



COAL MINING RISK ASSESSMENT

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Prepared for:

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Date:

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1.3 Scope of Coal Mining Risk Assessment

EnviroSolution Ltd has been commissioned to prepare a Coal Mining Risk Assessment Report (CMRA) for the proposed development site, in order to provide the Local Planning Authority with information on the coal mining legacy risk(s), an assessment of their potential impact on land stability, and provide recommendations for the need to carry out any further investigations (including intrusive boreholes) to address these risk(s).

The CMRA has been undertaken in accordance with the principles of best practice including the Coal Authority's guidance document "Risk Based Approach to Development Management - Resources for Developers Version 3" (2014) (Ref. 1), CIRIA "SP32 Construction over Abandoned Mine Workings" (2002) (Ref. 2) and CIRIA "C758D Abandoned Mine Workings Manual" (2019) (Ref. 3).

The purpose of the CMRA Report is to:

- present a desk-based review of available information on the coal mining issues that are relevant to the application site;
- use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact issues;
- set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of National Planning Policy with regard to development on unstable land.

1.4 Sources of Information

This report is based on current information of past mining activities relevant to the site. The following information sources have been used:

- CON29M Mining Report dated 25th May 2021 (Ref: IT-15370330 **Appendix B**);
- BGS Geoindex geological map;
- BGS geological 1:50,000 England and Wales Sheet 121 Wrexham;
- Groundsolve Ltd 2013: Geotechnical Report, Wern School, Rhos, 14139;
- Coal Authority Interactive Website;
- Historical Ordnance Survey maps.

The Main coal outcrop is shown to be located in close proximity to the site (see **Figure 2**) and is likely to be encountered at shallow depths. Further outcrops of coal are located further to the west. The Main Coal appears to be missing from Coal Authority records.

Using the recorded regional dip of 6° to the east and the trigonometric relationship below, the depth of the coal seam beneath the site can be estimated.

Main Coal (up to 2.30m thick)

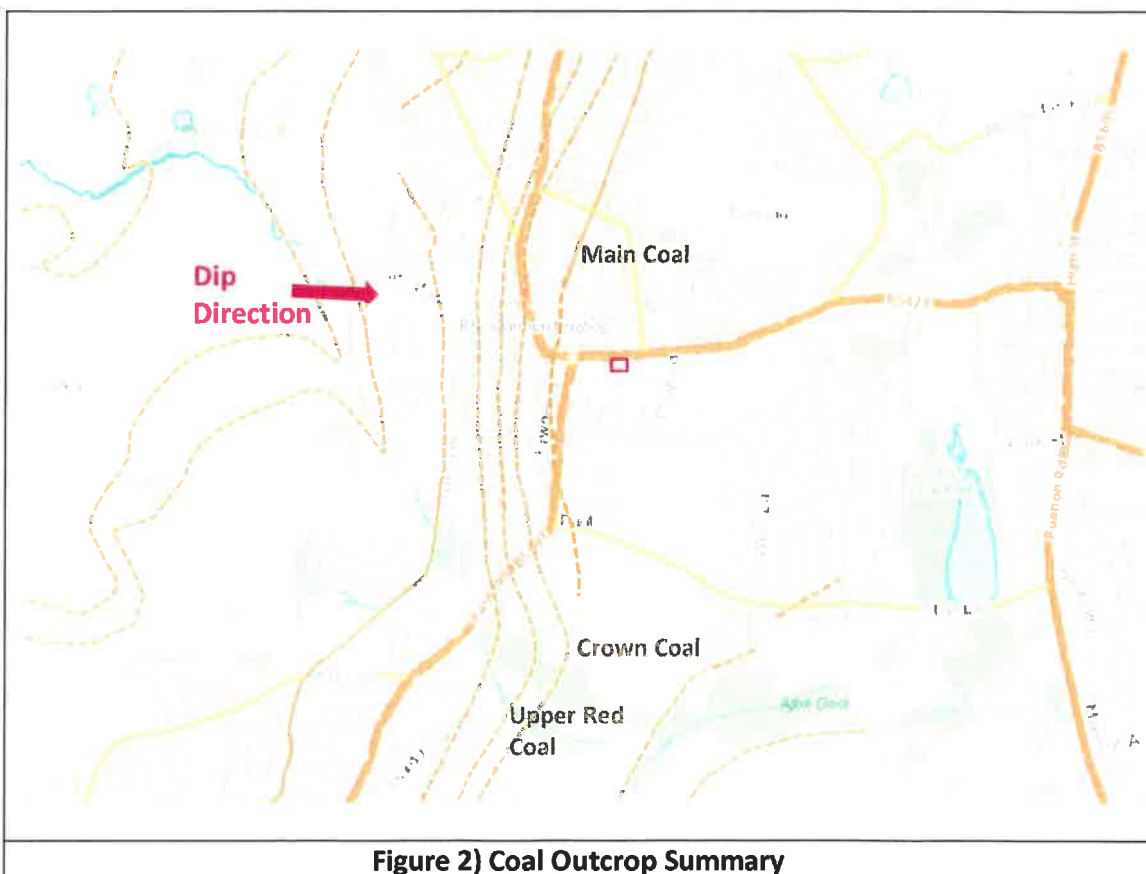
$$\tan 6^\circ \times 110\text{m} + 3.0\text{m (superficial thickness)} - 3.0\text{m (elevation change)} = 11.50\text{m}$$

Crown Coal

$$\tan 6^\circ \times 170\text{m} + 3.0\text{m (superficial thickness)} + 1.0\text{m (elevation change)} = 22.0\text{m}$$

Upper Red Coal

$$\tan 6^\circ \times 210\text{m} + 3.0\text{m (superficial thickness)} + 3.0\text{m (elevation change)} = 28.0\text{m}$$



The site is situated within a Secondary Opencast Coal Resource Area (**Appendix F**). The primary resource area constitutes the main target for opencast coal extraction and comprises a relatively closely spaced succession of variable but generally thick coals. These coals typically occur within a certain discrete stratigraphic interval, which comprises the succession from the middle to upper part of the South Wales and Pennine Lower Coal Measures

3 Third Party Site Investigations

The site has been subject to previous desk-based studies and intrusive site investigations. EnviroSolution conducted a search of the Local Authority Planning Records for the site and surrounding area. This section aims to summarise the works that have been completed and summarise the main findings.

3.1 Groundsolve Limited. 2013. Geotechnical Report, Wern School, Rhosllanerchrugog. 1413.

The report summarises the findings of a previous ground investigation undertaken at the site by South Lanc Boring of Wigan in 1972. The area of investigation covered the area formerly occupied by a school immediately south of the site referred to in the current report. A mine shaft was searched for and treated. Five boreholes were also drilled across the site.

Groundsolve Limited also undertook a geotechnical ground investigation in 2013 which included:

- Three rotary boreholes drilled to a maximum depth of 23.60m bgl.
- Nine machine dug trial pits excavated to a maximum depth of 4.60m bgl.
- Excavations for mine shafts.

A copy of the report is included in **Appendix H**.

Made Ground was encountered in the majority of the boreholes with a thickness of between 0.70m and 5.40m. It was concluded that the eastern area of the site was used as a tip following the opencast working of the Main Coal. This is shown in Figure 3 of **Appendix H**.

Diamicton was encountered beneath this, generally extending to depths of no greater than 3.70m bgl with the exception of the exploratory hole located within the old tip.

The underlying bedrock strata comprises interbedded mudstones, siltstones and sandstones. A total of 6 no. boreholes of those drilled found evidence of old workings at depth of between 18.90m and 21.0m bgl. The workings were described as 'soft drilling' with 'sight reduction in flush returns'. No voids were recorded, and it was interpreted that the workings had collapsed. **Figure 3** below shows a section across the site. The area of the proposed development considered in this report is indicated.

As part of the investigation works, a mine shaft located along the north-western boundary of the site (southern boundary of the current site) was searched for via excavating to the top of the glacial till. The search was restricted by adjacent properties and the shaft was not located.

4 Identification and Assessment of Site-Specific Coal Mining Risks

Table 2 below summarises the potential risks associated with coal mining legacy for the proposed development site, which have been identified from list sources of information.

Table 2 - Coal Mining Hazards Summary

Coal Mining Issues	Yes	No
Coal outcrops		X
Underground coal mining (recorded at shallow depths)	X	
Underground coal mining (probable at shallow depths)	X	
Recorded mine entries (shafts and adits)	X	
Unrecorded mine entries (shafts and adits)	X	
Coal mining geology (fissures)		X
Record of past gas emissions		X
Recorded coal mining surface hazard		X
Surface mining (opencast workings)		X

The Coal Authority Interactive Map Viewer (**Appendix G**) has identified that the site lies within a Development High Risk Area associated with the presence of shallow recorded coal workings, the potential for unrecorded shallow coal workings and recorded mine shafts.

The report obtained from the Coal Authority (CON29M Report, reference IT-15370330, dated 25th May 2022) revealed the property is in a surface area that could be affected by recorded underground mining in 3 no. coal seams between shallow depths (less than 30m) and 165m bgl. The seams were last worked in 1866. Records suggest the shallowest of these is likely the Main Coal.

Assuming a competent rock strata thickness equivalent to at least ten times the extraction thickness, provides adequate protection against vertical void migration leading to crown-hole development and surface subsidence (Ref 2 and 3 – See Table 5.1), it is considered that the risk posed by past recorded coal workings cannot be ruled out.

The Coal Authority report also states that the property is in an area where the Coal Authority believe there is coal at or close to the surface which may have been worked in the past. The Coal Authority has drawn attention to this and has stated that the presence of unrecorded shallow coal should be considered. It is considered that if these seams have been worked in the past, they could present a risk of surface instability.

The Coal Authority report states that they are aware of a single. recorded mine entry located within 20m of the development site boundary. The shaft information is summarised in Table 3 below.

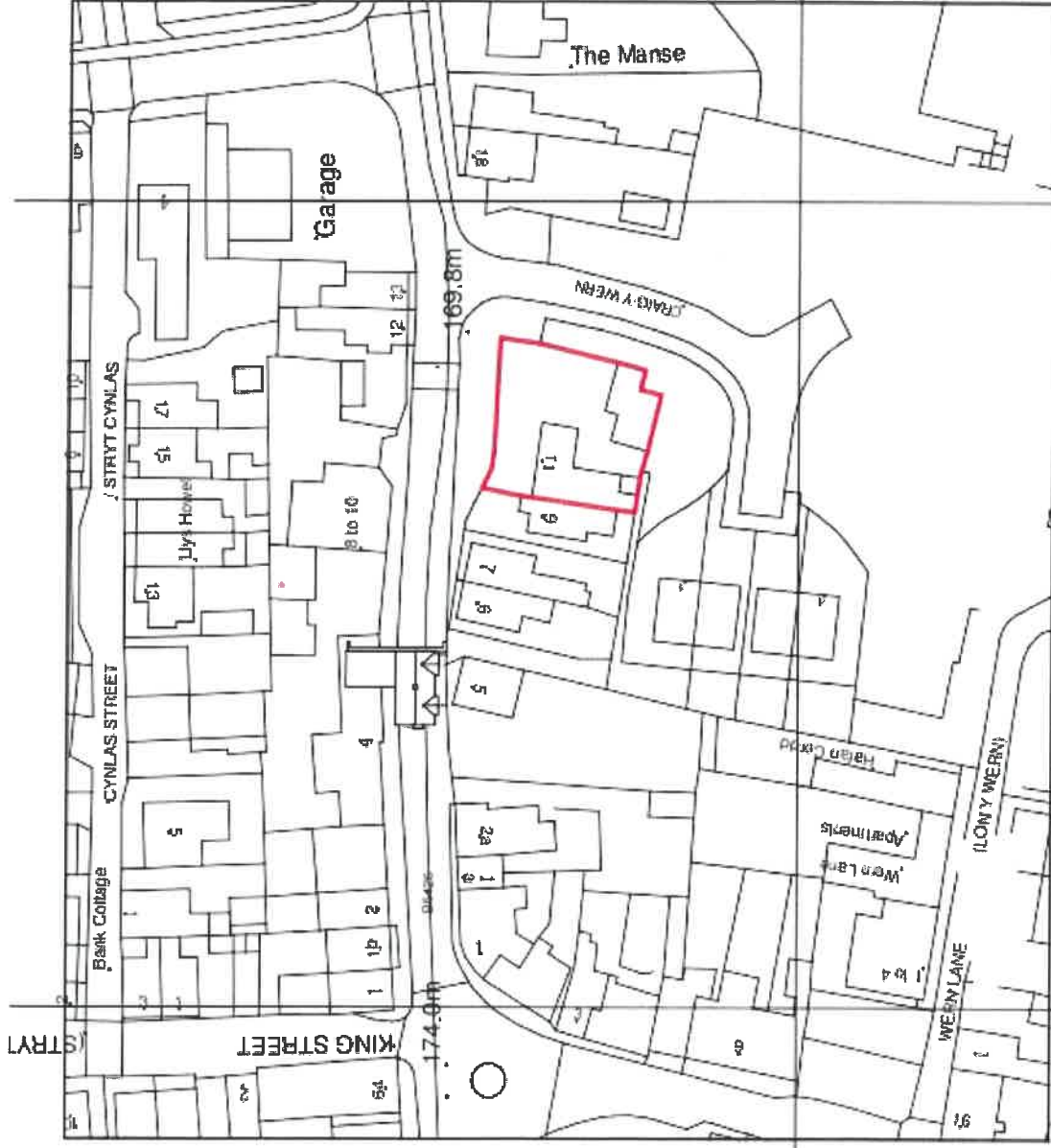
The Coal Authority mining report states the property is not within the boundary of a historic or current opencast site, and there are no license requests outstanding to remove coal via this method in the future. The risk posed to the site from opencast mining methods is therefore considered to be negligible.

