



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Geo-environmental Ground Investigation Report

ON

PROPOSED RESIDENTIAL DEVELOPMENT

AT

LAND OFF WESLEY AVENUE, NETHERTHONG

FOR

HEYWOOD DEVELOPMENTS Ltd

AUGUST 2022

E22/7931/R001

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Site Investigation Plan
Typical Site Conceptual Model

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0.0 **EXECUTIVE SUMMARY**

SITE	The site is located land to the south of Miry Lane, Netherthong. The site is irregular in shape, with the narrow northern boundary fronting onto Miry Lane. Wesley Avenue butts up to the eastern boundary. The site is divided into three separate grassed fields by stone walls, two in the eastern half and one in the western half. The southern boundary stone wall retains the land to the south approximately 0.5m above site levels, while the northern boundary stone wall retains the site approximately 0.5m above the land to the north. The site falls from a high point of 214.7m AOD in the southwest to a low point of 197.9m AOD in the northeast at an average grade of 1 in 17.
HISTORY	The site has been shown as open fields since 1854, with residential development to the east and south occurring in 1976-1982. A quarry was indicated 100m north east of the site from 1893-1918.
GEOLOGY	No superficial deposits or artificial ground are recorded on the site. The site is underlain by the Huddersfield White Rock Formation, consisting of Sandstone. There are no fault lines recorded in the vicinity of the site. The site work has generally proved a relatively thin layer of topsoil overlying weathered sandstone and a 3.1-3.9m thick band of sandstone. Mudstone/Siltstone bedrock was encountered at 4.8-6.7m below existing ground levels.
MINING/QUARRYING	The Phase 1 Environmental Desk Study by Rogers Geotechnical Services Ltd (Ref: C509/20/E/735 dated February 2020) states that the site lies outside development high risk areas. In addition to this, the site is shown to be outside areas of both past shallow mine working and probable shallow workings. The nearest recorded historical quarry was approximately 100m north east of the site which has been infilled.
HYDROLOGY	The nearest surface water feature is Dean Brook located approximately 25m north of the site. The site is not located within any Environment Agency defined flood zones or shown to be at risk of flooding from rivers or the sea.
HYDROGEOLOGY	The groundwater vulnerability map for the area indicates that the site overlies rocks designated as a Secondary (A) aquifer.

No groundwater was recorded during the trial pit excavations or rotary borehole investigation.

No groundwater has been recorded during the gas monitoring to date.

HAZARDOUS GAS	The property is in an area where no radon protective measures are required. Gas monitoring has been undertaken on three occasions to date and recorded no methane and a maximum carbon dioxide concentration of 1.6%. Due to the low levels of carbon dioxide levels and flow rates on site, we would recommend the gas regime on this site be currently classified as Green by the NHBC traffic light system, or CS1 by BS 8485:2015 Table 2.
CONTAMINATION	No elevated levels of heavy or phytotoxic metals or PAH compounds were recorded in the samples from site. No asbestos was recorded in the samples taken from site.
REMEDIATION	Topsoil to be scraped and stockpiled behind protective fencing on site prior to construction work commencing. Further sampling to be undertaken to prove the material is suitable for use on site.
FOUNDATIONS	We would suggest that the proposed two storey residential properties should be constructed on reinforced strip/trench fill footings founded entirely onto weathered sandstone/sandstone strata. The foundation widths will vary dependent upon the line loadings calculated and bearing strata. Due to the steep nature of the site, and the requirement to raise ground levels, piled foundations may be required. A review of the foundation proposals should be undertaken following design of finalised plot levels
DRAINAGE	Infiltration methods have proved unsuitable for use on site. A discharge rate has been previously agreed with the Local Water Authority and the LLFA through the planning application.

1.0 INTRODUCTION

- 1.1 As requested by Heywood Developments, this practice carried out ground and contamination investigation works for a proposed development on land west of Wesley Ave, Netherthong.
- 1.2 Limited investigation works have previously been undertaken on site to determine if infiltration methods would be a suitable form of surface water disposal.
YourEnvironment Ltd undertook infiltration testing on 10th March 2020 and the results are discussed in their report reference YG0151-20 dated 17th March 2020. A lack of infiltration was noted in the test undertaken in the lower northern half of the site. Good infiltration rates were recorded in the higher southern half of the site, however re-emergence of the water was noted in the lower northern half of the site following the tests. Infiltration methods are therefore not considered a suitable form of surface water disposal and no further tests were undertaken as part of the current site investigation.
- 1.3 The purpose of the report was to:-
 - 1.3.1 Identify the nature of the near surface strata, in order to enable recommendations to be made as to the most economic foundation solution for the proposed residential development.
 - 1.3.2 To identify any areas of contaminated ground.
 - 1.3.3 Propose a suitable outline remediation strategy, which will enable the site to be developed safely, to the satisfaction of the overseeing regulators and in compliance with the current environmental standards.
 - 1.3.4 Determine if ground gas migration from historical infilled ponds/quarries in the vicinity would adversely affect the site.
- 1.4 Soil sampling was undertaken via trial pits to determine the near surface strata. Distributed samples were taken for testing to ascertain the nature of the soils and fills present.
- 1.5 The conclusions and recommendations made in this report are limited to the findings of the preliminary Geotechnical Survey. The report is made on condition that Haigh Huddleston Associates will not in any circumstances be liable for loss, arising directly or indirectly from ground conditions encountered between trial pits and boreholes, which have not been revealed by the investigation.

- 1.6 Any opinion given on the possible configuration of strata between trial pit and borehole locations and below maximum depth of the investigation is for guidance only. Any remarks on groundwater conditions made are based solely on observations made at the time of investigation. Kindly note that levels may differ from those reported due to seasonal variations or other influences.
- 1.7 Furthermore, there is the possibility that any trial pits or boreholes undertaken as part of the investigatory works may be within the influence of existing or proposed foundations or excavations. Haigh Huddleston Associates cannot be held responsible for any failure of any excavations, foundations or structures within the influence of the trial pits or boreholes.

2.0 THE SITE

- 2.1 The site is located on land to the south of Miry Lane, Netherthong and lies around OS Grid Reference 413650, 409750. A site location plan is attached in Appendix A at the rear of the report.
- 2.2 The site is irregular in shape, with the narrow northern boundary fronting onto Miry Lane. Wesley Avenue butts up to the eastern boundary. There are residential properties to the east and south of the site, and a single residential property to the north west. south of Wakefield Road, and immediately to the west and east. To the west is open fields, and to the north of Miry Lane is a wooded area which slopes steeply down to Dean Brook. The site area is approximately 1.23ha including the proposed P.O.S.
- 2.3 The site is divided into three separate grassed fields by stone walls, two in the eastern half and one in the western half. The field in the west has a separate access point from Miry Lane to the fields on the east. An overgrown area of site was noted in the central area adjacent the southern boundary. Mature tree growth was noted primarily adjacent the north western and south eastern boundaries.
- 2.4 The site is bounded on all sides by a stone wall, with access to the eastern two fields in the north eastern corner from Miry Lane. Access to the western field is from the northern boundary with Miry Lane. The southern boundary stone wall retains the land to the south approximately 0.5m above site levels, while the northern boundary stone wall retains the site approximately 0.5m above the land to the north.
- 2.5 The site falls from a high point of 214.7m AOD in the south western corner of the site to a low point of 197.9m AOD in the north eastern corner at an average grade of 1 in 17.
- 2.6 Although the site currently has access points on the northern boundary from Miry Lane, it is understood that the proposed residential development is to be accessed from Wesley Avenue to the east.

