Appendix D. Geotechnical Investigation

- S119805/GEO – Wheal Jane Ground Investigation Report.
- MS37210 – Wheal Jane Archival Mining Search.
- 0319-1040-001–UtilityDetectionSurvey

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

Archival (Desktop) Mining Search

Mining Risk: Low

Further Action: None

Address: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Client: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Your Ref.:

Our Ref.: MS37210

Date: 18 June 2019

Tel:
01872 562008

E-mail (mine search):

dalef@ wheal-jane.co.uk

www.wheal-jane-consultancy.co.uk

Mine Searches

Site Investigations

Environmental Surveys

Mundic Analysis

Soil and Water Analysis

Mineralogical Surveys

Full Professional Indemnity Insurance

ISO9001 Registered Firm

Registered Office
WJE Ltd
Old Mine Offices
Wheal Jane
Baldhu,Truro
Cornwall, TR3 6EE
UK

Registered in England
Number 03676442
VAT number
760 4129 48

Dear Sirs,

Re: Trewirgie Junior School, Falmouth Road, Redruth, Cornwall, TR15 2QN

We thank you for your recent request.

As instructed, we have carried out a mining search in respect of the above property, as delineated on the plan supplied for the purpose of requesting this search (a copy of which is included with this report).

The purpose of this mine search is to examine and interpret the plans and records in our possession relating to metalliferous mining activity and based upon this information, give a professional opinion in respect of potential risk to the property from such historical mining activity and, if required, make recommendations as may be deemed appropriate.

Where other workings relating to clay, stone or other minerals are noted to be in close proximity to the property mention will be made of them.

This report is of a format suitable for conveyancing purposes.

Mining Activity

The property is located in a district which has seen extensive historical mining activity.

It is sited at the eastern end of the lease or sett of the abandoned East Carn Brea Mine, which worked for tin and copper ores.

The plans and records that are currently held in our possession, relating to this district, do not indicate the presence of any old shallow/surface mine workings or shafts within the boundaries of the property.

We have found no evidence of clay workings or other mineral workings in the immediate vicinity of the property.

An old mine shaft and adit (drainage tunnel) are indicated to lie some 130 metres to the north-east of the property.

A possible shaft is indicated to lie some 100 metres to the north-north-east of the property.

A lode (mineralised structure) underlies the property at a depth indicated to be almost 200 metres below sea level.

This lode was worked by East Carn Brea Mine, with workings on its shallower zone lying over 50 metres to the south of the property.

Conclusions & Recommendations

We know of no plans to exploit metallic minerals in the locality, nor do we consider this a likely event.

Based upon the information that is held in our possession, at the time of writing this report, we have found no evidence to indicate the presence of old shallow/surface mine workings underlying the property.

We would consider that the property appears to be at a lower level of risk from being affected by past mining activity.

Scope of Search & Limitations

This search has been carried out with reference to the extensive collection of plans, records and archives that are held in our possession at the time of writing this report and from this material we have endeavoured to give as accurate a report as possible in respect of the property as delineated in the initial request.

However, taking into account that such records may not be wholly complete or accurate, that records may exist of which we do not hold copies, or records exist that are held in private sources which are not available to us and that in Cornwall, Devon and Somerset many ancient shallow workings and shafts exist of which there are no records, we cannot accept liability for any inaccuracies there may be.

This report is concerned solely with the property searched and should not be used in connection with adjacent properties as only relevant mining features have been mentioned and any known features that would not have a direct influence upon the target property may have been omitted for clarity.

The report is based upon the property boundaries as shown on the supplied request plan.

We cannot accept liability for any inaccuracies if the property boundaries, as supplied to us by the client or the client's agent, are subsequently shown to be incorrect, incomplete or if no such request plan has been supplied when the search has been requested.

This report is confidential to the client and the client's legal advisor and the client's mortgage lender and as such may be used by them for conveyancing or related purposes.

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

This report or any part of it, is not permitted to be reproduced, copied, altered or in any other way distributed by any other person or organisation.

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 or organisation other than the person/organisation commissioning this report.

This report is not a contaminated land, environmental, geotechnical or archaeological survey and should not be interpreted as such.

No site visit has been made.

We trust that this report is to your satisfaction and will be happy to answer any queries with respect to it.

Yours faithfully,

Wheal Jane Consultancy
dalef@wheal-jane.co.uk
01872 560200

Mining Glossary

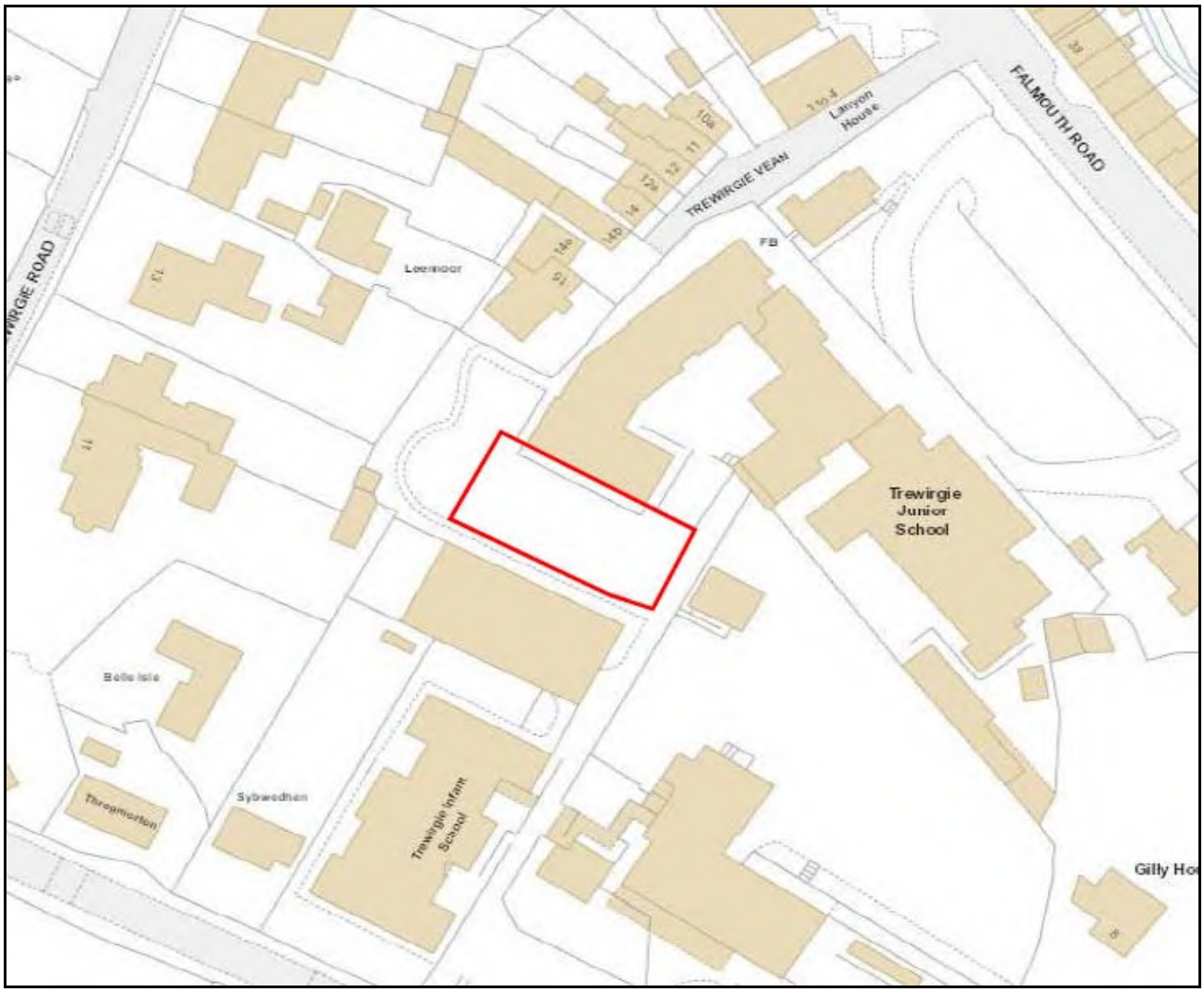
Adit	Horizontal mine drainage tunnel driven from low ground into mine workings. The adit tunnel is the shallowest level shown on mine plans and usually represents the earliest period of workings recorded. Adits have ventilation shafts at regular intervals, which are mostly unrecorded.
Alluvium	Clay, sand and debris deposited by a river. Often streamed for tin.
Burrow	A mine waste tip.
Caunter lode	A lode which runs in a different direction to the general trend of lodes in the district.
Coffin/Koffen	Trench-like openwork at surface.
Costean Pit	A small surface pit excavated to locate and/or sample a lode.
Crosscourse	Geological features which run at right-angles to the principal lodes of a district, and are vertical or sub-vertical faults. Mostly barren of payable minerals, but can carry values of iron ore, cobalt and other metallic minerals. Also known as 'guides' or 'trawns' in the St Just and St Ives mining districts respectively.
Crosscut	Tunnel driven underground, usually at right-angles to the lodes.
Dip of Lode	Angle of inclination of a lode from the horizontal.
Drive	Tunnel driven along the course of a lode.
Elvan	Igneous rock (quartz-porphyry) occurring as a vein or dyke. Can be extremely hard. Exploited by quarrying.
Granite	Igneous rock. Crystalline mixture of quartz, feldspar and mica.
Greenstone	Igneous rock also called 'blue elvan'. Generally extremely hard.
Gunnis	Open stope at surface or underground.
Kaolinisation	Alterations or weathering of granite to clay and sand from solid rock.
Killas	Generic term given to sedimentary rock in Cornwall.
Leat	A man-made watercourse.
Level	Horizon underground where ore movement and communications are maintained. Levels consist of lode drives and crosscut tunnels: i.e. 12 fathom level; the system of tunnels driven at 12 fathoms below adit horizon.
Lode	A mineralised structure or vein. Most lodes run from surface vertically or sub-vertically, and can vary from a few inches to several metres in width.
Mundic	Iron pyrite, arsenic and sulphur - arsenopyrite.
Openwork	A surface working, which has usually left a pit or backfilled excavation.
Outcrop	The part of the lode which breaks surface. Worked-out voids and backfilled areas are outcrop features.
Rab	Weathered zone of mixed rock and soil (natural profile)
Sett	An area of land leased for mining.
Shaft	Holes in the ground, which can vary from 0.5m x 1m up to shafts 7m across. Engine shafts tends to be large (typically 3m x 2m) and adit shafts are smaller (typically 1.2m x 1.8m). Depths vary down to 700m.
Stockwork	Mass of narrow veins or lodes running parallel and sub-parallel.
Stope	Ground where lode has been removed leaving void. Sometimes open to surface.
Tailings	Residual sands and slimes from ore dressing. Usually heavily contaminated.

Mining References (generic listing)

H G Dines - The Metalliferous Mining Region of South West England (2 Vols)
A K Hamilton Jenkin - Mines & Miners of Cornwall (16 Vols)
A K Hamilton Jenkin - Mines of Devon (2 Vols)
A K Hamilton Jenkin - Wendron
Thomas Spargo - Tin Mines of Cornwall (6 Vols)
J H Collins - Observations of West of England Mining Region
Sellwood, Durrance & Bristow - Geology of Cornwall
Durrance & Laming - Geology of Devon
Burt, Waite & Burnley - Cornish Mines
MRO Plans (CRO)
MRO Copies (SC Archive)
MRO Microfiche (SC)
South Crofty Archive
Tehidy Minerals Archive
JMS/JAB/JHB Archive
Wheal Jane Collection
Wheal Pendarves Collection
Geevor Collection
Thyssen Review & Plans
A K H Jenkin, Annotated 6" Plans
Geological 6" Plans
Richard Thomas Plans
Robert & Brenton Symons Plans
Nicholas Whitley Plans
K Bennet Annotated Plans
R Lyon Annotated Plans
Ordnance Survey 1880, 1906, etc Maps
H G Dines Composites

Search Request Plan

Copy of the request plans provided to Wheal Jane Consultancy to identify the property for search purposes:



Wheal Jane Consultancy

Environment & mining services

- Mine search reports**,** using the most extensive privately-owned mine plan archive in the region
- Mining Site Investigations – by drilling or trenching
- Mundic analysis
- Phase 1 Environmental surveys
- Laboratory testing of soils and water
- Mineralogical surveys and reports

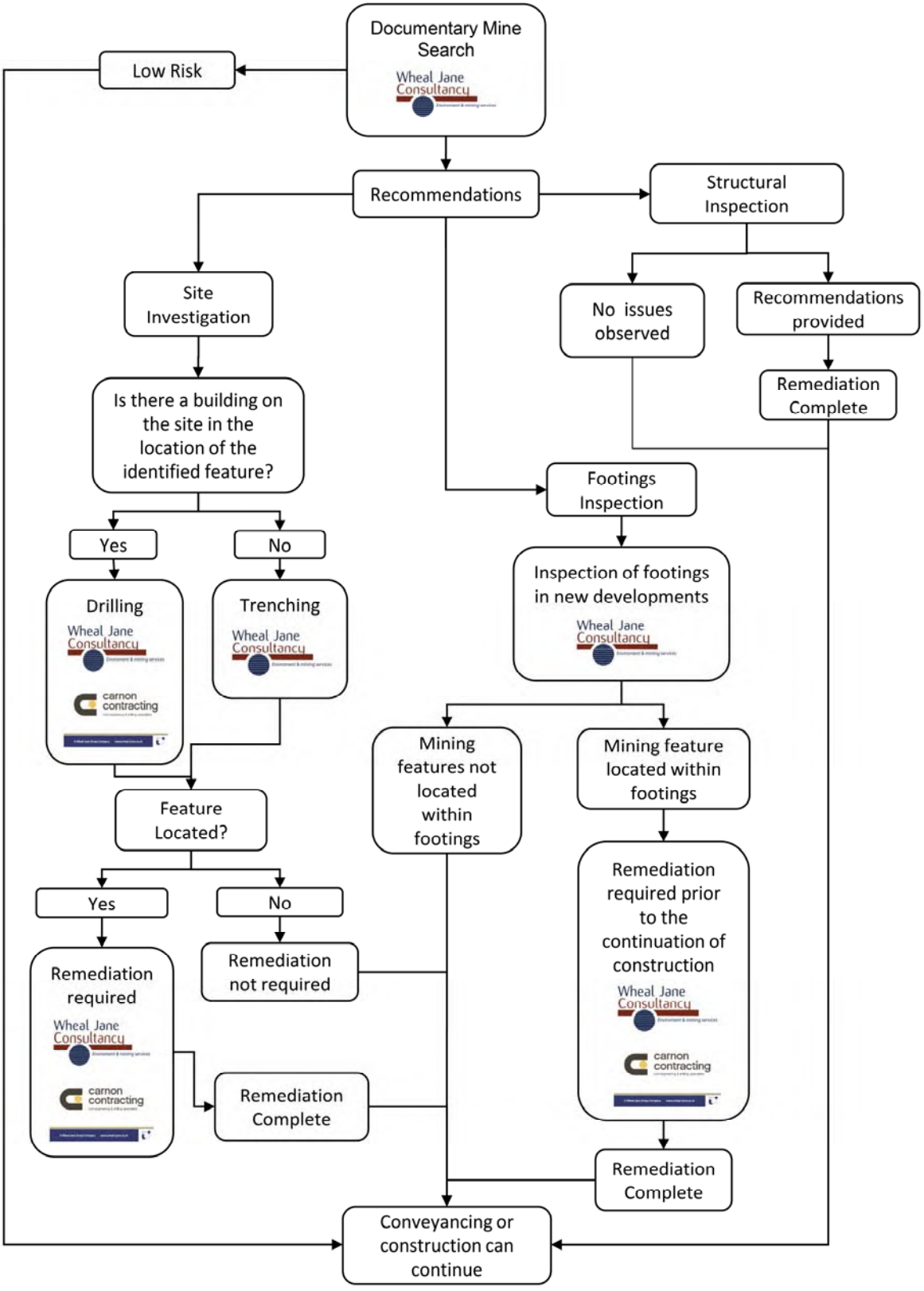
Accuracy, quick turnaround times, competitive prices, fully qualified and experienced staff, full professional indemnity insurance cover.

Cornwall's first ISO certified mine search and site investigation specialists

european certification group ISO 9001 REGISTERED FIRM UKAS QUALITY MANAGEMENT 054

european certification group ISO 14001 REGISTERED FIRM UKAS ENVIRONMENTAL MANAGEMENT 054

Mine Search – What Next?



Ground Investigation

Trewirgie Junior School

19 July 2019

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

Ref: SI19805/GEO

DOCUMENT CONTROL SHEET

Client	Trewirgie Junior School
Project Title	Trewirgie Junior School
Document Title	Ground Investigation
Document No.	S119805/GEO

Date	Status	Revision	Prepared By	Approved By
19 July 2019	Final	0	Bryony Halliday	Dan Jobson

CONTENTS

FIGURES

APPENDICES

TABLES

EXECUTIVE SUMMARY

Objectives	
Wheal Jane Consultancy (WJC) was commissioned by Trewirgie Junior School to undertake a ground investigation at the site known as Trewirgie Junior School.	
Site Investigation	
Previous Investigations	No previous ground investigations are known to have taken place.
Site Works	Samples were taken during an intrusive investigation from five (5 No.) Windowless Sample Boreholes and two (2 No.) Machine excavated trial pits.
Ground Conditions	Small amounts of Made Ground were encountered overlying gravel and clay belonging to the Mylor Slate Formation.
Groundwater	Groundwater was not encountered during the site investigation.
Geotechnical Considerations	
Foundation Options	Strip foundations taken to a depth of 1.00m, 0.60m wide may be designed to an allowable bearing capacity of 120kPa. There is the potential for differential settlement across differentially weathered horizons, it is therefore recommended that nominal reinforcement be included with foundations.
	A raft foundation solution may be suitable in this location however edge thickening will be required to resist bending movements.
Floor Slabs	Based on the results of laboratory testing and on-site observations, it is considered that a suspended floor slab seated above the Made Ground would be appropriate. Full radon protection should be incorporated into the floor slab in accordance with BRE guidelines.
Excavations	Excavations to at least 1.20m should be readily achievable with conventional soil excavating machinery. Excavations to this depth may require supporting due to unstable sides.
Buried Concrete	Based on the above results the site may be classified as falling into the Design Sulphate Class DS-2. The Aggressive Chemical Environment for Concrete (ACEC) class is based upon the pH and mobility of groundwater. The results indicate that the soils on site fall into class AC-1s.

1 INTRODUCTION

1.1 Instruction

1.1.1 Wheal Jane Consultancy (WJC) was commissioned by Faithful and Gould on behalf of Trewirgie Junior School to undertake a ground investigation at the site known as Trewirgie Junior School.

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 evaluate the geotechnical parameters of the sub-surface material in order to aid foundation design.

1.2.2 This assessment has been undertaken with guidance from BS10175:2011[1] and Environment Agency report CLR11[2], and as such represents a Ground Investigation.