There are no recorded past mining gas emissions recorded in the surrounding area, however, coal seams and coal mine workings pose a potential gas risk which should be considered in any future investigations and development. At development sites with shallow coal workings, probable shallow coal mine workings, or pathway features such as mine entries and geological disturbances on or nearby the site, it is recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance.

None of the coal seams referred to above have a particular history of spontaneous combustion, except that there is a general risk where mining methods left a significant thickness of roof coal.

7 References

1. Coal Authority, 2014, Risk Based Approach to Development Management Resources for Developers, Version 3.
2. CIRIA, 2002, SP32 Construction over Abandoned Mine Workings.
3. CIRIA, 2019, C758D Abandoned Mine Workings Manual.
4. CIRIA, Publication C665, Assessing risks posed by hazardous ground gases to buildings.



Existing Site Plan

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Appendix B – Coal Authority Report

Coal mining (CON29M) assessment

We consider there to be a potential risk to the property from past coal mining activity. For further details refer to: Past underground coal mining, Shafts and adits (mine entries).



Coal mining

Shafts and adits (mine entries)

A record of a mine entry or entries has been identified within 20 metres of the property. Additionally the zone of influence of a mine entry has been calculated to encroach into the property. Please see map on **page 4**.

It is our opinion that as the mine entry itself is likely to be outside of the property boundary a site investigation to clarify its exact condition and location is unlikely to be a viable option and that no further remote searches would be of value.

Next steps for consideration:

- Please read on for details on Coal Authority responsibilities in the event of subsidence issues relating to this mine entry, and also refer to the Shafts and adits (mine entries) section on **page 6** for further details.

In the event of damage resulting from the subsidence or settlement of this mine entry, property owners can make a claim against the mine owner or responsible person (usually The Coal Authority) under the provisions of the Coal Mining Subsidence Act 1991. The mine owner or responsible person will treat the mine entry and arrange for repairs to the property to be carried out to the reasonable satisfaction of the owner.

Past underground coal mining

Potential risk due to past underground coal mining has been identified within the boundary of the property. Whilst no further searches are required, it should be noted that in the event of coal mining settlement or subsidence occurring the property will benefit from the protection of the Coal Mining Subsidence Acts of 1991 and as amended 1994.

Next steps for consideration:

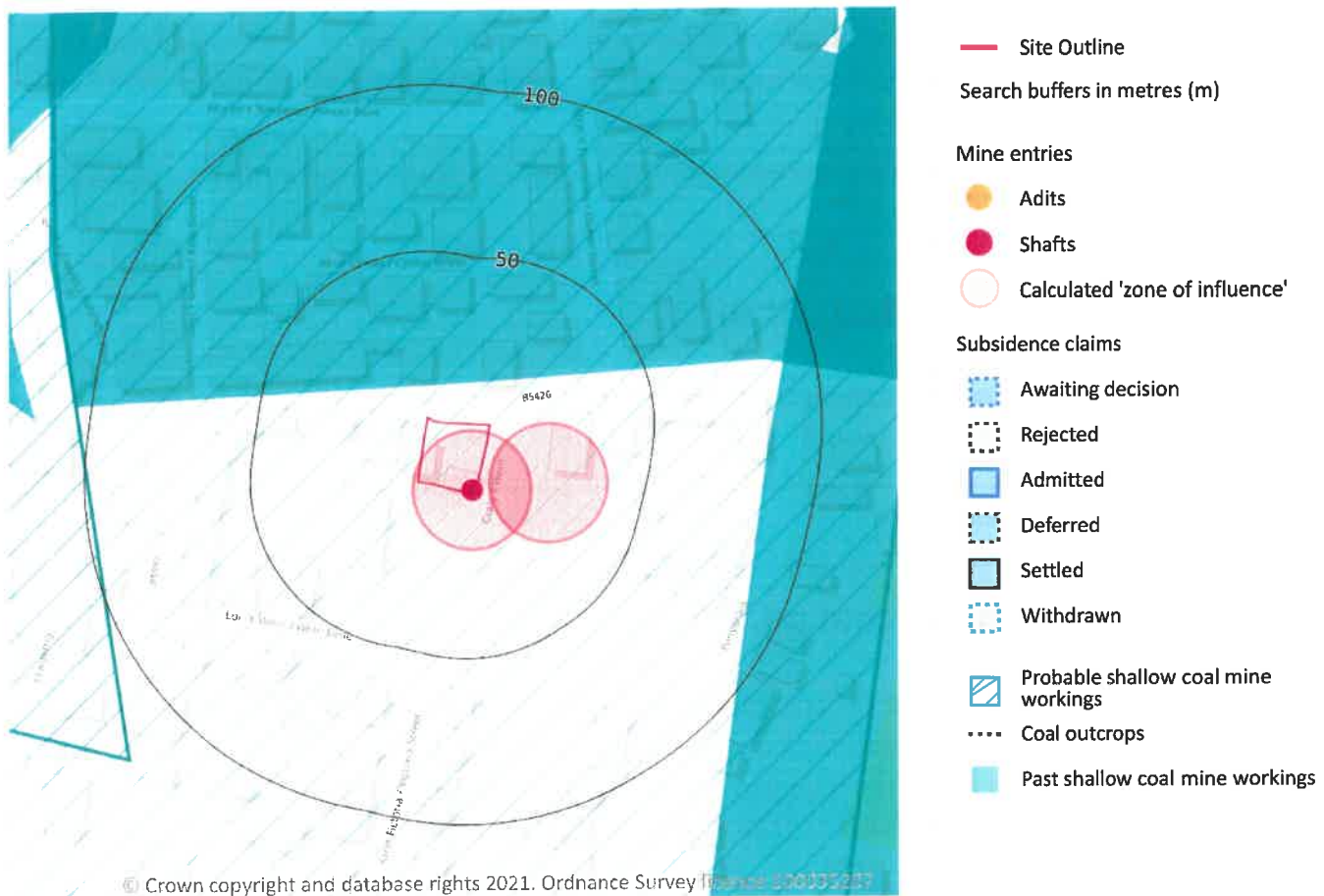
- A visual inspection of the property by a suitably qualified and experienced person may be of value in identifying any currently identifiable mining related settlement or subsidence effects.

Coal Mining Subsidence Act 1991

If any coal mining subsidence damage has occurred, as determined by the appropriate persons/bodies, the property will benefit from the protection of the Coal Mining Subsidence Acts of 1991 and as amended 1994.

This Act, however, does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester. In this instance it would be prudent to have the property visually inspected for signs of mining related settlement or subsidence by a suitably qualified and experienced person, who could be sought through <https://www.ricsfirms.com/>.

Coal mining (CON29M)



The map above shows relevant, mappable hazards identified that could constitute a risk to the property. It does not necessarily show all features or potential issues identified in this report.

Please read this report carefully, and in particular any sections flagged with an amber 'i'.

Further details of any features shown indicating the location of Mine Entries or Subsidence Claims can be found in the relevant sections of this report (4 and 9 respectively).

The following are responses to The Law Society CON29M Coal Mining search enquiries, which are used here with their permission. All responses have been produced using official Coal Authority data and the expert interpretation of Groundsure and Mining Searches UK. This report is prepared in accordance with The Law Society CON29M (2018) Guidance Notes. Additional interpretation and calculation of mine entry zones of influence has been carried out by Groundsure and Mining Searches UK using Coal Authority and British Geological Survey data.

4. Shafts and adits (mine entries)



Are there any shafts and adits or other entries to underground coal mine workings within the property or within 20 metres of the boundary of the property?

- Coal mine entries are recorded to lie within 20 metres of the property.

ID	Distance	Details	Dimensions	Treatment
1	2 m	Type: Shaft Mineral: Coal Reference: 329346-279 Name: NORTH WALES Owner: CA	Assumed diameter (m): 2 Confirmed diameter (m): - Depth (m): - Accuracy (m): 10 Source: Other: Plan of estate of Hon F. West - 1826.	Details: - Date: -

5. Coal mining geology



Is there any record of any fault or other line of weakness due to coal mining at the surface within the boundary of the property that has made the property unstable?

- No damage arising from geological faults or other lines of weakness activated by coal mining are recorded within the property.

6. Past opencast coal mining



Is the property situated within the geographical boundary of an opencast site from which coal has been removed in the past by opencast methods?

- The property does not lie within the boundary of an opencast site from which coal was removed by opencast methods.

7. Present opencast coal mining



Is the property within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods?

- The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

10. Mine gas emissions



Does the Coal Authority have record of any mine gas emission within the boundary of the property being reported that subsequently required action by the Authority to mitigate the effects of the mine gas emission?

- **No mine gas emissions are recorded within the boundary of the property.**

11. Emergency Surface Hazard Call Out incidents



Have the Coal Authority carried out any work on or within the boundaries of the property following a report of an alleged hazard related to coal mining under the Authority's Emergency Surface Hazard Call Out procedures?

- **No Emergency Surface Hazard Call Out procedures are recorded against the property.**

enable a desk-based assessment of the Site. The Report does not include a Site Investigation, nor does Groundsure Ltd / Cornwall Mining Services Limited T/A Mining Searches UK make additional specific information requests of the regulatory authorities for any relevant information they may hold.

This report is concerned solely with the Site searched and should not be used in connection with nearby properties, as only known coal mining features that could potentially have a direct influence upon the Site searched are considered relevant; other features present in the general area may have been omitted for ease of reference.

This report is confidential to the client, the client's legal advisor and the client's Mortgage lender, as defined in the Groundsure terms & conditions, and as such may be used by them for conveyancing or related purposes. Groundsure has 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.

Additional mine entry assessment is based on and limited to the data supplied by the Coal Authority at the time of production. In order to determine whether a property is within the likely zone of influence of a disused coal mine entry the following is considered: the actual or plotted position of the mine entry, its known or assumed diameter and the thickness of superficial deposits above rockhead. Where these figures are not known, assumptions based on established estimations have been made.

CON29M report licensing

This report contains Data provided by the Coal Authority. Any and all analysis and interpretation of Coal Authority Data in this report is made by Cornwall Mining Services Limited T/A Mining Searches UK and is in no way supported, endorsed or authorised by the Coal Authority. The use of the data is restricted to the terms and provisions contained in this report. Data reproduced in this report may be the copyright of the Coal Authority and permission should be sought from Groundsure Ltd / Cornwall Mining Services Limited T/A Mining Searches UK prior to any re-use.

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This report may contain plans and records held by the Coal Authority and made publicly available at the time of inspection which may include British Geological Survey and Ordnance Survey data.

Coal Mining Report Insurance Policy



Coal Mining Report Insurance Policy

The Schedule

Policy Number: The Reference contained in the **Coal Mining Search Report**

Premium: £1.40 inclusive of Insurance Premium Tax at 12%

Property: The property which is the subject of the **Coal Mining Search Report**

Limit of Indemnity: £100,000 increasing by 10% compound per annum on each anniversary of and for the first 10 years following the **Commencement Date**

Commencement Date: The date of the **Coal Mining Search Report**

You/Your:

1. A purchaser of the **Property**
2. A lender providing a **Mortgage** in connection with a purchase of the **Property**
3. A lender providing a **Mortgage** by way of a re-mortgage of the **Property**

Definitions

Where a word is defined below or in the schedule it shall carry the same meaning wherever it appears in bold text in this policy

Insured Use: The continued use of the **Property** as a single house or flat or a single commercial premises

Market Value: The value as determined by a surveyor appointed by agreement between **You** and **Us** or (in default of agreement) the President for the time being of the Royal Institution of Chartered Surveyors

Mortgage: A mortgage or charge secured on the **Property** by an institutional mortgage lender

Coal Mining Search Report: The coal mining search report attached to this policy

Search: An official search comprising a search in form CON29M (2018) being mining searches relating to coal and brine in the area in which the **Property** is situated

We/Our/Us:

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Communications may be monitored or recorded to improve our service and for security and regulatory purposes.

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1. any reduction in **Market Value** of the **Property** calculated at the date **You** become aware of the matter(s) and/or loss in connection with a **Mortgage** as a result of such reduction.
2. all other costs and expenses including out of court settlement costs incurred by **Us** or by **You** with **Our** prior written agreement.

Waiver of Breach of Policy Condition

We will not exercise **Our** right to avoid **Our** liability to **You** in respect of loss where **You** have inadvertently breached any term or condition of the policy provided that such breach does not prejudice **Our** rights and remedies under the policy or otherwise directly or indirectly result in or increase the amount of any loss.

Protection for Mortgagees and Successors in Title

We will not avoid **Our** liability to make a payment to **You** solely because another person breaches the terms and conditions of this policy, provided such breach was not committed on **Your** behalf or with **Your** agreement, and **We** will invoke the remedies available to **Us** under the Policy as against that other person as if a separate insurance contract had been issued to them leaving the remainder of the policy unaffected.

Joint Insured

Any party insured under this policy standing in the relation of parent company, subsidiary company, associated company, branch office or joint venture partner to each other will be deemed to be joint insured for the purposes of this policy and jointly liable and responsible for any breach of any terms and conditions of this policy. If there is any inconsistency between this clause and any other term of this policy, this clause shall prevail.

