Phase II Ground Investigation

Kilten Cottage, Hugus

29 April 2021

Wheal Jane Consultancy

Old Mine Offices, Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EE

01872 560200

www.wheal-jane-consultancy.co.uk

consultancy@wheal-jane.co.uk

SI20077PH1

DOCUMENT CONTROL SHEET

Client	Mr & Mrs Noon
Project Title	Kilten Cottage
Document Title	Phase II Site Investigation
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Date	Status	Revision	Prepared By	Approved By
29 April 2021	0	Final	Bryony Halliday	Dan Jobson

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EXECUTIVE SUMMARY

Objectives	
Wheal Jane Consultancy was commissioned by Mr & Mrs Noon to undertake an intrusive investigation on the site of a proposed residential dwelling.	
Site Investigation	
Previous Investigations	A phase I environmental risk assessment was undertaken by Wheal Jane Consultancy on 17th March 2020.
Site Works	Samples were taken during an intrusive investigation from three hand excavated trial pits.
Ground Conditions	Full ground profiles were obtained, showing topsoil overlying the Mylor Slate Formation.
Groundwater	Groundwater was not encountered during the site investigation.

Conclusions

- The site was subject to a Phase II Ground Investigation to determine the level and risk of potential contamination.
- It can be concluded that arsenic and lead within the soil present and unacceptable level of risk. The site is likely to be suitable for its intended use, as long as the recommendations set out in this report are adhered to.

Recommendations

- A Phase 3 Remediation Strategy Report should be compiled which outlines the scope of remedial works required to reduce the level of contamination to such condition that the site can be deemed suitable for its proposed residential use.
- Once the remediation strategy has been fully implemented and the work concluded to the required specifications, a Phase 4 Verification Report and Certificate must be produced.
- A flow chart detailing the phased approach to land contamination, as set out in CLR11, is contained to the rear of the report.
- As the site is situated in an area where between 10-30% of the properties are above the action level, it is recommended that full radon protective measures are installed on any proposed building.
- Suitable safety measures should be taken by those working on site to mitigate the risks associated with contaminated media including undertaking the appropriate risk assessments and ensuring all workers are wearing the correct PPE.
- Waste removed from site shall be disposed of at a suitable facility with the appropriate Waste Transfer Notices obtained for future records. Asbestos waste should be handled by a suitable waste contractor.

1 INTRODUCTION

1.1 Instruction

1.1.1 Wheal Jane Consultancy (WJC) was commissioned by Mr & Mrs Noon, to undertake a Phase II Ground Investigation at a site known as 'Kilten cottage'.

1.1.2 This report has been prepared by Wheal Jane Consultancy solely for the benefit of the client. It shall not be relied upon or transferred to any third party without the prior written authorisation of WJC.

1.2 Scope and Objectives

1.2.1 The objective of this investigation is to quantify any land contamination based on in-situ data collected from the actual site which will then be interpreted and evaluated.

1.2.2 This investigation was developed to target the possible contamination related to the sites historic use and/or natural geology.

1.2.3 The objective of this investigation is also to evaluate the geotechnical parameters of the sub-surface material in order to aid foundation design.

1.2.4 The conclusions and recommendations of this report are valid for a period of 12 months from the date of issue. Outside of this time frame the report will require reviewing by a suitably qualified geoenvironmental engineer, to ensure that the report complies with any changes to industry standards, policies and/or guidelines.

1.2.5 It is recommended that a copy of this report be submitted to the local authority for checking, prior to commissioning any further work which may be required.

1.2.6 This assessment has been undertaken with guidance from BS10175:2011 and Environment Agency report CLR11, and as such represents a Phase II Ground Investigation.

1.3 Limitations

1.3.1 Field work consisted of discrete sampling across the site, to assess the character and degree of contamination. Conditions of the ground at locations not included within the investigation may be different from the tested locations.

1.3.2 This report considers site conditions at the time of the ground investigation, but ground conditions may change with time. If future work discovers ground conditions that vary

significantly from the findings available in this report, the conclusions should be reviewed in the context of the new information.

1.3.3 Findings were assessed in the context of standards and methodology current at the time of reporting.

1.3.4 The findings and conclusions in this report are based upon information derived from a variety of sources. WJC cannot accept liability for the accuracy or completeness of any information derived from third party sources.

2 THE SITE

2.1 Site Location and Layout

2.1.1 The site is located in Hugus, approximately 5.30m south west of the city centre of Truro. The site is approximately centred on National Grid Reference SW 77516 43640.

2.1.2 The site is irregular in shape and covers an area of 0.22ha.

2.1.3 A site location plan (SLP) is contained in Figure 2.1, to the rear of the report.

2.1.4 The current site plan is contained in Figure 2.2, to the rear of the report.

2.2 Surrounding area

Direction	Land Use
North	Agricultural
East	Agricultural, Residential
South	Agricultural, Cycle Track
West	Residential, Agricultural, Historic Mine Workings

2.3 Proposed Development

2.3.1 It is proposed to construct a single replacement dwelling in the existing garden area. Further information can be found under planning application number PA20/00759.

2.3.2 The proposed site plan is contained in Figure 2.3, to the rear of the report.

3 SITE INVESTIGATION

3.1 Phase I Findings

3.1.1 A Phase I Desk Study was undertaken by Wheal Jane Consultancy in March 2020 (Ref: 20052/PH1; dated 17th March 2020).

3.1.2 The desk study concluded the site was historically used as a historic mining area. The risks identified in the desk study were summarised within the Conceptual Site Model (CSM). It was concluded that an investigation would be required involving soil sampling and testing; focussing specifically on heavy metals.

3.2 Site Works

3.2.1 An intrusive site investigation was conducted on Friday 10th July 2020. The investigation was overseen by a geoenvironmental engineer from Wheal Jane Consultancy.

