

# SLADEN ASSOCIATES

**REPORT ON PHASE 2 GROUND  
INVESTIGATION  
Proposed Barn Conversion  
Rowling House  
Cawthorne, Barnsley  
South Yorkshire**

Prepared for

**Abbey Masterbatch Ltd**

**Date : April 2017**

**Job No : 17 1765**

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**Prepared for:           Abbey Masterbatch Ltd**

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## **1 INTRODUCTION**

Abbey Masterbatch Ltd has instructed Sladen Associates to carry out a Phase 2 Ground Investigation at the site of a proposed barn conversion at Rowling House, Cawthorne.

The investigation included intrusive fieldwork using a mini-drilling rig and machine-excavated trial pit, as well as subsequent laboratory testing of samples and a monitoring programme.

A Geo-Environmental Phase 1 Desk Study for the site has previously been undertaken by others and reported as follows:

Report on Phase 1 Desk Study. Rowling House, Cawthorne, S75 4AF. Prepared for Abbey Masterbatch Ltd by Rogers Geotechnical Ltd. Report No: J3706/16/EDS, November 2016.

The Phase 1 report included a description of the site, a review of the site history, environmental and geological setting and development of a preliminary conceptual model of potential pollution linkages and should be read in conjunction with the present report. The current report presents the factual results of the intrusive investigation together with recommendations for the geotechnical and geo-environmental aspects of site re-development.

## **2 THE SITE**

The site comprises an area of outbuildings situated to the south to Rowling House Farm and Cottage, which is located off North Lane, Cawthorne. The site is approximately 0.16 hectares in size and its National Grid reference is 426679, 407009, see Figures 1 and 2.

It is understood that the development proposals currently comprise conversion of the existing barn into two dwellings and the construction of a single replacement garage, driveway and gardens (Figure 3). The barn is presently being used for general storage, and until recently was used also for animal housing. It is an 'L' shaped building, with fields to the rear and a small courtyard area comprising grass and concrete hard standing to the front/farm side.

## **3 FIELD AND LABORATORY PROGRAMME**

### **3.1 FIELDWORK**

The fieldwork comprised five boreholes (BH1 to BH5) put down with a mini-rig using 'window' sampling techniques. Samples were recovered from the boreholes for the purposes of classification and laboratory testing. Soil samples were screened for potential VOC (Volatile Organic Compound) impaction using a hand held PID (Photo Ionisation Detector) meter. In situ dynamic probe testing (DPSH Method) was undertaken adjacent to four of the borehole locations prior to drilling and 'SPT' Testing

was undertaken during drilling near the base of the boreholes. Groundwater/gas level monitoring standpipes were installed in three of the boreholes during backfilling. The fieldwork was undertaken on 16<sup>th</sup> March 2017.

A soakaway test (BRE 365 Method) was undertaken in a trial pit (SA1) excavated by mechanical excavator.

The borehole and trial pit locations are shown on the site layout plan, Figure 2.

Detailed logs of the boreholes and trial pit are included in Appendix A. Reference should be made to the logs for details of ground conditions at these locations but a generalised summary is provided in Section 4 Ground Conditions, below.

### **3.2 SAMPLE HANDLING**

All soil samples recovered from the field for potential chemical laboratory testing were divided into two sub samples; one sealed 420 ml glass jar and one 1l plastic tub. The glass jars were placed in cool boxes and were subsequently stored in a refrigerator. Following a review of data and scheduling, the selected jar and tub samples were transported to the laboratory (glass jars in cool boxes). The glass jars are used by the laboratory for all analysis for potentially volatile determinands.

### **3.3 LABORATORY TESTING**

Selected near surface soil samples were tested for a variety of potential contaminants as well as sulphate and pH. The detailed results of this work are included in Appendix B and chemical test results are summarised in Tables 1 to 4.

## **4 GROUND CONDITIONS**

### **4.1 GENERAL**

Ground conditions at the borehole locations were found to comprise topsoil or made ground, overlying natural soils considered to be weathered Penistone Flags Bedrock.

### **4.2 TOPSOIL AND MADE GROUND**

Sandy topsoil was present at the BH3 location and extended to a depth of 0.2 m.

Made ground was present at the other borehole locations and extended to depths in the range 0.2 to 0.25 m. The made ground was granular in nature and generally comprised a loose to medium dense sand with varying proportions of gravel. The gravel fraction of the made ground included, variously, sandstone and brick and, locally, ash and slag. A layer of brick was encountered at BH2 in the depth range 0.05 to 0.2 m

### **4.3 PENISTONE FLAGS**

Soils considered to be weathered Penistone Flag strata were encountered below the topsoil or made ground in all the boreholes. The weathered bedrock was typically described as medium dense becoming very dense sandy gravel or sand with much gravel. The boreholes reached effective refusal for the drilling method at relatively shallow depths in the range 0.4 to 1.07 m.

### **4.4 GROUNDWATER**

Free groundwater was not encountered during drilling of the boreholes and standpipes were dry during the monitoring period (Table 5).

## **4.5 CONTAMINATION**

Apart from some ash and slag locally present in the made ground, no visible or olfactory evidence of potentially significant ground contamination was noted during the recent fieldwork and PID screening showed no evidence of volatile organic compounds. Ash and slag can be associated with elevated metal and sometimes PAH (polyaromatic hydrocarbons) concentrations. By their nature, however, leachable concentrations are generally very low.

## **5 GEO-ENVIRONMENTAL ASSESSMENT**

### **5.1 GEOTECHNICAL CONSIDERATIONS**

#### **5.1.1 FOUNDATION CONDITIONS**

Natural weathered bedrock strata are present at relatively shallow depth and should be suitable to support conventional spread foundations. Footings taken down to 0.8 m depth or greater on natural ground may be designed assuming an allowable net bearing pressure of 200 kPa. Any made or disturbed ground, topsoil, soft or otherwise deleterious material that is encountered below founding level should be removed and replaced with compacted granular fill or mass concrete. Blinding concrete should be placed as soon as practicable after subgrade preparation.

The site subsoils are granular in nature and no special precautions are considered warranted with respect to potential shrinkage and swelling.

#### **5.1.2 MINING SUBSIDENCE CONSIDERATIONS**

The Coal Authority have no record of mining below the site but have suggested that coal may be present at shallow depth that may have been worked in the past, refer Phase 1 Report. This does not appear to agree with current large scale geological mapping published by the British Geological Survey. Indeed, the on-line mapping on the Coal Authority website appears to be based on outdated mapping. While a thin unnamed coal seam may be present, it is considered very unlikely that it was exploited by underground mining below the study area.

Current geological mapping shows only one coal seam at potentially shallow depth. This is a thin unnamed seam that outcrops some 100 m to the south west of the site, dipping to the north east. That seam is stratigraphically lower than the Cumberworth Thin Coal (anticipated thickness 0 to 0.2 m) which does outcrop a little way to the north east and as such would not be expected to be present below the study area. Neither of these coals would be expected to have been exploited by underground mining for their own sake but the Cumberworth Thin Coal is associated with a layer of fireclay that was utilized at the nearby Clough Green Stoneware Works (Mitchell et al 1947). As such the Cumberworth Thin Coal was sometimes exploited along with the fireclay.

It is evident from the published topographic, geological and on-line Coal Authority mapping that the fireclay used by the Stoneware works, along with the coal, was extracted by surface quarrying and underground mining in an area to the east of the site. There is no evidence of underground mining activity to the south west of the adjacent industrial area. Any unrecorded mining would, in any case, pre-date about 1870, when it became a legal requirement to keep records of underground mining. As such any related subsidence should have ceased by now. The existing barn and nearby house are in good condition for their age and style and show no evidence of potential ground subsidence.

Apart from a replacement garage, the present development includes no new structures but rather change of use and conversion of an existing building. The proposed conversion would result in no significant changes to foundation loading from the existing structure. Current Coal Authority guidance does not require more detailed assessment for developments involving only change of use.

In view of the very low likelihood of past shallow mining below the site and nature of the currently proposed development, it is not considered that any special precautions would be warranted with respect to mining subsidence issues.

### **5.1.3 FLOOR SLABS**

Conventional slab-on-grade floors may be considered for lightly loaded floors, provided several precautions are taken. Any topsoil or other soft or deleterious surface materials should be removed. A granular base course should be provided below floor slabs and the exposed subgrade should be compacted using a vibratory roller. Some differential movement within the slab area and between the floor slab and the portions of the structure supported by deeper structural foundations should be anticipated. Movement joints should be provided at the junction of the slabs and structural foundations. Any new fill below slabs-on-grade should be well-compacted granular material. For wide floor slab areas, consideration could be given to the incorporation of precautions to control cracking of the floor slabs, such as saw cut joints.

If a higher performance is required or if floor slabs are to be subjected to significant sustained loading, consideration should be given to the use of structurally supported floors.

### **5.1.4 BURIED CONCRETE**

Tests to determine the water-soluble sulphate content of soils (Table 3) gave values in the range of less than 0.06 to 0.064 g/l. These can be compared to the level of 0.5 g/l suggested by BRE Special Digest 1 (2005 Revision) as the level above which special precautions to protect buried concrete from sulphate attack in natural ground may be appropriate. The measured pH values were in the range 5.9 to 7.5, indicating that mildly acidic conditions are locally present on site. The site would not be considered 'brownfield' within the meaning adopted in Special Digest 1. Accordingly, it is considered that the site may be classified as exhibiting Class DS-1/AC-1 conditions as per BRE Special Digest 1. Further guidance with regard to the design of buried concrete can be found in BRE Special Digest 1.

### **5.1.5 SOAKAWAY DRAINAGE**

A soakaway test (BRE Digest 365 Method) were undertaken in trial pit SA1. The inferred infiltration rate was as follows:

Location	Depth of Trial Pit (m)	Depth to Water at Start of Test (m)	Calculated Infiltration Rate (m/s)
SA1	0.90	0.44	$4.5 \times 10^{-5}$

Final assessment of feasibility and design of soakaway drainage should be undertaken by a suitably qualified engineer.

## 5.2 ENVIRONMENTAL CONSIDERATIONS

### 5.2.1 SOIL CONTAMINATION ASSESSMENT

#### 5.2.1.1 CONCEPTUAL MODEL

The Phase 1 report included development of a conceptual model of potential pollution linkages. With regard to human health considerations, the site preliminary conceptual model concluded that in view of the potential presence of general contaminants within near surface soils at the site that there was a moderate risk associated with exposure of site users to ground contamination.

