

SLADEN ASSOCIATES

**REPORT ON PHASE 2 GROUND
INVESTIGATION
Proposed Replacement Residence
Elmsdale house, Ratcliffe Lane
Sheepy Magna
Leicestershire**

Prepared for

Mr Michael Schollar and Mrs Charlotte Schollar

Date : August 2022

Job No : 22 2430-2

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1 INTRODUCTION

Mr Michael Schollar and Mrs Charlotte Schollar have instructed Sladen Associates to carry out a Phase 2 Ground Investigation for a proposed new residence at a site known as Elmsdale House in Sheepy Magna.

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

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

Phase 1 Geo-environmental Report, Proposed Replacement Residence, Elmsdale House, Ratcliffe Lane, Sheepy Magna, Leicestershire. Prepared for Ms Charlotte Baxter by Sladen Associates. Report No: 22 2430, February 2022.

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

2.1 LOCATION

The site lies immediately to the east of Ratcliffe Lane on the southern fringe of the village of Sheepy Magna, some 3 km east north east of Atherstone Town Centre at National Grid Reference 4322 3006, see Figures 1 and 2. The existing house lies within the north western site area and to the east of that are a number of outbuildings some of which were formerly used as a cattery. An access driveway passes through the site area. The surrounding land uses are primarily agricultural but there is housing to the west of Ratcliffe Lane from the site.

2.2 PROPOSED DEVELOPMENT

It is proposed to re-develop the site for residential use with the removal of the existing residence and outbuildings to the north of the driveway and construction of a new single detached house. Outbuildings to the south of the driveway would remain. Figure 3 shows the currently proposed development layout. There will be an attached garage to the north of the house, with a parking and turning area to the west and private garden areas around the house.

3 FIELD AND LABORATORY PROGRAMME

3.1 FIELDWORK

The recent fieldwork comprised seven mechanically excavated trial pits (TP1 to TP7) and four TRL CBR Probes. The exploration hole locations are shown on the site layout plan, Figure 2. A soakaway test was undertaken in one of the trial pits prior to backfilling.

The fieldwork was undertaken on 4th August 2022.

Samples were recovered from the exploration holes 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.

Detailed logs of the exploration holes 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 four sub samples; one sealed 250 ml glass jar, two 60 ml glass jars and one 1000 ml 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 wide variety of potential contaminants including TPH fractions and BTEX compounds as well as sulphate and pH. Selected samples of clay soil were tested to determine geotechnical index properties. 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 trial pit locations were found to comprise a thin layer of made ground, locally underlain by old topsoil, overlying River Terrace Deposits, absent at some locations, which in turn overlay Glacial Deposits of mixed lithology. Depth to bedrock was not proved.

This is only partly consistent with the anticipated site geology, refer Phase 1 Report, as glacial strata were not anticipated to be present.

4.2 MADE GROUND AND OLD TOPSOIL

Block paving underlain by a plastic membrane paving was present at the surface at TP8. Beneath that and at surface at the other exploration hole locations, made ground was encountered and extended to depths in the range 0.35 m (TP3) to 0.6 m (TP1). The made ground was predominantly granular in nature and was typically described as loose, gravelly sand, sometimes with cobbles. Below the block paving at TP8 the made ground was described as a soft grey clay, also underlain by a plastic membrane.

The coarse fraction of the made ground included, variously, quartz, brick, concrete, limestone, plastic and locally ash (TP3) and metal (TP7).

A layer of old gravelly clay topsoil was encountered below the made ground at TP8 and extended to a depth of 0.5 m.

4.3 RIVER TERRACE DEPOSITS

Natural soils considered to be of River Terrace origin were encountered immediately below the made ground or old topsoil at all the trial pit locations except at TP1. These typically comprised loose, loose to medium dense or medium dense gravelly or very gravelly sands, sometimes with cobbles..

Trial pits TP6 to TP8 were terminated in the Terrace Deposits. At the other trial pit locations the Terrace Deposits extended to depths in the range 0.8 m (TP3 and TP5) and 1.8 m (TP4).

4.4 GLACIAL STRATA

Clay soils considered to be Glacial Till were encountered immediately below the made ground in TP1 and below the Terrace Deposits at TP2, TP3, TP4 and TP5.

The till typically comprised firm to stiff generally gravelly clay. TP4 and TP5 were terminated in clay till. At TP1, TP2 and TP3, the till was underlain by granular soils considered to be of fluvioglacial origin. These typically comprised medium dense gravelly sands. TP1, TP2 and TP3 were terminated in the fluvioglacial strata.

The glacial strata were proved to a maximum depth of 2.2 m.

4.5 GROUNDWATER

Free groundwater was not encountered in TP2 but at the other locations damp or wet conditions were noted near the base of the trial pits. Monitoring of standpipes showed dry conditions during the monitoring period.

4.6 CONTAMINATION

Apart from some ash locally present in the made ground at TP3, no visual or olfactory evidence of potential ground contamination was noted during the recent field programme and screening of soil samples with a PID meter showed no detectable VOC's.

5 GEO-ENVIRONMENTAL ASSESSMENT

5.1 GEOTECHNICAL CONSIDERATIONS

5.1.1 FOUNDATION CONDITIONS

It is not recommended that foundations to support structural loads be founded within the unimproved made ground.

The natural terrace deposits or glacial soils should be suitable to support conventional shallow or trench fill foundations. An allowable net bearing pressure of 150 kPa may be adopted for footings in natural strata, at 0.8 m depth or deeper.

Any made or disturbed ground, soft, very loose or otherwise deleterious material that is present at founding level should be excavated and replaced with lean mix concrete.

Care should be taken to prevent ponding of water on excavated foundation surfaces; blinding concrete should be placed as soon as practicable after foundation excavation.

If trees are to be planted or removed near proposed foundations, consideration should be given to the potential effect that consequent soil moisture content changes may have on the performance of the foundations. These depend upon the type and size of tree, the

proximity to the structure and depth of foundations as well as ground conditions. Guidance on this issue can be obtained from NHBC Standards. Visual classification and testing to determine index properties suggest that the cohesive units would exhibit 'low' to 'medium' shrinkability according to the classification proposed by NHBC. However the soils are partly granular and no thick clay units were encountered. Accordingly it is considered that 'low' shrinkability may be assumed for foundation design.

5.1.2 FLOOR SLABS

Conventional slab-on-grade floors may be considered for lightly loaded floors, provided several precautions are taken. 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.

5.1.3 BURIED CONCRETE

Tests to determine the water-soluble sulphate content of soils (Table 3) gave values in the range of less than 0.004 to 0.035 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 6.94 to 7.38, indicating that strongly acidic conditions are not generally present on site. 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.

5.1.4 PAVEMENTS

In situ TRL probe testing has been used to estimate California Bearing Ratio (CBR) values and profiles of inferred CBR are included in Appendix B.

Generally a sensible lower bound CBR value would be of the order of 5 %, which could be adopted for pavement design. The base course layer should be placed as soon as practicable after excavation. Although predominantly granular soils are anticipated near surface, if clay is present at subgrade, the profile of the subgrade should be designed such as to prevent accumulation of water in the base course and connected to suitable gravity drainage. Consideration could be given to incorporating a geotextile fabric between the base course and any clay subgrade areas to reduce the risk that softened clay contaminates the granular base course.

5.1.5 SOAKAWAY DRAINAGE

A full scale soakaway test was undertaken in TP4 in general accordance with BRE 365 methodology.

The results of the testing are summarised as follows:

Location	Depth of Pit (m)	Depth to Water at Start of Test (m)	Derived Infiltration Rate
TP4	2.2	0.67	2.6×10^{-6} m/s

As the pit had not emptied in in excess of four hours the test was not repeated. This result suggests that soakaway drainage for run-off may possibly be feasible at this site although infiltration rate is relatively low. The granular units would be expected to be significantly more permeable than the cohesive units. The base of TP4 was in clay. If it were assumed that the water infiltrated only into the granular material, then the inferred infiltration rate would be 4.1×10^{-6} m/s.

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 and preliminary risk assessment. In view of the possible presence of elevated concentrations of some contaminants, particularly in the eastern site area, in particular metals, fuels and oils, and some PAH compounds, and the relatively sensitive proposed land use, there was considered to be a low to moderate risk associated with exposure of site users to soil and soil dust and via vegetable pathways.

In view of the likely absence of sources of significant leachable contamination on site and relatively low sensitivity of the site location, there was considered to be a very low risk to controlled waters.

Given the likely absence of significant sources of ground gas, real risks associated with ground gas were also judged to be very low.

