



Phase I Geo-Environmental Desk Study

Land to the South of 17 Main Street

Woodnewton
Peterborough
PE8 5EB

Prepared for:

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EPS Project Reference: UK18.4119b

Date Issued: 28th February 2020

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LAND TO THE SOUTH OF 17 MAIN STREET

NON-TECHNICAL CLIENT SUMMARY

This report presents the findings of a Phase II Geo-Environmental Assessment undertaken to determine if there are any environmental risks associated with the site and its development for residential use. Pertinent findings and conclusions may be summarised as follows:

- The site is centred around two vacant barns that are proposed to be converted and redeveloped into two residential dwellings with associated car parking and domestic garden areas.
- Intrusive investigations comprised the drilling of 7 hand auger boreholes to a maximum depth of 1.0 m. The ground conditions are summarised as follows:

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Topsoil	>0.6	0.45 - >0.6
Made Ground	>0.6	0.5 - >0.6
Northampton Sand Formation	>1.0 (not proven)	>0.1 - > 0.15 (not proven)




- Laboratory analysis of soil samples obtained from the made ground has identified concentrations of contaminants that are not suitable for use within modern garden areas. Therefore, control measures will be required to ensure safe development of the site.
- Recommendations have been made for the implementation of a simple cover system comprising a minimum of **495mm** of certified clean topsoil in all areas of garden or soft landscaping where made ground is encountered. Alternatively, where finished levels dictate or where made ground is not as deep as 495mm, any made ground could be removed down to natural materials.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report, or alternatively give us a call and we'll talk you through it.

The above points represent a simplified summary of the findings of this assessment and should not form the basis for key decisions for the proposed development. A thorough review of the details is contained within the following report, or alternatively get in touch and we'll talk you through it.



Project Reference:	UK18.4119b	
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Status:	Issue 1	

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If third parties have been contracted / consulted during compilation of this report, the validity of any data they may have supplied, and which are included in the report, have been assessed as far as possible by EPS however, EPS cannot guarantee the validity of these data.

Where ground investigations have been conducted, these have been limited to the level of detail required for the site in order to achieve the objectives of the investigation.

No part of this report, or references to it, may be included in published documents of any kind without approval from EPS. This report and its contents, together with any supporting correspondence or other documentation, remain the property of Environmental Protection Strategies Ltd until paid for in full.

The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1. INTRODUCTION

In January 2020, Environmental Protection Strategies Ltd (EPS) was commissioned by Mrs Lucy Porter to complete a Phase II Geo-Environmental Assessment on land south of 17 Main Street, Woodnewton, Peterborough, PE8 5EB ('the site'); see Figure 1.

The work was commissioned in order to fulfil planning requirements relating to contamination for the conversion of two existing barns into residential dwellings with private gardens (East Northamptonshire Council, Reference No. 19/01665/PDU).

The current site layout plan is included as Figure 2 with selected site photographs included as Appendix A and an indicative proposed development plan is included as Appendix B.

This report presents the findings, conclusions, and recommendations of the Phase II Intrusive Investigation undertaken as instructed.

1.1 Objectives

The objectives of this investigation were as follows:

- a) To establish the presence of potential contaminant linkages established by the previous desk study by means of investigating shallow soils.
- b) To determine the potential risks posed by the site to human health and controlled waters, and make recommendations for further work that may be required and to ensure suitability for use and safe development in accordance with the Environment Agency's *Land Contamination: Risk Management (2019)* and the *National Planning Policy Framework*

1.2 Scope of Work

To perform an exploratory assessment of the site in accordance with the principles and requirements of DEFRA's '*Contaminated Land Statutory Guidance*' (2012), BS10175 – '*Investigation of Potentially Contaminated Sites*' and BS5930:2015 '*Code of practice for ground investigations*' the following tasks were undertaken:

Intrusive Investigation:

- a) Site walkover, inspection of any visual evidence of contamination at the site, obtaining photographic records.
- b) Health and safety briefing / site supervision.
- c) Drilling of seven hand auger boreholes to a maximum depth of 1.0 m below ground level (bgl).
- d) Continual logging of ground conditions including inspection of samples for visual and olfactory contamination, and laboratory analysis of selected representative samples.

Reporting:

- e) Data collection
- f) Interpretation of data including completion of Generic Quantitative Risk Assessment
- g) Reporting.

The findings and conclusions of these investigations are presented in the following sections.

1.3 Project Limitations and Constraints

The purpose of this report is to present the findings of a soil sampling investigation conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, Environmental Protection Strategies Ltd (EPS) makes the following statements:

No investigation method is capable of completely identifying all ground conditions that might be present in the soil or groundwater under a site. Where outlined in our report, we have examined the ground beneath a site by constructing a number of boreholes and / or trial pits to recover soil and / or groundwater samples. The locations of these excavations and sampling points are considered to be representative of the condition of the whole site subsurface however, ground conditions are naturally variable and it may be possible that the conditions encountered may differ to those found during the investigation.

No visible evidence of Japanese Knotweed was identified during the site walkover. However, this plant can be difficult to identify in the early stages of growth and therefore it is not always possible to identify its' presence at certain times of the year. For this reason, EPS cannot confirm that Japanese Knotweed rhizomes do not exist and it is recommended that if it is suspected that this species, or other similarly invasive plants are present at the site, a specialist contractor should be commissioned to make a detailed assessment.

This report does not include specific investigation for the presence of Potential Asbestos Containing Material (PACM). Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

The investigation was carried out to assess the significance of contamination resulting from the use of the site as identified in this report. Unless EPS has otherwise indicated, no assessment of potential impact of any other previous uses has been made.

Whilst it is recognised that information contained within this report may assist relevant and suitably qualified professionals, this report does not provide a geotechnical appraisal of ground conditions with respect to suitability of foundations or future structures nor does it intend to identify a need for any associated geotechnical ground improvement works.

2. BACKGROUND & PREVIOUS REPORTS

This investigation supplements a Phase I Desk Study undertaken for the site by EPS in August 2018. The key findings, as outlined within the non-technical summary of this previous report are given below, however, for more detailed background information, it is recommended that the reader reviews the following document:

- *Phase I Geo-Environmental Desk Study, Land to the South of 17 Main Street, Woodnewton, Peterborough, PE8 5EB (Ref: UK18.4119b) – Issue 1 (August 2018)*

A summary of the key information contained within the previous report is presented below:

- a) The site comprises former farm outbuildings, consisting of two barns and an area of hardstanding which is accessed from Main Street.
- b) Ground conditions are expected to comprise superficial alluvium deposits to the south of the site near the Willow Brook with a bedrock geology of the Northampton Sand Formation, which means the area is moderately sensitive in terms of water resources. Given the former site use and the current condition from the recently conducted site walkover, local watercourses and underlying groundwater are not considered to be at risk from potential onsite sources of contamination.
- c) However, it was not possible to completely discount risks posed to future users / residents due to the presence of potential contamination in the shallow soils, including made ground material that will be present beneath the barn, hardstanding and other former farm buildings. Sporadic debris and an area of burning as well as a disused heating oil tank also pose potential risks. These materials may not be of suitable quality for use within modern domestic gardens, therefore it was recommended that basic sampling of shallow soils be undertaken to confirm their suitability.

3. SUMMARY OF INTRUSIVE INVESTIGATIONS

Intrusive ground investigations were undertaken on 7th February 2020 in accordance with EPS standard operating procedures, copies of which will be made available on request. A summary of all site activities is presented in the following sections:

3.1 Exploratory Hole Locations

Exploratory hole locations were selected through consideration of the potential contaminant linkages identified through the Phase I Desk Study, the proposed development layout, the location of below ground utilities as well as operational and health & safety considerations.

Seven hand auger boreholes (HA01 – HA07) were formed at the site to a maximum depth of 1.0m.

The overall objective in terms of exploratory hole locations was to provide an appropriate lateral and vertical coverage of the soils underlying the site in order to offer information relating to their quality and nature.

Further rationale for each sampling location is provided in the table below.

Location	Rationale
WS01, WS03 & WS04	Provide information on the quality and nature of shallow soils in the proposed areas of soft landscaping/private gardens surrounding the barn conversions.
WS02	Provide information on the quality and nature of shallow soils adjacent to the storage tank identified during the Phase I investigation.
WS06 & WS07	Provide information on the quality and nature of shallow soils underneath the areas of concrete hardstanding.

A hand auger location plan is presented as Figure 3.

3.2 In-Situ Testing & Soil Sampling

Each hand auger borehole was logged for ground conditions encountered and inspected for any physical evidence of contamination, such as soil staining, odour and the presence of separate phase liquids on a precautionary basis. Borehole logs are presented in Appendix C.

Shallow soil samples were obtained from across the site for analysis of contaminants of concern, given the proposed residential end use.

Where potentially volatile organic compounds are suspected, EPS carries a Photoionisation Detector (PID), which can be used to measure the relative concentrations of vapour associated with soil samples collected from different depths and locations at the site. In these circumstances, soil samples will be placed into plastic bags, sealed, shaken and then allowed to rest for a few minutes to allow time for volatile vapour to accumulate in the air trapped within the bag.

The PID probe will then be used to pierce the bag and sample the air above the soil to measure the concentration of volatile compounds that have accumulated. PID readings are only used to provide EPS with a basic means to quantify areas of volatile organic compound in the field to help guide the investigation. In this case, no physical evidence of volatile organic compounds was encountered (such as soil staining or odour), therefore the PID was not used.

3.3 Laboratory Testing

Samples obtained for analysis of identified contaminants of concern were submitted to Element of Flintshire, who hold appropriate UKAS / MCERT accreditation for the required testing. Samples were transported in laboratory supplied containers and delivered to the laboratory by approved courier. Copies of chain of custody documentation are held by EPS and will be made available on request.

A laboratory testing schedule is included as Table 1.

4. FINDINGS OF THE INVESTIGATION

This section of the report provides a summary of the findings of the various aspects of the ground investigation.

4.1 Ground Conditions

A total of seven hand auger boreholes were formed at the site and the ground conditions encountered, from surface level, were found to comprise:

- Topsoil/ Made Ground
- Weathered Ironstone (Northampton Sand Formation)

Site specific borehole logs are included as Appendix C and give descriptions and depths of strata encountered. A summary of the general strata encountered across the site is provided in the table below, with more detailed description given in the following sub sections.