There was also considered to be a moderate risk to controlled waters.

Risks associated with ground gas were judged to be low to moderate.

Based on the recent intrusive investigation, some updates are required to the preliminary conceptual model. Apart from some ash and slag locally present within the made ground, no potentially significant evidence of potential land contamination was noted during the recent field programme. Ash and slag can be associated with elevated metal and sometimes PAH (polyaromatic hydrocarbons) concentrations. By their nature, however, leachable concentrations are generally very low. No visual or olfactory evidence of potential VOC impaction, as may be associated with fuels, was noted and PID screening showed no measurable concentrations of VOC's.

Accordingly risks to controlled waters may be re-assessed as very low at the preliminary level based on the likely absence of sources of leachable contamination.

#### 5.2.1.2 HAZARD ASSESSMENT

In order to allow a more quantified definition of potential hazards, selected soil samples were tested for a wide range of potential contaminants. This included banded total petroleum hydrocarbons and speciated polyaromatic hydrocarbons (PAH's) as well as presence of asbestos.

It is appropriate to consider three broad groups of contaminants. Firstly those that are potentially toxic to humans, secondly 'phytotoxins', which are potentially toxic to plants but not normally to humans and thirdly, potentially aggressive substances that may attack building materials. The latter have been discussed in the Section 5.1.4 'Buried Concrete', above.

With respect to potential hydrocarbon contamination, the following sequence of observation and testing was undertaken:

- Odour, if detected, would be noted.
- Soil samples from the boreholes were screened for potential VOC impaction using a hand held PID meter, none was detected.
- The basic laboratory testing suite included speciated PAHs.
- TPH fractions were determined in accordance with the narrow banded ranges proposed by the TPH Criteria Working Group (Gustafson et al, 1997 'TPCWG') and the proportions of aliphatic and aromatic compounds were determined.
- Analysis was undertaken to determine the concentrations of BTEX compounds, which represent the most volatile aromatic TPH compounds.

### 5.2.1.3 GENERIC QUANTITATIVE HUMAN HEALTH RISK ASSESSMENT

Measured levels of potential contaminants have been compared with preliminary generic screening values. These were taken to be current 'CLEA' Soil Guideline Values, where these exist (see Tables 1A to C).

CLEA SGV's have not been published for some determinands and the guidance that formed the basis for some of the published SGV's has been withdrawn. Where no current guidance has been published, "suitable for use" levels (S4UL's), published by LQM 2015 (Publication S4UL3287) were adopted as GAC (Generic Assessment Criteria) levels. Published SGV's relate to soil organic matter (SOM) contents of 6 % and S4UL values have been published for SOM values of 1, 2.5 and 6 %. A value of SOM of 2.5 % was adopted for preliminary screening, somewhat lower than the measured site average value (4.2 %). For lead, there is no current SGV or S4UL value and the screening value adopted is based on the recent 'Category 4', acceptable risk screening levels published by Defra. For these comparisons, the 95% upper confidence level (UCL) of the mean concentration of potential contaminants is usually adopted but for a small number of samples it is not always possible to determine a sensible value of UCL and the maximum and mean measured values are included in the tables.

Given the proposed nature of the development GAC values for residential usage with plant uptake have been adopted for the tables. With regard to the comparison to GAC's, apart from one sample showing elevated arsenic, no measured values exceed the GAC values.

No potentially asbestos containing materials were noted in the ground during the field programme and samples screened showed no asbestos fibres to be present. Further consideration is therefore warranted with respect to local presence of elevated arsenic in the site soils.

### 5.2.1.4 FURTHER CONSIDERATION WITH RESPECT TO ARSENIC

The sample showing elevated arsenic was from BH1, where some slag had been noted in the made ground. Inorganic arsenic compounds are non-volatile and potential exposure pathways can be broken by provision of clean cover soils in any garden and soft landscaped areas. Clean topsoil is, in any case, absent from much of the site. It is considered that a thickness of 300 mm of clean cover soils in any private garden areas or other soft landscaped areas should be sufficient to reduce risks to acceptable levels. Levels of potential contaminants in imported clean cover soils should not exceed the screening values in Tables 1A to 1C and Table 4A.

### 5.2.1.5 CONSTRUCTION WORKERS

Construction workers could potentially be exposed to contact with site soils and dust inhalation but it is not considered that any special precautions would be required to protect construction workers at the present site.

### 5.2.1.6 PLANTS

The CLEA approach only considers risks to human health of site users but CLR11 states that ICRCL Guidance Note 70/90 may be used for initial screening criteria for plants. Where values are not provided in ICRCL 70/90, the relevant values from former ICRCL Guidance Note 59/83 have been adopted. The test results are summarised in Table 2.

Based on these criteria, apart from one sample showing elevated total copper, from BH1 where slag was noted, no elevated concentrations of phytotoxins were measured. The leachable level of copper in that sample was very low (Table 4B). Low solubility metal compounds are not readily available to plants. In view of that and as clean cover soils are being recommended in soft landscaped areas with respect to human health

consideration, it is not considered that any additional special precautions are considered warranted with respect to plants.

#### 5.2.1.7 GENERIC QUANTITATIVE RISK ASSESSMENT– GROUND AND SURFACE WATER

The only practical 'wider' environmental pathway whereby potential contaminants within the near surface soils on site could migrate from the site following development would be by leaching to the groundwater and thence eventual discharge to the surface water system or abstraction. In order to assess the potential for leaching of contaminants, the following procedure was used:

1. An initial screening was carried out where total measured levels of contamination were compared to a leachate trigger level. This was taken to be 1) a generic Level 1 target value derived using the Environment Agency's RTM methodology (see Appendix C for details of derivation), or 2) the lower threshold concentration as defined in former EA guidance on the disposal of contaminated soils or 3) for TPH, 500 mg/kg (the current value used to define 'inert' waste) and for PAH 100 mg/kg, see Table 4A. According to this screening, one sample showed slightly elevated total copper.
2. The sample where the measured level exceeded the screening level was tested to determine the leachable concentration of copper. The measured leachable copper was below the relevant Environmental Quality Standard.

In view of this it is not considered that the site soils pose any risk to controlled waters and no special precautions are considered warranted.

#### 5.2.2 GROUND GAS

The Phase 1 Report concluded that risks to site usage associated with ground gas were low to moderate. No significant thickness of potentially putrescible material has been found on site. Gas monitoring standpipes were installed in three of the boreholes and a programme of ground gas monitoring was implemented (Table 5).

No methane was detected. Carbon dioxide concentrations were sometimes above atmospheric levels but the maximum recorded concentration was only 2.6 %. No gas flow was detected. Using the terminology of CIRIA 659, this would correspond to 'Characteristic Situation 1' and no special precautions are considered warranted with respect to ground gas.

#### 5.2.3 SUMMARY OF REMEDIAL PRECAUTIONS WITH REGARD TO CONTAMINATION

##### 5.2.3.1 SOIL CONTAMINATION

Clean cover soils should be provided in the proposed private garden and any other soft landscaped areas associated with the new residential development. A thickness of 300 mm (subsoil and topsoil combined) is recommended.

##### 5.2.3.2 CONSTRUCTION WORKERS

No special precautions are considered warranted with respect to protection of construction workers.

##### 5.2.3.3 GROUND GAS

No special precautions are considered warranted with respect to ground gas.

#### 5.2.3.4 PLANTS

No special additional precautions are considered necessary with respect to plants.

#### 5.2.3.5 WIDER ENVIRONMENT

No special precautions are considered necessary with respect to controlled waters.

#### 5.2.3.6 BURIED CONCRETE

It is considered that the site may be classified as exhibiting Class DS-1/AC-1 conditions as per BRE Special Digest 1.

#### 5.2.3.7 LOCAL SITE AREAS

The potential exists on a site of this nature for local areas of contamination to be present that are not identified during the ground investigation. Should any local areas of visibly potentially contaminated material be observed the affected material should be segregated and either removed from site or tested for potential re-use as fill, subject if necessary to appropriate remedial treatment.

### **5.3 GENERAL**

There is the potential for ground conditions to be present on site between exploration holes that are different from those encountered during a ground investigation. Should significantly different ground conditions be encountered the relevance of recommendations included in the present report should be reviewed in the light of any new information.

It is recommended that design details for the proposed development be discussed with the authority that will be responsible for building control, and if appropriate warranty, prior to finalisation of design details. The appropriate utility providers should be consulted with regard to any special precautions that may be required to protect buried services.

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## TABLES

**TABLE 1A COMPARISON OF LEVELS OF MEASURED CONTAMINANTS WITH GENERIC SOIL GUIDELINE VALUES – PRELIMINARY HAZARD SCREENING – METALS, PHENOL AND CYANIDE**

Determinand	Total No of Samples Tested	Mean	SGV/GAC	Maximum Value	Number of Outliers	Number of Samples Exceeding SGV/GAC
Arsenic	3	39	37	81.8	1	1
Boron	3	0.61	290	0.77	0	0
Cadmium	3	0.67	11	1.22	1	0
Hexavalent Chromium	3	0.57	6	1.3	0	0
Chromium (III)	3	30	910	47.9	1	0
Copper	3	170	2400	431	1	0
Lead	3	130	200	190	0	0
Mercury	3	1.4	170	2.5	0	0
Nickel	3	24	130	40	0	0
Selenium	3	All BLD	350	<2	0	0
Vanadium	3	44	410	73	0	0
Zinc	3	170	3700	317	1	0
Cyanide	3	All BLD	250	<1.1	0	0
Phenols	3	0.45	200	0.46	1	0

Key:

BLD

Below Limit of Detection

Notes:

- 1 Where value BLD - assumed equal to detection limit for calculation of mean values etc.
- 2 Where SGV not published by DEFRA, LQM S4UL (Pub No:S4UL3287) Value Used.
- 3 For Lead DEFRA C4SL Adopted.
- 4 All values are in mg/kg
- 5 Outliers included for Mean calculation
- 6 GAC Based on Sandy Loam and SOM = 2.5 %, Residential with Plant Uptake

**TABLE 1B COMPARISON OF LEVELS OF MEASURED  
CONTAMINANTS WITH GENERIC SOIL GUIDELINE VALUES –  
PRELIMINARY HAZARD SCREENING – TPH & BTEX**

