



# **GROUND INVESTIGATION**

## Factual Report

Carn Thomas, IOS

**24 January 2020**

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SI19937A

## DOCUMENT CONTROL SHEET

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## **1 INTRODUCTION**

### **1.1 Instruction**

- 1.1.1 Wheal Jane Consultancy (WJC) was commissioned by Homes England c/o Campbell Reith to undertake a Ground Investigation at a site known as Carn Thomas, IOS.
- 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 general specification for the works was provided by Campbell Reith.
- 1.2.2 This report represents full factual records of the work carried out, the ground conditions encountered in the exploratory holes, the in-situ and laboratory results and the results of ground gas monitoring.
- 1.2.3 This assessment has been undertaken with guidance from BS10175:2011 and Environment Agency report CLR11, and as such represents a 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 on St Mary's, Isles of Scilly, approximately 0.2km north west of the town centre of Hugh Town. The site is approximately centred on National Grid Reference SV 90680 10660.
- 2.1.2 The site is irregular in shape and covers an area of approximately 0.62ha.
- 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**

<b>Direction</b>	<b>Land Use</b>
North	Road, Residential
East	Residential
South	Residential
West	Residential

### **2.3 Proposed Development**

- 2.3.1 The development proposals are as-yet unclear.

### 3 SITE INVESTIGATION

#### 3.1 Site Works

3.1.1 An intrusive site investigation was conducted on Tuesday 10<sup>th</sup> December 2019. The investigation was overseen by a geoenvironmental engineer from Wheal Jane Consultancy.

3.1.2 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
Trial Pit	TP01 – TP09	0.40 – 3.30	Undertaken for site coverage across the terraced areas.

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

#### 3.2 Trial Pitting

3.2.1 Nine (9 No.) Trial Pits, designated TP01 – TP09 inclusive were advanced to depths of 0.40m to 3.30m using a Mini Digger on the 10<sup>th</sup> December 2019. A larger 8 tonne excavator was employed for TP09. Representative soil samples were taken at regular intervals for geotechnical and environmental analysis and logged on site by a suitably qualified geoenvironmental engineer.

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

3.2.3 All trial pits were backfilled with arisings upon completion.

3.2.4 Trial pit logs are included as Appendix A.

3.2.5 Trial Pit photographs are included as Appendix B.

#### 3.3 Geotechnical Sampling and Testing

3.3.1 Samples were dispatched to an accredited geotechnical laboratory in order to classify the geotechnical properties of the soils. The following tests were scheduled:

- Moisture Content
- Atterberg Limits (Scheduled however, samples were not suitable for full test – only liquid limits attained)
- Particle Size Distribution

- Particle Density
- pH & Water-Soluble Sulphate

3.3.2 All testing was carried out in accordance with the procedures set out in BS EN ISO/IEC 17025:2005.

3.3.3 All samples were tested by a UKAS accredited laboratory.

3.3.4 The results are included as Appendix C.

### **3.4 Chemical Sampling and Testing**

3.4.1 All retrieved soil 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.

3.4.2 Sampling was specified by the Engineer.

3.4.3 The following potential contaminants were tested for in selected samples:

- WJC Screen Suite
  - Heavy Metals (As, Ba, Cd, CrIII, CrVI, Cu, Hg, Mn, Ni, Pb, Sb, Se, V, Zn)
  - Organic Matter
  - Cyanide
  - Total PAH
  - Total TPH
  - pH
  - Sulphate
- Full WAC Solid State
- Asbestos ID

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

3.4.5 The results are included as Appendix D.

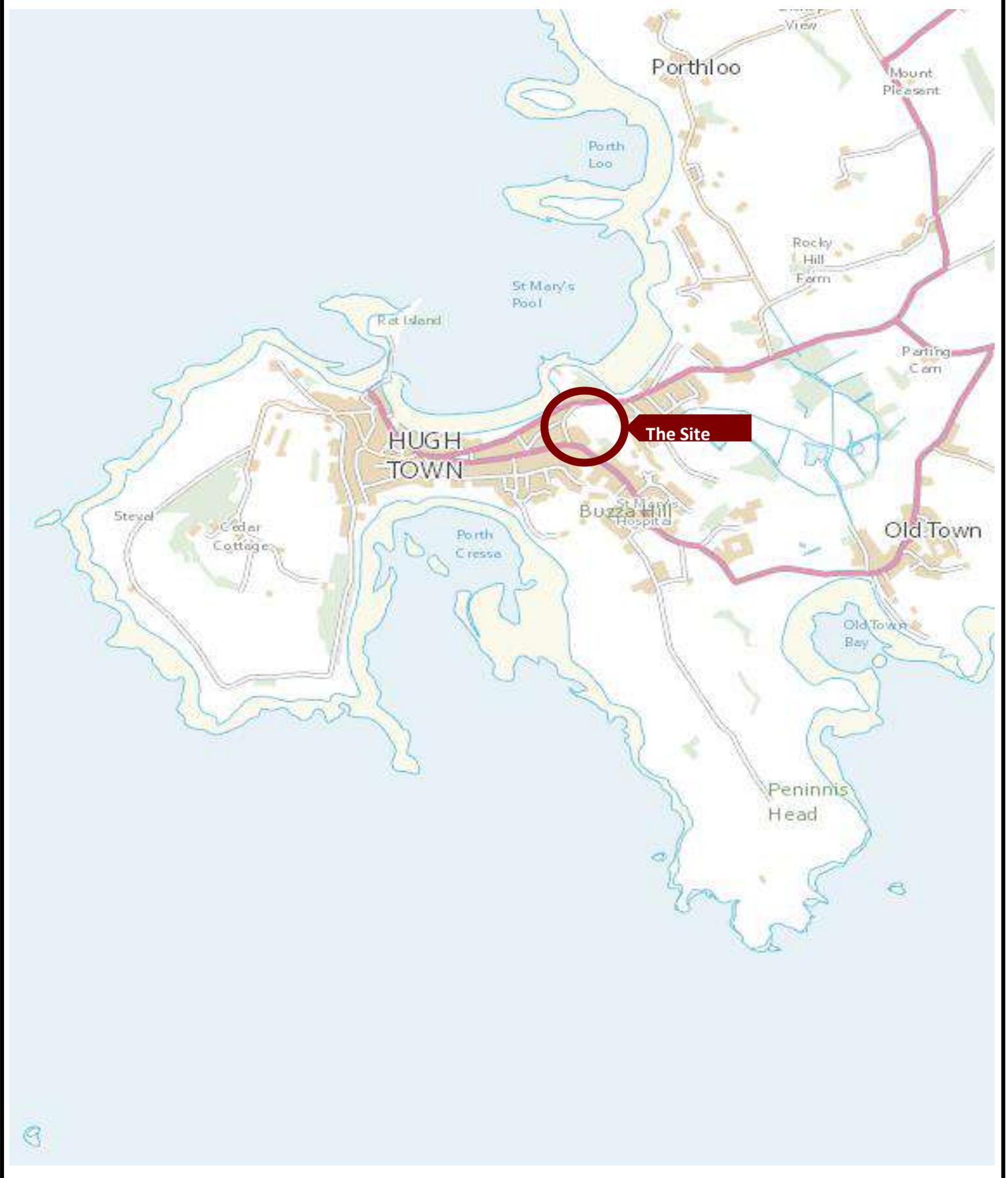
## **4 REFERENCE LIST**

- 4.1.1 BSI (2011) BS 10175:2011 Investigation of Potentially Contaminated Sites - Code of Practice. London, British Standards Institution
- 4.1.2 BSI (2015) BS5930:2015. Code of Practice for Site Investigations. London, British Standards Institution
- 4.1.3 British Research Establishment (BRE) (2005) Special Digest 1 Concrete in Aggressive Ground. 3rd edn. Watford, BRE
- 4.1.4 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
- 4.1.5 CIRIA (2001) CIRIA C552 - Contaminated land risk assessment: A guide to good practice. London, CIRIA
- 4.1.6 CIRIA (2007) CIRIA C665 - Assessing Risks Posed by Hazardous Ground Gases to Buildings. London, CIRIA
- 4.1.7 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
- 4.1.8 Contaminated Land: Applications in Real Environments (CL:AIRE) (2012) A Pragmatic Approach to Ground Gas Risk Assessment. Research Bulletin 17
- 4.1.9 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.
- 4.1.10 Environment Agency (2004) Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination. Bristol, Environment Agency
- 4.1.11 Environment Agency (2009) Updated Technical Background to the CLEA Model. Science Report SC050021/SR3. Bristol: Environment Agency
- 4.1.12 Environment Agency (2009) Human Health Toxicological Assessment of Contaminants in Soil. Science Report SC050021/SR2. Bristol: Environment Agency
- 4.1.13 Great Britain. Environmental Protection Act (1990). London, The Stationery Office
- 4.1.14 Great Britain. Water Act (2003) London, The Stationery Office
- 4.1.15 Great Britain. Environmental Permitting Regulations (2007). London, The Stationery Office
- 4.1.16 Great Britain. Environmental Damage (Prevention and Remediation) Regulations (2009). London, The Stationery Office
- 4.1.17 Great Britain. The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015. London, The Stationery Office
- 4.1.18 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
- 4.1.19 Royal Institution of Chartered Surveyors (RICS) (2012) Japanese Knotweed and Residential Property. Coventry, RICS

## **5 NOTES**

- 5.1.1 This report is concerned solely with the property, as defined by this report, or parts thereof examined.
- 5.1.2 The report should not be used in connection with adjacent properties.
- 5.1.3 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.
- 5.1.4 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.
- 5.1.5 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.
- 5.1.6 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.
- 5.1.7 We have no liability toward any person not party to commissioning this report.
- 5.1.8 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.
- 5.1.9 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: **Carn Thomas**

Client: **Homes England c/o Campbell Reith**

Report Title: **Ground Investigation**

Date: **24/01/2020**

Ref: **19937A**



Figure: **2.1**



Legend:



Title:

**Current Site Layout**

Project:

**Carn Thomas  
19937A**

Client:

