



Haigh Huddleston & Associates

Civil & Structural Engineering Consultants

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

t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

Geo-environmental Ground Investigation Report

ON

PROPOSED RESIDENTIAL DEVELOPMENT

AT

**Bradford Road,
Cleckheaton
West Yorkshire**

FOR

LAKELAND PROPERTIES LTD.

JUNE 2018

E18/5765/R001

INDEX

0.0	Executive Summary	Page 4
1.0	Introduction	Page 7
2.0	The Site	Page 8
3.0	Site History	Page 9
4.0	Site Geology and Mining	Page 10
5.0	Environmental Considerations	Page 11
5.1	Radon	Page 11
5.2	Landfill Sites	Page 11
5.3	Flood Risk	Page 11
5.4	Groundwater	Page 11
6.0	Preliminary Site Conceptual Model	Page 12
7.0	Fieldwork	Page 4
8.0	Results of the Investigation	Page 15
8.1	Geotechnical Investigation	Page 15
8.2	Groundwater	Page 16
8.3	Gas Monitoring	Page 16
9.0	Contamination	Page 17
9.1	Human Health Risk Assessment	Page 17
9.2	Contamination Results	Page 18
9.3	Qualitative Risk Assessment	Page 20
10.0	Conclusions and Recommendations	Page 24
10.1	Geotechnical Assessment	Page 24
10.2	Ground Floor Slab – Gas Measures	Page 25
10.3	Surface Water Drainage	Page 26
10.4	Contamination Assessment	Page 29
11.0	Suggested Further Work	Page 31

Appendix A Site Location Plan
 Trial Pit Location Plan
 Preliminary Plot Levels Drawing

Appendix B Trial Hole Logs

Appendix C Chemical Analysis of Samples

Appendix D Coal Authority Report
 Gas Testing Report

Appendix E Historical Plans

Appendix F Previous Geo-environmental Report

0.0 **EXECUTIVE SUMMARY**

SITE	The site is a rectangular shaped piece of land located to the north west of Bradford road in Cleckheaton. It lies approx. 1km south of Cleckheaton town centre. To the south and east there are existing industrial / commercial developments, whilst to the north and west there are existing residential developments. The site was previously part of the Bridon Wire Works so was previously an industrial site. The part of the works to the north has been remediated and redeveloped for residential use. The site has recently been used as an office material storage warehouse for the last 12 years. It is currently used for second-hand car sales, a storage distribution centre and a car wash. The site has a large central warehouse unit and the areas around this are a mixture of concrete slab to three sides whilst the front of the area has been covered with motorway planings to form a running surface for vehicles. The buildings and external slab areas are all connected to existing drainage systems. The site falls from west to east and from north to south. There is only a shallow fall as the site is predominantly covered by a steel framed warehouse and concreted open areas around it. There is sporadic tree growth noted on the perimeter of the site.
HISTORY	The 1907 OS Maps show the site separated from the Bridon Works by a narrow track called The Walk. The plans show only the northern section of the site developed as Pyenot cottages, the rest of the site was open fields. The 1928 plans show little more development but the western boundary shows the buildings designated as a Card Works and a small reservoir. The site changes little until 1974 when the OS Plans show the current building on the site and various paved areas around the building. Pyenot cottages have now disappeared. In 2004 the Bridon Wire works to the north of the site has been redeveloped with residential development.
GEOLOGY	Drift deposits of clays and occasional sands overlying firm to stiff clays. The underlying rock formations are the lower Coal Measures of mudstones, sand stones and silts stones. There are former small reservoir areas shown on the plans that are suspected of becoming shallow land fill areas according to environmental records. These areas were investigated in previous reports. . Some artificial strata is shown on or in the vicinity of these areas but no depths are given.

The trial pit excavations generally proved a shallow depth of stone fills beneath concrete slabs or scalplings, overlying a firm sandy clay becoming firm/stiff with depth particularly in the west of the site. No permeable strata was encountered and no ground water was encountered during the excavations.

MINING/QUARRYING The Coal Authority report states that the site is within a surface area that could be affected by past underground mining.

The property is not in an area likely to be affected by present, planned, or where they plan to approve, a license to remove or work coal by underground methods.

There are no known coal mine entries within, or within 20m of, the boundary of the property. The boreholes in this and previous site investigations did not encounter any coal seams worked or intact down to 30m below the site.

HYDROLOGY The nearest surface water features are the river Spen which runs approx. 70m to the east of the eastern boundary of the site. It runs slightly closer in the south eastern corner of the site where it passes beneath Bradford Road. The River Spen is classed as main river by the Environment Agency.

The site is shown as partially within Environment Agency flood zone 2 at the front of the site. But the rest of the site falls within a defined flood zone 1.

HAZARDOUS GAS The property is not in an area requiring radon protection measures.

Gas monitoring to date has recorded a maximum carbon dioxide concentration of 3.8% and no methane. A maximum flow rate of 1.5 l/s has been recorded. Based on these the site would have a preliminary classification of GREEN. However, the site will need ventilated slabs with subfloor ventilation and a normal DPM construction to satisfy BS 8485;2915 Table 2 requirements.

CONTAMINATION The samples of topsoils and subsoils submitted for analysis proved limited elevated levels of contaminants.

Small samples of asbestos were noted in 2 trial pits but further quantitative analysis of these samples showed that the level of asbestos was negligible and would be countermanded by the proposed clean cover capping to the site. The source of the contamination is unknown, but may be a product of previous annual bonfire held on the site.

REMEDIATION

An asbestos survey should be undertaken prior to the demolition of the existing buildings on the site and any asbestos containing material removed by a suitably qualified and certified specialist contractor.

There is no significant areas of topsoil on the site.

FOUNDATIONS

Based on the site investigations to date, we would recommend the proposed residential properties should be constructed on strip/trench fill footings founded entirely onto the firm clay strata. Where mudstone/sandstone is encountered within the excavations, the foundations should be deepened to lie entirely onto the sandstone/mudstone strata to avoid differential settlement. The foundation widths will vary dependent upon the line loadings calculated.

1.0 INTRODUCTION

- 1.1 As requested by Lakeland, this practice carried out ground and contamination investigation works to the proposed development located at Bradford Road Cleckheaton locally known as Hill Office Supplies. The site has been subject to numerous site investigations a summary of which is outlined below.
- 1.2 The purpose of the report was to:-
- 1.2.1 Identify the nature of the near surface strata, in order to enable to recommendations to be made as to the most economic foundation solution for the proposed residential properties.
 - 1.2.2 To identify any areas of contaminated ground.
 - 1.2.3 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.
 - 1.2.4 Determine if infiltration methods would be a suitable form of surface water dispersal.
- 1.3 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. It should be noted that the existing site owner has an ongoing venture at the time of the investigation works which restricted the location of the proposed window samplers and trial pits to the perimeter of the main building. Previous reports have shown the internal ground structure and these are attached to the report in the appendices.
- 1.4 The conclusions and recommendations made in this report are limited to the findings of this Geotechnical Survey and those noted in previous reports. 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 window samples, which have not been revealed by the investigation.
- 1.5 Any opinion given on the possible configuration of strata between trial pit and window sample 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.

- 1.6 Furthermore, there is the possibility that any trial pits or window samples 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 window samples.

2.0 THE SITE

- 2.1 The site is located to the west of Bradford Road, Cleckheaton, West Yorkshire and is situated around Ordnance Survey grid reference 419460, 424840. A site location plan is included in Appendix A.
- 2.2 The site is rectangular in shape and is located on the edge of a residential area and a light industrial area. . There is vehicle access direct from Bradford Road on the eastern boundary. To the north and west there are existing residential developments, formed from the Bridon Wire Works. To the south and east are light industrial developments. The overall site area to be developed is approximately 4ha.
- 2.3 The site has recently been used as an office material storage warehouse for the last 12 years. It is currently used for second-hand car sales, a storage distribution centre and a car wash. The site has a large central warehouse unit and the areas around this are a mixture of concrete slab to three sides whilst the front of the area has been covered with motorway planings to form a running surface for vehicles. The buildings and external slab areas are all connected to existing drainage systems. There is evidence of previous buildings on site with the brickwork walls still in evidence on site in localised areas,
- 2.4 The site banks down from west to east with site levels determined by the floor levels of the main building. The floor levels of the main building are 71.6m. There is a high point of approximately 73m AOD in the north west corner of the site of the site and a low point of approximately 69.0m AOD in the south corner of the site.

3.0 SITE HISTORY

A number of historical Ordnance Survey plans from 1885-2014 have been consulted. These are contained for reference within Appendix E to the rear of the report. Below is a brief description outlining the significant developments that may affect future construction of the site.

Date	Historical uses on site	Historical findings within 100m perimeter of the site	Historical findings further than 100m perimeter of the site
1885-1974	i) Buildings associated with the Bridon Wire works or more specifically the Card works are shown on the North west corner of the site. Pyenot cottages are shown on the northern boundary. There are two or three areas showing as Reservoirs that correspond with suspected infill sites. The remaining site area is shown as fields. The Bridon Works are separated from this site by a small track named as the Walk.	i) There are industrial works to the north including a former gasworks	i) The River Spen is located approximately 100m east west of the site.
1974 to 2004	i) The on-site features change to incorporate the existing warehouse building nominated as the Strand Plant. are similar to the previous sheet.		
2004	i) The on-site features are similar to the previous sheet.	i) The former Bridon works are remediated and redeveloped for Residential development.	i) No significant developments 100-500m from site.

4.0 SITE GEOLOGY & MINING

- 4.1 The BGS Digital Geological Map of Great Britain at 1:50,000 scale has been consulted and we would report as follows:-
- 4.2 No artificial strata is shown on or in the vicinity of the site. However, possible infilling to small mill reservoirs are recorded immediately west of the site and possibly on the southern boundary of the site.
- 4.3 The entire site is shown to be overlain by superficial strata consisting of clays and alluvial deposits. The underlying geology is The Lower Coal measures consisting of Mudstones, sandstones and silt stones.
- 4.5 There are no fault lines shown in the vicinity of the site.
- 4.6 The Coal Authority Report has been obtained and is included in Appendix D. This states that the property is within the zone of likely physical influence on the surface from past underground workings.
- 4.7 The property is not in an area for which the Coal Authority is determining whether to grant a license to remove coal using underground methods. The property is not in an area for which a license has been granted to remove or otherwise work coal using underground methods. However, reserves of coal exist in the local area which could be worked at some time in the future.
- 4.8 There are no known coal mine entries within, or within 20 metres of, the boundary of the property.
- 4.9 There are no subsidence claims within 50 metres of the site.

5.0 ENVIRONMENTAL CONSIDERATIONS

5.1 Radon

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 necessary.

5.2 Landfill Sites

There are recorded historical landfill sites shown within 500m of the site which have previously been investigated.

5.3 Flood Risk

The majority of the site falls within Flood Zone 1 as defined by the Environment Agency. The front portion of the site may fall within flood zone 2.

The site is not in an area recorded to be susceptible from groundwater flooding within the superficial deposits.

A Flood Risk Assessment has been prepared for the site, and this should be consulted for a detailed analysis of the flood risk to the development.

5.4 Groundwater

The superficial strata overlying the site are classified as Secondary (A) Aquifers. 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 bedrocks underlying the site are classified as Secondary (B) Aquifers. These are predominantly lower permeability layers which may store/yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers

There are no groundwater abstraction licences recorded within 250m of the site.

The nearest surface water features are then river spen some 100m to the east of the site. The River Spen at this point is classed as main river by the Environment Agency.