Based on the field observations, some changes are considered warranted to the preliminary risk assessment. Generally no visual or olfactory evidence of potential contamination was noted, the only exception be ash locally present at TP3. Accordingly it is considered that the risk to site users at the preliminary risk assessment stage could be considered low. No changes are considered warranted to the preliminary risk assessments with respect to controlled waters or ground gas.

The recent chemical testing of samples has allowed a more quantitative assessment of risks.

5.2.1.2 HAZARD ASSESSMENT

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 5.1.3 'Buried Concrete', above.

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.

5.2.1.3 GENERIC QUANTITATIVE HUMAN HEALTH RISK ASSESSMENT

Measured levels of potential contaminants have been compared with preliminary generic screening values (see Tables 1A to C).

“Suitable for use” levels (S4UL’s), published by LQM 2015 (Publication S4UL3287) were adopted as GAC (Generic Assessment Criteria) levels. S4UL values have been published for soil organic matter SOM values of 1, 2.5 and 6 %. A value of SOM of 2.5 % was adopted for preliminary screening, the site average value. For lead, there is no current SGV or S4UL value and the screening value adopted is based on the ‘Category 4’, acceptable risk screening levels published by Defra. The mean concentration and the maximum 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. Based on this testing, no samples showed any elevated levels.

No potentially asbestos containing materials were noted during the field work and screening of samples for presence of asbestos identified no asbestos fibres to be present.

No further risk assessment or special precautions are therefore considered necessary with respect to protection of site users.

5.2.1.4 PLANTS

ICRCL Guidance Note 70/90 has been 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, no elevated levels of phytotoxins were measured and it is therefore not considered that any special precautions are warranted with respect to plants. Topsoil is however absent from some site areas and clean topsoil will need to be provided for any soft landscaped areas where it is currently absent.

5.2.1.5 GENERIC CONTROLLED WATERS RISK ASSESSMENT

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 migration and eventual discharge to the surface water system. In order to assess the potential for leaching of contaminants 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 4. According to this screening no samples showed any elevated concentrations of any dererminands.

Accordingly, risks to controlled waters are considered to be very low and no further risk assessment or precautions are considered warranted.

5.2.2 GROUND BIO-GAS

Based on the site conceptual model and field programme no potential sources of significant volumes of ground gas generation have been identified. Accordingly no special precautions are considered warranted with respect to ground gas.

5.2.3 DISCOVERY STRATEGY

Based on the site characterisation works undertaken to date, the existence of unidentified significant historical soil contamination is considered to be unlikely.

However, should any unexpected contamination be encountered during development, the following measures should be undertaken by a suitably qualified person or company:

- ≠ Appropriate sampling and laboratory analysis of potentially contaminated materials to assess the severity and scale of any suspected contamination.
- ≠ Comparison of the results against appropriate site assessment criteria for the land use.
- ≠ Liaison with the Planning Authority to agree appropriate investigation or remediation method statement to address any identified potentially unacceptable risks.
- ≠ Implementation and verification of any agreed investigation or remedial works.

5.2.4 SUMMARY OF REMEDIAL PRECAUTIONS WITH REGARD TO CONTAMINATION

5.2.4.1 SOIL CONTAMINATION WITH RESPECT TO SITE USERS

No special precautions are considered warranted with respect to protection of site users.

5.2.4.2 GROUND GAS

No special precautions are considered warranted with respect to protection of site users.

5.2.4.3 PLANTS

No special precautions are considered necessary with respect to plants.

5.2.4.4 WIDER ENVIRONMENT

No special precautions are considered necessary with respect to controlled waters

5.2.4.5 BURIED CONCRETE

It is considered that the site may be classified as exhibiting Class DS1/AC1 conditions as per BRE Special Digest 1.

5.2.4.6 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
Cyanide	3	All BLD	250	<1	0	0
Arsenic	3	5.5	37	5.8	0	0
Boron	3	1	290	1.1	1	0
Cadmium	3	0.14	11	0.15	0	0
Hexavalent Chromium	3	All BLD	6	<0.6	0	0
Copper	3	13	2400	14	0	0
Lead	3	22	200	25	0	0
Mercury	3	All BLD	40	<0.1	0	0
Nickel	3	12	130	14.1	1	0
Selenium	3	All BLD	250	<1	0	0
Vanadium	3	19	410	20	0	0
Zinc	3	60	3700	71	0	0
Chromium (III)	3	12	910	14	0	0
Phenols	3	All BLD	200	<0.035	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 SGV 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
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 - C21	3	2.3	92000 sol (21)	3.6	0	0
Aliphatic EPH >C21 - C35	3	28	92000 sol (21)	44	0	0
Aliphatic EPH >C35 - C44	3	3.3	92000 sol (21)	4.6	0	0
Aliphatic VPH >C5 - C6	3	All BLD	78	<0.01	0	0
Aliphatic VPH >C6 - C8	3	All BLD	230	<0.01	0	0
Aliphatic VPH >C8 - C10	3	All BLD	65	<0.01	0	0
Aromatic EPH >C10 - C12	3	All BLD	180	<1	0	0
Aromatic EPH >C12 - C16	3	All BLD	330	<1	0	0
Aromatic EPH >C16 - C21	3	All BLD	540 sol (130)	<1	0	0
Aromatic EPH >C21 - C35	3	20	1500 sol (12)	38	0	0
Aromatic EPH >C35 - C44	3	2.9	1500 sol (0.18)	6	0	0
Aromatic VPH >C8 - C10	3	All BLD	83	<0.01	0	0
Benzene	3	All BLD	0.17	<0.009	0	0
Ethylbenzene	3	All BLD	110	<0.004	0	0
o-Xylene	3	All BLD	140	<0.01	0	0
m&p-Xylene	3	All BLD	130	<0.01	0	0
Toluene	3	All BLD	290	<0.007	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 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	All BLD	510 sol (140)	<0.016	0	0
Acenaphthylene	3	All BLD	420 sol (210)	<0.024	0	0
Anthracene	3	All BLD	5400 sol (2.9)	<0.032	0	0
Benzo(a)anthracene	3	0.045	11	0.0834	1	0
Benzo(a)pyrene	3	0.054	2.7	0.11	0	0
Benzo(b)fluoranthene	3	0.088	3.3	0.17	0	0
Benzo(g,h,i)perylene	3	0.056	340	0.118	1	0
Benzo(k)fluoranthene	3	0.028	93	0.054	0	0
Chrysene	3	0.054	22	0.111	1	0
Dibenz(a,h)anthracene	3	All BLD	0.28	<0.046	0	0
Fluoranthene	3	0.085	560 sol (47)	0.164	1	0
Fluorene	3	All BLD	400 sol (77)	<0.02	0	0
Indeno(1,2,3-c,d)pyrene	3	0.055	36	0.12	0	0
Naphthalene	3	All BLD	5.6	<0.018	0	0
Phenanthrene	3	0.029	220 sol (89)	0.0511	1	0
Pyrene	3	0.081	1200 sol (5.5)	0.158	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
- 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	1	<1 to 1.1	ICRL 59/83	3	0
Copper	3	13	12.6 to 13.6	ICRL 70/90	250	0
Nickel	3	12	11.2 to 14.1	ICRL 59/83	70	0
Zinc	3	60	47.8 to 71.2	ICRL 70/90	1000	0

Key:

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

ICRL 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
pH	6	7.2	6.94 to 7.38
Sulphate (Total) %	3	0.029	0.021 to 0.0336
Sulphate (WS) g/l	6	0.02	<0.004 to 0.0348

Notes:

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

**TABLE 4 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
Cyanide	3	All BLD	-	EA	250	0
Sulphide	3	All BLD	-	EA	250	0
Sulphur	3	All BLD	-	EA	5000	0
Arsenic	3	5.5	5.21 to 5.83	P20 Level 1	90	0
Boron	3	1	<1 to 1.1	P20 Level 1	20	0
Cadmium	3	0.14	0.13 to 0.149	P20 Level 1	13	0
Chromium (Total)	3	12	9.97 to 13.5	P20 Level 1	96	0
Copper	3	13	12.6 to 13.6	P20 Level 1	420	0
Lead	3	22	20.2 to 25.1	P20 Level 1	720	0
Mercury	3	All BLD	-	P20 Level 1	7.5	0
Nickel	3	12	11.2 to 14.1	P20 Level 1	80	0
Selenium	3	All BLD	-	P20 Level 1	3	0
Zinc	3	60	47.8 to 71.2	P20 Level 1	1000	0
Phenols	3	All BLD	-	EA	5	0
TPH (Total)	3	57	33.2 to 96.6	IWAL	500	0
PAH (Total)	3	0.56	0.221 to 1.14	IWAL	100	0
Total BTEX	3	All BLD	-	IWAL	6	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