Determinand	Total No of Samples Tested	Mean	SGV/GAC	Maximum Value	Number of Outliers	Number of Samples Exceeding SGV/GAC
Benzene	3	All BLD	0.17	<0.01	0	0
Toluene	3	All BLD	290	<0.01	0	0
Ethylbenzene	3	All BLD	110	<0.01	0	0
m&p-Xylene	3	All BLD	130	<0.01	0	0
o-Xylene	3	All BLD	140	<0.01	0	0
Aliphatic VPH >C5 - C6	3	All BLD	78	<0.1	0	0
Aliphatic VPH >C6 - C8	3	All BLD	230	<0.1	0	0
Aliphatic VPH >C8 - C10	3	All BLD	65	<0.1	0	0
Aliphatic EPH >C10 - C12	3	All BLD	330 sol (120)	<1	0	0
Aliphatic EPH >C12 - C16	3	All BLD	2400 sol (59)	<1	0	0
Aliphatic EPH >C16 - C35	3	19	92000 sol (21)	33	0	0
Aliphatic EPH >C35 - C44	3	4.8	92000 sol (21)	7.3	0	0
Aromatic VPH >C8 - C10	3	All BLD	83	<0.1	0	0
Aromatic EPH >C10 - C12	3	All BLD	180	<1	0	0
Aromatic EPH >C12 - C16	3	2.4	330	3.7	0	0
Aromatic EPH >C16 - C21	3	5.7	540 sol (130)	9.2	0	0
Aromatic EPH >C21 - C35	3	21	1500 sol (12)	35	0	0
Aromatic EPH >C35 - C44	3	6.7	1500 sol (0.18)	11	0	0

## Key:

BLD

Below Limit of Detection

## Notes:

- 1 Where value BLD - assumed equal to detection limit for calculation of mean values etc.
- 2 Where SGV not published by DEFRA, LQMS4UL (Pub No:S4UL3287) Value Used.
- 3 For Lead DEFRA C4SL Adopted.
- 4 All values are in mg/kg
- 5 Outliers included for Mean calculation
- 6 GAC Based on Sandy Loam and SOM = 2.5 %, Residential with Plant Uptake
- 7 sol = exceeds the solubility or vapour saturation limit, shown in brackets

**TABLE 1C COMPARISON OF LEVELS OF MEASURED  
CONTAMINANTS WITH GENERIC SOIL GUIDELINE VALUES –  
PRELIMINARY HAZARD SCREENING – PAH COMPOUNDS**

Determinand	Total No of Samples Tested	Mean	SGV/GAC	Maximum Value	Number of Outliers	Number of Samples Exceeding SGV/GAC
Acenaphthene	3	0.014	510 sol (140)	0.022	1	0
Acenaphthylene	3	0.02	420 sol (210)	0.036	0	0
Anthracene	3	0.065	5400 sol (2.9)	0.094	0	0
Benzo(a)anthracene	3	0.28	11	0.37	0	0
Benzo(a)pyrene	3	0.29	2.7	0.42	0	0
Benzo(b)fluoranthene	3	0.38	3.3	0.55	0	0
Benzo(g,h,i)perylene	3	0.19	340	0.29	0	0
Benzo(k)fluoranthene	3	0.15	93	0.22	0	0
Chrysene	3	0.29	22	0.39	0	0
Dibenz(a,h)anthracene	3	0.046	0.28	0.07	0	0
Fluoranthene	3	0.62	560 sol (47)	0.84	0	0
Fluorene	3	0.018	400 sol (77)	0.025	0	0
Indeno(1,2,3-c,d)pyrene	3	0.19	36	0.29	0	0
Naphthalene	3	0.073	5.6	0.177	1	0
Phenanthrene	3	0.38	220 sol (89)	0.56	0	0
Pyrene	3	0.5	1200 sol (5.5)	0.68	0	0

## Key:

BLD                      Below Limit of Detection

## Notes:

- 1 Where value BLD - assumed equal to detection limit for calculation of mean values etc.
- 2 Where SGV not published by DEFRA, LQM S4UL (Pub No:S4UL3287) Value Used.
- 3 For Lead DEFRA C4SL Adopted.
- 4 All values are in mg/kg
- 5 Outliers included for Mean calculation
- 6 GAC Based on Sandy Loam and SOM = 2.5 %, Residential with Plant Uptake
- 7 sol = exceeds the solubility saturation limit, shown in brackets

**TABLE 2 COMPARISON OF LEVELS OF MEASURED CONTAMINANTS WITH FORMER ICRL THRESHOLD TRIGGER VALUES – ALL AREAS WHERE PLANTS ARE TO BE GROWN**

Determinand	Total Number of Samples Tested	Mean Result (note 1)	Range	Reference Standard (See Key Below)	Trigger Value	Number of Samples Exceeding Trigger Value
Boron	3	0.61	<0.5 to 0.77	ICRCL 59/83	3	0
Copper	3	170	32.8 to 431	ICRCL 70/90	250	1
Nickel	3	24	15.4 to 39.6	ICRCL 59/83	70	0
Zinc	3	170	95.9 to 317	ICRCL 70/90	1000	0

## Key:

ICRCL 59/83 ICRL Threshold Concentration for all uses where plants are to be grown

ICRCL 70/90 ICRL Threshold Concentration for restoration for agriculture

## Notes:

1 Where value below detection limit - assumed equal to detection limit for calculation of mean values etc.

2 No action limits specified for phytotoxins

3 All values are in mg/kg

**TABLE 3 SOIL SULPHATE AND PH DATA**

Determinand	Total Number of Samples Tested	Mean Result	Range
Sulphate (Total) %	3	0.22	0.19 to 0.26
pH	5	6.9	5.9 to 7.5
Sulphate (WS) g/l	5	0.061	<0.06 to 0.064

## Notes:

1 Where value below detection limit - assumed equal to detection limit for calculation of mean values etc.

**TABLE 4A COMPARISON OF LEVELS OF MEASURED CONTAMINANTS WITH RTM LEVEL 1 LEACHATE SCREENING TRIGGER VALUES**

Determinand	Total Number of Samples Tested	Mean Result (note 1)	Range	Reference Standard (See Key Below)	Trigger Value	Number of Samples Exceeding Trigger Value
Arsenic	3	39	17.4 to 81.8	P20 Level 1	90	0
Boron	3	0.61	<0.5 to 0.77	P20 Level 1	20	0
Cadmium	3	0.67	<0.4 to 1.22	P20 Level 1	13	0
Chromium (Total)	3	31	20.8 to 49.2	P20 Level 1	96	0
Copper	3	170	32.8 to 431	P20 Level 1	420	1
Lead	3	130	85.5 to 187	P20 Level 1	720	0
Mercury	3	1.4	0.7 to 2.49	P20 Level 1	7.5	0
Nickel	3	24	15.4 to 39.6	P20 Level 1	80	0
Selenium	3	All BLD	-	P20 Level 1	3	0
Zinc	3	170	95.9 to 317	P20 Level 1	1000	0
Cyanide	3	All BLD	-	EA	250	0
Phenols	3	0.45	<0.44 to 0.46	EA	5	0
Sulphide	3	All BLD	-	EA	250	0
Sulphur	3	35	<10 to 86	EA	5000	0
TPH (Total)	3	59	<5 to 99	IWAL	500	0
PAH (Total)	3	3.5	1.18 to 4.98	IWAL	100	0

## Key:

P20 Level 1	Generic RTM Level 1 calculated target value
EA	Interim Guidance on the Disposal of 'Contaminated Soils' - Lower Threshold Concentration
IWAL	Waste acceptance limit for 'inert waste'
BLD	Below Limit of Detection
TPH	Total Petroleum Hydrocarbons
PAH	Poly Aromatic Hydrocarbons

## Notes:

- Where value below detection limit - assumed equal to detection limit for calculation of mean values etc.
- All values are in mg/kg

**TABLE 4B COMPARISON OF LEVELS OF MEASURED CONTAMINANTS WITH LEACHATE QUALITY THRESHOLD VALUES - LEACHING TESTS**

Determinand	Total Number of Samples Tested	Mean Result (see note 1)	Range	Reference Standard (See Key Below)	Trigger Value	Number of Samples exceeding trigger value
Copper	1	0.0162	-	EQS	0.028	0

## Key:

EQS	Environmental Quality Standards
PAH	Polyaromatic Hydrocarbons
TPH	Total Petroleum Hydrocarbons
DWS	Drinking Water Standard

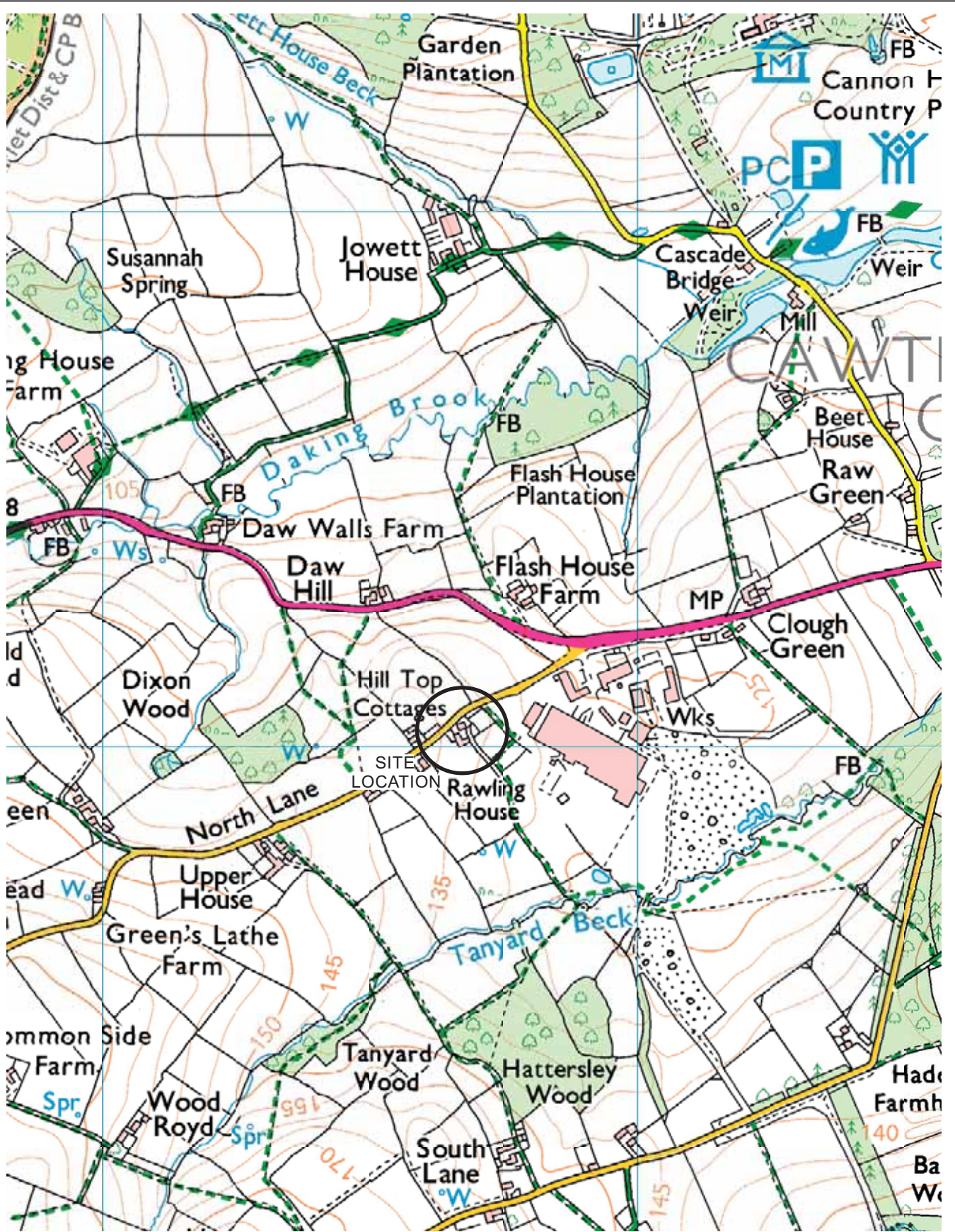
## Notes:

- Where value below detection limit – assumed equal to detection limit for calculation of mean values etc.
- All values are in mg/l

**TABLE 5 GROUNDWATER AND GROUND GAS MONITORING**

Date	BH	Atmospheric Pressure (bar)	CH <sub>4</sub> (%)	CO <sub>2</sub> (%)	O <sub>2</sub> (%)	Gas Flow Rate	Depth to Groundwater
17/03/17	2	1020	0	0.9	20.3	None	Dry (0.76)
	3	Falling	0	2.6	18.1	None	Dry (0.32)
	5		0	0.9	20.3	None	Dry (0.95)
25/08/17	2	1028	0	0.6	20.5	None	Dry
	3	Rising	0	1.3	20.1	None	Dry
	5		0	0.7	20.5	None	Dry
31/03/17	2	990	0	0.9	20.1	None	Dry
	3	Falling	0	1.2	19.9	None	Dry
	5		0	0.7	20.1	None	Dry
12/04/17	2	1000	0	0.9	20.2	None	Dry
	3	Falling	0	0.5	20.4	None	Dry
	5		0	0.7	20.4	None	Dry

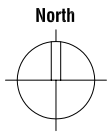
## FIGURES



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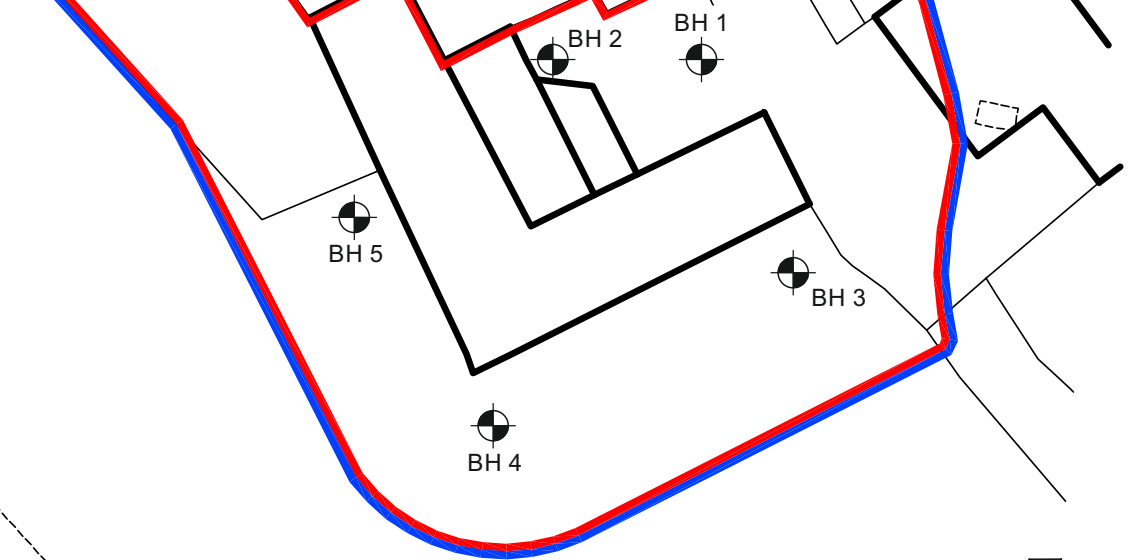
SITE LOCATION PLAN

<p><b>SLADEN ASSOCIATES</b></p>	<p>Report No 17-1765</p>	<p>Project Site at Rowling House Cawthorne Nr Barnsley</p>	<p>Figure 1</p>
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Rowling  
House  
Farm

Rowling House  
Cottage



**KEY**

-  Window Sample Borehole
-  Soakaway Trial Pit

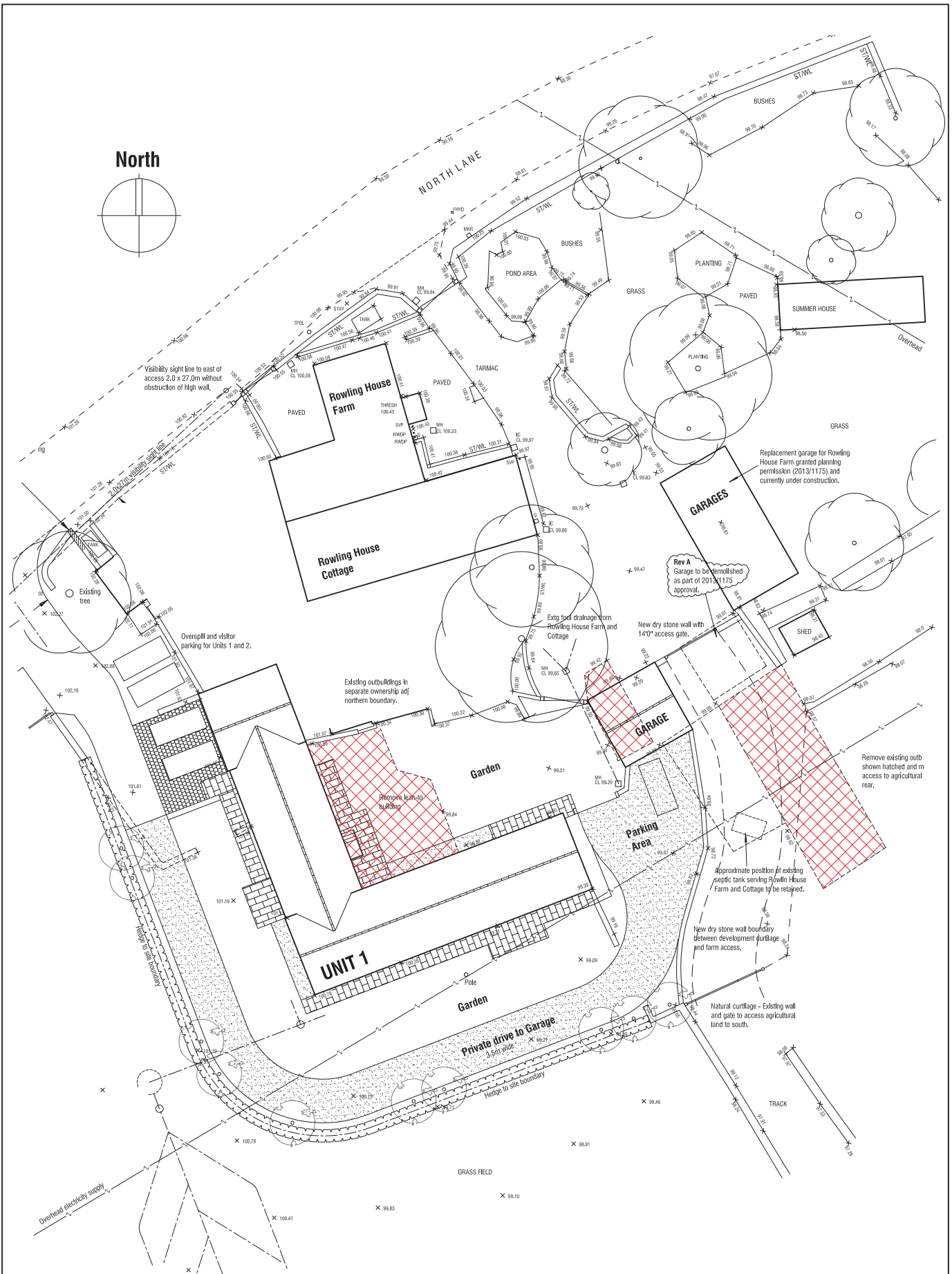
SITE LAYOUT PLAN

**SLADEN  
ASSOCIATES**

Report No  
17-1765

Project  
Site at Rowling House  
Cawthorne  
Nr Barnsley

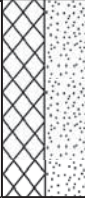

Figure  
**2**


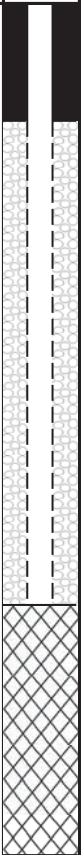




PROPOSED SITE LAYOUT PLAN

<p><b>SLADEN ASSOCIATES</b></p>	<p>Report No 17-1765</p>	<p>Project Site at Rowing House Cawthorne Nr Barnsley</p>	<p>Figure <b>3</b></p>
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**APPENDIX A**  
**BOREHOLE AND TRIAL PIT LOGS**