Exclusions

We will not pay for any:

1. amount in excess of the **Limit of Indemnity**.
2. loss which would be recoverable under a household buildings insurance policy.
3. loss arising from any matter that **You** were aware of at the **Commencement Date**.
4. loss if the **Property** is used for any purpose other than the **Insured Use**.

Claims Conditions and How to Claim

1. **You** must:

- i) give **Us** written notice as soon as possible of any potential or actual claim or any circumstances likely to result in a claim. Please provide the policy number, **Your** name, the full address of the **Property** and a brief description of the incident that has occurred. Notifications should be sent to: Speciality Lines Claims Team, Zurich Insurance, 8th Floor, 70 Mark Lane, London, EC3R 7NQ. Email: claims@uk.zurich.com, Enquiry line: telephone 0207 648 3523
- ii) pass all court documents and/or other communications to **Us** as soon as possible after receipt
- iii) not deal with, make any admission of liability or attempt to settle a claim without **Our** prior written agreement.
- iv) agree to and carry out at **Our** expense all things necessary to minimise any loss.
- v) provide all information and assistance that **We** may require to help defend and settle the claim.

2. **We** are entitled to:

- i) decide how to settle or defend a claim and may carry out proceedings in the name of any person insured under this policy, including proceedings for recovering any claim.
- ii) pay to **You** at any time, an amount equal to the **Limit of Indemnity** or any lower amount for which the claim can be settled, after deduction of any sum already paid. **We** may then give up control of and have no further liability in connection with the claim.

3. If **We** admit liability for a claim but there is a dispute as to the amount to be paid the dispute will be referred to an arbitrator. The arbitrator will be appointed jointly by **You** and **Us** in accordance with the law at the time. **You** may not take any legal action against **Us** over the dispute before the arbitrator has reached a decision.

4. If **You** or anyone acting on **Your** behalf:

Next steps if you are still unhappy

If you are not happy with the outcome of your complaint, you may be able to ask the Financial Ombudsman Service to review your case.

We will let you know if we believe the ombudsman service can consider your complaint when we provide you with our decision. The service they provide is free and impartial, but you would need to contact them within 6 months of the date of our decision.

More information about the ombudsman and the type of complaints they can review is available via their website www.financial-ombudsman.org.uk.

You can also contact them as follows:

Post: Financial Ombudsman Service, Exchange Tower, London, E14 9SR

Telephone: 08000 234567 (free on mobile phones and landlines)

Email: complaint.info@financial-ombudsman.org.uk

If the Financial Ombudsman Service is unable to consider your complaint, you may wish to obtain advice from the Citizens Advice Bureau or seek legal advice.

The Financial Services Compensation Scheme (FSCS)

We are covered by the Financial Services Compensation Scheme (FSCS) which means that you may be entitled to compensation if we are unable to meet our obligations to you. Further information is available on www.fscs.org.uk or by contacting the FSCS directly on 0800 678 1100.

How we use your information**Who controls your personal information**

This notice tells you how Zurich Insurance plc ('Zurich'), as data controller, will deal with your personal information. Where Zurich introduces you to a company outside the group, that company will tell you how your personal information will be used.

You can ask for further information about our use of your personal information or complain about its use in the first instance, by contacting our Data Protection Officer at: Zurich Insurance Group, Tri-centre 1, Newbridge Square, Swindon, SN1 1HN or by emailing the Data Protection Officer at GBZ.General.Data.Protection@uk.zurich.com.

If you have any concerns regarding our processing of your personal information, or are not satisfied with our handling of any request by you in relation to your rights, you also have the right to make a complaint to the Information Commissioner's Office. Their address is: First Contact Team, Information Commissioner's Office, Wycliffe House, Water Lane, Wilmslow, SK9 5AF.

What personal information we collect about you

We will collect and process the personal information that you give us by phone, e-mail, filling in forms, including on our website, and when you report a problem with our website. We also collect personal information from your appointed agent such as your trustee, broker, intermediary or financial adviser in order to provide you with the services you have requested and from other sources, such as credit reference agencies and other insurance companies, for verification purposes. We will also collect information you have volunteered to be in the public domain and other industry-wide sources. We will only collect personal information that we require to fulfil our contractual or legal requirements unless you consent to provide additional information. The type of personal information we will collect includes; basic personal information (i.e. name, address and date of birth), occupation and financial details, health and family information, claims and convictions information and where you have requested other individuals be included in the arrangement, personal information about those individuals.

If you give us personal information on other individuals, this will be used to provide you with a quotation and/or contract of insurance and/or provision of financial services. You agree you have their permission to do so. Except where you are managing the contract on another's behalf, please ensure that the individual knows how their personal information will be used by Zurich. More information about this can be found in the 'How we use your personal information' section.

How we use your personal information

We and our selected third parties will only collect and use your personal information (i) where the processing is necessary in connection with providing you with a quotation and/or contract of insurance and/or provision of financial services that you have requested; (ii) to meet our legal or regulatory obligations; or (iii) for our 'legitimate interests'. It is in our legitimate interests to collect your personal information as it provides us with the information that we need to provide our services to you more effectively

Your data protection rights

You have a number of rights under the data protection laws, namely:

- to access your data (by way of a subject access request);
 - to have your data rectified if it is inaccurate or incomplete;
 - in certain circumstances, to have your data deleted or removed;
 - in certain circumstances, to restrict the processing of your data;
 - a right of data portability, namely to obtain and reuse your data for your own purposes across different services;
 - to object to direct marketing;
 - not to be subject to automated decision making (including profiling), where it produces a legal effect or a similarly significant effect on you;
 - to claim compensation for damages caused by a breach of the data protection legislation.
- if we are processing your personal information with your consent, you have the right to withdraw your consent at any time.

We will, for the purposes of providing you with a contract of insurance, processing claims, reinsurance and targeted marketing, process your personal information by means of automated decision making and profiling where we have a legitimate interest or you have consented to this.

What happens if you fail to provide your personal information to us

If you do not provide us with your personal information, we will not be able to provide you with a contract or assess future claims for the service you have requested.

Fraud prevention and detection

In order to prevent and detect fraud we may at any time:

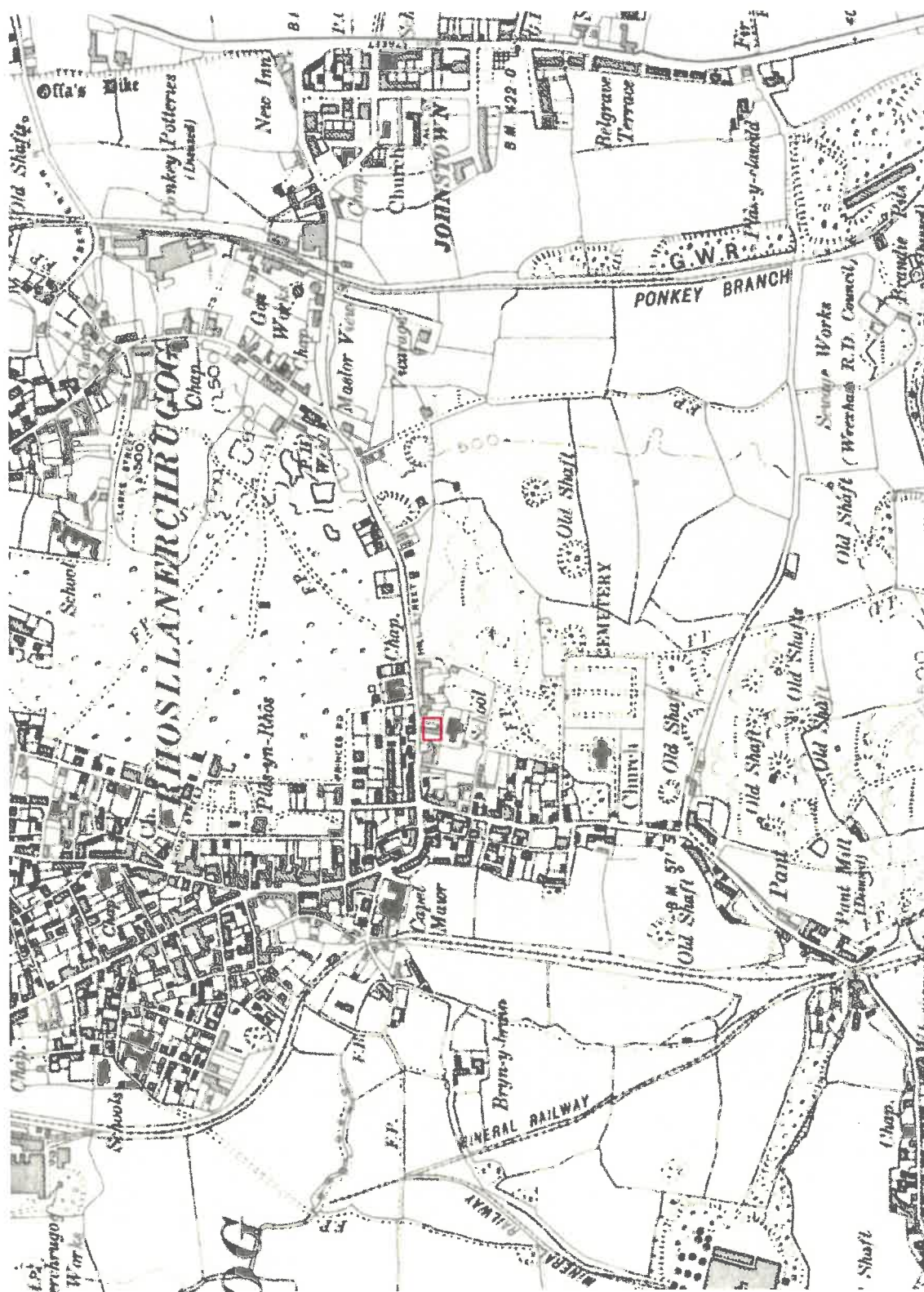
- check your personal data against counter fraud systems
- use your information to search against various publicly available and third party resources
- use industry fraud tools including undertaking credit searches and to review your claims history
- share information about you with other organisations including but not limited to the police, the Insurance Fraud Bureau (IFB), other insurers and other interested parties.

If you provide false or inaccurate information and fraud is identified, the matter will be investigated and appropriate action taken. This may result in your case being referred to the Insurance Fraud Enforcement Department (IFED) or other police forces and fraud prevention agencies. You may face fines or criminal prosecution. In addition, Zurich may register your name on the Insurance Fraud Register, an industry-wide fraud database.

Claims history

We may pass information relating to claims or potential claims to any relevant database. We and other insurers may search these databases when you apply for insurance, when claims or potential claims are notified to us or at time of renewal to validate your claims history or that of any other person or property likely to be involved in the policy or claim.

This helps to check information provided and prevent fraudulent claims.

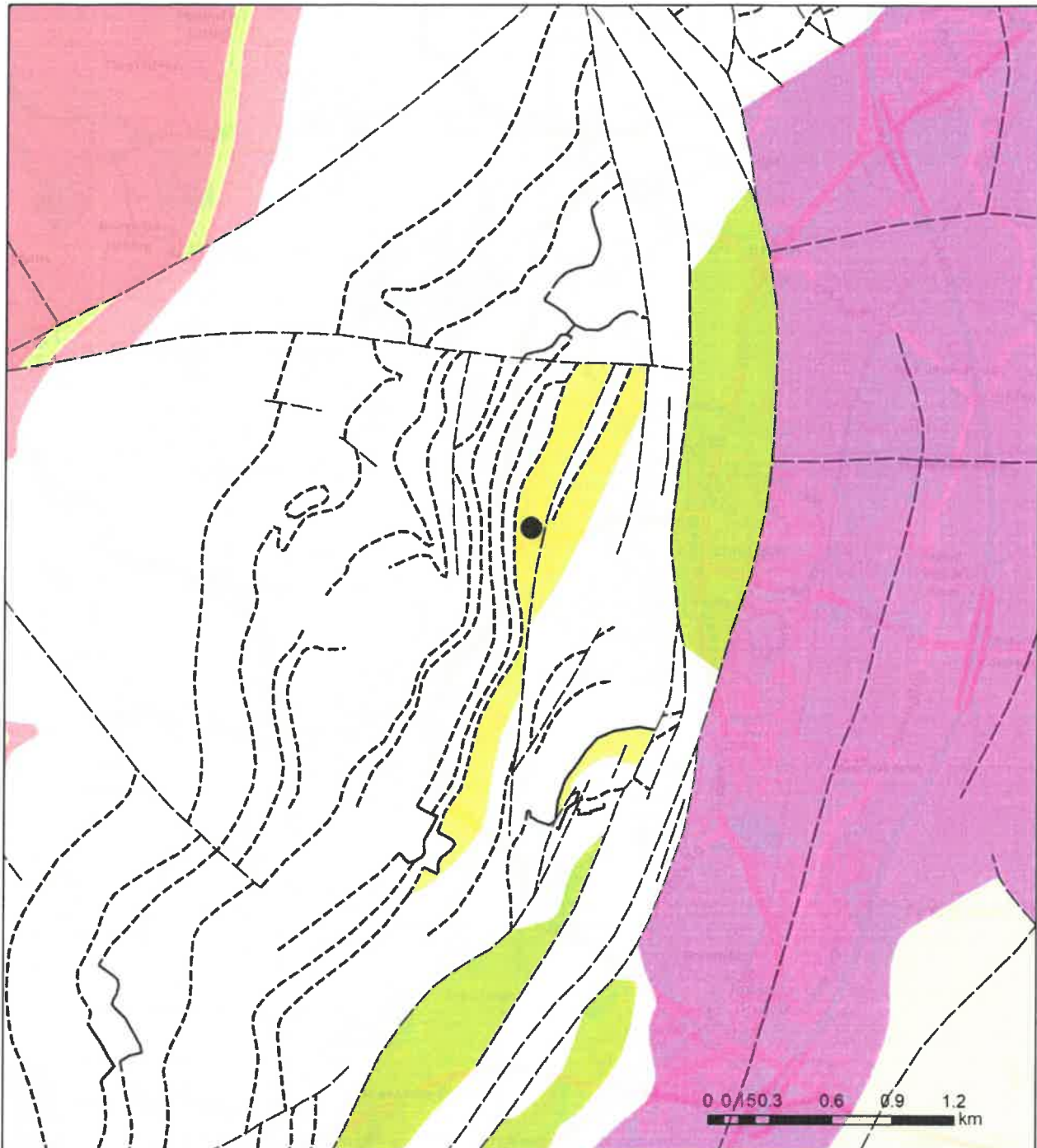


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Date: 1898
Scale 1:10,560

Appendix D – Geological Maps

Bedrock Geology



Bedrock geology 1:50,000 scale

PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - MUDSTONE, SILTSTONE AND SANDSTONE