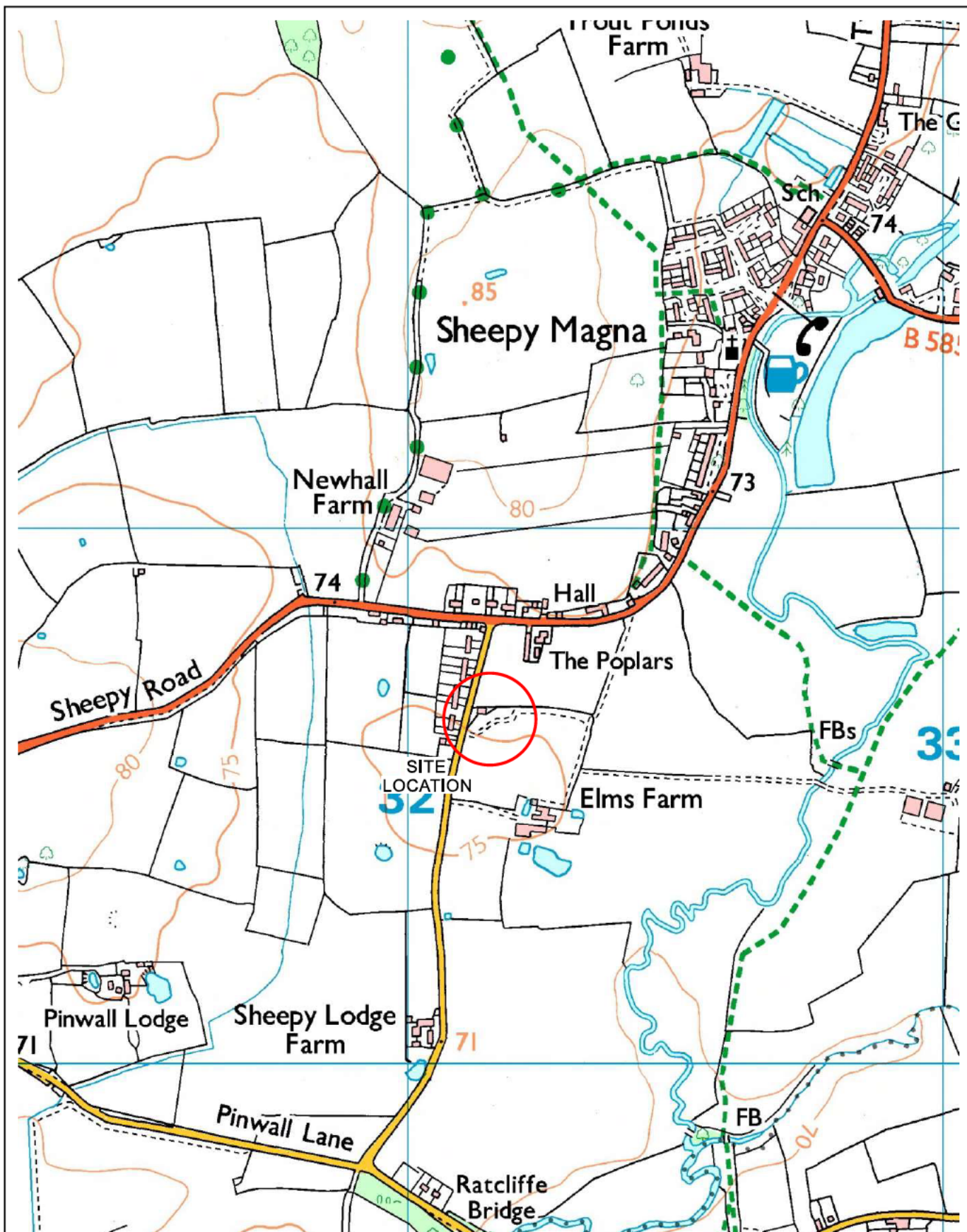
Notes:

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

TABLE 5 GROUNDWATER MONITORING

Date	TP	Atmospheric Pressure (bar)	CH ₄ (%)	CO ₂ (%)	O ₂ (%)	Gas Flow Rate	Depth to Groundwater
11-08-22	1	1024	0	2.9	18.5	None	Dry (2.22)
	3	(steady)	0	3.5	18.2	None	Dry (2.15)
	4		0	2.8	18.1	None	Dry (1.57)
25-08-22	1	999	0	2.5	18.9	None	Dry
	3	(steady)	0	3.8	18.0	None	Dry
	4		0	3.0	18.0	None	Dry

FIGURES



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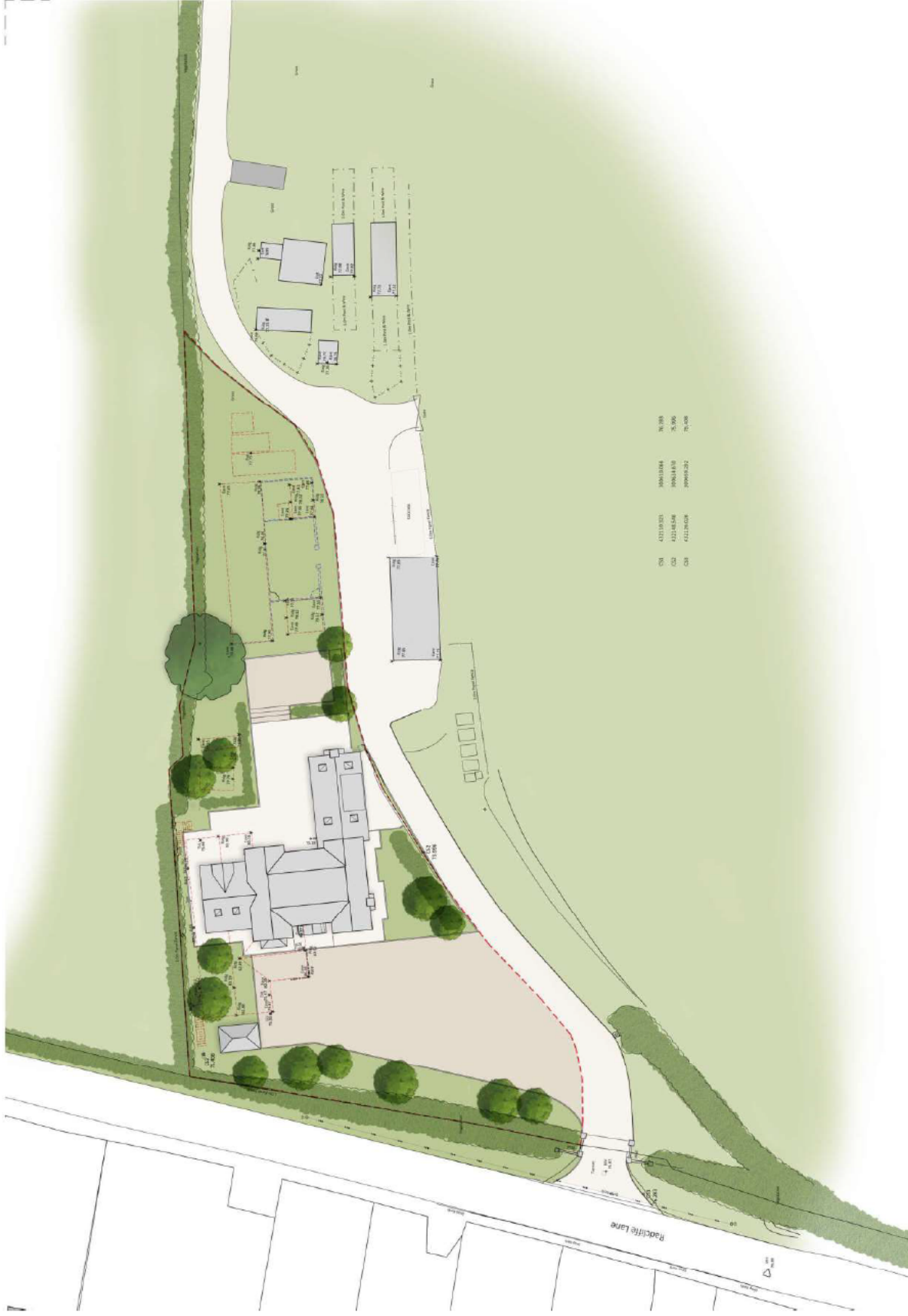
SITE LOCATION PLAN

**SLADEN
ASSOCIATES**

Report No
22-2430-2

Project
Elmsdale House
Ratcliffe Lane
Sheepy Magna

Figure
1



PROPOSED SITE LAYOUT PLAN

APPENDIX A
TRIAL PIT LOGS AND IN SITU TEST RESULTS

Unit 5, Netherton Workshops, Highley, Bridgnorth, Shropshire, WV16 6NN Tel:01746 860222 Fax:01746 862330

Page 1 of 1

Additional Comments	Logged by
Groundwater: Slightly damp at base.	ADNS
Pit sides stable during excavation.	
Groundwater/gas monitoring standpipe installed to 2.2m.	Figure
Land drain located at northern end of pit at 1.1m.	