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) Construction materials within existing buildings on site.
 - ii) Possible made ground used in levelling the nurseries in the west 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 female).
- 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 Users</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 The risk of pollution to controlled waters by existing contamination is considered low. The site is overlain by superficial strata that is classified as a Secondary (A) Aquifer with bedrock classified as a Secondary (B) aquifer. The nearest surface water feature is an un-named watercourse on the eastern boundary of the site. The historical plans show no obvious sources of potential contamination, however care should be taken during construction to ensure no contamination from building works enters the watercourse.
- 6.9 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.
- 6.10 The proposed planning drawings indicate residential properties with private garden areas to be constructed. 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 Site investigation works were undertaken using a JCB 3CX with back actor and 600mm wide bucket during 2017. A total of fifteen trial pits were undertaken to enable soil sampling to be undertaken. The location of the trial pits and window samples are indicated on the plan in the Appendices. In view of the previous information available on the site the location of the trial pitting and testing was designed to confirm the findings of previous reports.
- 7.2 Materials encountered in the trial pits and window samples were examined and categorised. Trial pit sample logs are contained within Appendix B of the report.
- 7.5 Soil samples were removed from the natural and made 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.
- 7.6 A total of samples from the natural and made 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.
- 7.7 A full range of common metal and inorganic contaminants were tested for as well as Total TPH and asbestos from the natural and made ground samples.
- 7.8 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 window sample logs providing a complete record of strata encountered beneath the proposed development is presented in Appendix B.
- 8.1.2 The trial pit excavations generally proved a concrete slab of hardcore running surface over lying at shallow depth of a firm sandy clay becoming darker and firm/stiff with depth in the east of the site.
- 8.1.3 The surface of all the trial pits except TP06 consisted of shallow fills beneath concrete slabs or tarmacadam road plans. In some trial pits remnants of old buildings were found particularly on the northern edge of the site. The trial pits also showed a shallow inert refuse on the southern edge of the site consistent with possible refuse use on the site as infill to old reservoirs. It was noted to contain made ground material including gravels, pottery, plastic and some brick fragments.
- 8.1.4 Beneath the top surface of concrete slabs and fills there was a soft to firm light brown sandy clay that was noted to contain sandstone gravels in all of the trial pits. The thickness of clay varied from 0.45m to 1.85m across site.
- 8.1.5 Beneath this layer over the whole site was a second layer of firm to stiff dark brown clay.

8.2 GROUNDWATER

- 8.2.1 Groundwater was not encountered in the trial pits undertaken on.
- 8.2.2 During the drilling operations groundwater was encountered in three window samples at a depth of 1.0m below existing ground levels. During the gas monitoring, groundwater has been recorded at depths of 0.8m to 1.2m below existing ground levels.
- 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 this investigation.

8.3 GAS MONITORING

- 8.3.1 As discussed previously a further 5 boreholes were installed with gas standpipes and lockable covers. Gas testing has been undertaken on site and to date the wells have been monitored on four occasions.
- 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 is included within the report attached to this report in appendix.
- 8.3.4 A maximum carbon dioxide concentration of 3.80% was recorded and no methane on site. A maximum flow rate of 1.5 l/hr was recorded.
- 8.3.5 The readings undertaken were during both falling and rising atmospheric pressure conditions.
- 8.3.6 The gas monitoring would indicate that the site may be classified as Green.

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 the CLEA SGV's for residential use with plant uptake, as these are considered to be the most suitable guidelines to protect the most critical targets from contaminants via all possible exposure routes.
- 9.2.4 Where no CLEA SGV has been published, Generic Assessment Criteria (GAC) based on guidelines from the Chartered Institute of Environmental Health (CIEH) and Land Quality Management Ltd (LQM) S4UL document residential land use with plant uptake has been used. Where there is no GAC, guidance limits have been adopted from sources referenced in the table below.

- 9.2.5 A new approach has now been adopted for the calculation of SGV based on an acceptably low level of risk. 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.
- 9.2.6 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.
- 9.2.7 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.
- 9.2.8 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)	6 -67	3/20	
Cadmium	22 (4)	0.2-3.3	0/20	
Chromium	130 (2)	14-45	0/20	
Lead	200 (4)	<0.3-2300	8/20	
Mercury (Total)	1.2 (1)	<0.05-2	2/20	
Selenium	250 (1)	<0.5-1.1	0/20	
Copper	2400 (1)	20-150	0/20	
Nickel	180 (1)	17-54	0/20	
Zinc	3700 (1)	69-3900	120	
Sulphate	0.24 (3)	<0.01-0.18	0/20	
Thiocyanate	50	<0.6-15	0/20	
Sulphide	250	20-36	0/20	

Naphthalene	2.3 (1)	<0.1-13	1/20
Benzo(a)pyrene	5 (4)	<0.1-15	2/20
PAH (Total)	40	<1.6-220	1/20
Phenols	280 (1)	<0.3-1.4	0/20
Asbestos	No fibres	some	2/20
pH	6-8	7.2-10.3	9/20

(1) Copyright Land Quality Management Ltd reproduced with permission; Publication Number S4UL3499. All rights reserved.

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

(3) BS 8110 1985 Table 6.1

(4) Category 4 Screening Levels

9.2.9 Isolated samples showed elevated levels of heavy or phytotoxic metals were recorded in the samples taken from site. There was high levels of lead in 8 of the 20 samples taken with a peak value of 2300 in TP3 at a depth of 1.35m. Similarly the readings for Zinc were elevated to 3900 in TP9. These are to be expected from a wire treatment works and are generally at depth of 0.6m or more below existing ground levels. The linkage to these contaminants would be broken by leaving the material in place and the use of a 600mm thick clean fill beneath garden and public open space areas.

9.2.10 No elevated levels of PAH compounds were recorded in the samples taken from site. There was however an isolated elevated level of Benzo(a) pyrene noted in

9.2.11 Some isolated fibres of asbestos were detected in two of the samples taken in TP3. This was the only samples showing signs of asbestos and this was noted as being beneath a former annual bonfire site. Further quantitative analysis of the samples showed these to be of very low in volume and again would be controlled by the use of a clean capping of 600mm depth. Site operatives should wear appropriate PPE when working in the vicinity of TP3 and any further discoveries notified to the engineers as soon as possible if they are encountered.

9.2.12 No elevated levels of sulphate were recorded in the samples taken from site, therefore a design sulphate class DS-1, ACEC class AC-1, when compared against the BRE Special Digest 1 "Concrete in aggressive ground". The ground does however show an elevated PH value over 40% of the samples taken. These are unlikely to affect buried concrete or apparatus in the site area.

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) Elevated levels of some contaminants were recorded on site.

9.3.3 **PATHWAYS**

- i) Ingestion of contamination material.
- ii) Inhalation of contaminated particles.
- iii) Dermal contact with the known contamination.

9.3.4 **RECEPTORS**

- i) Residential end users.
- ii) Construction and maintenance workers.
- iii) The building structure.

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

i) Residential end users.

Based on the chemical results obtained it is considered that there is currently a **medium to high** risk to end users from localised ground contamination on-site if no remediation carried out.

Localised elevated levels of heavy or phytotoxic metals were recorded in the samples taken from site.

No elevated levels of PAH (Total) was recorded in the samples taken from site.

Whilst fibres of asbestos were detected in the samples submitted for analysis these have been shown to be below risk levels if left insitu.

An asbestos survey should be undertaken on the existing buildings prior to any demolition works commencing. Any asbestos containing materials identified should be removed from site prior to demolition works commencing by a suitably qualified and specialist contractor.

It is not anticipated that additional topsoil and subsoil will need to be imported to site. It may be possible to source some of this material from on-site by digging borrow pits but the wide levels of low level contamination may make this un-feasible. Prior to construction work commencing on site.

All materials to be brought on to site should be subject to a contamination screen and testing prior to delivery to site and also prior to laying on site. Further testing will be required to provide a robust sampling base for the topsoil to confirm it's suitability for use. Prior to being laid on site, the imported topsoil should be screened to remove any unsuitable material.

A maximum carbon dioxide concentration of 3.80% was recorded but no methane was encountered on site. A maximum flow rate of 1.5 l/hr was recorded. The gas monitoring has shown that there is a low risk of gas on site. At present the results would indicate that the site may be classified as Green.

ii) Construction and Maintenance Workers.

It is considered that there is a **medium** risk to construction and maintenance workers from the redevelopment of the site. The elevated levels of heavy metals and a high PH may cause problems with dermal contact and employees should all utilise appropriate Personal Protection equipment. All site personnel should be made aware of the possible harmful effects at a site induction prior to entering the site.

Any asbestos containing materials identified in the asbestos report should be removed from site by specialist contractors prior to demolition and construction work commencing on site. Ongoing inspection for asbestos fibres should be maintained throughout the construction phase of the works.

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

There were elevated levels of contaminants identified during the site investigation works undertaken to date. However, there is a watercourse close to the low point of the site on the eastern boundary. Protection works should be undertaken to the eastern boundary prior to work commencing on site to prevent contaminants from construction works entering the watercourse through surface water run-off. The possibility of existing contaminants leaching is considered **low**.

iv) Building Structures.

No elevated levels of sulphate were recorded in the samples taken from site, therefore a design sulphate class DS-1, ACEC class AC-1, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

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.

10.0 CONCLUSIONS AND RECOMMENDATIONS

10.1 GEOTECHNICAL ASSESSMENT

- 10.1.1 The fieldwork generally proved firm clays overlying stiff clays with a mudstone bedrock. For initial design purposes we would envisage a safe bearing capacity of 100kN/m² where foundations are to be cited onto the firm/stiff sandy clay material or sands and 150kN/m² where the foundations are extended onto the mudstone/sandstone bedrock.
- 10.1.2 We would therefore suggest that the proposed two storey traditional house construction should be constructed on strip/trench fill footings founded entirely onto the firm clay. If mudstone/sandstone strata is encountered within the foundation excavation then the entire footing should be deepened and constructed off the mudstone/sandstone strata to avoid potential differential settlement. The foundation widths will vary dependent upon the line loadings calculated.
- 10.1.3 Foundations should be deepened where constructed adjacent to boundary retaining walls or existing buildings, to prevent any lateral forces being exerted on the retaining structure.
- 10.1.4 The plot foundations should be constructed in accordance with NHBC Standards Chapter 4.2 "Building Near Trees". Designs should cater for previous, existing or proposed trees adjacent to the plot foundations where sited in shrinkable soils. In particular, the plots in the centre of the site are situated above the hedge dividing the fields and existing trees which will result in localised deeper foundations. In these cases the foundation depths should be increased in accordance with NHBC Standards Chapter 4.2. Plasticity testing has found the clays to be of high volume change potential.
- 10.1.5 Particular care will also need to be exercised with any new landscape and planting proposals with their effects on the new foundations being considered prior to planting.
- 10.1.6 All foundations should be placed below a line of 45deg drawn up from the base of any services or other structures.

- 10.1.7 If any 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.
- 10.1.8 Due to the high groundwater table, and instability noted within the trial pits, extra caution should be taken to prevent collapse during excavation works, particularly in the nursery/western area of the site. Support should be considered for excavations which are to be left open for longer periods.
- 10.1.9 Furthermore, consideration should be given to pouring the trench foundations in discrete sections to minimise the extent of open excavations, with an overlaid capping beam.
- 10.1.10 No elevated levels of sulphate were recorded in the samples taken from site, therefore a design sulphate class DS-1, ACEC class AC-1, when compared against the BRE Special Digest 1 "Concrete in aggressive ground".

10.2 GROUND FLOOR SLAB – GAS MEASURES

- 10.2.1 Monitoring stations have been installed on site primarily to measure the gas concentrations have been undertaken.
- 10.2.2 The gas testing results obtained have proved max concentration of carbon dioxide of 3.8% and no methane. At present the results would indicate that the site may be classified as Green. Gas measurements are on-going and will be reported on in due course.
- 10.2.3 Radon protection measures are not required for the site.
- 10.2.4 A ventilated suspended precast concrete or cast insitu concrete floor with ventilation systems should be used together with a min 1200g DPM. In addition where the foundations are subject to the influence of trees a suspended floor is also required.