**Homes England c/o Campbell Reith**

Date: 24/01/2020

Scale: NTS

Drawn by: BH

Revision: A

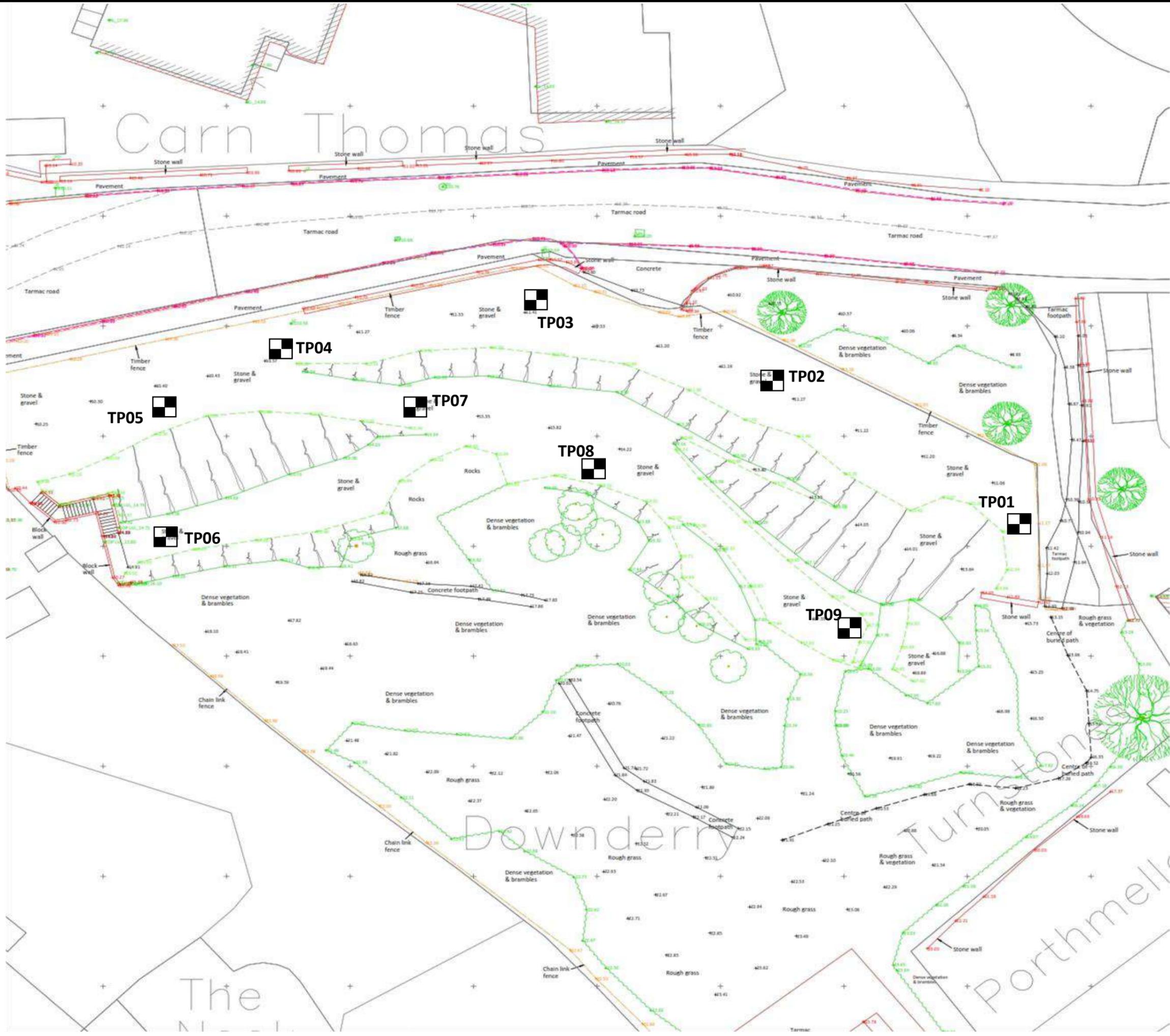
Figure: 2.2



Legend:



**Trial Pit**



Title:

**Exploratory Hole Location Plan**

Project:

**Carn Thomas  
19937A**

Client:

**Homes England c/o Campbell Reith**

Date: 24/01/2020

Scale: NTS

Drawn by: BH

Revision: A

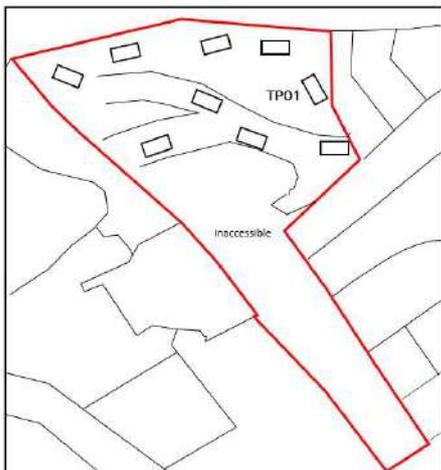
Figure: 3.1

## **APPENDIX A**

Trial Pit Logs

<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.40m Length: 1.90m	<b>Ground Level (mOD)</b> 11.20	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.40	B1					MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.		
0.20	ES2			10.80	0.40 (0.40)			
0.45	ES3			10.70	0.40 (0.10) 0.50	Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				10.36	0.34	Orangish brown silty, gravelly, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				10.35	0.84 0.85	GRANITE. Complete at 0.85m		



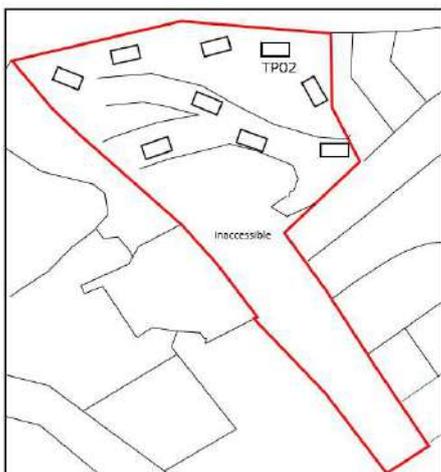
**Remarks**

Pit terminated due to encountering Granite bedrock.  
Sides of pit were stable.  
No groundwater encountered.

<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP01
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Excavation Method Machine Excavated Trial Pit.	Dimensions Width: 0.30m Length: 1.65m	Ground Level (mOD) 11.33	Client Campbell Reith	Job Number 19937A
	Location Carn Thomas	Dates 10/12/2019	Engineer Wheal Jane Consultancy	Sheet 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10	ES1			11.13	(0.20)	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.		
					0.20			
0.30	ES2			10.94	(0.19)	Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				10.93	0.39			
					0.40	GRANITE.		
						Complete at 0.40m		

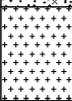


**Remarks**

No groundwater encountered.  
Sides of pit were stable.  
Pit terminated due to encountering granite bedrock.

Scale (approx)	Logged By	Figure No.
1:20	BH	19937A.TP02

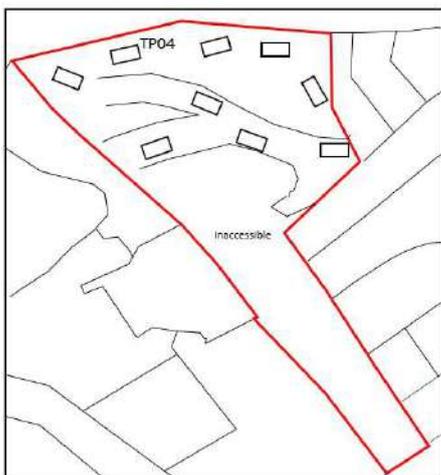
<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.30m Length: 1.60m	<b>Ground Level (mOD)</b> 11.41	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.00-0.35	B1				(0.35)	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.		
0.40	ES2			11.06	0.35 (0.20)	Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				10.86	0.55 (0.25)	Granite recovered as angular to subangular, medium to coarse COBBLES of granite up to 100mm.		
				10.61	0.80	Complete at 0.80m		

	<p><b>Remarks</b></p> <p>Pit terminated due to encountering Granite bedrock. Sides of pit were stable. No groundwater encountered.</p>	
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP03

<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.35m Length: 1.90m	<b>Ground Level (mOD)</b> 10.57	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.50-0.80	B1			10.42	(0.15) 0.15	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.		
					(0.65)	Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
0.90	ES2			9.77	0.80 (0.14)	Orangish brown silty, gravelly, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				9.63 9.62	0.94 0.95	GRANITE. Complete at 0.95m		



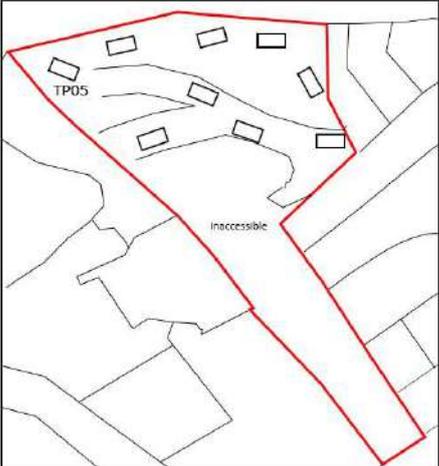
**Remarks**

Pit terminated due to encountering Granite bedrock. Sides of pit were stable. No groundwater encountered.

<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP04
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<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.30m Length: 1.70m	<b>Ground Level (mOD)</b> 10.40	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.40-0.75	B1			10.00	0.40	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.		
0.50	ES2			9.66	0.74	Orangish brown silty, gravelly, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.		
				9.65	0.75	GRANITE. Complete at 0.75m		

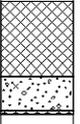
	<b>Remarks</b>  Pit terminated due to encountering Granite bedrock. Sides of pit were stable. No groundwater encountered.	
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP05

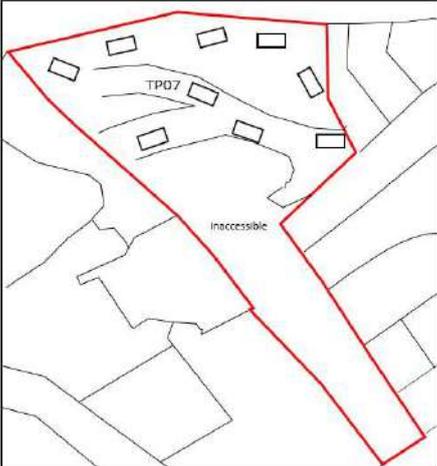
<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.35m Length: 1.95m	<b>Ground Level (mOD)</b> 14.70	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.60-0.90 0.70	B1 ES2			14.10 13.81 13.80	(0.60) 0.60 (0.29) 0.89 0.90	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.  Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.  GRANITE.  Complete at 0.90m		

	<b>Remarks</b>  Pit terminated due to encountering Granite bedrock. Sides of pit were stable. No groundwater encountered.	
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP06

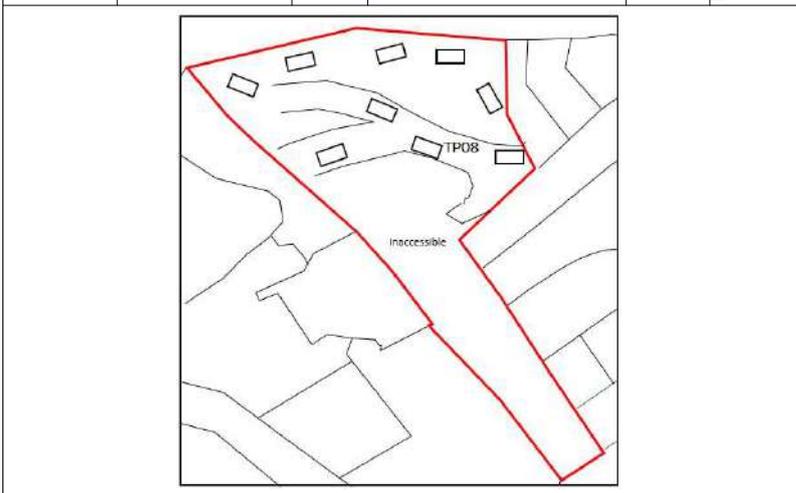
<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.30m Length: 2.10m	<b>Ground Level (mOD)</b> 13.35	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.20-0.30 0.25	B1 ES2			13.15 13.06 13.05	(0.20) 0.20 (0.09) 0.29 0.30	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm. Dark brown slightly gravelly, silty, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite. GRANITE. Complete at 0.30m		

	<b>Remarks</b>  No groundwater encountered. Sides of pit were stable Pit terminated due to encountering Granite bedrock.	
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP07

<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.35m Length: 2.10m	<b>Ground Level (mOD)</b> 14.30	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
0.10-0.40 0.20	B1 ES2			14.20 13.91 13.90	(0.10) 0.10 (0.29) 0.39 0.40	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 90mm.  Orangish brown silty, gravelly, medium to coarse SAND. Gravel is angular to subangular, medium to coarse of granite.  GRANITE.  Complete at 0.40m		



**Remarks**

Pit terminated due to encountering Granite bedrock.  
Sides of pit were stable.  
No groundwater encountered.

<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP08
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<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.40m Length: 2.05m	<b>Ground Level (mOD)</b> 17.39	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 1/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(3.30)	MADE GROUND: Grey angular to subangular, medium to coarse GRAVEL of granite aggregate. Frequent glass, plastic and timber. Occasional cobbles of granite aggregate up to 110mm.		