3.0 SITE HISTORY

- 3.1 The Phase 1 Environmental Desk Study by Rogers Geotechnical Services Ltd (Ref: C509/20/E/735 dated February 2020) has been consulted and below is a brief description outlining the significant developments that may affect future construction on the site.
- 3.2 The site itself was shown divided into three fields in 1854 and has remained largely unchanged since.
- 3.3 A quarry was indicated 100m north east of the site from 1893-1918. This was developed over first by an extension to the hospital 75m north of the site, and later by a residential development.
- 3.4 The residential developments immediately to the east and south were shown being constructed from 1976-1982 and are still there today.

4.0 SITE GEOLOGY & MINING

- 4.1 The BGS Digital Geological map of Great Britain at 1:50,000 has been consulted and we would report as follows:-
- 4.2 No artificial or superficial deposits are shown directly overlying the site.
- 4.3 The site is underlain by the Huddersfield White Rock Formation, consisting of Sandstone.
- 4.4 There are no fault lines indicated in the vicinity of the site.
- 4.5 The Phase 1 Environmental Desk Study by Rogers Geotechnical Services Ltd (Ref: C509/20/E/735 dated February 2020) states that the site lies outside development high risk areas. In addition to this, the site is shown to be outside areas of both past shallow mine working and probable shallow workings.
- 4.6 It is therefore considered that the site is at a low risk from historical coal workings.
- 4.7 There are no detailed deep BGS boreholes recorded in the vicinity of the site.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 Radon

The UK Radon online maps indicate the property is not in a Radon Affected Area, as less than 1% of properties are above the action level.

No Radon Protective Measures are required.

5.2 Landfill Sites

There are no recorded historical landfill sites in the vicinity of the development.

However, there is a former historical quarry approximately 100m north east of the site and a former pod approximately 170m north of the site that have been infilled with unknown materials.

5.3 Flood Risk

The site is not located in a currently defined Environment Agency floodzone or at risk of flooding from rivers and the sea.

5.4 Groundwater

The groundwater vulnerability map for the area indicates that the site overlies bedrock designated as a Secondary (A) aquifer. These are permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers.

The site is not within a currently defined (Groundwater) Source Protection Zone (SPZ).

There are no licensed groundwater or surface water abstractions within 250m of the site.

There are no Licensed Discharge Consents within 250m of the site.

There are no recorded pollution incidents to controlled water within 250m of the site.

Dean Brook is located approximately 25m north of the site. This is an inland river not influenced by normal tidal action.

5.5 Designated Environmentally Sensitive Site

The land immediately west of the site is shown to be part of the Liverpool, Manchester and West Yorks Greenbelt..

6.0 PRELIMINARY CONCEPTUAL SITE MODEL

- 6.1 The initial stage in assessing the risks posed from contaminated land during the redevelopment of a site is to prepare a conceptual model. A generalised conceptual model can be developed highlighting the main pollutant linkages through a contaminant ► pathway ► receptor model for a residential development. In order to prepare the conceptual model for a particular site the following parameters need to be reviewed as discussed below.
- 6.2 Contamination of existing land can be caused by a number of factors, including:-
- i) Possible historical/current industrial activities.
 - ii) Disposal of waste materials.
 - iii) Storage of materials.
 - iv) A number of natural processes can also lead to hazardous gases and elevated heavy metals.
- 6.3 Potential pathways can include ground and surface water, permeable strata, existing services providing a conduit and voided ground. Potential receptors can include human health, ecosystems, controlled waters and building structures. There are a number of ways that a receptor can be exposed to the contaminant these include, inhalation, direct contact, ingestion, dermal contact and uptake.
- 6.4 Sources of potential contamination, that could affect the proposed development, from either on or off site activities would include the following:-
- i) Possible ground gas migration from infilled quarry and pond located to the north of the site.
- Based on the above activities the potential for some contamination to exist on site is considered to be low.
- 6.5 Considering the proposed residential end use, there will be two possible human receptor groups exposed to the existing onsite contamination:-
- a) Site operatives during development.
 - b) End users, future site residents (the critical receptor is a 6 year-old girl).

- 6.6 Human receptors may be exposed to site contamination by a number of possible pathways. These pathways are summarised in Table 1 below.

Table 1- Potential Human Exposure Pathways

<u>Human Exposure Pathway</u>	<u>Site Residents</u>	<u>Construction Workers</u>
Soil Ingestion	YES	YES
Consumption of Home Grown Vegetables	YES	NO
Dermal Contact	YES	YES
Dust Inhalation	YES	YES
Gases/Vapours	YES	NO

- 6.7 The construction workers will come into contact with any contaminated soil to a far greater extent than future residents. The exposure pathways are generally through dermal contact and indirect ingestion. However their exposure will be for a limited time and the provision and correct use of personnel protective equipment and adequate welfare facilities during construction should restrict their risks to acceptable levels.
- 6.8 Future site residents can be protected in the long term development of the site via a suitable remediation strategy that ensures any proposed contaminated materials remaining on-site are suitably isolated beneath an effective capping layer.
- 6.9 The risk of pollution to controlled waters by existing contamination is considered low. There have been no historical uses of the site, or in the immediate vicinity of the site, likely to cause contamination. There are no licensed ground water abstractions recorded within 250m of the development. There have been no recorded pollution incidents to controlled waters associated with the site.
- 6.10 No specific areas of ecological importance have been identified in the initial desk top study. Therefore the site is considered to be in a low risk environmental setting. The potential for phototoxic materials to exist at shallow depth should be considered, these could pose a potential risk to new planting and soft landscaping areas within the proposed development.
- 6.11 The proposed planning drawings indicate residential properties with private garden areas and hard paved site access and parking areas. The presence of elevated

sulphates and hydrocarbons could affect the long term integrity of buried concrete structures, including foundations and drainage pipes. Plastic water supply pipes can also be damaged by the presence of hydrocarbon contamination.

7.0 FIELDWORK

- 7.1 Trial pit excavations were undertaken on the 21st September 2020 using a JCB 3CX with back actor and 600mm wide bucket. Ten trial pits were undertaken in total. In addition to this, eight rotary boreholes were undertaken on site, to depths between 3 and 7.5m. Five of these boreholes were fitted with gas monitoring stations to determine if ground gas generation would adversely affect the site.
- 7.2 Materials encountered in the trial pits and boreholes were examined and categorised. Trial pit and borehole logs are contained within Appendix B of the report.
- 7.3 The site investigation works were designed to achieve comprehensive site coverage within the proposed development area.
- 7.4 Soil samples were removed from the natural ground deposits within the trial pits. The samples were removed by operatives wearing gloves and placed into airtight clean plastic containers and glass bottles for transportation to the laboratory.
- 7.5 A total of ten samples from the natural ground deposits were recovered from the trial holes for chemical analysis. The testing was carried out by a UKAS accredited laboratory to nationally or accredited in-house methods. The results of the contamination testing are contained within Appendix C of this report.
- 7.6 A suite of common potential contaminants consisting of heavy metals, phytotoxic metals, sulphates, sulphides and poly-aromatic hydrocarbons was analysed for, including a range of metals and inorganic substances and asbestos.
- 7.7 All samples were stored in airtight containers within cool boxes at approximately 4°C until delivery to the laboratory within 48 hours.