1.2.3 A mine search was also commissioned as part of this investigation Ref: MS37210 June 2019.

1.3 Limitations

1.3.1 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. All recommendations set out within this report should be verified by a structural engineer.

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.

1 BS 10175:2011 'Investigation of Potentially Contaminated Sites – Code of Practice'.

2 Environment Agency, 2004. Contaminated Land Report 11 - Model Procedures for the Management of Land Contamination.

2 THE SITE

2.1 Site Location and Layout

2.1.1 The site is located approximately 0.40km to the south west of the town centre of Redruth. The site is approximately centred on National Grid Reference SW 69838 41651.

2.1.2 A Site Location Plan (SLP) is contained as Figure 2.1, to the rear of the report.

2.1.3 The site is rectangular in shape and covers an area of approximately 0.06ha.

2.1.4 The current site layout is contained as Figure 2.2.

2.2 Surrounding area

2.2.1 The site is bound to the north by the Junior School and to the south by the Infants School. School buildings are also located to the west and east. Residential properties lie beyond the school grounds.

2.3 Proposed Development

2.3.1 It is proposed to construct a lightweight single storey timber framed structure. A planning application number was not available at the time of writing this report.

2.3.2 The proposed site layout is contained as Figure 2.3.

3 SITE INVESTIGATION

3.1 Archival Desktop Mining Search

3.1.1 A mine search was completed by Wheal Jane Consultancy in June 2019 Ref: MS37210. Based on the findings of this report is was concluded that the risk from mining is low and as a result no further action is required in relation to mining.

3.1.2 The report is contained as Appendix E.

3.2 Site Works

3.2.1 An intrusive site investigation was conducted on Monday 24th June 2019. The investigation was overseen by a geotechnical 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
Windowless Sample Borehole	WS01 – WS05	3.00 – 3.50	Undertaken across the site to determine nature of ground conditions
Machine Exacavated Trial Pit	TP01 – TP03	1.70 – 2.20	Undertaken to enable infiltration testing and to identify retaining wall structure (TP03).
Hand Excavated Trial Pit	HP01 – HP02	0.31 – 0.87	Undertaken to identify retaining wall foundation structure.

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 and Infiltration Testing

3.3.1 3nr Machine Excavated Trial Pits, designated TP01 – TP03 inclusive, were advanced to depths of 1.70m to 2.20m using a 3 ton excavator on the 24th June 2019. Representative soil samples were taken at regular intervals for geotechnical analysis and logged on site by a suitably qualified Geotechnical Engineer.

3.3.2 2nr Hand Excavated Trial Pits, designated HP01 – HP02 inclusive, were advanced to depths of 0.31m to 0.87m on 24th June 2019 to identify the retaining wall foundation structure.

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

3.3.4 All trial pits were backfilled with arisings upon completion.

3.3.5 Trial Pit photographs are included as Appendix B.

3.3.1 Infiltration testing was carried out in TP01 and TP02 in accordance with BRE 365.

3.3.2 Soakaway results are contained as Appendix C

3.4 Windowless Sample Boring

3.4.1 5nr Windowless Sample Boreholes, designated WS01 – WS05 inclusive, were advanced to depths of between 3.00m to 3.50m using a tracked Terrier rig on the 24th June 2019. Standard Penetration Tests (SPTs) and representative soil samples were taken at regular intervals for geotechnical analysis and logged on site by a suitably qualified Geotechnical Engineer.

3.4.2 Upon completion all exploratory holes were backfilled with a mixture of arisings and Bentonite granules.

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

3.5 Geotechnical Sampling and Testing

3.5.1 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 (4pt)

- Particle Size Distribution
- pH & Water-Soluble Sulphate

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

3.5.3 All samples were tested by a UKAS accredited laboratory.

3.5.4 The results are included as Appendix D.

4 GROUND CONDITIONS

4.1 General

4.1.1 The geological map indicates that the site is underlain by the Mylor Slate Formation formed between 382.7 and 358.9 million years ago during the Devonian period.

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		
Made Ground	0.00	0.40 - 1.70	1.00	Brown gravelly CLAY with anthropogenic components
Weathered Mylor Slate Formation	0.40 – 1.70	0.87 – 3.50	Unproven	Orangish brown gravelly CLAY Becoming Orangish brown clayey GRAVEL of Mudstone.

4.2 Made Ground

4.2.1 All holes encountered Made Ground varying in thickness from 0.40m to 1.70m.

4.2.2 The unit is generally described as brown gravelly CLAY with anthropogenic components, there was also an area of concrete and sandy, gravelly COBBLES and BOULDERS of Granite in TP03; this is likely to be the location of an historic soakaway.

4.2.3 Anthropogenic components were noted within the material such as glass, ceramic and plastic.

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 3.50m.

4.3.2 The unit may be generally described as Orangish brown gravelly CLAY becoming Orangish brown clayey GRAVEL of Mudstone with depth. This is typical of a gradational weathering profile. Generally, the cohesive section is around 0.80m thick with the thickest horizon present in WS05 (1.50m) in the SE of the site area and the thinnest in WS04 (0.30m) in the NE of the site.

4.3.3 The cohesive material was subject to plasticity testing as shown to be a CLAY of intermediate plasticity.

4.3.4 The Modified Plasticity Index (I'p) is defined by the NHBC Chapter 4.1, as the "Plasticity Index (Ip) of the soil multiplied by the percentage of Particles less than 425µm." In this instance the soil has been shown to be subject to negligible volume change potential. This is graphically represented in Appendix D, to the rear of the report.

4.3.5 Standard Penetration Tests (SPTs) were completed at regular intervals within the Weathered Mylor Slate Formation and can be summarised below;

Table 4.2: Standard Penetration Tests within the Weathered Staddon Formation

Depth (mBGL)	SPT 'N' Value		
	Min	Max	Average
1.00	6	11	*8*
2.00	9	35	*20*
*2.50	50+	50+	*50+*
3.00	50+	50+	*50+*

*WS02 only.

4.3.6 An SPT 'N' Value vs Depth plot is provided as Figure 4.1.

4.3.7 The granular material was subject to particle size distribution testing and was shown to contain 47-69% gravel, 12-23% sand and 20-30% fines (silt/clay).

4.4 Existing Foundation

4.4.1 2nr Hand Excavated Trial Pits, designated HP01 – HP02 inclusive, were advanced to depths of 0.87m to 0.31m respectively. A further Machine Excavated Trial Pit (TP03) was also excavated to a depth of 1.70m in order to identify the retaining wall foundation structure.

4.4.2 Concrete was encountered in HP02 at 0.31m depth, thus preventing further excavation in this area.

4.4.3 HP01 was advanced to 0.87m depth, with the base of the retaining wall encountered at 0.80m depth. This is also shown on Figure 4.2. Exploratory hole TP03 was completed immediately adjacent to HP01, on the southern side of the retaining wall.

4.4.4 The northern profile of the retaining wall extents straight down to a depth of 0.80mBGL. The southern profile steps outwards as shown in Figure 4.2.

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

4.4.6 Hand Pit and Trial Pit photographs are contained as Appendix B.

5 GEOTECHNICAL ASSESSMENT

5.1 Introduction

5.1.1 It is proposed to construct a lightweight single storey timber framed structure.

5.1.2 At the time of writing this report, no definitive structural loads have been provided by the client.

5.2 Foundation Options

5.2.1 Based on the ground conditions encountered it is considered that conventional strip foundations will be suitable to support the proposed new structures.

5.2.2 Strip foundations should be taken down through any made ground and seated in the weathered Mylor Slate Formation at a depth of at least 1.00m.

5.2.3 Foundations taken to a depth of 1.00m, 0.60m wide may be designed to an allowable bearing capacity of 120kPa. A factor of safety of 3 has been applied to the calculations, settlements should not exceed 25mm.

5.2.4 Moderate variation in strength within the weathered Mylor Slate Formation was observed at 1.00m, as indicated in Table 4.2 and Figure 4.1. The above calculations have been based on an average SPT 'N' value of N8 at 1.00m depth and are thus conservative. There is the potential for differential settlement across differentially weathered horizons, it is therefore recommended that nominal reinforcement be included with foundations.

5.2.5 Raft foundations are a solution often applied to soils with a low bearing capacity, with the aim of spreading the foundation pressure over as large an area as possible.

5.2.6 A raft foundation solution may be suitable in this location however edge thickening will be required to resist bending movements.

5.3 Floor Slabs

5.3.1 Based on the results of laboratory testing and on-site observations, it is considered that a suspended floor slab seated above the Made Ground would be appropriate.

5.3.2 Full radon protection should be incorporated into the floor slab in accordance with BRE guidelines.

5.4 Excavations and Earthworks

5.4.1 Excavations to at least 1.20m should be readily achievable with conventional soil excavating machinery. Excavations to this depth may require supporting due to unstable sides.

5.4.2 Any excavations to greater than 1.20m which require personnel to enter should be supported.

5.4.3 Due to the fines content of the fill and natural material, excavations should be covered during periods of inclement weather to prevent wetting and subsequent degradation.

5.4.4 It is considered that groundwater will not be encountered in shallow excavations.

5.5 Chemical Attack on Buried Concrete

5.5.1 Chemical testing indicates water soluble sulphate contents of 0.58g/l, with pH values of between 8.0 and 8.3 with an average of 8.1.

5.5.2 Based on the above results the site may be classified as falling into the Design Sulphate Class DS-2. The Aggressive Chemical Environment for Concrete (ACEC) class is based upon the pH and mobility of groundwater. The results indicate that the soils on site fall into class AC-1s.

5.6 Drainage

5.6.1 Two (2 No) soakaway tests were completed across the site at the locations identified in Figure 3.1. The tests were completed in-line with BRE 365.

5.6.2 Infiltration rates varied from 7.78^{E-05} m/s to 2.33^{E-05} m/s within the weathered Mylor Slate Formation. These indicate the material to be of good drainage characteristics.

5.6.3 Infiltration rates were fastest in TP02 in the south of the site with TP01 in the north west recording slightly slower rates. Both locations are therefore suitable for soakaway drainage.

6 REFERENCE LIST

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

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

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

6.1.4 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

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

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

6.1.7 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

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

6.1.9 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.

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

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

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

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

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

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

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

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

6.1.18 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

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

7 NOTES

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

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

7.1.3 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.

7.1.4 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.

7.1.5 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.

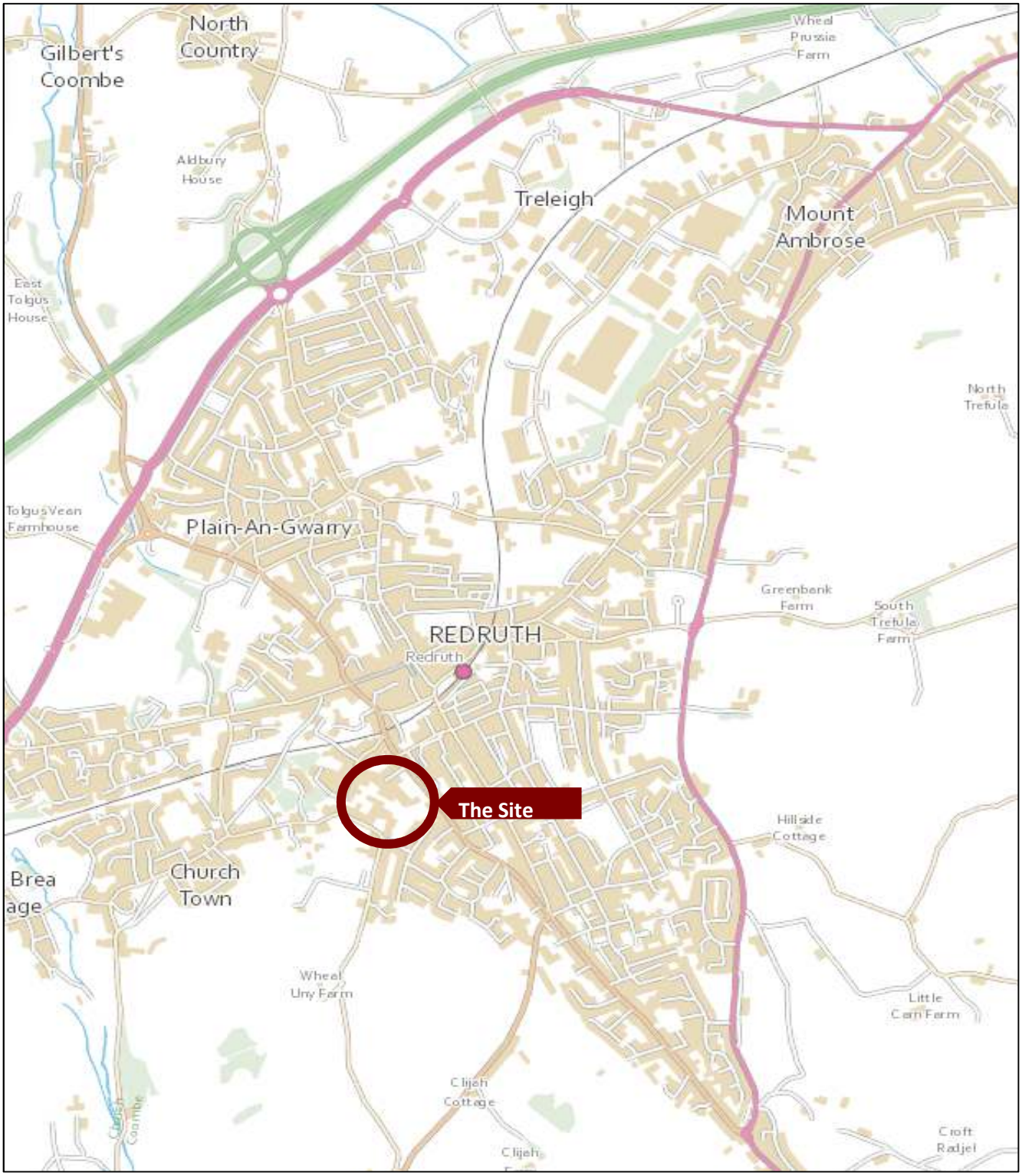
7.1.6 This report is confidential to the client, the client's legal and professional advisors, and may not be reproduced or distributed without our permission other than to directly facilitate the sale or development of the property concerned.

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

7.1.8 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.

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

FIGURES



Title: Site Location Plan

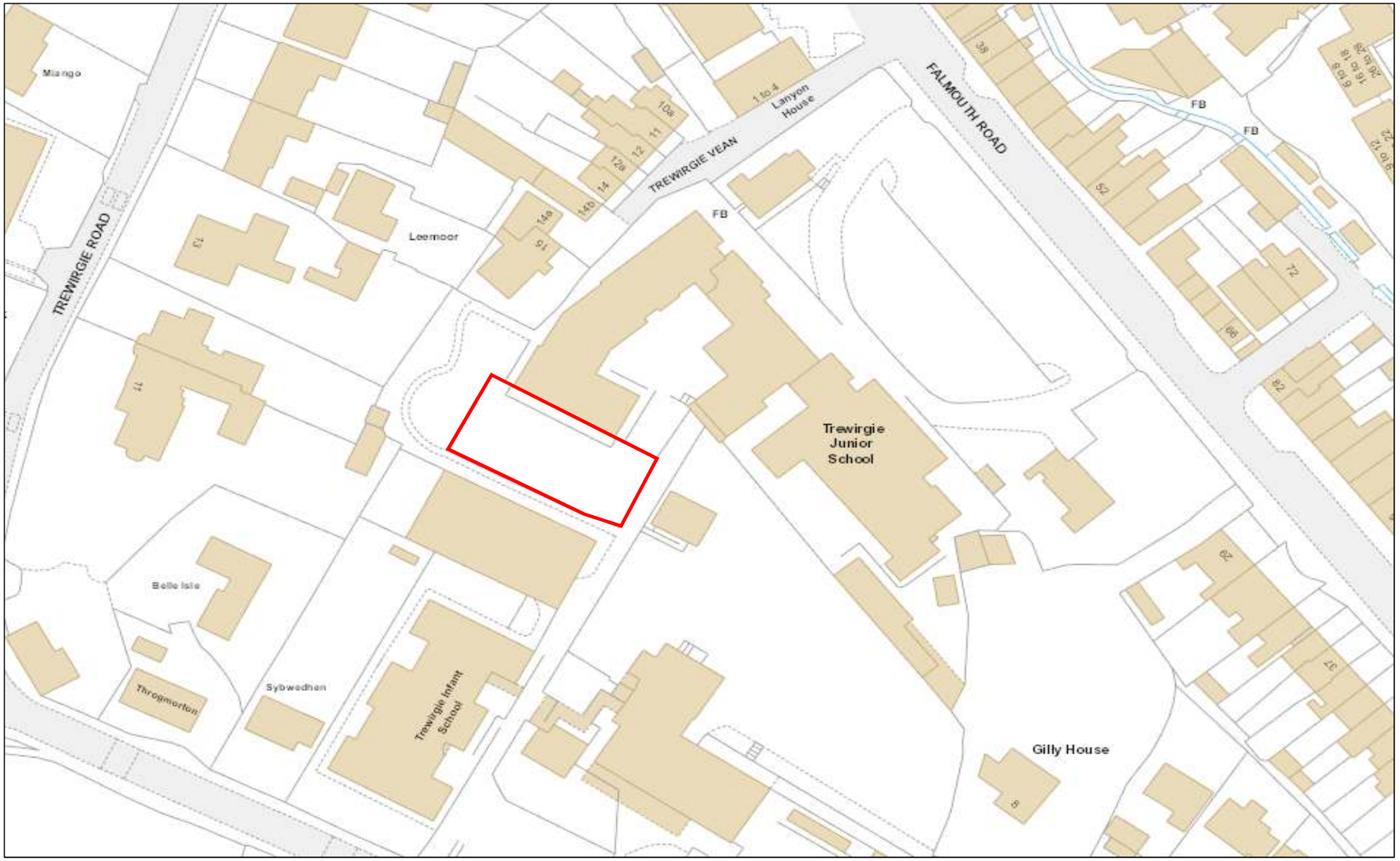
Project: Trewirgie Junior School

Client: Trewirgie Junior School

Report Title: Ground Invesitgation

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Date: 13/06/2019 Ref: 19805 Figure: 2.1



N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Current Site Layout

Project:

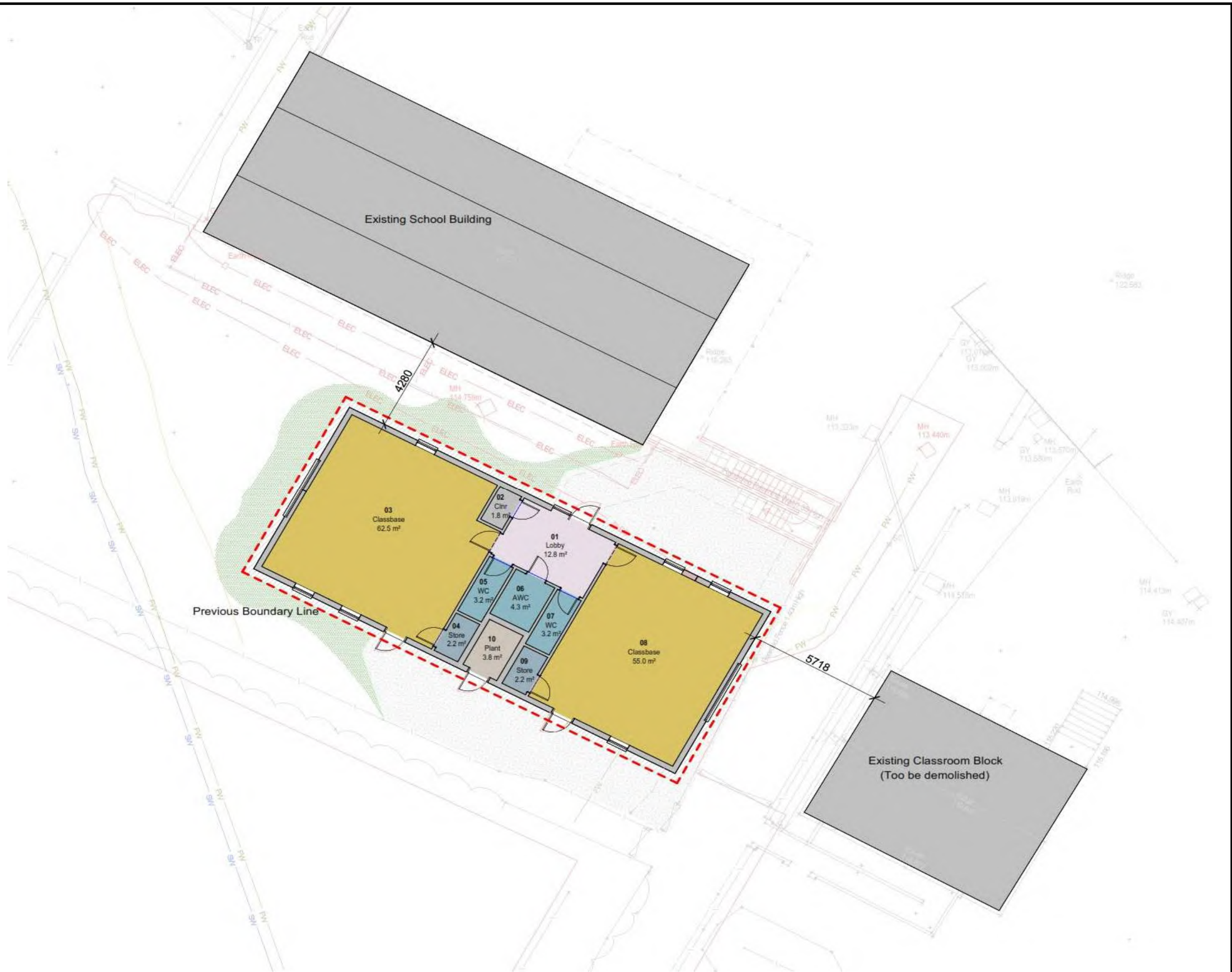
Trewirgie Junior School

19805

Client:

Trewirgie Junior School

Date:	13/06/2019
Scale:	NTS
Drawn by:	
Revision:	A
Figure:	2.2



N

Legend:

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Proposed Site Layout

Project:

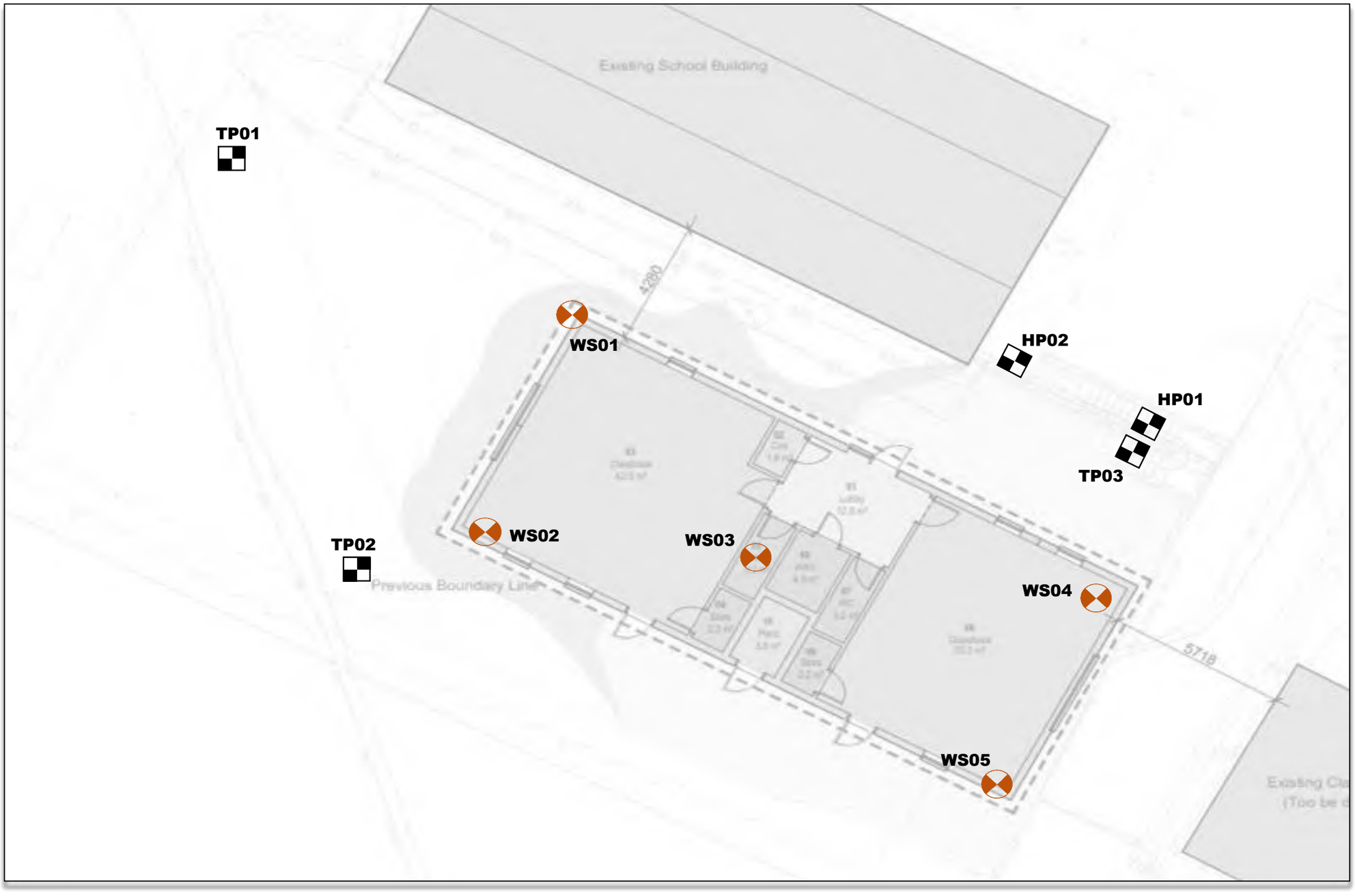
Trewirgie Junior School

19805

Client:

Trewirgie Junior School

Date:	19/07/2019
Scale:	NTS
Drawn by:	DJ
Revision:	A
Figure:	2.3



N

Legend:

Windowless Sample Borehole

Trial Pit

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Title:

Exploratory Hole Location Plan

Project:

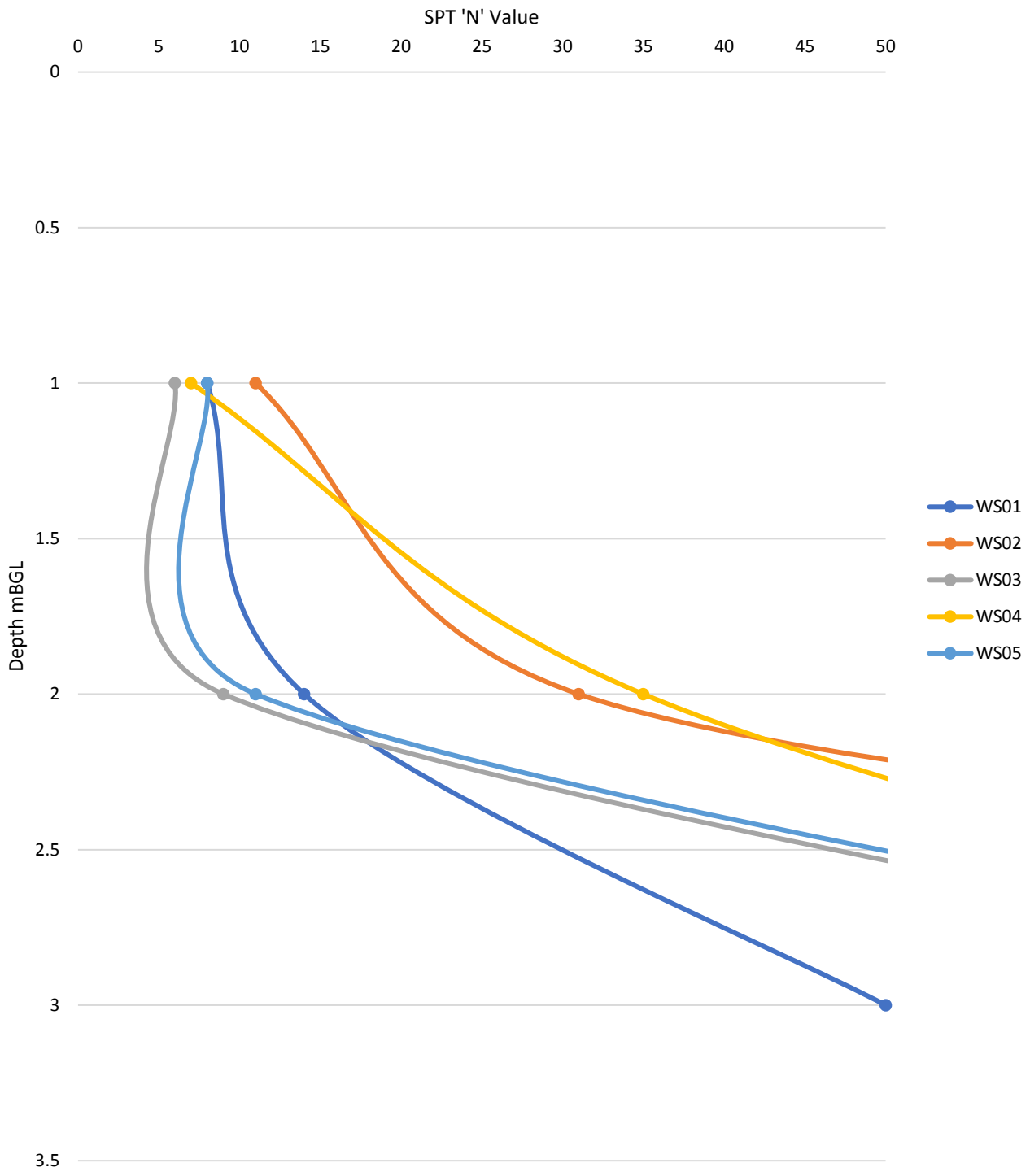
Trewirgie Junior School

19805

Client:

Trewirgie Junior School

Date:	18/07/2019
Scale:	NTS
Drawn by:	BH
Revision:	A
Figure:	3.1



Title: SPT 'N' VS Depth Plot

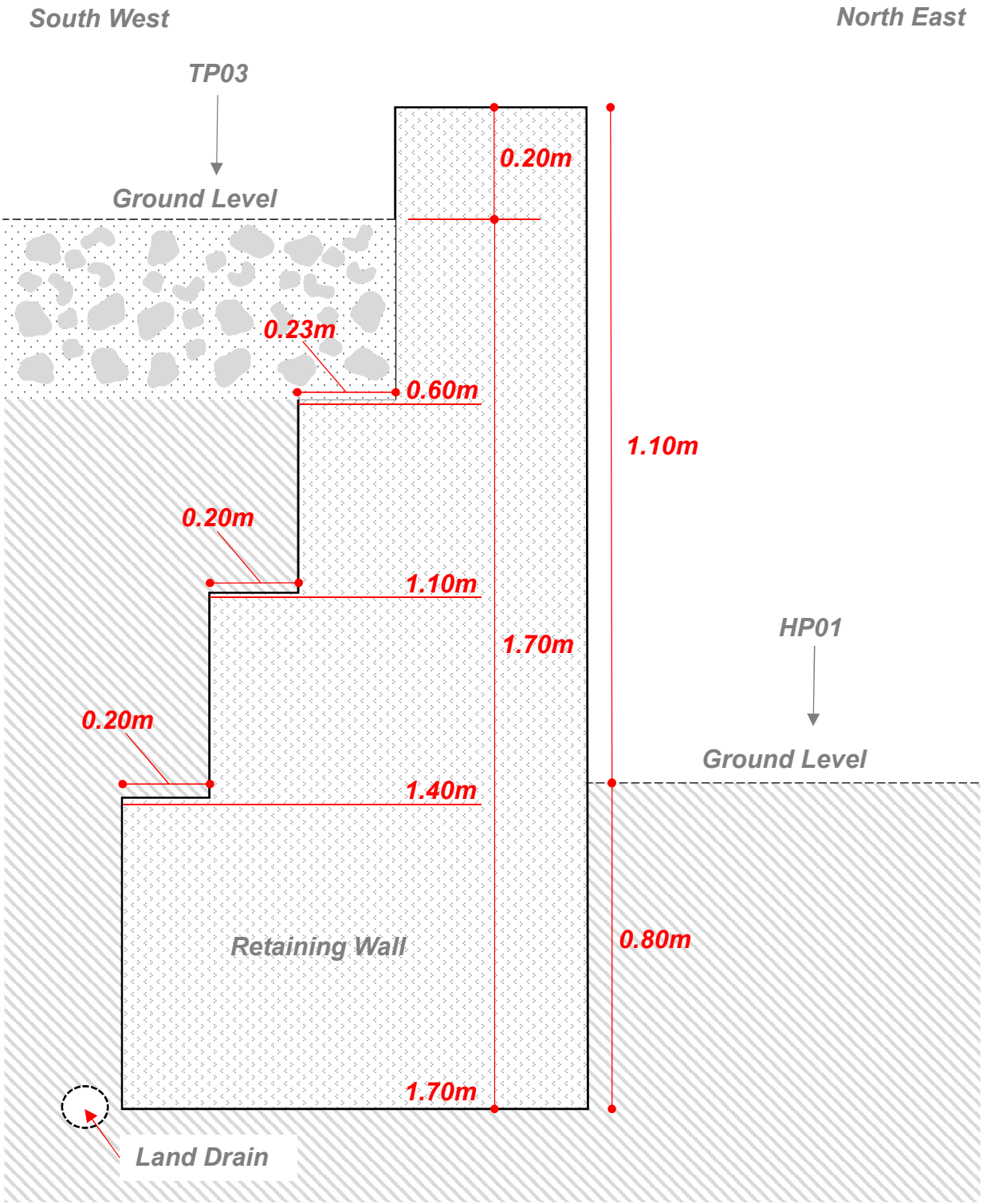
Project: Trewirgie Junior School

Client: Trewirgie Junior School

Report Title: Ground Invesitgation

Date: 19/07/2019 Ref: 19805 Figure: 4.1

Wheal Jane Consultancy
Geotechnical, environmental & mining services



Title: Retaining Wall Structure

Project: Trewirgie Junior School

Client: Trewirgie Junior School

Report Title: Ground Invesitgation

Wheal Jane Consultancy
Geotechnical, environmental & mining services

Date: 18/07/2019 Ref: 19805 Figure: 4.2

Appendix A

Exploratory Hole Logs

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Trewirgie Junior School	WS01

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		116.00	Trewirgie Junior School	19805
	Location	**Dates**	**Engineer**	**Sheet**
	Redruth	24/06/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.55)	MADE GROUND: Grass over soft brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
0.50-1.00	B1			115.45	0.55			
					(0.45)	MADE GROUND: Grass over soft dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
1.00-1.45	SPT N=8		2,1/2,2,2,2	115.00	1.00			
					(0.70)	Soft to Firm orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
1.50	D2			114.30	1.70			
1.80-3.00	B3					Medium dense to very dense orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
2.00-2.45	SPT N=14		3,4/4,3,3,4					
					(1.60)			
3.00-3.45	SPT N=50		19,29/50					
				112.70	3.30	Complete at 3.30m		

Remarks
No groundwater encountered.

Scale (approx)	Logged By
1:25	BH

Figure No. 19805.WS01

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Trewirgie Junior School	WS02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		116.00	Trewirgie Junior School	19805
	Location	**Dates**	**Engineer**	**Sheet**
	Redruth	24/06/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.35)	MADE GROUND: Grass over soft brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				115.65	0.35			
					(0.55)	MADE GROUND: Grass over soft dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				115.10	0.90			
1.00-1.45 1.00	SPT N=11 D1		3,3/2,3,3,3			Firm orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
					(0.60)			
1.50-3.00	B2			114.50	1.50	Medium dense to very dense orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
2.00-2.45	SPT N=31		5,7/9,8,7,7					
					(1.50)			
2.50-2.95	SPT N=95		11,17/18,22,26,29					
				113.00	3.00	Complete at 3.00m		

Remarks
No groundwater encountered.

Scale (approx)	Logged By
1:25	BH

Figure No.
19805.WS02

Wheal Jane Consultancy		Site: Trewirgie Junior School	Number: WS03
Excavation Method: Drive-in Windowless Sampler	**Dimensions**	**Ground Level (mOD)**: 116.00	**Client**: Trewirgie Junior School	**Job Number**: 19805
	Location: Redruth	**Dates**: 24/06/2019	**Engineer**: Wheal Jane Consultancy	**Sheet**: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.45)	MADE GROUND: Grass over soft brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
0.50-1.00	B1			115.55	0.45	MADE GROUND: Grass over soft dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
1.00-1.45	SPT N=6		3,1/2,1,2,1	115.00	(0.55) 1.00	Soft to firm orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
1.20	D2				(0.85)			
2.00-2.45	SPT N=9		2,2/2,2,2,3	114.15	1.85	Loose to very dense orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
3.00-3.45	SPT N=96		14,27/28,32,36		(1.65)			
				112.50	3.50	Complete at 3.50m		

Remarks
No groundwater encountered.

Scale (approx)	Logged By
1:25	BH

Figure No. 19805.WS03

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Trewirgie Junior School	WS04

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler.		116.00	Trewirgie Junior School	19805
	Location	**Dates**	**Engineer**	**Sheet**
	Redruth	24/06/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.50)	MADE GROUND: Grass over soft brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				115.50	0.50			
					(0.50)	MADE GROUND: Grass over soft dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
1.00-1.45	SPT N=7		1,1/1,2,2,2	115.00	1.00			
					(0.30)	Soft orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
1.30 1.40-3.00	D1 B2			114.70	1.30			
2.00-2.45	SPT N=35		4,4/9,9,8,9			Dense to very dense orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
					(2.10)			
2.90-3.35	SPT N=94		8,13/21,27,46					
				112.60	3.40			
						Complete at 3.40m		

Remarks
No groundwater encountered.