10.3 Previous site investigations on this site.

10.3.1 FKI Plc provided previous site investigation reports. These have been reviewed and assessed with a summary of key findings provided in this section of the report. The findings of the previous investigations, relating to the site have been combined with the findings of the recent Willis site investigation (September 2001) in order to form the overall site assessment which will be provided in this report.

10.3.2 "Environmental Review-Bridon International's Cleckheaton Site (North)", June 1997. Aspinwall and Company Ltd, Ref TRX 0603E. FKI Plc commissioned this report. The area subject to this review was not Area C but the area to the north (Area A and Area B). The review comprised a desk study and site visit with no site investigation, sampling or laboratory testing. As such its aim was to assess potential contamination issues at the site. Although not directly relevant to Area C the report does provide relevant information of the site history, ground conditions at the site (geological records) and site processes of the Mill in general. The report concluded that there were sources of potential contamination in area north of area C. Although there were no local groundwater abstraction points the risk to groundwater from site derived contamination was considered "moderately high" and risk to surface water was "moderate". Improved housekeeping measures were recommended in addition to a site investigation to assess the potential contamination.

10.3.3 "Site Investigation at the Bridon Wire Site in Cleckheaton, West Yorkshire", September 1997, Aspinwall and Company Ltd., Ref MHB Sep97 I BR8302A
Following on from the above desk study, this investigation focused on the area north of Area C. A total of 16 shell and auger boreholes and 3 rotary core boreholes, for deep groundwater monitoring, were completed. Two of the rotary core boreholes (BH Band BH C) were located along the northern boundary of Area C and drilled to depths of 15.25m below ground level (bgl) and 12m bgl into the underlying sandstone and mudstone. Information associated with these two boreholes i.e. soil description, groundwater levels, analysis data etc will be incorporated into the Area C risk assessment in Section 7.0 of this report.
The report concluded that the risk of liability was "low to moderate" and "unlikely to be considered 'Contaminated Land'" under statutory legislation i.e. the possibility of the Local Authority serving a remediation notice was unlikely. Following the investigation, the risk to groundwater and surface water from site derived

contamination was unlikely to be significant. This is of relevance to Area C when considering the potential risk of contamination migrating from off site sources that would appear to be limited. The report indicated the groundwater flow within the Sandstone at depth was considered to be in a northeasterly direction. Localised areas contamination were encountered and further investigation was recommended.

- 10.3.4 "A Supplementary Ground Investigation at Site B, Bridon International, Cleckheaton, West Yorkshire", February 1999, Willis Corroon Hinton Ltd, This investigation was commissioned by Weatherall Green & Smith and FKI Plc covering Area A and Area B of the Bridon Mills site. Three trial pits and four deep groundwater monitoring wells were installed in the north west part of Area B together with additional groundwater sampling from existing wells. This included sampling and analysis for groundwater sample from BH C located along the northern boundary of Area C. This information will be used as part of the overall Area C risk assessment in Section 7.0 of this report.

The report concluded that "little groundwater impact has occurred as a results of site activities" and any soil contamination present was localised, shallow and limited to heavy metals and sulphate. There was no evidence to suggest significant contaminant migration.

- 10.3.5 "A Supplementary Ground Investigation Re: Site B & C Bridon International, Cleckheaton, West Yorkshire" July 1999, Willis Ltd., Ref 027328 . This investigation was commissioned by Asda Stores Ltd who were proposing to purchase Area Band C. A total of eight trial pits and three groundwater monitoring boreholes were completed. Six of these trial pits were located, and all of the boreholes, were located within Area C. Like Area B, widespread contamination of Area C was not evident. Localised elevated heavy metals and sulphates were encountered within shallow soil samples with no evidence of migration or similar levels occurring at depth.

- 10.3.6 Additional data came to light that showed areas on landfill south and west of the Strand Plant building. Gas monitoring had taken place by the local authority in the early 1990s and no significant levels of landfill gas were encountered. No gas monitoring took place as part of the investigation and the report stated that further investigation was recommended to determine the nature and extent of fill material. The report concluded that there were a "number of gaps" in information regarding Area C compared to Area B that had been subject to various investigations. The immediate environmental risks were considered not to be high under current

conditions but further details were required in Area C and made recommendations for further works.

10.3.7 "Report on Ground Investigation Work carried out for a proposed ASDA Store at Cleckheaton, West Yorkshire" January 2000, DTS Geotechnical & Environmental Engineering, Ref DTS 7161. This report was commissioned by ASDA Stores Ltd and comprised two shell and auger boreholes (within Area B), seven window sampling boreholes (Area C) and seven trial pits (Area C). None of the bore holes were converted to monitoring wells. The seven window sampling boreholes were located around the outside perimeter of the Strand Plant building. Five of the trial pits were excavated within the areas of landfill. Access into the Strand Plant building was restricted therefore no drilling took place within building. Ground conditions encountered within the infilled areas comprised fill material (clay, sand, gravel with brick and concrete fragments) to depths of between 1.00m bgl and 1.50m bgl overlying naturally occurring Clay. No odours or perched water was encountered during the investigation. According to the investigation, no biodegradable material such as paper, wood, vegetation was present within the fill material. This will significantly limit the potential for methane gas to be produced. A number of soil samples were analysed with elevated heavy metals values (arsenic and lead) found to be concentrated within the samples from the landfill areas. Samples tested from the underlying Clay did not show significant level of those heavy metals suggesting that migration is limited. No groundwater samples were taken, or analysed, from Area C. The investigation partly filled the "gaps" indicated in the Willis report of 1999. However information is outstanding relating to ground conditions beneath the Strand Plant building, groundwater conditions (sampling and testing) and gas monitoring of the landfill areas. The current investigation by Willis (Sep 2001) aims to address these outstanding issues.

10.3.8 In November 2002 Barratt Leeds Ltd commissioned a Preliminary Report on Contamination and a Remediation Strategy for the Bridon Wire Works Site immediately to the north of the current site from Haigh Huddleston and Associates Ltd SR 2213/2002. This outline the major contamination of the main works and former gasometer site to the north of the current site. The major heavy metal contamination and problems from former acid baths were all recorded and a simple remediation strategy of a fill capping installed on site including borrow pits to source clean materials.

10.4 CONTAMINATION ASSESSMENT

- 10.4.1 The trial pit excavations generally proved a shallow depth of a variety of materials overlying a sandy firm clay becoming firm/stiff with depth in the east of the site. Contamination was in isolated hot spots but extended into the underlying subsoils from the previous industrial use.
- 10.4.2 Elevated levels of heavy or phytotoxic metals were recorded in isolated trial pits. The samples taken from site showed a general low level contamination with occasional hotspots that would be difficult to define.
- 10.4.3 No elevated levels of PAH compounds were recorded in the samples taken from site.
- 10.4.4 Some fibres of asbestos were detected in two of the samples taken but found to be of low significance under quantitative analysis. Leaving the material insitu and providing a clean capping will resolve this problem.
- 10.4.5 An asbestos survey should be undertaken on the existing buildings and any asbestos containing materials identified should be removed from site prior to demolition works commencing by a suitably qualified and specialist contractor.
- 10.4.6 Protection works should be undertaken to the eastern boundary prior to work commencing on site to prevent contaminants from construction works entering the watercourse through surface water run-off.
- 10.4.7 Prior to delivery to site all the subsoils and topsoil should be analysed to prove its suitability for use in the remediation works. Further testing will be required on site to provide a robust sampling base for the topsoil to confirm its suitability for use. Prior to being relaid on site, the topsoil should be screened to remove any unsuitable material.
- 10.4.8 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.

- 10.4.9 It is not currently anticipated that any topsoil will be required to be imported to site based on the currently available information. However, should any material need to be imported, all imported material should be tested for the range of contaminants listed previously in table 4. Only material found to be below published trigger levels should be deemed uncontaminated and accepted for use on site.
- 10.4.10 If the imported material is from a Greenfield site, a minimum of 3 samples or 1 per 250m³ of imported material should be taken for testing, whichever is greater. If it is from a brownfield site, a minimum of 6 samples, or 1 per 100m³ of imported material should be taken for testing, whichever is greater. Material provided by a commercial supplier should be certified to the same level of testing, with the certificate less than two months old.
- 10.4.11 All imported certified material should be placed immediately. If this is not possible, or the material is not certified and sampling is to be carried out prior to being laid, it should be securely stored on site prior to use to prevent possible contamination from any materials on site.
- 10.4.12 If any areas of made ground are removed off site, they should be taken to a licensed waste site and full documentation should be obtained. Any material to be taken off-site should be suitably quarantined prior to removal to prevent cross contamination. Any relevant chemical test results should be given to the landfill operator, so that they can determine if this material is suitable to be disposed of in their licensed landfill.
- 10.4.13 Following completion of the remediation, shallow trial pits should be excavated to the top of the capping layer by an independent consultant to confirm the capping layer thickness. All site records and results of the shallow trial pits should be consolidated into a validation report.
- 10.4.14 The proposed remediation works will consist of laying a 600mm thick layer of clean subsoils and top soils over garden areas and public open spaces on site. This will be sufficient to break the linkage from the identified contaminants on site to the future residents on site. Site operatives should utilise PPE equipment on site and site disturbance should be kept to minimum.

11.0 SUGGESTED FURTHER WORK

- 11.1 Asbestos survey to be undertaken on existing buildings and all asbestos containing materials removed from site prior to demolition of buildings.
- 11.2 Following the demolition of the existing properties and breaking up of areas of hardstanding on site, further investigation works may be required to determine any areas of localised contamination that may need to be removed from site.
- 11.3 The proposed in filling materials should be tested off site prior to delivery on site and again prior to laying on site. Further validation of the depth of the capping layers should be carried out once they have been laid. This can be carried out on a piece meal basis on a testing ratio of 1 hole for every three plots. Further testing should be undertaken to provide a robust sample set confirming its suitability for use on site.

12.0 APPROVALS

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

These include:

- a) Kirklees MDC Environmental Health Department as required by the building and planning regulations.
- b) The NHBC or similar warranty provider 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

T. Haigh. BSc.,C.Eng.M.I.C.E.

May 2018

This report is subject to the provisions of the Copyright Acts and is for the sole benefit of Lakeland Properties Ltd for the limited use to the site proposals described.