8.0 RESULTS OF THE INVESTIGATION

8.1 GEOTECHNICAL INVESTIGATION

- 8.1.1 A copy of the trial hole and borehole logs providing a complete record of strata encountered beneath the proposed development is presented in Appendix B.
- 8.1.2 The fieldwork generally proved a shallow depth of soils and weathered sandstone overlying sandstone and bands of mudstone/siltstone.
- 8.1.3 At the surface of all the trial pits was rough grass over a dark brown sometimes loamy, sometimes sandy topsoil. The topsoil varied in thickness between 0.2 and 0.4m across site.
- 8.1.4 Below the topsoil in all but TP09 was a 0.9-1.9m thick layer of weathered sandstone. The weathered sandstone consisted of clayey sand with numerous sandstone gravels becoming sandstone gravels and cobbles in a sandy matrix with depth.
- 8.1.5 In TP09 in the centre of the site, there was a 1.0m thick layer of very sandy clay containing numerous angular gravels of sandstone beneath the topsoil. At the base of this was a 0.4m thick layer of weak grey mudstone with sandstone cobbles interbedded.
- 8.1.6 At the base of all the trial pits, a strong sandstone that rapidly became difficult to excavate was encountered at depths of 1.2-2.1m below existing ground levels. All ten trial pits terminated in this strata.
- 8.1.7 The sides of all the trial pits remained stable. However, it should be noted they were only open for a short period of time for samples and logs to be taken before being infilled.
- 8.1.8 The rotary boreholes undertaken on site generally proved 0.4-0.7m of soils overlying 1.4-2.1m of weathered sandstone. Beneath this there was a 3.1-3.9m thick band of stronger sandstone and a banded mudstone/siltstone bedrock encountered at 4.8-6.7m below existing ground levels.

- 8.1.9 The result of the geotechnical analysis undertaken on the sample of clayey soil indicates the clay to be of low plasticity (Plasticity Index 9%). If the modified results are calculated, taking into account the percentage of material retained on a 425micron sieve, the results correspond to a low shrinkage clay. It should be noted however that limited clay was encountered on site. The test certificate is contained in Appendix C.

8.2 GROUNDWATER

- 8.2.1 No groundwater was encountered during the trial pit investigation.
- 8.2.2 No groundwater strikes were recorded during the rotary borehole investigation. No groundwater was recorded the gas monitoring undertaken on site.
- 8.2.3 It should be recognised that ground water levels may vary throughout the year. During periods of heavy rainfall the groundwater levels may be substantially higher than the results revealed in these investigations.

8.3 GAS MONITORING

- 8.3.1 As discussed previously BH01, BH02, BH03, BH04 and BH05 were installed with gas standpipes and lockable covers. Gas testing is currently being undertaken on site and to-date the wells have been monitored on three occasions following the installation of the standpipes.
- 8.3.2 A standard gas monitoring procedure has been followed in accordance with CIRIA guidance, including measurement of the following:-
- i) Methane, Oxygen and Carbon Dioxide concentrations.
 - ii) Atmospheric Pressure.
 - iii) Gas Flow Rate.
 - iv) Standing water level.
- 8.3.3 The result of the monitoring undertaken to-date is summarised in Table 4 below. A complete set of results will be reported on completion of the intended testing programme.

Table 4 - Summary of Recorded Gas Levels.

Borehole No.	Date	Oxygen %	Carbon Dioxide %	Methane %	Flow Rate (l/hr)	Depth to Water (m)	Atmospheric Pressure (mb)
BH01	29.06.22	19.7	1.5	ND	ND	DRY	986
	27.07.22	19.6	1.6	ND	ND	DRY	995
	10.08.22	19.8	1.6	ND	ND	DRY	1003
BH02	29.06.22	19.9	1.2	ND	ND	DRY	986
	27.07.22	18.4	1.4	ND	ND	DRY	995
	10.08.22	19.9	1.6	ND	ND	DRY	1004
BH03A	29.06.22	19.6	1.2	ND	ND	DRY	985
	27.07.22	20.0	0.8	ND	ND	DRY	995
	10.08.22	20.3	0.7	ND	ND	DRY	1003
BH04	29.06.22	20.0	0.8	ND	ND	DRY	984
	27.07.22	19.9	0.9	ND	ND	DRY	995
	10.08.22	20.2	0.9	ND	ND	DRY	1004
BH06A	29.06.22	20.2	0.6	ND	ND	DRY	985
	27.07.22	19.8	0.6	ND	ND	DRY	997
	10.08.22	20.2	0.7	ND	ND	DRY	1005

8.3.4 The gas monitoring on 29th June and 10th August 2022 was undertaken during falling air pressure. During the monitoring to date, a maximum carbon dioxide concentration of 1.6% has been recorded in BH01 and BH02. No methane has been recorded on site. No flow rates have been detected within the boreholes.

8.3.5 Due to the low levels of carbon dioxide levels and flow rates on site, we would recommend the gas regime on this site be currently classified as **Green** by the NHBC traffic light system, or **CS1** by BS 8485:2015 Table 2.

8.3.6 The gas monitoring is ongoing and a final report confirming any gas protection measures required will be prepared when the monitoring is completed.

9.0 CONTAMINATION

9.1 HUMAN HEALTH RISK ASSESSMENT

9.1.1 The appraisal of contaminated land within the UK is based on a risk assessment approach. The method involves the principle of defining a source ► pathway ► receptor, linkage to establish a human health risk. For any risk to exist to a potential receptor from an identified contaminant there must be an unbroken source ► pathway ► target relationship.

9.1.2 In the first instance site data for the contaminant levels are compared against guidance such as the CLEA values published by DEFRA. Should the site values exceed the guidance criteria, the contamination levels are recognised to have the potential to pose a risk to human health. Two scenarios are then available:-

- a) To break or remove one of the source ► pathway ► receptor linkages, by specifying an appropriate level of remedial work. Examples of remedial action may include the removal of the contaminated material or alternatively specifying a sufficient capping layer.
- b) The alternative approach is to provide a more detailed human health site specific risk assessment. This will involve examining factors such as soil properties, exposure assumptions, groundwater flows and contamination composition.

9.2 CONTAMINATION RESULTS

9.2.1 As stated above, in order to put the analytical results into context, the data has in the first instance been assessed in relation to several sets of guidelines: -

9.2.2 The analytical results have been assessed via an initial screening assessment with regard to the current Contaminated Land Exposure Assessment model (CLEA UK) for human health, which has been produced for the Environment Agency and the Department of Environment, Food and Rural Affairs (DEFRA). The CLEA model provides Soil Guideline Values (SGVs) for a limited range of contaminants only, and these are based on risk to human health. As such they do not take into account potential risks to other receptors eg groundwater and third party land.

- 9.2.3 It is proposed to redevelop the site for residential properties with private garden areas. Soil results have therefore been assessed against Generic Assessment Criteria (GAC) based on guidelines from the Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) S4UL document. Where there is no GAC, guidance limits have been adopted from sources referenced in the table below.
- 9.2.4 In addition to the above, the calculation of SGVs based on an acceptably low level of risk is currently being undertaken. These Category 4 Screening Levels (C4SL) have been calculated for six substances to date by modifying the toxicological/exposure parameters within CLEA. C4SLs have been used as tier 1 trigger levels within this assessment, superseding the previous CIEH and LQM SGVs.
- 9.2.5 Assessment of risk is considered as a tiered approach. Assessment based on non intrusive means is considered Tier 1 assessment, comparison against SGVs and GACs is a Tier 2 assessment, and the generation of and comparison with Site Specific Assessment Criteria (SSAC) is a Tier 3 assessment and is conducted where deemed appropriate following the Tier 2 assessment.
- 9.2.6 The sulphate and acid concentrations have been compared against the BRE digest "Concrete in Aggressive Ground" parts 1-4. This will enable the concrete class to be specified in relation to possible contact with aggressive soils.
- 9.2.7 The results of the chemical analysis are presented on the laboratory analysis sheets with Appendix C. A summary of the significance of the results is presented in Table 5.