3.2.2 The following table summarises the intrusive investigation techniques employed during the site investigation;

Table 3.1: Site Works

Exploratory Hole Type	Exploratory Hole ID	Hole Depths (mBGL)	Comments
Hand Excavated Trial Pit	TP01 – TP03	0.50 – 0.90	Undertaken for site coverage.

3.2.3 Exploratory hole logs are included as Appendix A.

3.2.4 A plan showing the location of the exploratory holes is provided as Figure 3.1.

3.3 Trial Pitting

3.3.1 3nr Trial Pits, designated TP01 – TP03 inclusive, were advanced to depths of 0.50m to 0.90m using hand digging methods on the 10th July 2020. Representative soil samples were taken at regular intervals for environmental analysis and logged on site by a suitably qualified Geoenvironmental Engineer.

3.3.2 The locations of all exploratory holes can be seen on the exploratory hole location plan, contained as Figure 3.1.

3.3.3 All trial pits were backfilled with arisings upon completion.

3.3.4 Trial Pit photographs are included as Appendix B.

3.4 Chemical Sampling and Testing

3.4.1 The proposed end use of the site is for residential housing and the subsequent data analysis will be conducted using this setting to test for levels of contaminants against generic assessment criteria.

3.4.2 The Phase I report highlighted heavy metals as the primary contaminants of concern, the sampling was designed to target the proposed areas of soft landscaping or private gardens. Such areas provide the most exposure to potentially contaminated soils.

3.4.3 All retrieved samples were logged in accordance with BS5930;2015 and BS EN ISO 14689. Collection of media for environmental testing was obtained, stored in plastic tubs and glass jars and kept within a temperature controlled cool box before being dispatched for testing.

3.4.4 Samples were taken at varying depths and tested for potential contaminants including the following;

- Heavy Metals (As, B, Cd, Cr, Cu, Hg, Pb, Ni, Se, Zn)

3.4.1 All samples were tested by a UKAS and MCERT accredited laboratory.

3.4.2 The results are included as Appendix C.

4 GROUND CONDITIONS

4.1 General

4.1.1 The BGS 1:50,000-scale bedrock geological map Sheet 352, Falmouth of the area shows the site to be underlain by the Mylor Slate Formation.

4.1.2 The following table represents a summary of the strata encountered beneath the site;

Table 4.1: Ground Conditions

Strata	Depth Encountered (mBGL)		Typical Thickness (m)	Brief Description & Comments
	From	To		
Topsoil	0.00	0.30 – 0.40	0.30	Dark brown sandy, clayey, gravelly TOPSOIL
Mylor Slate Formation	0.30 – 0.40	0.50 – 0.90	Unproven	Brown clayey GRAVEL, Orangish brown gravelly CLAY, Orangish brown clayey COBBLES.

4.2 Topsoil

4.2.1 All holes encountered topsoil to depths of between 0.30m and 0.40m.

4.2.2 The unit is generally described as 'Dark brown sandy, clayey, gravelly TOPSOIL'.

4.3 Weathered Mylor Slate Formation

4.3.1 Material described as Weathered Mylor Slate Formation was encountered across the site to depths of up to 0.90m.

4.3.2 The unit may be generally described as 'Brown clayey GRAVEL, Orangish brown gravelly CLAY or Orangish brown clayey COBBLES'.

4.4 Groundwater

4.4.1 Groundwater was not encountered during the investigation.

4.5 Contamination Indications

4.5.1 There were no visual or olfactory signs of contamination present present on site during the investigation.

5 CONTAMINATION ASSESSMENT

5.1 Comparison with Generic Assessment Criteria (GACs)

5.1.1 The laboratory results are contained as Appendix C.

5.1.2 Results from the environmental testing can be compared against Generic Assessment Criteria (GAC) to form the basis of a GQRA. The GAC's used are taken from the LQM/CIEH 'Suitable 4 Use Levels' publication. In the absence of a suitable S4UL value (such as Lead), reference has been made to DEFRA's Category 4 Screening Levels (C4SL) where deemed justifiable. Given the proposed land use for this site, the residential with homegrown produce has been chosen for the appropriate set of criteria. A comparison table can be found below.

Table 5.1: Comparison of soil results against GAC's; based on the average value recorded – all values in mg/kg unless stated)

Contaminant	GAC's: S4UL's - Resi$_{w}$HGP (unless stated)	Minimum	Maximum	Exceedances
Metals				
Arsenic	37	750	5900	**9**
Cadmium	11	<0.2	<0.2	0
Chromium (III)	910	13	28	0
Copper	2400	44	420	0
Mercury (inorganic)	40	<0.3	0.6	0
Nickel	180	4.8	55	0
Lead	200 (C4SL)	170	4000	**8**
Selenium	250	1.4	6.7	0
Zinc	3700	57	1300	0

5.1.3 Elevated levels of arsenic and lead were noted across the site within both the topsoil and underlying Mylor Slate Formation.

5.1.4 Levels of arsenic and lead are considerably higher than their respective GACs and therefore bioavailability testing is unlikely to bring them to within acceptable levels. Levels of all other heavy metals are within the relevant GAC's.

5.2 Refined Conceptual Site Model

Table 5.2: Refined Conceptual Model

Preliminary Conceptual Model							
	Source(s)	Contaminant(s)	Pathway(s)	Receptor(s)	Probability	Consequence	Risk Assessment
On Site	Natural Geology	Radon gas	Ingress into proposed buildings	Future site users	High Likelihood	Medium	**High Risk** – Development is within an area where between 10-30% of properties are affected.
		Arsenic	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk –** Levels of arsenic were recorded on site up to 5900mg/kg. This greatly exceeds the generic acceptance criteria of 37mg/kg for residential developments with produce. As these exceedances are so high further bioaccessibility testing was not considered suitable for this site.
		Lead	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk –** Levels of lead were recorded on site up to 4000mg/kg. This greatly exceeds the generic acceptance criteria of 200mg/kg for residential developments with produce. As these exceedances are so high further bioaccessibility testing was not considered suitable for this site.
	Historic Mine Workings	Heavy Metals (Arsenic & Lead)	Dermal contact Soil and dust ingestion and inhalation Ground & surface waters	Future site users Site workers Site flora and fauna	Likely	Medium	**Moderate Risk –** Levels of heavy metals (Arsenic & Lead) exceeded guideline values throughout the site, it is highly likely that without further mitigation the contaminant will reach the receptor.