ETRURIA FORMATION - MUDSTONE

MINERA FORMATION - LIMESTONE AND [SUBEQUAL/SUBORDINATE] SANDSTONE, INTERBEDDED

HALESOWEN FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE

GWESPYR SANDSTONE - SANDSTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED

SALOP FORMATION - MUDSTONE, SANDSTONE AND CONGLOMERATE

CEFN-Y-FEDW SANDSTONE FORMATION - SANDSTONE AND [SUBEQUAL/SUBORDINATE] ARGILLACEOUS ROCKS, INTERBEDDED

BOWLAND SHALE FORMATION - MUDSTONE

PENNINE LOWER COAL MEASURES FORMATION AND PENNINE MIDDLE COAL MEASURES FORMATION (UNDIFFERENTIATED) - SANDSTONE

CEFN-Y-FEDW SANDSTONE FORMATION - CHERT

CEFN ROCK - SANDSTONE

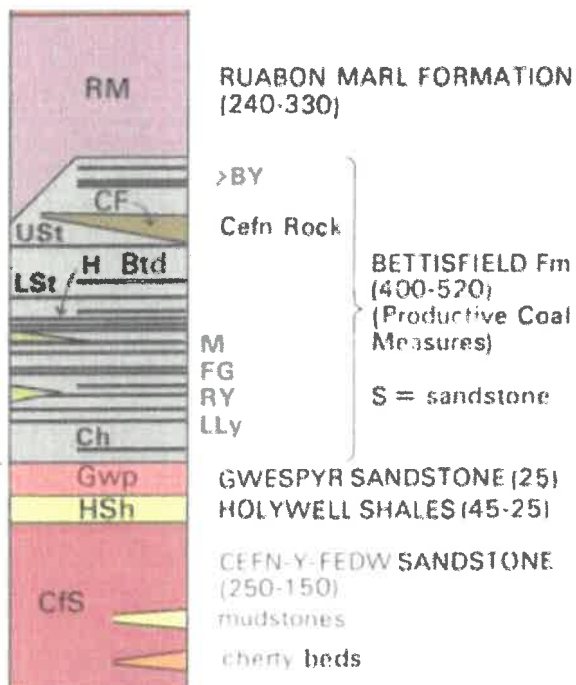
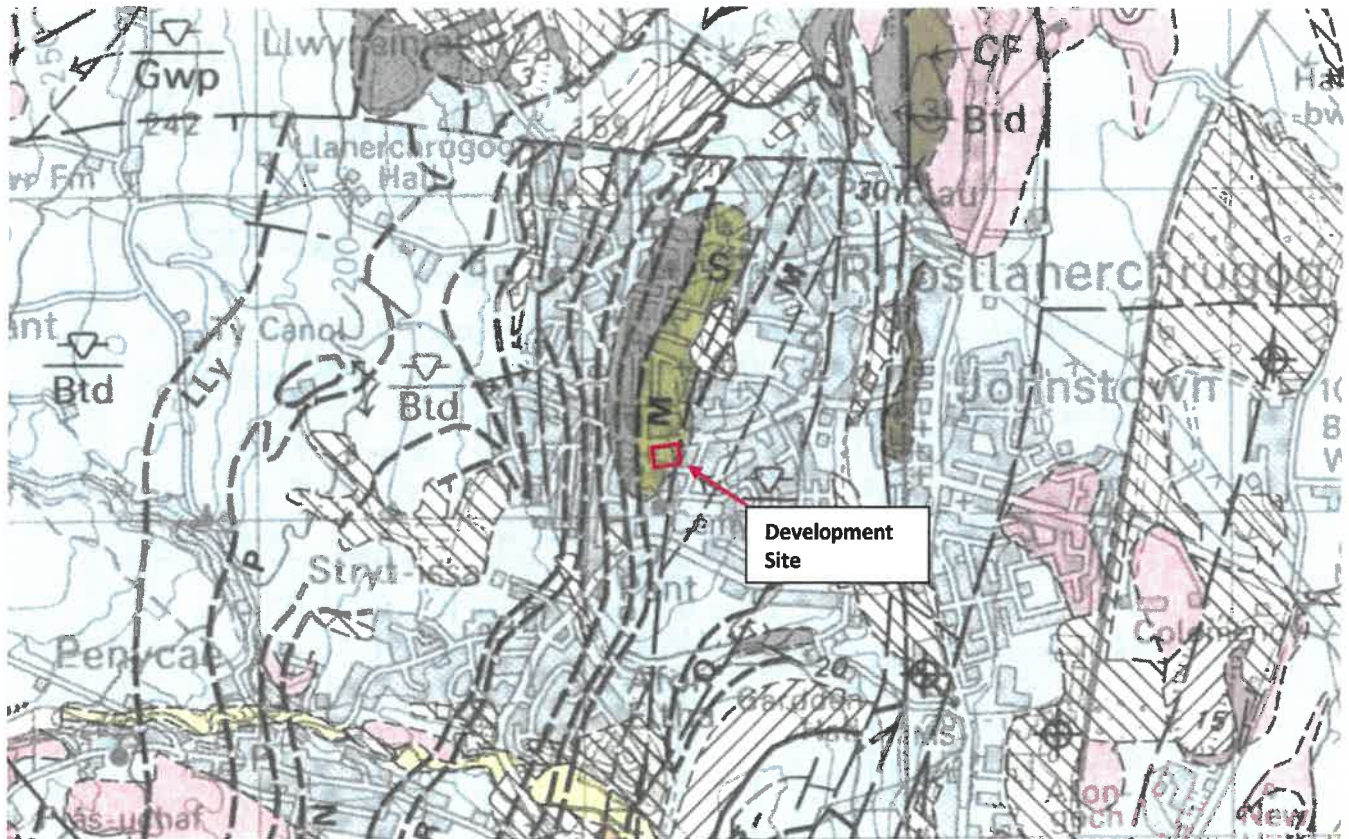
Linear features 1:50,000 scale

-- Coal_seam_Inf

— Coal_seam_Obs

↔ Mineral_Vein_Inf

BGS Geological Survey 1:50,000 Series England and Wales Sheet 121 Wrexham



COAL SEAM NAMES

Mo	MORLAS
BY	BERSHAM YARD GROUP
	(from ALPHA (α) or ALPHA RYDER (αR) to DELTA (Δ) or DELTA BENCH (ΔB))
USt	UPPER STINKING
W	WARRAS
LSt	LOWER STINKING
Po	POWELL
H	HOLLIN
C	CRANK
Q	QUAKER
M	MAIN
Cr	CROWN
UR	UPPER RED
LR	LOWER RED
FG	FIRECLAY GROUP
N	NANT
RY	RUABON YARD
P	PREMIER
LLy	LLWYNEINION HALF-YARD
Ch	CHWARELAU

SOUTH LANCs. BORING CO. (U.K.) LTD.

CHAPEL STREET · PEMBERTON · WIGAN

Telephone — Wigan 83237/8

BOREHOLE RECORD SHEET

Job No. 1972

Date 17.4.73

Location YSGOL Y WERN, RHOSLLANERCHRUGOG

Carried out for JAMES WILLIAMSON & PARTNERS

Borehole No. 4

Diameter 4"

Ground Level

Scale 1:125

DESCRIPTION	O.S.D.	LEGEND	DEPTH	THICK- NESS	SAMPLE	S.P.T. "N" VALUE	WATER LEVELS
TOP SOIL			0.3	0.3			
Soft yellowish brown, stony, silty CLAY			2.1	2.1			
Firm yellowish brown weathered MUDSTONE			2.4	0.6			
Hard light grey MUDSTONE			3.0	1.9			
			4.9	6.7			
Hard light grey SILTSTONE			11.6	7.3			
Hard light grey SILTSTONE with occasional thin bands of firm brown mudstone.			18.9	0.6			
Soft mudstone and siltstone (BROKEN GROUND)			19.5	0.3			
Hard light grey SILTSTONE			19.8	0.6			
Coal fragments (OLD WORKINGS)			20.4	2.0			
Firm black shale.			22.4	3.2			
Firm grey MUDSTONE			25.6	1.8			
Firm black SHALE with occasional thin bands of coal. (OLD WORKINGS?)			27.4				
END OF BORE							

Undisturbed Sample



Disturbed Sample



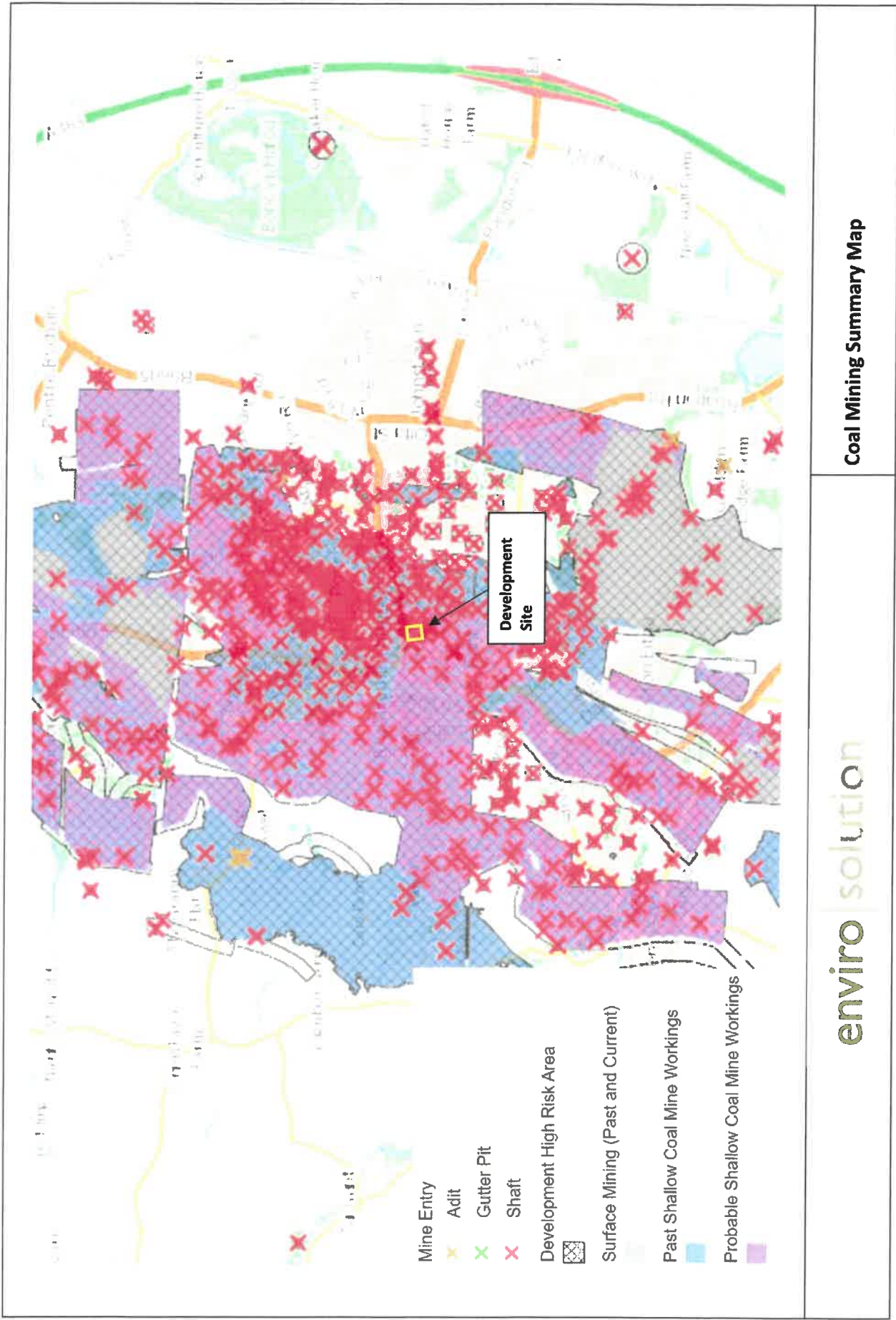
Water Sample



Standard Penetration



Appendix G – Coal Mining Summary Map



Received 20.2.2013 P/2012/0010

Wern School Rhosllanerchrugog

Geotechnical Report

Heed Developments Ltd



GroundSolve Ltd

Consulting Geotechnical, Engineering Geology and Environmental Engineers

FIGURES

1. Site Location
2. Existing Site Layout
3. History 1850
4. Proposed development
5. Exploratory Hole Locations and Ground Constraints
6. Cross Section

APPENDICES

- A Site Photographs
- B Coal Authority Report and Permissions
- C Groundsure Report
- D Borehole Logs (Previous Investigation)
- E Borehole Test Results
- F Physical Test Results
- G Chemical Test Results

2.0 THE SITE

2.1 Site Location and Description

The site is located on the old Wern School site in Rhosllanerchrugog to the west of Wrexham Town Centre at National Grid reference SJ 293 463, see Figure 1.