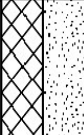
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Page 1 of 1

Additional Comments	Logged by
Groundwater: none encountered.	ADNS
Pit sides stable during excavation.	Figure
Land drain located across northern half of pit at 1.1m.	

Trial Pit No: 3

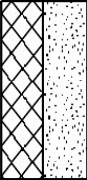
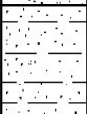
Page 1 of 1

Equipment & Methods		Job No: 22-2430-2						
Machine Excavator		Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna						
Carried out for		Ground Level		Coordinates			Date	
Mr & Mrs Schollar		0		E N			04-08-22	
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes				Field Records
				Depth	Sample		Test	
					Type	No.		
Loose dark brown gravelly fine SAND with many rootlets. Gravels are fine to coarse angular to rounded quartz and coal with occasional brick and ash. (MADE GROUND)		0.35	-0.35	0.00 to 0.50	B	1	PID	<0.1ppm
Loose to medium dense brown slightly silty, gravelly fine SAND. Gravel is fine to coarse rounded quartz. (RIVER TERRACE DEPOSITS)		0.80	-0.80					
Stiff, locally firm to stiff reddish brown sandy, gravelly CLAY with some sand bands. Gravels are fine to coarse rounded to subrounded quartz, sandstone and siltstone. (GLACIAL TILL)		1.80	-1.80	1.10	B	2	PID	<0.1ppm
Medium dense reddish brown silty, gravelly fine to medium SAND with some pockets of silty clay. Gravel is fine to coarse rounded quartz. (FLUVIOGLACIAL)		2.20	-2.20	2.00	B	3	PID	<0.1ppm
End of Trial Pit								
Additional Comments Groundwater: Slightly damp at base. Pit sides stable during excavation. Groundwater/gas monitoring standpipe installed to 2.15m.								Logged by ADNS
								Figure

Trial Pit No: 4

Page 1 of 1

Equipment & Methods		Job No: 22-2430-2						
Machine Excavator		Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna						
Carried out for		Ground Level		Coordinates			Date	
Mr & Mrs Schollar		0		E N			04-08-22	
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes				Field Records
				Depth	Sample		Test	
					Type	No.		
Grass underlain by: loose dark brown silty, gravelly fine SAND with many rootlets. Gravel is fine to coarse rounded quartz. (MADE GROUND)		0.45	-0.45					
Loose to medium dense brown silty, very gravelly fine SAND with some cobbles. Gravels are fine to coarse rounded to subangular quartz and flint. Cobbles are rounded quartz. (RIVER TERRACE DEPOSITS)		1.10	-1.10					
Medium dense light brown to orangey brown silty, gravelly fine to medium SAND. Gravel is fine to coarse rounded quartz. Cobbles are rounded quartz. Reddish brown at base. Very silty and clayey at base. (RIVER TERRACE DEPOSITS)		1.20		1.20	B	1	PID	<0.1ppm
Firm reddish brown very silty, very sandy CLAY. (GLACIAL TILL)		1.80	-1.80					
End of Trial Pit		2.20	-2.20					
Additional Comments								Logged by
Groundwater: slightly damp at 2.0m.								ADNS
Small collapses in long pit sides during soakaway test.								Figure
Soakaway test conducted in excavation.								
Groundwater/gas monitoring standpipe installed to 1.57m.								

Equipment & Methods Machine Excavator		Job No: 22-2430-2 Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna					
Carried out for Mr & Mrs Schollar		Ground Level 0		Coordinates E N			Date 04-08-22
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records
				Depth	Sample Type	Test	
Grass underlain by: loose dark brown to brown gravelly fine SAND with some rootlets and occasional cobbles and boulders. Gravels are fine to coarse angular to rounded quartz, brick, concrete, plastic and limestone. Cobbles and boulders are angular brick and concrete. (MADE GROUND)		0.00 to 0.50		B	1	PID	<0.1ppm
Loose light brown gravelly fine SAND. Gravel is fine to coarse rounded quartz. (RIVER TERRACE DEPOSITS)		0.45	-0.45				
Firm to stiff reddish brown sandy, gravelly CLAY. Gravel is fine to coarse rounded quartz. (GLACIAL TILL)		0.80	-0.80				
End of Trial Pit		1.10	-1.10				
Additional Comments Groundwater: Slightly damp at base. Pit sides stable during excavation. Brick wall located at southern end of pit at 0.0-0.3m.							Logged by ADNS Figure

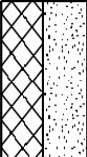
Equipment & Methods	Job No: 22-2430-2							
Machine Excavator	Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna							
Carried out for	Ground Level		Coordinates			Date		
Mr & Mrs Schollar	0		E N			04-08-22		
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	
				Depth	Sample Type	Test		
Grass underlain by: loose dark brown silty, gravelly fine SAND. Gravel is fine to coarse rounded quartz. (MADE GROUND)		0.40	-0.40	0.00 to 0.50	B	1	PID	<0.1ppm
Medium dense brown very gravelly fine SAND. Gravel is fine to coarse rounded quartz. (RIVER TERRACE DEPOSITS)		1.00	-1.00					
End of Trial Pit								
Additional Comments								Logged by
Groundwater: Slightly damp at base.								ADNS
Pit sides stable during excavation.								Figure

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Trial Pit No: 7

Page 1 of 1

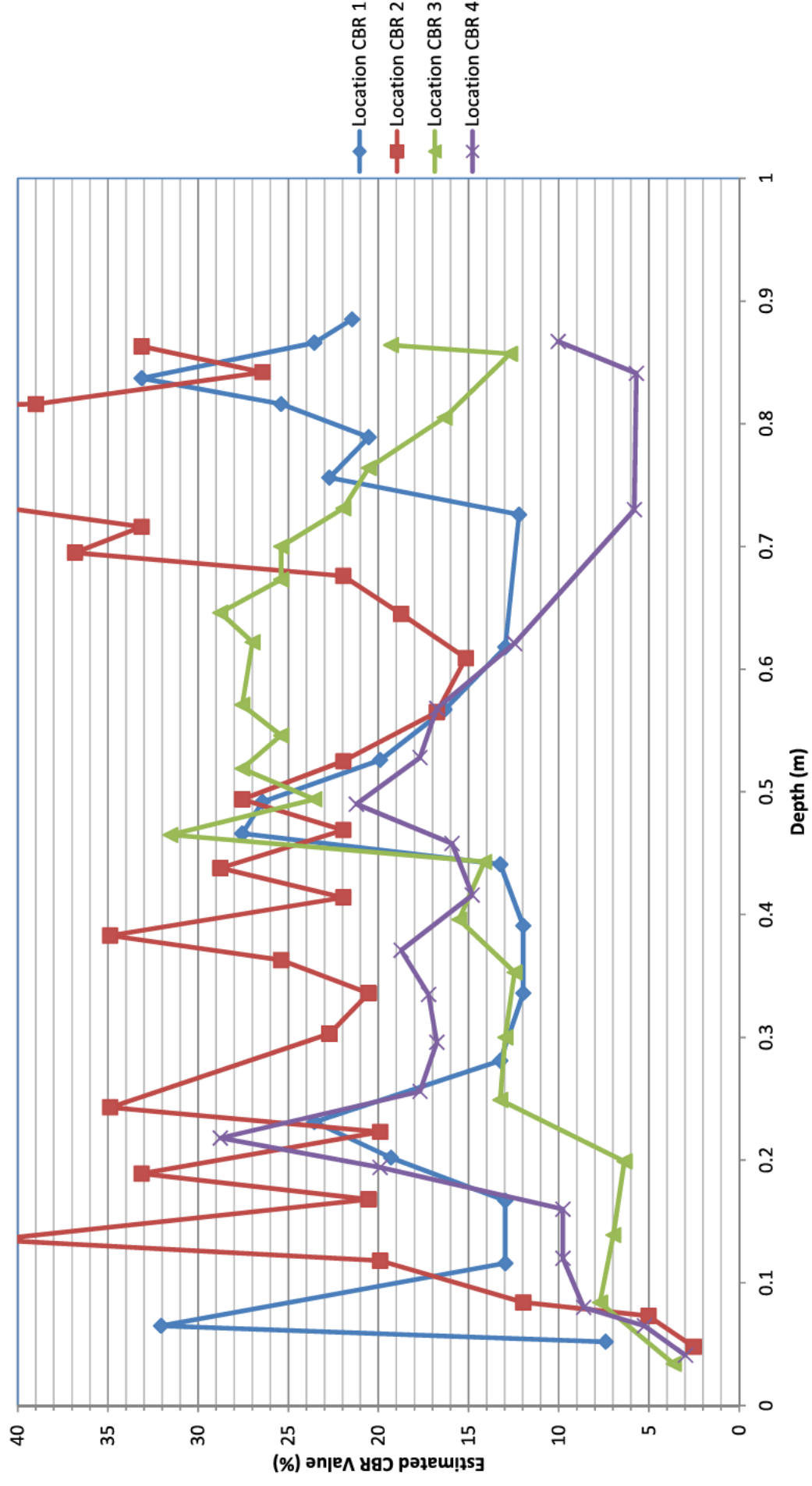
Equipment & Methods Machine Excavator		Job No: 22-2430-2 Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna						
Carried out for Mr & Mrs Schollar		Ground Level 0		Coordinates E N			Date 04-08-22	
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	
				Depth	Sample Type	Sample No.		Test
Grass underlain by: loose dark brown silty, gravelly fine SAND with some rootlets with occasional cobbles. Gravels are fine to coarse rounded quartz with occasional brick, concrete and plastic. Cobbles are angular brick with a single metal bar. (MADE GROUND)		0.40	-0.40	0.00 to 0.50	B	1	PID	<0.1ppm
Loose to medium dense brown gravelly fine SAND. Gravel is fine to coarse rounded quartz. (RIVER TERRACE DEPOSITS)		1.00	-1.00					
End of Trial Pit								
Additional Comments Groundwater: Slightly damp at base. Pit sides stable during excavation.							Logged by ADNS	
							Figure	