Table 5**Comparison of contaminant against accepted guidance values for residential use with plant uptake**

<u>CONTAMINANT</u>	<u>SGV</u> <u>MG/KG</u>	<u>CONCENTRATION IN</u> <u>ALL SOILS.</u> <u>MG/KG</u>	<u>No. OF</u> <u>SAMPLES</u> <u>EXCEEDING</u> <u>GUIDANCE</u> <u>VALUES</u>	<u>PERCENTAGE</u> <u>OF SAMPLES</u> <u>EXCEEDING</u> <u>GUIDELINE</u> <u>VALUE</u>
Arsenic	37 (4)	3.3-19	0/10	
Cadmium	22 (4)	<0.1-0.3	0/10	
Chromium (Total)	130 (2)	14-21	0/10	
Lead	200 (4)	15-97	0/10	
Mercury (Total)	40 (1,5)	<0.05-2.8	0/10	
Selenium	250 (1)	<0.5-1.0	0/10	
Copper	2400 (1)	9.7-30	0/10	
Nickel	180 (1)	11-21	0/10	
Zinc	3700 (1)	39-64	0/10	
Sulphate	0.24 (3)	0.02-0.11	0/10	
Thiocyanate	50	<0.6-4.3	0/10	
Sulphide	250	23-84	0/10	
Naphthalene	2.3 (1)	<0.1	0/10	
Benzo(a)pyrene	5 (4)	<0.1-0.3	0/10	
PAH (Total)	40	<1.6-2.3	0/10	
Phenols	760 (1)	<0.3-0.4	0/10	
Asbestos	No fibres	None	0/8	
pH	6-8	4.8-6.8	0/10	

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(2) DEFRA CLR SGV's withdrawn used for initial comparison

(3) BS 8110 1985 Table 6.1

(4) Category 4 Screening Levels

(5) Unless there is considered to be historical site usage that would result in elemental and methylmercury compounds to be present, the inorganic mercury SGV is used as this is the most prevalent for of mercury present in the natural environment.

9.2.8 There were no elevated levels of heavy or phytotoxic metals recorded in the samples from site.

9.2.9 No elevated levels of PAH (Total) or individual PAH compounds were recorded in the samples taken from site.

9.2.10 No asbestos was recorded in the samples taken from site.

9.2.11 There were no elevated levels of sulphate recorded in the samples taken from site, however, pH values as low as 4.8 were recorded. This corresponds to a design sulphate class DS-1, ACEC class AC-2z, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

9.3 QUALITATIVE RISK ASSESSMENT

9.3.1 The Qualitative Risk Assessment is based upon the previously discussed source ► pathway ► receptor principle. In relation to the proposed site these may be described as follows:-

9.3.2 SOURCE

- i) No elevated levels of contaminants
- ii) No elevated levels of ground gas.

9.3.3 PATHWAYS

- i) Ingestion of contamination material.
- ii) Inhalation of contaminated particles.
- iii) Dermal contact with the known contamination.
- iv) Leaching to controlled waters.

9.3.4 RECEPTORS

- i) Residential site users.
- ii) Construction and maintenance workers.
- iii) Controlled waters.
- iv) The building structure.

9.3.5 Each of the receptors will now be appraised and attribute the likely risks involved.

i) Residential site users.

Based on the chemical results obtained it is considered that there is currently a **low/negligible** risk to end users from localised ground contamination on-site.

No elevated levels of heavy or phytotoxic metals or PAH compounds were recorded in the samples from site.

No asbestos recorded in the samples taken from site.

It is recommended that the existing topsoil is scraped and stockpiled behind protective fencing prior to development commencing on site. This will prevent cross contamination during construction works. The topsoil should be screened to remove any unsuitable materials prior to being re-laid on site.

Based on the site area of 12300m², and an average topsoil depth of 0.3m, there is $12300 \times 0.3 = 3690\text{m}^3$ of topsoil on site. To achieve a sampling rate of 1 per 250m³, $3690/250 = 14.76$, 15 samples total would be required. As 8 samples of topsoil have already proved clean from contaminants, a further 7 samples are required to provide a robust sample set confirming the topsoil suitable for re-use in soft landscaped areas.

During the monitoring to date, a maximum carbon dioxide concentration of 1.6% has been recorded in BH01 and BH02. No methane has been recorded on site. No flow rates have been detected on site. Due to the low levels of carbon dioxide levels and flow rates on site, we would recommend the gas regime on this site be currently classified as **Green** by the NHBC traffic light system, or **CS1** by BS 8485:2015 Table 2. The gas monitoring is ongoing and a final report confirming any gas protection measures required will be prepared when the monitoring is completed.

ii) Construction and Maintenance Workers.

It is considered that there is a **low** risk to construction and maintenance workers from the redevelopment of the site.

Construction workers should always wear PPE including overalls, boots and gloves when handling the contaminated materials onsite. In addition eating, drinking and smoking should be restricted to designated areas where the above hygiene facilities are available.

iii) Controlled Waters

No elevated levels of contaminants have been recorded in the samples taken from site. It is therefore considered unlikely that there is a risk to groundwater and controlled waters from existing contamination on site.

iv) Building Structures.

Service providers should be forwarded the final validated chemical levels in order for them to provide an accurate specification for the apparatus to be provided. New services should be surrounded and backfilled with clean material to afford some protection to the apparatus and allow any future maintenance work to be undertaken in clean material.

There were no elevated levels of sulphate recorded in the samples taken from site, however, pH values as low as 4.8 were recorded. This corresponds to a design sulphate class DS-1, ACEC class AC-2z, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 GEOTECHNICAL ASSESSMENT

- 10.1.1 The fieldwork generally proved a shallow depth of topsoil overlying weathered sandstone with a sandstone bedrock. For initial design purposes we would envisage a safe bearing capacity of 100kN/m² where foundations are cited into the weathered sandstone strata and 200kN/m² where foundations are extended onto the solid sandstone strata.
- 10.1.2 We would therefore initially suggest that the proposed two/three storey residential constructions should be constructed on strip/trench fill footings founded entirely onto the weathered sandstone strata. Where solid sandstone is encountered within the excavations, the foundations should be deepened to lie entirely onto the sandstone strata to avoid differential settlement. The foundation widths will vary dependent upon the line loadings calculated and bearing strata.
- 10.1.3 However, it should be noted that proposed levels may need to be raised above existing ground levels due to the existing slope of the site and final highway design. In this instance, piling or other methods, may be the better foundation option. We would recommend that the final foundation design is to be determined following detailed examination of the final site levels and required foundation depths.
- 10.1.4 All foundations should be placed below a line of 45° drawn up from the base of any services or other structures.
- 10.1.5 Where existing foundations or structures are encountered during construction, these should be totally removed from the excavations to enable the new foundations to be constructed without obstructions.
- 10.1.6 At present it is not anticipated that excessive ground water control measures will be required. Please note that ground water flows can vary throughout the year and a further assessment should be undertaken if construction work is proposed following a prolonged rainfall event.
- 10.1.7 There were no elevated levels of sulphate recorded in the samples taken from site, however, pH values as low as 4.8 were recorded. This corresponds to a design

sulphate class DS-1, ACEC class AC-2z, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

10.1.8 Wherever any foundations are located near existing or proposed new trees, their foundations must be sited below the root growth zone. Reference should be made to the NHBC standards Chapter 4.2 "Building Near Trees" which provides guidance on foundation criteria, depths and construction. All services should be similarly protected. Plasticity testing of the clays on site has shown them to be of low volume change potential. It should be noted however that limited clay was encountered on site.