	<b>Remarks</b>  Pit terminated due to limit of excavator being reached. Sides of pit were fairly stable. No groundwater encountered.	
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP09



**Site**  
Isles of Scilly, Carn Thomas

**Trial Pit Number**  
**TP09**

<b>Excavation Method</b> Machine Excavated Trial Pit.	<b>Dimensions</b> Width: 0.40m Length: 2.05m	<b>Ground Level (mOD)</b> 17.39	<b>Client</b> Campbell Reith	<b>Job Number</b> 19937A
	<b>Location</b> Carn Thomas	<b>Dates</b> 10/12/2019	<b>Engineer</b> Wheal Jane Consultancy	<b>Sheet</b> 2/2

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				14.09	3.30	Complete at 3.30m		

<b>Plan</b> . . . . . . . . . .	<b>Remarks</b>  Pit terminated due to limit of excavator being reached. Sides of pit were fairly stable. No groundwater encountered.		
	<table border="1"> <tr> <td><b>Scale (approx)</b> 1:20</td> <td><b>Logged By</b> BH</td> <td><b>Figure No.</b> 19937A.TP09</td> </tr> </table>	<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH
<b>Scale (approx)</b> 1:20	<b>Logged By</b> BH	<b>Figure No.</b> 19937A.TP09	

## **APPENDIX B**

### Trial Pit Photographs

**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP01





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP01





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP01



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP02





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP02





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP02





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP02



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP03





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP03





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP03





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP03



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP04





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP04





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP04





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP04



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP05





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP05





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP05





**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP06





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP06





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP06





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP06



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP07





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP07





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP07





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP07



**Before  
Excavation**



**After  
Reinstatement**



Title:	Trial Pit Photographs	
Project:	Isles of Scilly, Carn Thomas	
Client:	Campbell Reith	
Report Title:	Ground Investigation	
Date:	December 2019	
	Ref: 19937A	Trial Pit: TP08



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP08





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP08





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP08



**Before  
Excavation**



**After  
Reinstatement**



Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP09





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP09





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP09





Title: Trial Pit Photographs

Project: Isles of Scilly, Carn Thomas

Client: Campbell Reith

Report Title: Ground Investigation

Date: December 2019

Ref: 19937A

Trial Pit: TP09



## **APPENDIX C**

### Geotechnical Laboratory Results





SOUTH WEST GEOTECHNICAL

## Summary of Classification Test Results

Unit 3 Brooklands,  
Howden Road,  
Tiverton,  
Devon  
EX16 5HW



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Project No.	Project Name
12134	Carn Thomas
Client Job No.	Client
19937A	Wheal Jane Consultancy

Hole No.	Sample				Soil Description	mc	Passing 425µm	LL	PL	PI	Particle density	Remarks
	Type	Top	Base	Ref		CI.3.2			CI5.3	CI5.4		
						%	%	%	%	%	Mg/m3	
TP01/TP03	AMAL	0.00	0.40	-	Dark grey silty very sandy GRAVEL	13	28 - Sieved	39 - 1pt	NP	-	-	
TP04	B	0.50	0.80	-	Dark brown silty very sandy GRAVEL	15	38 - Sieved	30 - 1pt	NP	-	-	
TP05/TP06	AMAL	0.40	0.90		Greyish brown silty very andy GRAVEL	12	25 - Sieved	36 - 1pt	NP	-	-	
TP07	B	0.20	0.30	-	Dark brown silty very sandy GRAVEL	17	40 - Sieved	34 - 1pt	NP	-	-	
TP08	B	0.10	0.40	-	Dark brown silty very sandy GRAVEL	15	18 - Sieved	44 - 1pt	NP	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	

**Preparation Clauses: Particle Density (BS1377:Part 1: 1990: CL7.4.4) Atterberg Limits (BS1377:Part 1: 1990: CL7.4.3) Moisture Content (BS1377: Part 1: 1990: CL7.3.3 & 7.4.2)**

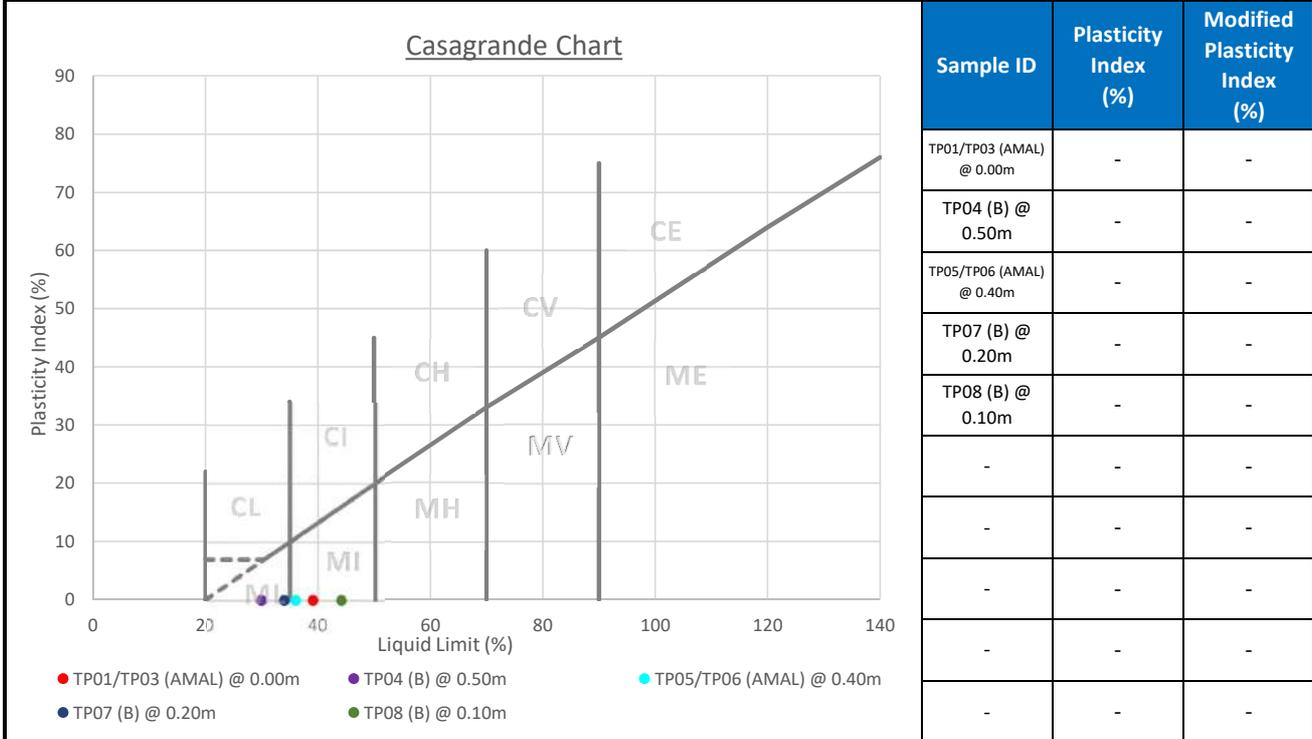
Key	Date	Approved By	Page No.
<p>Atterberg Limits BS1377-2:1990 4pt cone (CL.4.3) unless : 1pt - single point test (CL.4.4) 4.2.3 - Natural 4.2.4 - Sieved Moisture Content (mc) %</p> <p>Particle density BS1377-2:1990 sp - small pyknometer CL.8.3 gj - gas jar CL.8.2</p>	17/01/2020	Matt Stokes - Senior Technician	1  KL001R Index Summary



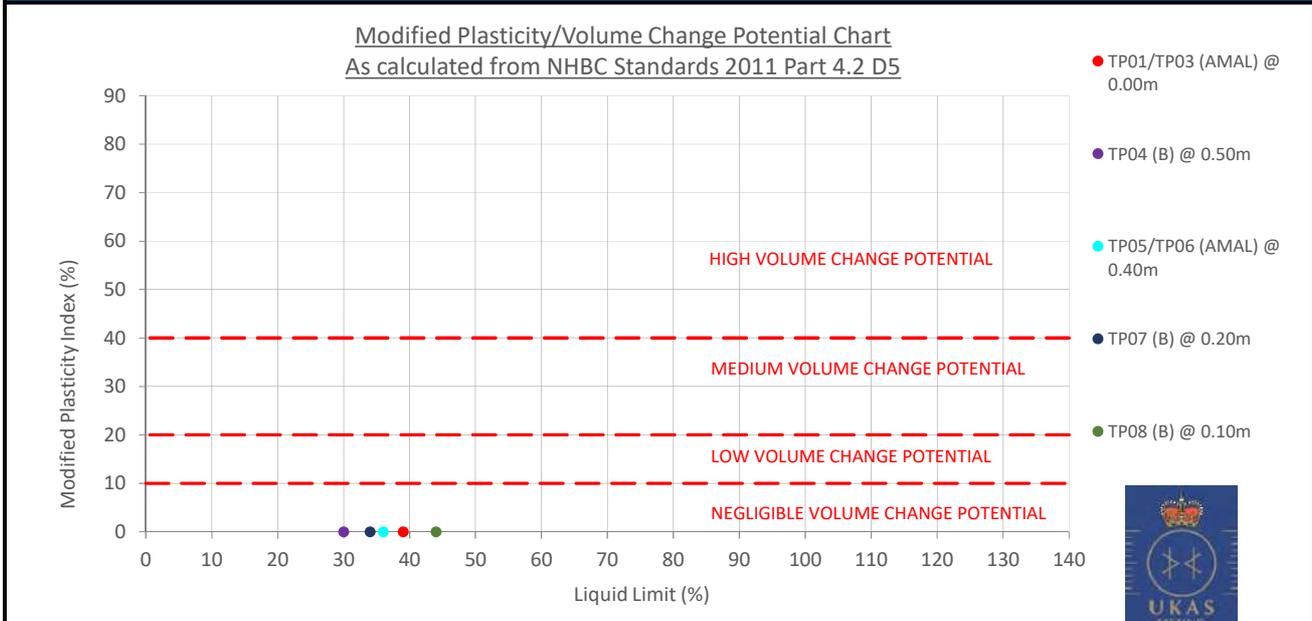
## Graphical Summary of Atterberg Test Results

Unit 3 Brooklands,  
Howden Road,  
Tiverton,  
Devon  
EX16 5HW

<b>Project No.</b>	<b>Project Name</b>
12134	Carn Thomas
<b>Client Job No.</b>	<b>Client</b>
-	0