Equipment & Methods		Job No: 22-2430-2						
Machine Excavator		Project: Elmsdale House, Ratcliffe Lane, Sheepy Magna						
Carried out for		Ground Level		Coordinates			Date	
Mr & Mrs Schollar		0		E N			04-08-22	
Descriptions	Legend	Depth	Reduced Level	Samples/Tests/Notes			Field Records	
				Depth	Sample			Test
					Type	No.		
Block paving underlain by: SAND with a plastic membrane at base. (MADE GROUND)		0.10	-0.10	0.00 to 0.60	B	1	PID	<0.1ppm
Soft brownish grey CLAY with a plastic membrane at base. (MADE GROUND)		0.25	-0.25					
Soft dark brown organic silty, slightly gravelly CLAY. Gravel is fine to coarse rounded quartz. (OLD TOPSOIL) Moderate organic [plant] odour.		0.50	-0.50					
Loose to medium dense greyish brown to brown grey silty, gravelly fine SAND. Gravel is fine to coarse rounded quartz. (RIVER TERRACE DEPOSITS) Slight organic [plant] odour.		1.00		1.00	B	2	PID	<0.1ppm
End of Trial Pit		1.20	-1.20					
Additional Comments Groundwater: Slightly damp at base. Pit sides stable during excavation.								Logged by ADNS
								Figure

Elmsdale House, Sheepy Magna 08/22

CBR vs Depth

TRL DCP Method



APPENDIX B

LABORATORY TEST RESULTS



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref.: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Received Sample Overview

Lab Sample No(s)	Customer Sample Ref.	AGS Ref.	Depth (m)	Sampled Date
26697004	TP 1		2.20	04/08/2022
26697005	TP 2		0.80	04/08/2022
26697006	TP 3		1.10	04/08/2022
26697001	TP 6		0.00 - 0.50	04/08/2022
26697002	TP 7		0.00 - 0.50	04/08/2022
26697003	TP 8		0.10 - 0.60	04/08/2022

Only received samples which have had analysis scheduled will be shown on the following pages.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref.: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Results Legend



Test



No Determination Possible

Sample Types -

S - Soil/Solid
UNS - Unspecified Solid
GW - Ground Water
SW - Surface Water
LE - Land Leachate
PL - Prepared Leachate
PR - Process Water
SA - Saline Water
TE - Trade Effluent
TS - Treated Sewage
US - Untreated Sewage
RE - Recreational Water
DW - Drinking Water
Non-regulatory
UNL - Unspecified Liquid
SL - Sludge
G - Gas
OTH - Other

Results Legend	Lab Sample No(s)		Customer Sample Reference		AGS Reference		Depth (m)		Container		Sample Type	
	26697003	26697002	26697001	26697006	26697005	26697004	TP 8	TP 7	TP 6	TP 3	TP 2	TP 1
	0.10 - 0.60	0.00 - 0.50	0.00 - 0.50	1.10	0.80	2.20	60g VOC (ALE215)	250g Amber Jar (ALE210)	1kg TUB with Handle (ALE260)	60g VOC (ALE215)	250g Amber Jar (ALE210)	1kg TUB with Handle (ALE260)
	S	S	S	S	S	S	S	S	S	S	S	S
Anions by Kone (soil)	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X	X	X	X
Asbestos ID in Solid Samples	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Boron Water Soluble	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Chromium III	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Cyanide Comp/Free/Total/Thiocyanate	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Easily Liberated Sulphide	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Elemental Sulphur	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
EPH CWG GC (S)	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
GRO by GC-FID (S)	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Hexavalent Chromium (s)	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Metals in solid samples by OES	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
PAH by GCMS	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
pH	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X	X	X	X
Phenols by HPLC (S)	All	NDPs: 0 Tests: 3	X	X	X	X	X	X	X	X	X	X
Sample description	All	NDPs: 0 Tests: 6	X	X	X	X	X	X	X	X	X	X



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Sample Descriptions

Grain Sizes

very fine <0.063mm **fine** 0.063mm - 0.1mm **medium** 0.1mm - 2mm **coarse** 2mm - 10mm **very coarse** >10mm

Lab Sample No(s)	Customer Sample Ref.	Depth (m)	Colour	Description	Inclusions	Inclusions 2
26697004	TP 1	2.20	Dark Brown	Sandy Loam	Stones	None
26697005	TP 2	0.80	Dark Brown	Sandy Loam	Stones	Vegetation
26697006	TP 3	1.10	Light Brown	Clay	Stones	Vegetation
26697001	TP 6	0.00 - 0.50	Light Brown	Sandy Loam	Stones	Vegetation
26697002	TP 7	0.00 - 0.50	Light Brown	Sandy Loam	Stones	Vegetation
26697003	TP 8	0.10 - 0.60	Dark Brown	Sandy Clay Loam	Stones	Vegetation

These descriptions are only intended to act as a cross check if sample identities are questioned, and to provide a log of sample matrices with respect to MCERTS validation. They are not intended as full geological descriptions.

We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample.

Other coarse granular materials such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

PAH by GCMS

Results Legend			Customer Sample Ref.		TP 6	TP 7	TP 8			
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference		0.00 - 0.50 Soil/Solid (S) 04/08/2022 06/08/2022 220806-72 26697001	0.00 - 0.50 Soil/Solid (S) 04/08/2022 06/08/2022 220806-72 26697002	0.10 - 0.60 Soil/Solid (S) 04/08/2022 06/08/2022 220806-72 26697003			
M	mCERTS accredited.									
aq	Aqueous / settled sample.									
dis,flt	Dissolved / filtered sample.									
tot,unflt	Total / unfiltered sample.									
* Subcontracted - refer to subcontractor report for accreditation status.										
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery										
(F) Trigger breach confirmed										
1-4-5@ Sample deviation (see appendix)										
Component	LOD/Units	Method								
Naphthalene-d8 % recovery**	%	TM218	94.7	99.5	93					
Acenaphthene-d10 % recovery**	%	TM218	96.2	106	93.3					
Phenanthrene-d10 % recovery**	%	TM218	98.5	105	93.9					
Chrysene-d12 % recovery**	%	TM218	94.7	112	95.6					
Perylene-d12 % recovery**	%	TM218	99.2	101	96.6					
Naphthalene	<9 µg/kg	TM218	<9	<18	<9					
Acenaphthylene	<12 µg/kg	TM218	<12	<24	<12					
Acenaphthene	<8 µg/kg	TM218	<8	<16	<8					
Fluorene	<10 µg/kg	TM218	<10	<20	<10					
Phenanthrene	<15 µg/kg	TM218	17.4	51.1	19.2					
Anthracene	<16 µg/kg	TM218	<16	<32	<16					
Fluoranthene	<17 µg/kg	TM218	46.2	164	45.3					
Pyrene	<15 µg/kg	TM218	44.1	158	40.7					
Benz(a)anthracene	<14 µg/kg	TM218	25	83.4	26					
Chrysene	<10 µg/kg	TM218	26.3	111	25.3					
Benzo(b)fluoranthene	<15 µg/kg	TM218	49.8	175	40.2					
Benzo(k)fluoranthene	<14 µg/kg	TM218	16.9	54	<14					
Benzo(a)pyrene	<15 µg/kg	TM218	30.8	108	24					
Indeno(1,2,3-cd)pyrene	<18 µg/kg	TM218	27.2	119	<18					
Dibenzo(a,h)anthracene	<23 µg/kg	TM218	<23	<46	<23					
Benzo(g,h,i)perylene	<24 µg/kg	TM218	26.9	118	<24					
PAH, Total Detected USEPA 16	<118 µg/kg	TM218	310	1140	221					



