							mg/kg	0.07	A-T-019s
Total PAH-16MS$_A^{M\#}$	<0.08							mg/kg	0.01	A-T-019s

REPORT NOTES

General
This report shall not be reproduced, except in full, without written approval from Envirolab.
The results reported herein relate only to the material supplied to the laboratory.
The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.
Analytical results reflect the quality of the sample at the time of analysis only.
Opinions and interpretations expressed are outside the scope of our accreditation.
If results are in italic font they are associated with an AQC failure, these are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.
The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.
For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any “A” subscripts
All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

TPH analysis of water by method A-T-007:
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Electrical Conductivity of water by Method A-T-037:
Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.
Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.
Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

Key:
IS indicates Insufficient Sample for analysis.
US indicates Unsuitable Sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Superscript "M" indicates method accredited to MCERTS.
Subscript "A" indicates analysis performed on the sample as received.
Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

Envirolab Deviating Samples Report

Units 7&8 Sandpits Business Park, Mottram Road, Hyde, SK14 3AR
Tel. 0161 368 4921 email. ask@envlab.co.uk

Client: MET Engineers Ltd, Southgate House, Pontefract Road, Leeds, LS10 1SW

Project No: 20/07185

Date Received: 28/08/2020 (am)

Project: 81 Huddersfield Road

Cool Box Temperatures (°C): 17.1

Clients Project No: P20-00120

NO DEVIATIONS IDENTIFIED

If, at any point before reaching the laboratory, the temperature of the samples has breached those set in published standards, e.g. BS-EN 5667-3, ISO 18400-102:2017, then the concentration of any affected analytes may differ from that at the time of sampling.