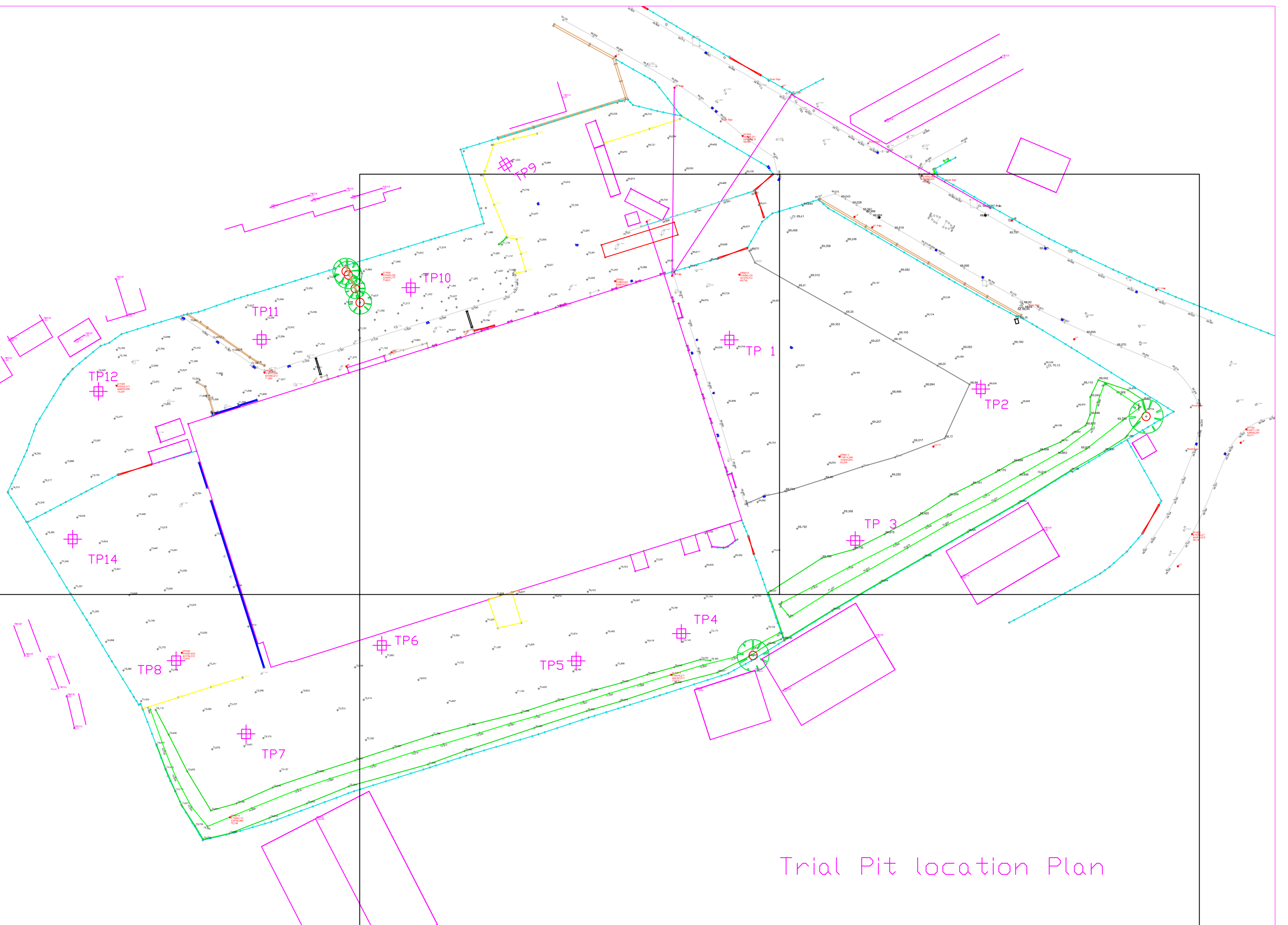
APPENDIX A

Site Location Plan

Trial Pit Location Plan

Preliminary Plot Levels Drawing







Haigh Huddleston & Associates
Civil Structural Engineering Consultants

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

t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 10

Client :	LAKELAND PROPERTIES	Job No :	5765
Site :	Hill Supplies, Dewsbury Road, Cleckheaton	Date :	January 2018

0.0		
	0.1	Topsoil.
		Brick and ash rubble.
0.5		
		Sample taken at 0.8m.
1.0		
	1.2	
		Firm stiff clay.
1.5		
	1.8	
2.0		
2.5		
3.0		
3.5		
4.0		

REMARKS:

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

NOTES:

.....
.....



Haigh Huddleston & Associates
Civil Structural Engineering Consultants

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

t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 11

Client :	LAKELAND PROPERTIES	Job No :	5765
Site :	Hill Supplies, Dewsbury Road, Cleckheaton	Date :	January 2018

0.0		
	0.2	Topsoil.
0.5		Firm light brown silty clay.
	0.8	
1.0		Firm mottled grey brown silty clay.
1.5		
2.0		
	2.1	
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:

.....
.....



Haigh Huddleston & Associates
Civil Structural Engineering Consultants

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

t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 12

Client :	LAKELAND PROPERTIES	Job No :	5765
Site :	Hill Supplies, Dewsbury Road, Cleckheaton	Date :	January 2018

0.0

0.5		
	0.6	Topsoil. Brick and ash rubble fill.
1.0		Dark grey ash fill
	1.2	
1.5		Firm dark brown silty clay.
2.0		
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:

.....
.....



Haigh Huddleston & Associates
Civil Structural Engineering Consultants

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

t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 14

Client :	LAKELAND PROPERTIES	Job No :	5765
Site :	Hill Supplies, Dewsbury Road, Cleckheaton	Date :	January 2018

0.0		
	0.25	Reinforced concrete.
0.5		Stone and ash fill.
	0.6	
1.0		Firm grey yellow mottled clay.
1.5	1.5	End of trial pit.
2.0		
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:

.....
.....



Haigh Huddleston & Associates
Civil Structural Engineering Consultants

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

t 01924 464342
f 01924 450662
e trevor.haigh@haighhuddleston.co.uk

FORM HHA 5

TRIAL HOLE NO. 15

Client :	LAKELAND PROPERTIES	Job No :	5765
Site :	Hill Supplies, Dewsbury Road, Cleckheaton	Date :	January 2018

0.0		
	0.15	Reinforced concrete.
	0.6	Limestone brick rubble.
0.5		
	1.5	Soft to firm light brown clay.
1.0		
1.5	1.5	End of trial pit.
	4.0	
2.0		
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:

.....
.....

APPENDIX C

Chemical Analysis of Samples



Certificate of Analysis

Certificate Number 17-06959-1

14-Aug-17

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

Our Reference 17-06959-1

Client Reference 5765

Order No (not supplied)

Contract Title Hills Supplies

Description 14 Soil samples.

Date Received 03-Aug-17

Date Started 03-Aug-17

Date Completed 14-Aug-17

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

Notes **This report supersedes 17-06959. Extra testing.**

Opinions and interpretations are outside the laboratory's scope of ISO 10725 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



Adam Fenwick
Contracts Manager





Summary of Chemical Analysis

Matrix Descriptions

Our Ref 17-06959-1

Client Ref 5765

Contract Title Hills Supplies

Sample ID	Depth	Lab No	Completed	Matrix Description
TP01	0.4	1212779	09/08/2017	Brown gravelly, sandy CLAY
TP01	0.9	1212780	09/08/2017	Dark brown gravelly, sandy CLAY (Made ground - brick)
TP02	0.6	1212781	09/08/2017	Dark brown gravelly, sandy CLAY
TP02	1.8	1212782	09/08/2017	Brown gravelly, sandy CLAY
TP03	0.35	1212783	09/08/2017	Dark brown gravelly, sandy CLAY (Made ground - brick)
TP03	1.35	1212784	09/08/2017	Dark brown gravelly, sandy CLAY
TP04	0.3	1212785	09/08/2017	Dark brown gravelly, sandy CLAY
TP04	0.8	1212786	09/08/2017	Dark brown gravelly, sandy CLAY
TP05	0.6	1212787	09/08/2017	Dark brown gravelly, sandy CLAY (Made ground - brick)
TP05	1.3	1212788	09/08/2017	Brown gravelly, sandy CLAY
TP06	0.45	1212789	09/08/2017	Brown gravelly, clayey SAND (Made ground - brick)
TP07	0.6	1212790	09/08/2017	Brown gravelly, sandy CLAY
TP07	0.9	1212791	09/08/2017	Brown gravelly, sandy CLAY
TP07	1.2	1212792	09/08/2017	Brown gravelly, sandy CLAY

Summary of Chemical Analysis

Soil Samples

Our Ref 17-06959-1

Client Ref 5765

Contract Title Hills Supplies

Lab No	1212779	1212780	1212781	1212782	1212783	1212784
Sample ID	TP01	TP01	TP02	TP02	TP03	TP03
Depth	0.40	0.90	0.60	1.80	0.35	1.35
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	27/07/17	27/07/17	27/07/17	27/07/17	27/07/17	27/07/17
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Asbestos Quantification	DETSC 1102	0						Y	Y
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	6.0	67	14	11	29	30
Cadmium	DETSC 2301#	0.1	mg/kg	0.2	0.4	0.2	0.2	0.8	3.3
Chromium	DETSC 2301#	0.15	mg/kg	20	21	20	21	33	45
Copper	DETSC 2301#	0.2	mg/kg	20	100	75	32	93	150
Lead	DETSC 2301#	0.3	mg/kg	< 0.3	1100	290	27	7000	23000
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.48	0.95	0.05	1.3	2.0
Nickel	DETSC 2301#	1	mg/kg	21	26	20	27	32	42
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.1	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	69	120	110	84	230	380
Inorganics									
pH	DETSC 2008#			9.5	7.3	8.5	8.2	8.3	8.4
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	6.5	< 0.6	< 0.6	2.7	0.8
Sulphide	DETSC 2024*	10	mg/kg	32	24	20	36	28	24
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.04	0.11	0.05	0.03	0.08	0.13
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	< 1.0	13	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 1.0	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 1.0	7.5	< 0.1	< 0.1	< 0.1	0.4
Fluorene	DETSC 3301	0.1	mg/kg	< 1.0	5.9	< 0.1	< 0.1	0.1	0.3
Phenanthrene	DETSC 3301	0.1	mg/kg	< 1.0	37	0.5	< 0.1	0.6	2.3
Anthracene	DETSC 3301	0.1	mg/kg	< 1.0	8.2	0.2	< 0.1	0.2	0.8
Fluoranthene	DETSC 3301	0.1	mg/kg	< 1.0	36	0.8	< 0.1	0.8	3.1
Pyrene	DETSC 3301	0.1	mg/kg	< 1.0	30	0.7	< 0.1	0.8	2.7
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 1.0	14	0.5	< 0.1	0.5	1.5
Chrysene	DETSC 3301	0.1	mg/kg	< 1.0	16	0.4	< 0.1	0.4	1.3
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 1.0	9.9	0.4	< 0.1	0.3	1.0
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 1.0	6.1	0.2	< 0.1	0.2	0.6
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 1.0	15	0.5	< 0.1	0.6	1.6
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 1.0	8.5	0.1	< 0.1	< 0.1	0.9
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 1.0	1.1	< 0.1	< 0.1	< 0.1	0.2
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 1.0	6.9	0.2	< 0.1	< 0.1	0.8
PAH Total	DETSC 3301	1.6	mg/kg	< 16.0	220	4.4	< 1.6	4.5	18
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.6	< 0.3	< 0.3	< 0.3	< 0.3



Summary of Chemical Analysis

Soil Samples

Our Ref 17-06959-1

Client Ref 5765

Contract Title Hills Supplies

Lab No	1212785	1212786	1212787	1212788	1212789	1212790
Sample ID	TP04	TP04	TP05	TP05	TP06	TP07
Depth	0.30	0.80	0.60	1.30	0.45	0.60
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	27/07/17	27/07/17	27/07/17	27/07/17	27/07/17	27/07/17
Sampling Time	n/s	n/s	n/s	n/s	n/s	n/s

Test	Method	LOD	Units						
Asbestos Quantification	DETSC 1102	0							
Metals									
Arsenic	DETSC 2301#	0.2	mg/kg	11	67	19	12	14	13
Cadmium	DETSC 2301#	0.1	mg/kg	0.4	0.6	0.7	< 0.1	1.7	0.5
Chromium	DETSC 2301#	0.15	mg/kg	14	25	19	22	14	19
Copper	DETSC 2301#	0.2	mg/kg	46	100	150	35	47	30
Lead	DETSC 2301#	0.3	mg/kg	620	1200	680	< 0.3	74	7.0
Mercury	DETSC 2325#	0.05	mg/kg	0.47	0.95	1.1	0.08	0.11	< 0.05
Nickel	DETSC 2301#	1	mg/kg	17	25	24	14	18	18
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	1.8	0.6	0.5	< 0.5	0.7
Zinc	DETSC 2301#	1	mg/kg	200	180	1700	53	130	86
Inorganics									
pH	DETSC 2008#			10.3	7.7	8.6	7.7	10.0	7.0
Thiocyanate	DETSC 2130#	0.6	mg/kg	1.1	15	1.4	1.0	< 0.6	0.8
Sulphide	DETSC 2024*	10	mg/kg	20	28	32	24	20	28
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.10	0.11	0.17	0.03	0.18	0.05
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	0.8	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	0.1	0.8	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	0.2	0.6	0.8	< 0.1	0.5	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.1	0.2	0.3	< 0.1	0.2	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	0.3	1.2	1.5	< 0.1	1.0	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	0.4	1.0	2.8	< 0.1	0.7	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	0.5	< 0.1	< 0.1	0.4	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	0.6	< 0.1	< 0.1	0.3	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.4	< 0.1	< 0.1	0.3	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	0.2	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	0.6	< 0.1	< 0.1	0.4	< 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 Total	DETSC 3301	1.6	mg/kg	< 1.6	5.5	7.1	< 1.6	3.9	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.6	1.4	< 0.3	< 0.3	< 0.3