10.2 GROUND FLOOR SLAB – GAS MEASURES

10.2.1 As discussed previously, gas monitoring stations were installed in five of the borehole locations on site due to the possibility of ground gas migration from infilled land in the vicinity of the site.

10.2.2 A maximum carbon dioxide concentration of 1.6% was recorded in BH01 and BH02. No methane has been recorded. No steady flow rates have been detected during the monitoring.

10.2.3 The proposed development consists of low rise residential housing and therefore the gas regime has been characterised in accordance with the traffic light methodology as outlined in *CIRIA Report C665*. Due to the low carbon dioxide levels on site, we would recommend the gas regime on this site be currently classified as **Green** by the NHBC traffic light system, or **CS1** by BS 8485:2015 Table 2.

10.2.4 No Radon Protection measures are required for the site.

10.2.5 Due to the presence of trees immediately adjacent the site, a suspended beam & block floor will be required for the properties in accordance with NHBC Chapter 4.2, this will allow a ventilated void to be constructed beneath the floor construction.

10.2.6 A detailed analysis of the results and any gas protection measures required will be confirmed on completion of the on-site gas testing in a separate report.

10.3 CONTAMINATION ASSESSMENT

- 10.3.1 No other elevated levels of heavy or phytotoxic metals or PAH compounds were recorded in the samples from site.
- 10.3.2 No asbestos recorded in the samples taken from site.
- 10.3.3 It is recommended that the existing topsoil is scraped and stockpiled behind protective fencing prior to development commencing on site. This will prevent cross contamination during construction works. The topsoil should be screened to remove any unsuitable materials prior to being re-laid on site.
- 10.3.4 Based on the site area of 12300m², and an average topsoil depth of 0.3m, there is $12300 \times 0.3 = 3690\text{m}^3$ of topsoil on site. To achieve a sampling rate of 1 per 250m³, $3690/250 = 14.76$, 15 samples total would be required. As 8 samples of topsoil have already proved clean from contaminants, a further 7 samples are required to provide a robust sample set confirming the topsoil suitable for re-use in soft landscaped areas.
- 10.3.5 Should any suspected areas of contamination be exposed during site strip/construction, an engineer should be contacted to determine if additional chemical testing should be undertaken. The on-site staff should maintain a photographic record and dates of any exposed contaminated material.

10.4 SURFACE WATER DRAINAGE

- 10.4.1 YourEnvironment Ltd undertook infiltration testing on 10th March 2020 and the results are discussed in their report reference YG0151-20 dated 17th March 2020. A lack of infiltration was noted in the test undertaken in the lower northern half of the site. Good infiltration rates were recorded in the higher southern half of the site, however re-emergence of the water was noted in the lower northern half of the site following the tests.
- 10.4.2 Additionally, due to the steep nature of the site there is the possibility for re-emergence of water downhill from the soakaways. Finally, due to the re-levelling required to develop the site, it may prove impractical to construct soakaways through the re-engineered ground to the underlying natural strata.

10.4.3 We would therefore not consider infiltration methods a suitable long term drainage solution for the development.

10.4.4 A discharge rate and point of connection to the will need to be agreed with Kirklees Council Lead Local Flood Authority and Yorkshire Water.

11.0 SUGGESTED FURTHER WORK

- 11.1 Gas monitoring to be completed and final assessment on gas protection measures to be made.
- 11.2 Further samples of topsoil to be taken to confirm the suitability of the material for re-use on

12.0 APPROVALS

12.1 Proposals for the remediation of contaminated land may require the approval of numerous bodies.

These include:

- a) Kirklees Council Environmental Health Department as required by the building and planning regulations.
- b) The NHBC or similar as they will provide the insurance costs to cover the property.
- c) The Environment Agency if there are risks of contamination to ground or surface water systems. They will also require notification if material is removed from site and taken to an appropriate tip.
- d) Relevant highways and drainage authorities and other service companies may also wish to know about the level of contaminants.

Prepared by



M. Dean. BSc(Hons) HND

Checked by



M. Huddleston. MEng

August 2022

This report is subject to the provisions of the Copyright Acts and is for the sole benefit of Heywood Developments Ltd in respect of the proposals described.

APPENDIX A

Site Location Plan

Dwg No. E22/7931/03 – Site Investigation Plan

Dwg No. E22/7931/32 - Typical Site Conceptual Model



Haigh Huddleston & Associates

Civil Structural Engineering Consultants

t 01924 464342 f 01924 450662
e Martin@haighhuddleston.co.uk

Firth Building
99-101 Leeds Road
Dewsbury
WF12 7BU

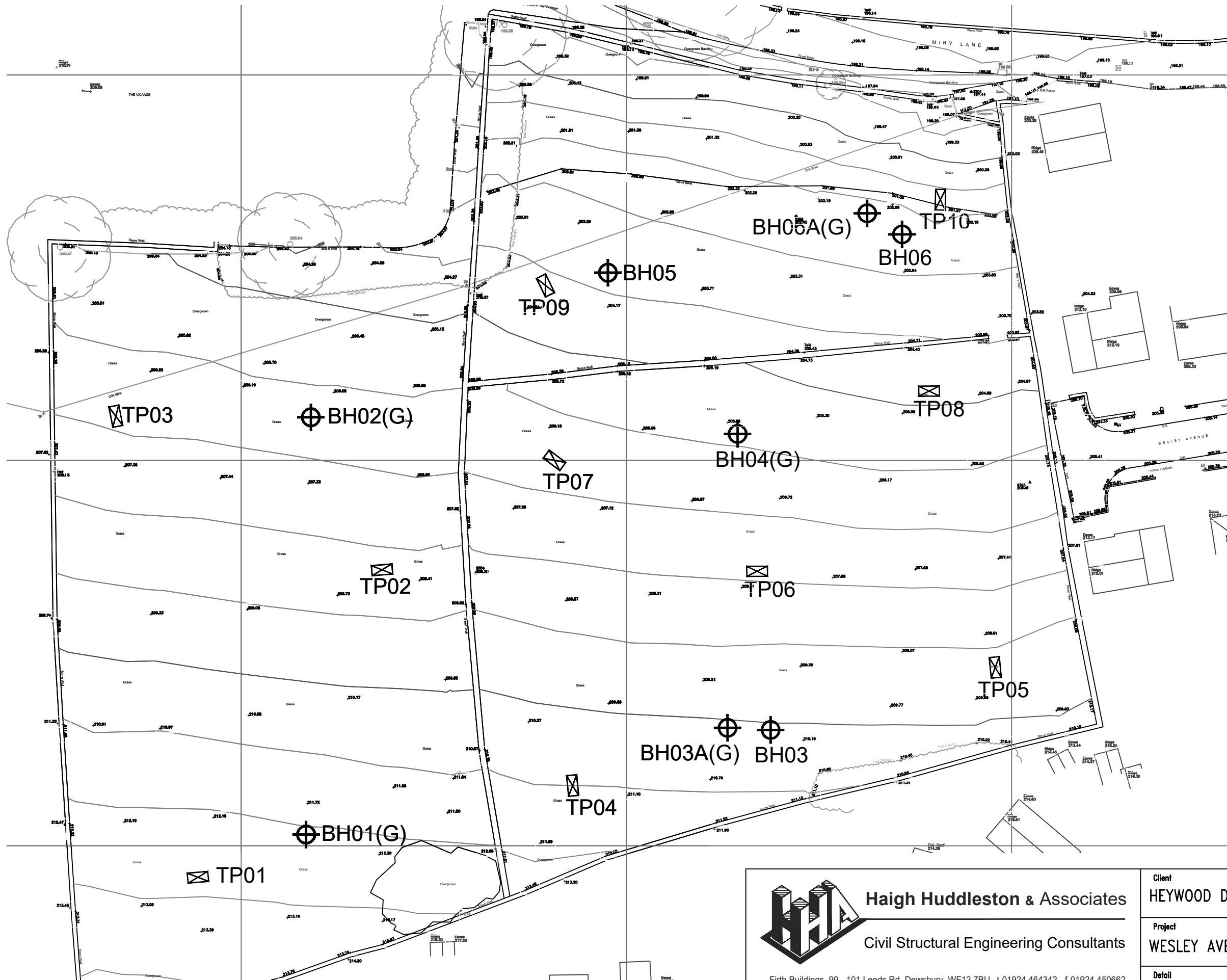
Client : Jonathan Mayo
Job Title: Wesley Avenue, Netherthong
HD9 3UN
Job Number : E22/7931