Geological Strata	Maximum Depth to Base of Strata (m bgl)	Strata Thickness (m)
Topsoil	>0.6	0.45 - >0.6
Made Ground	>0.6	0.5 - >0.6
Northampton Sand Formation	>1.0 (not proven)	>0.1 - > 0.15 (not proven)

4.1.1 Topsoil/ Made Ground

Topsoil was encountered in two locations (HA01 & HA05), as a dark brown slightly sandy clayey silt, becoming increasingly sandier and more clayey with depth.

Made ground was encountered in all other hand auger borehole locations, as a dark brown to black slightly gravelly, slightly sandy, clayey, silt with sub-angular fine to medium brick, concrete and asphalt. Within HA07, the made ground below the incompetent concrete hardstanding was noted as light brown, gravelly sand with sub-rounded medium to coarse grained concrete between 0.2 to 0.3 m bgl.

4.1.2 Weathered Ironstones (Northampton Sand Formation)

Materials interpreted to be representative of the weathered top of the Ironstone bedrock were encountered in several borehole locations, varying in thickness, but predominantly characterised as orangey/brown slightly gravelly sandy clay, with sub-rounded fine to medium ironstone gravel.

4.2 Groundwater

Groundwater was not encountered during the intrusive activities.

4.3 Physical Evidence of Contamination

Despite the presence of a limited thickness of made ground at selected locations, there was no palpable evidence of contamination, waste or putrefiable material encountered in any of the sampling locations during the investigation including any visual or olfactory evidence of hydrocarbon staining.

4.4 Laboratory Analysis – Soil

A laboratory analysis testing schedule is presented as Table 1 and all environmental sample results obtained from the laboratory are included as Appendix D. The key results of laboratory testing on environmental soil samples are summarised below.

Contaminant	No. of Samples	No of Detections	Range of Detections (mg/kg)		Highest Location & Depth (m bgl)
			Min	Max	
Arsenic	6	6	29.2	71.7	HA07 (0.20-0.60)
Cadmium	6	0	-		
Chromium	6	6	90.5	148.8	HA07 (0.20-0.60)
Copper	6	5	3	23	HA02 (0.00-0.50)
Lead	6	6	31	110	HA01 (0.00-0.45)
Mercury	6	0	-		
Nickel	6	6	37.3	72.5	HA07 (0.20-0.60)
Selenium	6	6	6	13	HA01 (0.00-0.45)
Zinc	6	6	180	349	HA01 (0.00-0.45)
Naphthalene	6	1	0.75		HA03 (0.00-0.60)
Benzo[a]pyrene	6	4	0.08	26.21	HA03 (0.00-0.60)
Dibenz(ah)anthracene	6	1	3.74		HA03 (0.00-0.60)
Phenols	6	0	-		
BTEX	3	0	-		
MTBE	3	0	-		
TPH CWG	3	2	202	573	HA03 (0.00-0.60)
TPH CWG Aliphatics (C5 – C35)	3	2	32	91	HA02 (0.00-0.50)
TPH CWG Aromatics (C5 – C35)	3	2	111	541	HA03 (0.00-0.60)
pH	6	6	7.76	10.23	HA07 (0.20-0.60)
Cyanide	6	0	-		
Asbestos (%)	6	0	-		

Notes: - Contaminant not found above laboratory detection limits
 PAH Polycyclic Aromatic Hydrocarbons
 BTEX Benzene, Toluene, Ethylbenzene, Xylenes
 TPH CWG Total Petroleum Hydrocarbons (Criteria Working Group)

5. ENVIRONMENTAL APPRAISAL

The following section outlines the approach applied to assessing the risks posed to human health and controlled waters through a Generic Quantitative Risk Assessment, then identifies any sample results found by this investigation which warrant further consideration.

5.1 Human Health

5.1.1 Land Use Setting & Screening Criteria

It is understood that development proposals for the site includes the conversion of two existing barns into residential dwellings with private gardens. In order to screen laboratory data for concentrations of contaminants in soil with potential to cause harm to human health in a residential (with home grown produce) land-use setting, relevant generic screening values for contaminants in soil have been utilised.

The technical framework used to derive the assessment criteria and the documents in which they are published are summarised as follows:

- d) *EA Science Reports* (SC050021/SR2, SC050021/SR3, and SC050021/SR7)
- e) *EA Soil Guideline Value Science Reports*
- f) *Suitable For Use Levels (S4ULs) for Human Health Risk Assessment* – LQM and CIEH (2015)
- g) *Soil Generic Assessment Criteria for Human Health Risk Assessment* - EIC/AGS/CL: AIRE (2010)
- h) *Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – SP1010 – DEFRA (2013)*

A summary of the screening criteria and the methodology used to derive them is included in Appendix E.

5.1.2 Assessment of Results- Human Health

The results of the screening process for on-site human receptors showed that generic screening criteria representative of minimal or low risk levels for human health have been exceeded for a number of PAH compounds and the heavy metal lead. It has been considered reasonable to utilise recorded concentrations of Benzo[a]pyrene (BaP) as a risk driver representative of genotoxic PAHs to further assess the data. The exceedances are summarised in the table below.

Contaminant	Screening Criteria (mg/kg)	No. of Exceedances	Highest Exceedance (mg/kg) & Sampling Location (m bgl)
Arsenic	37	1	71.7 at HA07 (0.20-0.60)
Benzo(a)pyrene	5	1	26.21 at HA03 (0.0-0.60)

5.1.3 Statistical Analysis

In order to further assess if the presence of arsenic and genotoxic PAHs in shallow soils may pose a potentially significant risk to future site users, statistical analysis was carried out on the dataset. All samples, with the exception of HA01, were taken were from made ground materials. The sample obtained from topsoil has been removed from this statistical analysis.

Initially an outlier test was carried out and although an outlier was identified in each dataset (HA07 - 71.7 mg/kg for Arsenic and HA03 – 26.21 mg/kg for Benzo(a)pyrene), the field evidence did not justify removing it from the dataset (i.e. the soils appeared comparable to other boreholes) so all sample results have been retained in the main dataset and treated as a single population.

On this basis, an upper 95th percentile confidence limit on the true mean (U95) was also calculated for the samples of made ground so that a better comparison for lifetime exposure to future site users could be made. This was carried out in line with recent guidance from CIEH and CL:AIRE entitled: ‘Guidance on Comparing Soil Contamination Data with a Critical Concentration’. The calculated U95 values is detailed below along with the relevant screening value.

Contaminant	U95 Value (mg/kg)	Screening Criteria (mg/kg)
Arsenic	75.05	37
Benzo(a)pyrene	28.09	5

The U95 values for all contaminants do exceed relevant generic screening criteria protective of human health for a residential land use.

A summary of the calculations for statistical testing referred to in this section are provided as Appendix F of this report, with detailed information regarding the calculations undertaken available on request.

5.2 Summary of Findings

The previous Phase I desk study completed by EPS in August 2018 identified that the site comprises of two barns and areas of hardstanding, with ground conditions anticipated to comprise of bedrock geology of the Northampton Sand Formation. Given the former site use and current condition, local watercourses and underlying groundwater were not considered at risk from site derived sources of contamination, however, potential contamination of shallow soils could pose a risk to the health of future site users.

Laboratory analysis of shallow soils sampled from across the site has identified that made ground materials have elevated concentrations of the heavy metal Arsenic as well as several PAH contaminants.

Although through the screening process only one of the five samples of made ground had exceedances of PAH compounds, given that it was visually indistinguishable from the other samples, it is considered representative of the made ground materials present across the entirety of the site. On this basis, EPS considers it necessary to apply appropriate remedial action/control measures to all areas of the made ground within the site boundary in order to make the site safe and suitable for its proposed use

One such control measures which is considered appropriate is the installation of a cover system following guidance presented in the BRE publication: *Cover Systems for Land Regeneration: Thickness Design of cover systems for Contaminated Land* (BRE, March 2004), for which recommendations have been made in Section 5.4.

5.3 Recommendations

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11), the risks identified by this work will require further assessment unless control measures are implemented. Recommended control measures are outlined below:

- a) Where made ground materials are encountered within the site boundary it is recommended that a minimum of **495mm** of certified clean cover material is placed within any proposed areas of soft landscaping, including domestic gardens.

Alternatively (or where made ground materials do not reach 495mm depth), made ground materials could be removed down to natural soils, therefore eliminating the source of contamination.

It should be noted that this recommendation is made only for domestic garden areas and landscaping over made ground, and there is no such requirement for areas beneath any hardstanding/building footprint or where natural material is encountered.

The cover system calculations on which this minimum thickness is broadly based are included as Appendix G.

All imported topsoil / subsoil for use within the cover system should be accompanied by appropriate laboratory analysis to demonstrate its chemical and physical suitability for use. The analysis should include TPHs, Asbestos, PAHs and Metals and should also comply with the relevant physical parameters outlined within the British Standard BS 3882:2007 'Specification for topsoil and requirements for use'. Upon completion of this work, the cover system should be verified and reported to East Northamptonshire Council for approval.

- b) All construction workers operating at the site should be advised of the potential for contact with made ground material within shallow soils, particularly beneath the existing buildings and hardstanding. Appropriate health and safety precautions should be adopted during any excavation works to avoid exposure to infilled soils. Reference should be made to relevant health & safety guidance including the following CIRIA document: *R132 Guide to Safe Working on Contaminated Sites*.
- c) Although the findings of the investigation would suggest that significant quantities of asbestos are unlikely to be encountered, the possibility of discrete pockets of this material existing within the made ground remains. If any evidence of visually identifiable ACM is suspected and is to be disturbed during the site development it is recommended that all works are postponed until suitable assessment and control measures (including a Working Method Statement (WMS)) are created. This WMS should be in accordance with guidance from CIRIA as well as the CL:AIRE /Joint Industry Working Group industry guidance on Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials (2016).

All asbestos containing materials should be handled and disposed of with the appropriate duty of care in accordance with the *Control of Asbestos Regulations (2012)*.