Scale (approx)	Logged By
1:25	BH

Figure No.
19805.WS04

Wheal Jane Consultancy

Wheal Jane Group

Site	Number
Trewirgie Junior School	WS05

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Drive-in Windowless Sampler		116.00	Trewirgie Junior School	19805
	Location	**Dates**	**Engineer**	**Sheet**
	Redruth	24/06/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.55)	MADE GROUND: Grass over soft brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				115.45	0.55			
0.60-1.00	B1				(0.45)	MADE GROUND: Grass over soft dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
1.00-1.45	SPT N=9		2,1/2,3,2,2	115.00	1.00	Firm orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
1.50	D2				(1.50)			
2.00-2.45 2.00	SPT N=11 D3		3,4/4,3,2,2					
				113.50	2.50	Medium dense to very dense orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
3.00-3.45	SPT N=100		7,11/15,21,29,35		(1.00)			
				112.50	3.50	Complete at 3.50m		

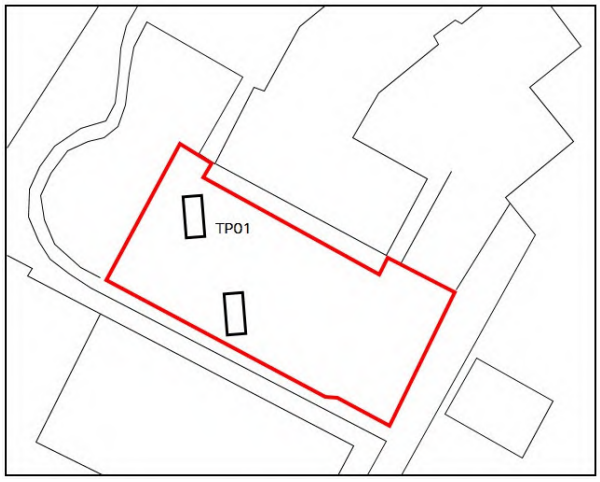
Remarks

Scale (approx)	Logged By
1:25	BH

Figure No. 19805.WS05

Wheal Jane Consultancy	Wheal Jane Group	**Site** Trewirgie Junior School	**Trial Pit Number** TP01
Excavation Method Machine excavated trial pit.	**Dimensions** Width: 0.68m Length: 2.05m	**Ground Level (mOD)** 116.00	**Client** Trewirgie Junior School	**Job Number** 19805
	Location Redruth	**Dates** 24/06/2019	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.40)	MADE GROUND: Grass over brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				115.60	0.40			
0.50-1.00	B1				(0.80)	MADE GROUND: Grass over dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
				114.80	1.20			
1.50	D2				(0.70)	Orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
				114.10	1.90			
2.00-2.20	B3				(0.30)	Orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
				113.80	2.20	Complete at 2.20m		



Remarks

Sides fairly unstable.
No groundwater encountered.

Scale (approx)	Logged By	Figure No.
1:25	BH	19805.TP01

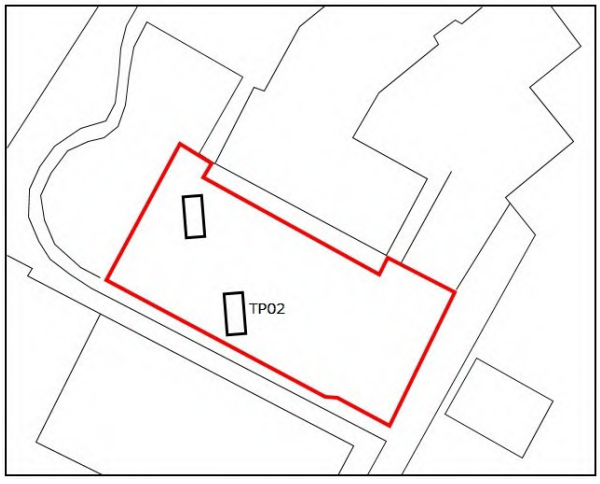
Wheal Jane Consultancy

Wheal Jane Group

Site	Trial Pit Number
Trewirgie Junior School	TP02

Excavation Method	Dimensions	Ground Level (mOD)	Client	Job Number
Machine excavated trial pit.	Width: 0.66m Length: 1.55m	116.00	Trewirgie Junior School	19805
	Location	**Dates**	**Engineer**	**Sheet**
	Redruth	24/06/2019	Wheal Jane Consultancy	1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
					(0.45)	MADE GROUND: Grass over brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
0.50-0.80	B1			115.55	0.45 (0.45)	MADE GROUND: Grass over dark brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of glass, ceramic, plastic, coal and mudstone.		
1.00	D2			115.10	0.90 (0.80)	Orangish brown gravelly CLAY. Gravel is angular to subangular, medium to coarse of mudstone.		
1.80-2.00	B3			114.30	1.70 (0.40)	Orangish brown clayey, angular to subangular, medium to coarse GRAVEL of mudstone.		
				113.90	2.10	Complete at 2.10m		



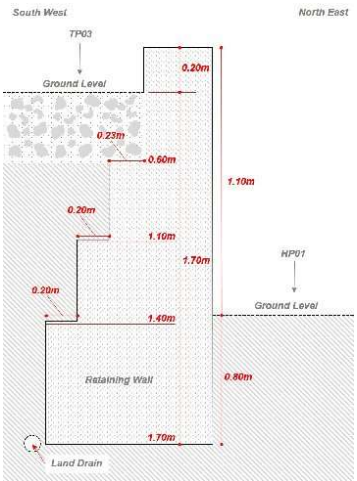
Remarks

No groundwater encountered.
Sides are fairly unstable.

Scale (approx)	Logged By	Figure No.
1:25	BH	19805.TP02

Wheal Jane Consultancy	Wheal Jane Group	**Site** Trewirgie Junior School	**Trial Pit Number** TP03
Machine : 2 Tonne Excavator **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)** 114.50	**Client** Trewirgie Junior School	**Job Number** 19805
	Location 169855 E 41651 N	**Dates** 24/06/2019	**Engineer** Wheal Jane Consultancy	**Sheet** 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				114.35	(0.15) 0.15	Grass over brown gravelly TOPSOIL.		
					(0.45)	MADE GROUND: Grey very sandy very gravelly granite COBBLES and BOULDERS. All clasts are subrounded.		
				113.90	0.60	MADE GROUND: Reworked natural material comprising soft to firm orangish brown sandy slightly gravelly CLAY. Gravel is subrounded to subangular fine to coarse mudstone and granite.		
					(1.10)			
				112.80	1.70	Complete at 1.70m		



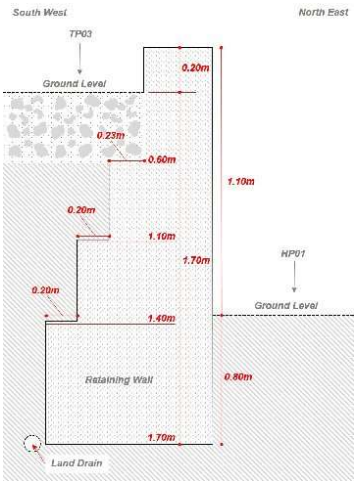
Remarks

Pit excavated against retaining wall.
Land drain located at base of pit, adjacent to retaining wall.

Scale (approx)	Logged By	Figure No.
1:50	DJ	19805.TP03

Wheal Jane Consultancy		Site: Trewirgie Junior School	Trial Pit Number: HP01
Machine : Hand Tools Method : Trial Pit	Dimensions	Ground Level (mOD): 113.60	Client: Trewirgie Junior School	Job Number: 19805
	Location: 169855 E 41652 N	Dates: 24/06/2019	Engineer: Wheal Jane Consultancy	Sheet: 1/1

Depth (m)	Sample / Tests	Water Depth (m)	Field Records	Level (mOD)	Depth (m) (Thickness)	Description	Legend	Water
				113.50	0.10	Tarmac		
					(0.30)			
				113.20	0.40	Light grey SUBBASE of Granite		
					(0.47)	Soft to firm orangish brown gravelly CLAY. Gravel is subangular to angular fine to coarse mudstone.		
				112.73	0.87			
						Complete at 0.87m		



Remarks

Base of retaining wall located at 0.80mbgl.
Pit backfilled with compacted layers of arisings and capped with cold-lay macadam.

Scale (approx)	Logged By	Figure No.
1:50	DJ	19805.HP01

Wheal Jane Consultancy

Wheal Jane Group

Site Trewirgie Junior School			**Trial Pit Number** HP02
Machine : Hand Tools **Method :** Trial Pit	**Dimensions**	**Ground Level (mOD)**	**Client** Trewirgie Junior School	**Job Number** 19805
	Location	**Dates** 24/06/2019	**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 (0.20) 0.30 0.31	Tarmac Light grey SUBASE of Granite Concrete Abandoned at 0.31m		

Plan

Remarks

Concrete from 0.31m.
120mm plastic pipe located at 0.30m depth. Pipe located 300mm out from retaining wall.

Scale (approx)	Logged By	Figure No.
1:50		19805.HP02

Appendix B

Trial Pit Photographs

Trial Pit:	TP01

Trewirgie Junior School	19805
Ground Investigation	Trial Pit Photographs
Trewirgie Junior School	July 2019

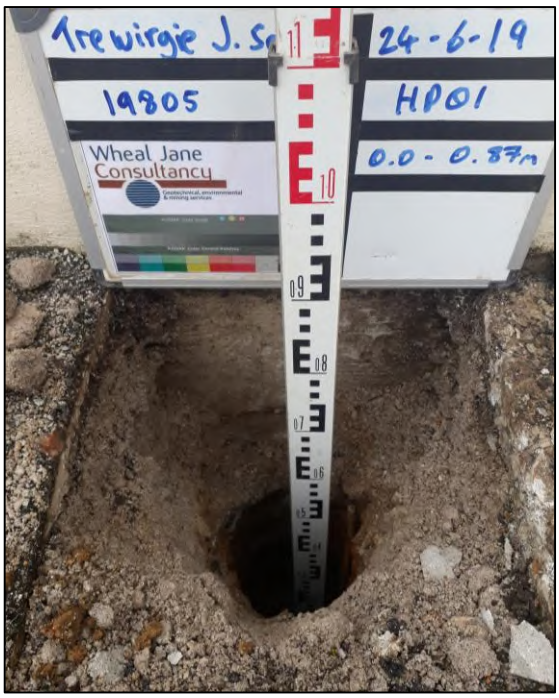
Trial Pit:	TP02

Trewirgie Junior School	19805
Ground Investigation	Trial Pit Photographs
Trewirgie Junior School	July 2019

Trial Pit:	TP03

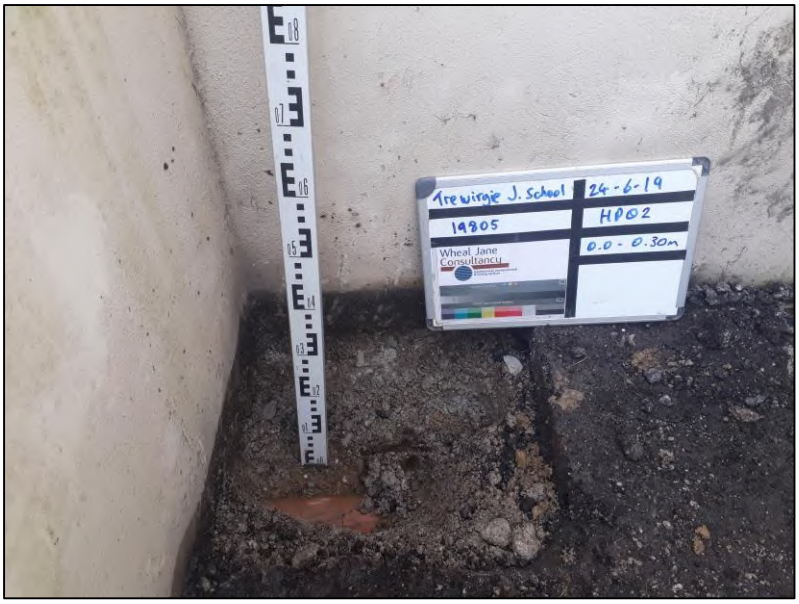
Trewirgie Junior School	19805
Ground Investigation	Trial Pit Photographs
Trewirgie Junior School	July 2019

Trial Pit:	HP01



Trewirgie Junior School	19805
Ground Investigation	Trial Pit Photographs
Trewirgie Junior School	July 2019

Trial Pit:	HP02



Trewirgie Junior School	19805
Ground Investigation	Trial Pit Photographs
Trewirgie Junior School	July 2019

Appendix C

Infiltration Testing

Soakaway Test (BRE Digest 365)

Site : Trewirgie Junior School

Client : Trewirgie Junior School

Engineer : Wheal Jane Consultancy

Job Number 19805

Sheet 1 / 2

Location	Date	Level	Location
TP01	24/06/2019	116.00	Trewirgie

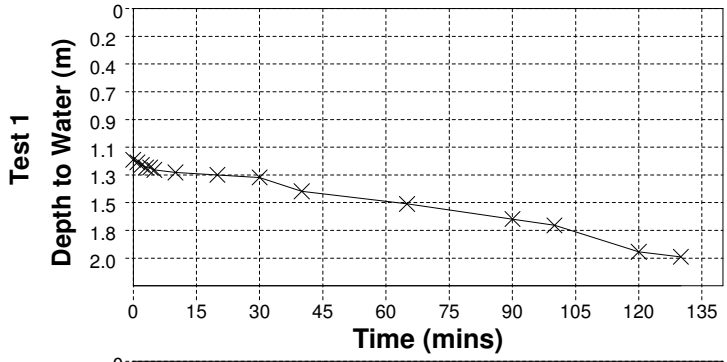
Pit Width (m)	0.68
Pit Depth (m)	2.20
Pit Length (m)	2.05

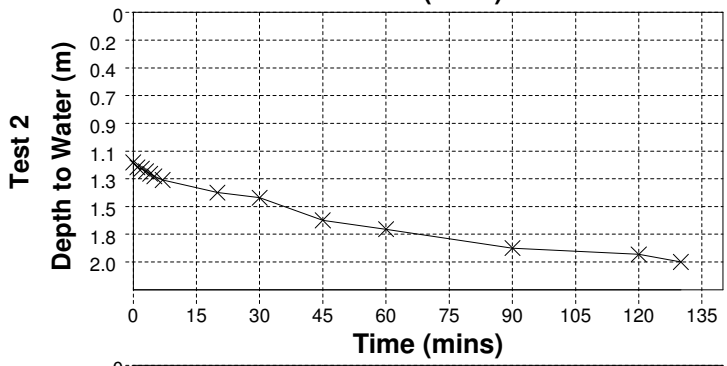
Soil type at test level	Mylor Slate Formation
Groundwater	None
Drain discharge depth	
Sidewall stability	Unstable
Stone filled or open pit	Open Pit

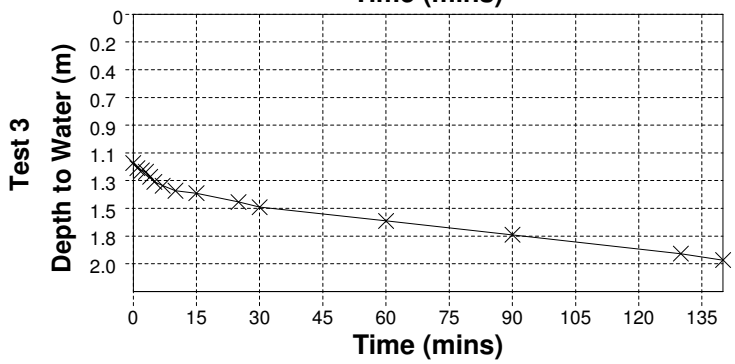
	1	2	3
Effective depth (m)	1.00	1.01	1.02
Volume outflowing between 75% & 25% (m3)	0.70	0.70	0.71
Mean surface area through which outflow occurs (m2)	4.12	4.15	4.18
Time for outflow between 75% & 25% (min)	85.00	101.45	121.86
SOIL INFILTRATION RATE (ms-1), f	3.32E-5	2.79E-5	2.33E-5

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
0	1.20	1.19	1.18
1	1.22	1.23	1.22
2	1.24	1.24	1.24
3	1.26	1.26	1.25
4	1.26	1.28	1.29
5	1.28	1.30	1.33
7		1.33	1.36
10	1.30		1.40
15			1.42
20	1.32	1.43	
25			1.49
30	1.34	1.47	1.53
40	1.45		
45		1.65	
60		1.72	1.64
65	1.55		
90	1.67	1.87	1.75
100	1.72		
120	1.93	1.92	
130	1.97	1.98	1.90
140			1.95







Soakaway Test (BRE Digest 365)

Site : Trewirgie Junior School

Client : Trewirgie Junior School

Engineer : Wheal Jane Consultancy

Job Number 19805

Sheet 2 / 2

Location	Date	Level	Location
TP02	24/06/2019	116.00	Trewirgie

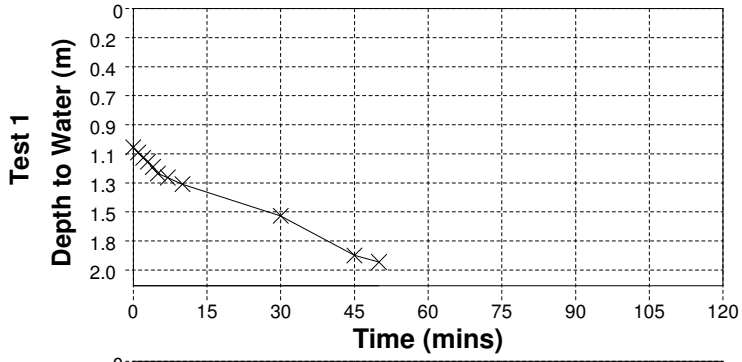
Pit Width (m)	0.66
Pit Depth (m)	2.10
Pit Length (m)	1.55

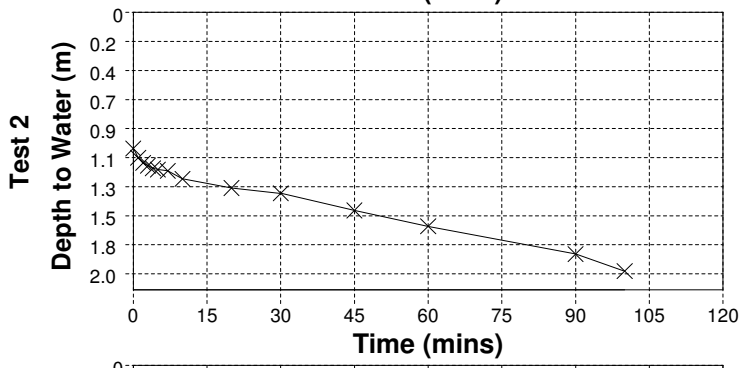
Soil type at test level	Mylor Slate Formation
Groundwater	None
Drain discharge depth	
Sidewall stability	Unstable
Stone filled or open pit	Open Pit