Superseded Report: 657888

Location: Elmsdale House, Sheepy Magna



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

VOC MS (S)

Results Legend			Customer Sample Ref.		TP 6	TP 7	TP 8										
#	ISO17025 accredited.		Depth (m) Sample Type Date Sampled Sample Time Date Received SDG Ref Lab Sample No.(s) AGS Reference														
M	mCERTS accredited.																
aq	Aqueous / settled sample.																
dis,flt	Dissolved / filtered sample.																
tot,unflt	Total / unfiltered sample.																
* Subcontracted - refer to subcontractor report for accreditation status.																	
** % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery																	
(F) Trigger breach confirmed																	
1-4-5@ Sample deviation (see appendix)																	
Component	LOD/Units	Method															
Dibromofluoromethane**	%	TM116	112								113	109					
Toluene-d8**	%	TM116	88.7								87.3	89.6					
4-Bromofluorobenzene**	%	TM116	70.5								74	71.7					
Methyl Tertiary Butyl Ether	<10 µg/kg	TM116	<10								<10	<10					
Benzene	<9 µg/kg	TM116	<9								<9	<9					
Toluene	<7 µg/kg	TM116	<7								<7	<7					
Ethylbenzene	<4 µg/kg	TM116	<4								<4	<4					
p/m-Xylene	<10 µg/kg	TM116	<10								<10	<10					
o-Xylene	<10 µg/kg	TM116	<10								<10	<10					
Sum of Detected Xylenes	<0.02 mg/kg	TM116	<0.02								<0.02	<0.02					
Sum of BTEX	<40 µg/kg	TM116	<40								<40	<40					



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Asbestos Identification - Solid Samples

Results Legend

ISO17025 accredited,
M mCERTS accredited,
* Subcontracted test,
(F) Trigger breach confirmed
1-5	@ Sample deviation (see appendix)

		Date of Analysis	Analysed By	Comments	Amosite (Brown) Asbestos	Asbestos Actinolite	Asbestos Anthophyllite	Asbestos Tremolite	Chrysotile (White) Asbestos	Crocidolite (Blue) Asbestos	Non-Asbestos Fibre
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP 6 0.00 - 0.50 SOLID 04/08/2022 00:00:00 06/08/2022 05:00:00 220806-72 26697001 TM048	15/08/2022	Paul Poynton	N/A	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP 7 0.00 - 0.50 SOLID 04/08/2022 00:00:00 06/08/2022 05:00:00 220806-72 26697002 TM048	15/08/2022	Paul Poynton	N/A	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected
Cust. Sample Ref. Depth (m) Sample Type Date Sampled Date Received SDG Original Sample Method Number	TP 8 0.10 - 0.60 SOLID 04/08/2022 00:00:00 06/08/2022 05:00:00 220806-72 26697003 TM048	15/08/2022	Joanne Furnivall	-	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected (#)	Not Detected



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Table of Results - Appendix

Method No	Reference	Description
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material
TM048	HSG 248, Asbestos: The analysts' guide for sampling, analysis and clearance procedures	Identification of Asbestos in Bulk Material
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) by Headspace GC-FID (C4-C12)
TM116	Modified: US EPA Method 8260, 8120, 8020, 624, 610 & 602	Determination of Volatile Organic Compounds by Headspace / GC-MS
TM132	In - house Method	ELTRA CS800 Operators Guide
TM133	BS 1377: Part 3 1990;BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter
TM136	Method 17.10, Second Site property, March 2003	Determination of Sulphur by HPLC
TM151	Method 3500D, AWWA/APHA, 20th Ed., 1999	Determination of Hexavalent Chromium using Kone analyser
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser
TM180	Sulphide in waters and waste waters 1991 [ISBN 01 175 7186 SCA rec. 2007 (unpublished)]	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by iCap 6500 Duo ICP-OES
TM218	Shaker extraction - EPA method 3546.	The determination of PAH in soil samples by GC-MS
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid Extractable Sulphate in Soils by ICP OES
TM222	In-House Method	Determination of Hot Water Soluble Boron in Soils (10:1 Water:Soil) by ICP OES.
TM243		Mixed Anions In Soils By Kone
TM414	Analysis of Petroleum Hydrocarbons in Environmental Media – Total Petroleum Hydrocarbon Criteria	Determination of Speciated Extractable Petroleum Hydrocarbons in Soils by GCxGC-FID

NA = not applicable.

Chemical testing (unless subcontracted) performed at ALS Life Sciences Ltd Hawarden (Method codes TM).



CERTIFICATE OF ANALYSIS

Validated

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Test Completion Dates

Lab Sample No(s)	26697004	26697005	26697006	26697001	26697002	26697003
Customer Sample Ref.	TP 1	TP 2	TP 3	TP 6	TP 7	TP 8
AGS Ref.						
Depth	2.20	0.80	1.10	0.00 - 0.50	0.00 - 0.50	0.10 - 0.60
Type	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)	Soil/Solid (S)
Anions by Kone (soil)	15-Aug-2022	15-Aug-2022	15-Aug-2022	15-Aug-2022	15-Aug-2022	15-Aug-2022
Asbestos ID in Solid Samples				15-Aug-2022	15-Aug-2022	15-Aug-2022
Boron Water Soluble				12-Aug-2022	12-Aug-2022	12-Aug-2022
Chromium III				16-Aug-2022	15-Aug-2022	15-Aug-2022
Cyanide Comp/Free/Total/Thiocyanate				12-Aug-2022	12-Aug-2022	12-Aug-2022
Easily Liberated Sulphide				15-Aug-2022	15-Aug-2022	15-Aug-2022
Elemental Sulphur				15-Aug-2022	15-Aug-2022	15-Aug-2022
EPH CWG GC (S)				15-Aug-2022	15-Aug-2022	15-Aug-2022
GRO by GC-FID (S)				12-Aug-2022	12-Aug-2022	12-Aug-2022
Hexavalent Chromium (s)				16-Aug-2022	15-Aug-2022	15-Aug-2022
Metals in solid samples by OES				12-Aug-2022	15-Aug-2022	15-Aug-2022
PAH by GCMS				11-Aug-2022	11-Aug-2022	11-Aug-2022
pH	11-Aug-2022	11-Aug-2022	10-Aug-2022	10-Aug-2022	10-Aug-2022	11-Aug-2022
Phenols by HPLC (S)				11-Aug-2022	11-Aug-2022	11-Aug-2022
Sample description	11-Aug-2022	11-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022	09-Aug-2022
Total Organic Carbon				12-Aug-2022	15-Aug-2022	15-Aug-2022
Total Sulphate				12-Aug-2022	12-Aug-2022	12-Aug-2022
TPH CWG GC (S)				15-Aug-2022	15-Aug-2022	15-Aug-2022
VOC MS (S)				11-Aug-2022	11-Aug-2022	11-Aug-2022



CERTIFICATE OF ANALYSIS

SDG: 220806-72
Client Ref: 22-2430-2

Report Number: 658048
Location: Elmsdale House, Sheepy Magna

Superseded Report: 657888

Appendix

General

1. Results are expressed on a dry weight basis (dried at 35°C) for all soil analyses except for the following: NRA and CEN Leach tests, flash point LOI, pH, ammonium as NH₄ by the BRE method, VOC TICs and SVOC TICs.

2. If sufficient sample is received a sub sample will be retained free of charge for 30 days after analysis is completed (e-mailed) for all sample types unless the sample is destroyed on testing. The prepared soil sub sample that is analysed for asbestos will be retained for a period of 6 months after the analysis date. All bulk samples will be retained for a period of 6 months after the analysis date. All samples received and not scheduled will be disposed of one month after the date of receipt unless we are instructed to the contrary. Once the initial period has expired, a storage charge will be applied for each month or part thereof until the client cancels the request for sample storage. ALS reserve the right to charge for samples received and stored but not analysed.