Summary of Chemical Analysis

Soil Samples

Our Ref 17-06959-1
 Client Ref 5765
 Contract Title Hills Supplies

Lab No	1212791	1212792
Sample ID	TP07	TP07
Depth	0.90	1.20
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	27/07/17	27/07/17
Sampling Time	n/s	n/s

Test	Method	LOD	Units		
Asbestos Quantification	DETSC 1102	0			
Metals					
Arsenic	DETSC 2301#	0.2	mg/kg	12	8.7
Cadmium	DETSC 2301#	0.1	mg/kg	0.3	0.1
Chromium	DETSC 2301#	0.15	mg/kg	19	21
Copper	DETSC 2301#	0.2	mg/kg	32	18
Lead	DETSC 2301#	0.3	mg/kg	1.3	< 0.3
Mercury	DETSC 2325#	0.05	mg/kg	< 0.05	0.05
Nickel	DETSC 2301#	1	mg/kg	38	12
Selenium	DETSC 2301#	0.5	mg/kg	0.9	< 0.5
Zinc	DETSC 2301#	1	mg/kg	110	52
Inorganics					
pH	DETSC 2008#			7.9	7.8
Thiocyanate	DETSC 2130#	0.6	mg/kg	< 0.6	< 0.6
Sulphide	DETSC 2024*	10	mg/kg	32	36
Sulphate as SO ₄ , Total	DETSC 2321#	0.01	%	0.03	0.03
PAHs					
Naphthalene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	< 1.6	< 1.6
Phenols					
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	< 0.3

Summary of Asbestos Analysis

Soil Samples

Our Ref 17-06959-1

Client Ref 5765

Contract Title Hills Supplies

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1212779	TP01 0.40	SOIL	NAD	none	Colin Patrick
1212780	TP01 0.90	SOIL	NAD	none	Colin Patrick
1212781	TP02 0.60	SOIL	NAD	none	Colin Patrick
1212782	TP02 1.80	SOIL	NAD	none	Colin Patrick
1212783	TP03 0.35	SOIL	Amosite Chrysotile	bundle of Amosite+ Chrysotile fibres	Colin Patrick
1212784	TP03 1.35	SOIL	Amosite Chrysotile	bundle of Amosite+ Chrysotile fibres	Colin Patrick
1212785	TP04 0.30	SOIL	NAD	none	Colin Patrick
1212786	TP04 0.80	SOIL	NAD	none	Colin Patrick
1212787	TP05 0.60	SOIL	NAD	none	Colin Patrick
1212788	TP05 1.30	SOIL	NAD	none	Colin Patrick
1212789	TP06 0.45	SOIL	NAD	none	Colin Patrick
1212790	TP07 0.60	SOIL	NAD	none	Colin Patrick
1212791	TP07 0.90	SOIL	NAD	none	Colin Patrick
1212792	TP07 1.20	SOIL	NAD	none	Colin Patrick

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.

Summary of Asbestos Quantification Analysis

Soil Samples

Our Ref 17-06959-1

Client Ref 5765

Contract Title Hills Supplies

Lab No	1212783	1212784
Sample ID	TP03	TP03
Depth	0.35	1.35
Other ID		
Sample Type	SOIL	SOIL
Sampling Date	27/07/17	27/07/17
Sampling Time		

Test	Method	Units		
Total Mass% Asbestos (a+b+c)	DETSC 1102	Mass %	0.018	0.014
Gravimetric Quantification (a)	DETSC 1102	Mass %	0.001	0.001
Detailed Gravimetric Quantification (b)	DETSC 1102	Mass %	0.001	0.001
Quantification by PCOM (c)	DETSC 1102	Mass %	na	na
Potentially Respirable Fibres (d)	DETSC 1102	Fibres/g	na	na
Breakdown of Gravimetric Analysis (a)				
Mass of Sample		g	343.23	313.41
ACMs present*		type	ASBD	ASBD
Mass of ACM in sample		g	0.02	0.01
% ACM by mass		%	0.01	0.01
% asbestos in ACM		%	40.00	40
% asbestos in sample		%	0.00	0.01
Breakdown of Detailed Gravimetric Analysis (b)				
% Amphibole bundles in sample		Mass %	0.001	0.001
% Chrysotile bundles in sample		Mass %	na	0.002
Breakdown of PCOM Analysis (c)				
% Amphibole fibres in sample		Mass %	na	na
% Chrysotile fibres in sample		Mass %	na	na
Breakdown of Potentially Respirable Fibre Analysis (d)				
Amphibole fibres		Fibres/g	na	na
Chrysotile fibres		Fibres/g	na	na

* Denotes test or material description outside of UKAS accreditation.

% asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264.

Recommended sample size for quantification is approximately 1kg

denotes deviating sample

Information in Support of the Analytical Results

Our Ref 17-06959-1
Client Ref 5765
Contract Hills Supplies

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1212779	TP01 0.40 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212780	TP01 0.90 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212781	TP02 0.60 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212782	TP02 1.80 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212783	TP03 0.35 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212784	TP03 1.35 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212785	TP04 0.30 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212786	TP04 0.80 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212787	TP05 0.60 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212788	TP05 1.30 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212789	TP06 0.45 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212790	TP07 0.60 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212791	TP07 0.90 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID
1212792	TP07 1.20 SOIL	27/07/17	PT 1L		Naphthalene, PAH FID

Key: P-Plastic 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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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.



Certificate of Analysis

Certificate Number 18-01359

23-Jan-18

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

Our Reference 18-01359

Client Reference 5765

Order No (not supplied)

Contract Title HILLS SUPPLIES

Description 6 Soil samples.

Date Received 18-Jan-18

Date Started 18-Jan-18

Date Completed 23-Jan-18

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



Adam Fenwick
Contracts Manager





Summary of Chemical Analysis Matrix Descriptions

Our Ref 18-01359

Client Ref 5765

Contract Title HILLS SUPPLIES

Sample ID	Depth	Lab No	Completed	Matrix Description
TP09	0.6	1285998	23/01/2018	Dark brown gravelly, sandy CLAY (Possible made ground - slag)
TP10	0.45	1285999	23/01/2018	Dark brown gravelly, sandy CLAY (Possible made ground - slag)
TP11	0.6	1286000	23/01/2018	Brown, gravelly, sandy CLAY
TP12	0.7	1286001	23/01/2018	Brown, gravelly, sandy CLAY
TP13	1	1286002	23/01/2018	Brown sandy CLAY
TP15	1	1286003	23/01/2018	Brown sandy CLAY



Summary of Chemical Analysis

Soil Samples

Our Ref 18-01359
Client Ref 5765
Contract Title HILLS SUPPLIES

Lab No	1285998	1285999	1286000	1286001	1286002	1286003
Sample ID	TP09	TP10	TP11	TP12	TP13	TP15
Depth	0.60	0.45	0.60	0.70	1.00	1.00
Other ID						
Sample Type	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
Sampling Date	12/01/18	12/01/18	12/01/18	12/01/18	16/01/18	16/01/18
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	21	43	13	26	13	7.6
Cadmium	DETSC 2301#	0.1	mg/kg	1.0	0.7	< 0.1	< 0.1	< 0.1	< 0.1
Chromium	DETSC 2301#	0.15	mg/kg	41	42	39	18	21	16
Copper	DETSC 2301#	0.2	mg/kg	130	140	45	120	33	18
Lead	DETSC 2301#	0.3	mg/kg	870	440	56	85	26	56
Mercury	DETSC 2325#	0.05	mg/kg	0.66	0.48	< 0.05	0.22	0.09	0.17
Nickel	DETSC 2301#	1	mg/kg	54	30	30	36	21	9.3
Selenium	DETSC 2301#	0.5	mg/kg	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5	< 0.5
Zinc	DETSC 2301#	1	mg/kg	3900	260	180	96	70	55
Inorganics									
pH	DETSC 2008#			8.6	7.8	7.1	8.1	7.4	7.8
Thiocyanate	DETSC 2130#	0.6	mg/kg	0.9	< 0.6	< 0.6	0.7	< 0.6	< 0.6
Sulphide	DETSC 2024*	10	mg/kg	82	180	73	150	24	69
Sulphate as SO4, Total	DETSC 2321#	0.01	%	0.09	0.09	0.05	0.14	0.04	0.02
PAHs									
Naphthalene	DETSC 3301	0.1	mg/kg	0.2	0.4	< 0.1	< 0.1	< 0.1	< 0.1
Acenaphthylene	DETSC 3301	0.1	mg/kg	0.2	0.1	0.1	< 0.1	< 0.1	< 0.1
Acenaphthene	DETSC 3301	0.1	mg/kg	< 0.1	0.3	< 0.1	< 0.1	< 0.1	< 0.1
Fluorene	DETSC 3301	0.1	mg/kg	0.3	0.1	< 0.1	< 0.1	< 0.1	< 0.1
Phenanthrene	DETSC 3301	0.1	mg/kg	1.3	2.6	1.6	< 0.1	< 0.1	< 0.1
Anthracene	DETSC 3301	0.1	mg/kg	0.3	1.4	0.6	< 0.1	< 0.1	< 0.1
Fluoranthene	DETSC 3301	0.1	mg/kg	1.5	8.4	4.7	< 0.1	< 0.1	< 0.1
Pyrene	DETSC 3301	0.1	mg/kg	1.6	12	5.4	< 0.1	< 0.1	< 0.1
Benzo(a)anthracene	DETSC 3301	0.1	mg/kg	1.0	9.4	3.9	< 0.1	< 0.1	< 0.1
Chrysene	DETSC 3301	0.1	mg/kg	1.0	9.7	4.0	< 0.1	< 0.1	< 0.1
Benzo(b)fluoranthene	DETSC 3301	0.1	mg/kg	1.4	8.5	2.9	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	DETSC 3301	0.1	mg/kg	0.5	5.9	2.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	DETSC 3301	0.1	mg/kg	0.8	13	3.8	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-c,d)pyrene	DETSC 3301	0.1	mg/kg	1.0	7.0	2.3	< 0.1	< 0.1	< 0.1
Dibenzo(a,h)anthracene	DETSC 3301	0.1	mg/kg	0.3	1.7	0.5	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	DETSC 3301	0.1	mg/kg	0.4	5.9	1.7	< 0.1	< 0.1	< 0.1
PAH Total	DETSC 3301	1.6	mg/kg	12	86	34	< 1.6	< 1.6	< 1.6
Phenols									
Phenol - Monohydric	DETSC 2130#	0.3	mg/kg	< 0.3	0.6	< 0.3	0.3	< 0.3	< 0.3



Summary of Asbestos Analysis Soil Samples

Our Ref 18-01359

Client Ref 5765

Contract Title HILLS SUPPLIES

Lab No	Sample ID	Material Type	Result	Comment*	Analyst
1285998	TP09 0.60	SOIL	NAD	none	Colin Patrick
1285999	TP10 0.45	SOIL	NAD	none	Colin Patrick
1286000	TP11 0.60	SOIL	NAD	none	Colin Patrick
1286001	TP12 0.70	SOIL	NAD	none	Colin Patrick
1286002	TP13 1.00	SOIL	NAD	none	Colin Patrick
1286003	TP15 1.00	SOIL	NAD	none	Colin Patrick