6 CONCLUSIONS

6.1.1 The site was subject to a Phase II Ground Investigation to determine the level and risk of potential contamination.

6.1.2 It can be concluded that arsenic and lead within the soil present and unacceptable level of risk. The site is likely to be suitable for its intended use, as long as the recommendations set out in this report are adhered to.

7 RECOMMENDATIONS

7.1.1 A Phase 3 Remediation Strategy Report should be compiled which outlines the scope of remedial works required to reduce the level of contamination to such condition that the site can be deemed suitable for its proposed residential use.

7.1.2 Once the remediation strategy has been fully implemented and the work concluded to the required specifications, a Phase 4 Verification Report and Certificate must be produced.

7.1.3 A flow chart detailing the phased approach to land contamination, as set out in CLR11, is contained to the rear of the report.

7.1.4 As the site is situated in an area where between 10-30% of the properties are above the action level, it is recommended that full radon protective measures are installed on any proposed building.

7.1.5 Suitable safety measures should be taken by those working on site to mitigate the risks associated with contaminated media including undertaking the appropriate risk assessments and ensuring all workers are wearing the correct PPE.

7.1.6 Waste removed from site shall be disposed of at a suitable facility with the appropriate Waste Transfer Notices obtained for future records. Asbestos waste should be handled by a suitable waste contractor.

8 REFERENCE LIST

8.1.1 BSI (2011) BS 10175:2011 Investigation of Potentially Contaminated Sites - Code of Practice. London, British Standards Institution

8.1.2 BSI (2015) BS5930:2015. Code of Practice for Site Investigations. London, British Standards Institution

8.1.3 British Research Establishment (BRE) (2005) Special Digest 1 Concrete in Aggressive Ground. 3rd edn. Watford, BRE

8.1.4 Chartered Institute of Environmental Health (CIEH) and Contaminated Land: Applications in Real Environments (CL:AIRE) (2008) Guidance on Comparing Soil Contamination Data with a Critical Concentration. London, CIEH

8.1.5 CIRIA (2001) CIRIA C552 - Contaminated land risk assessment: A guide to good practice. London, CIRIA

8.1.6 CIRIA (2007) CIRIA C665 - Assessing Risks Posed by Hazardous Ground Gases to Buildings. London, CIRIA

8.1.7 Contaminated Land: Applications in Real Environments (CL:AIRE), Association of Geotechnical and Geo-environmental Specialists (AGS) and The Environmental Industries Commission (EIC) (2010) Soil Generic Assessment Criteria for Human Health Risk Assessment. London, CL:AIRE

8.1.8 Contaminated Land: Applications in Real Environments (CL:AIRE) (2012) A Pragmatic Approach to Ground Gas Risk Assessment. Research Bulletin 17

8.1.9 Contaminated Land: Applications in Real Environments (CL:AIRE) (2016) CAR SOIL: Control of Asbestos Regulations 2012. Interpretation for Managing and Working with Asbestos in Soil and Construction and Demolition Materials.

8.1.10 Environment Agency (2004) Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination. Bristol, Environment Agency

8.1.11 Environment Agency (2009) Updated Technical Background to the CLEA Model. Science Report SC050021/SR3. Bristol: Environment Agency

8.1.12 Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil. Science Report SC050021/SR2. Bristol: Environment Agency

8.1.13 Great Britain. Environmental Protection Act (1990). London, The Stationery Office

8.1.14 Great Britain. Water Act (2003) London, The Stationery Office

8.1.15 Great Britain. Environmental Permitting Regulations (2007). London, The Stationery Office

8.1.16 Great Britain. Environmental Damage (Prevention and Remediation) Regulations (2009). London, The Stationery Office

8.1.17 Great Britain. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. London, The Stationery Office

8.1.18 National House Building Council (NHBC), Environment Agency and Chartered Institute of Environmental Health (CIEH) (2008) Research & Development Publication 66: Guidance for the Safe Development of Housing on Land Affected by Contamination. Amersham, NHBC

8.1.19 Royal Institution of Chartered Surveyors (RICS) (2012) Japanese Knotweed and Residential Property. Coventry, RICS

9 NOTES

9.1.1 This report is concerned solely with the property, as defined by this report, or parts thereof examined.

9.1.2 The report should not be used in connection with adjacent properties.

9.1.3 In respect of site works, Wheal Jane Consultancy cannot accept any liabilities for any additional mine workings found outside the limits of any areas examined.

9.1.4 The information supplied by third parties which has been used in compiling this Phase 2 ground investigation report, is derived from a number of statutory and non-statutory sources. While every effort is made by the supplier to ensure accuracy, the supplier cannot guarantee the accuracy or completeness of such information or data, nor to identify all the factors that may be relevant.

9.1.5 The conclusions and recommendations relate to the type and extent of development outlined in this report for this specific property only and should not be taken as suitable for any other form or extent of development on this property without further consultation with Wheal Jane Consultancy.