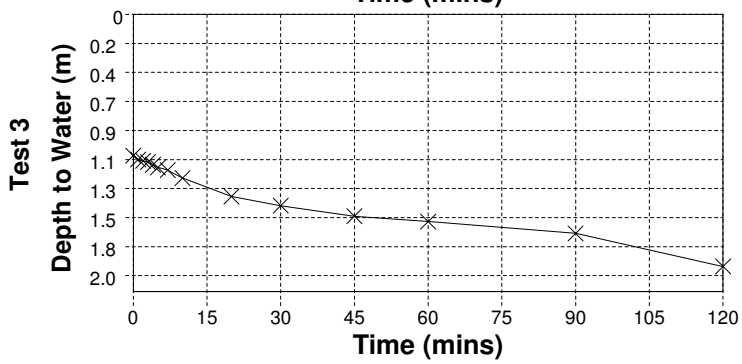
	1	2	3
Effective depth (m)	1.05	1.07	1.03
Volume outflowing between 75% & 25% (m3)	0.54	0.55	0.53
Mean surface area through which outflow occurs (m2)	3.34	3.39	3.30
Time for outflow between 75% & 25% (min)	34.43	74.83	95.65
SOIL INFILTRATION RATE (ms-1), f	7.78E-5	3.60E-5	2.78E-5

Remarks

Elapsed time (mins)	Depth to Water Test 1	Depth to Water Test 2	Depth to Water Test 3
0	1.05	1.03	1.07
1	1.09	1.10	1.10
2	1.13	1.14	1.11
3	1.16	1.16	1.12
4	1.20	1.18	1.14
5	1.25	1.19	1.16
7	1.28	1.20	1.18
10	1.33	1.26	1.24
20		1.33	1.38
30	1.57	1.37	1.45
45	1.87	1.50	1.53
50	1.92		
60		1.62	1.57
90		1.83	1.66
100		1.96	
120			1.91







Appendix D

Geotechnical Laboratory Results

Test Report

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

Job No:	11555	**Date Received:**	28/06/19
Job Name:	Trewirgie School	**Date Sent:**	12/07/19
Client Name:	Wheal Jane Ltd	**Transmittal Number:**	T4781
Client Job No:	-	**Senders Initials:**	DA
Client Address	Old Mine Offices, Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EE	**Report Revision No.**	1
		Sampled by SWG lab staff?	NO

Ref.	Test Detail	No. of Tests / Report No.
A1	BS1377: Part 2: 1990: Clause 3 - Moisture Content - UKAS Accredited	2
A5	BS1377: Part 2: 1990: Clause 4 & 5 - Atterberg Limits - UKAS Accredited	2
A9	BS1377: Part 2: 1990: Clause 9.2 / 9.3 - Particle Size Distribution - UKAS Accredited	2

Sampling not performed by South West Geotechnical laboratory staff. Results apply to the samples as received.

Approved Signatories:

David Trowbridge (Laboratory Manager)

Dan Ayre (Quality Manager)

Matt Stokes (Senior Technician)

8260
Accredited to
ISO/IEC
17025:2017

SOUTH WEST GEOTECHNICAL

Summary of Classification Test Results

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

Project No.	Project Name
11555	Trewirgie School
Client Job No.	**Client**
19805	Wheal Jane Consultancy

UKAS TESTING 8260 Accredited to ISO/IEC 17025:2017

Hole No.	Sample Type	Sample Top	Sample Base	Sample Ref	Soil Description	*mc* Cl.3.2 %	Passing 425µm %	LL %	PL Cl5.3 %	PI Cl5.4 %	Particle density Mg/m3	Remarks
WS02	D	1.00		-	Yellowish brown slightly sandy slightly gravelly silty CLAY	20	64 - Sieved	36	23	13	-	
WS04	D	1.30		-	Yellowish brown slightly sandy gravelly silty CLAY	21	61 - Sieved	39	26	13	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	
						-	-	-	-	-	-	

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

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) %

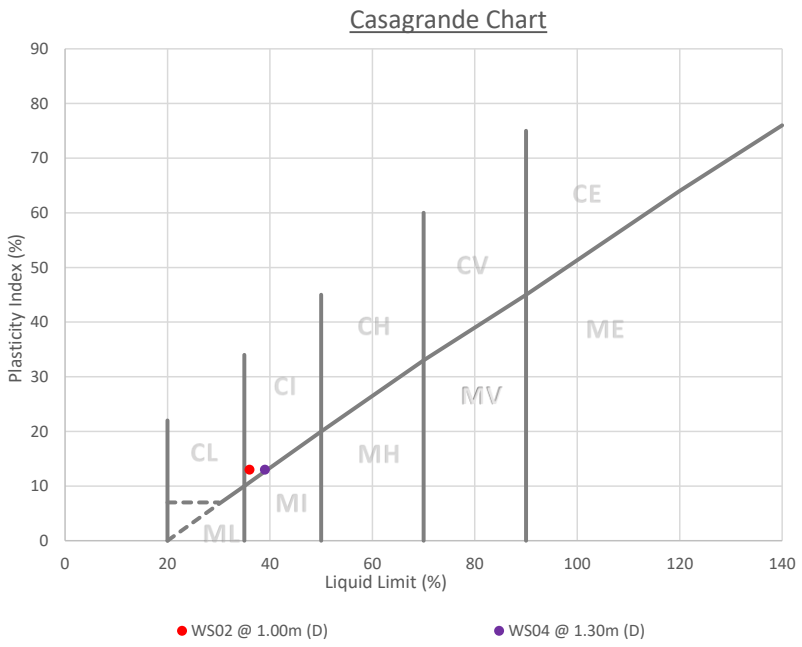
Particle density BS1377-2:1990
sp - small pyknometer CL.8.3
gj - gas jar CL.8.2

Date	Approved By	Page No.	1
12/07/2019	Dan Ayre - Quality Manager	KL001R Index Summary	

Graphical Summary of Atterberg Test Results

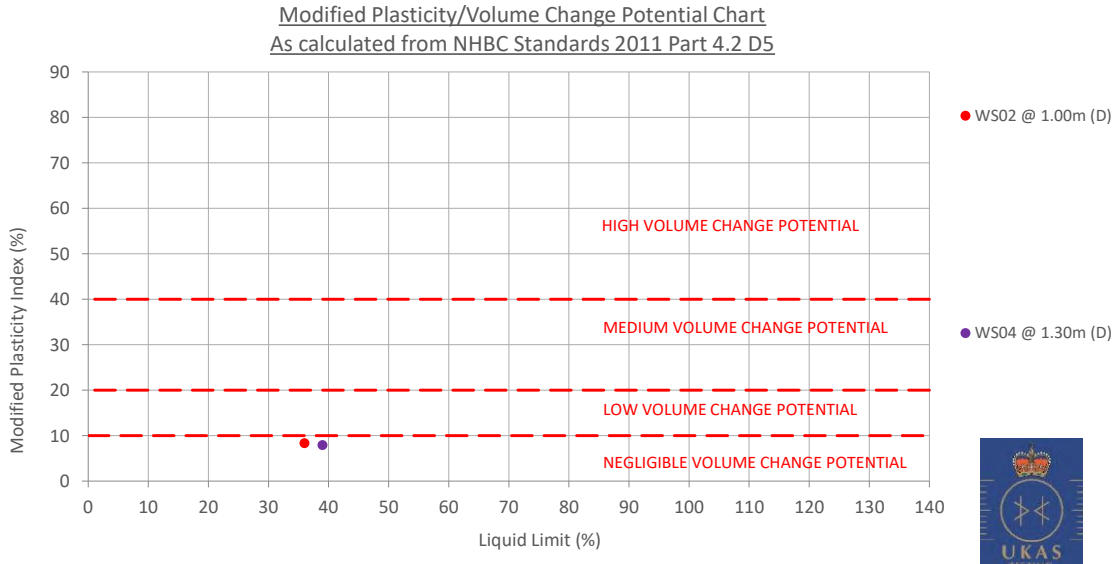
Unit 3 Brooklands,
Howden Road,
Tiverton,
Devon
EX16 5HW

Project No.	Project Name
11555	Trewirgie School
Client Job No.	**Client**
-	Wheal Jane Ltd



Sample ID	Plasticity Index (%)	Modified Plasticity Index (%)
WS02 @ 1.00m (D)	13	8
WS04 @ 1.30m (D)	13	8
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

The Modified Plasticity Index (I'p) is defined as the Plasticity Index (Ip) of the soil multiplied by the percentage of particles less than 425µm.
ie. I'p x % less than 425um/100%

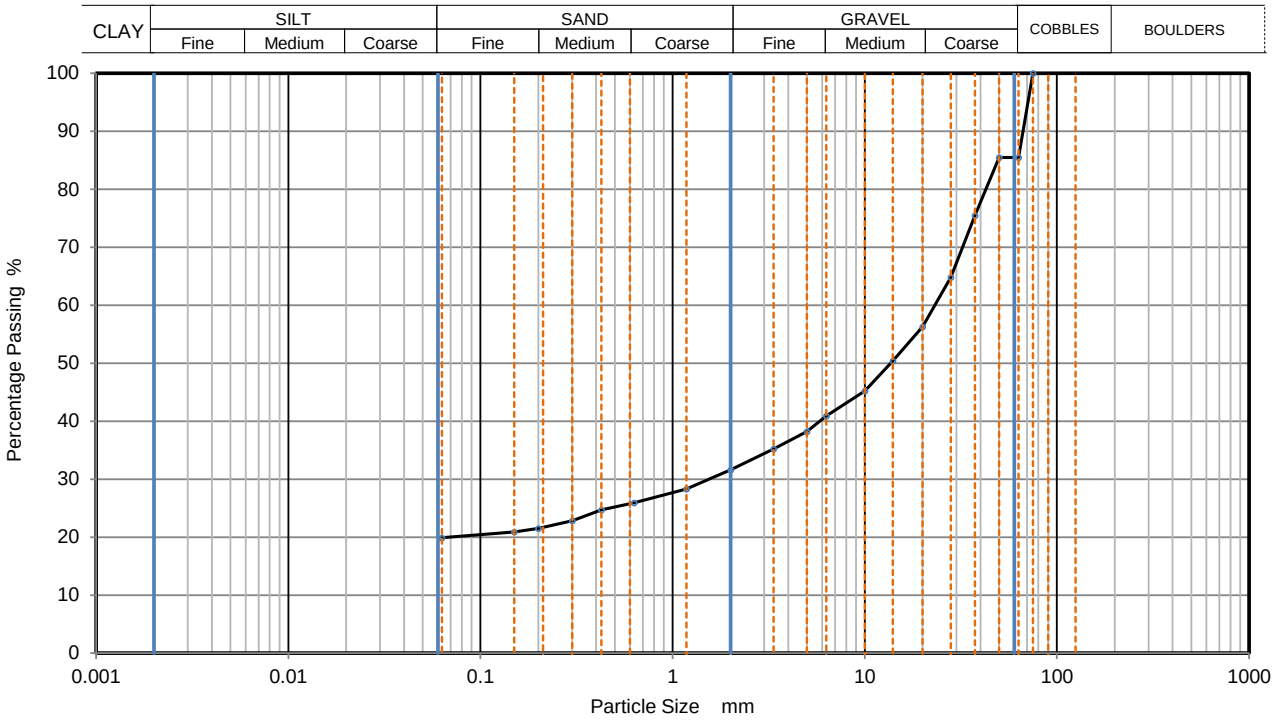


KL001a Index Graphical Summary	Approved By	Date
	Dan Ayre - Quality Manager	**12/07/2019 15:24**

8260
Accredited to ISO/IEC 17025:2017

PARTICLE SIZE DISTRIBUTION

Project No.	11555		
Borehole/Pit No.	TP01		
Project Name	Trewirgie School	Sample No.	-
Soil Description	Brown very silty sandy GRAVEL with frequent cobble	Depth, m	2.00
Specimen Reference	1	Specimen Depth	m
Sample Type	B		
Test Method	BS1377:Part 2:1990, clause 9.2		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
75	100		
63	86		
50	86		
37.5	76		
28	65		
20	56		
14	50		
10	45		
6.3	41		
5	38		
3.35	35		
2	32		
1.18	28		
0.63	26		
0.425	25		
0.3	23		
0.2	22		
0.15	21		
0.063	20		

Dry Mass of sample, g	10557

Sample Proportions	% dry mass
Very coarse	15
Gravel	54
Sand	12
Fines <0.063mm	20

Grading Analysis		
D100	mm	75
D60	mm	23.2
D30	mm	1.55
D10	mm	
Uniformity Coefficient		
Curvature Coefficient		

Remarks

Preparation and testing in accordance with BS1377 unless noted below

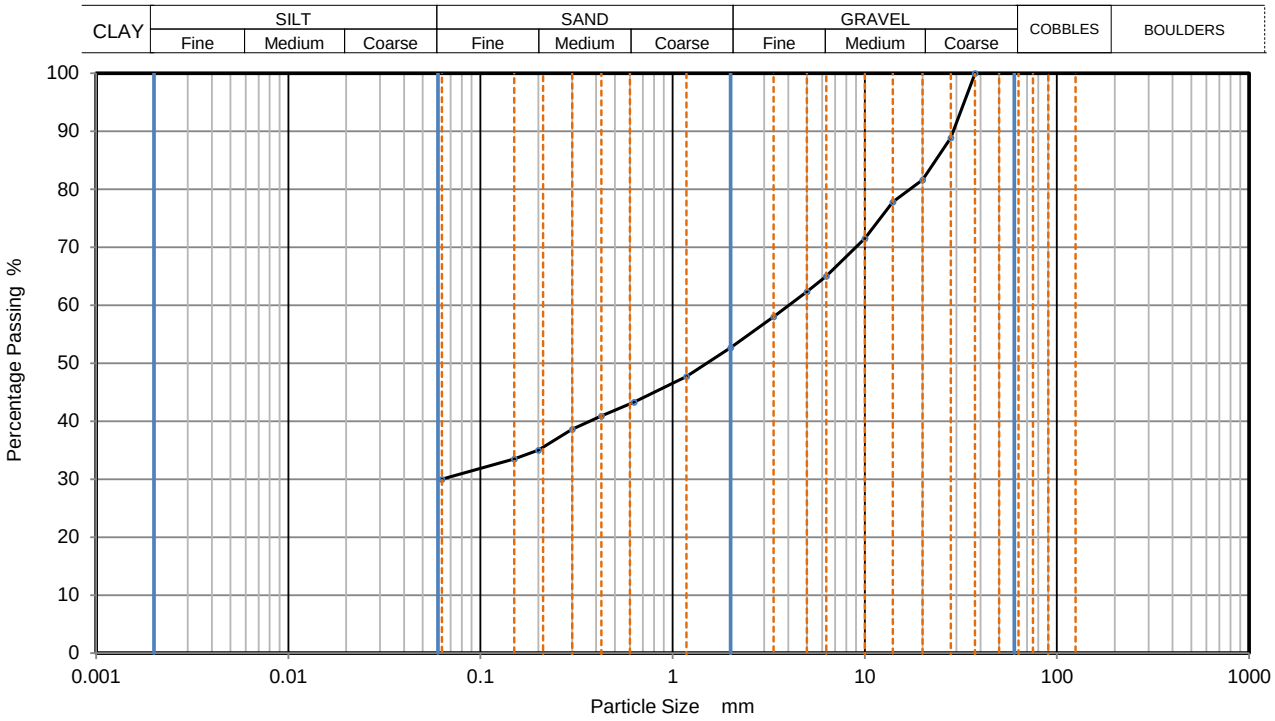
Preparation and testing in accordance with BS1377 - Deviation to standard as insufficient material provided in order to meet the minimum mass requirement

UKAS TESTING
8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Dan Ayre - Quality Manager	12/07/2019	KL002R PSD

PARTICLE SIZE DISTRIBUTION

Project No.	11555		
Borehole/Pit No.	WS05		
Project Name	Trewirgie School	Sample No.	-
Soil Description	Dark brown very silty very sandy GRAVEL	Depth, m	0.60
Specimen Reference	1	Specimen Depth	m
Sample Type	B		
Test Method	BS1377:Part 2:1990, clause 9.2		



Sieving		Sedimentation	
Particle Size mm	% Passing	Particle Size mm	% Passing
37.5	100		
28	89		
20	82		
14	78		
10	72		
6.3	65		
5	62		
3.35	58		
2	53		
1.18	48		
0.63	43		
0.425	41		
0.3	39		
0.2	35		
0.15	34		
0.063	30		

Dry Mass of sample, g	1788

Sample Proportions	% dry mass
Very coarse	0
Gravel	47
Sand	23
Fines <0.063mm	30

Grading Analysis		
D100	mm	37.5
D60	mm	4.04
D30	mm	0.0636
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

8260
Accredited to ISO/IEC 17025:2017

Approved by	Date	Sheet ID:
Dan Ayre - Quality Manager	12/07/2019	KL002R PSD

Test Report

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

Job No:	11555	**Date Received:**	29/06/19
Job Name:	Trewirgie School	**Date Sent:**	16/07/19
Client Name:	Wheal Jane Ltd	**Transmittal Number:**	T4781A
Client Job No:	-	**Senders Initials:**	DLT
Client Address	Old Mine Offices, Wheal Jane, Baldhu, Truro, Cornwall, TR3 6EE	**Report Revision No.**	1
		Sampled by SWG lab staff?	No

Ref.	Test Detail	No. of Tests / Report No.
Chem	External Chemical Testing	19-22164

Sampling not performed by South West Geotechnical laboratory staff. Results apply to the samples as received.

Approved Signatories:

David Trowbridge (Laboratory Manager)

Dan Ayre (Quality Manager)

Matt Stokes (Senior Technician)

Chemtest
The right chemistry to deliver results
Chemtest Ltd.
Depot Road
Newmarket
CB8 0AL
Tel: 01638 606070
Email: info@chemtest.com

UKAS TESTING
2183

Final Report

Report No.:	19-22164-1
Initial Date of Issue:	15-Jul-2019
Client	South West Geotechnical
Client Address:	Unit 3 Brooklands Howden Road Tiverton Devon EX16 5HW
Contact(s):	Lab
Project	11555 Trewirge School

Quotation No.:		**Date Received:**	03-Jul-2019
Order No.:	11555/T4781A	**Date Instructed:**	05-Jul-2019
No. of Samples:	4		
Turnaround (Wkdays):	5	**Results Due:**	11-Jul-2019
Date Approved:	15-Jul-2019		

Approved By:

Details: Robert Monk, Technical Manager

Chemtest
The right chemistry to deliver results

Results - Soil

Project: 11555 Trewirge School

Client: South West Geotechnical				**Chemtest Job No.:**	19-22164	19-22164	19-22164	19-22164
Quotation No.:				**Chemtest Sample ID.:**	851654	851655	851656	851657
				Sample Location:	WS02	WS04	WS05	TP01
				Sample Type:	SOIL	SOIL	SOIL	SOIL
				Top Depth (m):	1.0	1.3	0.6	2.0
				Bottom Depth (m):			1.0	2.2
Determinand	**Accred.**	**SOP**	**Units**	**LOD**				
Moisture	N	2030	%	0.020	16	16	14	14
pH	U	2010		N/A	[A] 8.3	[A] 8.1	[A] 8.0	[A] 8.0
Sulphate (2:1 Water Soluble) as SO4	U	2120	g/l	0.010	0.18	0.58	< 0.010	< 0.010
Sulphate (Acid Soluble)	U	2430	%	0.010	[A] 0.018	[A] 0.014	[A] 0.032	[A] < 0.010

Deviations

In accordance with UKAS Policy on Deviating Samples TPS 63. Chemtest have a procedure to ensure 'upon receipt of each sample a competent laboratory shall assess whether the sample is suitable with regard to the requested test(s)'. This policy and the respective holding times applied, can be supplied upon request.The reason a sample is declared as deviating is detailed below. Where applicable the analysis remains UKAS/MCERTs accredited but the results may be compromised.