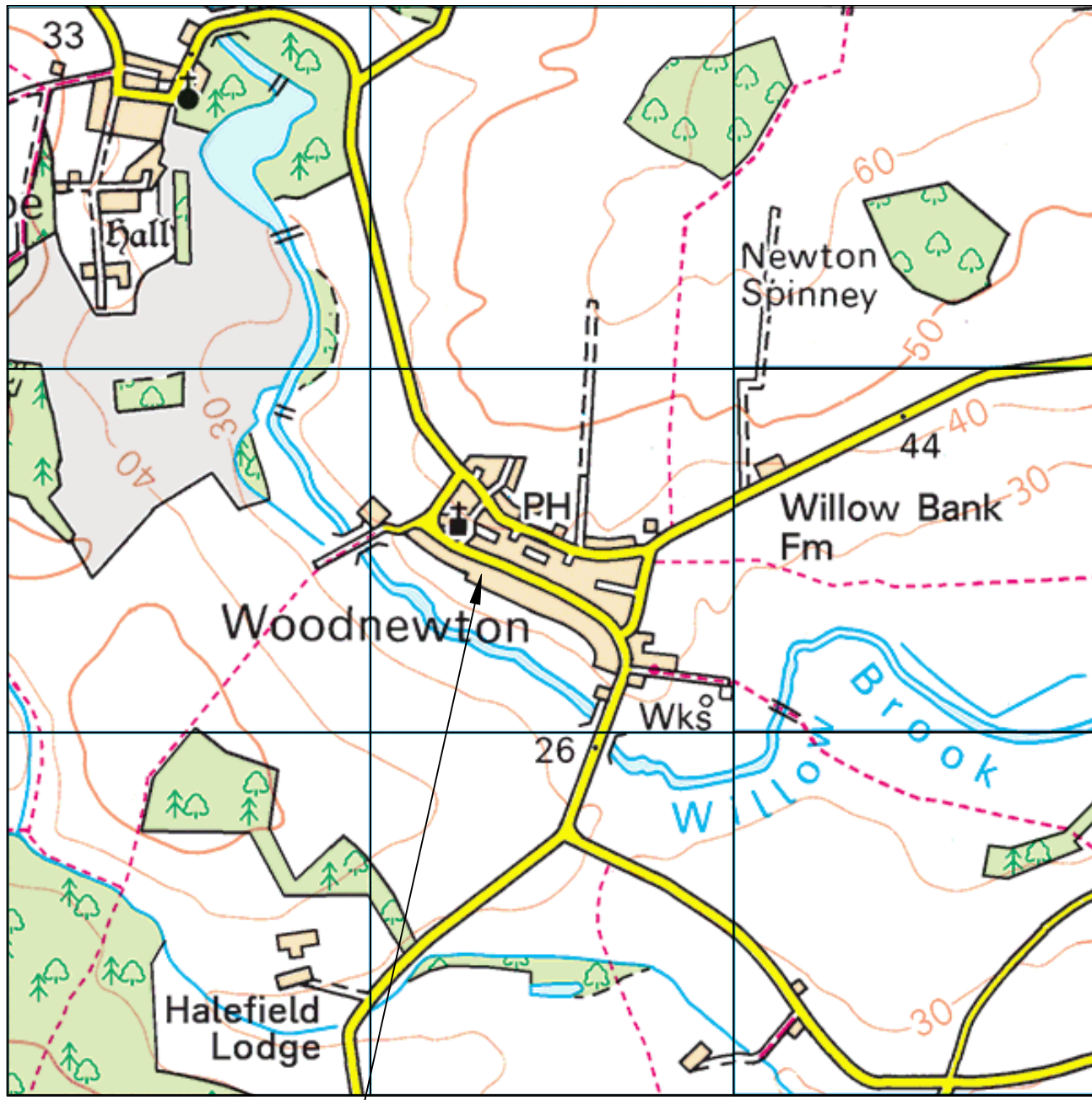


- d) Should any palpable evidence of unexpected contamination be encountered during the redevelopment work, it should be reported to EPS so that an inspection can be made and appropriate sampling and assessment work carried out, a method statement for this is provided as Appendix H.

It is recommended that a copy of this report be provided to the Environmental Health Department of East Northamptonshire Council so that the information may be incorporated into their land quality records and used to support the current planning application.



FIGURES



Approximate Site Location

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Licence Number: 100054115



Title: Site Location Plan

Project: Land South of 17 Main Street,
Woodnewton, Peterborough
PE8 5EB

Fig No: 1

Scale:	NTS	
Drawn By:	MT	Approved By: BV
Job No:	UK18.4119b	
Dwg No:	17MainStreet/0220/01	
Date:	February 2020	



Approximate Site Boundary —

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Licence Number: 100054115



Title: Current Site Layout

Project: Land South of 17 Main Street,
Woodnewton, Peterborough
PE8 5EB

Fig No: 2

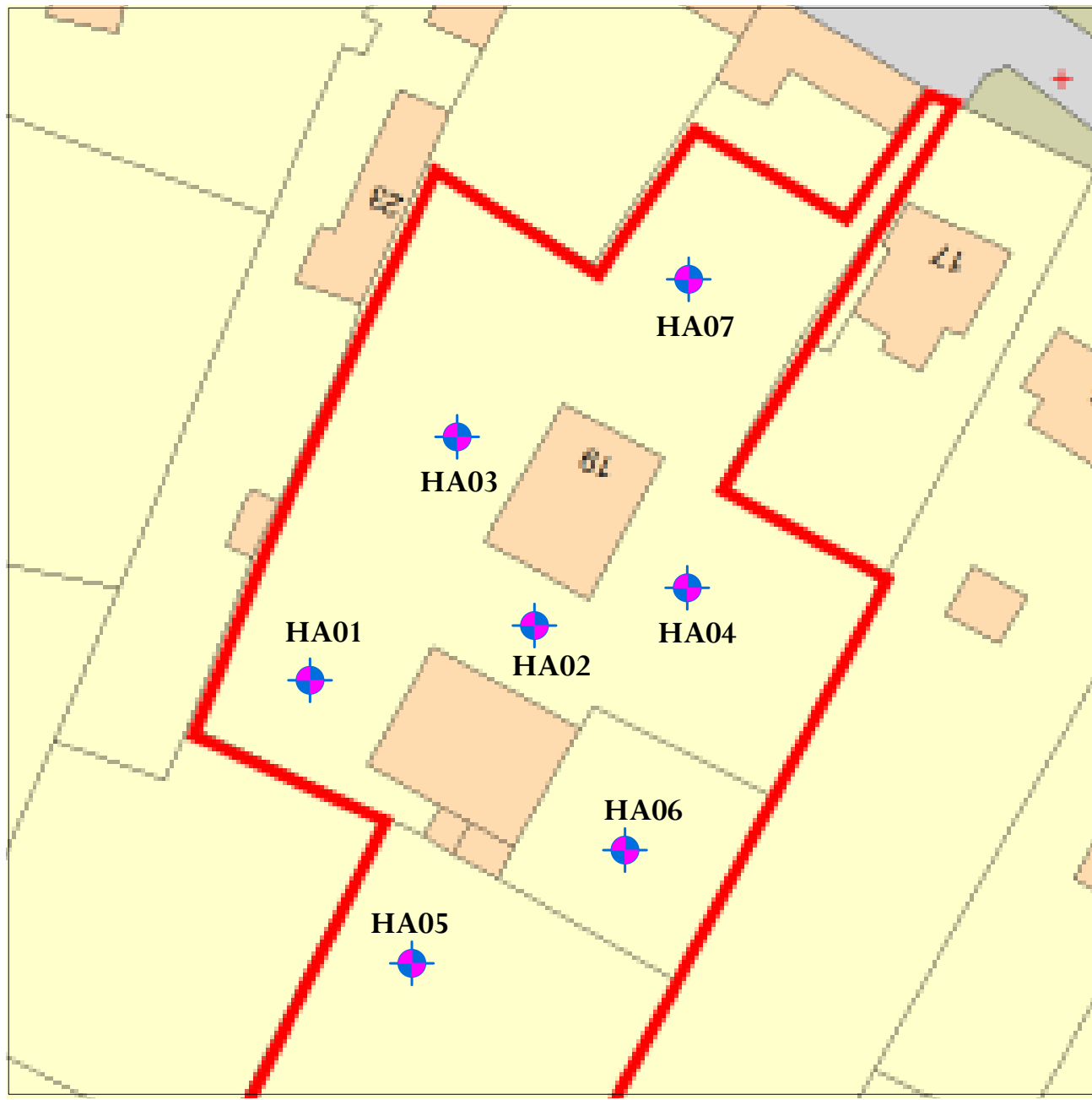
Scale: NTS

Drawn By: MT | Approved By: BV

Job No: UK18.4119b

Dwg No: 17MainStreet/0220/02

Date: February 2020



Approximate Site Boundary —

Hand Auger Borehole Location

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Title: Exploratory Hole Location Plan

Project: Land South of 17 Main Street,
Woodnewton, Peterborough
PE8 5EB

Fig No: 3

Scale:	NTS	
Drawn By:	MT	Approved By: BV
Job No:	UK18.4119b	
Dwg No:	17MainStreet/0220/03	
Date:	February 2020	



TABLES



Table 1 – Laboratory Testing Schedule (Environmental)

Sample ID	Sample Depth (m bgl)	EPS Mini Suite	EPS TPH Suite
HA01 ES1	0.0 - 0.45	X	
HA02 ES1	0.0 - 0.5	X	X
HA03 ES1	0.0 - 0.6	X	X
HA04 ES1	0.0 - 0.6	X	
HA05 ES1	0.0 - 0.6	-	-
HA06 ES1	0.18 - 0.5	X	X
HA07 ES1	0.2 - 0.6	X	

Notes:

m bgl meters below ground level
1 Sample Taken
- Sample Not Analysed
EPS Mini Suite Organic Matter, Cyanide, Metals, PAH's, Phenols, Asbestos
EPS Waste Suite Waste Characterisation Suite