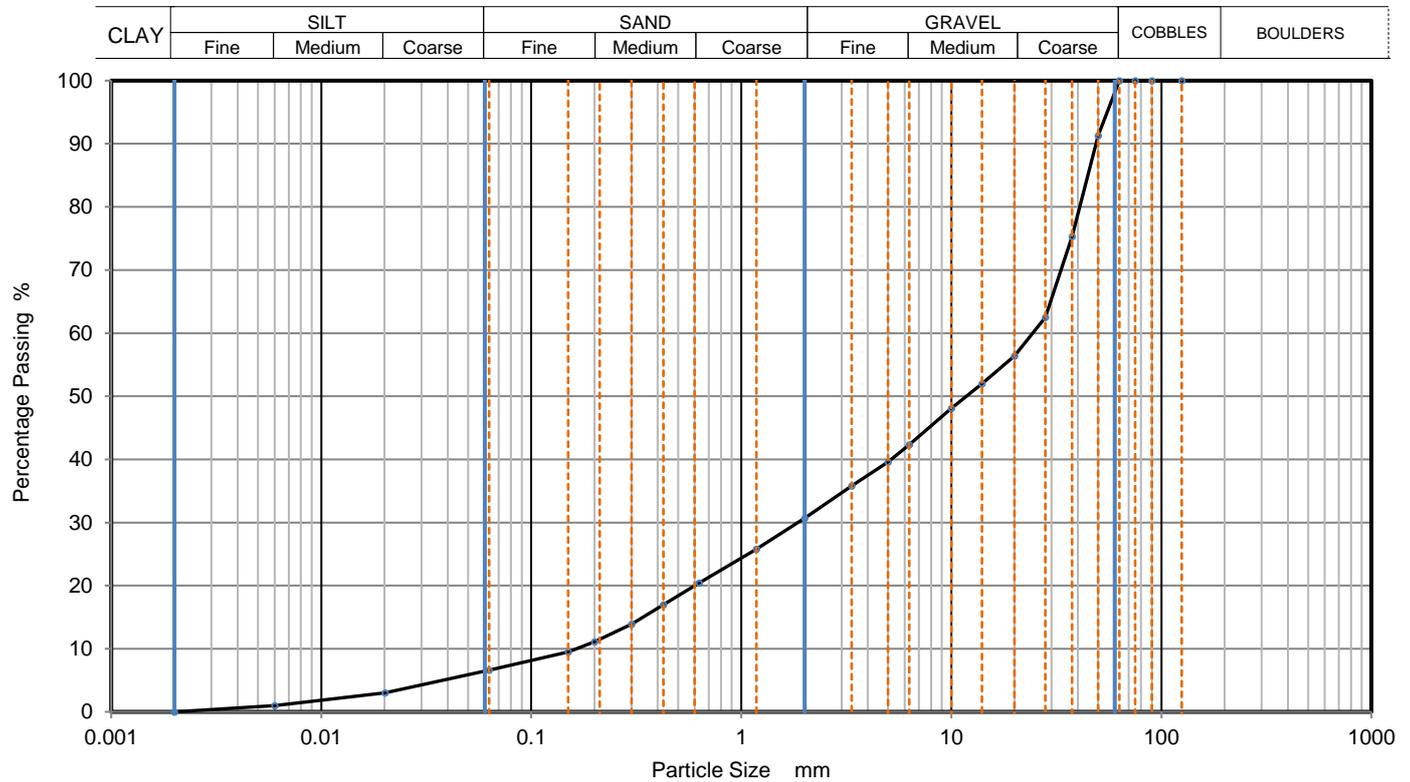
The Modified Plasticity Index ( $I_p$ ) is defined as the Plasticity Index ( $I_p$ ) of the soil multiplied by the percentage of particles less than 425µm.  
ie.  $I_p \times \% \text{ less than } 425\mu\text{m} / 100\%$



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<b>KL001a Index Graphical Summary</b>	<b>Approved By</b>	<b>Date</b>
	David Trowbridge - Laboratory Manager	17/01/2020 16:12

	<b>PARTICLE SIZE DISTRIBUTION</b>		<b>Project No.</b>	12134	
			<b>Borehole/Pit No.</b>	TP01/TP03	
<b>Project Name</b>	Carn Thomas		<b>Sample No.</b>	-	
<b>Soil Description</b>	Dark grey silty very sandy GRAVEL		<b>Depth, m</b>	0.00	
<b>Specimen Reference</b>	1	<b>Specimen Depth</b>	m	<b>Sample Type</b>	AMAL
<b>Test Method</b>	BS1377:Part 2:1990, clauses 9.2 and 9.4				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	3
90	100	0.0060	1
75	100	0.0020	0
63	100		
50	91		
37.5	75		
28	63		
20	56		
14	52		
10	48		
6.3	42		
5	40		
3.35	36		
2	31		
1.18	26		
0.63	20	<b>Particle density (assumed)</b>	
0.425	17	<b>2.65</b>	<b>Mg/m3</b>
0.3	14		
0.2	11		
0.15	10		
0.063	7		

<b>Dry Mass of sample, g</b>	14732
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	0
Gravel	69
Sand	24
Silt	7
Clay	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	150
Curvature Coefficient	0.87

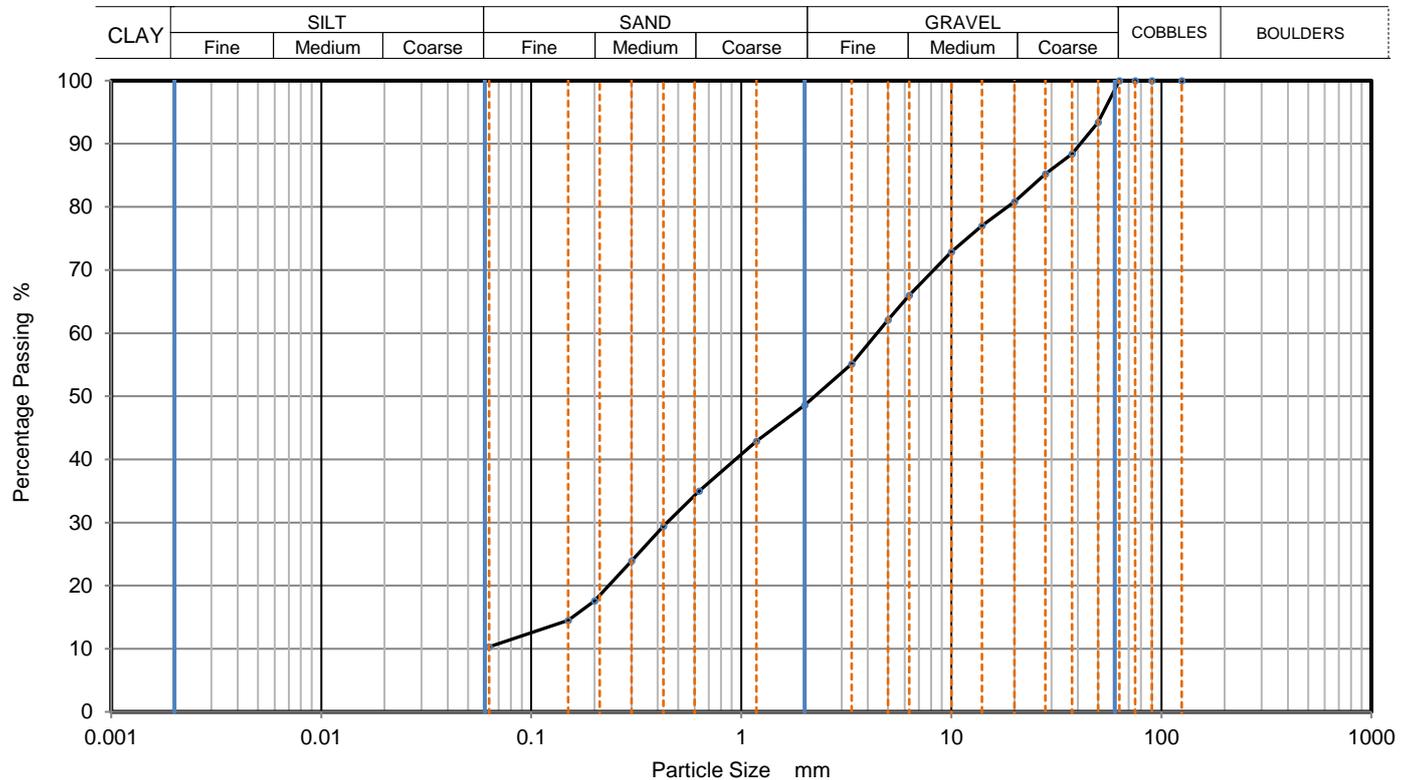
Remarks
Preparation and testing in accordance with BS1377 unless noted below
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5



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Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	17/01/2020	KL002R PSD

	<b>PARTICLE SIZE DISTRIBUTION</b>		<b>Project No.</b>	12134	
			<b>Borehole/Pit No.</b>	TP04	
<b>Project Name</b>	Carn Thomas		<b>Sample No.</b>	-	
<b>Soil Description</b>	Dark brown silty very sandy GRAVEL		<b>Depth, m</b>	0.50	
<b>Specimen Reference</b>	6	<b>Specimen Depth</b>	m	<b>Sample Type</b>	B
<b>Test Method</b>	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	93		
37.5	88		
28	85		
20	81		
14	77		
10	73		
6.3	66		
5	62		
3.35	55		
2	49		
1.18	43		
0.63	35		
0.425	29		
0.3	24		
0.2	18		
0.15	15		
0.063	10		

<b>Dry Mass of sample, g</b>	8781
------------------------------	------

Sample Proportions	% dry mass
Very coarse	0
Gravel	51
Sand	38
Fines <0.063mm	10

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	
Curvature Coefficient	

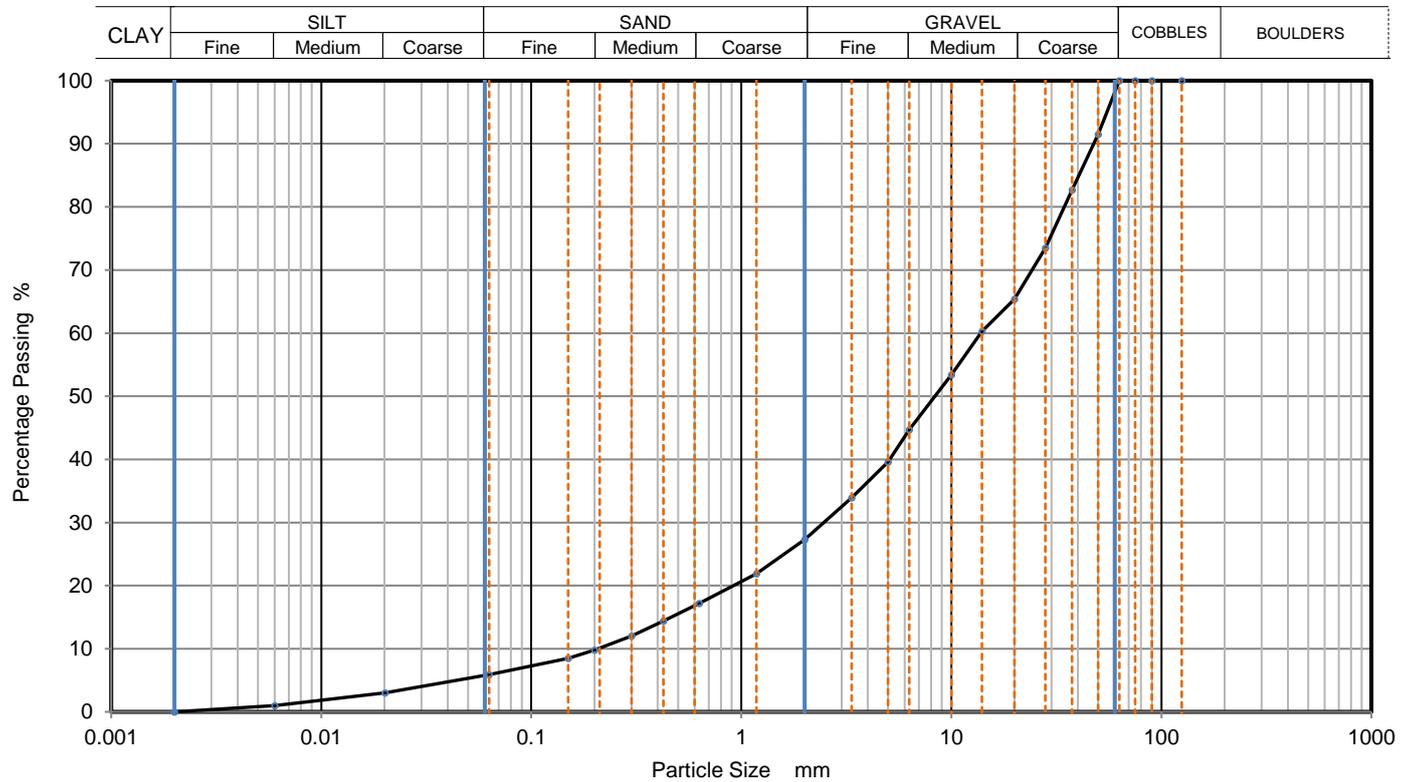
Remarks
Preparation and testing in accordance with BS1377 unless noted below
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement



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17025:2017

<b>Approved by</b>	<b>Date</b>	<b>Sheet ID:</b>
Matt Stokes - Senior Technician	17/01/2020	KL002R PSD

	<b>PARTICLE SIZE DISTRIBUTION</b>		<b>Project No.</b>	12134	
			<b>Borehole/Pit No.</b>	TP05/TP06	
<b>Project Name</b>	Carn Thomas		<b>Sample No.</b>		
<b>Soil Description</b>	Greyish brown silty very sandy GRAVEL		<b>Depth, m</b>	0.40	
<b>Specimen Reference</b>	2	<b>Specimen Depth</b>	m	<b>Sample Type</b>	AMAL
<b>Test Method</b>	BS1377:Part 2:1990, clauses 9.2 and 9.4				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100	0.0201	3
90	100	0.0060	1
75	100	0.0020	0
63	100		
50	92		
37.5	83		
28	74		
20	65		
14	60		
10	53		
6.3	45		
5	40		
3.35	34		
2	27		
1.18	22		
0.63	17	<b>Particle density (assumed)</b> 2.65	<b>Mg/m<sup>3</sup></b>
0.425	14		
0.3	12		
0.2	10		
0.15	9		
0.063	6		

<b>Dry Mass of sample, g</b>	16045
------------------------------	-------

Sample Proportions	% dry mass
Very coarse	0
Gravel	73
Sand	21
Silt	6
Clay	0

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	66
Curvature Coefficient	2.1

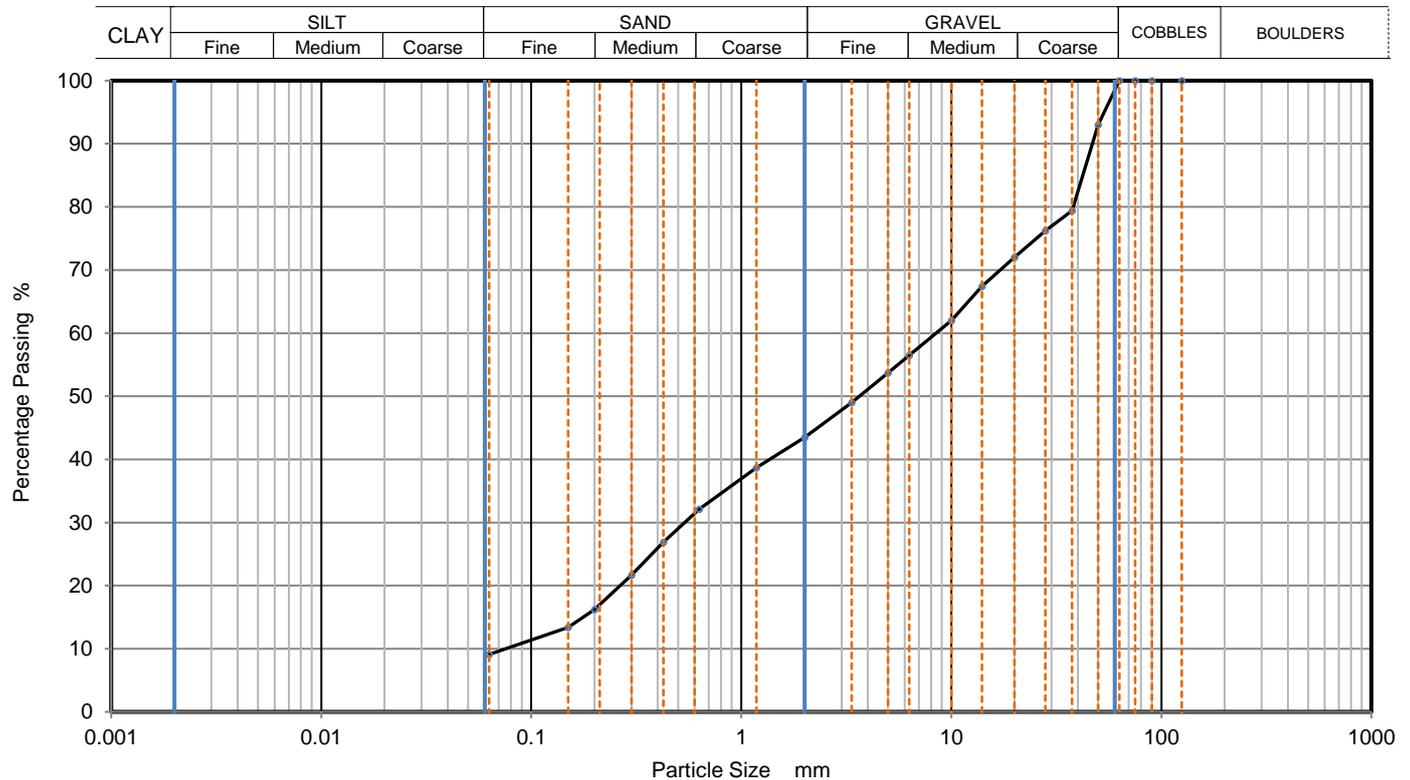
Remarks
Preparation and testing in accordance with BS1377 unless noted below
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement



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17025:2017

Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	17/01/2020	KL002R PSD

	<b>PARTICLE SIZE DISTRIBUTION</b>		<b>Project No.</b>	12134	
			<b>Borehole/Pit No.</b>	TP07	
<b>Project Name</b>	Carn Thomas		<b>Sample No.</b>	-	
<b>Soil Description</b>	Dark brown silty very sandy GRAVEL		<b>Depth, m</b>	0.20	
<b>Specimen Reference</b>	6	<b>Specimen Depth</b>	m	<b>Sample Type</b>	B
<b>Test Method</b>	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	93		
37.5	79		
28	76		
20	72		
14	67		
10	62		
6.3	57		
5	54		
3.35	49		
2	44		
1.18	39		
0.63	32		
0.425	27		
0.3	22		
0.2	16		
0.15	13		
0.063	9		

<b>Dry Mass of sample, g</b>	7712
------------------------------	------

Sample Proportions	% dry mass
Very coarse	0
Gravel	57
Sand	34
Fines <0.063mm	9

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	110
Curvature Coefficient	0.45

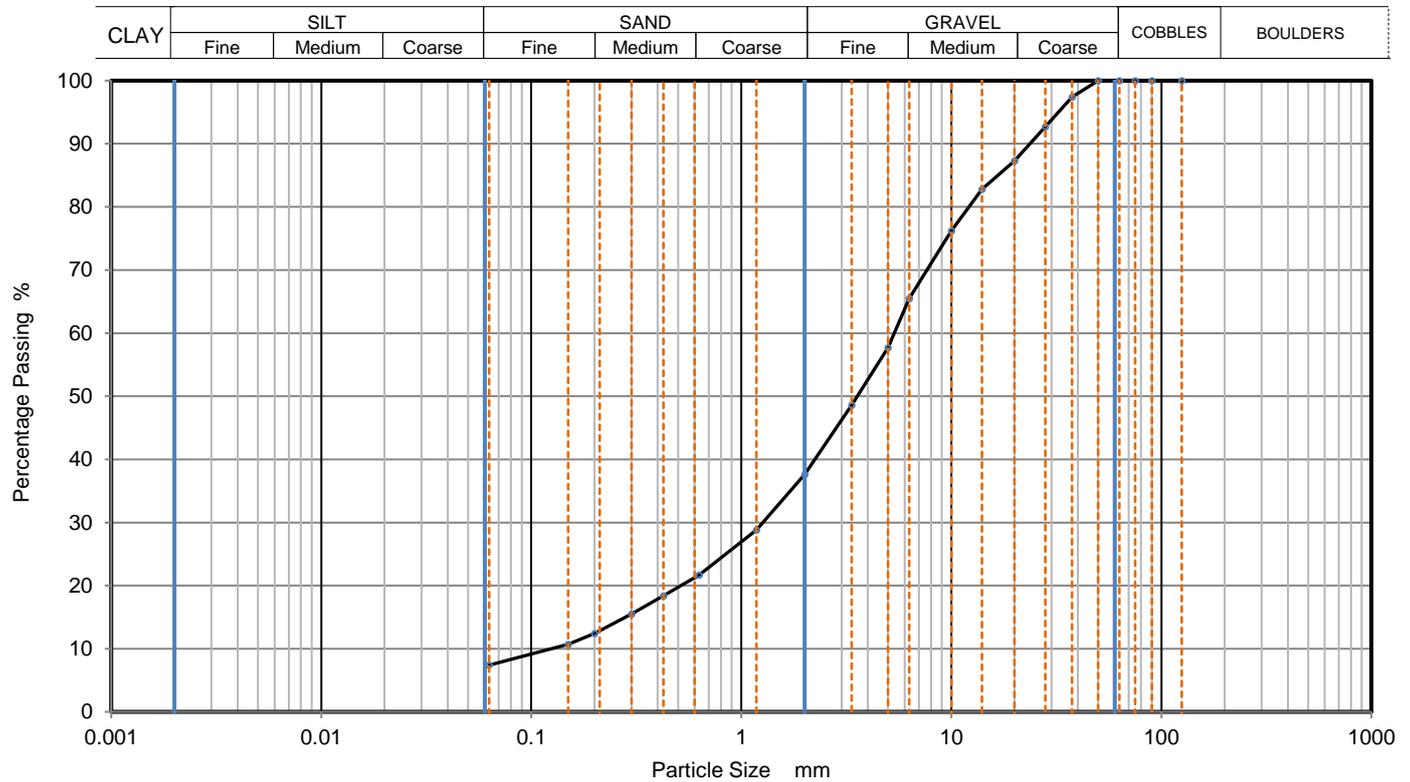
Remarks
Preparation and testing in accordance with BS1377 unless noted below
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement



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<b>Approved by</b>	<b>Date</b>	<b>Sheet ID:</b>
Matt Stokes - Senior Technician	17/01/2020	KL002R PSD

	<b>PARTICLE SIZE DISTRIBUTION</b>		<b>Project No.</b>	12134	
			<b>Borehole/Pit No.</b>	TP08	
<b>Project Name</b>	Carn Thomas		<b>Sample No.</b>	-	
<b>Soil Description</b>	Dark brown silty very sandy GRAVEL		<b>Depth, m</b>	0.10	
<b>Specimen Reference</b>	6	<b>Specimen Depth</b>	m	<b>Sample Type</b>	B
<b>Test Method</b>	BS1377:Part 2:1990, clause 9.2				



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
125	100		
90	100		
75	100		
63	100		
50	100		
37.5	97		
28	93		
20	87		
14	83		
10	76		
6.3	66		
5	58		
3.35	49		
2	38		
1.18	29		
0.63	22		
0.425	18		
0.3	16		
0.2	12		
0.15	11		
0.063	7		

<b>Dry Mass of sample, g</b>	9036
------------------------------	------

Sample Proportions	% dry mass
Very coarse	0
Gravel	62
Sand	30
Fines <0.063mm	7

Grading Analysis	
D100	mm
D60	mm
D30	mm
D10	mm
Uniformity Coefficient	43
Curvature Coefficient	2.4

Remarks
Preparation and testing in accordance with BS1377 unless noted below
Preparation and testing in accordance with BS1377: Part 1: 1990 CL7.3 & 7.4.5



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Approved by	Date	Sheet ID:
Matt Stokes - Senior Technician	17/01/2020	KL002R PSD



David Trowbridge  
South West Geotechnical Ltd  
Unit 3 Brooklands  
Howden Road  
Tiverton  
Devon  
EX16 5HW