LOCATION PLAN

OS Grid Reference : SE 136097
Easting : 413649
Northing : 409743

Topographical Survey carried out
using GPS.





Haigh Huddleston & Associates

Civil Structural Engineering Consultants

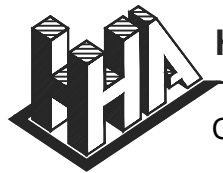
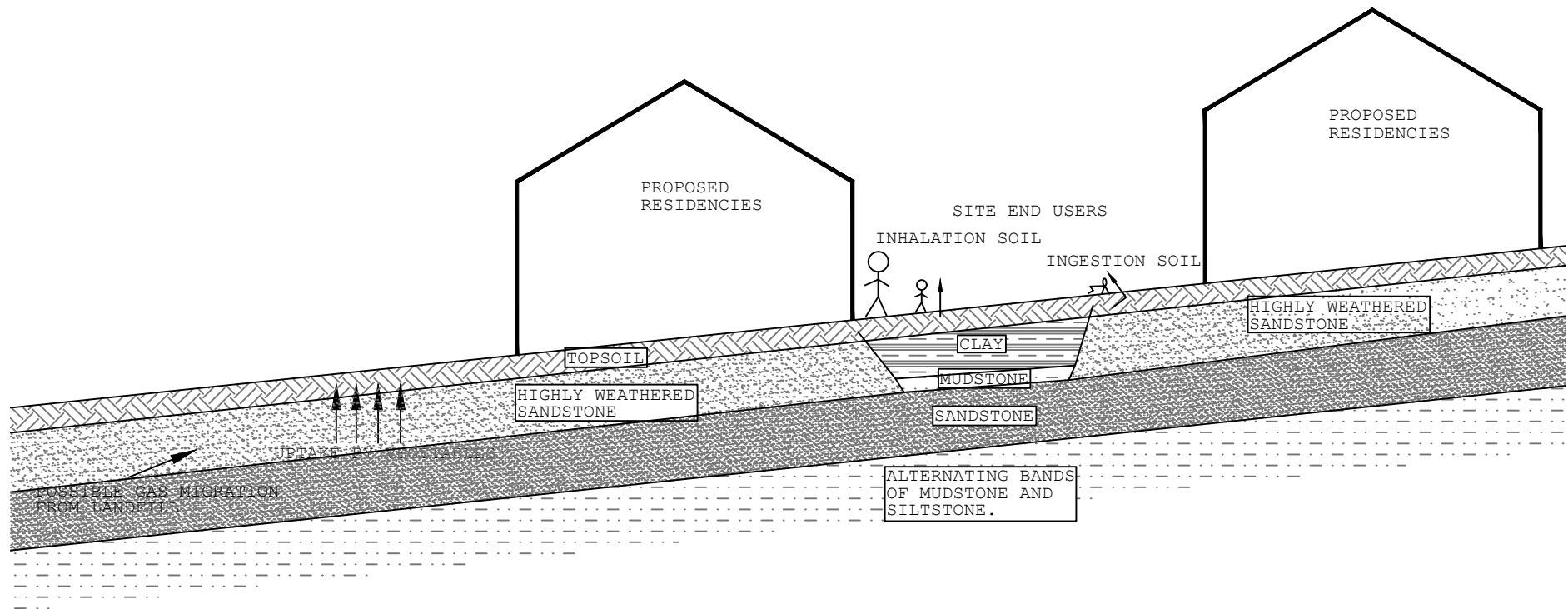
Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662
e martin@haighhuddleston.co.uk

Client
HEYWOOD DEVELOPMENTS

Project
WESLEY AVENUE, NETHERTHONG

Detail
SITE INVESTIGATION PLAN

Scale	Dwn	Chkd	Date	Dwg No.
1:500@A3			Aug'22	E22/7931/03



Haigh Huddleston & Associates

Civil Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Rd, Dewsbury, WF12 7BU t 01924 464342 f 01924 450662
e martin@haighhuddleston.co.uk

Client				
HEYWOOD DEVELOPMENTS				
Project				
WESLEY AVENUE, NETHERTHONG				
Detail				
TYPICAL SITE CONCEPTUAL MODEL				
Scale	Dwn	Chkd	Date	Dwg No.
NTS	MD		Aug'22	E22/7931/32

APPENDIX B

Trial Hole Logs

Borehole Logs

TRIAL HOLE NO. 1



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Dark brown loamy topsoil. (Sample taken at 0.2m.)
0.5		Brown slightly clayey sand with numerous gravels and cobbles of sandstone.
1.0		
	1.2	
1.5		Moderately weak light brown sandstone excavated as horizontally bedded gravels and cobbles.
	1.6	Becoming difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

TRIAL HOLE NO. 2



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13 TH JUNE 2022

0.0		
	0.2	Dark brown sandy topsoil. (Sample taken at 0.1m.)
0.5		Brown slightly clayey sand with numerous sandstone gravels and cobbles.
1.0		
1.5		
	1.6	
		Moderately weak brown horizontally bedded sandstone excavated as gravels and cobbles.
	1.9	Becoming difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.1m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

TRIAL HOLE NO. 3



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Rough grass over dark brown slightly sandy topsoil. (Sample taken at 0.2m.)
0.5		Orangish brown slightly clayey sand excavated with occasional sandstone gravels. (Sample taken at 0.6m.)
1.0	1.0	Weak brown highly weathered sandstone excavated as gravels and cobbles within a sandy matrix.
1.5		
	1.8	Brown moderately weak horizontally bedded sandstone becoming difficult to excavate. Becoming difficult to excavate.
2.0		
	2.1	
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m & 0.6m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

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TRIAL HOLE NO. 4



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.2	Rough grass over dark brown loamy topsoil.
0.5		
	0.8	
1.0		Weak highly weathered sandstone excavated within a sandy matrix.
1.5		
2.0		
	2.1	
	2.3	Moderately strong brown horizontally bedded sandstone becoming difficult to excavate.
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation NO

Sample taken NO

Sides of excavation remained stable YES

Level

NOTES:

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.....