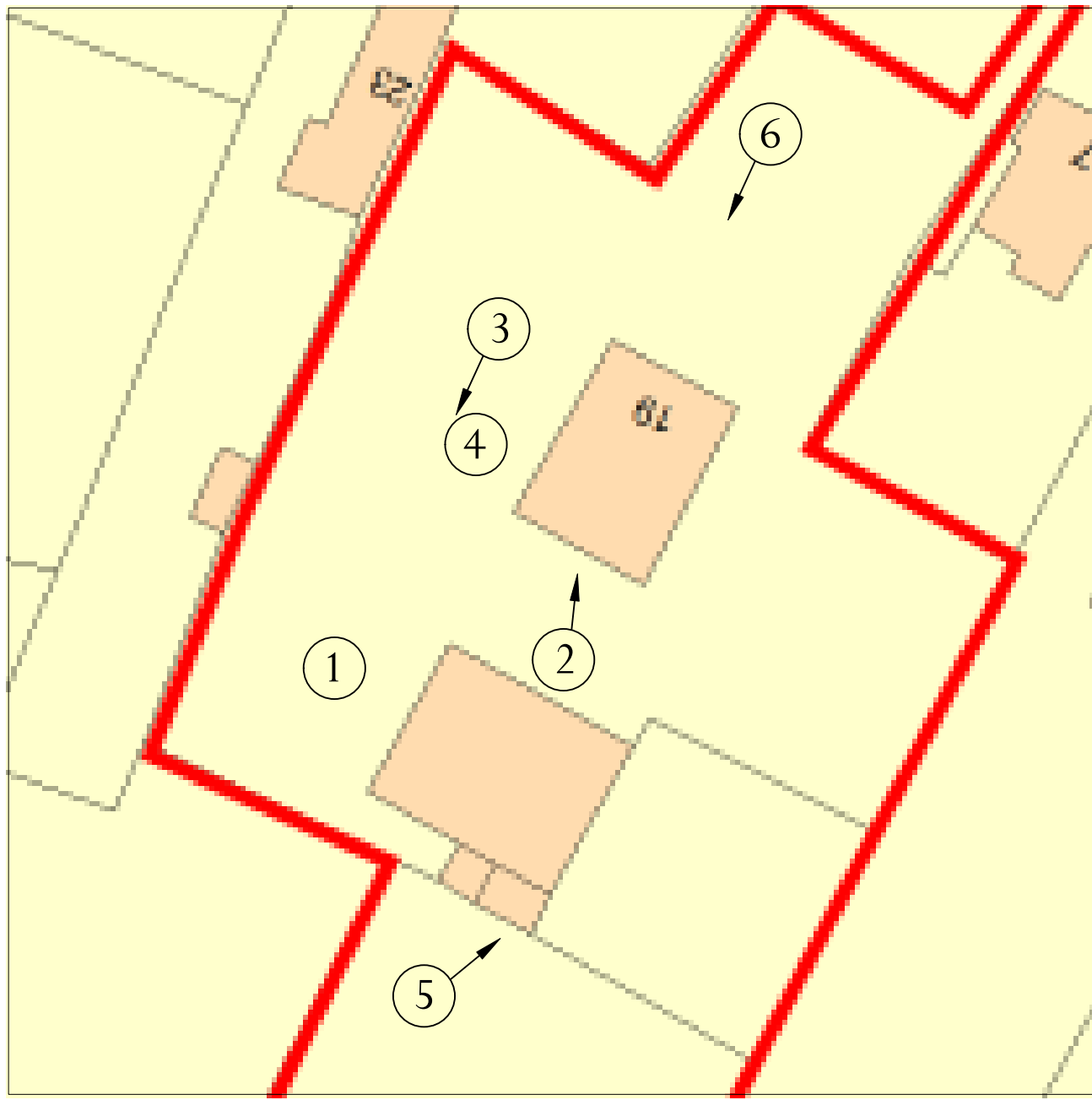


APPENDICES



APPENDIX A

Selected Site Photographs



Approximate Site Boundary —

Hand Auger Borehole Location

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Title: Photograph Location Plan

Project: Land South of 17 Main Street,
Woodnewton, Peterborough
PE8 5EB

Fig No: A

Scale: NTS

Drawn By: MT | Approved By: BV

Job No: UK18.4119b

Dwg No: 17MainStreet/0220/A

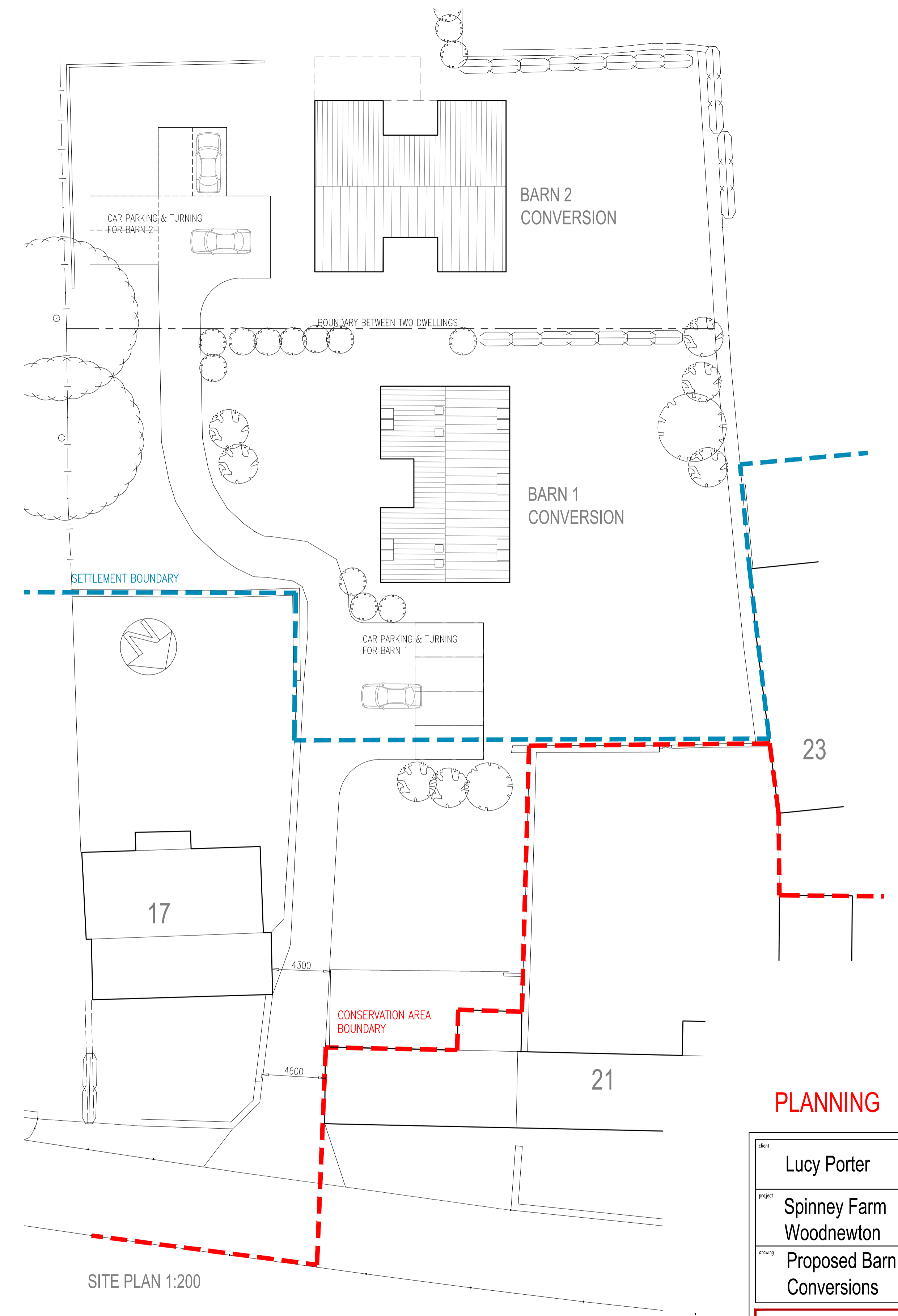
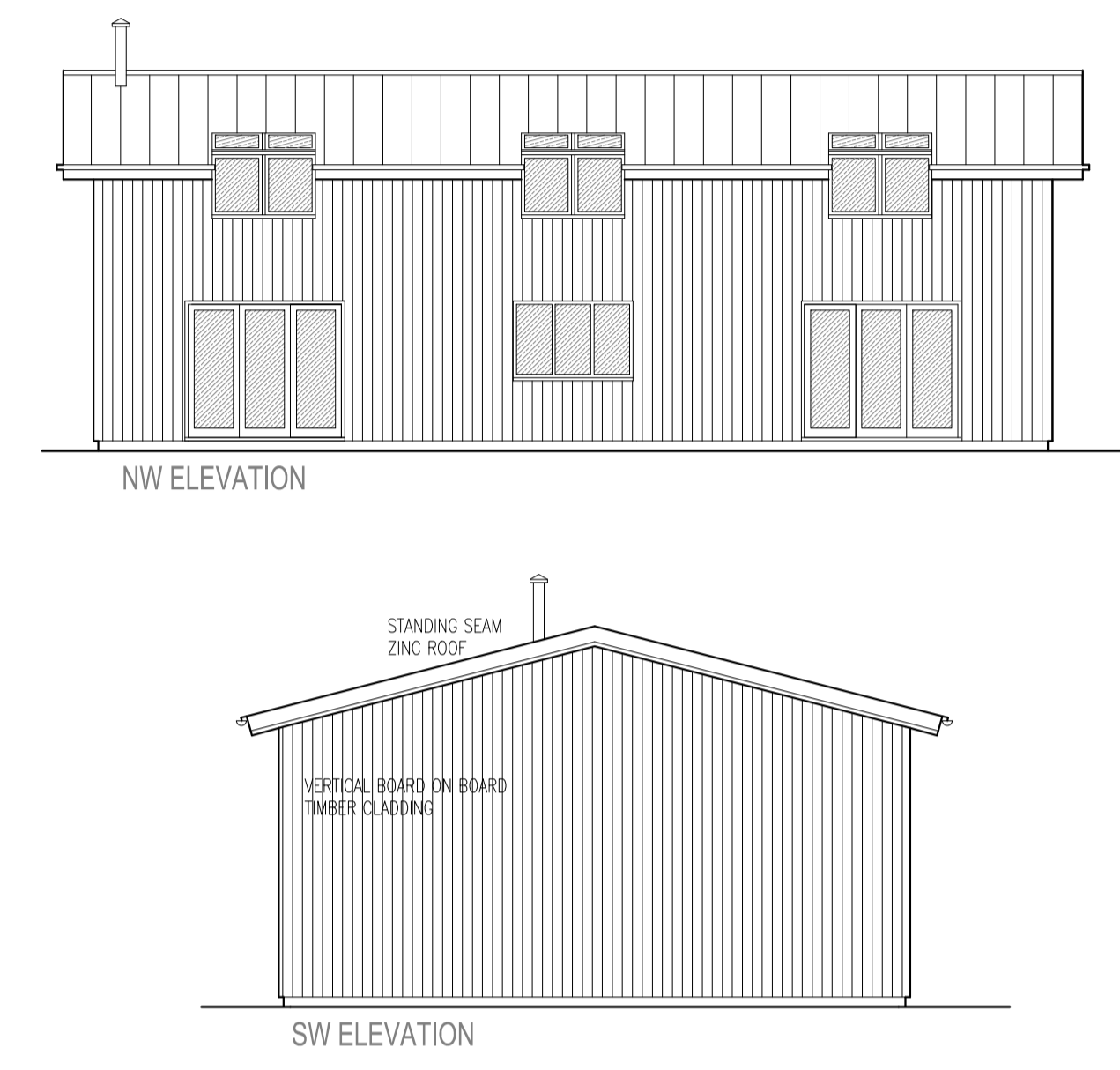
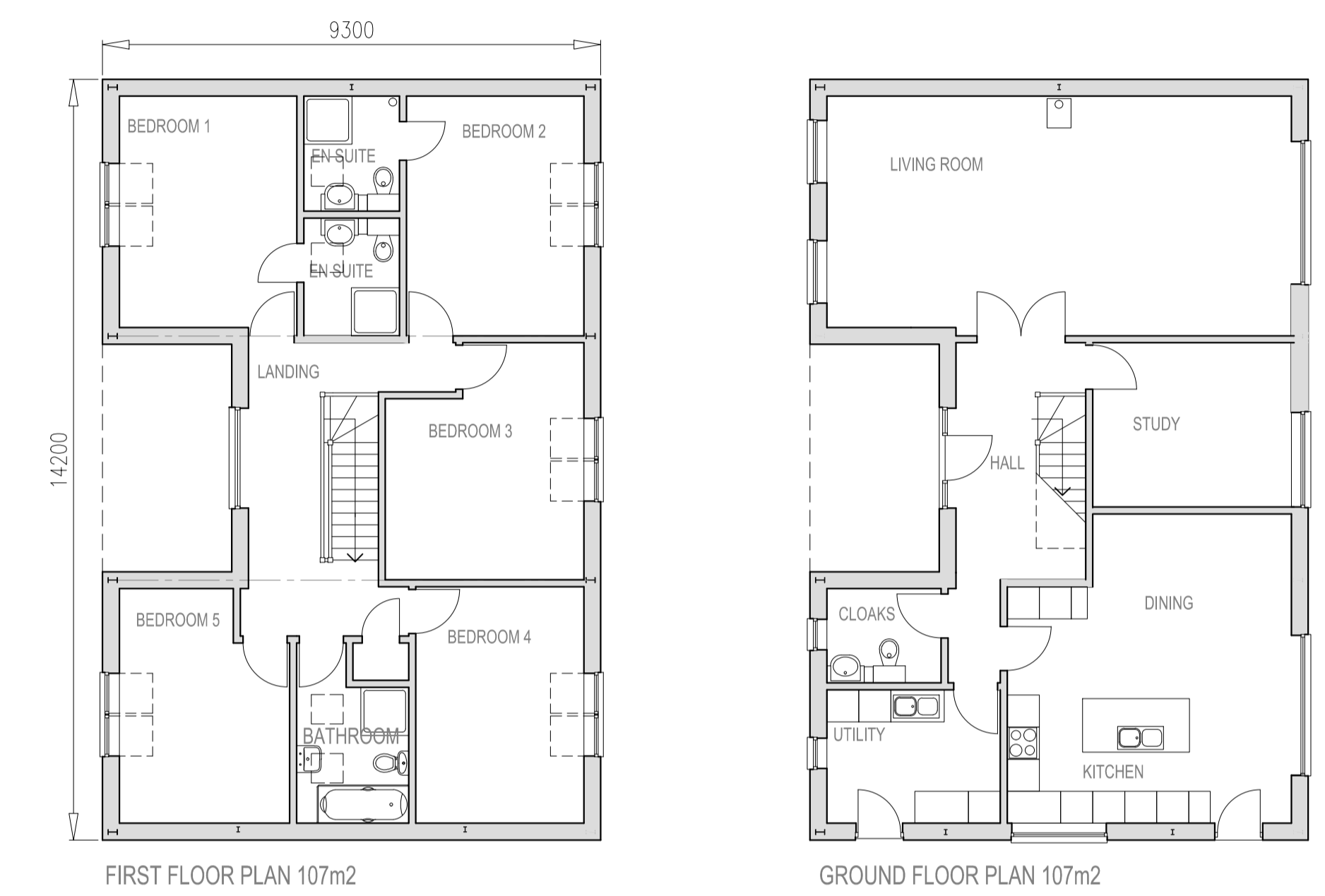
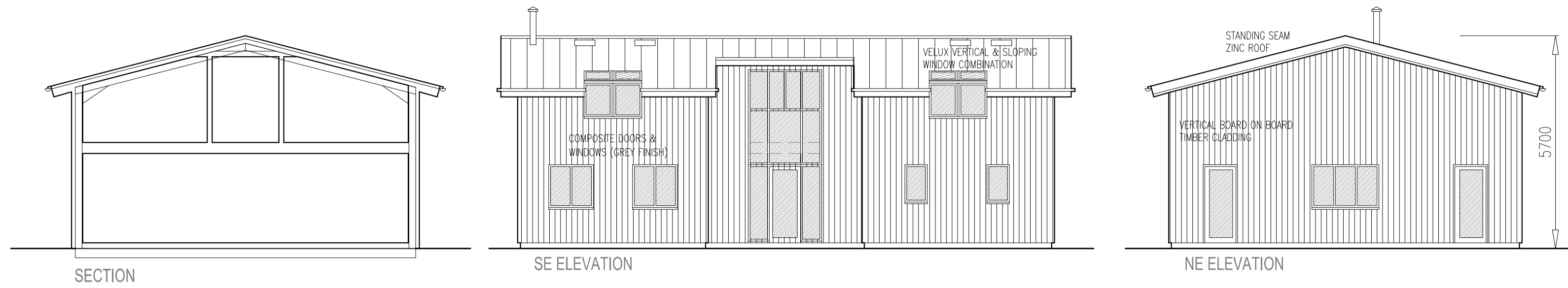
Date: February 2020