**DETS Ltd**  
Unit 1  
Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Kent  
ME17 2JN  
t: 01622 850410

## **DETS Report No: 20-00079**

**Site Reference:** Carn Thomas

**Project / Job Ref:** 12134 - T5358A

**Order No:** None Supplied

**Sample Receipt Date:** 08/01/2020

**Sample Scheduled Date:** 08/01/2020

**Report Issue Number:** 1

**Reporting Date:** 13/01/2020

**Authorised by:**

Dave Ashworth  
Technical Manager

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**DETS Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
**Lenham Heath**  
**Maidstone**  
**Kent ME17 2JN**  
**Tel : 01622 850410**



<b>Soil Analysis Certificate</b>						
<b>DETS Report No: 20-00079</b>	<b>Date Sampled</b>	None Supplied				
<b>South West Geotechnical Ltd</b>	<b>Time Sampled</b>	None Supplied				
<b>Site Reference: Carn Thomas</b>	<b>TP / BH No</b>	TP01	TP03	TP04	TP05	TP06
<b>Project / Job Ref: 12134 - T5358A</b>	<b>Additional Refs</b>	None Supplied				
<b>Order No: None Supplied</b>	<b>Depth (m)</b>	GL - 0.40	GL - 0.35	0.50 - 0.80	0.40 - 0.75	0.60 - 0.90
<b>Reporting Date: 13/01/2020</b>	<b>DETS Sample No</b>	455081	455082	455083	455084	455085

<b>Determinand</b>	<b>Unit</b>	<b>RL</b>	<b>Accreditation</b>					
pH	pH Units	N/a	<b>MCERTS</b>	8.6	10.8	10.4	10.1	10.5
W/S Sulphate as SO <sub>4</sub> (2:1)	mg/l	< 10	<b>MCERTS</b>	196	377	241	165	233
W/S Sulphate as SO <sub>4</sub> (2:1)	g/l	< 0.01	<b>MCERTS</b>	0.20	0.38	0.24	0.16	0.23

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
 Subcontracted analysis (S)



**DETS Ltd**  
**Unit 1, Rose Lane Industrial Estate**  
**Rose Lane**  
**Lenham Heath**  
**Maidstone**  
**Kent ME17 2JN**  
**Tel : 01622 850410**



<b>Soil Analysis Certificate</b>					
<b>DETS Report No: 20-00079</b>	<b>Date Sampled</b>	None Supplied	None Supplied		
<b>South West Geotechnical Ltd</b>	<b>Time Sampled</b>	None Supplied	None Supplied		
<b>Site Reference: Carn Thomas</b>	<b>TP / BH No</b>	TP07	TP08		
<b>Project / Job Ref: 12134 - T5358A</b>	<b>Additional Refs</b>	None Supplied	None Supplied		
<b>Order No: None Supplied</b>	<b>Depth (m)</b>	0.20 - 0.30	0.10 - 0.40		
<b>Reporting Date: 13/01/2020</b>	<b>DETS Sample No</b>	455086	455087		

<b>Determinand</b>	<b>Unit</b>	<b>RL</b>	<b>Accreditation</b>				
pH	pH Units	N/a	<b>MCERTS</b>	9.9	8.5		
W/S Sulphate as SO <sub>4</sub> (2:1)	mg/l	< 10	<b>MCERTS</b>	212	42		
W/S Sulphate as SO <sub>4</sub> (2:1)	g/l	< 0.01	<b>MCERTS</b>	0.21	0.04		

Analytical results are expressed on a dry weight basis where samples are assisted-dried at less than 30°C  
 Subcontracted analysis (S)



DETS Ltd  
Unit 1, Rose Lane Industrial Estate  
Rose Lane  
Lenham Heath  
Maidstone  
Kent ME17 2JN  
Tel : 01622 850410



**Soil Analysis Certificate - Sample Descriptions**

DETS Report No: 20-00079	
South West Geotechnical Ltd	
Site Reference: Carn Thomas	
Project / Job Ref: 12134 - T5358A	
Order No: None Supplied	
Reporting Date: 13/01/2020	

DETS Sample No	TP / BH No	Additional Refs	Depth (m)	Moisture Content (%)	Sample Matrix Description
^ 455081	TP01	None Supplied	GL - 0.40	13.5	Brown loamy sand with stones and vegetation
^ 455082	TP03	None Supplied	GL - 0.35	13.3	Brown sandy gravel with stones and concrete
^ 455083	TP04	None Supplied	0.50 - 0.80	13	Brown sandy clay with stones
^ 455084	TP05	None Supplied	0.40 - 0.75	10.4	Brown sandy clay with stones
^ 455085	TP06	None Supplied	0.60 - 0.90	12	Brown sandy gravel with stones and concrete
^ 455086	TP07	None Supplied	0.20 - 0.30	15.7	Brown sandy gravel with stones
^ 455087	TP08	None Supplied	0.10 - 0.40	11.7	Brown sandy gravel with stones and oil / petroleum

Moisture content is part of procedure E003 & is not an accredited test

Insufficient Sample <sup>1/5</sup>

Unsuitable Sample <sup>1/5</sup>

^ no sampling date provided; unable to confirm if samples are within acceptable holding times

**Soil Analysis Certificate - Methodology & Miscellaneous Information**

**DETS Report No: 20-00079**

**South West Geotechnical Ltd**

**Site Reference: Carn Thomas**

**Project / Job Ref: 12134 - T5358A**

**Order No: None Supplied**

**Reporting Date: 13/01/2020**

Matrix	Analysed On	Determinand	Brief Method Description	Method No
Soil	D	Boron - Water Soluble	Determination of water soluble boron in soil by 2:1 hot water extract followed by ICP-OES	E012
Soil	AR	BTEX	Determination of BTEX by headspace GC-MS	E001
Soil	D	Cations	Determination of cations in soil by aqua-regia digestion followed by ICP-OES	E002
Soil	D	Chloride - Water Soluble (2:1)	Determination of chloride by extraction with water & analysed by ion chromatography	E009
Soil	AR	Chromium - Hexavalent	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphénylcarbazine followed by colorimetry	E016
Soil	AR	Cyanide - Complex	Determination of complex cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Free	Determination of free cyanide by distillation followed by colorimetry	E015
Soil	AR	Cyanide - Total	Determination of total cyanide by distillation followed by colorimetry	E015
Soil	D	Cyclohexane Extractable Matter (CEM)	Gravimetrically determined through extraction with cyclohexane	E011
Soil	AR	Diesel Range Organics (C10 - C24)	Determination of hexane/acetone extractable hydrocarbons by GC-FID	E004
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of saturated calcium sulphate followed by electrometric measurement	E022
Soil	AR	Electrical Conductivity	Determination of electrical conductivity by addition of water followed by electrometric measurement	E023
Soil	D	Elemental Sulphur	Determination of elemental sulphur by solvent extraction followed by GC-MS	E020
Soil	AR	EPH (C10 - C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH Product ID	Determination of acetone/hexane extractable hydrocarbons by GC-FID	E004
Soil	AR	EPH TEXAS (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C40)	Determination of acetone/hexane extractable hydrocarbons by GC-FID for C8 to C40. C6 to C8 by headspace GC-MS	E004
Soil	D	Fluoride - Water Soluble	Determination of Fluoride by extraction with water & analysed by ion chromatography	E009
Soil	D	FOC (Fraction Organic Carbon)	Determination of fraction of organic carbon by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	D	Loss on Ignition @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace	E019
Soil	D	Magnesium - Water Soluble	Determination of water soluble magnesium by extraction with water followed by ICP-OES	E025
Soil	D	Metals	Determination of metals by aqua-regia digestion followed by ICP-OES	E002
Soil	AR	Mineral Oil (C10 - C40)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge	E004
Soil	AR	Moisture Content	Moisture content; determined gravimetrically	E003
Soil	D	Nitrate - Water Soluble (2:1)	Determination of nitrate by extraction with water & analysed by ion chromatography	E009
Soil	D	Organic Matter	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	PAH - Speciated (EPA 16)	Determination of PAH compounds by extraction in acetone and hexane followed by GC-MS with the use of surrogate and internal standards	E005
Soil	AR	PCB - 7 Congeners	Determination of PCB by extraction with acetone and hexane followed by GC-MS	E008
Soil	D	Petroleum Ether Extract (PEE)	Gravimetrically determined through extraction with petroleum ether	E011
Soil	AR	pH	Determination of pH by addition of water followed by electrometric measurement	E007
Soil	AR	Phenols - Total (monohydric)	Determination of phenols by distillation followed by colorimetry	E021
Soil	D	Phosphate - Water Soluble (2:1)	Determination of phosphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Total	Determination of total sulphate by extraction with 10% HCl followed by ICP-OES	E013
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of sulphate by extraction with water & analysed by ion chromatography	E009
Soil	D	Sulphate (as SO4) - Water Soluble (2:1)	Determination of water soluble sulphate by extraction with water followed by ICP-OES	E014
Soil	AR	Sulphide	Determination of sulphide by distillation followed by colorimetry	E018
Soil	D	Sulphur - Total	Determination of total sulphur by extraction with aqua-regia followed by ICP-OES	E024
Soil	AR	SVOC	Determination of semi-volatile organic compounds by extraction in acetone and hexane followed by GC-MS	E006
Soil	AR	Thiocyanate (as SCN)	Determination of thiocyanate by extraction in caustic soda followed by acidification followed by addition of ferric nitrate followed by colorimetry	E017
Soil	D	Toluene Extractable Matter (TEM)	Gravimetrically determined through extraction with toluene	E011
Soil	D	Total Organic Carbon (TOC)	Determination of organic matter by oxidising with potassium dichromate followed by titration with iron (II) sulphate	E010
Soil	AR	TPH CWG (ali: C5- C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C34, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C35. C5 to C8 by headspace GC-MS	E004
Soil	AR	TPH LQM (ali: C5-C6, C6-C8, C8-C10, C10-C12, C12-C16, C16-C35, C35-C44, aro: C5-C7, C7-C8, C8-C10, C10-C12, C12-C16, C16-C21, C21-C35, C35-C44)	Determination of hexane/acetone extractable hydrocarbons by GC-FID fractionating with SPE cartridge for C8 to C44. C5 to C8 by headspace GC-MS	E004
Soil	AR	VOCS	Determination of volatile organic compounds by headspace GC-MS	E001
Soil	AR	VPH (C6-C8 & C8-C10)	Determination of hydrocarbons C6-C8 by headspace GC-MS & C8-C10 by GC-FID	E001

**D Dried**  
**AR As Received**



## Sample Restriction Notification

South West Geotechnical Ltd  
 Unit 3 Brooklands,  
 Howden Road,  
 Tiverton,  
 Devon EX16 5HW

<b>Job</b>	Carn Thomas			<b>Job No.</b>	12134	
<b>Client</b>	Wheal Jane			<b>Client Job No.</b>		
<b>BH/TP/WS</b>	<b>Sample</b>	<b>Sample</b>	<b>Test Affected</b>	<b>Reason for Restriction</b>	<b>Technicians Comments</b>	<b>Client Response</b>
TP01	0.00-0.40	B	Atterberg Limits	Insufficient Material		Combine with TP03
			PSD	Insufficient Material		
			Specific Gravity	Insufficient Material		
			OMC/MDD	Insufficient Material	Material too coarse for standard method	
TP03	0.00-0.40	B	Atterberg Limits	Insufficient Material		Combine with TP01
			PSD	Insufficient Material		
			Specific Gravity	Insufficient Material		
			OMC/MDD	Insufficient Material	Material too coarse for standard method	
TP05	0.40-0.75	B	Atterberg Limits	Insufficient Material		Combine with TP06
			PSD	Insufficient Material		
			Specific Gravity	Insufficient Material		
			OMC/MDD	Insufficient Material	Material too coarse for standard method	
TP06	0.60-0.90	B	Atterberg Limits	Insufficient Material		Combine with TP05
			PSD	Insufficient Material		
			Specific Gravity	Insufficient Material		
			OMC/MDD	Insufficient Material	Material too coarse for standard method	
<b>Restriction Identification No.</b>				<b>Date of Issue</b>		24/01/2020
<b>Restriction Raised by (initials):</b>		AB		<b>Checked/Sent by (initials):</b>		DT 24/01/20



## **APPENDIX D**

### Chemical Laboratory Results



**Bryony Halliday**  
Wheal Jane Services  
Old Mine Offices  
Wheal Jane  
Baldhu  
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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 : 19-78000**

<b>Project / Site name:</b>	Carn Thomas	<b>Samples received on:</b>	16/12/2019
<b>Your job number:</b>	19937A	<b>Samples instructed on:</b>	17/12/2019
<b>Your order number:</b>	19937A	<b>Analysis completed by:</b>	02/01/2020
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	02/01/2020
<b>Samples Analysed:</b>	9 soil samples		

**Signed:** *A. Czerwińska*

Agnieszka Czerwińska

Technical Reviewer (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.