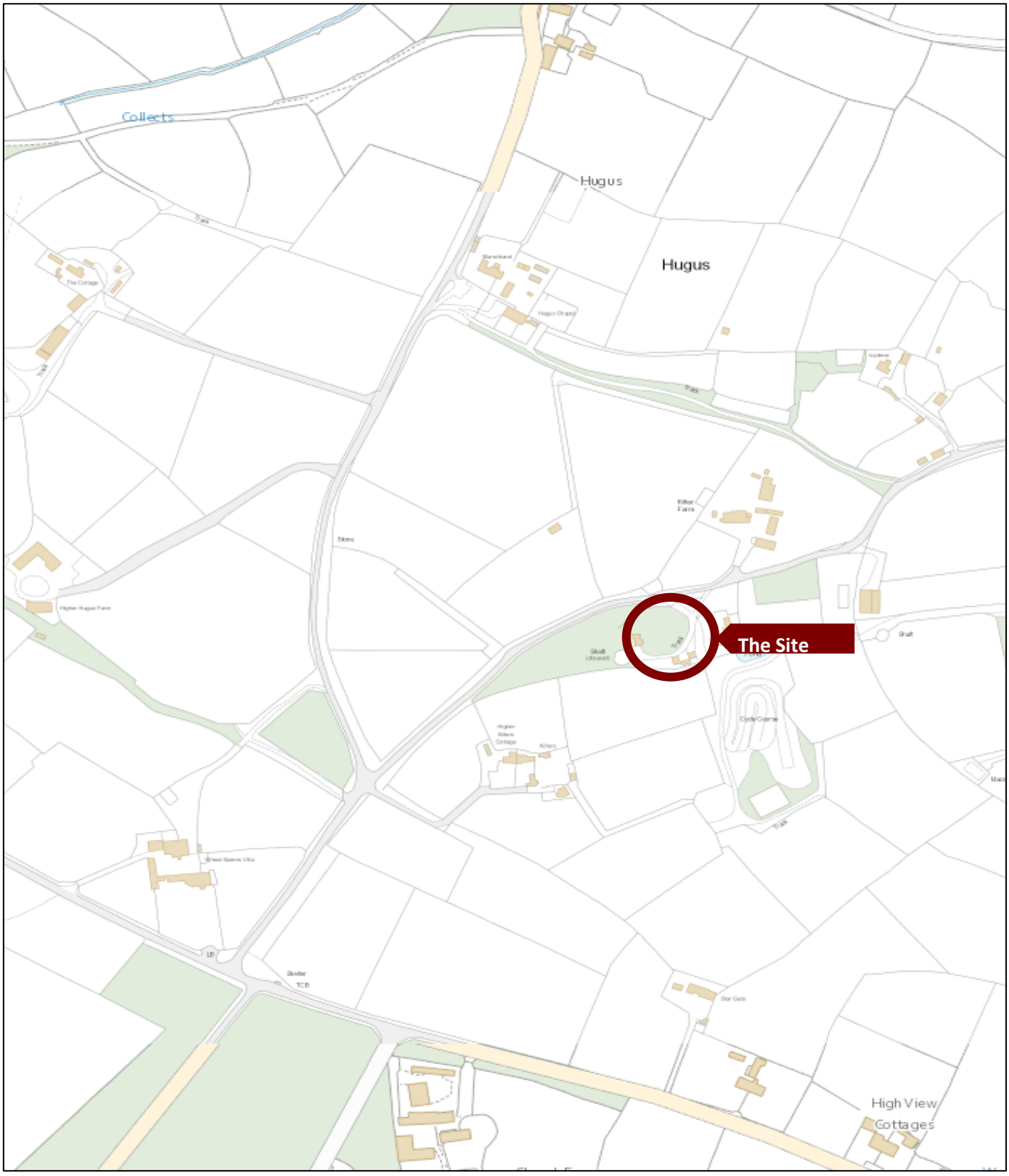
9.1.6 This report is confidential to the client, the client's legal and professional advisors, and may not be reproduced or distributed without our permission other than to directly facilitate the sale or development of the property concerned.

9.1.7 We have no liability toward any person not party to commissioning this report.

9.1.8 Unless otherwise expressly stated, nothing in this report shall create or confer any rights or other benefits pursuant to the Contracts (Rights of Third Parties) Act 1999 in favour of any person other than the person commissioning this report.

9.1.9 This report is not an asbestos inspection that may fall within the control of Control of Asbestos Regulations 2006

FIGURES:



Title: **Site Location Plan**

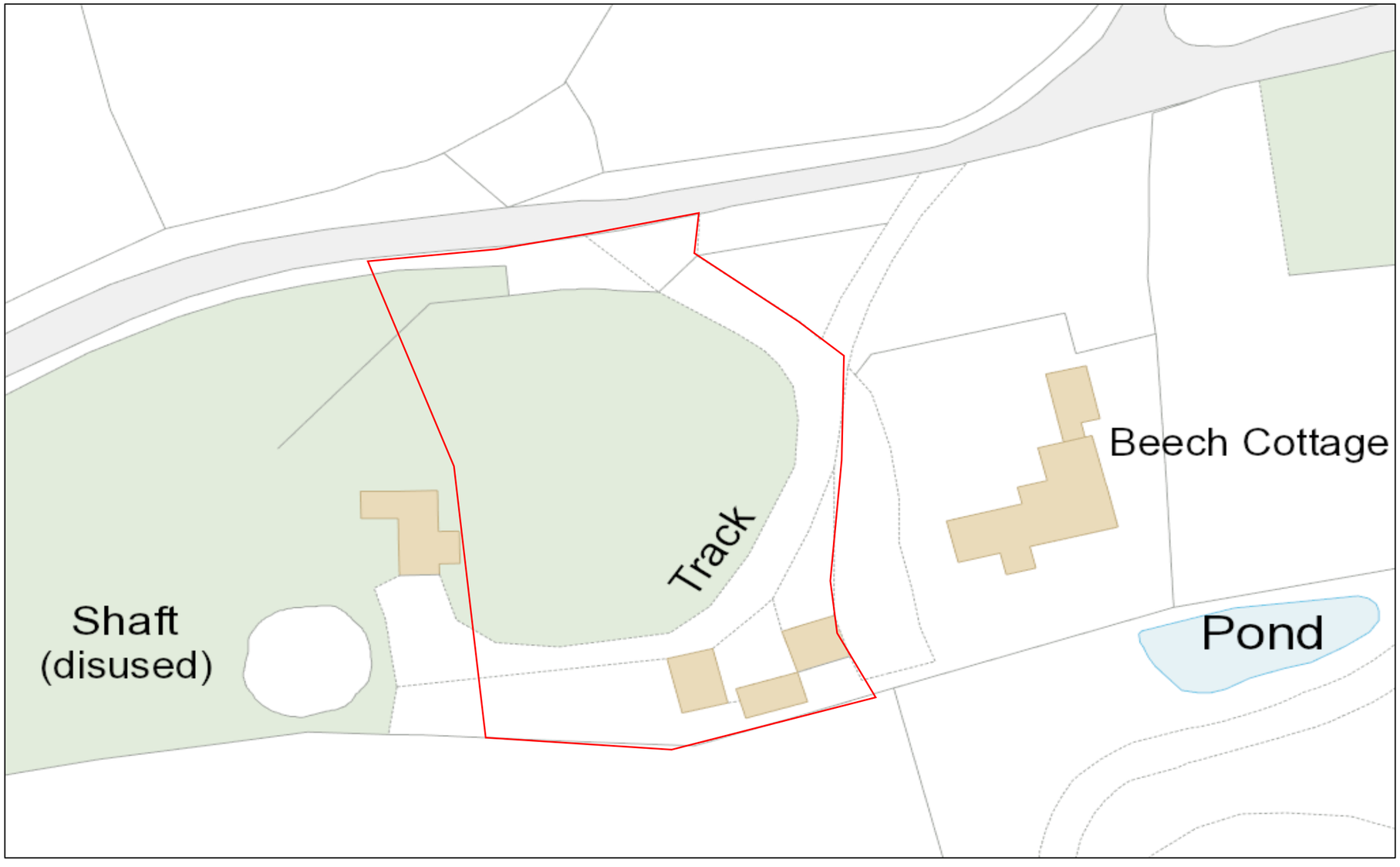
Project: **Kilten Cottage, Hugus**

Client: **Mr & Mrs Noon**

Report Title: **Ground Investigation**

Date: **29/04/2021** Ref: **20077** Figure: **2.1**

Wheal Jane Consultancy
Geotechnical, environmental & mining services



N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Current Site Layout

Project:

Kilten Cottage, Hugus

20077

Client:

Mr & Mrs Noon

Date:	29/04/2021
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	2.2

N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Proposed Site Layout

Project:

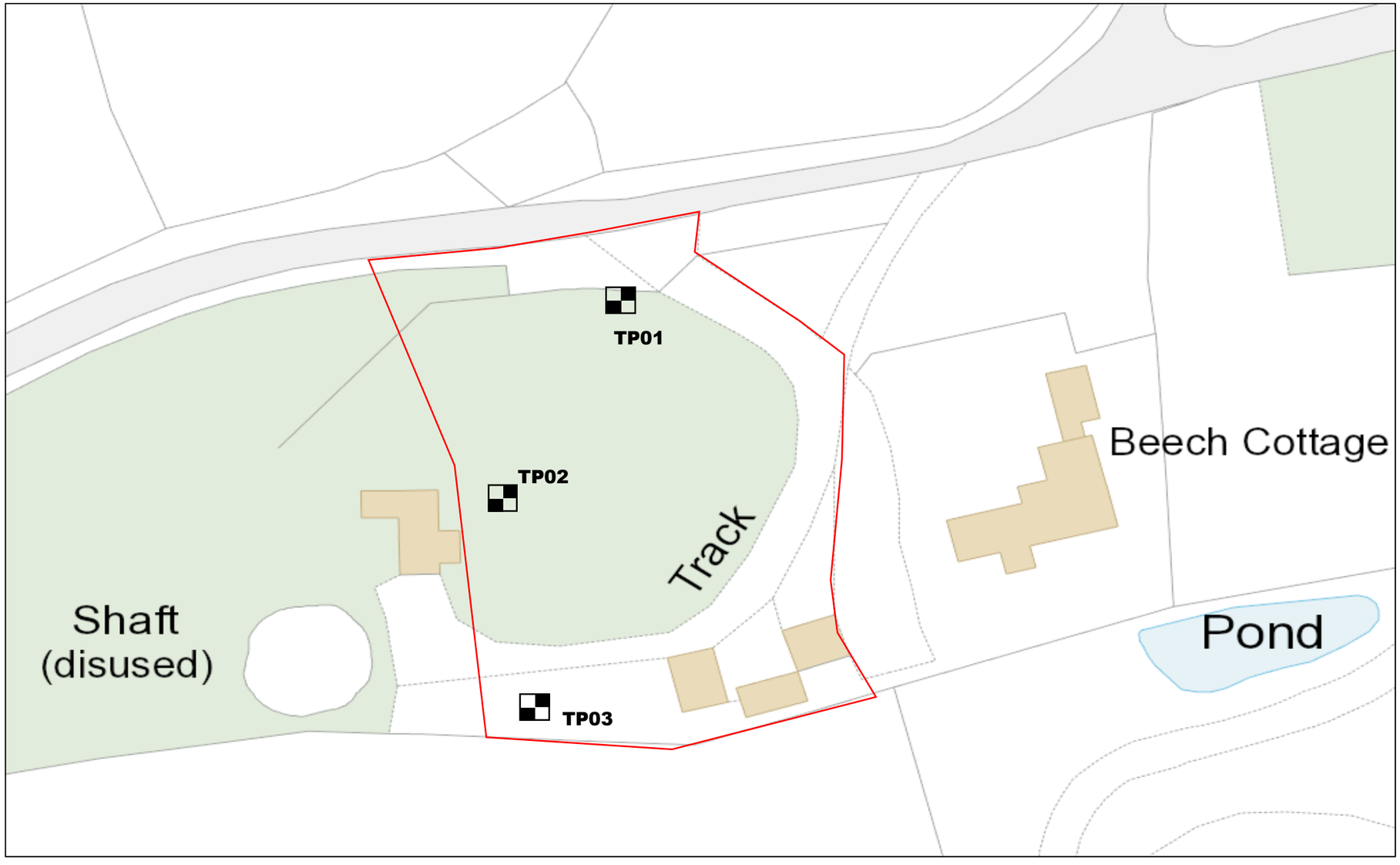
Kilten Cottage, Hugus

20077

Client:

Mr & Mrs Noon

Date:	29/04/2021
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	2.3



N

Legend:

Hand Pit Location

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Exploratory Hole Location Plan

Project:

Kilten Cottage, Hugus

20077

Client:

Mr & Mrs Noon

Date:	29/04/2021
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	3.1

APPENDIX A

Exploratory Hole Logs

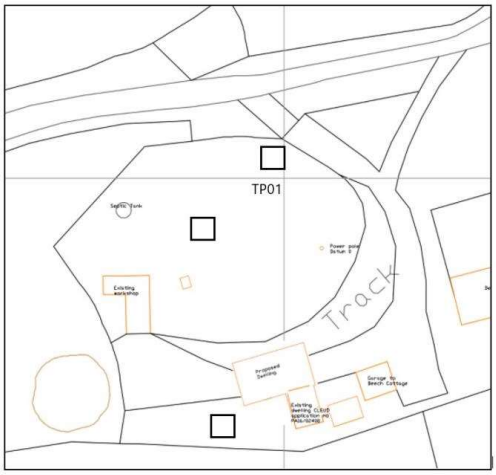
Wheal Jane Consultancy
Geotechnical, environmental & mining services

Wheal Jane Group

Site	Trial Pit Number
Kilten Cottage	HP01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated trial pit.	Width: 0.40m Length: 0.40m	93.00	Mr & Mrs Noon	20077
	Location Hugus	**Dates** 10/07/2020	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Grass over dark brown sandy, clayey, gravelly TOPSOIL. Gravel is angular to subangular, medium to coarse of mudstone. Sand is medium to coarse.		
0.10	ES1			92.70	0.30			
					(0.20)	Brown clayey angular to subangular, medium to coarse GRAVEL of mudstone.		
0.40	ES2			92.50	0.50			
					(0.10)	Orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
				92.40	0.60			
					(0.15)	Orangish brown clayey COBBLES. Cobbles are subangular to subrounded of mudstone up to 450mm.		
0.70	ES3			92.25	0.75			
						Complete at 0.75m		



Remarks

Pit terminated due to encountering large cobble.
No groundwater encountered.

North	Scale (approx)	Logged By	Figure No.
↑	1:10	BH	20077.HP01

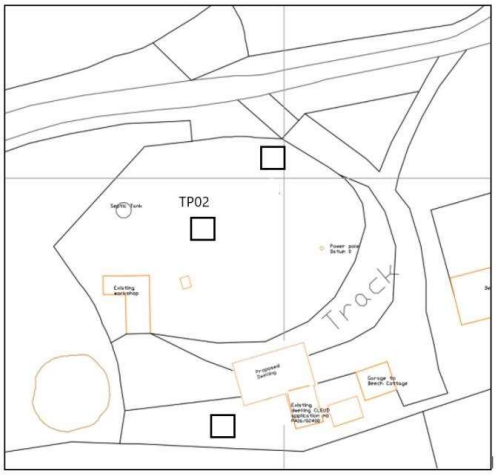
Wheal Jane Consultancy
Geotechnical, environmental & mining services

Wheal Jane Group

Site	Trial Pit Number
Kilten Cottage	HP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated trial pit.	Width: 0.30m Length: 0.40m	94.00	Mr & Mrs Noon	20077
	Location Hugus	**Dates** 10/07/2020	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.30)	Grass over dark brown sandy, clayey, gravelly TOPSOIL. Gravel is angular to subangular, medium to coarse of mudstone. Sand is medium to coarse.		
0.20	ES1			93.70	0.30	Orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
0.40	ES2			93.55	(0.15) 0.45			
				93.50	(0.05) 0.50	Orangish brown clayey COBBLES. Cobbles are subangular to subrounded of mudstone up to 450mm.		
						Complete at 0.50m		



Remarks

Pit terminated due to encountering large cobbles at base of pit.
No groundwater encountered.

North	Scale (approx)	Logged By	Figure No.
	1:10	BH	20077.HP02

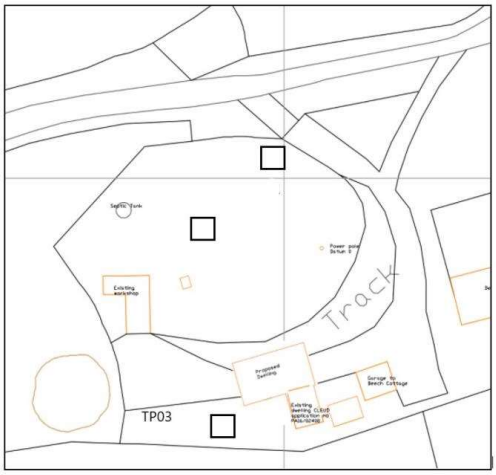
Wheal Jane Consultancy
Geotechnical, environmental & mining services

Wheal Jane Group

Site	Trial Pit Number
Kilten Cottage	HP03

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Hand excavated trial pit.	Width: 0.50m Length: 0.50m	95.00	Mr & Mrs Noon	20077
	Location Hugus	**Dates** 10/07/2020	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	Grass over dark brown sandy, clayey, gravelly TOPSOIL. Gravel is angular to subangular, medium to coarse of mudstone. Sand is medium to coarse.		
0.30	ES1			94.60	0.40			
					(0.20)	Brown clayey angular to subangular, medium to coarse GRAVEL of mudstone.		
0.50	ES2			94.40	0.60			
					(0.25)	Orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
0.70	ES3			94.15	0.85			
0.85	ES4			94.10	(0.05) 0.90	Orangish brown clayey COBBLES. Cobbles are subangular to subrounded of mudstone up to 450mm.		
						Complete at 0.90m		



Remarks

No groundwater encountered.