<p>Photo 1: Photo of topsoil materials from HA01, with ironstone gravel of the Northampton Sand Formation visible at the bottom.</p>	<p>Photo 2: Location of elevated storage tank and HA02 location.</p>
	
<p>Photo 3: Location of HA03 adjacent to the northern barn.</p>	<p>Photo 4: Photo of made ground materials found within HA03.</p>
	
<p>Photo 5: Location of HA05 in natural soil to the south of the barns.</p>	<p>Photo 6: Location of HA07, taken from the northern perimeter of site, with both barns visible in the background.</p>
	



APPENDIX B

Proposed Development Plan



BARN 1 - EXISTING PLAN, SECTION & ELEVATIONS

PLANNING

client	Lucy Porter
project	Spinney Farm Woodnewton
drawing	Proposed Barn Conversions
 CMPS COLIN MOORE architect	
Lodge Barn Lindsey Close Woodnewton Peterborough PE8 5EW tel 01780 470636 cmpsarchitect@gmail.com	



APPENDIX C

Site Specific Borehole Logs



Borehole Log

Borehole No.

HA01

Sheet 1 of 1

Project Name: Land to the rear of 17 Main Street, Woodnewton

Project No. UK18.4119b

Co-ords:

Hole Type HA

Location: Peterborough, PE8 5EB

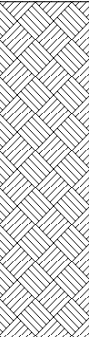
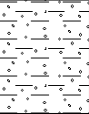
Level:

Scale 1:10

Client: CMPS Architects

Dates: 07/02/2020

Logged By DB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.00 - 0.45	ES				TOPSOIL: Dark brown sandy slightly gravelly clayey SILT with fine flint gravel. <i>Extensive vegetation and debris at the surface...</i>	
					0.45		Orangey brown very gravelly CLAY with medium to fine ironstone gravel.	
					0.60		End of Borehole at 0.600m	

1

2

Remarks





Borehole Log

Borehole No.

HA02

Sheet 1 of 1

Project Name:	Land to the rear of 17 Main Street, Woodnewton	Project No.	UK18.4119b	Co-ords:		Hole Type	HA
Location:	Peterborough, PE8 5EB			Level:		Scale	1:10
Client:	CMPS Architects			Dates:	07/02/2020	Logged By	DB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.00 - 0.50	ES					MADE GROUND: Dark brown sandy gravelly slightly clayey SILT with medium subangular flint, fine concrete and brick fragments with black bituminous gravel.
		0.30	PID	PID=0.00				
					0.50			
				0.60				End of Borehole at 0.600m

1

2

Remarks





Borehole Log

Borehole No.

HA03

Sheet 1 of 1

Project Name: Land to the rear of 17 Main Street, Woodnewton

Project No. UK18.4119b

Co-ords:

Hole Type HA

Location: Peterborough, PE8 5EB

Level:

Scale 1:10

Client: CMPS Architects

Dates: 07/02/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.00 - 0.60	ES				MADE GROUND: Dark brown slightly gravelly slightly sandy clayey SILT with frequent rootlets. Gravel is sub-rounded fine to medium asphalt and flint.	
					0.20		MADE GROUND: Dark brown very gravelly sandy clayey SILT. Gravel is sub-rounded fine to medium asphalt and flint.	
					0.40		MADE GROUND: Dark blackish brown gravelly silty CLAY. Gravel is sub-rounded fine to medium brick and flint.	
					0.60		End of Borehole at 0.600m	

1

2

Remarks





Borehole Log

Borehole No.

HA04

Sheet 1 of 1

Project Name: Land to the rear of 17 Main Street, Woodnewton

Project No. UK18.4119b

Co-ords:

Hole Type HA

Location: Peterborough, PE8 5EB

Level:

Scale 1:10

Client: CMPS Architects

Dates: 07/02/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.00 - 0.50	ES					MADE GROUND: Black slightly gravelly SILT & CLAY with frequent rootlets. Gravel is angular fine to medium brick
					0.30			MADE GROUND: Brown slightly sandy silty CLAY with rare brick fragments.
					0.50			Orangey brown slightly gravelly CLAY with medium to fine ironstone gravel.
					0.60			End of Borehole at 0.600m

1

2

Remarks





Borehole Log

Borehole No.