TRIAL HOLE NO. 5



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Rough grass over dark brown topsoil. Sample taken at 0.1m.
0.5		
	0.8	Brown slightly clayey sand with occasional sandstone gravels.
1.0		
		Moderately weak brown highly weathered sandstone excavated as angular gravels and cobbles within a sandy matrix.
1.5		
	1.7	
	1.9	Moderately strong brown horizontally bedded sandstone excavated as gravels and cobbles. Becoming difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.1m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

TRIAL HOLE NO. 6



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Rough grass over dark brown topsoil. Sample taken at 0.2m.
0.5		
	0.6	Orangish brown slightly clayey sand with occasional sandstone gravels. Sample taken at 0.5m.
1.0		
	1.4	Brown highly weathered sandstone excavated as gravels and cobbles within a sandy matrix.
1.5		
	1.7	Moderately strong brown horizontal sandstone. Becoming difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m. & 0.5m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

TRIAL HOLE NO. 7



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Rough grass over dark brown topsoil. Sample taken at 0.2m.
0.5		
	0.6	Orangish brown slightly clayey sand with occasional sandstone gravels. Sample taken at 0.6m.
1.0		Weak brown highly weathered sandstone excavated as angular gravels/cobbles within a sandy matrix.
	1.3	
	1.4	Moderately strong brown sandstone becoming difficult to excavate.
1.5		
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m & 0.6m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

TRIAL HOLE NO. 8



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.4	Rough grass over dark brown topsoil. Sample taken at 0.2m.
0.5		
1.0		
	1.2	Yellowish/brown slightly clayey sand with occasional sandstone gravels.
1.5		
	1.6	Weak brown highly weathered sandstone excavated as angular gravels within a sandy matrix.
	1.7	Moderately strong brown sandstone becoming difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

.....

TRIAL HOLE NO. 9



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.3	Rough grass over dark brown topsoil. Sample taken at 0.2m.
0.5		Soft/firm very sandy clay with numerous angular gravels of sandstone.
1.0		
	1.3	
1.5		Weak dark grey mudstone excavated as small gravels with large sandstone cobbles inter bedded.
	1.7	
	1.8	Moderately strong light brown sandstone difficult to excavate.
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation

NO

Sample taken

YES at 0.2m.

Sides of excavation remained stable

YES

Level

.....

NOTES:

.....

.....

TRIAL HOLE NO. 10



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

Firth Buildings, 99 - 101 Leeds Road, Dewsbury, WF12 7BU

t 01924 464342 f 01924 450662 e martin@haighhuddleston.co.uk

Client :	HEYWOOD DEVELOPMENTS	Job No :	7931
Site :	WESLEY AVENUE	Date :	13TH JUNE 2022

0.0		
	0.25	Rough grass over dark brown topsoil.
0.5	1.1	Brown slightly clayey sand with numerous gravels of sandstone.
1.0	1.9	Dark brown highly weathered sandstone interbedded with a sandy clay matrix. Sandstone horizontally bedded.
1.5	1.9	Moderately strong light brown sandstone becoming difficult to excavate.
2.0	4.0	
2.5		
3.0		
3.5		
4.0		

REMARKS:

Ground water encountered during excavation NO
Sample taken NO
Sides of excavation remained stable YES
Level

NOTES:

.....
.....

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Miry Lane, Netherthong	Date:	13/06/2022
Driller	G LEE	Flush	Air

bh	depth	description	bh	depth	description
BH1	GL to 0.70	Soil	BH3	GL to 0.40	Soil
	0.70 to 2.80	Weathered Soft Sandstone		0.40 to 1.80	Weathered Soft Sandstone
	2.80 to 6.70	Medium/Strong Sandstone		1.80 to 5.60	Medium/Strong Sandstone
	6.70 to 7.30	Grey Silty Mudstone		5.60 to 7.50	Grey Siltstone with mudstone bands
	7.30 to 9.00	Grey Siltstone with mudstone bands			
			BH3 A	GL to 0.40	Soil
		Backfill to 3m with gravel		0.40 to 1.80	Weathered Soft Sandstone
		Install to 3m, gravel pack		1.80 to 3.00	Hard Sandstone
		Bentonite seal and flush cover			
					Install to 3m, gravel pack
BH2	GL to 0.40	Soil			Bentonite seal and flush cover
	0.40 to 2.10	Weathered Soft Sandstone			
	2.10 to 3.00	Hard Sandstone			
		Install to 3m, gravel pack			
		Bentonite seal and flush cover			

STRATIGRAPHY GROUND ENGINEERS

DAILY DRILLING LOG

Site	Miry Lane, Netherthong	Date:	13/06/2022
Driller	G LEE	Flush	Air

bh	depth	description	bh	depth	description
BH4	GL to 0.50	Soil	BH6	GL to 0.40	Soil
	0.50 to 1.70	Weathered Soft Sandstone		0.40 to 2.00	Weathered Soft Sandstone
	1.70 to 3.00	Hard Sandstone		2.00 to 4.80	Hard Sandstone
				4.80 to 7.50	Grey Siltstone with mudstone bands
		Install to 3m, gravel pack			
		Bentonite seal and flush cover	BH6 A	GL to 0.40	Soil
				0.40 to 2.00	Weathered Soft Sandstone
BH5	GL to 0.40	Soil		2.00 to 3.00	Hard Sandstone
	0.40 to 1.90	Weathered Clayey Sandstone			
	1.90 to 3.50	Hard Sandstone			Install to 3m, gravel pack
	3.50 to 4.70	Damp Medium Sandstone			Bentonite seal and flush cover
	4.70 to 5.00	Hard Sandstone			
	5.00 to 7.50	Grey Siltstone with mudstone bands			

APPENDIX C

Chemical Analysis of Samples

Geotechnical Analysis of Samples



Certificate of Analysis

Certificate Number 22-11522

Issued: 24-Jun-22

Client Haigh Huddleston & Associates Ltd
Firth Buildings
99-101 Leeds Road
Dewsbury
WF12 7BU

Our Reference 22-11522

Client Reference 7931

Order No (not supplied)

Contract Title Wesley Ave

Description 10 Soil samples.

Date Received 20-Jun-22

Date Started 20-Jun-22

Date Completed 24-Jun-22

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

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

Approved By

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

Kirk Bridgewood
General Manager



2139

Summary of Chemical Analysis

Matrix Descriptions

Our Ref 22-11522

Client Ref 7931

Contract Title Wesley Ave

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	0.2	2022568	24/06/2022	Brown sandy CLAY
TP02	0.1	2022569	24/06/2022	Brown sandy CLAY including some rootlets
TP03	0.2	2022570	24/06/2022	Brown sandy CLAY including some rootlets
TP05	0.1	2022571	24/06/2022	Brown slightly gravelly, sandy CLAY including some rootlets
TP06	0.2	2022572	24/06/2022	Brown slightly gravelly, sandy CLAY including some rootlets
TP06	0.5	2022573	24/06/2022	Brown gravelly, sandy CLAY
TP07	0.2	2022574	24/06/2022	Brown slightly gravelly, sandy CLAY including some rootlets
TP07	0.7	2022575	24/06/2022	Brown gravelly, sandy CLAY
TP08	0.2	2022576	24/06/2022	Brown slightly gravelly,, sandy CLAY
TP09	0.3	2022577	24/06/2022	Brown slightly gravelly,, sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 22-11522