Equipment & Methods		Job No: 17-1765					
Mini Rig/Window Sampler		Project: Site at Rowling House, Cawthorne, Nr Barnsley					
Carried out for		Ground Level		Coordinates			Date
Abbey Masterbatch Ltd		0		E N			16-03-17
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records
				Depth	Sample		
					Type	No.	
Medium dense dark brown SAND with some sub angular to angular fine to coarse gravel. Gravel is sandstone and occasional slag. (MADE GROUND)		0.00 to 0.60		U	1	PID	<0.1ppm
		0.10 to 0.70		CPT	2	DPSH Test	see separate record
Medium dense becoming very dense light brown becoming yellow brown slightly sandy angular fine to coarse GRAVEL. Gravel is sandstone. (PENISTONE FLAGS)		0.25	-0.25				
		0.60 to 0.75		SPT	3	N=>50	10,18 blows for 75mm
End of Borehole		0.75	-0.75				
Additional Comments							Logged by
Log based on limited returns due to sampling method - depths are approximate.							GLD
Continuous dynamic probe put down prior borehole - see separate record.							
Groundwater: none encountered.							Figure




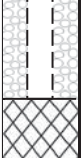

Equipment & Methods		Job No: 17-1765							
Mini Rig/Window Sampler		Project: Site at Rowling House, Cawthorne, Nr Barnsley							
Carried out for		Ground Level		Coordinates			Date		
Abbey Masterbatch Ltd		0		E N			16-03-17		
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	Well	
				Depth	Sample				Test
					Type	No.			
Loose to medium dense dark brown SAND with occasional rounded to angular fine to coarse gravel. Gravel is sandstone and brick. (MADE GROUND)		0.05	-0.05	0.00 to 1.00	U	1	PID	<0.1ppm	
				0.10 to 1.10	CPT	2	DPSH Test	see separate record	
Brick. (MADE GROUND)		0.20	-0.20						
Medium dense light brown and yellow brown sandy angular to sub rounded fine to coarse GRAVEL. Gravel is sandstone. Very dense at base. (PENISTONE FLAGS)				1.00 to 1.07	SPT	3	N=>50	30 blows for 75mm	
End of Borehole		1.07	-1.07						



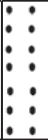
**Additional Comments**


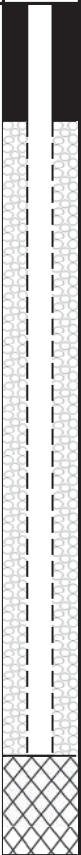

Log based on limited returns due to sampling method - depths are approximate.  
 Continuous dynamic probe put down prior borehole - see separate record.  
 Groundwater: none encountered.  
 50mm groundwater/gas monitoring standpipe installed 0.0m to 0.15m, plain pipe with bentonite seal 0.15m to 0.76m slotted pipe with gravel surround.

Logged by  
GLD

Figure

Equipment & Methods Mini Rig/Window Sampler		Job No: 17-1765 Project: Site at Rowling House, Cawthorne, Nr Barnsley							
Carried out for Abbey Masterbatch Ltd		Ground Level 0		Coordinates E N			Date 16-03-17		
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	Well	
				Depth	Sample Type	Sample No.			Test
Loose to medium dense brown SAND with some sub angular to sub rounded fine to coarse gravel. Gravel is sandstone. (TOPSOIL)				0.00 to 0.40	U	1	PID	<0.1ppm	
Medium dense becoming very dense light brown to yellow brown sandy angular to sub angular fine to coarse GRAVEL. Gravel is sandstone. (PENISTONE FLAGS)		0.20	-0.20						
End of Borehole		0.40	-0.40	0.40 to 0.47	SPT	2	N=>50	20 blows for 75mm	
Additional Comments Log based on limited returns due to sampling method - depths are approximate. Groundwater: none encountered. 50mm groundwater/gas monitoring standpipe installed 0.0m to 0.15m, plain pipe with bentonite seal 0.15m to 0.32m slotted pipe with gravel surround.							Logged by GLD	Figure	

Equipment & Methods		Job No: 17-1765						
Mini Rig/Window Sampler		Project: Site at Rowling House, Cawthorne, Nr Barnsley						
Carried out for		Ground Level		Coordinates		Date		
Abbey Masterbatch Ltd		0		E N		16-03-17		
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	
				Depth	Sample Type	Sample No.		Test
Loose brown SAND with some sub rounded to angular fine to coarse gravel. Gravel is sandstone and occasional brick. (MADE GROUND)				0.00 to 0.50 0.00 to 0.60	U CPT	1 2	PID DPSH Test	<0.1ppm see separate record
Medium dense light brown SAND with much angular to sub rounded fine to coarse gravel. Gravel is sandstone. (PENISTONE FLAGS)		0.25	-0.25					
Very weak yellow brown SANDSTONE. Highly fractured. (PENISTONE FLAGS)		0.50	-0.50	0.50 to 0.67	SPT	3	N=>50	25 blows for 75mm
End of Borehole		0.67	-0.67					
Additional Comments Log based on limited returns due to sampling method - depths are approximate. Continuous dynamic probe put down prior borehole - see separate record. Groundwater: none encountered.							Logged by GLD	
							Figure	

Equipment & Methods		Job No: 17-1765						
Mini Rig/Window Sampler		Project: Site at Rowling House, Cawthorne, Nr Barnsley						
Carried out for		Ground Level		Coordinates			Date	
Abbey Masterbatch Ltd		0		E N			16-03-17	
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	Well
				Depth	Sample			
				Type	No.			
Medium dense dark brown SAND with some sub angular to angular fine to coarse gravel. Gravel is sandstone, occasional ash and brick. (MADE GROUND)		0.00 to 1.00	-0.20	U	1	PID	<0.1ppm	
				CPT	2	DPSH Test	see separate record	
Medium dense orange brown and brown, becoming yellow brown sandy angular to sub angular fine to coarse GRAVEL. Gravel is sandstone. Very dense at base. (PENISTONE FLAGS)		0.20	-0.20					
				1.00 to 1.07	SPT	3	N=>50	27 blows for 75mm
End of Borehole		1.07	-1.07					

**Additional Comments**

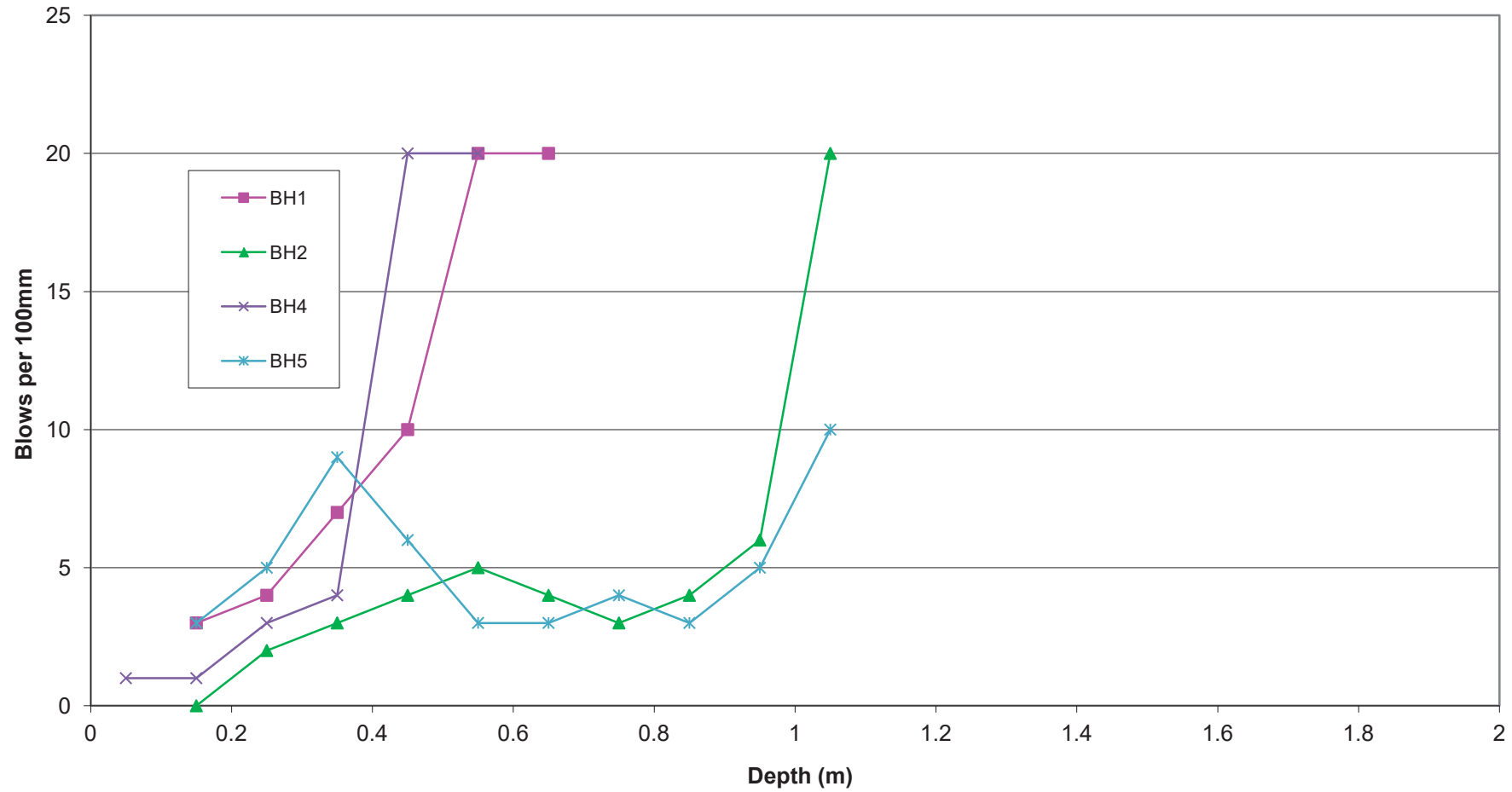
Log based on limited returns due to sampling method - depths are approximate.  
 Continuous dynamic probe put down prior borehole - see separate record.  
 Groundwater: none encountered.  
 50mm groundwater/gas monitoring standpipe installed 0.0m to 0.15m, plain pipe with bentonite seal 0.15m to 0.95m slotted pipe with gravel surround.