Iss No 19-78000-1 Carn Thomas 19937A

This certificate should not be reproduced, except in full, without the express permission of the laboratory.

The results included within the report are representative of the samples submitted for analysis.

Page 1 of 7

Analytical Report Number: 19-78000

Project / Site name: Carn Thomas

Your Order No: 19937A

Lab Sample Number				1395123	1395124	1395125	1395126	1395127
Sample Reference				TP01	TP02	TP02	TP03	TP04
Sample Number				None Supplied				
Depth (m)				0.20	0.10	0.30	0.40	0.90
Date Sampled				10/12/2019	10/12/2019	10/12/2019	10/12/2019	10/12/2019
Time Taken				None Supplied				
Analytical Parameter (Soil Analysis)	Units	Limit of detection	Accreditation Status					
Stone Content	%	0.1	NONE	40	22	< 0.1	59	< 0.1
Moisture Content	%	N/A	NONE	8.7	7.2	9.0	8.0	9.5
Total mass of sample received	kg	0.001	NONE	1.4	1.2	1.2	1.2	1.3

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected	Not-detected

#### General Inorganics

	pH Units	N/A	MCERTS	12.2	11.1	10.8	8.5	9.8
pH - Automated								
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1	< 1
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0	< 5.0
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	4100	3500	2800	640	2000
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	24	730	900	360	690
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.012	0.36	0.45	0.18	0.34
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	11.8	364	448	179	343
Sulphide	mg/kg	1	MCERTS	< 1.0	1.0	< 1.0	< 1.0	< 1.0
Organic Matter	%	0.1	MCERTS	1.4	0.6	1.2	1.5	0.5

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0

#### Speciated PAHs

	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.29
Pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	0.23
Benzo(a)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Chrysene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	< 0.80	< 0.80	< 0.80	< 0.80	< 0.80

#### Heavy Metals / Metalloids

	mg/kg	1	MCERTS	7.2	17	13	12	13
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	7.2	17	13	12	13
Boron (water soluble)	mg/kg	0.2	MCERTS	0.5	1.9	2.5	0.5	0.7
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	< 0.2	< 0.2	0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	13	7.8	8.9	7.4	10
Copper (aqua regia extractable)	mg/kg	1	MCERTS	19	21	21	19	37
Lead (aqua regia extractable)	mg/kg	1	MCERTS	17	120	37	54	37
Mercury (aqua regia extractable)	mg/kg	0.3	MCERTS	< 0.3	< 0.3	< 0.3	< 0.3	< 0.3
Nickel (aqua regia extractable)	mg/kg	1	MCERTS	9.2	6.3	6.4	5.2	5.9
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	32	39	67	240	65

#### Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	71	< 10	43	< 10	130

Analytical Report Number: 19-78000

Project / Site name: Carn Thomas

Your Order No: 19937A

Lab Sample Number	1395128			1395129			1395130			1395131		
Sample Reference	TP05			TP06			TP07			TP08		
Sample Number	None Supplied			None Supplied			None Supplied			None Supplied		
Depth (m)	0.50			0.70			0.25			0.20		
Date Sampled	10/12/2019			10/12/2019			10/12/2019			10/12/2019		
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	< 0.1	< 0.1	< 0.1	< 0.1	
Moisture Content	%	N/A	NONE	11	12	11	9.2					
Total mass of sample received	kg	0.001	NONE	1.6	1.2	1.2	1.5					

Asbestos in Soil	Type	N/A	ISO 17025	Not-detected	Not-detected	Not-detected	Not-detected

#### General Inorganics

Parameter	Units	N/A	MCERTS	9.6	10.0	10.3	8.8
pH - Automated	pH Units	N/A	MCERTS	9.6	10.0	10.3	8.8
Total Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Free Cyanide	mg/kg	1	MCERTS	< 1	< 1	< 1	< 1
Thiocyanate as SCN	mg/kg	5	NONE	< 5.0	< 5.0	< 5.0	< 5.0
Total Sulphate as SO <sub>4</sub>	mg/kg	50	MCERTS	3300	4200	3300	660
Water Soluble Sulphate as SO <sub>4</sub> 16hr extraction (2:1)	mg/kg	2.5	MCERTS	1100	950	920	110
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	g/l	0.00125	MCERTS	0.53	0.48	0.46	0.056
Water Soluble SO <sub>4</sub> 16hr extraction (2:1 Leachate Equivalent)	mg/l	1.25	MCERTS	530	476	461	55.9
Sulphide	mg/kg	1	MCERTS	< 1.0	1.4	1.0	2.2
Organic Matter	%	0.1	MCERTS	0.9	0.9	1.7	2.4

#### Total Phenols

Total Phenols (monohydric)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0

#### Speciated PAHs

Parameter	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Naphthalene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthylene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Acenaphthene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Fluorene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Phenanthrene	mg/kg	0.05	MCERTS	0.57	< 0.05	0.29	< 0.05
Anthracene	mg/kg	0.05	MCERTS	0.20	< 0.05	< 0.05	< 0.05
Fluoranthene	mg/kg	0.05	MCERTS	2.2	< 0.05	0.54	< 0.05
Pyrene	mg/kg	0.05	MCERTS	1.9	< 0.05	0.46	< 0.05
Benzo(a)anthracene	mg/kg	0.05	MCERTS	1.2	< 0.05	0.27	< 0.05
Chrysene	mg/kg	0.05	MCERTS	1.3	< 0.05	0.31	< 0.05
Benzo(b)fluoranthene	mg/kg	0.05	MCERTS	1.1	< 0.05	0.29	< 0.05
Benzo(k)fluoranthene	mg/kg	0.05	MCERTS	0.68	< 0.05	0.18	< 0.05
Benzo(a)pyrene	mg/kg	0.05	MCERTS	1.0	< 0.05	0.24	< 0.05
Indeno(1,2,3-cd)pyrene	mg/kg	0.05	MCERTS	0.43	< 0.05	< 0.05	< 0.05
Dibenz(a,h)anthracene	mg/kg	0.05	MCERTS	< 0.05	< 0.05	< 0.05	< 0.05
Benzo(ghi)perylene	mg/kg	0.05	MCERTS	0.51	< 0.05	< 0.05	< 0.05

#### Total PAH

Speciated Total EPA-16 PAHs	mg/kg	0.8	MCERTS	11.1	< 0.80	2.58	< 0.80

#### Heavy Metals / Metalloids

Parameter	mg/kg	1	MCERTS	26	19	11	11
Arsenic (aqua regia extractable)	mg/kg	1	MCERTS	26	19	11	11
Boron (water soluble)	mg/kg	0.2	MCERTS	0.4	2.2	1.7	0.8
Cadmium (aqua regia extractable)	mg/kg	0.2	MCERTS	< 0.2	0.2	< 0.2	< 0.2
Chromium (hexavalent)	mg/kg	4	MCERTS	< 4.0	< 4.0	< 4.0	< 4.0
Chromium (aqua regia extractable)	mg/kg	1	MCERTS	15	14	9.3	13
Copper (aqua regia extractable)	mg/kg	1	MCERTS	26	34	17	8.1
Lead (aqua regia extractable)	mg/kg	1	MCERTS	79	87	50	25
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	11	8.9	5.2	6.4
Selenium (aqua regia extractable)	mg/kg	1	MCERTS	< 1.0	< 1.0	< 1.0	< 1.0
Zinc (aqua regia extractable)	mg/kg	1	MCERTS	78	56	53	53

#### Petroleum Hydrocarbons

TPH C10 - C40	mg/kg	10	MCERTS	150	95	32	< 10



**Analytical Report Number : 19-78000**

**Project / Site name: Carn Thomas**

\* 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 *
1395123	TP01	None Supplied	0.20	Brown loam and sand with stones and vegetation.
1395124	TP02	None Supplied	0.10	Brown loam and sand with stones and vegetation.
1395125	TP02	None Supplied	0.30	Brown loam and sand with gravel and vegetation.
1395126	TP03	None Supplied	0.40	Brown loam and sand with stones and gravel
1395127	TP04	None Supplied	0.90	Brown clay and sand with gravel.
1395128	TP05	None Supplied	0.50	Brown clay and sand with gravel.
1395129	TP06	None Supplied	0.70	Brown clay and sand with rubble and gravel
1395130	TP07	None Supplied	0.25	Brown loam and sand with gravel and rubble.
1395131	TP08	None Supplied	0.20	Brown loam and sand with gravel.

**Analytical Report Number : 19-78000**

**Project / Site name: Carn Thomas**

**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
Asbestos identification in soil	Asbestos Identification with the use of polarised light microscopy in conjunction with disperion staining techniques.	In house method based on HSG 248	A001-PL	D	ISO 17025
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
Free cyanide in soil	Determination of free cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Hexavalent chromium in soil	Determination of hexavalent chromium in soil by extraction in water then by acidification, addition of 1,5 diphenylcarbazine followed by colorimetry.	In-house method	L080-PL	W	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 based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols in soil	Determination of phenols in soil by extraction with sodium hydroxide followed by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (skalar)	L080-PL	W	MCERTS
Organic matter (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	BS1377 Part 3, 1990, Chemical and Electrochemical Tests""	L009-PL	D	MCERTS
pH in soil (automated)	Determination of pH in soil by addition of water followed by automated electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L099-PL	D	MCERTS
Speciated EPA-16 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270	L064-PL	D	MCERTS
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
Sulphate, water soluble, in soil (16hr extraction)	Determination of water soluble sulphate by ICP-OES. Results reported directly (leachate equivalent) and corrected for extraction ratio (soil equivalent).	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests, 2:1 water:soil extraction, analysis by ICP-OES.	L038-PL	D	MCERTS
Sulphide in soil	Determination of sulphide in soil by acidification and heating to liberate hydrogen sulphide, trapped in an alkaline solution then assayed by ion selective electrode.	In-house method	L010-PL	D	MCERTS
Thiocyanate in soil	Determination of thiocyanate in soil by extraction in water followed by acidification followed by addition of ferric nitrate followed by discrete analyser (spectrophotometer).	In-house method	L082-PL	D	NONE
Total cyanide in soil	Determination of total cyanide by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton (Skalar)	L080-PL	W	MCERTS
Total sulphate (as SO4 in soil)	Determination of total sulphate in soil by extraction with 10% HCl followed by ICP-OES.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L038-PL	D	MCERTS
TPH Banding in Soil by FID	Determination of hexane extractable hydrocarbons in soil by GC-FID.	In-house method, TPH with carbon banding and silica gel split/cleanup.	L076-PL	W	MCERTS

Iss No 19-78000-1 Carn Thomas 19937A

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The results included within the report are representative of the samples submitted for analysis.