The site is surrounded by existing housing and is accessed from the north off Hill Street. It is bounded to the east by Pen y Graig Road and a lane called Lon Y Wern is on the southern site boundary, see Figure 2.

It is some 200m long and is generally around 80m wide. The site elevation falls from around 174.5mOD in the west to 166.3mOD on the eastern site boundary.

The previous site layout as shown in the topographic survey is presented in Figure 2. Prior to demolition of the school there was a large retaining wall in the western section of the site, which supported the upper section, this has subsequently been removed and the ground level lowered in this area to around 172mOD. The site then falls gently to the east to an elevation of 170mOD.

There is sharp fall in level on the eastern section of the site, which was defined by steps while the school was in operation, falling to a level of around 160mOD. This section of site is lower than the surrounding ground to the east, north and south.

Photographs showing the site are presented in Appendix A.

2.2 Geology

The geology of the site has been studied using the following sources:

- 1st Edition geology plan at a scale of 1:10,560,
- Later edition dated 1977, at a scale of 1:10,000,
- Geological memoirs, Reference 1,
- 1:50,000 scale plan, Sheet 121,
- Wrexham Applied geological mapping, Reference 2.

The 1:50,000 scale plan, Sheet 121, shows a fault crossing the site with the outcrop of the Main Coal seam to the west of the site. Between the fault and the seam sandstone bedrock is shown at surface, while to the east of the fault glacial till is shown at surface.

Reference 2 shows the Main Coal seam running into the fault north of the site. It also confirms the bedrock and glacial outcrop described above.

The 1st Edition plan confirms the location of the fault across the site to be at the change in level by the school steps, to the west of the fault the outcrop of the Main Coal seam is shown 250m from the site boundary, with the underlying Brassey seam further to the west. The

2.4 History

The history has been studied on various plans held in GSL archives.

An 1850's Public Health plan at a scale of 1:500 shows the site to be occupied by National Schools, with a church to the west of the site and a large excavation on the eastern section of the site. The access to the site was from Hill Street, which was fronted by housing, see Figure 3.

The school buildings were on the central northern section of the site and spot levels recorded elevations around 560'OD (170.7mOD) reducing to 557.5'OD (170mOD) on the boundary immediately west of the excavation. No Shafts are shown on or close to the site.

The ground elevation by the top of the excavation was 552.7OD (168.5mOD) in the west reducing to 549'OD (167.3mOD) on the eastern boundary. A path entered the quarry and one crossed it, suggesting that quarrying was complete. The level at the lowest point was 522.1'OD (159.17mOD) showing that around 9.5m had been excavated.

The 1873 OS plan at a scale of 1:2,500 shows a similar scenario, although the path across the quarry is no longer shown.

By the 1900 OS plan the quarry had been largely backfilled.

The only other plan in GSL archives was dated 1962 and shows the quarry to have been completely backfilled and the school (now called Rhos Junior Controlled School) had been expanded with a building present on the eastern section of the site.

4.0 PROPOSED DEVELOPMENT

Beech Developments (BD) proposes to build fifteen traditional two storey houses on the site of the old Wern School in Rhosllanerchrugog to the west of Wrexham Town centre. Most of the houses are semi detached although there are several detached houses. The current proposed site layout is presented in Figure 4. An area of public open space is proposed in the north east corner of the site.

The proposed floor slab levels, existing ground levels and any cut/fill required are presented in the table below.

Plot	Floor slab level mOD	Ground level mOD	Cut (m)
1	172.0	173.5	1.5
2	172.0	173.5	1.5
3	172.2	174	1.8
4	172.2	173-174	0.8-1.8
5	172.4	173-174.4	0.6-2.0
6	172.2	172.0	
7	171.44	172.0	0.56
8	171.3	170.5	
9	170.4	170.5	
10	170.05	170.5	
11	170.05	170.5	
12	169.7	170.2	
13	166.11	166.0	
14	165.8	165.96	
15	165.8	165.96	

The ground level at the back of Plots 1 to 5 has already been lowered. At the back of the properties it is proposed to construct a 2m wide patio area bounded by a low retaining wall. The garden areas will then be made up with around 800m of imported material. A further small retaining wall is then proposed close to the site boundary.

The foundation loads are not known at this stage, however, based on experience of similar developments they are not anticipated to exceed 50kN/m run, with floor slab loadings not exceeding 5kN/m². The recommendations given in this report are based on these assumptions and should be reviewed and if necessarily revised during the detailed design process.

Chemical Testing (Alcontrol)

CLEA Contaminants – Arsenic (As), Cadmium (Cd), Mercury (Hg), Nickel (Ni), Lead (Pb), Selenium (Se), Phenol.

GAC Contaminants – Boron (B), Copper (Cu), Zinc (Zn), Chromium total (Cr), PAH (Speciation),

Other Contaminants

Sulphide, Sulphate (wat sol), Cyanide total, pH, Sulphur total, Total Organic Matter.

In addition, a WAC analysis was carried out on a stockpile of spoil that will need to be taken of site to tip. The results are summarised in Section 8 and presented in full in Appendix G.

angular, fine to coarse gravel of mudstone, with occasional cobbles, coal fragments and fragments of burnt shale

6.3 Glacial Till

The till was described as firm, locally stiff, brown mottled orange brown, slightly sandy, slightly gravelly clay.

Atterberg limit testing revealed liquid limits between 29 and 35%, plastic limits between 17 and 19%, with plasticity indices of between 12 and 16%, indicating clay of low plasticity. The natural moisture content of the glacial till ranged between 16.8 and 19.6%, see Appendix F.

6.4 Bedrock

In TP 2 and TP 6 sandstone bedrock was encountered, which was described as moderately weak to moderately strong, brown mottled orange brown, very thinly bedded, fine grained sandstone, with thin siltstone laminations.

On the eastern section of the site the boreholes encountered sandstone and siltstone near surface, with mudstones encountered at depths of 14.20 and 16m.

BH 3 drilled to the west of the fault encountered sandstone and siltstone to a depth of 12m whereby mudstone was encountered to 20m where 2m of coal and possible workings were encountered, at the horizon of the Main Coal Seam.

The previous boreholes described the rock above the Main Coal as mainly siltstone, while in BH 3 it was described as sandstone overlying mudstone.

6.5 Groundwater

No groundwater was encountered in any of the boreholes or trial pits.

6.6 Mine Shaft Cap Construction

The shaft cap was found to be some 600mm thick with visqueen at its base resting on 100 to 200m of concrete blinding. It was 9.15m².

GAC Contaminants

Determinant (GAC Metals)	No of Tests	Range (Mean) (mg/kg)	GAC Value (mg/kg)	% exceeding GAC
Zinc	5	43 – 1960 (734)	3750	0
Boron	5	2.09-33.7 (9.8)	291	0
Chromium	5	7.38 – 16.9 (14.7)	3,000 Cr III 4.3 Cr VI	0
Copper	5	33 – 111 (57.5)	2330	0

None of the above values exceed the relevant guidelines.

PAH Speciation

Determinant (GAC Speciated PAH)	No of Tests	Range (ug/kg)	GAC Value (mg/kg)	% exceeding GAC
Anthracene	5	<16 – 270	2300	0
Acenaphthylene	5	<12 – 49.5	170	0
Acenaphthene	5	<8 – 50.4	210	0
Benz(a)anthracene	5	18.8 – 582	3.1	0
Benzo(a)pyrene	5	<15 – 283	0.83	0
Benzo(b)fluoranthene	5	41.9 – 463	5.6	0
Benzo(ghi)perylene	5	30.8 – 495	44	0
Benzo(k)fluoranthene	5	<14 – 87.4	8.5	0
Chrysene	5	25 – 608	6	0
Dibenzo(ah)anthracene	5	<23 – 75.6	0.76	0
Fluoranthene	5	41.3 – 563	260	0
Fluorene	5	<10 – 55.6	160	0
Indeno(123cd)pyrene	5	<18 – 104	3.2	0
Naphthalene	5	75.2– 452	1.5	0
Phenanthrene	5	133 – 1650	92	0
Pyrene	5	31 – 726	560	0
Total	5	411-6460		

The above guidance values are based on a worst case SOM of 1%. No values exceeded the GAC values for residential use.

8.0 MINING RISK ASSESSMENT

8.1 Risk Assessment

When assessing the risk of shallow mining to a development several issues need to be considered, such as the type of working, depth to workings etc.

There are two types of mining, partial and total extraction. Methods of partial extraction are nearly all variations of, "Pillar and Stall" techniques, with pillars of coal being left to support the roof of the mine. Extraction ratios of between 30 to 75% were typical, depending on geological conditions and depths. However, it was common practice to work pillars on withdrawal from the mine, so higher extraction ratios may have been possible.

Total extraction is achieved by long wall working and also by various pillar and stall techniques, where the pillars were removed in a second phase of mining, normally on retreat from the mine.

It is important to know the method of mining employed, as total extraction methods normally result in total collapse of the workings, with the exception of the main roadways. While partial abstraction techniques leave voids in the mine, which can become unstable and migrate to surface. These take the form of "crown holes" at surface, which are generally circular and can be several metres in diameter.

No detailed mine plans showing the method of working have survived, if mined this strata would have been mined prior to 1872 when it became legal to deposit mine plans. Due to the age of the mining and the proximity to outcrop, it must be assumed that it would have been by pillar and stall techniques and potential for voids may exist.

No detailed research into mining subsidence in North Wales has been undertaken. However, extensive research has been carried out in South Wales, where similar pillar and stall mining has taken place, Reference 5. This research revealed:

- Almost all incidents are "crown holes" in form, delayed general subsidence is very rare,
- About 75% of subsidence incidents are caused by the collapse of mine entrances or workings close to outcrop,
- Mine entrances present the greatest risk and account for over 50% of recorded incidents,
- The recorded rate of occurrence is very low.

The remaining subsidence incidents were analysed for their migration ratio (H/T), where H is the thickness of rock above the workings and T is the typical seam/void thickness, taken here as 2m, the height of a typical roadway. Of these 75% of the incidents had an H/T ratio of less than 2 (4m rock cover), with 90% of incidents having an H/T ratio of less than 6 (12m rock cover). The majority of the remaining incidents were related to special events, probably

Eastern Section

The desk study and site investigation have proven the Main Coal seam to have been extracted by opencast methods at surface over the eastern section of the site, therefore removing any risk from shallow abandoned workings in this coal seam. It is also possible based on the depth of excavation that some clay was also worked from this pit, possibly for brickmaking.

The two boreholes have proved a coal seam at a depth of 15.5m increasing to 20m beneath this section of the site. The dip on this side of the fault appears steeper and this is due to movement of the fault dragging the strata. Consequently, mining would not have been pursued close to the fault. This seam is likely to be a minor seam between the Main Coal seam and the next seam the Wall and Bench. The depth from rock head in BH 1 and the base of the shaft is 26m, which coincides perfectly with the shaft section discussed in Section 2.3. While it is possible this seam was worked the Wall and Bench coal seam would certainly have been worked beneath the site.

PV Voids remain in Workings

The boreholes have shown that the workings themselves have been completely backfilled/collapsed. This was typical and was undertaken to avoid having to bring waste to surface. However, old roadways could exist beneath the site, as these were typically the only well constructed part of the workings, as they provided access to the mine. The height of a roadway would typically be 2m.

PI Voids become unstable

The potential for voids to become unstable has to be considered, although the depth to any potential workings would ensure that any voids were soon be "choked" by material collapsing into the void, therefore preventing any further upward migration. In addition, all of the boreholes on the western side of the site (5 No) proved the seam at its anticipated depth, with no evidence of upward migration.

PR Rock cover insufficient to prevent migration of rock

Western Side

The site investigation has indicated that the rock cover above the seam is some 16m in the west increasing to 17.5m in the central section of the site. Given a starting void height of around 2m, this would give an H/T ratio of between 8 and 8.75. Consequently, the risk of upward migration of any residual voidage reaching surface is considered to be very low. In addition, immediately west of the fault the chances of upward migration of the Main Coal seam are considered to be negligible for the reasons discussed above.

The rock cover above the Main Coal seam is recorded as sandstone, which is a competent rock, which will also help preclude any upward migration towards surface.

It can therefore be seen from the above assessment that the risk to the surface from crown hole collapse is considered to be very low. Therefore it is not considered necessary to drill and grout beneath the proposed structure.

To address the remaining very low risk, recommendations are given in Section 9.0 below.

Plot 13 is directly above the cap for the old shaft, which would have had its top section and liner removed during the open casting. While it is possible to build on shafts it would be preferable to have them engineered to the highest possible standard, that is with the cap founded directly on bedrock. This is not the case at this shaft and it would therefore be very difficult from an insurance and selling perspective to construct this house at this location. As discussed above the risk of failure still exists which could cause substantial ground movements. It is therefore recommended that its location be moved westwards away from the cap. The present excavation for the cap can then be backfilled with inert clay derived from foundation excavations in the glacial till.