Logged by  
GLD

Figure

Equipment & Methods		Job No: 17-1765					
Machine Excavator		Project: Site at Rowling House, Crawthorne, Nr Barnsley					
Carried out for		Ground Level		Coordinates			Date
Abbey Masterbatch Ltd		0		E N			16-03-17
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records
				Depth	Sample		
					Type	No.	
Loose to medium dense brown SAND with occasional sub rounded to sub angular fine to coarse gravel. Gravel is sandstone. (TOPSOIL)		0.10		B	1	PID	<0.1ppm
Soft orange brown sandy CLAY with some sub rounded to sub angular fine to coarse gravel. Gravel is sandstone. (PENISTONE FLAGS)		0.20	-0.20				
		0.30		B	2	PID	<0.1ppm
Medium dense light grey, brown and yellow brown sandy angular to sub angular fine to coarse GRAVEL and occasional cobbles. Gravel is sandstone. Very dense at base. (PENISTONE FLAGS)		0.40	-0.40				
		0.70		B	3	PID	<0.1ppm
End of Borehole		0.90	-0.90				
Additional Comments Groundwater: none encountered. Pit side stable during excavation. Soakaway test conducted in excavation.							Logged by GLD
							Figure

17-1765 Site at Rowling House, Cawthorne, Nr Barnsley  
Dynamic Probe Test Results (DPSH Method) Sheet 1 of 1



**APPENDIX B**  
**LABORATORY TEST RESULTS**

# Report Summary



1314  
0897  
4409



**Mr Graham Dorrell  
Sladen Associates  
Netherton Workshops  
New Road  
Highley  
Bridgnorth  
West Midlands  
WV16 6NN**

Date of Issue: **26 April 2017**

Report Number: **COV/1371481/2017** Issue **3**

**Job Description:** General Analysis

**Job Location:** 17-1765 Rowling House Cawthorne

Number of Samples  
included in this report: **3**

Job Received: **14 March 2017**

Number of Test Results  
included in this report: **198**

Analysis Commenced: **16 March 2017**

Signed: *A I Horobin*

Name: **A. Horobin**

Date: **26 April 2017**

Title: **Organic Operations Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

MCERTS accreditation refers to analysis carried out at our Coventry site only.

Analysis carried out on air-dried and ground test portion of the sample(s), unless otherwise stated. Air drying is carried out at not greater than 30 degrees C. Samples are not preserved on site, unless otherwise stated.

All results are reported on an air-dried basis following removal of stones.

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# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948651**

Sample **1** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH1 0.00m - 0.50m**

Visual Description: **Dark brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017**

Sample Time:

Sample Received:

**14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Arsenic as As, dry weight	81.8	mg/kg	22/03/2017		N S	SUBCON
Cadmium as Cd, dry weight	1.22	mg/kg	22/03/2017		N S	SUBCON
Chromium as Cr, dry weight	49.2	mg/kg	22/03/2017		N S	SUBCON
Copper as Cu, dry weight	431	mg/kg	22/03/2017		N S	SUBCON
Lead as Pb, dry weight	187	mg/kg	22/03/2017		N S	SUBCON
Mercury as Hg, dry weight	0.89	mg/kg	22/03/2017		N S	SUBCON
Nickel as Ni, dry weight	39.6	mg/kg	22/03/2017		N S	SUBCON
Selenium as Se, dry weight	<2.0	mg/kg	22/03/2017		N S	SUBCON
Zinc as Zn, dry weight	317	mg/kg	22/03/2017		N S	SUBCON
Vanadium as V, dry weight	72.6	mg/kg	22/03/2017		N S	SUBCON
Stones Content >10mm NG	5.4	%	29/03/2017		N Cov	Stones
Moisture content at 30C	10	%	29/03/2017		N Cov	33A
Boron as B, hot water sol dw	0.77	mg/kg	20/03/2017		Y Cov	6
Hexavalent Chromium as dw	1.3	mg/kg	20/03/2017		N Cov	30B
Chromium (III)	47.9	mg/kg	27/03/2017		N Cov	30
Cyanide, Total	<1.1	mg/kg	20/03/2017		M Cov	14
Organic Matter	7.1	%	21/03/2017		Y Cov	36
Mono Phenols, Total DW	<0.44	mg/kg	16/03/2017		Y Cov	40A
Sulphate, Total as SO4	0.26	%	20/03/2017		N Cov	45
Sulphide	<3.1	mg/kg	21/03/2017		M Cov	47
pH	7.5	pH units	17/03/2017		M Cov	39
Sulphur, Elemental	86	mg/kg	17/03/2017		M Cov	51
MTBE (Methyl-tert-Butyl Ether)	<0.011	mg/kg	17/03/2017		M Cov	304
Benzene	<0.011	mg/kg	17/03/2017		M Cov	304
Toluene	<0.011	mg/kg	17/03/2017		M Cov	304
Ethylbenzene	<0.011	mg/kg	17/03/2017		M Cov	304
m&p-Xylene	<0.011	mg/kg	17/03/2017		M Cov	304
o-Xylene	<0.011	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C5 - C6	<0.11	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C6 - C8	<0.11	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	17/03/2017		Y Cov	304
Aliphatic EPH >C10 - C12	<1.1	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C12 - C16	<1.1	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C16 - C35	37	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C35 - C44	8.1	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	44	mg/kg	17/03/2017		N Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.011	mg/kg	17/03/2017		M Cov	304

ALS Environmental Ltd

Torrington Avenue, Coventry, CV4 9GU  
Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948651**

Sample **1** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH1 0.00m - 0.50m**

Visual Description: **Dark brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017** Sample Time:

Sample Received: **14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Aromatic VPH >C7 - C8	<0.011	mg/kg	17/03/2017		M Cov	304
Aromatic VPH >C8 - C10	<0.11	mg/kg	17/03/2017		M Cov	304
Aromatic EPH >C10 - C12	<1.1	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C12 - C16	4.1	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C16 - C21	10	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C21 - C35	39	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C35 - C44	12	mg/kg	16/03/2017		M Cov	317EPH
Aromatic VPH/EPH >C5 - C44	66	mg/kg	17/03/2017		N Cov	304/317EPH
VPH/EPH >C5 - C44	110	mg/kg	17/03/2017		M Cov	304/317EPH
Description of Sample	Analyst Comme	Text	20/03/2017		N Cov	70
Asbestos Identification	Analyst Comme	Text	20/03/2017		N Cov	70
PAH, Sum of 16	4.98	mg/kg DW	21/03/2017		N S	SUBCON
Naphthalene	0.177	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthylene	0.015	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthene	0.022	mg/kg DW	21/03/2017		N S	SUBCON
Fluorene	0.025	mg/kg DW	21/03/2017		N S	SUBCON
Phenanthrene	0.559	mg/kg DW	21/03/2017		N S	SUBCON
Anthracene	0.082	mg/kg DW	21/03/2017		N S	SUBCON
Fluoranthene	0.826	mg/kg DW	21/03/2017		N S	SUBCON
Pyrene	0.679	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)anthracene	0.364	mg/kg DW	21/03/2017		N S	SUBCON
Chrysene	0.390	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(b)fluoranthene	0.552	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(k)fluoranthene	0.223	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)pyrene	0.418	mg/kg DW	21/03/2017		N S	SUBCON
Indeno(1,2,3-c,d)pyrene	0.286	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(g,h,i)perylene	0.291	mg/kg DW	21/03/2017		N S	SUBCON
Dibenzo(a,h)anthracene	0.070	mg/kg DW	21/03/2017		N S	SUBCON
Sulphate as SO <sub>4</sub> , Water Soluble	<0.060	g/l	21/03/2017		N Cov	46

**Analyst Comments for 15948651:**

This sample has been analysed for VPH soils method 304 outside recommended stability times. It is therefore possible that the results provided may be compromised. ASBESTOS COMMENTS Asbestos ID: Non Detected, Description of Sample: Soil

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Che = Chester(CH4 9EP), Ott = Otterbourne(SO21 2SW), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).

**ALS Environmental Ltd**

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# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948652**

Sample **2** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH3 0.00m - 0.40m**

Visual Description: **Brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017**

Sample Time:

Sample Received:

**14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Arsenic as As, dry weight	17.4	mg/kg	22/03/2017		N S	SUBCON
Cadmium as Cd, dry weight	<0.40	mg/kg	22/03/2017		N S	SUBCON
Chromium as Cr, dry weight	20.8	mg/kg	22/03/2017		N S	SUBCON
Copper as Cu, dry weight	37.5	mg/kg	22/03/2017		N S	SUBCON
Lead as Pb, dry weight	114	mg/kg	22/03/2017		N S	SUBCON
Mercury as Hg, dry weight	2.49	mg/kg	22/03/2017		N S	SUBCON
Nickel as Ni, dry weight	17.7	mg/kg	22/03/2017		N S	SUBCON
Selenium as Se, dry weight	<2.0	mg/kg	22/03/2017		N S	SUBCON
Zinc as Zn, dry weight	96.5	mg/kg	22/03/2017		N S	SUBCON
Vanadium as V, dry weight	28.2	mg/kg	22/03/2017		N S	SUBCON
Stones Content >10mm NG	4.4	%	29/03/2017		N Cov	Stones
Moisture content at 30C	17	%	29/03/2017		N Cov	33A
Boron as B, hot water sol dw	<0.50	mg/kg	20/03/2017		Y Cov	6
Hexavalent Chromium as dw	0.17	mg/kg	20/03/2017		N Cov	30B
Chromium (III)	20.6	mg/kg	27/03/2017		N Cov	30
Cyanide, Total	<1.1	mg/kg	20/03/2017		M Cov	14
Organic Matter	3.1	%	21/03/2017		Y Cov	36
Mono Phenols, Total DW	0.46	mg/kg	16/03/2017		Y Cov	40A
Sulphate, Total as SO4	0.21	%	20/03/2017		N Cov	45
Sulphide	<3.1	mg/kg	21/03/2017		M Cov	47
pH	5.9	pH units	17/03/2017		M Cov	39
Sulphur, Elemental	<10	mg/kg	17/03/2017		M Cov	51
MTBE (Methyl-tert-Butyl Ether)	<0.012	mg/kg	17/03/2017		M Cov	304
Benzene	<0.012	mg/kg	17/03/2017		M Cov	304
Toluene	<0.012	mg/kg	17/03/2017		M Cov	304
Ethylbenzene	<0.012	mg/kg	17/03/2017		M Cov	304
m&p-Xylene	<0.012	mg/kg	17/03/2017		M Cov	304
o-Xylene	<0.012	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C5 - C6	<0.12	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C6 - C8	<0.12	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	17/03/2017		Y Cov	304
Aliphatic EPH >C10 - C12	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C12 - C16	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C16 - C35	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C35 - C44	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	<6.0	mg/kg	17/03/2017		N Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.012	mg/kg	17/03/2017		M Cov	304

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# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948652**

Sample **2** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH3 0.00m - 0.40m**

Visual Description: **Brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017**

Sample Time:

Sample Received: **14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Aromatic VPH >C7 - C8	<0.012	mg/kg	17/03/2017		M Cov	304
Aromatic VPH >C8 - C10	<0.12	mg/kg	17/03/2017		M Cov	304
Aromatic EPH >C10 - C12	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C12 - C16	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C16 - C21	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C21 - C35	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C35 - C44	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic VPH/EPH >C5 - C44	<6.0	mg/kg	17/03/2017		N Cov	304/317EPH
VPH/EPH >C5 - C44	<6.0	mg/kg	17/03/2017		M Cov	304/317EPH
Description of Sample	Analyst Comme	Text	20/03/2017		N Cov	70
Asbestos Identification	Analyst Comme	Text	20/03/2017		N Cov	70
PAH, Sum of 16	4.26	mg/kg DW	21/03/2017		N S	SUBCON
Naphthalene	0.023	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthylene	0.036	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthene	<0.010	mg/kg DW	21/03/2017		N S	SUBCON
Fluorene	0.018	mg/kg DW	21/03/2017		N S	SUBCON
Phenanthrene	0.449	mg/kg DW	21/03/2017		N S	SUBCON
Anthracene	0.094	mg/kg DW	21/03/2017		N S	SUBCON
Fluoranthene	0.840	mg/kg DW	21/03/2017		N S	SUBCON
Pyrene	0.676	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)anthracene	0.370	mg/kg DW	21/03/2017		N S	SUBCON
Chrysene	0.370	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(b)fluoranthene	0.422	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(k)fluoranthene	0.170	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)pyrene	0.341	mg/kg DW	21/03/2017		N S	SUBCON
Indeno(1,2,3-c,d)pyrene	0.203	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(g,h,i)perylene	0.196	mg/kg DW	21/03/2017		N S	SUBCON
Dibenzo(a,h)anthracene	0.052	mg/kg DW	21/03/2017		N S	SUBCON
Sulphate as SO <sub>4</sub> , Water Soluble	<0.060	g/l	21/03/2017		N Cov	46

**Analyst Comments for 15948652:**

This sample has been analysed for VPH soils method 304 outside recommended stability times. It is therefore possible that the results provided may be compromised. ASBESTOS COMMENTS Asbestos ID: Non Detected, Description of Sample: Soil

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Che = Chester(CH4 9EP), Ott = Otterbourne(SO21 2SW), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).

# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948653**

Sample **3** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH4 0.00m - 0.50m**

Visual Description: **Brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017**

Sample Time:

Sample Received:

**14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Arsenic as As, dry weight	19.0	mg/kg	22/03/2017		N S	SUBCON
Cadmium as Cd, dry weight	<0.40	mg/kg	22/03/2017		N S	SUBCON
Chromium as Cr, dry weight	21.7	mg/kg	22/03/2017		N S	SUBCON
Copper as Cu, dry weight	32.8	mg/kg	22/03/2017		N S	SUBCON
Lead as Pb, dry weight	85.5	mg/kg	22/03/2017		N S	SUBCON
Mercury as Hg, dry weight	0.70	mg/kg	22/03/2017		N S	SUBCON
Nickel as Ni, dry weight	15.4	mg/kg	22/03/2017		N S	SUBCON
Selenium as Se, dry weight	<2.0	mg/kg	22/03/2017		N S	SUBCON
Zinc as Zn, dry weight	95.9	mg/kg	22/03/2017		N S	SUBCON
Vanadium as V, dry weight	32.6	mg/kg	22/03/2017		N S	SUBCON
Stones Content >10mm NG	4.9	%	29/03/2017		N Cov	Stones
Moisture content at 30C	18	%	29/03/2017		N Cov	33A
Boron as B, hot water sol dw	0.55	mg/kg	20/03/2017		Y Cov	6
Hexavalent Chromium as dw	0.25	mg/kg	20/03/2017		N Cov	30B
Chromium (III)	21.5	mg/kg	27/03/2017		N Cov	30
Cyanide, Total	<1.1	mg/kg	20/03/2017		M Cov	14
Organic Matter	2.5	%	21/03/2017		Y Cov	36
Mono Phenols, Total DW	0.44	mg/kg	16/03/2017		Y Cov	40A
Sulphate, Total as SO4	0.19	%	20/03/2017		N Cov	45
Sulphide	<3.1	mg/kg	21/03/2017		M Cov	47
pH	7.0	pH units	17/03/2017		M Cov	39
Sulphur, Elemental	<10	mg/kg	17/03/2017		M Cov	51
MTBE (Methyl-tert-Butyl Ether)	<0.012	mg/kg	17/03/2017		M Cov	304
Benzene	<0.012	mg/kg	17/03/2017		M Cov	304
Toluene	<0.012	mg/kg	17/03/2017		M Cov	304
Ethylbenzene	<0.012	mg/kg	17/03/2017		M Cov	304
m&p-Xylene	<0.012	mg/kg	17/03/2017		M Cov	304
o-Xylene	<0.012	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C5 - C6	<0.12	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C6 - C8	<0.12	mg/kg	17/03/2017		M Cov	304
Aliphatic VPH >C8 - C10	<0.10	mg/kg	17/03/2017		Y Cov	304
Aliphatic EPH >C10 - C12	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C12 - C16	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C16 - C35	27	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic EPH >C35 - C44	7.6	mg/kg	16/03/2017		M Cov	317EPH
Aliphatic VPH/EPH >C5 - C44	34	mg/kg	17/03/2017		N Cov	304/317EPH
Aromatic VPH >C5 - C7	<0.012	mg/kg	17/03/2017		M Cov	304

ALS Environmental Ltd

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# Certificate of Analysis



Matrix: **Soil - Sand**

Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948653**

Sample **3** of **3**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH4 0.00m - 0.50m**

Visual Description: **Brown loam with many stones and occasional organic matter**

Sample Date: **10 March 2017**

Sample Time:

Sample Received: **14 March 2017**

Test Description	Result	Units	Analysis Date	UoM%	Accreditation	Method
Aromatic VPH >C7 - C8	<0.012	mg/kg	17/03/2017		M Cov	304
Aromatic VPH >C8 - C10	<0.12	mg/kg	17/03/2017		M Cov	304
Aromatic EPH >C10 - C12	<1.2	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C12 - C16	2.9	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C16 - C21	8.4	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C21 - C35	33	mg/kg	16/03/2017		M Cov	317EPH
Aromatic EPH >C35 - C44	10	mg/kg	16/03/2017		M Cov	317EPH
Aromatic VPH/EPH >C5 - C44	54	mg/kg	17/03/2017		N Cov	304/317EPH
VPH/EPH >C5 - C44	89	mg/kg	17/03/2017		M Cov	304/317EPH
Description of Sample	Analyst Comme	Text	20/03/2017		N Cov	70
Asbestos Identification	Analyst Comme	Text	20/03/2017		N Cov	70
PAH, Sum of 16	1.18	mg/kg DW	21/03/2017		N S	SUBCON
Naphthalene	0.018	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthylene	<0.010	mg/kg DW	21/03/2017		N S	SUBCON
Acenaphthene	<0.010	mg/kg DW	21/03/2017		N S	SUBCON
Fluorene	<0.010	mg/kg DW	21/03/2017		N S	SUBCON
Phenanthrene	0.142	mg/kg DW	21/03/2017		N S	SUBCON
Anthracene	0.018	mg/kg DW	21/03/2017		N S	SUBCON
Fluoranthene	0.185	mg/kg DW	21/03/2017		N S	SUBCON
Pyrene	0.156	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)anthracene	0.092	mg/kg DW	21/03/2017		N S	SUBCON
Chrysene	0.098	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(b)fluoranthene	0.151	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(k)fluoranthene	0.051	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(a)pyrene	0.103	mg/kg DW	21/03/2017		N S	SUBCON
Indeno(1,2,3-c,d)pyrene	0.070	mg/kg DW	21/03/2017		N S	SUBCON
Benzo(g,h,i)perylene	0.075	mg/kg DW	21/03/2017		N S	SUBCON
Dibenzo(a,h)anthracene	0.017	mg/kg DW	21/03/2017		N S	SUBCON
Sulphate as SO <sub>4</sub> , Water Soluble	<0.060	g/l	21/03/2017		N Cov	46

**Analyst Comments for 15948653:**

This sample has been analysed for VPH soils method 304 outside recommended stability times. It is therefore possible that the results provided may be compromised. ASBESTOS COMMENTS Asbestos ID: Non Detected, Description of Sample: Soil

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Che = Chester(CH4 9EP), Ott = Otterbourne(SO21 2SW), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).