Sample:	Sample Ref:	Sample ID:	Sample Location:	Sampled Date:	Deviation Code(s):	Containers Received:
851654			WS02		A	Amber Glass 250ml
851655			WS04		A	Amber Glass 250ml
851656			WS05		A	Amber Glass 250ml
851657			TP01		A	Amber Glass 250ml

Test Methods

SOP	Title	Parameters included	Method summary
2010	pH Value of Soils	pH	pH Meter
2030	Moisture and Stone Content of Soils(Requirement of MCERTS)	Moisture content	Determination of moisture content of soil as a percentage of its as received mass obtained at <37°C.
2120	Water Soluble Boron, Sulphate, Magnesium & Chromium	Boron; Sulphate; Magnesium; Chromium	Aqueous extraction / ICP-OES
2430	Total Sulphate in soils	Total Sulphate	Acid digestion followed by determination of sulphate in extract by ICP-OES.

Report Information

Key

U	UKAS accredited
M	MCERTS and UKAS accredited
N	Unaccredited
S	This analysis has been subcontracted to a UKAS accredited laboratory that is accredited for this analysis
SN	This analysis has been subcontracted to a UKAS accredited laboratory that is not accredited for this analysis
T	This analysis has been subcontracted to an unaccredited laboratory
I/S	Insufficient Sample
U/S	Unsuitable Sample
N/E	not evaluated
<	"less than"
>	"greater than"

Comments or interpretations are beyond the scope of UKAS accreditation
The results relate only to the items tested
Uncertainty of measurement for the determinands tested are available upon request
None of the results in this report have been recovery corrected
All results are expressed on a dry weight basis
The following tests were analysed on samples as received and the results subsequently corrected to a dry weight basis TPH, BTEX, VOCs, SVOCs, PCBs, Phenols
For all other tests the samples were dried at < 37°C prior to analysis
All Asbestos testing is performed at the indicated laboratory
Issue numbers are sequential starting with 1 all subsequent reports are incremented by 1

Sample Deviation Codes

A - Date of sampling not supplied
B - Sample age exceeds stability time (sampling to extraction)
C - Sample not received in appropriate containers
D - Broken Container
E - Insufficient Sample (Applies to LOI in Trommel Fines Only)

Sample Retention and Disposal

All soil samples will be retained for a period of 45 days from the date of receipt
All water samples will be retained for 14 days from the date of receipt
Charges may apply to extended sample storage

If you require extended retention of samples, please email your requirements to:
customerservices@chemtest.com

Appendix E

Archival Mine Search

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

Archival (Desktop) Mining Search

Mining Risk: Low

Further Action: None

Address: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Client: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Your Ref.:

Our Ref.: MS37210

Date: 18 June 2019

Tel:
01872 562008

E-mail (mine search):

dalef@ wheal-jane.co.uk

www.wheal-jane-consultancy.co.uk

Mine Searches

Site Investigations

Environmental Surveys

Mundic Analysis

Soil and Water Analysis

Mineralogical Surveys

Full Professional Indemnity Insurance

ISO9001 Registered Firm

Registered Office
WJE Ltd
Old Mine Offices
Wheal Jane
Baldhu,Truro
Cornwall, TR3 6EE
UK

Registered in England
Number 03676442
VAT number
760 4129 48

Dear Sirs,

Re: Trewirgie Junior School, Falmouth Road, Redruth, Cornwall, TR15 2QN

We thank you for your recent request.

As instructed, we have carried out a mining search in respect of the above property, as delineated on the plan supplied for the purpose of requesting this search (a copy of which is included with this report).

The purpose of this mine search is to examine and interpret the plans and records in our possession relating to metalliferous mining activity and based upon this information, give a professional opinion in respect of potential risk to the property from such historical mining activity and, if required, make recommendations as may be deemed appropriate.

Where other workings relating to clay, stone or other minerals are noted to be in close proximity to the property mention will be made of them.

This report is of a format suitable for conveyancing purposes.

Mining Activity

The property is located in a district which has seen extensive historical mining activity.

It is sited at the eastern end of the lease or sett of the abandoned East Carn Brea Mine, which worked for tin and copper ores.

The plans and records that are currently held in our possession, relating to this district, do not indicate the presence of any old shallow/surface mine workings or shafts within the boundaries of the property.

We have found no evidence of clay workings or other mineral workings in the immediate vicinity of the property.

An old mine shaft and adit (drainage tunnel) are indicated to lie some 130 metres to the north-east of the property.

A possible shaft is indicated to lie some 100 metres to the north-north-east of the property.

A lode (mineralised structure) underlies the property at a depth indicated to be almost 200 metres below sea level.

This lode was worked by East Carn Brea Mine, with workings on its shallower zone lying over 50 metres to the south of the property.

Conclusions & Recommendations

We know of no plans to exploit metallic minerals in the locality, nor do we consider this a likely event.

Based upon the information that is held in our possession, at the time of writing this report, we have found no evidence to indicate the presence of old shallow/surface mine workings underlying the property.

We would consider that the property appears to be at a lower level of risk from being affected by past mining activity.

Scope of Search & Limitations

This search has been carried out with reference to the extensive collection of plans, records and archives that are held in our possession at the time of writing this report and from this material we have endeavoured to give as accurate a report as possible in respect of the property as delineated in the initial request.

However, taking into account that such records may not be wholly complete or accurate, that records may exist of which we do not hold copies, or records exist that are held in private sources which are not available to us and that in Cornwall, Devon and Somerset many ancient shallow workings and shafts exist of which there are no records, we cannot accept liability for any inaccuracies there may be.

This report is concerned solely with the property searched and should not be used in connection with adjacent properties as only relevant mining features have been mentioned and any known features that would not have a direct influence upon the target property may have been omitted for clarity.

The report is based upon the property boundaries as shown on the supplied request plan.

We cannot accept liability for any inaccuracies if the property boundaries, as supplied to us by the client or the client's agent, are subsequently shown to be incorrect, incomplete or if no such request plan has been supplied when the search has been requested.

This report is confidential to the client and the client's legal advisor and the client's mortgage lender and as such may be used by them for conveyancing or related purposes.

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

This report or any part of it, is not permitted to be reproduced, copied, altered or in any other way distributed by any other person or organisation.

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 or organisation other than the person/organisation commissioning this report.

This report is not a contaminated land, environmental, geotechnical or archaeological survey and should not be interpreted as such.

No site visit has been made.

We trust that this report is to your satisfaction and will be happy to answer any queries with respect to it.

Yours faithfully,

Wheal Jane Consultancy
dalef@wheal-jane.co.uk
01872 560200

Mining Glossary

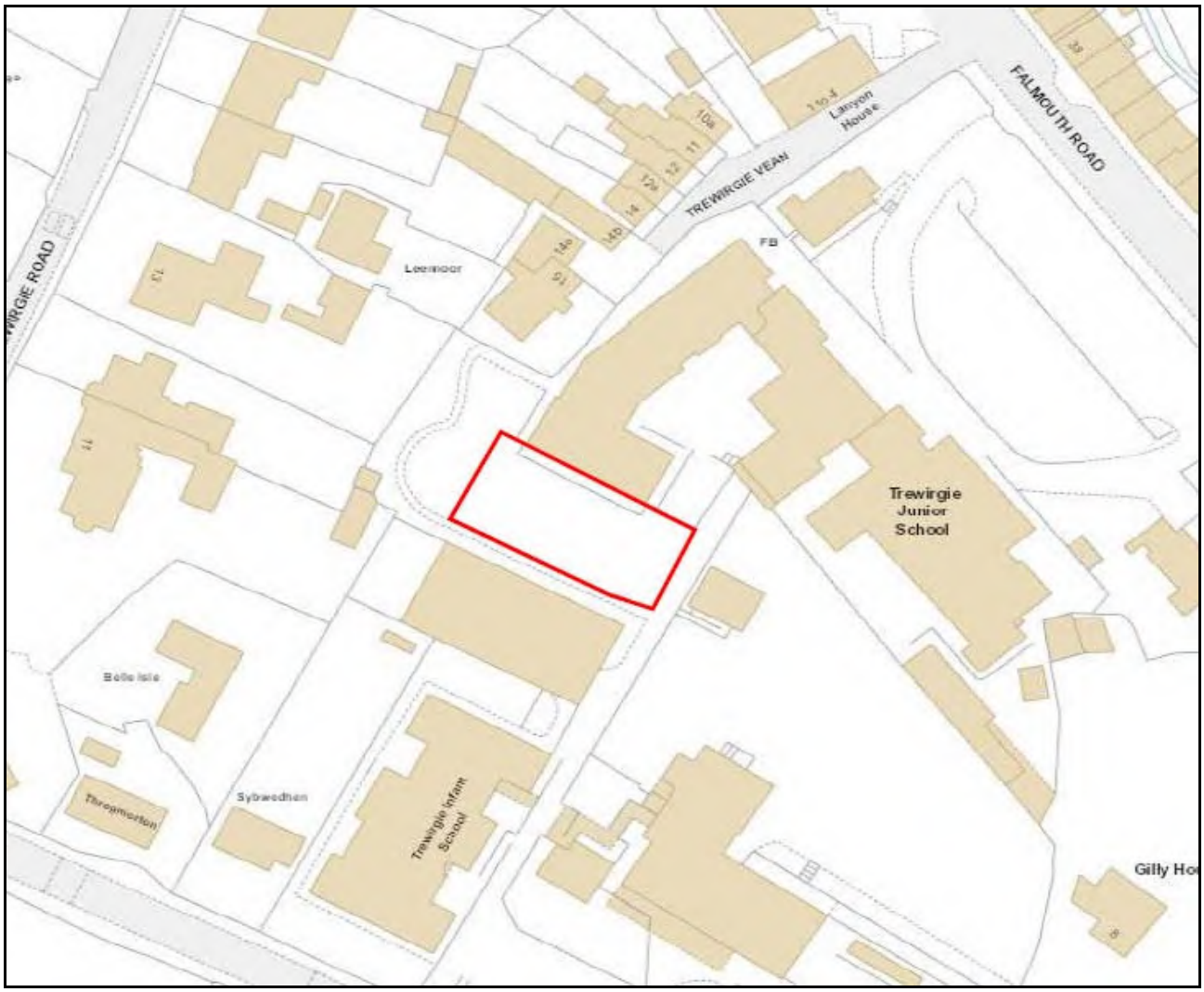
Adit	Horizontal mine drainage tunnel driven from low ground into mine workings. The adit tunnel is the shallowest level shown on mine plans and usually represents the earliest period of workings recorded. Adits have ventilation shafts at regular intervals, which are mostly unrecorded.
Alluvium	Clay, sand and debris deposited by a river. Often streamed for tin.
Burrow	A mine waste tip.
Caunter lode	A lode which runs in a different direction to the general trend of lodes in the district.
Coffin/Koffen	Trench-like openwork at surface.
Costean Pit	A small surface pit excavated to locate and/or sample a lode.
Crosscourse	Geological features which run at right-angles to the principal lodes of a district, and are vertical or sub-vertical faults. Mostly barren of payable minerals, but can carry values of iron ore, cobalt and other metallic minerals. Also known as 'guides' or 'trawns' in the St Just and St Ives mining districts respectively.
Crosscut	Tunnel driven underground, usually at right-angles to the lodes.
Dip of Lode	Angle of inclination of a lode from the horizontal.
Drive	Tunnel driven along the course of a lode.
Elvan	Igneous rock (quartz-porphyry) occurring as a vein or dyke. Can be extremely hard. Exploited by quarrying.
Granite	Igneous rock. Crystalline mixture of quartz, feldspar and mica.
Greenstone	Igneous rock also called 'blue elvan'. Generally extremely hard.
Gunnis	Open stope at surface or underground.
Kaolinisation	Alterations or weathering of granite to clay and sand from solid rock.
Killas	Generic term given to sedimentary rock in Cornwall.
Leat	A man-made watercourse.
Level	Horizon underground where ore movement and communications are maintained. Levels consist of lode drives and crosscut tunnels: i.e. 12 fathom level; the system of tunnels driven at 12 fathoms below adit horizon.
Lode	A mineralised structure or vein. Most lodes run from surface vertically or sub-vertically, and can vary from a few inches to several metres in width.
Mundic	Iron pyrite, arsenic and sulphur - arsenopyrite.
Openwork	A surface working, which has usually left a pit or backfilled excavation.
Outcrop	The part of the lode which breaks surface. Worked-out voids and backfilled areas are outcrop features.
Rab	Weathered zone of mixed rock and soil (natural profile)
Sett	An area of land leased for mining.
Shaft	Holes in the ground, which can vary from 0.5m x 1m up to shafts 7m across. Engine shafts tends to be large (typically 3m x 2m) and adit shafts are smaller (typically 1.2m x 1.8m). Depths vary down to 700m.
Stockwork	Mass of narrow veins or lodes running parallel and sub-parallel.
Stope	Ground where lode has been removed leaving void. Sometimes open to surface.
Tailings	Residual sands and slimes from ore dressing. Usually heavily contaminated.

Mining References (generic listing)

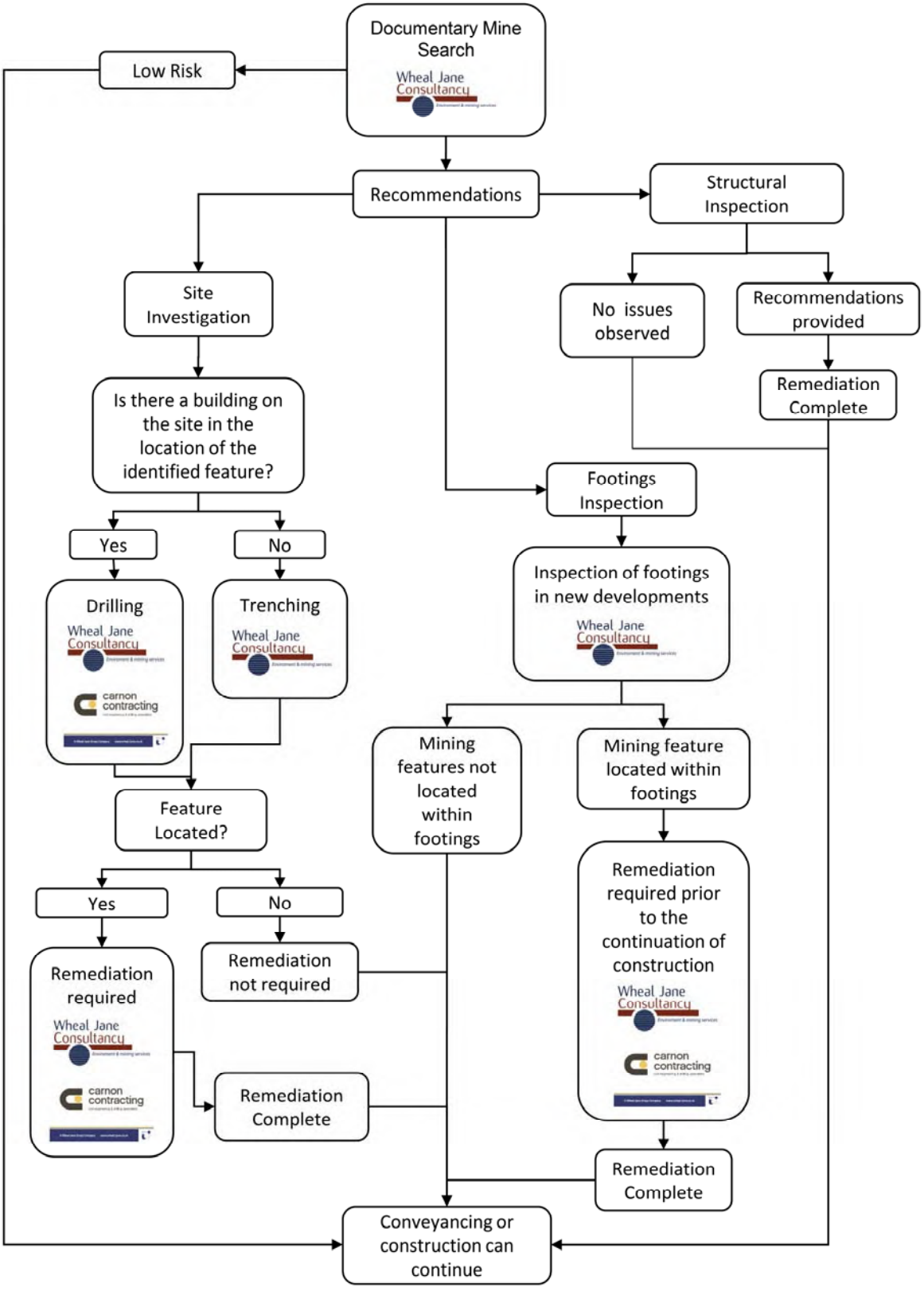
H G Dines - The Metalliferous Mining Region of South West England (2 Vols)
A K Hamilton Jenkin - Mines & Miners of Cornwall (16 Vols)
A K Hamilton Jenkin - Mines of Devon (2 Vols)
A K Hamilton Jenkin - Wendron
Thomas Spargo - Tin Mines of Cornwall (6 Vols)
J H Collins - Observations of West of England Mining Region
Sellwood, Durrance & Bristow - Geology of Cornwall
Durrance & Laming - Geology of Devon
Burt, Waite & Burnley - Cornish Mines
MRO Plans (CRO)
MRO Copies (SC Archive)
MRO Microfiche (SC)
South Crofty Archive
Tehidy Minerals Archive
JMS/JAB/JHB Archive
Wheal Jane Collection
Wheal Pendarves Collection
Geevor Collection
Thyssen Review & Plans
A K H Jenkin, Annotated 6" Plans
Geological 6" Plans
Richard Thomas Plans
Robert & Brenton Symons Plans
Nicholas Whitley Plans
K Bennet Annotated Plans
R Lyon Annotated Plans
Ordnance Survey 1880, 1906, etc Maps
H G Dines Composites

Search Request Plan

Copy of the request plans provided to Wheal Jane Consultancy to identify the property for search purposes:



Mine Search – What Next?