North	Scale (approx)	Logged By	Figure No.
	1:10	BH	20077.HP03

APPENDIX B

Trial Pit Photographs

Trial Pit:	HP01

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

Trial Pit:	HP01

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

Trial Pit:	HP02

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

Trial Pit:	HP02

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

Trial Pit:	HP03

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

Trial Pit:	HP03

Kilten Cottage, Hugus	20077
Phase 2 Geoenvironmental Investigation	Trial Pit Photographs
Mr & Mrs Noon	April 2021

APPENDIX C

Chemical Laboratory Results

Bryony Halliday
Wheal Jane Services
Old Mine Offices
Wheal Jane
Baldhu
Truro
Cornwall
TR3 6EE

t: 01872 560200
f: 01872 560826
e: bhalliday@wheal-jane.co.uk

i2 Analytical Ltd.
7 Woodshots Meadow,
Croxley Green
Business Park,
Watford,
Herts,
WD18 8YS

t: 01923 225404
f: 01923 237404
e: reception@i2analytical.com

Analytical Report Number : 20-19252

Project / Site name:	Kilten Cottage	**Samples received on:**	14/07/2020
Your job number:	20077	**Sample instructed/ Analysis started on:**	14/07/2020
Your order number:	20077	**Analysis completed by:**	22/07/2020
Report Issue Number:	1	**Report issued on:**	22/07/2020
Samples Analysed:	9 soil samples		

Signed: Karolina Marek

Karolina Marek
PL Head of Reporting Team

For & on behalf of i2 Analytical Ltd.

Standard Geotechnical, Asbestos and Chemical Testing Laboratory located at: ul. Pionierów 39, 41 -711 Ruda Śląska, Poland.

Accredited tests are defined within the report, opinions and interpretations expressed herein are outside the scope of accreditation.

Standard sample disposal times, unless otherwise agreed with the laboratory, are :

soils	- 4 weeks from reporting
leachates	- 2 weeks from reporting
waters	- 2 weeks from reporting
asbestos	- 6 months from reporting

Excel copies of reports are only valid when accompanied by this PDF certificate.

Any assessments of compliance with specifications are based on actual analytical results with no contribution from uncertainty of measurement. Application of uncertainty of measurement would provide a range within which the true result lies. An estimate of measurement uncertainty can be provided on request.

Analytical Report Number: 20-19252

Project / Site name: Kilten Cottage
Your Order No: 20077

Lab Sample Number				1561438	1561439	1561440	1561441	1561442
Sample Reference				TP01	TP01	TP01	TP02	TP02
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Depth (m)				0.10	0.40	0.70	0.20	0.40
Date Sampled				10/07/2020	10/07/2020	10/07/2020	10/07/2020	10/07/2020
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	None Supplied
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Moisture Content	%	N/A	NONE	28	14	17	13	15
Total mass of sample received	kg	0.001	NONE	1.0	1.0	1.0	1.0	1.0
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	1800	3400	5900	2500	4100
Boron (water soluble)	mg/kg	0.2	MCERTS	1.2	0.3	0.5	0.7	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	< 0.2
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	19	24	28	17
Copper (aqua regia extractable)	mg/kg	1	MCERTS	220	200	240	330	320
Lead (aqua regia extractable)	mg/kg	1	MCERTS	2300	810	490	3300	2200
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	0.6	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	5.5	4.8	5.7	11	5.0
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	4.2	6.7	6.1	5.6	4.9
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	200	74	100	240	130

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Lab Sample Number				1561443	1561444	1561445	1561446	
Sample Reference				TP03	TP03	TP03	TP03	
Sample Number				None Supplied	None Supplied	None Supplied	None Supplied	
Depth (m)				0.30	0.50	0.70	0.85	
Date Sampled				10/07/2020	10/07/2020	10/07/2020	10/07/2020	
Time Taken				None Supplied	None Supplied	None Supplied	None Supplied	
Analytical Parameter (Soil Analysis)	**Units**	**Limit of detection**	**Accreditation Status**					
Stone Content	%	0.1	NONE	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	17	4.6	15	13	
Total mass of sample received	kg	0.001	NONE	1.0	1.0	1.0	1.0	
Heavy Metals / Metalloids								
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	2800	750	4500	4200	
Boron (water soluble)	mg/kg	0.2	MCERTS	2.0	0.5	0.4	0.5	
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	< 0.2	
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	16	13	19	23	
Copper (aqua regia extractable)	mg/kg	1	MCERTS	420	44	120	120	
Lead (aqua regia extractable)	mg/kg	1	MCERTS	4000	390	370	170	
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.4	9.3	5.5	7.4	
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	6.0	1.4	4.2	3.7	
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	1300	57	74	57	

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* These descriptions are only intended to act as a cross check if sample identities are questioned. The major constituent of the sample is intended to act with respect to MCERTS validation. The laboratory is accredited for sand, clay and loam (MCERTS) soil types. Data for unaccredited types of solid should be interpreted with care.

Stone content of a sample is calculated as the % weight of the stones not passing a 10 mm sieve. Results are not corrected for stone content.