HA05

Sheet 1 of 1

Project Name:	Land to the rear of 17 Main Street, Woodnewton	Project No.	UK18.4119b	Co-ords:		Hole Type	HA
Location:	Peterborough, PE8 5EB			Level:		Scale	1:10
Client:	CMPS Architects			Dates:	07/02/2020	Logged By	

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.00 - 0.60	ES				Dark brown slightly sandy clayey SILT (TOPSOIL) with frequent rootlets. Sand is fine to medium.	
				0.20			Orangey brown slightly sandy clayey SILT (TOPSOIL) with rootlets and very rare fine brick fragments.	
				0.40			Orangey brown sandy very silty CLAY (TOPSOIL). Sand is fine to medium.	
				0.60			End of Borehole at 0.600m	

1

2

Remarks





Borehole Log

Borehole No.

HA06

Sheet 1 of 1

Project Name: Land to the rear of 17 Main Street, Woodnewton

Project No. UK18.4119b

Co-ords:

Hole Type HA

Location: Peterborough, PE8 5EB

Level:

Scale 1:10

Client: CMPS Architects

Dates: 07/02/2020

Logged By DB

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.18 - 0.50	ES		0.18		Competent concrete hardstanding.	
								MADE GROUND: Brown to dark brown sandy slightly gravelly CLAY with rare medium flint and concrete gravel.
								Orangey brown gravelly CLAY with infrequent ironstone and rare flint gravel.
					1.00		End of Borehole at 1.000m	

2

Remarks





Borehole Log

Borehole No.

HA07

Sheet 1 of 1

Project Name: Land to the rear of 17 Main Street, Woodnewton

Project No. UK18.4119b

Co-ords:

Hole Type HA

Location: Peterborough, PE8 5EB

Level:

Scale 1:10

Client: CMPS Architects

Dates: 07/02/2020

Logged By

Well	Water Strikes	Sample and In Situ Testing			Depth (m)	Level (m)	Legend	Stratum Description
		Depth (m)	Type	In Situ Results				
		0.20 - 0.50	ES		0.20			Incompetent concrete hardstanding.
					0.30			MADE GROUND: Light brown gravelly SAND. Sand is medium to coarse. Gravel is sub-rounded medium to coarse concrete.
					0.50			MADE GROUND: Brown slightly sandy gravelly CLAY. Gravel is sub-angular fine to medium concrete and flint.
					0.60			Orangey brown slightly gravelly sandy CLAY. Gravel is fine to medium flint and ironstone.
							End of Borehole at 0.600m	

1

2

Remarks





APPENDIX D

Environmental Laboratory Results

EPS Ltd
7B Caxton House
Broad Street
Cambourne
Cambridgeshire
CB23 6JN



Attention : Daryl Bowell
Date : 17th February, 2020
Your reference : UK18.4119B
Our reference : Test Report 20/1995 Batch 1
Location : Rear of 17 Main Street, Woodnewton
Date samples received : 11th February, 2020
Status : Final report
Issue : 1

Seven samples were received for analysis on 11th February, 2020 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.
All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

Authorised By:



Phil Sommerton BSc
Senior Project Manager

Please include all sections of this report if it is reproduced

Client Name: EPS Ltd
Reference: UK18.4119B
Location: Rear of 17 Main Street, Woodnewton
Contact: Daryl Bowell

Note:
 Asbestos Screen analysis is carried out in accordance with our documented in-house methods PM042 and TM065 and HSG 248 by Stereo and Polarised Light Microscopy using Dispersion Staining Techniques and is covered by our UKAS accreditation. Detailed Gravimetric Quantification and PCOM Fibre Analysis is carried out in accordance with our documented in-house methods PM042 and TM131 and HSG 248 using Stereo and Polarised Light Microscopy and Phase Contrast Optical Microscopy (PCOM). Samples are retained for not less than 6 months from the date of analysis unless specifically requested.

Opinions, including ACM type and Asbestos level less than 0.1%, lie outside the scope of our UKAS accreditation.

Where the sample is not taken by a Element Materials Technology consultant, Element Materials Technology cannot be responsible for inaccurate or unrepresentative sampling.

EMT Job No.	Batch	Sample ID	Depth	EMT Sample No.	Date Of Analysis	Analysis	Result
20/1995	1	HA01	0.00-0.45	1	12/02/2020	General Description (Bulk Analysis)	soil-stones
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD
20/1995	1	HA02	0.00-0.50	3	12/02/2020	General Description (Bulk Analysis)	soil.stones
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD
20/1995	1	HA03	0.00-0.60	4	12/02/2020	General Description (Bulk Analysis)	soil/stones
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD
20/1995	1	HA04	0.00-0.60	5	12/02/2020	General Description (Bulk Analysis)	soil-stones
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD
20/1995	1	HA06	0.18-0.50	7	12/02/2020	General Description (Bulk Analysis)	Soil/Stone
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD
20/1995	1	HA07	0.20-0.60	8	12/02/2020	General Description (Bulk Analysis)	soil.stones
					12/02/2020	Asbestos Fibres	NAD
					12/02/2020	Asbestos ACM	NAD
					12/02/2020	Asbestos Type	NAD
					12/02/2020	Asbestos Level Screen	NAD

NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

EMT Job No.: 20/1995

SOILS

Please note we are only MCERTS accredited (UK soils only) for sand, loam and clay and any other matrix is outside our scope of accreditation.

Where an MCERTS report has been requested, you will be notified within 48 hours of any samples that have been identified as being outside our MCERTS scope. As validation has been performed on clay, sand and loam, only samples that are predominantly these matrices, or combinations of them will be within our MCERTS scope. If samples are not one of a combination of the above matrices they will not be marked as MCERTS accredited.

It is assumed that you have taken representative samples on site and require analysis on a representative subsample. Stones will generally be included unless we are requested to remove them.

All samples will be discarded one month after the date of reporting, unless we are instructed to the contrary.

If you have not already done so, please send us a purchase order if this is required by your company.

Where appropriate please make sure that our detection limits are suitable for your needs, if they are not, please notify us immediately.

All analysis is reported on a dry weight basis unless stated otherwise. Limits of detection for analyses carried out on as received samples are not moisture content corrected. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

Where a CEN 10:1 ZERO Headspace VOC test has been carried out, a 10:1 ratio of water to wet (as received) soil has been used.

% Asbestos in Asbestos Containing Materials (ACMs) is determined by reference to HSG 264 The Survey Guide - Appendix 2 : ACMs in buildings listed in order of ease of fibre release.

Sufficient amount of sample must be received to carry out the testing specified. Where an insufficient amount of sample has been received the testing may not meet the requirements of our accredited methods, as such accreditation may be removed.

Negative Neutralization Potential (NP) values are obtained when the volume of NaOH (0.1N) titrated (pH 8.3) is greater than the volume of HCl (1N) to reduce the pH of the sample to 2.0 - 2.5. Any negative NP values are corrected to 0.

The calculation of Pyrite content assumes that all oxidisable sulphides present in the sample are pyrite. This may not be the case. The calculation may be an overestimate when other sulphides such as Barite (Barium Sulphate) are present.

WATERS

Please note we are not a UK Drinking Water Inspectorate (DWI) Approved Laboratory .

ISO17025 accreditation applies to surface water and groundwater and usually one other matrix which is analysis specific, any other liquids are outside our scope of accreditation.

As surface waters require different sample preparation to groundwaters the laboratory must be informed of the water type when submitting samples.

Where Mineral Oil or Fats, Oils and Grease is quoted, this refers to Total Aliphatics C10-C40.

DEVIATING SAMPLES

All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. The temperature of sample receipt is recorded on the confirmation schedules in order that the client can make an informed decision as to whether testing should still be undertaken.

SURROGATES

Surrogate compounds are added during the preparation process to monitor recovery of analytes. However low recovery in soils is often due to peat, clay or other organic rich matrices. For waters this can be due to oxidants, surfactants, organic rich sediments or remediation fluids. Acceptable limits for most organic methods are 70 - 130% and for VOCs are 50 - 150%. When surrogate recoveries are outside the performance criteria but the associated AQC passes this is assumed to be due to matrix effect. Results are not surrogate corrected.

DILUTIONS

A dilution suffix indicates a dilution has been performed and the reported result takes this into account. No further calculation is required.

BLANKS

Where analytes have been found in the blank, the sample will be treated in accordance with our laboratory procedure for dealing with contaminated blanks.

NOTE

Data is only reported if the laboratory is confident that the data is a true reflection of the samples analysed. Data is only reported as accredited when all the requirements of our Quality System have been met. In certain circumstances where all the requirements of the Quality System have not been met, for instance if the associated AQC has failed, the reason is fully investigated and documented. The sample data is then evaluated alongside the other quality control checks performed during analysis to determine its suitability. Following this evaluation, provided the sample results have not been effected, the data is reported but accreditation is removed. It is a UKAS requirement for data not reported as accredited to be considered indicative only, but this does not mean the data is not valid.

Where possible, and if requested, samples will be re-extracted and a revised report issued with accredited results. Please do not hesitate to contact the laboratory if further details are required of the circumstances which have led to the removal of accreditation.

Please include all sections of this report if it is reproduced

REPORTS FROM THE SOUTH AFRICA LABORATORY

Any method number not prefixed with SA has been undertaken in our UK laboratory unless reported as subcontracted.

Measurement Uncertainty

Measurement uncertainty defines the range of values that could reasonably be attributed to the measured quantity. This range of values has not been included within the reported results. Uncertainty expressed as a percentage can be provided upon request.