The made ground is considered unsuitable for traditional spread foundations due to its weak strength, variability and difference in thickness.

Several options were considered for these plots and these are discussed below:

Piling

All types of piling would be considered feasible at this site. The main disadvantage is the possibility of mine workings at depth, which should ground movements occur would cause failure of the piles. To consider using piles they would have to be bored piles taken below the coal seam below and would also require grouting of any workings, which would be exceeding expensive for three plots.

Ground Treatment

There are several types of ground treatment such as vibro stone columns or concrete columns that would be suitable.

Preferred Option

The most suitable option both technically and cost effectively would be to found the buildings on a granular raft. This would involve excavating the existing made ground for a depth of at least 1m below the base of the proposed foundations and for a distance of 1m outside the building line. This material should then be replaced with suitable imported granular material, such as a 6F2, which should be well compacted in accordance with an approved earthworks specification.

The house foundations should then comprise raft foundations designed to span any potential collapse of 3m and cantilever 1.5m at its edge.

Alternative Solution

Based on the above discussion, it is recommended that Plot 13 be moved. If this is possible, it would also make sense to move Plots 14 and 15 as well. These three plots could be moved to the upper area in the proposed area of the public open space, with this area being re located to the eastern section of the site. This has the advantage in that strip foundations could be used

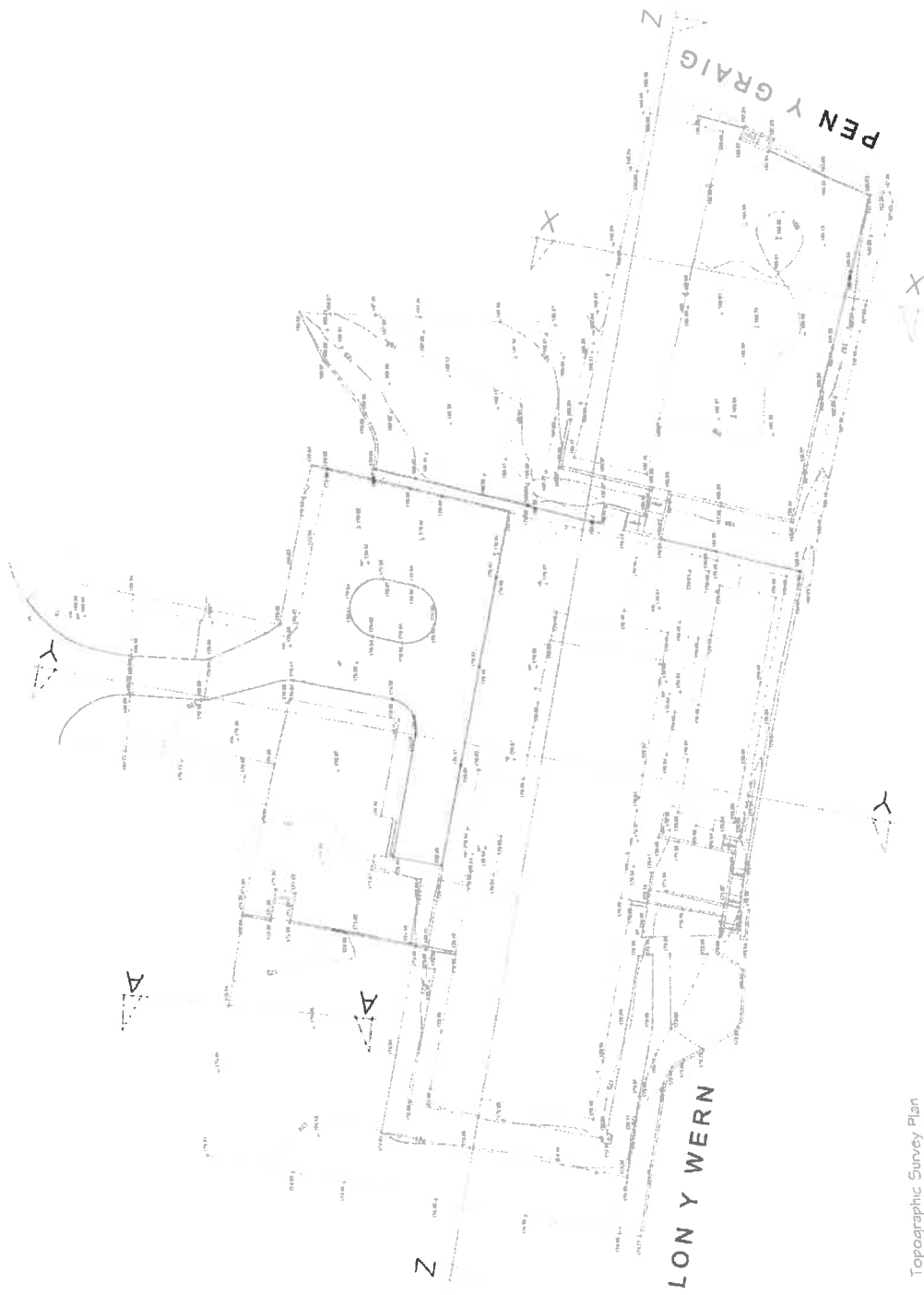
The site is therefore considered to be uncontaminated, however, in accordance with current good practice a watching brief should be kept on all excavations. Should any contaminated material be encountered it should be excavated, stored safely on site and samples taken for testing so it can be taken off site to an appropriately licensed landfill facility.

In addition, the WAC analysis of the excavated colliery spoil from the western end of the site has indicated it to be inert and can be taken to an appropriately licensed landfill. However, if permission is obtained to move the public open space to the eastern section of the site, this material can be used to raise the levels in this area.

FIGURES



HILL STREET



Topographic Survey Plan

SCALE 1:500

**EXISTING
SITE LAYOUT**

FIGURE 2

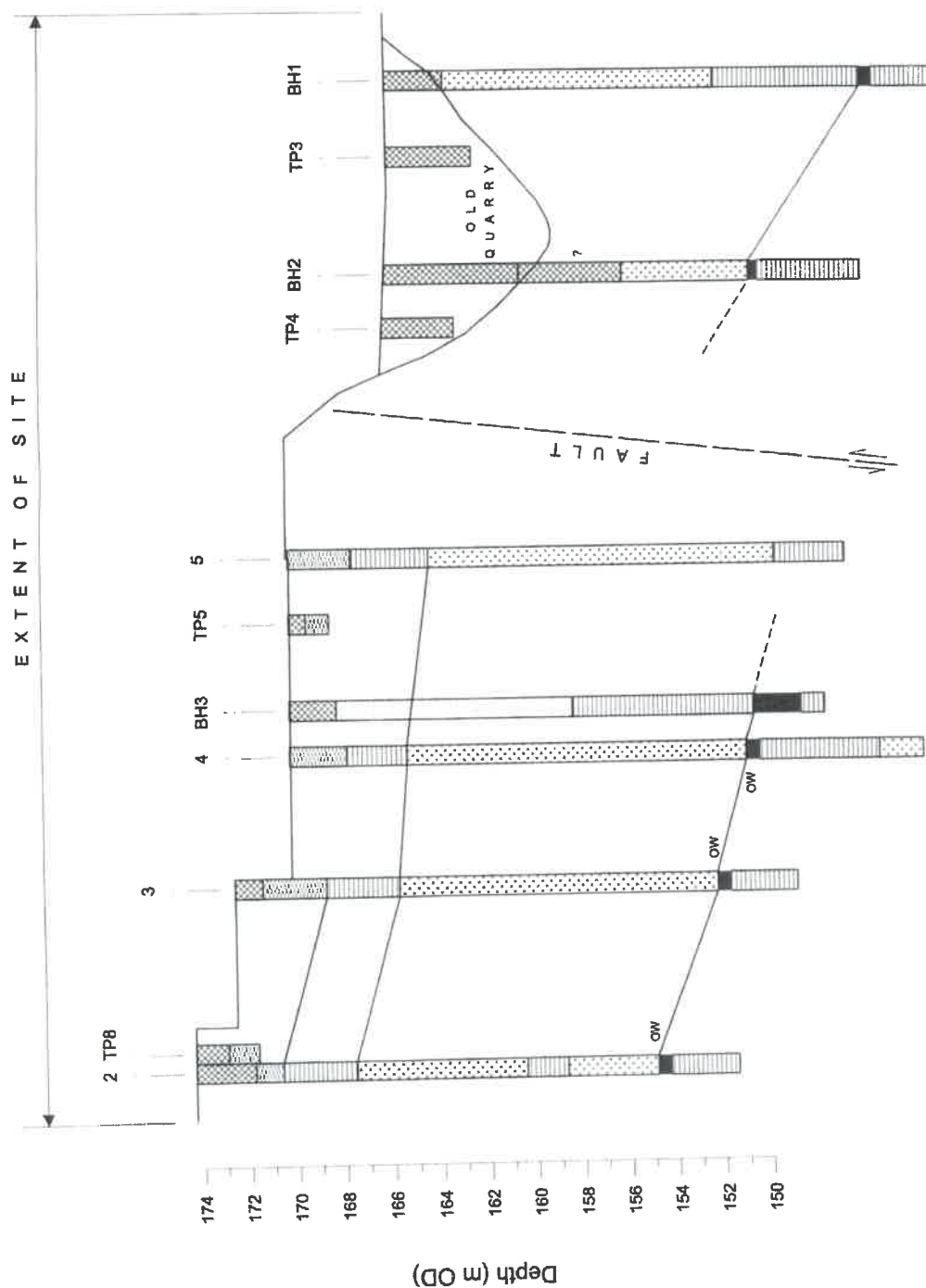
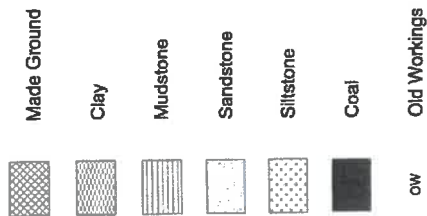


SCALE 1:500

**PROPOSED
LAYOUT**

FIGURE 4

Legend



Section A - A

Depth of Shaft

Scale : 1:500 Horiz
1:200 Vert

GEOLOGICAL CROSS SECTION

FIGURE 6



Photograph 1 Showing reduced ground levels along western site boundary, looking south



Photograph 2: Western site boundary looking north



Photograph 5 Showing reinforcement in cap



Photograph 6 Showing shaft cap

APPENDIX B

Coal Authority Report and Permissions

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

Within, or within 20 metres of, the boundary of the property there are 5 mine entries, the approximate positions of which are shown on the attached plan.

Coal Authority records disclose the following information:

329346-080. This entry was drilled and grouted by means of three boreholes within the shaft during April/May 1973. A total of 15 tons of PFA grout at a PFA/cement ratio of 9:1 was injected under pressure. Similarly the made ground in the vicinity of the shaft was stabilised by drilling 16 holes in a ring 7.5m diameter into which 10 Tons of grout were injected. In mid 1973 correspondence was ongoing between the NCB and the Denbighshire Council regarding the specification for capping of the shaft but it is unknown if this was carried out.

329346-281. No treatment details.

329346-280. No treatment details.

329346-279. No treatment details.

329346-278. No treatment details.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal-mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast Coal Mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal-mining subsidence

The Coal Authority has not received a damage notice or claim for the property since 31 October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number at all times is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The report is compliant with Home Information Pack requirements.

The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.

The COAL AUTHORITY



*This matter is being dealt with by
Paul Heap, Tel: 01623 637154
E-Mail: paulheap@coal.gov.uk*

200 Lichfield Lane
Berry Hill
Mansfield
Nottinghamshire
NG18 4RG

Tel: 01623 637000
Fax: 01623 620363
E-mail: permissions@coal.gov.uk

Our Ref: 7476

20th December 2012

Your Ref:

Groundsolve Ltd
Unit 7
Well House Barns
Chester Road
Bretton
CHESTER
CH4 0DH

For the attention of Mike Scott

Dear Sir

**Ysgol Y Wern, Rhos, Wrexham
Application for Permission to Enter or Disturb Coal Authority Mining Interests**

I refer to your application, on behalf of your client, for permission to enter the Coal Authority's mining property. Attached to this letter is the signed permit certificate and supporting documentation which allows you to carry out the works to the specifications in the documents you submitted within "the site", as shown on the plan which is part of the attached mining report.

You should be aware that mine gas may be present within voids in shallow mine workings, mine entries, voids above such workings and in any permeable strata or surface fill material. Consequently there is a risk of encountering mine gas within the proposed boreholes. Especially at times of falling barometric pressure, all boreholes and excavations should be regularly tested for all gases associated with coal mining, commonly carbon dioxide, methane and hydrogen sulphide.

If mine gas or mine water is encountered, would you ensure that such occurrences are documented and the appropriate actions are taken. Any surface construction must take account of the risks associated with building on land that may be susceptible to surface emissions of mine gases and mining related instability. Care should be taken to ensure any exposed coal seams and all boreholes and excavations are effectively sealed with a cement based material at the earliest opportunity to prevent continued ingress of air.

Care should be taken when investigating the mine entry and the appropriate safety measures should be employed. If the recorded or any unrecorded mine entries are encountered you are required to provide the Authority with the results of your investigations together with the proposed specification for any treatment, for comment, prior to treatment works commencing.

The accompanying permit certificate and supporting documentation should be copied to all interested parties, especially the site operatives, and be available for inspection on a site visit by the Authority or the HSE.

This permit certificate is issued on the understanding that, under no circumstances will works other than those specified, be carried out without the prior written approval of the Authority.