Client Ref 7931

Contract Title Wesley Ave

Lab No	2022568	2022569	2022570	2022571	2022572	2022573
Sample ID	TP01	TP02	TP03	TP05	TP06	TP06
Depth	0.20	0.10	0.20	0.10	0.20	0.50
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	15/06/2022	15/06/2022	15/06/2022	15/06/2022	15/06/2022	15/06/2022
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	12	18	19	12	13	4.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.2	0.2	0.2	0.2	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	21	24	18	17	16	21
Copper	DETSC 2301#	0.2	mg/kg	26	26	30	24	27	13
Lead	DETSC 2301#	0.3	mg/kg	65	64	74	82	75	23
Mercury	DETSC 2325#	0.05	mg/kg	1.6	2.6	2.8	0.20	0.18	< 0.05
Nickel	DETSC 2301#	1	mg/kg	13	14	13	12	13	21
Selenium	DETSC 2301#	0.5	mg/kg	1.0	0.7	0.9	0.7	0.6	< 0.5
Zinc	DETSC 2301#	1	mg/kg	64	61	57	50	49	59
Inorganics									
pH	DETSC 2008#		pH	6.2	5.3	5.1	4.8	4.8	6.0
Thiocyanate	DETSC 2130#	0.6	mg/kg	3.5	3.1	3.5	4.3	1.0	3.5
Total Organic Carbon	DETSC 2084#	0.5	%	5.4	5.1	6.7	5.0	6.5	0.9
Sulphide	DETSC 2024*	10	mg/kg	50	84	23	73	46	57
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.08	0.08	0.11	0.07	0.08	0.02
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.2	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.3	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.4	0.4	0.3	< 0.3	0.4	< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 22-11522

Client Ref 7931

Contract Title Wesley Ave

Lab No	2022574	2022575	2022576	2022577
Sample ID	TP07	TP07	TP08	TP09
Depth	0.20	0.70	0.20	0.30
Other ID				
Sample Type	SOIL	SOIL	SOIL	SOIL
Sampling Date	15/06/2022	15/06/2022	15/06/2022	15/06/2022
Sampling Time	n/s	n/s	n/s	n/s

Test	Method	LOD	Units				
Metals							
Arsenic	DETSC 2301#	0.2	mg/kg	13	3.3	16	14
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	< 0.1	0.3	0.2
Chromium	DETSC 2301#	0.15	mg/kg	14	15	19	15
Copper	DETSC 2301#	0.2	mg/kg	27	9.7	29	20
Lead	DETSC 2301#	0.3	mg/kg	97	15	93	56
Mercury	DETSC 2325#	0.05	mg/kg	0.35	< 0.05	0.28	0.09
Nickel	DETSC 2301#	1	mg/kg	12	16	14	11
Selenium	DETSC 2301#	0.5	mg/kg	0.8	< 0.5	0.7	0.8
Zinc	DETSC 2301#	1	mg/kg	51	39	64	61
Inorganics							
pH	DETSC 2008#		pH	6.8	6.6	5.1	5.4
Thiocyanate	DETSC 2130#	0.6	mg/kg	0.7	< 0.6	2.3	< 0.6
Total Organic Carbon	DETSC 2084#	0.5	%	5.7	1.0	5.5	3.3
Sulphide	DETSC 2024*	10	mg/kg	42	57	31	42
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.08	0.01	0.07	0.06
PAHs							
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.4	0.6
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	0.3	0.4
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.5
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.2
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	0.3
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1	< 0.1	< 0.1
PAH 16 Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6	< 1.6	2.3
Phenols							
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	0.3	< 0.3	< 0.3	< 0.3

Summary of Asbestos Analysis Soil Samples

Our Ref 22-11522

Client Ref 7931

Contract Title Wesley Ave

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
2022568	TP01 0.20	SOIL	NAD	none	Josh Best
2022569	TP02 0.10	SOIL	NAD	none	Josh Best
2022570	TP03 0.20	SOIL	NAD	none	Josh Best
2022571	TP05 0.10	SOIL	NAD	none	Josh Best
2022572	TP06 0.20	SOIL	NAD	none	Josh Best
2022574	TP07 0.20	SOIL	NAD	none	Josh Best
2022576	TP08 0.20	SOIL	NAD	none	Josh Best
2022577	TP09 0.30	SOIL	NAD	none	Josh Best

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

Information in Support of the Analytical Results

Our Ref 22-11522
Client Ref 7931
Contract Wesley Ave

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Hold time exceeded for tests	Inappropriate container for tests
2022568	TP01 0.20 SOIL	15/06/22	GJ 250ml, PT 1L		
2022569	TP02 0.10 SOIL	15/06/22	GJ 250ml, PT 1L		
2022570	TP03 0.20 SOIL	15/06/22	GJ 250ml, PT 1L		
2022571	TP05 0.10 SOIL	15/06/22	GJ 250ml, PT 1L		
2022572	TP06 0.20 SOIL	15/06/22	GJ 250ml, PT 1L		
2022573	TP06 0.50 SOIL	15/06/22	GJ 250ml, PT 1L		
2022574	TP07 0.20 SOIL	15/06/22	GJ 250ml, PT 1L		
2022575	TP07 0.70 SOIL	15/06/22	GJ 250ml, PT 1L		
2022576	TP08 0.20 SOIL	15/06/22	GJ 250ml, PT 1L		
2022577	TP09 0.30 SOIL	15/06/22	GJ 250ml, PT 1L		

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

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

Soil Analysis Notes

Inorganic soil analysis was carried out on a dried sample, crushed to pass a 425µm sieve, in accordance with BS1377.

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

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

Disposal

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

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

Appendix A - Details of Analysis

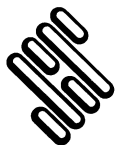
Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETSC 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETSC 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETSC 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETSC 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETSC 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETSC 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETSC 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETSC 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETSC 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETSC2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETSC2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETSC2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETSC2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETSC2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETSC2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETSC2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETSC2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETSC2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETSC2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETSC2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETSC 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETSC 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETSC 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETSC 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 062	Benzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Ethylbenzene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Toluene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	m+p Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETS 062	o Xylene	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETSC 3311	EPH (C10-C40)	mg/kg	10	As Received	No	Yes	Yes

Appendix A - Details of Analysis

Method	Parameter	Units	Limit of Detection	Sample Preparation	Sub-Contracted	UKAS	MCERTS
DETSC 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETSC 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETSC 3401	PCB Total	mg/kg	0.01	As Received	No	Yes	Yes

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

End of Report



STRUCTURAL SOILS LTD
TEST REPORT



Report No. 785236 R1

Date 22-June-2022 Contract Wesley Avenue

Client Haigh Huddleston Associates
Address Firth Building
99-101 Leeds Road
Dewsbury
WF12 7BU

For the Attention of Martin Huddleston

Samples submitted by client 16/06/2022
Testing Started 16/06/2022
Testing Completed 22/06/2022

Client Reference
Client Order No.
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 mark.athorne@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
TP03		D	0.60	15	28	19	9	48	Brown slightly sandy slightly gravelly silty CLAY

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

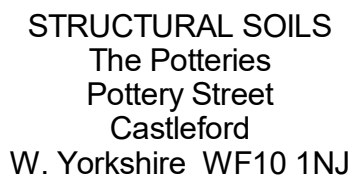
[illegible]

- 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

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)



[Signature]

22/06/22



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: **22/06/2022 15:31:50**.

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:

Wesley Avenue

Job No:

785236