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 18-01359
 Client Ref 5765
 Contract HILLS SUPPLIES

Containers Received & Deviating Samples

Lab No	Sample ID	Date Sampled	Containers Received	Holding time exceeded for tests	Inappropriate container for tests
1285998	TP09 0.60 SOIL	12/01/18	GJ 250ml, PT 1L		
1285999	TP10 0.45 SOIL	12/01/18	GJ 250ml, PT 1L		
1286000	TP11 0.60 SOIL	12/01/18	GJ 250ml, PT 1L		
1286001	TP12 0.70 SOIL	12/01/18	GJ 250ml, PT 1L		
1286002	TP13 1.00 SOIL	16/01/18	GJ 250ml, PT 1L		
1286003	TP15 1.00 SOIL	16/01/18	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
DETS 2002	Organic matter	%	0.1	Air Dried	No	Yes	Yes
DETS 2003	Loss on ignition	%	0.01	Air Dried	No	Yes	Yes
DETS 2008	pH	pH Units	1	Air Dried	No	Yes	Yes
DETS 2024	Sulphide	mg/kg	10	Air Dried	No	Yes	Yes
DETS 2076	Sulphate Aqueous Extract as SO ₄	mg/l	10	Air Dried	No	Yes	Yes
DETS 2084	Total Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2084	Total Organic Carbon	%	0.5	Air Dried	No	Yes	Yes
DETS 2119	Ammoniacal Nitrogen as N	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2130	Cyanide free	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Cyanide total	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2130	Phenol - Monohydric	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2130	Thiocyanate	mg/kg	0.6	Air Dried	No	Yes	Yes
DETS 2321	Total Sulphate as SO ₄	%	0.01	Air Dried	No	Yes	Yes
DETS 2325	Mercury	mg/kg	0.05	Air Dried	No	Yes	Yes
DETS 3049	Sulphur (free)	mg/kg	0.75	Air Dried	No	Yes	Yes
DETS 2123	Boron (water soluble)	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Arsenic	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Barium	mg/kg	1.5	Air Dried	No	Yes	Yes
DETS 2301	Beryllium	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Cadmium Available	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cadmium	mg/kg	0.1	Air Dried	No	Yes	Yes
DETS 2301	Cobalt	mg/kg	0.7	Air Dried	No	Yes	Yes
DETS 2301	Chromium	mg/kg	0.15	Air Dried	No	Yes	Yes
DETS 2301	Copper	mg/kg	0.2	Air Dried	No	Yes	Yes
DETS 2301	Manganese	mg/kg	20	Air Dried	No	Yes	Yes
DETS 2301	Molybdenum	mg/kg	0.4	Air Dried	No	Yes	Yes
DETS 2301	Nickel	mg/kg	1	Air Dried	No	Yes	Yes
DETS 2301	Lead	mg/kg	0.3	Air Dried	No	Yes	Yes
DETS 2301	Selenium	mg/kg	0.5	Air Dried	No	Yes	Yes
DETS 2301	Zinc	mg/kg	1	Air Dried	No	Yes	Yes
DETS 3072	Ali/Aro C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	1.2	As Received	No	Yes	Yes
DETS 3072	Aliphatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	1.5	As Received	No	Yes	Yes
DETS 3072	Aliphatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aliphatic C21-C35	mg/kg	3.4	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	0.9	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C12	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C10-C35	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	0.5	As Received	No	Yes	Yes
DETS 3072	Aromatic C12-C16	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	0.6	As Received	No	Yes	Yes
DETS 3072	Aromatic C16-C21	mg/kg	10	As Received	No	Yes	Yes
DETS 3072	Aromatic C21-C35	mg/kg	1.4	As Received	No	Yes	Yes
DETS 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
DETS 3311	C10-C24 Diesel Range Organics (DRO)	mg/kg	10	As Received	No	Yes	Yes
DETS 3311	C24-C40 Lube Oil Range Organics (LORO)	mg/kg	10	As Received	No	Yes	Yes
DETS 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
DETS 3303	Acenaphthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Acenaphthylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(a)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(b)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(k)fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Benzo(g,h,i)perylene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Dibenzo(a,h)anthracene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Fluoranthene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Indeno(1,2,3-c,d)pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Naphthalene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Phenanthrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3303	Pyrene	mg/kg	0.03	As Received	No	Yes	Yes
DETS 3401	PCB 28 + PCB 31	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 52	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 101	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 118	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 153	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 138	mg/kg	0.01	As Received	No	Yes	Yes
DETS 3401	PCB 180	mg/kg	0.01	As Received	No	Yes	Yes
DETS 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.

APPENDIX D

Coal Authority Report

Gas Testing Report

Capping Design



E14/5765/MD/001

6 May 2015

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

t 01924 464342 f 01924 450662 e trevor.haigh@haighhuddleston.co.uk

FAO Michael Singh

Lakeland Property Consultants & Management Co Ltd
1A Dewsbury Road
Cleckheaton
BD19 3RS

Dear Sir,

Re: Cleckheaton Mill, Bradford Road, Cleckheaton

Further to your instructions, we have conducted a coal mining risk assessment of the above site to confirm the likelihood of shallow mine workings affecting the above development and the requirement to undertake intrusive borehole investigation works.

The following information has been used to prepare this report, and is attached to the rear:

1. Coal Authority Report
2. Extracts from the Interactive Coal Authority Map.

The Coal Authority Report states that the property is in the likely zone of influence from workings in 1 seam of coal at 70m to 80m depth, and last worked in 1892. Any ground movement from these coal workings should have stopped by now.

However, the report states that the property is in an area where the Coal Authority believe there is **coal at or close to the surface**. This coal may have been worked at some time in the past. Historically, shallow coal seams may have been worked by private individuals and these workings are not recorded by the Coal Authority.

Consulting the Coal Authority online resources, it can be seen that the south western and south eastern corners of the site lie within areas that have probably been subject to workings at a shallow depth. In addition to this, the coal is shown to outcrop in the south west corner of the site.

The online BGS borehole records show that boreholes have been undertaken to depths of approximately 6m immediately west and south of the site. These showed the strata consists of clays overlying mudstones.

Additionally, immediately to the north of the site, boreholes have been drilled to a depth of 20m and did not encounter coal seams or evidence of shallow workings. However, as the coal is shown to outcrop in the south west of the site, these boreholes are unlikely to represent the existing strata beneath the site.

To conclude, we would make the following comments:

From the above, it is possible that there is coal at shallow depth beneath the site that has been worked historically.

The Coal Authority report states that the property is not in an area where there is an existing licence to remove coal using underground methods, or are currently

determining whether to grant such a licence. Nor is the property in an area likely to be affected at the surface by any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

There have been no subsidence claims on site, or recorded surface hazard call-outs or remedial works undertaken on behalf of the Coal Authority.

There are no records of mine gas emissions within the site boundary.

Recommendations

As the site is shown to be in an area of probable historic shallow workings with coal outcropping on the site, it is recommended that an intrusive ground investigation, including rotary boreholes to a minimum depth of 30m, is undertaken to determine the extent of possible shallow mine workings on site.

The rotary drilling investigation should focus primarily on the south western and south eastern corners of the site to determine the extents of any possible workings encroaching onto the site. Due to the proximity of residential properties to the south western corner of the site, it is likely that the investigatory drilling in this area will need to be undertaken using water flush methods.

The findings of the ground investigations should be used to prepare an interpretive report specifying any remediation strategies and construction design features required for the construction of the proposed development.

As the intrusive investigation works will intersect, disturb or enter coal seams, coal mine workings or mine entries, written permission and a permit should be sought from the Coal Authority prior to any investigative works taking place.

I trust the above is acceptable to yourself. Should you require any further information, or wish to discuss, please do not hesitate to contact me direct.

Yours faithfully

MICHAEL DEAN
m.dean@haighhuddleston.co.uk

CC Paul Howarth



The Coal
Authority

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

Z & D PROPERTIES
3 - 5 BRADFORD ROAD
CLECKHEATON
WEST YORKSHIRE
BD19 5AG

Our reference: **51000682977001**
Your reference: **Cleckheaton Mill**
Date of your enquiry: **18 November 2014**
Date we received your enquiry: **18 November 2014**
Date of issue: **18 November 2014**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report

Z & D PROPERTIES, CLECKHEATON MILL, BRADFORD ROAD, CLECKHEATON, WEST YORKSHIRE, BD19 5BD

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 1 seam of coal at 70m to 80m depth, and last worked in 1892.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on Coal Authority Information section of the report.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is not in an area for which a notice of entitlement to withdraw support has been published.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	18 November 2014
Issued to:	Z & D PROPERTIES 3 - 5 BRADFORD ROAD CLECKHEATON WEST YORKSHIRE BD19 5AG
Property Search for:	Z & D PROPERTIES, CLECKHEATON MILL, BRADFORD ROAD, CLECKHEATON, WEST YORKSHIRE, BD19 5BD
Reference Number:	51000682977001
Date of Issue:	18 November 2014
Cost:	£119.00
VAT @ 20%:	£23.80
Total Received:	£142.80
VAT Registration	598 5850 68

Location map



Approximate position
of property

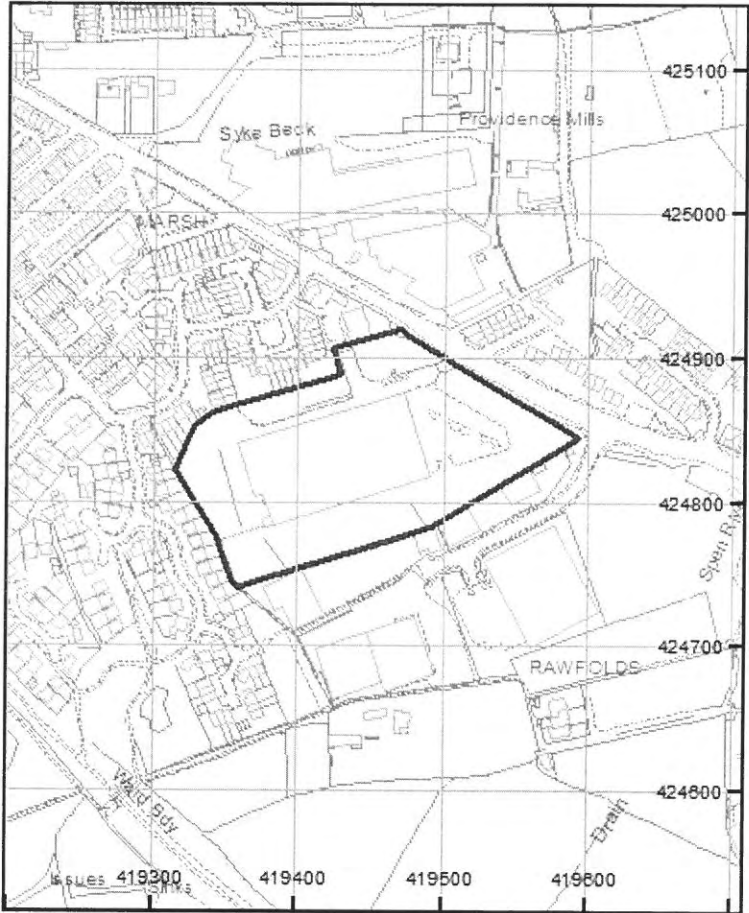


Enquiry boundary

Reproduced by permission of Ordnance Survey
on behalf of HMSO. © Crown copyright and
database right 2014. All rights reserved.
Ordnance Survey Licence number: 100020315

Key

Approximate position of enquiry
boundary shown





The Coal
Authority



INVESTOR IN PEOPLE

200 Lichfield Lane
Berry Hill
Mansfield
Nottinghamshire
NG18 4RG

Tel: 01623 637 119 (Planning Enquiries)

Email: planningconsultation@coal.gov.uk

Web: www.coal.gov.uk/services/planning

For the Attention of: Mr B. Topping – Case Officer
Kirklees Council

[By Email: Bill.Topping@kirklees.gov.uk]

24 April 2015

Dear Mr Topping

PLANNING APPLICATION: 2014/62/92998/E

Proposed residential development - Cleckheaton Mills, Bradford Road, Cleckheaton, West Yorkshire, BD19 5BD – Re-consultation

Thank you for your notification of 20 April 2015 seeking the views of The Coal Authority on the additional information received to support the above planning application.