Please submit full details of all works undertaken as required by the Permissions terms and conditions, when the works are complete. At this time you will need to confirm if the Permission should remain in force. If you wish to discuss this or any other matter, please do not hesitate to contact me using the contact details above.

Please quote the Coal Authority Reference No.7476 on all future correspondence.

THE COAL AUTHORITY

Permit Reference Number 7476

Permission to Enter or Disturb Coal Authority Mining Interests

Name and Address of Permit Holder:

Beech Developments
24 Middle Road
Coedpoeth
WREXHAM
LL11 3TN

Site Location:

Ysgol Y Wern
Rhos
Wrexham

This certificate hereby grants the above named Permit Holder permission to carry out :-
*Investigation of shallow mine workings by 4 boreholes and investigation of mine entry
329346-080*

within the Authority's mining interests at the identified site location for the period of 12 months from the effective date shown below. The granting of this Permission does not constitute advice given by the Authority in relation to the proposed operations. It is the Applicant's responsibility to obtain appropriate health, safety, environmental, technical and legal advice.

Signed:  Effective Date:20/12/2012.....

For and on behalf of The Director of Operations at the Coal Authority

Nominated Representative: Paul Heap, Licensing & Permissions Manager;
The Coal Authority, Licensing & Permits Office, 200 Lichfield Lane, Mansfield, Notts, NG18 4RG
Tel: 01623 637339; E-Mail: permissions@coal.gov.uk

- 10) Immediately on completion of each borehole it shall be temporarily plugged or sealed pending permanent sealing. Permanent sealing must be effected with a suitable cementitious based material. Such permanent sealing to be throughout the borehole to full depth, and to take place as soon as practicable, having regard to the proposals for site stabilisation.
- 11) A written report summarising the works carried out must be submitted to the Authority's nominated representative *within 3 months* of the completion of operations. The report must include details of all excavations, gas and water encountered, treatment and stabilisation work carried out (including engineering drawings) and grout takes. Included in the report must be a plan to a reasonable scale, showing salient surface features and correlated to Ordnance Survey national grid, showing all boreholes and excavations, and the positions of mine entries and voids proved by the works.
- 12) The Applicant shall, for a period from the date of commencement of the works to 12 years after completion of the works and receipt by the Authority of the report detailed at 11 above, indemnify the Authority against liability for claims, losses or damages, including those made under the Coal Mining Subsidence Act 1991 and claims by the Applicant, whether arising as a result of any failure by the Applicant or the Applicant's contractors, to comply with the requirements of this permission, or as a result of any act, failure, inadequacy, omission, negligence or default by the Applicant or the Applicant's contractors in designing or carrying out the works.
- 13) All costs incurred in compliance with this permission shall be borne by the Applicant.
- 14) For the avoidance of doubt, this permission does not confer upon the Applicant nor anyone acting on his behalf any right whatsoever to explore for coal, win and work coal, or to explore for coal mine or coal-bed methane. Where it is necessary to dig and carry away coal as part of the development, separate prior written permission must be sought from the Authority.
- 15) The Applicant will be responsible for obtaining any necessary permission under Town and Country Planning and any other relevant legislation, and for notifying statutory undertakers and other relevant bodies of his intentions, and for establishing and protecting the positions of any services on the Site.
- 16) The Applicant will obtain all necessary consents from surface and mineral owners, to obtain access to, and occupy the Site, and to carry out operations in any mine or mineral not vested in the Authority.
- 17) If at any time the Authority considers the Applicant to be in breach of any of the obligations or conditions of this document, the Authority may terminate this permission, with immediate effect, by oral or written notice at which time all activities interfering with the Authority's interest must cease.
- 18) Where in the Authority's opinion, the proximity of any mine entry to a proposed new development is likely to increase its liabilities, the Applicant agrees to take a formal conveyance of the mine entries. All such mine entries shall be fully stabilised by the Applicant prior to the conveyance. The conveyance will be on the Authority's standard terms and conditions for a nominal sum. The purchaser will also be required to make a single payment of £200 (regardless of the number of mine entries being conveyed), towards the Authority's legal and other costs.

I agree to the terms and conditions set out by the Coal Authority in relation to:

Site Location: YSGC 7 Lenn
 Signed: [Signature] Date: 6/12/12
 (Please print clearly) E-mail: mike.scott@groundsoke.com
 Name: M. J. Scott Telephone: 01244 661 361
 Position: Director
 For and on behalf of: Beech Developments

Please return this completed terms and conditions agreement to:

The Coal Authority, Licensing & Permits Office, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG or e-mail it to permissions@coal.gov.uk

329346-278. No treatment details.

329346-080. This entry was drilled and grouted by means of three boreholes within the shaft during April/May 1973. A total of 15 tons of PFA grout at a PFA/cement ratio of 9:1 was injected under pressure. Similarly the made ground in the vicinity of the shaft was stabilised by drilling 16 holes in a ring 7.5m diameter into which 10 Tons of grout were injected. In mid 1973 correspondence was ongoing between the NCB and the Denbighshire Council regarding the specification for capping of the shaft but it is unknown if this was carried out..

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

For an additional fee, the Coal Authority will provide a supplementary Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry (entries) referred to in this report. It will give details based on information in the Coal Authority's possession, together with an opinion on the likelihood of mining subsidence damage arising from ground movement as a consequence of the existence of the mine entry/entries. It will also give details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie. for development sites and new build).

For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

There are 1 claim(s) within 50 metres of the property boundary that do not match the property address. These are shown on the attached plan.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

If further subsidence damage claims information is required in addition to that provided in this report, the Authority need to manually search their records. For further advice on how to order this additional information visit www.groundstability.com or telephone 0845 7626 848.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The Coal Authority owns the copyright in this report. The information we have used to write this report is protected by our database right. All rights are reserved and unauthorised use is prohibited. If we provide a report for you, this does not mean that copyright and any other rights will pass to you. However, you can use the report for your own purposes.



CLOSURE SUMMARY FORM – PERMIT 7476

PERMISSION TO ENTER OR DISTURB COAL AUTHORITY MINING INTERESTS

Permit Holder: Beech Developments 24 Middle Road Coedpoeth WREXHAM LL11 3TN	Site Location: Ysgol Y Wern Rhos Wrexham
---	--

Within 90 days of site operations finishing, this form must be completed and returned to the Coal Authority together with a **completion/validation report** detailing the work which was carried out to our property.

The attached completion report should include: *number of boreholes; grout takes, treatments and stabilisation works carried out in relation to mine workings or mine entries (including engineering drawings); a scaled site layout plan (correlated to O.S National Grid) showing the relevant mine entry positions, voids and broken ground proved by the works, et al.*

On what date did operations commence?	
On what date did operations finish?	

Risk Factor	Factors	Comments					
		Carbon Monoxide (CO)	Methane (CH ₄)	Carbon Dioxide (CO ₂)	Oxygen (O ₂)	Other gases (Please specify)	None
Mine Gas Monitoring	What gases were found during the works? (Include maximum readings / flow rates/ barometric pressure)						
	Where were the gases found?	Drill Rig	On-site Buildings	Off-site buildings	Monitoring Points	Other locations (please specify)	

Risk Factor	Factors	Yes	No	Comments
Spontaneous Combustion	Was spontaneous combustion found or created during the works?			If yes, provide the circumstance details together with any relevant treatment information.
Mine Water	Was mine water encountered during the works?			
Collapse of shallow mine workings or mine entries	Did any mine workings or mine entries collapse during the work activities?			

Signed.....	Date
Print Name	Position
E-mail	Tel No

In order for this file to be closed please send this closure form together with the completion report to:
The Coal Authority, Licensing & Permits Office, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
 or e-mail it to permissions@coal.gov.uk

APPENDIX C

GroundSure Report

Client: The Coal Authority



Report Reference: 00071671-11

Aerial Photograph of Study Site



Aerial photography supplied by Getmapping PLC.
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Site Name: YSGOL Y WERN, PENTREDWR, RHOSLLANERCHRUGOG,
WREXHAM, LL14 1DD

Grid Reference: 329290,346191

Size of Site: 0.56 ha

Report Reference: 00071671-11

Recommendations

None Required.

If you would like any further assistance regarding this report, then please contact the GroundSure Helpline on 08444 159000.

Environmental Consultancy: GroundSure Environmental Consultants are available to discuss the findings of this report free of charge and to assist in possible solutions where reports are determined to be In Need of Further Assessment, or where other outstanding environmental issues require further consideration.

Environmental Insurance: Environmental Insurance may be available for the subject property. Please contact GroundSure for further details.

Overview of Findings

For further details on each dataset, please refer to each individual section in the main report as listed. Where the database has been searched a numerical result will be recorded. Where the database has not been searched '-' will be recorded.

Report Section	Number of records found within (X) m of the study site boundary					
	on-site	0-50	51-250	251-500	501-1000	1000-1500
1. Historical Industrial Sites						
1.1 Potentially Contaminative Past Land Use						
Records of potentially contaminative past land use (1:10,000 scale mapping)	0	0	39	-	-	-
1.2 Additional Information - Historical Tanks (1:2,500,1:1,250 scale mapping)	0	0	0 *	-	-	-
1.3 Additional Information - Historical Energy Features (1:2,500,1:1,250 scale mapping)	0	0	18*	-	-	-
1.4 Additional Information - Historical Petrol and Fuel Site Database (1:2,500,1:1,250 scale mapping)	0	0	0*	-	-	-
1.5 Additional Information - Historical Vehicle Repair and Garages (1:2,500,1:1,250 scale mapping)	0	11	0*	-	-	-
1.6 Potentially Infilled Land						
Records of potentially infilled land (1:10,000)	0	0	13*	-	-	-
*51-100m						
2. Environmental Permits, Incidents and Registers						
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations						
Records of Historic IPC Authorisations	0	0	0	0	-	-
Records of Part A(1) and IPPC Authorised Activities	0	0	0	0	-	-
Records of Water Industry Referrals (potentially harmful discharges to the public sewer)	0	0	0	0	-	-
Records of Red List Discharge Consents (potentially harmful discharges to controlled waters)	0	0	0	0	-	-
Records of List 1 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of List 2 Dangerous Substances Inventory sites	0	0	0	0	-	-
Records of Part A(2) and Part B Activities and Enforcements	0	0	0	0	-	-
Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0	-	-
Records of Licensed Discharge Consents	0	0	0	4	-	-
Records of Planning Hazardous Substance Consents and Enforcements	0	0	0	0	-	-
2.2 Records of COMAH and NIHHS sites	0	0	0	0	-	-
2.3 Environment Agency Recorded Pollution Incidents						
National Incidents Recording System, List 2	0	0	0	-	-	-
National Incidents Recording System, List 1	0	0	0	-	-	-
2.4 Sites Determined as Contaminated Land under Part IIA EPA 1990	0	0	0	0	-	-

7. Flooding

7.1 Are there any Environment Agency indicative Zone 2 floodplains within 250m of the study site?	No
7.2 Are there any Environment Agency indicative Zone 3 floodplains within 250m of the study site?	No
7.3 Are there any Flood Defences within 250m of the study site?	No
7.4 Are there any areas benefiting from Flood Defences within 250m of the study site?	No
7.5 Are there any areas used for Flood Storage within 250m of the study site?	No
7.6 What is the maximum BGS Groundwater Flooding susceptibility within 50m of the study site?	Very Low
7.7 What is the BGS confidence rating for the Groundwater Flooding susceptibility areas?	Low

8. Designated Environmentally Sensitive Sites	on-site	0-50	51-250	251-500	501-1000	1001-1500
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	1	-	-
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	-	-
8.3 Records of Local Nature Reserves (LNR)	0	0	0	0	-	-
8.4 Records of Special Areas of Conservation (SAC)	0	0	0	1	-	-
8.5 Records of Special Protection Areas (SPA)	0	0	0	0	-	-
8.6 Records of Ramsar sites	0	0	0	0	-	-
8.7 Records of World Heritage Sites	0	0	0	0	-	-
8.8 Records of Environmentally Sensitive Areas	0	0	0	0	-	-
8.9 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	-	-
8.10 Records of National Parks	0	0	0	0	-	-
8.11 Records of Nitrate Sensitive Areas	0	0	0	0	-	-

9. Additional Information	on-site	0-50	51-250
9.1 Records of mobile phone transmitters	0	0	0
9.2 Records of potential sites of OfCom telecommunications masts	0	0	0
9.3 Have any overhead transmission lines been identified in proximity to the study site in this search?			No

10. Natural Hazards

10.1 What is the maximum risk of natural ground subsidence?	Very Low
10.2 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is in a Radon Affected Area, as between 5 and 10% of properties are above the Action Level
Is the property in an area where radon protection measures are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	Basic radon protective measures are necessary

11. Non CON29M Coal Mining Information

11.1 Are there any coal mining areas within 75m of the study site?	Yes
11.2 What is the risk of subsidence relating to shallow mining within 150m of the study site?	Moderate
11.3 Are there any brine affected areas within 75m of the study site?	No
The Coal Authority CON29M Coal and Brine report	Appendix 1

10. Natural Hazards

Provides information on a range of natural hazards that may pose a risk to the study site. These factors include natural ground subsidence and radon.

11. Non Con29m Mining Information

Provides information on areas of coal and shallow mining.

12. Contacts

This section of the report provides contact points for statutory bodies and data providers that may be able to provide further information on issues raised within this report. Alternatively, GroundSure provide a free Technical Helpline (08444 159000) for further information and guidance.