3. With respect to turnaround, we will always endeavour to meet client requirements wherever possible, but turnaround times cannot be absolutely guaranteed due to so many variables beyond our control.

4. We take responsibility for any test performed by sub-contractors (marked with an asterisk). We endeavour to use UKAS/MCERTS Accredited Laboratories, who either complete a quality questionnaire or are audited by ourselves. For some determinands there are no UKAS/MCERTS Accredited Laboratories, in this instance a laboratory with a known track record will be utilised.

5. If no separate volatile sample is supplied by the client, or if a headspace or sediment is present in the volatile sample, the integrity of the data may be compromised. This will be flagged up as an invalid VOC on the test schedule and the result marked as deviating on the test certificate.

6. NDP - No determination possible due to insufficient/unsuitable sample.

7. Results relate only to the items tested.

8. LoDs (Limit of Detection) for wet tests reported on a dry weight basis are not corrected for moisture content.

9. **Surrogate recoveries** - Surrogates are added to your sample to monitor recovery of the test requested. A % recovery is reported, results are not corrected for the recovery measured. Typical recoveries for organics tests are 70-130%. Recoveries in soils are affected by organic rich or clay rich matrices. Waters can be affected by remediation fluids or high amounts of sediment. Test results are only ever reported if all of the associated quality checks pass; it is assumed that all recoveries outside of the values above are due to matrix affect.

10. Stones/debris are not routinely removed. We always endeavour to take a representative sub sample from the received sample.

11. In certain circumstances the method detection limit may be elevated due to the sample being outside the calibration range. Other factors that may contribute to this include possible interferences. In both cases the sample would be diluted which would cause the method detection limit to be raised.

12. For dried and crushed preparations of soils volatile loss may occur e.g volatile mercury

13. For leachate preparations other than Zero Headspace Extraction (ZHE) volatile loss may occur.

14. For the BSEN 12457-3 two batch process to allow the cumulative release to be calculated, the volume of the leachate produced is measured and filtered for all tests. We therefore cannot carry out any unfiltered analysis. The tests affected include volatiles GCFID/GCMS and all subcontracted analysis.

15. Analysis and identification of specific compounds using GCFID is by retention time only, and we routinely calibrate and quantify for benzene, toluene, ethylbenzenes and xylenes (BTEX). For total volatiles in the C5-C12 range, the total area of the chromatogram is integrated and expressed as ug/kg or ug/l. Although this analysis is commonly used for the quantification of gasoline range organics (GRO), the system will also detect other compounds such as chlorinated solvents, and this may lead to a falsely high result with respect to hydrocarbons only. It is not possible to specifically identify these non-hydrocarbons, as standards are not routinely run for any other compounds, and for more definitive identification, volatiles by GCMS should be utilised.

16. We are accredited to MCERTS for sand, clay and loam/topsoil, or any of these materials - whether these are derived from naturally occurring soil profiles, or from fill/made ground, as long as these materials constitute the major part of the sample. Other coarse granular material such as concrete, gravel and brick are not accredited if they comprise the major part of the sample.

17 Data retention. All records, communications and reports pertaining to the analysis are archived for seven years from the date of issue of the final report.

18. **Tentatively Identified Compounds (TICs)** are non-target peaks in VOC and SVOC analysis. All non-target peaks detected with a concentration above the LoD are subjected to a mass spectral library search. Non-target peaks with a library search confidence of >75% are reported based on the best mass spectral library match. When a non-target peak with a library search confidence of <75% is detected it is reported as "mixed hydrocarbons". Non-target compounds identified from the scan data are semi-quantified relative to one of the deuterated internal standards, under the same chromatographic conditions as the target compounds. This result is reported as a semi-quantitative value and reported as Tentatively Identified Compounds (TICs). TICs are outside the scope of UKAS accreditation and are not moisture corrected.

19. Sample Deviations

If a sample is classed as deviated then the associated results may be compromised.

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Matrix interference
♦	Sample holding time exceeded in laboratory
@	Sample holding time exceeded due to late arrival of instructions or samples
§	Sampled on date not provided

20. Asbestos

When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TM048 based on HSG 248 (2021), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible (NDP). The quantity of asbestos present is not determined unless specifically requested.

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials and soils are obtained from supplied bulk materials and soils which have been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2021).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALS (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining.

Asbestos Type	Common Name
Chrysotile	White Asbestos
Amosite	Brown Asbestos
Crocidolite	Blue Asbestos
Fibrous Actinolite	-
Fibrous Anthophyllite	-
Fibrous Tremolite	-

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than: - Trace - Where only one or two asbestos fibres were identified.

Respirable Fibres

Respirable fibres are defined as fibres of <3 µm diameter, longer than 5 µm and with aspect ratios of at least 3:1 that can be inhaled into the lower regions of the lung and are generally acknowledged to be most important predictor of hazard and risk for cancers of the lung.

Further guidance on typical asbestos fibre content of manufactured products can be found in HSG 264.

The identification of asbestos containing materials and soils falls within our schedule of tests for which we hold UKAS accreditation, however opinions, interpretations and all other information contained in the report are outside the scope of UKAS accreditation.

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WV16 6NN

24 August 2022

Report No : GEO/36108/01

Page 1 of 1

For the attention of Mr G Dorrell

Our ref **GEO / 36108**
Your Ref **22-2430-2**

Date samples received 11/08/2022
Date written instructions received 11/08/2022
Date testing commenced 12/08/2022
Date of sample disposal 21/09/2022

Project **ELMSDALE HOUSE, SHEEPY MAGNA**

Further to your instructions we have pleasure in enclosing the results of the tests you requested in the attached figures.

LABORATORY TEST REPORT

Item No	Test Quantity	Description
1	~	Liquid & Plastic Limits Summary
~	3	Water Content
2	3	Liquid & Plastic Limits

Any opinions or interpretations expressed herein are outside the scope of UKAS accreditation. All results contained in this report are provisional unless signed by an approved signatory. The results contained in this report relate only to samples received in the laboratory and are tested 'as received' unless otherwise stated. This report should not be reproduced, except in full, without the written approval of the laboratory. The results reported are applicable only to the test items received by the laboratory.

All the necessary data required by the documented test procedures has been recorded and will be stored for a period of not less than 6 years. This data will be issued to yourselves at your request. All samples will be disposed of after the date shown above. Written confirmation will be required to retain the samples beyond this period and a storage charge may be applied.

We trust that the above meets your requirements and should you require any further information or assistance, please do not hesitate to contact us.

Yours faithfully
on behalf of **GEOLABS Limited**

J A Reynolds
Director

eurolab

BMTA

BGA

AGS



Test Type:	Sample condition:
1 - 1 point 80g / 30° fall cone method.	1 - As Received
2 - 4 point 80g / 30° fall cone method.	2 - Air Dried
3 - Non plastic determination.	3 - Washed & Air Dried



LIQUID AND PLASTIC LIMITS

Location TP1
Depth (m) 1.00
Sample Type D

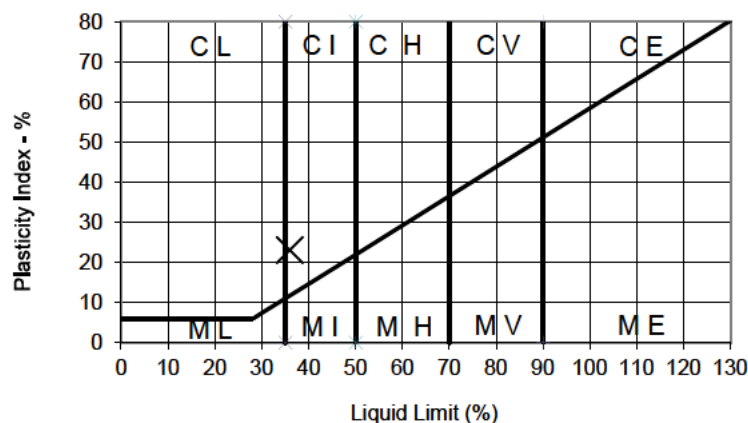
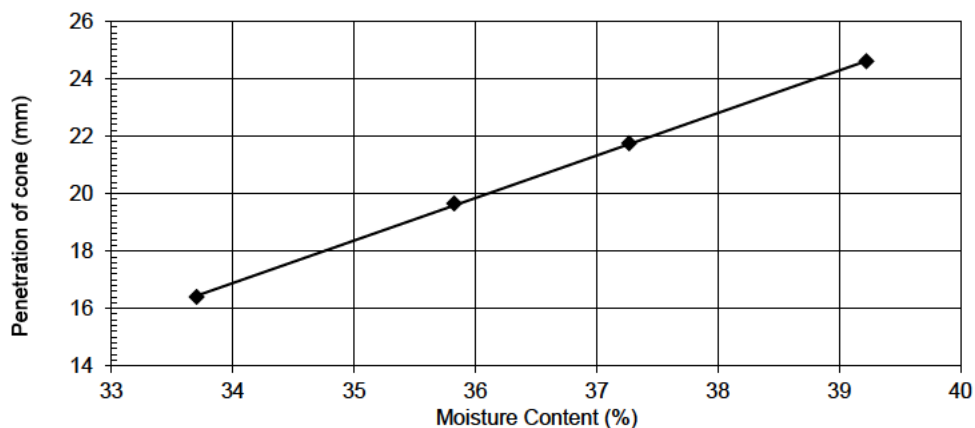
Description:

Brown very sandy CLAY with rare fine to medium gravel.