Signed: A I Horobin

Name: **A. Horobin**

Date: **26 April 2017**

Title: **Organic Operations Manager**

Date of Issue : **26 April 2017**

Method	Statement
14	The cyanides in the sample are determined in two stages. The free cyanide is liberated by heating with pH 4 buffer and the resulting gas collected in sodium hydroxide solution. Complex cyanide is liberated using phosphoric acid under the same conditions. The two portions of sodium hydroxide are then analysed for cyanide content using a discrete autoanalyser. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
30	Metals are extracted from land samples by boiling with hydrochloric/nitric acids (3:1 ratio). The measurement of metal concentrations is determined directly on an ICP-OES at defined wavelengths. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
304	The method employs the use of Headspace extraction of the volatile hydrocarbons from as received soil samples using a commercial headspace sampler followed by gas chromatograph (GC). The effluent from the chromatographic column is split between a flame ionisation detector (FID) for the determination of total VPH and a mass selective detector (MSD) for the determination of aromatic volatile hydrocarbons.
304/317EPH	Headspace extraction of the compounds from the sample using a commercial headspace sampler followed by separation and quantitative determination of the compounds using gas chromatography with flame ionisation detection/Soil samples are extracted with hexane. The extracts are separated into aliphatic and aromatic fractions using silica solid phase extraction cartridges. The fractionated extracts are then analysed by capillary gas chromatography with flame ionisation detection (GC-FID). This analysis is carried out on an as received portion of sample.
30B	Hexavalent chromium is extracted from land samples using dilute hydrochloric acid. The extract is shaken and then filtered. The measurement of chromium in the filtrate is then determined directly by ICP-OES at a defined wavelength. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
317EPH	A known amount of soil, is shaken and sonicated in an extraction vial containing hexane and acetone. A portion of the resulting hexane layer is analysed by GC-FID. Fractionation is done by solid phase extraction using an unmodified silica column. This analysis is carried out on an as received portion of sample.
33A	Moisture Content is the weight difference between an as received sample and the air dried sample at 30 degrees C.
36	This method determines the percentage, by dry mass, of natural organic matter present in soil. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
39	The test is carried out by extraction using deionised water with agitation. The pH of this suspension is read directly from an electronic pH meter. This analysis is carried out on an air dried sample, ground to pass a 212um sieve.
40A	This method determines steam distillable phenolic compounds in land materials. Phenol is extracted from air dried soil using steam distillation. The pH adjusted distillate is measured colorimetrically at a defined wavelength. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
45	The sulphates are extracted from land samples using boiling hydrochloric acid solution. After cooling and filtration the determination of sulphate is obtained from an aliquot of solution, via a turbidimetric measurement. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
46	Water soluble sulphate is content of land samples is extracted by shaking with deionised water. The resultant solution is filtered and the determination of sulphate is obtained turbidimetrically from this filtrate via a reaction with barium chloride. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
47	The sulphide content of land samples is determined via extraction with dilute sulphuric acid and steam distillation into zinc acetate solution and sodium hydroxide. The distillate is then titrated against sodium thiosulphate solution using iodine indicator. This analysis is carried out on an air dried sample, ground to pass a 2mm sieve.
51	Sulphur is extracted from the soil matrix with dichloromethane, using microwave assisted solvent extraction. The extract is analysed by HPLC with UV wavelength detection.
6	Boron is extracted from land samples using boiling deionised water followed by vacuum filtration. The measurement of boron in the filtrate is then determined directly by ICP-OES at the defined wavelength. This analysis is carried out on an air-dried sample, ground to pass a 2mm sieve. For analysis by National Grid - Version 1.0, the samples are ground to pass a 212um sieve.
70	Representative fibres are mounted in appropriate Refractive Index (RI) liquids on slides and the different fibrous components are identified using PLM. If no asbestos is found then additional searches for small asbestos fibres on random sub-samples are undertaken using PLM.
Stones	The percentage weight of the stones that are naturally occurring and are greater than 10mm in diameter of the total weight of sample.

# Report Summary



1314  
0897  
4409



**Mr Graham Dorrell  
Sladen Associates  
Netherton Workshops  
New Road  
Highley  
Bridgnorth  
West Midlands  
WV16 6NN**

Date of Issue: **26 April 2017**

Report Number: **COV/1371481/2017**

Issue **3**

This issue replaces  
all previous issues

**Job Description:** General Analysis

**Job Location:** 17-1765 Rowling House Cawthorne

Number of Samples  
included in this report **2**

Job Received: **14 March 2017**

Number of Test Results  
included in this report **4**

Analysis Commenced: **16 March 2017**

Signed: *A I Horobin*

Name: **A. Horobin**

Date: **26 April 2017**

Title: **Organic Operations Manager**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

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# Certificate of Analysis



Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948654**

Sample **1** of **2**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH2 1.00m**

Sample Matrix: **Soil**

Sample Date/Time: **10 March 2017**

Sample Received: **14 March 2017**

Analysis Complete: **26 April 2017**

Test Description	Result	Units	Analysis Date	Accreditation	Method
pH	6.4	pH units	17/03/2017	Y Cov	39
Sulphate as SO <sub>4</sub> , Water Soluble	<0.060	g/l	21/03/2017	N Cov	46

**Analyst Comments for 15948654:**

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Che = Chester(CH4 9EP), Ott = Otterbourne(SO21 2SW), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).

Signed: *A I Horobin*

Name: **A. Horobin**

Date: **26 April 2017**

Title: **Organic Operations Manager**

# Certificate of Analysis



Report Number: **COV/1371481/2017**

Issue **3**

Laboratory Number: **15948655**

Sample **2** of **2**

Sample Source: **Sladen Associates**

Sample Point Description: **Sladen**

Sample Description: **BH5 1.00m**

Sample Matrix: **Soil**

Sample Date/Time: **10 March 2017**

Sample Received: **14 March 2017**

Analysis Complete: **26 April 2017**

Test Description	Result	Units	Analysis Date	Accreditation	Method
pH	7.5	pH units	17/03/2017	Y Cov	39
Sulphate as SO <sub>4</sub> , Water Soluble	0.064	g/l	21/03/2017	N Cov	46

Analyst Comments for 15948655:

No Analyst Comment

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Che = Chester(CH4 9EP), Ott = Otterbourne(SO21 2SW), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for sample volume analysed).

Signed: *A I Horobin*

Name: **A. Horobin**

Date: **26 April 2017**

Title: **Organic Operations Manager**

**DETERMINAND COMMENTS FOR REPORT**
**COV/1371481/2017**
**ISSUE 3**
**Date of Issue : 26 April 2017**

Sample No	Description	Determinand	Comments
15948651	BH1 0.00m - 0.50m	Asbestos Identification	{/*}Non Detected{/*}
15948651	BH1 0.00m - 0.50m	Description of Sample	{/*}Soil{/*}
15948652	BH3 0.00m - 0.40m	Asbestos Identification	{/*}Non Detected{/*}
15948652	BH3 0.00m - 0.40m	Description of Sample	{/*}Soil{/*}
15948653	BH4 0.00m - 0.50m	Asbestos Identification	{/*}Non Detected{/*}
15948653	BH4 0.00m - 0.50m	Description of Sample	{/*}Soil{/*}

 Signed: *A I Horobin*

 Name: **A. Horobin**

 Date: **26 April 2017**

 Title: **Organic Operations Manager**

# Report Summary



**Mr Graham Dorrell  
Sladen Associates  
Netherton Workshops  
New Road  
Highley  
Bridgnorth  
West Midlands  
WV16 6NN**

Date of Issue: **05 April 2017**

Report Number: **COV/1375486/2017**

Issue **1**

This issue replaces all previous issues

Number of Samples  
included in this report: **1**

Number of Test Results  
included in this report: **2**

Site Name: **17-1765 Rowling House, Cawthorne**

Job Received: **28 March 2017**

Analysis Commenced: **30 March 2017**

Signed:

A handwritten signature in black ink, appearing to be 'R. Stocks'.

Name: **R. Stocks**

Date: **05 April 2017**

Title: **Inorganic Team Leader**

ALS Environmental Ltd was not responsible for sampling unless otherwise stated. Sampling is not covered by our UKAS accreditation.

Information on the methods of analysis and performance characteristics are available on request.

Opinions and interpretations expressed herein are outside the scope of UKAS accreditation. The results relate only to the items tested.

Tests marked 'Not UKAS Accredited' in this Report/Certificate are not included in the UKAS Accreditation Schedule for our laboratory.

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**ALS Environmental Ltd**


Torrington Avenue, Coventry, CV4 9GU Tel:+44 (0)24 7642 1213 Fax:+44 (0)24 7685 6575

# Certificate of Analysis



Report Number: **COV/1375486/2017** Issue **1**  
Site Name: **17-1765 Rowling House, Cawthorne**

Lab ID	Client ID	Sample Date	Matrix	NRA Leachate		Copper, Filtered as Cu	
				Cov	Cov	ug/l	Cov
15978025	BH1 0.0-0.5	28/03/2017	Prepared Leachate	N	Y	N	16.2

Signed: 	Name: <b>R. Stocks</b>	Date: <b>05 April 2017</b>
	Title: <b>Inorganic Team Leader</b>	

This issue replaces all previous issues

Accreditation Codes: Y = UKAS / ISO17025 Accredited, N = Not UKAS / ISO17025 Accredited, M = MCERTS.

Analysed at: Cov = Coventry(CV4 9GU), Run = Runcorn(WA7 1SL), S = Subcontracted, Trb = Subcontracted to Trowbridge(BA14 0XD), Wak = Wakefield(WF5 9TG).

For Microbiological determinands 0 or ND=Not Detected, For Legionella ND=Not Detected in volume of sample filtered. The LOD for the Legionella analysis will increase where the volume analysed is <1000g (1g is approximately equivalent to 1ml for

**ALS Environmental Ltd**

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**ANALYST COMMENTS FOR REPORT**

**COV/1375486/2017**

**Issue 1**

Date of Issue: **05 April 2017**

**Sample No**

15978025

**Analyst Comments**

Signed:



Name: **R. Stocks**

Date: **05 April 2017**

Title: **Inorganic Team Leader**

**APPENDIX C**  
**GENERIC RTM LEVEL 1 SCREENING VALUES**

**DERIVATION OF GENERIC PRELIMINARY LEVEL 1 SCREENING FOR LEACHABLE METALS**

Development of Level 1 Remedial Targets in accordance with the document 'Remedial Targets Methodology: Hydrogeological risk assessment for land contamination ( Environment Agency 2006) for some metals can be undertaken in a generic manner.

For such potential contaminants, Table 5.1 of that document gives the following equation for Level 1 Soil Remedial Target (RTs (mg/kg)):

$$RTs = Cs = Ct \cdot [ Kd + ( ( \theta_w + \theta_a \cdot H ) / \rho ) ]$$

Where:

Kd = Soil water partition coefficient (l/kg)

$\theta_w$  = Water-filled soil porosity

$\theta_a$  = Air-filled soil porosity

H = Henry's Law constant (dimensionless)

$\rho$  = bulk density (g/cm<sup>3</sup>)

Ct = Target Concentration (mg/kg)

Cs = Total soil concentration (mg/kg)

Such materials are those where the ratio  $( \theta_w + \theta_a \cdot H ) / \rho$  is small compared to Kd and may therefore be ignored such that:

$$RTs = Cs = Ct \cdot Kd$$

Values of Kd have been suggested by Lijzen et al 2001 (RIVM Report 711701 023) or, for Boron (RIVM Report 715810 004, 1994). Ct is generally been taken to be the relevant Environmental Quality Standard (EQS) level. Where no EQS has been published, the relevant drinking water standard (DWS) has been used. However, for the phytotoxins copper and zinc, the EQS results in unreasonably low screening values and the lower leaching limit Waste Acceptance Criteria (WAC) for inert waste have been used.

Contaminant	Kp	EQS/DWS/WAC Ct	Level 1 RTs
Arsenic	1800	0.05	90
Boron	10	2	20
Cadmium	2560	0.005	12.8
Chromium (Total)	4800	0.02	96
Lead	36000	0.02	720
Mercury	7500	0.001	7.5
Selenium	300	0.01	3
Zinc	2600	0.4	1040
Copper	2120	0.2	424
Nickel	2000	0.04	80

Where possible, for samples where the total soil concentration exceeds the Level 1 RTs, testing is undertaken to measure the actual leachable concentration of the relevant potential contaminant in that sample.