The Coal Authority is a non-departmental public body sponsored by the Department of Energy and Climate Change. As a statutory consultee, The Coal Authority has a duty to respond to planning applications and development plans in order to protect the public and the environment in mining areas.

The Coal Authority Response: Substantive Concern

The application site falls within the defined Development High Risk Area. The Coal Authority previously objected to this planning application in a letter to the LPA dated 16 October 2014 as no Coal Mining Risk Assessment has been submitted to support the application.

The applicant has simply submitted a Coal Mining Report in support of this planning application. The submission of a Coal Mining Report is not a Coal Mining Risk Assessment. The Coal Mining Report provides the basic coal mining information in relation to the application site; it does not provide an assessment of the risks to any proposed new development on the site. The Coal Authority therefore **maintains its objection** to this planning application,

The applicant should use this coal mining information to assess whether or not past mining activity poses any risk to their development proposal and, where necessary, propose

mitigation measures to address any issues of land instability. This could include further intrusive site investigation to ensure that the LPA has sufficient information to determine the planning application.

It is a requirement of the NPPF, paragraph 120 - 121, that the applicant demonstrates to the satisfaction of the LPA that the application site is safe, stable and suitable for development.

The Coal Authority Recommendation to the LPA

The submission of a Coal Mining Report is not a Coal Mining Risk Assessment. The Coal Mining Report provides the basic coal mining information in relation to the application site; it does not provide an assessment of the risks to any proposed new development on the site. The applicant should use this coal mining information to assess whether or not past mining activity poses any risk to their development proposal and, where necessary, propose mitigation measures to address any issues of land instability. This could include further intrusive site investigation to ensure that the LPA has sufficient information to determine the planning application.

The Coal Mining Risk Assessment should be prepared by a "competent body". Links to the relevant professional institutions of competent bodies can be found at:
<https://www.gov.uk/planning-applications-coal-mining-risk-assessments>

The Coal Authority would be very pleased to receive for further consultation and comment any additional information prepared and submitted by the applicant.

Please do not hesitate to contact me if you would like to discuss this matter further.

Yours sincerely

Melanie Lindsley *BA (Hons), DipEH, DipURP, MA, PGCertUD, MRTPI*
Planning Liaison Manager

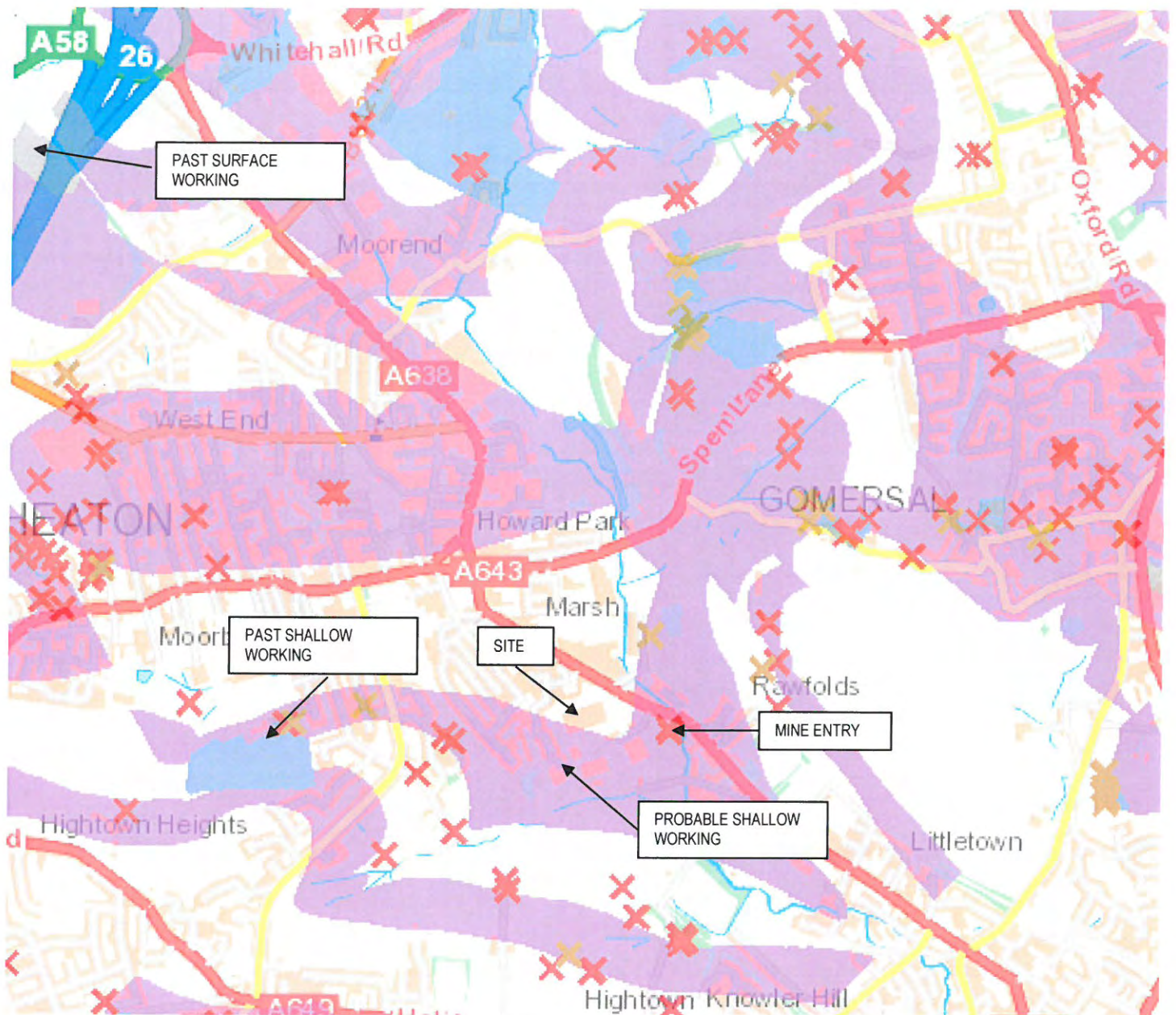
General Information for the Applicant

Under the Coal Industry Act 1994 any intrusive activities, including initial site investigation boreholes, and/or any subsequent treatment of coal mine workings/coal mine entries for ground stability purposes require the prior written permission of The Coal Authority, since such activities can have serious public health and safety implications. Failure to obtain permission will result in trespass, with the potential for court action. Application forms for Coal Authority permission and further guidance can be obtained from The Coal Authority's website at:

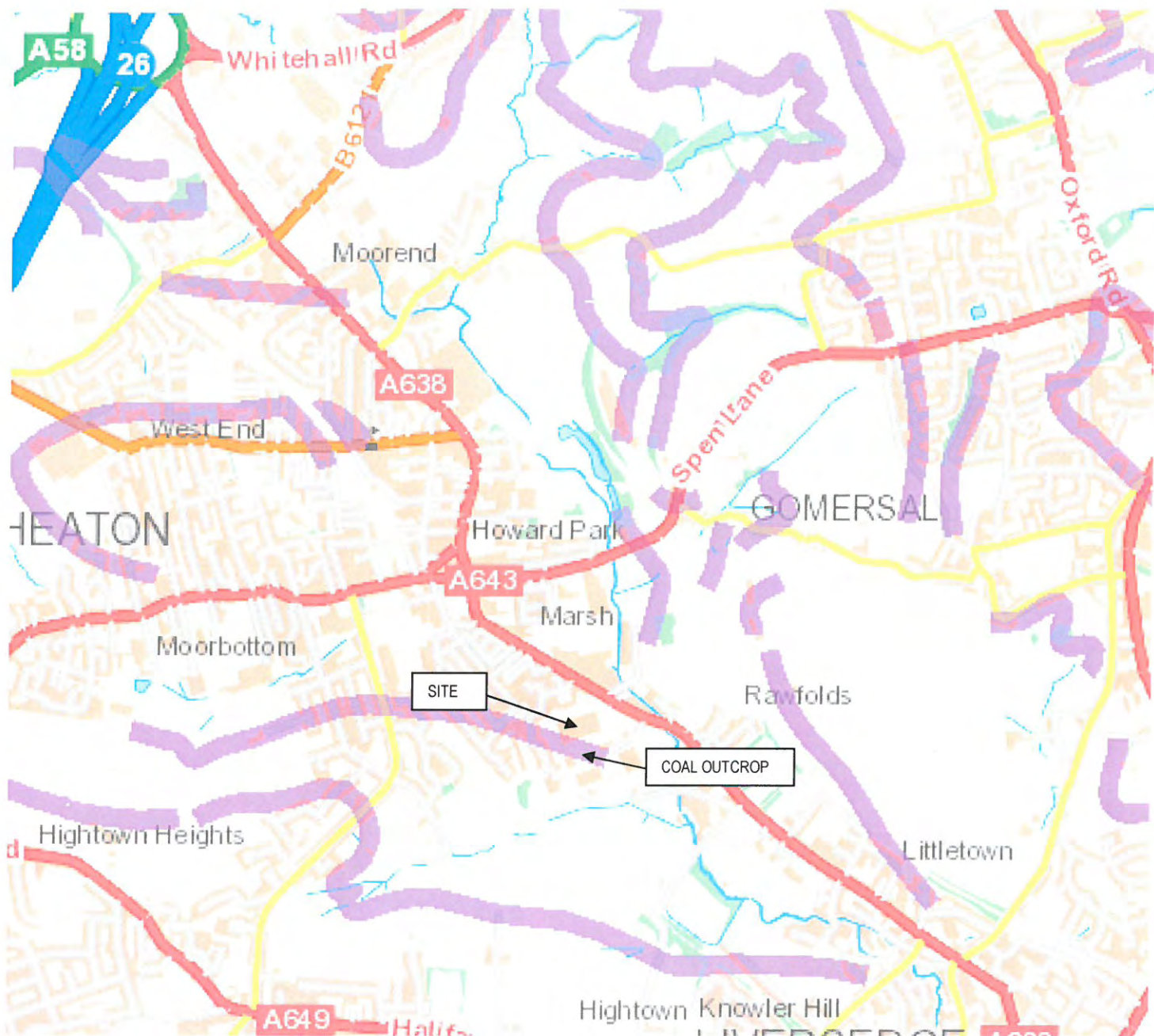
<http://coal.decc.gov.uk/en/coal/cms/services/permits/permits.aspx>

Disclaimer

The above consultation response is provided by The Coal Authority as a Statutory Consultee and is based upon the latest available coal mining data on the date of the response, and electronic consultation records held by The Coal Authority since 1 April 2013. The comments made are also based upon only the information provided to The Coal Authority by the Local Planning Authority and/or has been published on the Council's website for consultation purposes in relation to this specific planning application. The views and conclusions contained in this response may be subject to review and amendment by The Coal Authority if additional or new data/information (such as a revised Coal Mining Risk Assessment) is provided by the Local Planning Authority or the Applicant for consultation purposes.