Preparation : Sample as received with discrete coarse particles removed by hand.

Water Content : (BS EN ISO 17892-1:2014) 14.0 %
Estimated percentage passing 425µm sieve : 95 %
Liquid Limit - Fall Cone 4 point Method (cone angle 30°) with increasing water content : 36 %
Plastic Limit : 13 %
Plasticity Index : 23 %

Equivalent Water Content of material passing 425µm sieve : 14.7 %
Liquidity Index : 0.07



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Version

Tested by PK
Checked and Approved by

J A Reynolds - Director
24/08/2022

Project Number:

GEO / 36108

Project Name:

**ELMSDALE HOUSE, SHEEPY MAGNA
22-2430-2**

GEOLABS



LIQUID AND PLASTIC LIMITS

Location TP2
Depth (m) 1.20
Sample Type D

Description:

Brown sandy CLAY with rare fine to medium gravel.

Preparation : Sample as received with discrete coarse particles removed by hand.

Water Content : (BS EN ISO 17892-1:2014) 16.1 %

Estimated percentage passing 425µm sieve : 95 %

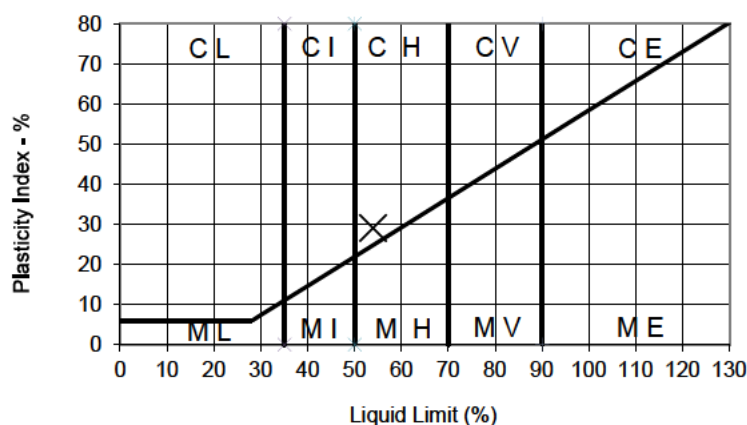
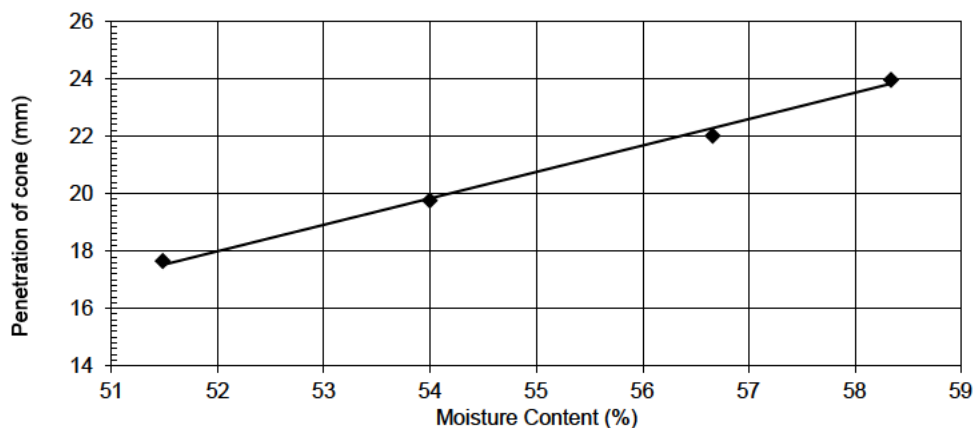
Liquid Limit - Fall Cone 4 point Method (cone angle 30°) with increasing water content : 54 %

Plastic Limit : 25 %

Plasticity Index : 29 %

Equivalent Water Content of material passing 425µm sieve : 16.9 %

Liquidity Index : -0.28



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Versi

Tested by PK
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Project Name:

ELMSDALE HOUSE, SHEEPY MAGNA
22-2430-2

J A Reynolds - Director
24/08/2022



LIQUID AND PLASTIC LIMITS

Location TP3
Depth (m) 1.10
Sample Type D

Description:

Brown mottled grey sandy CLAY with much fine to coarse gravel.

Preparation : Particles >425µm removed by wet sieving and air drying.

Water Content : (BS EN ISO 17892-1:2014) 18.6 %

Measured percentage passing 425µm sieve : 60 %

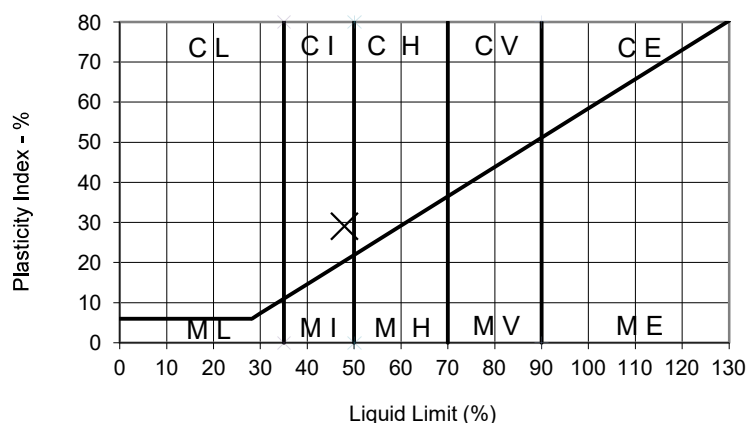
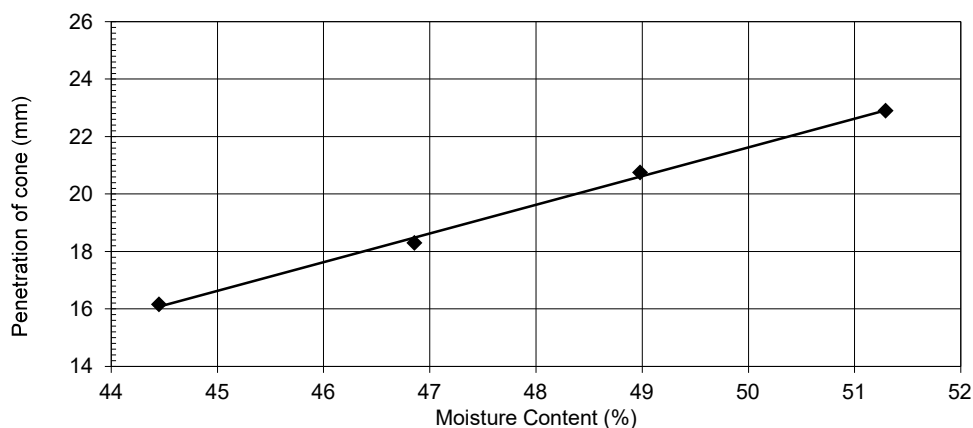
Liquid Limit - Fall Cone 4 point Method (cone angle 30°) with increasing water content : 48 %

Plastic Limit : 19 %

Plasticity Index : 29 %

Equivalent Water Content of material passing 425µm sieve : 31.0 %

Liquidity Index : 0.41



Tested by PK
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Project Number:

GEO / 36108

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**ELMSDALE HOUSE, SHEEPY MAGNA
22-2430-2**

J A Reynolds - Director
24/08/2022



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)):

$$RTs = Cs = Ct \cdot [Kd + ((\tau_w + \tau_a \cdot H) / \nu)]$$

Where:

Kd = Soil water partition coefficient (l/kg)

τ_w = Water-filled soil porosity

τ_a = Air-filled soil porosity

H = Henry's Law constant (dimensionless)

ν = bulk density (g/cm³)

Ct = Target Concentration (mg/kg)

Cs = Total soil concentration (mg/kg)

Such materials are those where the ratio $((\tau_w + \tau_a \cdot H) / \nu)$ 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.