Wheal Jane Consultancy

Part of the Wheal Jane Group

-Laboratory Testing of Soils and Water-

-Mineralogical Surveys and Reports-

-Contaminated Land Assessments-

-Geotechnical Investigation-

-Mine Site Investigations-

-Mine Search Reports-

-Mundic Analysis-

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

Archival (Desktop) Mining Search

Mining Risk: Low

Further Action: None

Address: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Client: Trewirgie Junior School
Falmouth Road
Redruth
Cornwall
TR15 2QN

Your Ref.:

Our Ref.: MS37210

Date: 18 June 2019

Tel:
01872 562008

E-mail (mine search):

dalef@ wheal-jane.co.uk

www.wheal-jane-consultancy.co.uk

Mine Searches

Site Investigations

Environmental Surveys

Mundic Analysis

Soil and Water Analysis

Mineralogical Surveys

Full Professional Indemnity Insurance

ISO9001 Registered Firm

Registered Office
WJE Ltd
Old Mine Offices
Wheal Jane
Baldhu,Truro
Cornwall, TR3 6EE
UK

Registered in England
Number 03676442
VAT number
760 4129 48

Dear Sirs,

Re: Trewirgie Junior School, Falmouth Road, Redruth, Cornwall, TR15 2QN

We thank you for your recent request.

As instructed, we have carried out a mining search in respect of the above property, as delineated on the plan supplied for the purpose of requesting this search (a copy of which is included with this report).

The purpose of this mine search is to examine and interpret the plans and records in our possession relating to metalliferous mining activity and based upon this information, give a professional opinion in respect of potential risk to the property from such historical mining activity and, if required, make recommendations as may be deemed appropriate.

Where other workings relating to clay, stone or other minerals are noted to be in close proximity to the property mention will be made of them.

This report is of a format suitable for conveyancing purposes.

Mining Activity

The property is located in a district which has seen extensive historical mining activity.

It is sited at the eastern end of the lease or sett of the abandoned East Carn Brea Mine, which worked for tin and copper ores.

The plans and records that are currently held in our possession, relating to this district, do not indicate the presence of any old shallow/surface mine workings or shafts within the boundaries of the property.

We have found no evidence of clay workings or other mineral workings in the immediate vicinity of the property.

An old mine shaft and adit (drainage tunnel) are indicated to lie some 130 metres to the north-east of the property.

A possible shaft is indicated to lie some 100 metres to the north-north-east of the property.

A lode (mineralised structure) underlies the property at a depth indicated to be almost 200 metres below sea level.

This lode was worked by East Carn Brea Mine, with workings on its shallower zone lying over 50 metres to the south of the property.

Conclusions & Recommendations

We know of no plans to exploit metallic minerals in the locality, nor do we consider this a likely event.

Based upon the information that is held in our possession, at the time of writing this report, we have found no evidence to indicate the presence of old shallow/surface mine workings underlying the property.

We would consider that the property appears to be at a lower level of risk from being affected by past mining activity.

Scope of Search & Limitations

This search has been carried out with reference to the extensive collection of plans, records and archives that are held in our possession at the time of writing this report and from this material we have endeavoured to give as accurate a report as possible in respect of the property as delineated in the initial request.

However, taking into account that such records may not be wholly complete or accurate, that records may exist of which we do not hold copies, or records exist that are held in private sources which are not available to us and that in Cornwall, Devon and Somerset many ancient shallow workings and shafts exist of which there are no records, we cannot accept liability for any inaccuracies there may be.

This report is concerned solely with the property searched and should not be used in connection with adjacent properties as only relevant mining features have been mentioned and any known features that would not have a direct influence upon the target property may have been omitted for clarity.

The report is based upon the property boundaries as shown on the supplied request plan.

We cannot accept liability for any inaccuracies if the property boundaries, as supplied to us by the client or the client's agent, are subsequently shown to be incorrect, incomplete or if no such request plan has been supplied when the search has been requested.

This report is confidential to the client and the client's legal advisor and the client's mortgage lender and as such may be used by them for conveyancing or related purposes.

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

This report or any part of it, is not permitted to be reproduced, copied, altered or in any other way distributed by any other person or organisation.

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 or organisation other than the person/organisation commissioning this report.

This report is not a contaminated land, environmental, geotechnical or archaeological survey and should not be interpreted as such.

No site visit has been made.

We trust that this report is to your satisfaction and will be happy to answer any queries with respect to it.

Yours faithfully,

Wheal Jane Consultancy
dalef@wheal-jane.co.uk
01872 560200

Mining Glossary

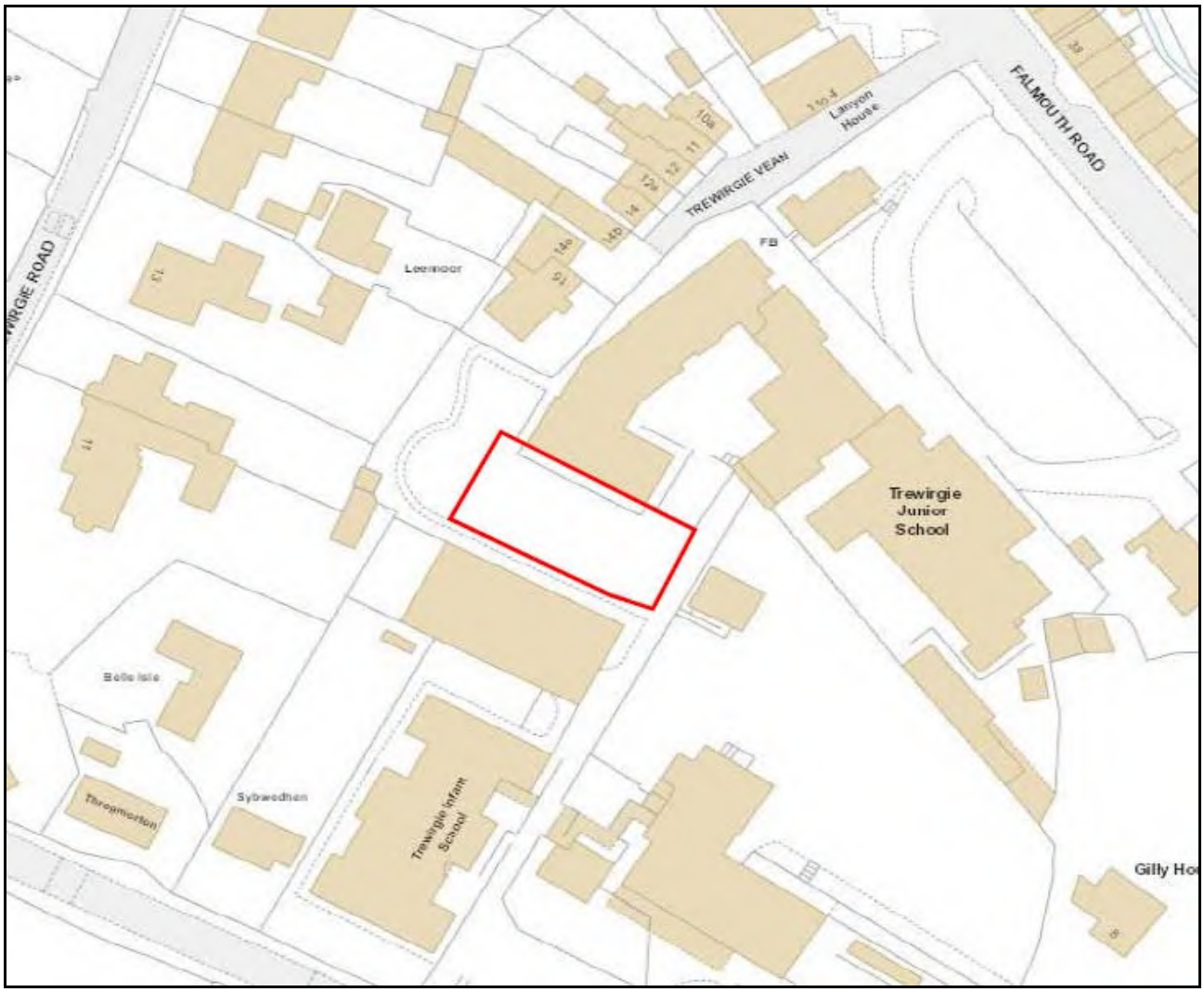
Adit	Horizontal mine drainage tunnel driven from low ground into mine workings. The adit tunnel is the shallowest level shown on mine plans and usually represents the earliest period of workings recorded. Adits have ventilation shafts at regular intervals, which are mostly unrecorded.
Alluvium	Clay, sand and debris deposited by a river. Often streamed for tin.
Burrow	A mine waste tip.
Caunter lode	A lode which runs in a different direction to the general trend of lodes in the district.
Coffin/Koffen	Trench-like openwork at surface.
Costean Pit	A small surface pit excavated to locate and/or sample a lode.
Crosscourse	Geological features which run at right-angles to the principal lodes of a district, and are vertical or sub-vertical faults. Mostly barren of payable minerals, but can carry values of iron ore, cobalt and other metallic minerals. Also known as 'guides' or 'trawns' in the St Just and St Ives mining districts respectively.
Crosscut	Tunnel driven underground, usually at right-angles to the lodes.
Dip of Lode	Angle of inclination of a lode from the horizontal.
Drive	Tunnel driven along the course of a lode.
Elvan	Igneous rock (quartz-porphyry) occurring as a vein or dyke. Can be extremely hard. Exploited by quarrying.
Granite	Igneous rock. Crystalline mixture of quartz, feldspar and mica.
Greenstone	Igneous rock also called 'blue elvan'. Generally extremely hard.
Gunnis	Open stope at surface or underground.
Kaolinisation	Alterations or weathering of granite to clay and sand from solid rock.
Killas	Generic term given to sedimentary rock in Cornwall.
Leat	A man-made watercourse.
Level	Horizon underground where ore movement and communications are maintained. Levels consist of lode drives and crosscut tunnels: i.e. 12 fathom level; the system of tunnels driven at 12 fathoms below adit horizon.
Lode	A mineralised structure or vein. Most lodes run from surface vertically or sub-vertically, and can vary from a few inches to several metres in width.
Mundic	Iron pyrite, arsenic and sulphur - arsenopyrite.
Openwork	A surface working, which has usually left a pit or backfilled excavation.
Outcrop	The part of the lode which breaks surface. Worked-out voids and backfilled areas are outcrop features.
Rab	Weathered zone of mixed rock and soil (natural profile)
Sett	An area of land leased for mining.
Shaft	Holes in the ground, which can vary from 0.5m x 1m up to shafts 7m across. Engine shafts tends to be large (typically 3m x 2m) and adit shafts are smaller (typically 1.2m x 1.8m). Depths vary down to 700m.
Stockwork	Mass of narrow veins or lodes running parallel and sub-parallel.
Stope	Ground where lode has been removed leaving void. Sometimes open to surface.
Tailings	Residual sands and slimes from ore dressing. Usually heavily contaminated.

Mining References (generic listing)

H G Dines - The Metalliferous Mining Region of South West England (2 Vols)
A K Hamilton Jenkin - Mines & Miners of Cornwall (16 Vols)
A K Hamilton Jenkin - Mines of Devon (2 Vols)
A K Hamilton Jenkin - Wendron
Thomas Spargo - Tin Mines of Cornwall (6 Vols)
J H Collins - Observations of West of England Mining Region
Sellwood, Durrance & Bristow - Geology of Cornwall
Durrance & Laming - Geology of Devon
Burt, Waite & Burnley - Cornish Mines
MRO Plans (CRO)
MRO Copies (SC Archive)
MRO Microfiche (SC)
South Crofty Archive
Tehidy Minerals Archive
JMS/JAB/JHB Archive
Wheal Jane Collection
Wheal Pendarves Collection
Geevor Collection
Thyssen Review & Plans
A K H Jenkin, Annotated 6" Plans
Geological 6" Plans
Richard Thomas Plans
Robert & Brenton Symons Plans
Nicholas Whitley Plans
K Bennet Annotated Plans
R Lyon Annotated Plans
Ordnance Survey 1880, 1906, etc Maps
H G Dines Composites

Search Request Plan

Copy of the request plans provided to Wheal Jane Consultancy to identify the property for search purposes:



Wheal Jane Consultancy

Environment & mining services

- Mine search reports**,** using the most extensive privately-owned mine plan archive in the region
- Mining Site Investigations – by drilling or trenching
- Mundic analysis
- Phase 1 Environmental surveys
- Laboratory testing of soils and water
- Mineralogical surveys and reports

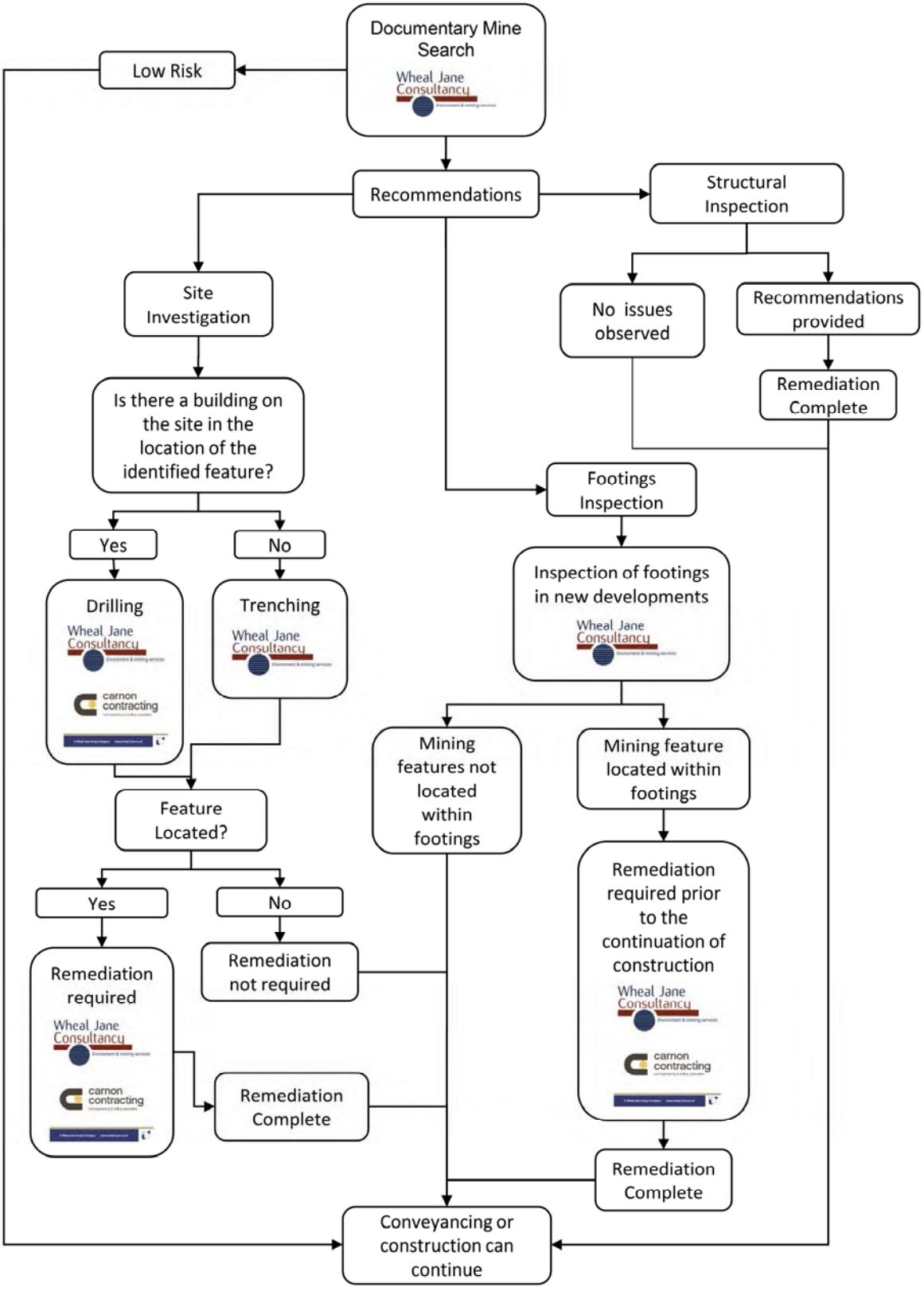
Accuracy, quick turnaround times, competitive prices, fully qualified and experienced staff, full professional indemnity insurance cover.

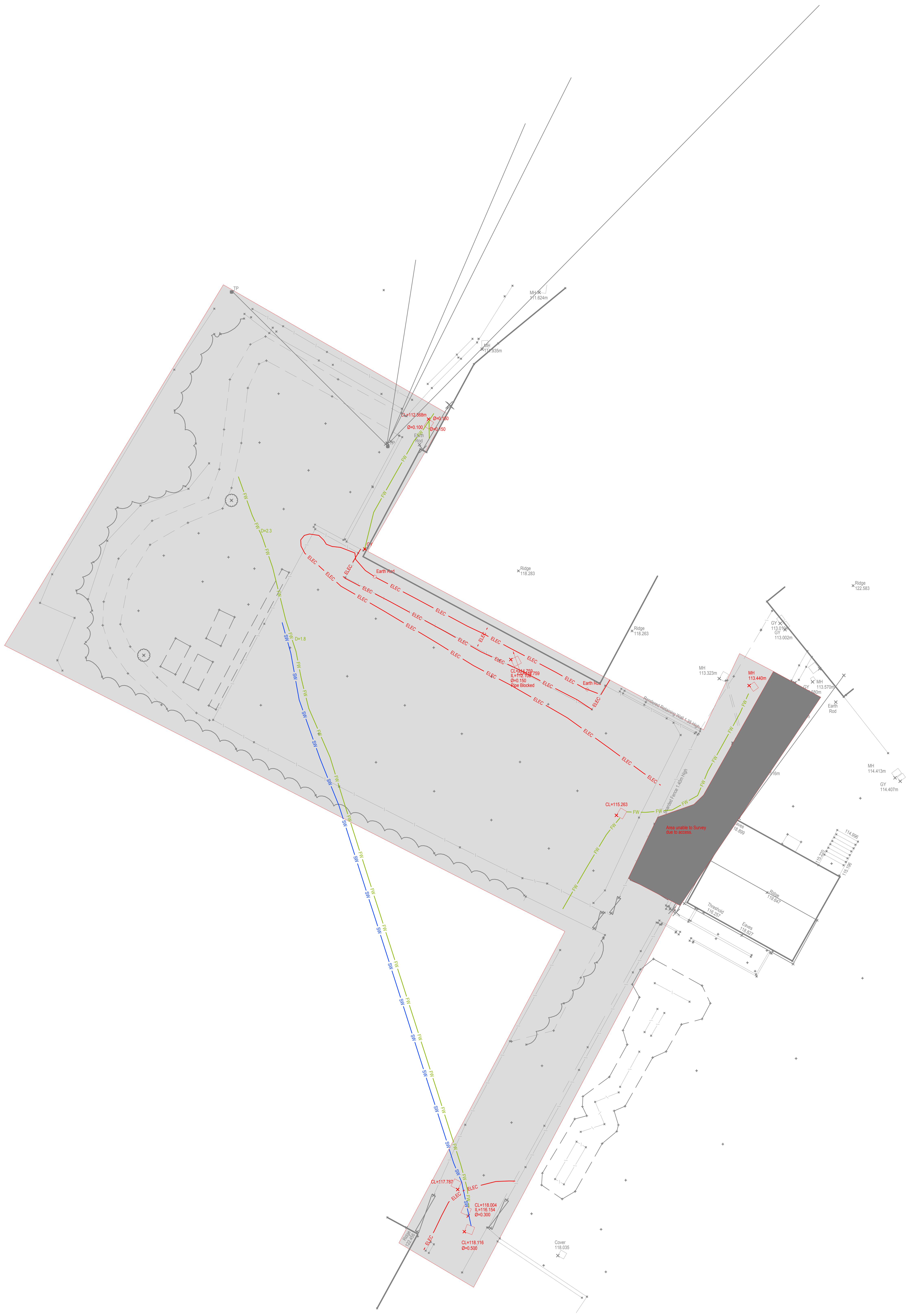
Cornwall's first ISO certified mine search and site investigation specialists

european certification group ISO 9001 REGISTERED FIRM UKAS QUALITY MANAGEMENT 054

european certification group ISO 14001 REGISTERED FIRM UKAS ENVIRONMENTAL MANAGEMENT 054

Mine Search – What Next?