ABBREVIATIONS and ACRONYMS USED

#	ISO17025 (UKAS Ref No. 4225) accredited - UK.
SA	ISO17025 (SANAS Ref No.T0729) accredited - South Africa
B	Indicates analyte found in associated method blank.
DR	Dilution required.
M	MCERTS accredited.
NA	Not applicable
NAD	No Asbestos Detected.
ND	None Detected (usually refers to VOC and/SVOC TICs).
NDP	No Determination Possible
SS	Calibrated against a single substance
SV	Surrogate recovery outside performance criteria. This may be due to a matrix effect.
W	Results expressed on as received basis.
+	AQC failure, accreditation has been removed from this result, if appropriate, see 'Note' on previous page.
>>	Results above calibration range, the result should be considered the minimum value. The actual result could be significantly higher, this result is not accredited.
*	Analysis subcontracted to an Element Materials Technology approved laboratory.
AD	Samples are dried at 35°C ±5°C
CO	Suspected carry over
LOD/LOR	Limit of Detection (Limit of Reporting) in line with ISO 17025 and MCERTS
ME	Matrix Effect
NFD	No Fibres Detected
BS	AQC Sample
LB	Blank Sample
N	Client Sample
TB	Trip Blank Sample
OC	Outside Calibration Range
AA	x5 Dilution

EMT Job No: 20/1995

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
PM4	Gravimetric measurement of Natural Moisture Content and % Moisture Content at either 35°C or 105°C. Calculation based on ISO 11465 and BS1377.	PM0	No preparation is required.			AR	
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.			AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes		AR	Yes
TM4	Modified USEPA 8270 method for the solvent extraction and determination of PAHs by GC-MS.	PM8	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required.	Yes	Yes	AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM16	Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.			AR	
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes		AR	Yes
TM5	Modified 8015B method for the determination of solvent Extractable Petroleum Hydrocarbons (EPH) within the range C8-C40 by GCFID. For waters the solvent extracts dissolved phase plus a sheen if present.	PM8/PM16	End over end extraction of solid samples for organic analysis. The solvent mix varies depending on analysis required/Fractionation into aliphatic and aromatic fractions using a Rapid Trace SPE.	Yes	Yes	AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details			AR	Yes
TM5/TM36	please refer to TM5 and TM36 for method details	PM8/PM12/PM16	please refer to PM8/PM16 and PM12 for method details	Yes		AR	Yes
PM13	A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description.	PM0	No preparation is required.			AR	No

EMT Job No: 20/1995

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM21	Modified BS 7755-3:1995, ISO10694:1995 Determination of Total Organic Carbon or Total Carbon by combustion in an Eltra TOC furnace/analyser in the presence of oxygen. The CO2 generated is quantified using infra-red detection. Organic Matter (SOM) calculated as per EA MCERTS Chemical Testing of Soil, March 2012 v4.	PM24	Dried and ground solid samples are washed with hydrochloric acid, then rinsed with deionised water to remove the mineral carbon before TOC analysis.			AD	Yes
TM26	Determination of phenols by Reversed Phased High Performance Liquid Chromatography and Electro-Chemical Detection.	PM21	As received solid or water samples are extracted in Methanol: Sodium Hydroxide (0.1M NaOH) (60:40) by orbital shaker.			AR	Yes
TM30	Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7, 6010B and BS EN ISO 11885 2009	PM15	Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground.	Yes	Yes	AD	Yes
TM31	Modified USEPA 8015B. Determination of Methyltertbutylether, Benzene, Toluene, Ethylbenzene and Xylene by headspace GC-FID.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.			AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes		AR	Yes
TM36	Modified US EPA method 8015B. Determination of Gasoline Range Organics (GRO) in the carbon chain range of C4-12 by headspace GC-FID. MTBE by GC/FID co-elutes with 3-methylpentane if present and therefore can give a false positive. Positive MTBE results can be confirmed using GCMS.	PM12	Modified US EPA method 5021. Preparation of solid and liquid samples for GC headspace analysis.	Yes	Yes	AR	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes	Yes	AD	Yes
TM38	Soluble Ion analysis using Discrete Analyser. Modified US EPA methods 325.2 (Chloride), 375.4 (Sulphate), 365.2 (o-Phosphate), 353.1 (TON), 354.1 (Nitrite), 350.1 (NH4+) comparable to BS ISO 15923-1, 7196A (Hex Cr)	PM20	Extraction of dried and ground or as received samples with deionised water in a 2:1 water to solid ratio using a reciprocal shaker for all analytes except hexavalent chromium. Extraction of as received sample using 10:1 ratio of 0.2M sodium hydroxide to soil for hexavalent chromium using a reciprocal shaker.	Yes		AR	Yes
TM50	Acid soluble sulphate (Total Sulphate) analysed by ICP-OES	PM29	A hot hydrochloric acid digest is performed on a dried and ground sample, and the resulting liquor is analysed.	Yes	Yes	AD	Yes

EMT Job No: 20/1995

Test Method No.	Description	Prep Method No. (if appropriate)	Description	ISO 17025 (UKAS/S ANAS)	MCERTS (UK soils only)	Analysis done on As Received (AR) or Dried (AD)	Reported on dry weight basis
TM65	Asbestos Bulk Identification method based on HSG 248.	PM42	Solid samples undergo a thorough visual inspection for asbestos fibres prior to asbestos identification using TM065.	Yes		AR	
TM73	Modified US EPA methods 150.1 and 9045D and BS1377:1990. Determination of pH by Metrohm automated probe analyser.	PM11	Extraction of as received solid samples using one part solid to 2.5 parts deionised water.	Yes	Yes	AR	No
TM89	Modified USEPA method OIA-1667. Determination of cyanide by Flow Injection Analyser. Where WAD cyanides are required a Ligand displacement step is carried out before analysis.	PM45	As received solid samples are extracted with 1M NaOH by orbital shaker for Cyanide, Sulphide and Thiocyanate analysis.	Yes	Yes	AR	Yes
NONE	No Method Code	NONE	No Method Code			AD	Yes



APPENDIX E

Generic Screening Criteria

EPS Generic Quantitative Risk Assessment - Residential Land Use

Contaminant	Soil Targets			Groundwater Targets	
	Human Health	Controlled Waters		Controlled Waters	
		LGwRP	HGwRP	LGwRP	HGwRP
Unit	mg/kg			ug/l	
Arsenic	See C4SL	n/c	n/c	50	10
Cadmium	See C4SL	n/c	n/c	5	5
Chromium III	910	n/c	n/c	250	50
Chromium VI	See C4SL	n/c	n/c	n/c	n/c
Copper	2400	n/c	n/c	28	28
Mercury (elemental)	1.2	n/c	n/c	1	1
Nickel	180	n/c	n/c	200	50
Lead	See C4SL	n/c	n/c	250	10
Selenium	250	n/c	n/c	10	10
Zinc	3700	n/c	n/c	500	500
Benzene	See C4SL	0.252	0.008	30	1
Toluene	130	1.17	1.17	50	50
Ethylbenzene	47	15.0	10.0	300	200
Xylene (para)	56	0.885	0.885	30	30
MTBE#	49	0.138	0.0276	75	15
Benzo(a)Pyrene	See C4SL	10	1.44	0.7	0.1
Naphthalene	2.3	0.934	0.02	10	0.1
Dibenz(ah)anthracene	0.24	n/c	n/c	n/c	n/c
Aliphatic C5-C6	42	5.27	1.05	50	10
Aliphatic C6-C8	100	23.2	4.64	50	10
Aliphatic C8-C10	27	175	35.1	50	10
Aliphatic C10-C12	130(48)*	1380	276	50	10
Aliphatic C12-C16	1100(8.48)**	27500	5490	50	10
Aliphatic C16-C35	65000 (8.48)**	3.46E+06	6.91E+05	50	10
Aromatic C8-C10	34	8.74	1.75	50	10
Aromatic C10-C12	74	13.8	2.76	50	10
Aromatic C12-C16	140	27.5	5.5	50	10
Aromatic C16-C21	260	86.9	17.4	50	10
Aromatic C21-C35	1100	690	138	50	10

Notes:

LGwRP - Low Groundwater Resource Potential

HGwRP - High Groundwater Resource Potential

f = Oral, dermal and inhalation exposure compared with oral HCV N/C = Not Calculated

* = S4UL exceeds vapour saturation limit (in brackets)

** = S4UL exceeds solubility saturation limit (in brackets)

Soil Targets

Targets for Human Health have been taken from S4ULs 'Suitable For Use Levels for Human Health Risk Assessment' – LQM and CIEH (2014) derived using standard sandy loam soil with 1% SOM, except (#) = EIC/AGS/CL:AIRE GAC 'Soil Generic Assessment Criteria' (2010). For sites where ground conditions differ significantly from sandy loam or site-specific SOM and pH are available, the generic human health targets may be revised.

Targets for Controlled waters have been derived using EA Remedial Targets Worksheet (v3.1) - using standard Sandy Loam ground conditions as described in Science Report SC050021/SR3, assuming no degradation for a 10m compliance distance with criteria of EQS or UKDWS for LGwRP and HGwRP respectively (see notes for GW targets).

Groundwater Targets

For LGwRP, targets have been taken as Freshwater EQS where available. For Ethylbenzene and BaP the WHO Health limit has been used and for MTBE and individual TPH fractions a 5 times multiplier of taste threshold and UKDWS has been taken respectively.

For HGwRP, targets have been taken as UKDWS where available, with the exception of Copper and Zinc where the EQS is lower than the DWS and therefore the EQS has been used as the groundwater target. For Ethylbenzene the upper WHO ATO limit has been used. For Toluene and Xylene, the WHO ATO limit is higher than the EQS and so the lower value has been taken. For MTBE the taste threshold has been taken.

Work carried out to calculate generic screening criteria for concentrations of contaminant in groundwater with respect of risks to Human Health has generally found that criteria far exceed (by at least 2 orders of magnitude) those listed for the protection of either LGwRP and HGwRP receptors. On this basis, the above Groundwater criteria are also considered protective of human health and further evaluation of these risks should be considered alongside any detailed quantitative risk assessments carried out for groundwater on a site specific basis.



EPS Generic Quantitative Risk Assessment

Generic Screening Criteria (C4SLs) - All Land Uses

Contaminant	Soil Targets					
	Residential		Allotments	Commercial	Public Open Spaces	
	With Home Grown Produce	Without Home Grown Produce			Residential	Parks
Unit	mg/kg					
Arsenic	37	40	49	640	79	168
Benzene	0.87	3.3	0.18	98	140	230
Benzo(a)pyrene	5	5.3	5.7	76	10	21
Cadmium	26	149	4.9	410	220	880
Chromium (VI)	21	21	170	49	23	250
Lead	200	310	80	2330	630	1300

Notes:

Targets for Human Health have been taken from the publicly available Category 4 Screening Levels (C4SLs) for assessment of land affected by contamination issued by DEFRA in December 2013.

Within the modelling for C4SLs, a Soil Organic Matter content of 6% has been used. Reference to site-specific data should be made where possible. EPS have carried out a sensitivity analysis in-house and the contaminant benzene is the current C4SL most susceptible to changes in SOM and therefore any risk assessment for this compound must account for this aspect.