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**Analytical Report Number : 19-78000**

**Project / Site name: Carn Thomas**

**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
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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.

Sample Deviation Report



Sample ID	Other ID	Sample Type	Job	Sample Number	Sample Deviation Code	test_name	test_ref	Test Deviation code
TP01		S	19-78000	1395123	c	Free cyanide in soil	L080-PL	c
TP01		S	19-78000	1395123	c	Total cyanide in soil	L080-PL	c
TP02		S	19-78000	1395124	c	Free cyanide in soil	L080-PL	c
TP02		S	19-78000	1395124	c	Total cyanide in soil	L080-PL	c
TP02		S	19-78000	1395125	c	Free cyanide in soil	L080-PL	c
TP02		S	19-78000	1395125	c	Total cyanide in soil	L080-PL	c
TP03		S	19-78000	1395126	c	Free cyanide in soil	L080-PL	c
TP03		S	19-78000	1395126	c	Total cyanide in soil	L080-PL	c
TP04		S	19-78000	1395127	c	Free cyanide in soil	L080-PL	c
TP04		S	19-78000	1395127	c	Total cyanide in soil	L080-PL	c
TP05		S	19-78000	1395128	c	Free cyanide in soil	L080-PL	c
TP05		S	19-78000	1395128	c	Total cyanide in soil	L080-PL	c
TP06		S	19-78000	1395129	c	Free cyanide in soil	L080-PL	c
TP06		S	19-78000	1395129	c	Total cyanide in soil	L080-PL	c
TP07		S	19-78000	1395130	c	Free cyanide in soil	L080-PL	c
TP07		S	19-78000	1395130	c	Total cyanide in soil	L080-PL	c
TP08		S	19-78000	1395131	c	Free cyanide in soil	L080-PL	c
TP08		S	19-78000	1395131	c	Total cyanide in soil	L080-PL	c



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## **Analytical Report Number : 19-78001**

<b>Project / Site name:</b>	Carn Thomas	<b>Samples received on:</b>	16/12/2019
<b>Your job number:</b>	19937A	<b>Samples instructed on:</b>	17/12/2019
<b>Your order number:</b>	19937A	<b>Analysis completed by:</b>	31/12/2019
<b>Report Issue Number:</b>	1	<b>Report issued on:</b>	31/12/2019
<b>Samples Analysed:</b>	2 10:1 WAC samples		

**Signed:** 

Katarzyna Lewicka  
Head of Reporting Section

**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

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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.

## i2 Analytical

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Waste Acceptance Criteria Analytical Results							
Report No:	19-78001						
				Client: <b>WHEAL</b>			
Location	Carn Thomas						
Lab Reference (Sample Number)	1395134 / 1395135			Landfill Waste Acceptance Criteria			
Sampling Date	10/12/2019			Limits			
Sample ID	TP01			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Depth (m)	0.45						
<b>Solid Waste Analysis</b>							
TOC (%)**	1.3			3%	5%	6%	
Loss on Ignition (%) **	3.5			--	--	10%	
BTEX (µg/kg) **	< 10			6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007			1	--	--	
Mineral Oil (mg/kg)	< 10			500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.9			100	--	--	
pH (units)**	8.2			--	>6	--	
Acid Neutralisation Capacity (mol / kg)	11			--	To be evaluated	To be evaluated	
<b>Eluate Analysis</b>							
	10:1		10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0084		0.0722	0.5	2	25	
Barium *	0.0065		0.0560	20	100	300	
Cadmium *	< 0.0001		< 0.0008	0.04	1	5	
Chromium *	0.0035		0.030	0.5	10	70	
Copper *	0.0050		0.043	2	50	100	
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2	
Molybdenum *	< 0.0004		< 0.0040	0.5	10	30	
Nickel *	< 0.0003		< 0.0030	0.4	10	40	
Lead *	0.0023		0.020	0.5	10	50	
Antimony *	< 0.0017		< 0.017	0.06	0.7	5	
Selenium *	< 0.0040		< 0.040	0.1	0.5	7	
Zinc *	0.0036		0.031	4	50	200	
Chloride *	2.6		22	800	4000	25000	
Fluoride	0.36		3.1	10	150	500	
Sulphate *	17		140	1000	20000	50000	
TDS*	98		840	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-	
DOC	15.2		131	500	800	1000	
<b>Leach Test Information</b>							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.0						
Dry Matter (%)	90						
Moisture (%)	10						
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)							
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited							

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.  
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.

## i2 Analytical

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Telephone: 01923 225404  
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Waste Acceptance Criteria Analytical Results							
Report No:	19-78001						
				Client: <b>WHEAL</b>			
Location	Carn Thomas						
Lab Reference (Sample Number)	1395136 / 1395137			Landfill Waste Acceptance Criteria			
Sampling Date	10/12/2019			Limits			
Sample ID	TP02			Inert Waste Landfill	Stable Non-reactive HAZARDOUS waste in non-hazardous Landfill	Hazardous Waste Landfill	
Depth (m)	0.30						
<b>Solid Waste Analysis</b>							
TOC (%)**	0.6			3%	5%	6%	
Loss on Ignition (%) **	2.6			--	--	10%	
BTEX (µg/kg) **	< 10			6000	--	--	
Sum of PCBs (mg/kg) **	< 0.007			1	--	--	
Mineral Oil (mg/kg)	< 10			500	--	--	
Total PAH (WAC-17) (mg/kg)	< 0.9			100	--	--	
pH (units)**	9.5			--	>6	--	
Acid Neutralisation Capacity (mol / kg)	18			--	To be evaluated	To be evaluated	
<b>Eluate Analysis</b>							
	10:1		10:1	Limit values for compliance leaching test			
(BS EN 12457 - 2 preparation utilising end over end leaching procedure)	mg/l		mg/kg	using BS EN 12457-2 at L/S 10 l/kg (mg/kg)			
Arsenic *	0.0043		0.0376	0.5	2	25	
Barium *	0.0102		0.0902	20	100	300	
Cadmium *	< 0.0001		< 0.0008	0.04	1	5	
Chromium *	0.0042		0.037	0.5	10	70	
Copper *	0.016		0.14	2	50	100	
Mercury *	< 0.0005		< 0.0050	0.01	0.2	2	
Molybdenum *	< 0.0004		< 0.0040	0.5	10	30	
Nickel *	0.0003		0.0031	0.4	10	40	
Lead *	0.0033		0.029	0.5	10	50	
Antimony *	< 0.0017		< 0.017	0.06	0.7	5	
Selenium *	< 0.0040		< 0.040	0.1	0.5	7	
Zinc *	0.0098		0.086	4	50	200	
Chloride *	2.6		23	800	4000	25000	
Fluoride	0.13		1.1	10	150	500	
Sulphate *	62		550	1000	20000	50000	
TDS*	200		1700	4000	60000	100000	
Phenol Index (Monohydric Phenols) *	< 0.010		< 0.10	1	-	-	
DOC	13.4		118	500	800	1000	
<b>Leach Test Information</b>							
Stone Content (%)	< 0.1						
Sample Mass (kg)	1.2						
Dry Matter (%)	91						
Moisture (%)	9.0						
Results are expressed on a dry weight basis, after correction for moisture content where applicable. *= UKAS accredited (liquid eluate analysis only)							
Stated limits are for guidance only and i2 cannot be held responsible for any discrepancies with current legislation ** = MCERTS accredited							

Landfill WAC analysis (specifically leaching test results) must not be used for hazardous waste classification purposes as defined by the Waste (England and Wales) Regulations 2011 (as amended) and EA Guidance WM3.  
This analysis is only applicable for landfill acceptance criteria (The Environmental Permitting (England and Wales) Regulations) and does not give any indication as to whether a waste may be hazardous or non-hazardous.



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**Analytical Report Number : 19-78001**

**Project / Site name: Carn Thomas**

\* 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 *
1395134	TP01	None Supplied	0.45	Brown clay and sand with gravel and vegetation.
1395136	TP02	None Supplied	0.30	Brown loam and sand with gravel and vegetation.

**Analytical Report Number : 19-78001**

**Project / Site name: Carn Thomas**

**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
Acid neutralisation capacity of soil	Determination of acid neutralisation capacity by addition of acid or alkali followed by electronic probe.	In-house method based on Guidance on Sampling and Testing of Wastes to Meet Landfill Waste Acceptance""	L046-PL	W	NONE
BS EN 12457-2 (10:1) Leachate Prep	10:1 (as received, moisture adjusted) end over end extraction with water for 24 hours. Eluate filtered prior to analysis.	In-house method based on BSEN12457-2.	L043-PL	W	NONE
BTEX in soil (Monoaromatics)	Determination of BTEX in soil by headspace GC-MS.	In-house method based on USEPA8260	L0738-PL	W	MCERTS
Chloride 10:1 WAC	Determination of Chloride colorimetrically by discrete analyser.	In house based on MEWAM Method ISBN 0117516260.	L082-PL	W	ISO 17025
Dissolved organic carbon 10:1 WAC	Determination of dissolved inorganic carbon in leachate by TOC/DOC NDIR Analyser.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L037-PL	W	NONE
Fluoride 10:1 WAC	Determination of fluoride in leachate by 1:1ratio with a buffer solution followed by Ion Selective Electrode.	In-house method based on Use of Total Ionic Strength Adjustment Buffer for Electrode Determination"	L0338-PL	W	ISO 17025
Loss on ignition of soil @ 450oC	Determination of loss on ignition in soil by gravimetrically with the sample being ignited in a muffle furnace.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L047-PL	D	MCERTS
Metals in leachate by ICP-OES	Determination of metals in leachate by acidification followed by ICP-OES.	In-house method based on MEWAM 2006 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Mineral Oil (Soil) C10 - C40	Determination of mineral oil fraction extractable hydrocarbons in soil by GC-MS/GC-FID.	In-house method with silica gel split/clean up.	L076-PL	D	NONE
Moisture Content	Moisture content, determined gravimetrically. (30 oC)	In-house method based on BS1377 Part 2, 1990, Classification tests	L019-UK/PL	W	NONE
Monohydric phenols 10:1 WAC	Determination of phenols in leachate by distillation followed by colorimetry.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L080-PL	W	ISO 17025
PCB's By GC-MS in soil	Determination of PCB by extraction with acetone and hexane followed by GC-MS.	In-house method based on USEPA 8082	L027-PL	D	MCERTS
pH in soil	Determination of pH in soil by addition of water followed by electrometric measurement.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests	L005-PL	W	MCERTS
Speciated WAC-17 PAHs in soil	Determination of PAH compounds in soil by extraction in dichloromethane and hexane followed by GC-MS with the use of surrogate and internal standards.	In-house method based on USEPA 8270. MCERTS accredited except Coronene.	L064-PL	D	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
Sulphate 10:1 WAC	Determination of sulphate in leachate by ICP-OES	In-house method based on MEWAM 1986 Methods for the Determination of Metals in Soil""	L039-PL	W	ISO 17025
Total dissolved solids 10:1 WAC	Determination of total dissolved solids in water by electrometric measurement.	In-house method based on Examination of Water and Wastewater 20th Edition: Clesceri, Greenberg & Eaton	L004-PL	W	NONE



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**Analytical Report Number : 19-78001**

**Project / Site name: Carn Thomas**

**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
Total organic carbon (Automated) in soil	Determination of organic matter in soil by oxidising with potassium dichromate followed by titration with iron (II) sulphate.	In-house method based on BS1377 Part 3, 1990, Chemical and Electrochemical Tests <sup>™</sup>	L009-PL	D	MCERTS

**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.**

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