1:200

4m 0 4m 8m 12m 16m 20m

Notes:

Ⓒ Copyright Measura

N

Datum Reference = Ordnance

Building Survey Legend

Building Line
Barge Board
Ground
Steps
Rain Water Pipe
Windows
Beams
Pipes
Roof
Kitchen
Ventilation
Bathroom
Storage
Heating

Floor To Sill Height	F/S 0.87	Floor Level	FL 50.00
Floor To Head Height	F/H 2.05	Ground Level	GL 52.00
Door Head Height	DH 2.05	Beam Height	BH: 2.20
Room Area	Area: 9.04	Structural Ceiling Height	SCH 2.27

Topographical Survey Legend

Banks Top
Banks Bottom
Road Centre
Kerb Line
Contour Line Major 50.00
Contour Line Minor 50.50
Fence Line
Wall
Hard edge
Soft Edge
Vegetation

BT	British Telecom	Spot Level	× 50.00
CATV	Cable Tv		
EP	Electricity Pole	Gate	
ER	Earth Rod		
FH	Fire Hydrant	Building	
FP	Flag Pole		
GAS	Gas Cover		
GY	Gully	Tree	
IC	Inspection Cover		
LP	Lamp Post		
MH	Manhole		
MKR	Marker		
RE	Rodding Eye	Station Marker	
RWP	Rain Water Pipe		
SC	Stop Cock		
SVP	Soil Vent Pipe		
TK	Top Of Kerb		
TWL	Top Of Wall	Bore Hole	Bore Hole
TP	Telegraph Pole		
WAT	Water Cover	Trial Hole	Trial Hole

measura
Surveying & Site Engineering

LAND & TOPOGRAPHICAL SURVEYING - MEASURED BUILDING - LASER SCANNING - 3D COLOURED POINT CLOUDS - UTILITY DETECTION & MAPPING - SITE ENGINEERING/SETTING OUT - ENGINEERING SURVEY - MACHINE CONTROL

94 FORE STREET
BODMIN
CORNWALL
PL31 2HR
01208 74660
office@measura.co.uk
www.measura.co.uk

Client:
Faithful & Gould

Project:
Trewirgie Junior School
Redruth

Title:
Utility Detection Survey

Date: 29.03.19	Scale 1:200@A1	Cad Ref: -
Surveyor: ADS/BL/LG	Drawn: ADS/BL	Checked: ADS
Job/Dwg No: 0319-1040-001		Rev A

Appendix E. Radon Barrier Data Sheets

VISQUEEN TOP HAT UNITS

Top Hat Unit

- **Provides an effective seal around service pipe penetrations**

Description
Visqueen Top Hat Units are used to provide an effective seal around service pipe penetrations. They are available in a range of sizes, the typical size being 110mm in diameter.

Application
Airtight seals should be formed around all service entry points. Visqueen Pre-formed Top Hat Units are available for sealing around pipe entries. The base of the pre-formed unit should be sealed using Visqueen Double-sided Jointing Tape and Visqueen Girth Jointing Tape.

Please Note:
When ordering your Top Hat Units, please provide the outside diameter of your pipe for the correct Top Hat fitting.

Installation
Procedure
Cut a circular hole in the membrane as close as possible to the pipe, or pipe socket. Ensure that pipe penetrations do not occur at joints in the membrane.

With the pipe in position, slide the Visqueen Pre-formed Top Hat Unit over the pipe (various diameters are available – 110mm being the most common).

Mark the extent of the square horizontal skirt over the membrane and also mark the line of the top of the top hat unit around the pipe.

Raise the top hat unit and cut four lengths of Visqueen Double Sided Jointing Tape, one for each side of the horizontal skirt, allowing for an overlap at each corner. Cut one length to go round the pipe.

Start to remove the protective paper from the double-sided tape around the pipe and raise it up at an angle so that it will project above the top hat unit when it is stuck to the membrane.

Release the protective paper from each of the four lengths of double-sided tape. Lower the top hat unit, ensuring that the free end of the protective paper around the pipe is reachable, and seal the horizontal skirt to the membrane.

Gradually remove the remainder of the protective film from the double-sided tape around the pipe.

Seal the junction of the horizontal skirt and the membrane with Visqueen Girth Jointing Tape and secure the top hat unit to the pipe with a jubilee clip.

VISQUEEN BUILDING PRODUCTS

DATASHEET

Technical Support: 0333 202 6800
LAST UPDATED: 16.11.2015

VISQUEEN TOP HAT UNITS

Top Hat Unit

Appendix A

Visqueen Building Products
Visqueen is the market leader in the manufacture and supply of structural waterproofing and gas protection systems. Visqueen offers the complete package - a proven, reliable range backed by a technical support service that goes unmatched in the market - everything you would expect from a reputable and ethical company.

System Accessories
To ensure full waterproofing protection please use the following certified system components:

- Visqueen High Performance (HP) Tanking Primer
- Visqueen TreadGUARD1500
- Visqueen Protect&Drain
- Visqueen Top Hat Unit

Downloads Library
- Technical Datasheet
- Declaration of Performance
- Visqueen's Guide to CE Marking

Find your local stockist
Search our directory of Visqueen specification Stocking Centres to locate your nearest Visqueen Partner.

Distributor Support
Our specification Stocking Centres can access a free library of sales support tools, bespoke catalogues and more, click here.

Technical support throughout your project
We are specialists in our field and can help you specify the correct solutions with the necessary performance levels, in accordance with building regulations.

- Nationwide site support team
- Specification advice
- Installation guidance & project sign off
- System design including CAD details

Heanor Gate | Heanor | Derbyshire DE75 7RG
Email: enquiries@visqueenbuilding.co.uk
Tel: 0333 202 6800 | Web: www.visqueenbuilding.co.uk

VISQUEEN RADON MEMBRANE

Radon Membrane
CE Mark to EN 13967:2017

- **Independently tested for radon resistance**
- **BBA Certified**
- **High resistance to puncture**
- **Also acts as a Damp Proof Membrane**
- **Complies with BR 211: 2015**

Description
Visqueen Radon Membrane is manufactured from an enhanced blend of polymer films that is suitable for use in the protection of buildings from the ingress of radon gas.

Visqueen Radon Membrane also acts as a damp proof membrane, but is not intended for use where there is the risk of hydrostatic pressure. It is approved for use in Ireland. Visqueen Radon Membrane and ancillary components must be used in accordance with the recommendations in the most recent edition of Building Research Establishment Report BR 211:2015. Visqueen Radon Membrane can be used in most common floor constructions. It is installed in a similar way to a damp proof membrane, but with much greater attention paid to workmanship and detailing in order to achieve effective sealing at all locations.

Assessing The Risk For Your Area
Because the level of risk differs across the country according to local geology, the risk depends on where your site is situated.

The main source of guidance on the risks and solutions is BRE Report BR 211:2015. It includes maps for determining the need for radon protection, as well as detailed information on construction solutions. The maps are used as the basis for determining in general terms the required degree of radon protection (“basic” or “full”) in your area. Essentially, “basic” protection means you need to lay a ground floor radon membrane and “full” protection means that, in addition, you need to make provision for underfloor depressurisation.

Your local authority Building Control Officer or a local Approved Inspector should also be able to help you determine the broad level of risk in your area but, like the maps, they can only give a broad indication. Ultimately, if you are in an area that is potentially at risk, there is no substitute for an assessment close to your actual site – you may be in a pocket where the geology is different from the region as a whole, allowing the required protection to be downgraded from “full” to “basic”, or even making radon protection unnecessary.

Determining The Risk For Your Site
If you are in an area where the maps indicate that no protection is required, there is no need to take further action. However, if the maps indicate the need for “full” protection, it is worth confirming this by requesting a detailed assessment from the British Geological Survey (BGS), which focuses more accurately on your location. This may show that only “basic” protection is necessary on your particular site.

Construction Solutions

Radon Protection
Once you have determined whether you need “basic” or “full” protection, you must check that your preferred ground floor construction gives you the right level of protection. The options are as follows:

Basic Radon Protection

For “basic” protection, you need to provide an airtight barrier covering the entire ground floor of the building, linked to the damp proof course using cavity trays which prevent radon moving through the wall cavity and into the building. All junctions between the floor membrane and cavity trays should be sealed. You can achieve “basic” protection with both ground supported and suspended (ventilated) concrete ground floors by installing a radon-proof membrane system. With a suspended concrete slab, the space beneath the floor is available to ventilate radon safely away should “full” protection be required.

Full Radon Protection
For “full” protection, you not only need to provide a radon-proof floor membrane, but also an underfloor depressurisation system. Depressurisation can be achieved by natural or mechanical underfloor ventilation through the subfloor space, or from a radon sump if there is no underfloor space. If you prefer to use an in situ slab in contact with the ground, the slab should be supported on the inner leaf. The full system consists of;

- Visqueen Radon Jointing System, prevents radon ingress at joints,
- Visqueen Top Hat Units prevents radon ingress at pipe penetrations,
- Visqueen Radon Sumps, where subfloor depressurisation may be required.

Installation
Visqueen Radon Gas Membrane and ancillary components must be installed in accordance with the recommendations of Building Research Establishment BRE 414 “Protective measures for housing on gas contaminated land”, NHBC guidelines and the Chartered Institute of Environmental Health Ground Gas Handbook. The product is not intended for use where there is the risk of hydrostatic pressure.

The membrane should be installed on a compacted sand blinding layer or smooth concrete float finish allowing adequate overlap for jointing between the sheets and avoiding bridging (i.e. areas of unsupported membrane). For beam and block floor construction, the membrane must be placed above. In areas where high levels of unsupported membrane occur it is recommended that Visqueen Pre Applied Membrane is used. To avoid slip or shear planes and high compressive loadings it is not recommended to take the membrane through the wall. In order to provide a continuous barrier across the cavity Visqueen Zedex CPT DPC should be taken through the blockwork and incorporated below the damp proof course cavity tray in the outer leaf. Laps can be joined together by either using the Visqueen Gas Barrier Jointing System or welded by our specialist onsite contractors.

Jointing The Radon Membrane
Visqueen Radon Membrane should be overlapped by at least 150mm and sealed using Visqueen DPM Double Sided Jointing Tape. The joint should be secured with VisqueenPro Single Sided Jointing Tape. The membrane should be clean and dry at the time of jointing.

In demanding site conditions high performance Gas Resistant (GR) lap tape is available as an alternative to VisqueenPro Single Sided Jointing tape.

Punctures
If the membrane is punctured or perforated then a patch of material with identical thickness should be lapped at least 150mm beyond the limits of the puncture and bonded with Visqueen Double Sided Jointing Tape and sealed with VisqueenPro Single Sided Jointing Tape. Alternatively a patch can be formed using Visqueen Detailing Strip and lapped at least 150mm beyond the limits of the puncture. External and internal corners should be round and reinforced with Visqueen Detailing Strip. Where this is not possible and the three dimensional shapes are complex it is recommended a preformed unit is used.

Covering
Visqueen Radon Membrane should be covered by a protective layer as soon as possible after installation. Care should be taken to ensure that the membrane is not punctured, stretched or displaced when applying a screed or final floor covering. A minimum thickness of 50mm screed is recommended. When reinforced concrete is to be laid over the barrier the wire reinforcements and spacers must be prevented from contacting the barrier. It is recommended that the barrier is covered with Visqueen Protection Boards or screed before

positioning the reinforcement. When underfloor heating is being installed, it is recommended that the barrier is positioned between the blinded hardcore and insulation. This will protect the insulation from moisture and avoid any risk of overheating the membrane.

Storage and Handling

Visqueen Radon Gas Barrier is classified as non-hazardous when used in accordance with the relevant Code of Practice (CP 102:1973). The product is chemically inert and is not affected by acids and alkalis that may be present in the sub-soils. The material is not recommended for uses where it will be exposed to long periods of outdoor weathering as exposure to ultraviolet light will embrittle the product. Weathering will not occur when the membrane is installed in accordance with CP 102:1973. Care should be taken to avoid accidental damage when handling the membrane on site. When the weather is cold all jointing tapes should be kept in a warm and dry place until needed. Installation is not recommended below 5°C.

System Components

- Visqueen Double Sided Jointing Tape: a blue butyl based strip adhesive.
- VisqueenPro Single Sided Jointing Tape: a single sided tape suitable for securing laps.
- Visqueen Foil Backed Lap Tape: a high performance single sided overlap tape for securing laps in demanding conditions.
- Visqueen Zedex CPT High Performance DPC: a co-polymer thermoplastic damp proof course suitable for horizontal, vertical or cavity tray applications. Suitable to prevent the ingress of radon gas.
- Visqueen Preformed Pipe Cloak (Top Hat) Units: a preformed unit providing an effective airtight seal around service pipe penetrations (see Visqueen drawing PFU-105).
- Visqueen Preformed Unit: three-dimensional preformed unit to prevent damp or gas ingress at junctions or complex details. Standard or non standard types as shown on construction drawings.
- Visqueen Gas Resistant Self Adhesive Detailing Strip: self adhesive strip for detailing complex shapes and junctions.
- Visqueen Heavy Duty Protection Boards: providing membrane protection from damage from following trades, positioning of reinforcement, etc.
- Visqueen Radon Sump: providing a depressurisation zone, for use in full radon protection systems.

Technical Data and CE Mark

Visqueen Radon Membrane complies with the requirements and clauses of EN 13967 - Flexible sheets for waterproofing - Plastic and rubber damp proof sheets including plastic rubber basement tanking sheet - Definitions and characteristics.

British Board of Agrement performed the initial inspection of the manufacturing plant and of factory production control and the continuous surveillance, assessment and evaluation of factory production control, and issued the certificate of constancy of conformity of the factory production control. 0836–CPD – 13/F029 applies.

DATASHEET

Technical Support: 0333 202 6800
LAST UPDATED: 26.10.2018

VISQUEEN RADON MEMBRANE

Radon Membrane
CE Mark to EN 13967:2017

Product Data

Product Data

Characteristic	Test method	Units	Compliance criteria	Value or Statement
Visible defects	EN 1850 -2	-	Pass/Fail	Pass
Length	EN 1848-2	m	-0%/+10%	25
Width	EN 1848-2	m	-2.5%/+2.5%	4
Straightness	EN 1848-2	-	Pass/Fail	Pass
Thickness	EN 1849-2	mm	-12.5%/+12.5%	0.3
Mass	EN 1849-2		-12.5%/+12.5%	271
Tensile Strength - MD	EN EN12311		>MLV	15
Tensile Strength - TD	EN EN12311		>MLV	15
Tensile Elongation - MD	EN EN12311	%	>MLV	300
Tensile Elongation - TD	EN EN12311	%	>MLV	300
Joint Strength	EN12317-2	N	>MLV	144
Watertightness 2kPa	EN 1928	-	Pass/Fail	Pass
Resistance to impact	EN 12691	mm	>MLV	200
Durability (artificial ageing)	EN 1296 and EN 1928	-	Pass/Fail	Pass
Durability Chemical Resistance	EN 1847	-	Pass/Fail	Pass
Resistance to tearing (nail shank) TD	EN 12310-1	N	MDV	190
Resistance to tearing (nail shank) MD	EN 12310-1	N	MDV	205
Resistance to static loading	EN 12730	Kg	>MLV	Pass-20kg
Water vapour transmission - resistance	EN 1931	MNs/g	MDV	1100
Water vapour transmission - permeability	EN 1931		MDV	0.2
Radon Permeability	SP Test Method		MDV	5.77x10-12
Radon Transmittance	SP Test Method	m/s	MDV	1.922x10-8
Reaction to Fire	EN 13501-1	Class	MDV	F

DATASHEET

Technical Support: 0333 202 6800
LAST UPDATED: 26.10.2018

Appendix A

Radon Membrane
CE Mark to EN 13967:2017

About Visqueen

Visqueen is the market leader in the manufacture and supply of structural waterproofing and gas protection systems. Visqueen offers the complete package – a proven, reliable range backed by a technical support service that goes unmatched in the market - everything you would expect from a reputable and ethical company.

Complete Range, Complete Solution

- Structural Waterproofing
- Damp Proof Course
- Damp Proof Membranes
- Gas Protection and Gas Venting
- Vapour Control Layers
- Stormwater Protection

Download Library

- Technical Datasheet
- Standard Details
- Technical Service
- Visqueen Gas Protection Brochure
- NBS Clauses
- BBA Certificates
- Material Safety Datasheets
- Specification Guide

Find your local stockist

Search our directory of Visqueen specification Specialist Centres to locate your nearest Visqueen Partner.

Technical support throughout your project

We are specialists in our field and can help you specify the correct solutions with the necessary performance levels, in accordance with building regulations.

- Nationwide site support team
- Specification advice
- Installation guidance & project sign off
- System design including CAD details

CPD Seminars and Training Academy

Gas Protection CPD
The specification, technical design, and installation of gas protection systems, enabling the sustainable regeneration of brownfield sites.

Structural Waterproofing CPD
The specification, technical design, and installation of structural waterproofing systems for protection against water and damp ingress in both above and below ground projects.

Visqueen Training Academy
We are now able to offer exclusive in depth training opportunities on a wide variety of Visqueen products at our Training Academy.

Visqueen Special Projects
We provide high-level expertise, comprehensive support and experience in all types of waterproofing and gas protection.

VISQUEEN
Part of RPC bpi group
Heanor Gate Road, Heanor, Derbyshire, DE75 7RG
0333 202 6800 enquiries@visqueen.com www.visqueen.com