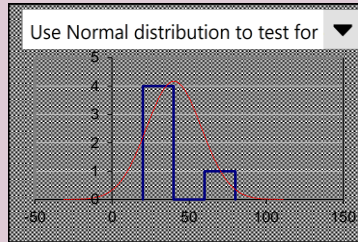
APPENDIX F

Statistical Testing Calculations

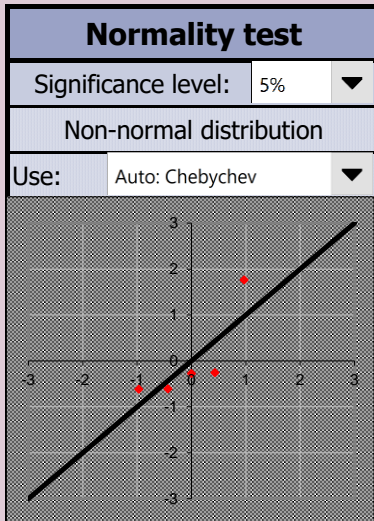
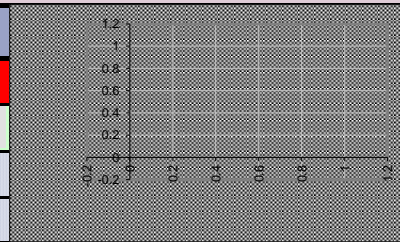
Test Results

Client/client ref: Mrs Lucy Porter Site ref: Land to the South of 17 Main Street, Wood Date: 25-Feb-2020
 Project ref: UK18.4119b Data description: Statistical analysis of soils recover User details: MT

Dataset: Arsenic #M (mg/kg)	
Sample mean, \bar{x} (mg/kg)	40.2
Sample standard deviation, s	17.876
Sample size, n	5
Critical concentration, Cc (mg/kg)	37



Outliers & non-detects	
Outliers present?	YES
Significance level	5%
Outliers removed?	0
Non-detects	0



Test scenario:	Planning: is true mean lower than critical concentration ($\mu < C_c$)?	
Null hypothesis:	The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$	
Alternative hypothesis:	The true mean concentration is less than the critical concentration: $\mu < C_c$	

Evidence against Null hypothesis:	0%
Base decision on:	evidence level
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No

$\mu \geq C_c$

[Back to data](#)

[Back to summary](#)

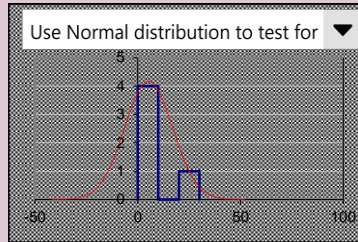
[Go to outlier test](#)

[Go to normality test](#)

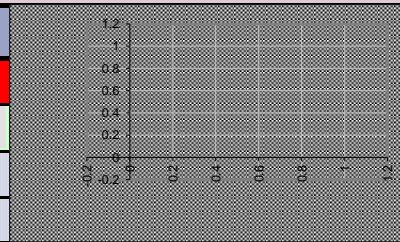
Test Results

Client/client ref: Mrs Lucy Porter Site ref: Land to the South of 17 Main Street, Wood Date: 25-Feb-2020
 Project ref: UK18.4119b Data description: Statistical analysis of soils recover User details: MT

Dataset: Benzo(a)pyrene # (mg/kg)	
Sample mean, \bar{x} (mg/kg)	5.296
Sample standard deviation, s	11.691
Sample size, n	5
Critical concentration, C_c (mg/kg)	5



Outliers & non-detects	
Outliers present?	YES
Significance level	5%
Outliers removed?	0
Non-detects	0



Normality test

Significance level: 5%

Non-normal distribution

Use: Auto: Chebychev

Test scenario: Planning: is true mean lower than critical concentration ($\mu < C_c$)?

Null hypothesis: The true mean concentration is equal to or greater than the critical concentration: $\mu \geq C_c$

Alternative hypothesis: The true mean concentration is less than the critical concentration: $\mu < C_c$

Evidence against Null hypothesis:	0%
Base decision on:	evidence level
Evidence level required:	95%
Balance of probability?	N/A
Reject Null Hypothesis?	No

$\mu \geq C_c$

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[Go to normality test](#)

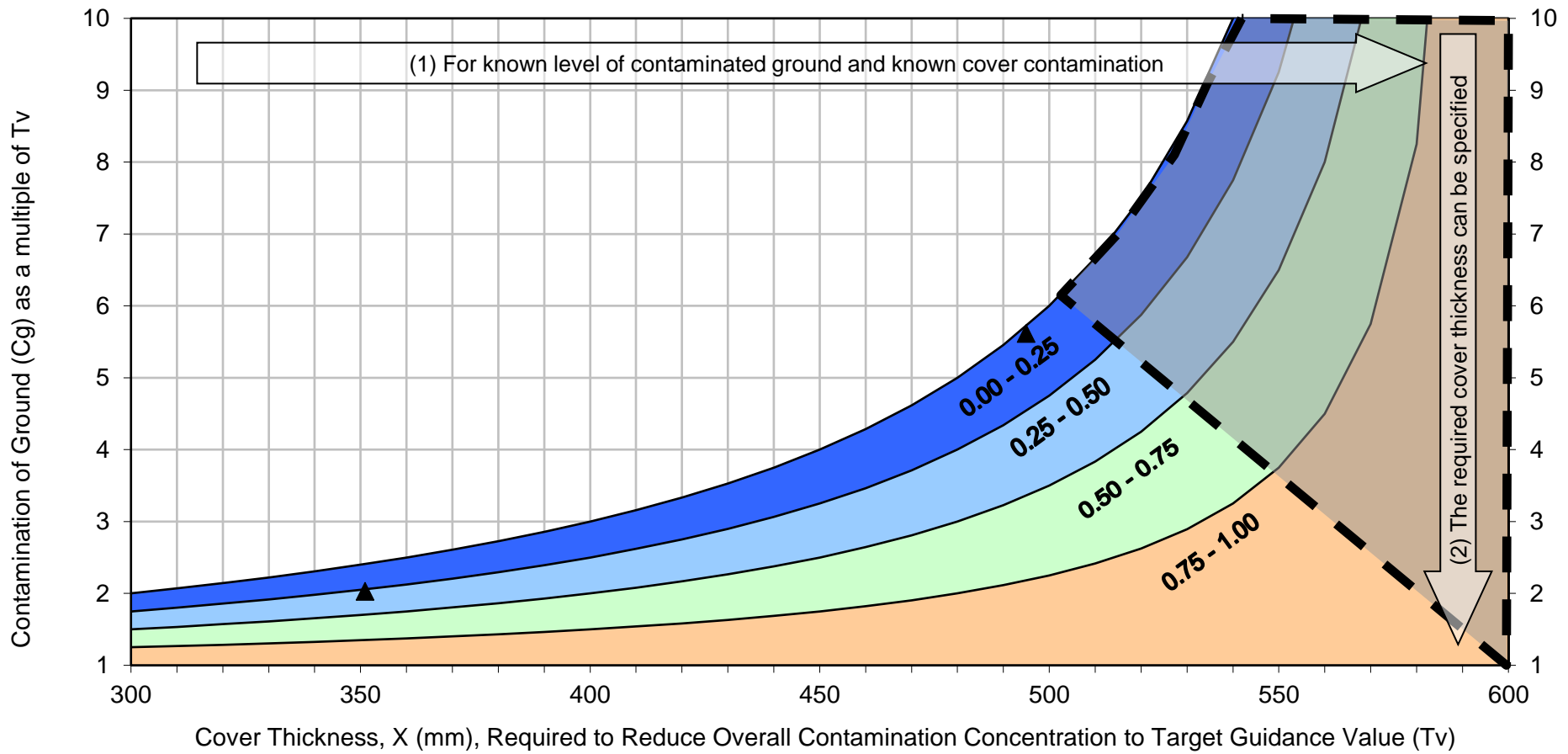


APPENDIX G

Cover System Calculations

Design Chart

- $C_c = 0.00 - 0.25 \times$ Trigger levels
 - $C_c = 0.25 - 0.50 \times$ Trigger levels
 - $C_c = 0.50 - 0.75 \times$ Trigger levels
 - $C_c = 0.75 - 1.00 \times$ Trigger levels
 - ▲ Target Guideline Value 2
 - ▲ Target Guideline Value 1
- If site specific data falls in shaded area consideration should be given to the applicability of using a cover system





APPENDIX H

Method Statement for Encountering Unexpected Contamination



METHOD STATEMENT

ACTIONS TO BE TAKEN IN THE EVENT OF DISCOVERING UNEXPECTED CONTAMINATION DURING INTRUSIVE GROUNDWORKS

If at any point during intrusive groundworks at a site, evidence of unforeseen contamination is encountered in the form of significant noxious odours, discolouration, or instability within soils or sheen/ discolouration in groundwater, the following actions will be taken:

- Intrusive works in the immediate area of the impacted ground will be suspended and the continuation of work in other areas of the site will be considered within the context of the site specific health & safety plan.
- Environmental Protection Strategies Ltd (EPS) will be contacted and appraised of the situation so that arrangements can be made to characterise the impact and determine what action may be necessary in addition to the scheduled site works. Where possible / health & safety plan permits, digital photographs of the impacted ground will be taken and emailed to EPS at the address below to assist in the initial assessment
- It may well be necessary for EPS to attend site to undertake visual inspection and obtain samples for field and/or laboratory analysis, although the actions taken will be dependent on the nature of what is encountered
- In cases where EPS consider the unforeseen contamination likely to pose a significant risk of significant harm to adjacent site users or local environmental receptors, the local authority and the Environment Agency will be informed of the situation and the actions being taken
- Once appropriate action has been agreed and undertaken, a written summary will be produced by EPS for submission to the Local Authority, (and where relevant, the Environment Agency) in accordance with planning requirements. The submission will include details of work undertaken, analytical results of investigative and validation samples obtained and conclusions and recommendations for any further actions considered necessary
- Where regulatory bodies have been involved, site works should only recommence following their agreement and in all cases should only recommence when the site manager considers it safe to do so within the context of the site specific health & safety plan.

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Email: info@epstrategies.co.uk (Automatically forwarded to the above and office-based personnel)



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