Lab Sample Number	Sample Reference	Sample Number	Depth (m)	Sample Description *
1561438	TP01	None Supplied	0.10	Brown loam and clay with vegetation and gravel
1561439	TP01	None Supplied	0.40	Brown clay and sand with vegetation and gravel
1561440	TP01	None Supplied	0.70	Brown clay and sand with vegetation and gravel
1561441	TP02	None Supplied	0.20	Brown loam and sand with vegetation and gravel.
1561442	TP02	None Supplied	0.40	Brown loam and sand with vegetation and gravel.
1561443	TP03	None Supplied	0.30	Brown loam and clay with vegetation and gravel
1561444	TP03	None Supplied	0.50	Light brown gravelly sand with vegetation.
1561445	TP03	None Supplied	0.70	Light brown clay and sand with gravel.
1561446	TP03	None Supplied	0.85	Light brown clay and sand with vegetation and gravel.

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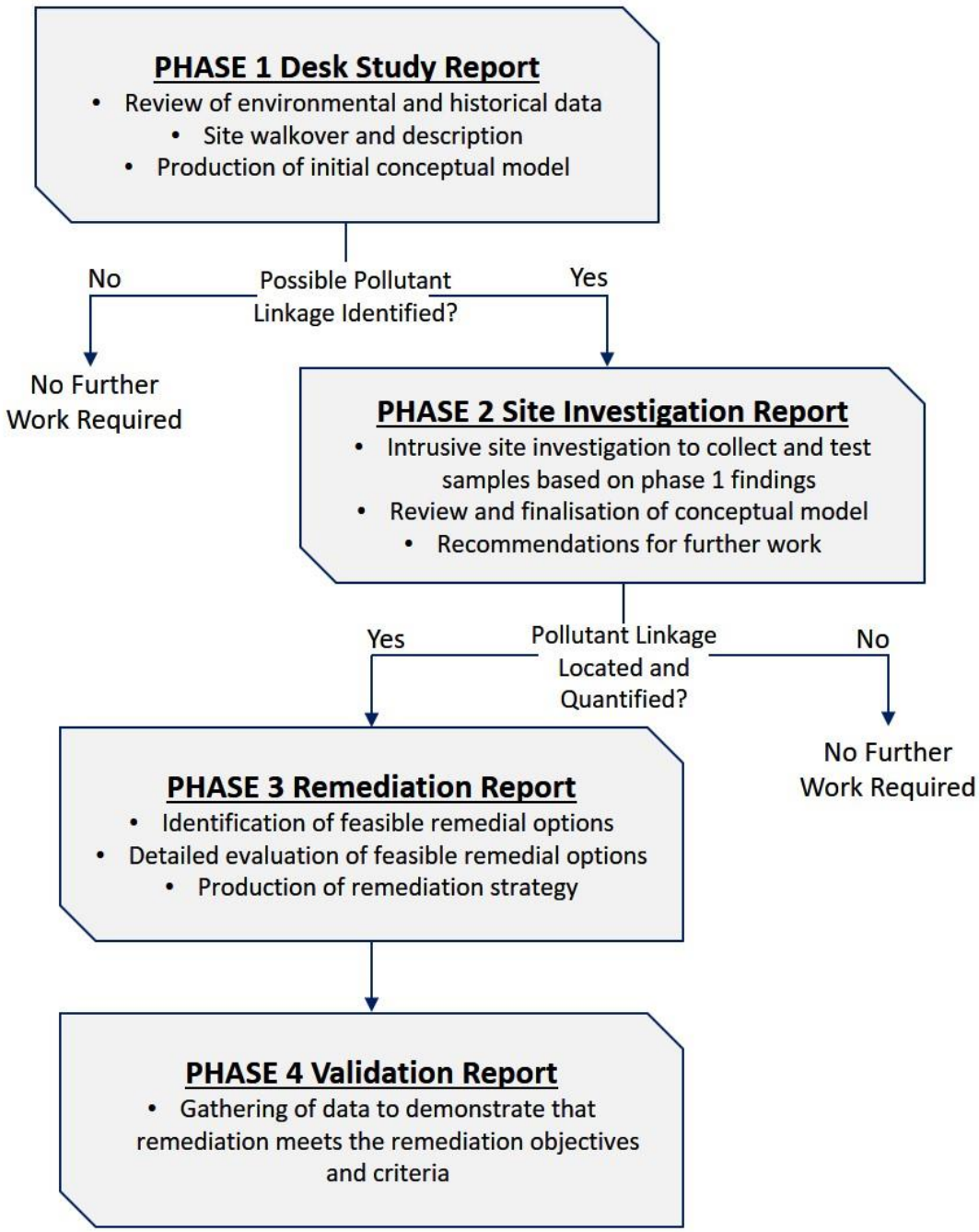
Water matrix abbreviations: Surface Water (SW) Potable Water (PW) Ground Water (GW) Process Water (PrW)

Analytical Test Name	Analytical Method Description	Analytical Method Reference	Method number	Wet / Dry Analysis	Accreditation Status
Boron, water soluble, in soil	Determination of water soluble boron in soil by hot water extract followed by ICP-OES.	In-house method based on Second Site Properties version 3	L038-PL	D	MCERTS
Metals in soil by ICP-OES	Determination of metals in soil by aqua-regia digestion followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil.	L038-PL	D	MCERTS
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In house method.	L019-UK/PL	W	NONE
Stones content of soil	Standard preparation for all samples unless otherwise detailed. Gravimetric determination of stone > 10 mm as % dry weight.	In-house method based on British Standard Methods and MCERTS requirements.	L019-UK/PL	D	NONE

For method numbers ending in 'UK' analysis have been carried out in our laboratory in the United Kingdom.
For method numbers ending in 'PL' analysis have been carried out in our laboratory in Poland.
Soil analytical results are expressed on a dry weight basis. Where analysis is carried out on as-received the results obtained are multiplied by a moisture correction factor that is determined gravimetrically using the moisture content which is carried out at a maximum of 30oC.

The Phased Approach to Land Contamination

As set out in Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination. Environment Agency Guidelines




Wheal Jane
Consultancy
Geotechnical, environmental
& mining services