EXTRACT FROM THE INTERACTIVE COAL AUTHORITY MAP SHOWING SURFACE MINING, PAST SHALLOW COAL MINING WORKINGS AND PROBABLE SHALLOW MINE WORKINGS AT CLECKHEATON MILL, BRADFORD ROAD, CLECKHEATON



EXTRACT FROM THE INTERACTIVE COAL AUTHORITY MAP SHOWING COAL OUTCROPS AT CLECKHEATON MILL, BRADFORD ROAD, CLECKHEATON



Our Ref: E15/5765/JM/002

12st February 2018

(Email Only)

FAO Sid Singh

Lakeland Properties

Dear Sir,

Re: Development at Hills Supplies, Dewsbury Road, Cleckheaton

Gas testing was undertaken at the above development to confirm if elevated gases on site would adversely affect the development.

Three boreholes were constructed and installed with gas monitoring standpipes and lockable covers. The standpipes were backfilled with single size gravels and sealed with bentonite.

Five rounds of gas monitoring were undertaken between 21st October 2017 and 05th January 2018 using a Gas Data LMSxi G3.18.

The results to date are tabulated in the Appendix.

The gas monitoring was undertaken over a range in barometric pressures between 990mb and 1004mb. With the readings on 21st October 2017 being carried out under falling barometric pressure.

On site, no methane concentrations were detected. Carbon dioxide values were found between 0.5 and 3.8% with oxygen levels between 17.6 and 20.9%. Flow rates were between 0.0 and 1.5/hr.

On several occasions the high ground water table and the site's use as a car dealership prevented readings being taken. Following the fifth reading the site was cleared and the gas monitoring points destroyed, preventing the final reading taking place.

Discussions

Based on a high sensitivity end use under the NHBC traffic light system in conjunction with CIRIA C665, the GSV value corresponds to the site being characterised as **Green**. The GSV value is obtained by multiplying the maximum gas concentration by maximum borehole flow rate.

i.e. Carbon Dioxide - $0.038 \times 1.5 = 0.057$ l/hr.

In addition, we can confirm that the site is not within an area where radon protection measures are required.

When consulting BS 8485:2015 Table 2 the site can be characterised as CS1 for Type A buildings. Consulting tables 5 - 7 we would recommend the following to achieve a score of 2.5:

- Fully vented minimum 150mm deep void below suspended slab. To be increased to 250mm where the proximity of trees affect the foundation construction.	2.5 Points
- Continuous membrane across the cavity/party walls.	0 Points
- Cavity tray in the external walls.	0 Points
- Fully sealed service entries and ducts to manufactures specification.	0 Points
- Beam and block floor slab	0 Points
- A 1200 Gauge Visqueen DPM installed to manufacturers specification.	0 Points
Total	2.5 Points

We hope that the above is sufficient for your requirements. However, should you have any queries please do not hesitate to contact me direct.

Yours sincerely,

JAMIE McBRIDE
j.mcbride@haighhuddleston.co.uk

SITE:	Hills Supplies, Dewsbury Road, Cleckheaton	
CLIENT:	Lakeland Properties	
JOB NO:	5765	
VISIT NO:		

GAS MONITORING RESULTS

	GAS CONCENTRATIONS								FLOW DATA				Qhg per borehole		WELL AND WATER DATA				A Pressure (mB)	Comments	
Monitoring Point	Methane (%v/v)		%LEL		Carbon dioxide (%v/v)		Oxygen (%v/v)		Flow rate (l/hr)		Differential borehole Pressure (Pa)	Time for flow to equalise (secs)	Methane (l/hr)	CO2 (l/hr)	Water level (mbgl)	Depth of well (m)	Response Zone				
	Peak	Steady	Peak	Steady	Peak	Steady	Min	Steady	Peak	Steady											
Ambient Air	NR	ND	NR	ND	NR	ND	21.1	21.1	ND	ND	-	-	-	-	-	-	-	991	Date: 21.10.17	Time: 3.20pm	
BH 01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ground wet, cold, cloudy		
BH 02A	ND	ND	ND	ND	0.6	0.6	20.6	20.6	<<<	<<<	-	-	NR	0.0006	0.80	3.10	0.00m	991	Reading on BH01A prevented by ground water		
BH 07A	ND	ND	ND	ND	3.2	3.2	19.3	19.3	<<<	<<<	-	-	NR	0.0032	Dry	3.20	1.00 - 3.20m	991	Falling A.Pressure		
Ambient Air	NR	ND	NR	ND	NR	ND	21.2	21.2	ND	ND	-	-	-	-	-	-	-	1004	Date: 21.10.17	Time: 3.20pm	
BH 01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ground dry, cold, cloudy		
BH 02A	ND	ND	ND	ND	1.1	ND	20.9	20.9	<<<	<<<	-	-	NR	0.0011	1.00	3.10	1.00 - 3.10m	1004	Reading on BH01A prevented by ground water		
BH 07A	ND	ND	ND	ND	3.6	3.6	19.3	19.3	ND	ND	-	-	NR	0.0036	Dry	3.20	1.00 - 3.20m	1004			
Ambient Air	NR	ND	NR	ND	NR	ND	21.2	21.2	ND	ND	-	-	-	-	-	-	-	1004	Date: 16.11.17	Time: 9.45am	
BH 01A	0.2	0.1	2.6	1.0	0.6	0.5	17.6	18.2	<<<	<<<	-	-	0.0002	0.0006	1.00	2.80	1.00 - 2.80m	1004	Ground wet, cold, cloudy		
BH 02A	ND	ND	ND	ND	0.6	0.6	20.7	20.7	-1.5	-0.1	-	2	NR	0.009	1.20	3.10	1.20 - 3.10m	1004	Unable to access BH07A		
BH 07A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-			
Ambient Air	NR	ND	NR	ND	NR	ND	21.5	21.5	ND	ND	-	-	-	-	-	-	-	992	Date: 12.12.17	Time: 1.30pm	
BH 01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ground frozen, cold, sunny		
BH 02A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Bung frozen on BH01A & 02A preventing reading		
BH 07A	ND	ND	ND	ND	3.8	3.8	19.1	19.1	ND	ND	-	-	NR	0.0038	Dry	3.20	1.00 - 3.20m	992			
Ambient Air	NR	ND	NR	ND	NR	ND	21.5	21.5	ND	ND	-	-	-	-	-	-	-	990	Date: 05.01.18	Time: 1.30pm	
BH 01A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Ground wet, cold, cloudy		
BH 02A	ND	ND	ND	ND	0.5	0.5	20.8	20.8	ND	ND	-	-	NR	0.0005	1.00	3.10	1.00 - 3.10m	990	Unable to access BH07A		
BH 07A	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	Reading on BH01A prevented by ground water		
																			Date: 07.02.18		Time: 4.00pm
																			Boreholes removed during site clearance		

ND - Not detected

NR - Not recorded

NB: where no flow (ND) recorded Qhg values are calculated using equipment limit of detection (0.1 l/hr). Where negative flows recorded, these are converted to positive values for calculation of Qhg.

Ambient air check: CH4 CO2 O2

CLEAN CAPPING DEPTH CALCULATION

Contaminant:	Arsenic
Level Recorded: TP4 0.8m deep (G)	67 mg/kg
Action Level:	37 mg/kg (T _v)
Assume contaminant concentration in clean capping is maximum of 0.5 x T _v :	18.5 mg/kg (C)

Depth of clean capping required (x) calculated by using the equation:

$$x = M * \frac{(C_g - 1)}{(C_g - C_c)}$$

Where:

M is the depth of the mixed zone of clean and contaminated material:	600mm
C _g is the ratio of contaminant concentration to Action level in existing ground:	G/T _v = 67/37 = 1.81
C _c is the ratio of contaminant concentration to Action Level in clean capping:	C/T _v = 18.5/37 = 0.5

Which gives:

$$x = 600 * \frac{(1.81 - 1)}{(1.81 - 0.5)}$$

$$x = 600 * \frac{0.81}{1.3}$$

$$x = 375mm$$

Depth to contaminant is 450mm Use additional 600mm clean top-soils and sub-soils is adequate.

CLEAN CAPPING DEPTH CALCULATION

Contaminant:	Lead
Level Recorded: TP3 1.35m deep	23000 mg/kg (G)
Action Level:	200 mg/kg (T _v)
Assume contaminant concentration in clean capping is maximum of 0.5 x T _v :	100 mg/kg (C)
Depth of clean capping required (x) calculated by using the equation:	

$$x = M * \frac{(C_g - 1)}{(C_g - C_c)}$$

Where:

M is the depth of the mixed zone of clean and contaminated material:	600mm
C _g is the ratio of contaminant concentration to Action level in existing ground:	G/T _v = 23000/200 = 115
C _c is the ratio of contaminant concentration to Action Level in clean capping:	C/T _v = 100/200 = 0.5

Which gives:

$$x = 600 * \frac{(115 - 1)}{(115 - 0.5)}$$

$$x = 600 * \frac{114}{114.5}$$

$$x = 597mm$$

Depth to contaminant is 1350mm Use of an additional cap of 600mm clean top-soils and sub-soils is adequate.

CLEAN CAPPING DEPTH CALCULATION

Contaminant:	Benzo(a)pyrene
Level Recorded:	13 mg/kg (G)
Action Level:	5 mg/kg (T _v)
Assume contaminant concentration in clean capping is maximum of 0.5 x T _v :	2.5 mg/kg (C)
Depth of clean capping required (x) calculated by using the equation:	

$$x = M * \frac{(C_g - 1)}{(C_g - C_c)}$$

Where:

M is the depth of the mixed zone of clean and contaminated material:	450mm
C _g is the ratio of contaminant concentration to Action level in existing ground:	G/T _v = 13/5 = 2.6
C _c is the ratio of contaminant concentration to Action Level in clean capping:	C/T _v = 2.5/5 = 0.5

Which gives:

$$x = 450 * \frac{(2.6 - 1)}{(2.6 - 0.5)}$$

$$x = 450 * \frac{2.5}{2.1}$$

$$x = 535mm$$

Depth to contaminant is 450mm Use additional 600mm clean top-soils and sub-soils. In vicinity of TP10

CLEAN CAPPING DEPTH CALCULATION

Contaminant:	zinc
Level Recorded: TP9 0.6m deep	3900 mg/kg (G)
Action Level:	3700 mg/kg (T _v)
Assume contaminant concentration in clean capping is maximum of 0.5 x T _v :	1850 mg/kg (C)
Depth of clean capping required (x) calculated by using the equation:	

$$x = M * \frac{(C_g - 1)}{(C_g - C_c)}$$

Where:

M is the depth of the mixed zone of clean and contaminated material:	600mm
C _g is the ratio of contaminant concentration to Action level in existing ground:	G/T _v = 3900/3700 = 1.05
C _c is the ratio of contaminant concentration to Action Level in clean capping:	C/T _v = 1850/3700 = 0.5

Which gives:

$$x = 600 * \frac{(1.05 - 1)}{(1.05 - 0.5)}$$

$$x = 600 * \frac{.05}{0.65}$$

$$x = 461mm$$

Depth to contaminant is 600mm use of an additional cap of 600mm clean top-soils and sub-soils is adequate.

CLEAN CAPPING DEPTH CALCULATION

Contaminant:	mercury	
Level Recorded: TP3 1.9m deep	2 mg/kg	(G)
Action Level:	1.2 mg/kg	(T _v)
Assume contaminant concentration in clean capping is maximum of 0.5 x T _v :	0.6 mg/kg	(C)
Depth of clean capping required (x) calculated by using the equation:		

$$x = M * \frac{(C_g - 1)}{(C_g - C_c)}$$

Where:

M is the depth of the mixed zone of clean and contaminated material:	600mm
C _g is the ratio of contaminant concentration to Action level in existing ground:	G/T _v = 2/1.2 = 1.67
C _c is the ratio of contaminant concentration to Action Level in clean capping:	C/T _v = 0.6/1.2 = 0.5

Which gives:

$$x = 600 * \frac{(1.67 - 1)}{(1.67 - 0.5)}$$

$$x = 600 * \frac{0.67}{1.17}$$

$$x = 345mm$$

Depth to contaminant is 1900mm Use additional 600mm clean top-soils and sub-soils is adequate.