Note: Maps

Only certain features are placed on the maps within the report. All features represented on maps found within this search are given an identification number. This number identifies the feature on the mapping and correlates it to the additional information provided below. This identification number precedes all other information and takes the following format -Id: 1, Id: 2, etc. Where numerous features on the same map are in such close proximity that the numbers would obscure each other a letter identifier is used instead to represent the features. (e.g. Three features which overlap may be given the identifier "A" on the map and would be identified separately as features 1A, 3A, 10A on the data tables provided).

Where a feature is reported in the data tables to a distance greater than the map area, it is noted in the data table as "Not Shown".

All distances given in this report are in Metres (m). Directions are given as compass headings such as N: North, E: East, NE: North East from the nearest point of the study site boundary.

Risk Assessment Definitions

Acceptable Environmental Risk: Significant potential environmental liabilities have not been identified

In Need of Further Assessment: Significant potential environmental liabilities have been identified

Is there a risk of statutory (e.g. Part IIA EPA 1990) or third party action being taken against the site?

This response considers the risk of legal liability arising through ownership or occupation and use of the property through statutory or other third party claims.

Does the property represent Acceptable Banking Security from an environmental risk perspective?

Consideration is given to the suitability of the property as robust financial security for the purposes of secured lending facilities. An assumption is made here that the subject property is being considered in isolation and that normal commercial lending loan to value ratios are being considered.

GroundSure may in certain circumstances be able to make a specific lender liability assessment based on a full view of financial arrangements and hence the commercial context of the environmental risks.

Is there a risk that the property value may be impacted due to environmental liability issues?

This response sets out to advise whether environmental liabilities are likely to materially impact upon a standard Royal Institution of Chartered Surveyors valuation of the property necessitating further assessment.

What is the potential for environmental risk associated with property ownership i.e. that a prudent purchaser may wish to consider further?

Low: There are unlikely to be significant environmental liabilities associated with the property

Low-Moderate: There are unlikely to be significant environmental liabilities associated with the property with regard to the proposed use. However, minor issues may require further consideration and further assessment may be appropriate under certain circumstances e.g. redevelopment

Moderate: Some potential environmental liabilities are likely to reside with the property as a result of historical and / or current use. Whilst unlikely to represent an immediate significant issue, if left unchecked this position may change with time. A prudent purchaser may wish to make further enquiries of the vendor / undertake limited further due diligence / seek environmental improvements. Redevelopment of the site will likely require further, more detailed assessment.

Moderate-High: Some potential significant environmental liability issues have been identified at the property requiring further assessment. Should further information be available it may be possible to re-assess the risk. In the absence of sufficient further information, further assessment might comprise consultation with the environmental regulators / review of existing environmental reports / commissioning new environmental reports / consideration of environmental insurance.

High: Significant potential environmental liabilities have been identified at the property. Further detailed environmental due diligence will likely be required and may include review of existing environmental reports / commissioning new environmental reports including site investigations / consideration of environmental insurance / transaction restructuring.

1.3 Additional Information – Historical Energy Features Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical energy features within 100m of the search centre:

18

The following records are not represented on Mapping:

Distance (m)	Direction	Use	Date
60.0	N	Electricity Sub Station	1994
60.0	N	Electricity Sub Station	1999
60.0	N	Electricity Sub Station	1996
60.0	N	Electricity Sub Station	1993
73.0	NE	Electricity Sub Station	1973
75.0	NE	Electricity Sub Station	1981
75.0	NE	Electricity Sub Station	1988
75.0	NE	Electricity Sub Station	1989
75.0	NE	Electricity Sub Station	1989
75.0	NE	Electricity Sub Station	1990
77.0	W	Electricity Sub Station	1990
78.0	W	Electricity Sub Station	1994
78.0	W	Electricity Sub Station	1996
78.0	W	Electricity Sub Station	1999
78.0	W	Electricity Sub Station	1993
78.0	W	Electricity Sub Station	1973
79.0	W	Electricity Sub Station	1981
79.0	W	Electricity Sub Station	1988

1.4 Additional Information – Historical Petrol and Fuel Site Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical petrol stations and fuel sites within 100m of the search centre:

0

Database searched and no data found.

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

The systematic analysis of data extracted from High Detailed 1:1,250 and 1:2,500 scale historical maps provides the following information.

Records of historical garage and motor vehicle repair sites within 100m of the search centre:

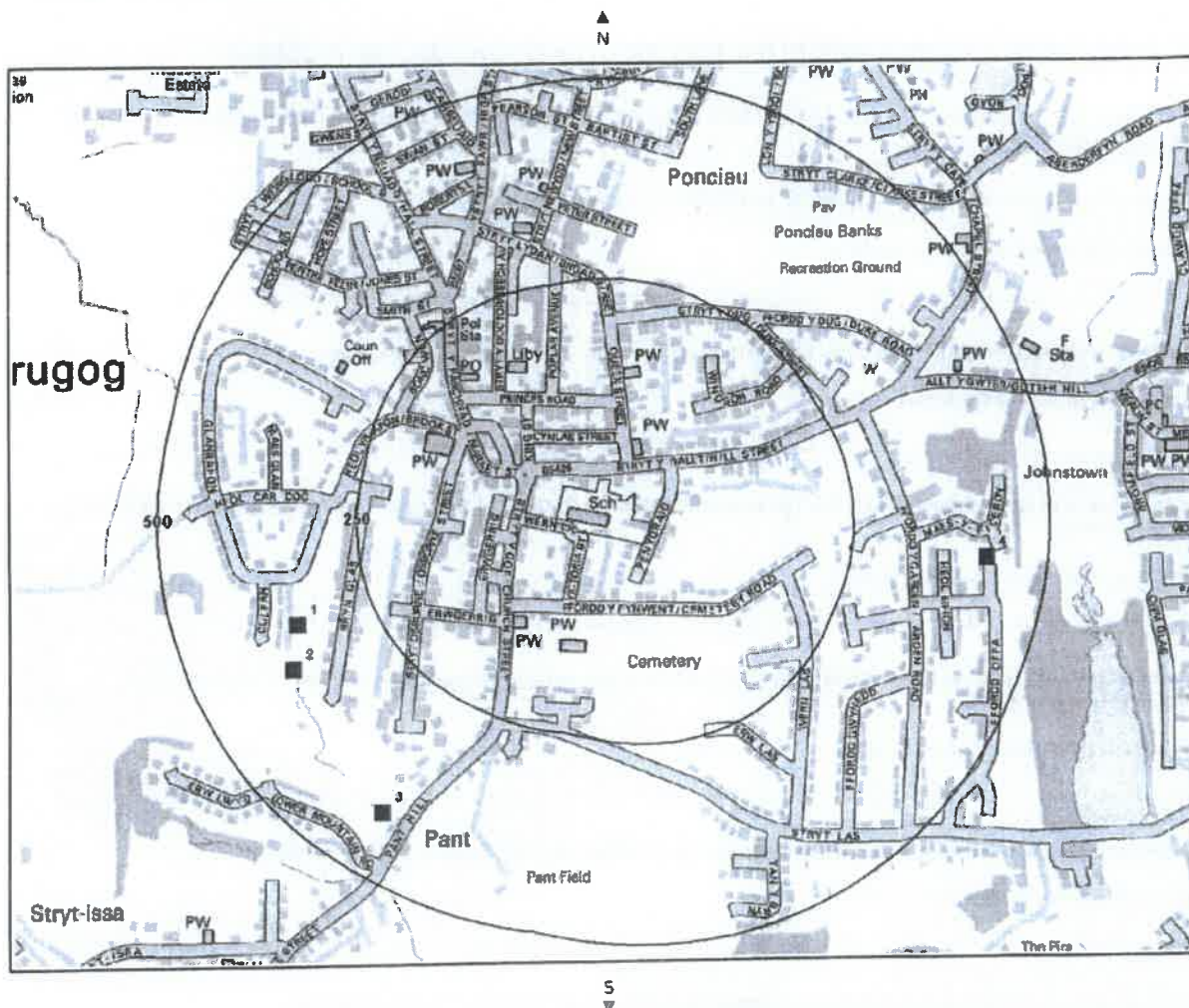
11

The following records are not represented on Mapping:

Distance (m)	Direction	Use	Date
17.0	N	Garage	1990
17.0	N	Garage	1962
17.0	N	Garage	1973
19.0	N	Garage	1989
19.0	N	Garage	1981
19.0	N	Garage	1988
19.0	N	Garage	1989
19.0	N	Garage	1994
20.0	N	Garage	1999
20.0	N	Garage	1996

Report Reference: 00071671-11

2. Environmental Permits, Incidents and Registers Map



Authorisations, Incidents and Registers Legend

Enabled by Ordnance Survey

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- | | | |
|-----------------------------|---------------------------------------|--|
| Site Outline | Recorded Pollution Incident | RAS 3 & 4 Authorisations |
| Search Buffers (m) | Dangerous Substances (List 1) | Part A(1) Authorised Processes and Historic IPC Authorisations |
| 250
500 | Dangerous Substances (List 2) | Part A(2) and Part B Authorised Processes |
| Water Industry Referrals | Licenced Discharge Consents | COMAH / NIHS Sites |
| Red List Discharge Consents | Sites Determined as Contaminated Land | Hazardous Substance Consents and Enforcements |

The following Licensed Discharge Consents records are represented as points on the Authorisations, Incidents and Registers map:

ID	Distance [m]	Direction	NGR	Details	
1	346.0	W	328906, 346056	Address: Bersham Colliery Cso, Wrexham Road, Rhosyllen, Wrexham, Wales, LL14 4DW Effluent Type: Sewage Discharges - Sewer Storm Overflow - Water Company Permit Number: CM0176001 Permit Version: 2	Receiving Water: Pant Brook Avon Soch Status: Varied By Application - (wra 91 Sched 10 - As Amended By Env Act 1995) Issue date: 19/3/2004 Effective Date: 31/3/2004 Revocation Date: -
2	374.0	SW	328900, 346000	Address: Rhoslanerchrugog Bryn Y Brai, Rhoslanerchrugog Bryn Y Brai Effluent Type: Unspecified Permit Number: CM0176001 Permit Version: 1	Receiving Water: Pant Brook Avon Soch Status: New Consent, By Application (wra 91, Section 88) Issue date: - Effective Date: - Revocation Date: 30/3/2004
3	419.0	SW	329010, 345820	Address: Rhos Osborne Street, Rhos Osborne Street, Osborne Street Effluent Type: Unspecified Permit Number: CM0057901 Permit Version: 1	Receiving Water: Trib.of Goch Status: Consent Expired - Time Limit Issue date: 27/6/1969 Effective Date: 27/6/1969 Revocation Date: 5/4/1995
4	421.0	E	329770, 346130	Address: Ffordd Offa Rhoslanerchrugog, Ffordd Offa Rhoslanerchrugog, Rhoslanerchrugog, Rhoslanerchrugog, Rhoslanerchrugog Effluent Type: Sewage Discharges - Sewer Storm Overflow - Water Company Permit Number: CG0359501 Permit Version: 1	Receiving Water: Unnamed Watercourse Status: New Consent, By Application (wra 91, Section 88) Issue date: 21/7/1994 Effective Date: 21/7/1994 Revocation Date: -

Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site: 0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

Records of COMAH & NIHHS sites within 500m of the study site: 0

Database searched and no data found.

2.3 Environment Agency Recorded Pollution Incidents

Records of National Incidents Recording System, List 2 within 250m of the study site: 0

Database searched and no data found.

Records of National Incidents Recording System, List 1 within 250m of the study site: 0

Database searched and no data found.

2.4 Sites Determined as Contaminated Land under Part IIA EPA 1990¹

How many records of sites determined as contaminated land under Section 78R of the Environmental Protection Act 1990 are there within 500m of the study site? 0

Report Reference: 00071671-11

Not shown	1330.0	E	330800, 345500	Site Address: Hafod Quarry, Bangor Road, Johnstown, Wrexham Waste Licence: Yes Site Reference: - Waste Type: - Regis Reference: WW1/L/SWM001	Licence Issue: 30-Apr-1999 Licence Surrendered: 23-May-2005 Licence Hold Address: - Operator: -
Not shown	1370.0	N	328700, 347600	Site Address: Monsanto Chemical Tip, Cae Dwr Waste Licence: - Site Reference: - Waste Type: Special Regis Reference: -	Licence Issue: Licence Surrendered: Licence Hold Address: - Operator: -

Records of non-operational landfill sites sourced from Landmark within 1000m of the study site: 1

The following landfill records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance [m]	Direction	NGR	Details	Record Date: 01-Jul-1993
1	550.0	E	329900, 346150	Site Address: Stryd Las Landfill, Between Stryd Las & Gutter Hill, Johnstown, WREXHAM, Clwyd. Landfill Licence: W1FAMPAL Agency Reference: EAWML37077 Waste Type: Non-Hazardous Waste Description: Non-Hazardous Landfill Known Restrictions: Waste produced/controlled by licence holder	Transfer Date: Modification Date: Status: Site closed Category: LANDFILL Regulator: EA - Welsh Region - Northern Area (Buckley) Size: Medium (< 75,000 tonnes/year)

Records of BGS/DoE non-operational landfill sites within 1500m of the study site: 0

Database searched and no data found.

Records of Local Authority landfill sites within 1500m of the study site: 7

The following landfill records are represented as points or polygons on the Landfill and Other Waste Sites map:

ID	Distance [m]	Direction	Site Address	Source	Data Type
Not shown	994.0	S	Refuse Tip	1975 mapping	Polygon
Not shown	1148.0	N	Refuse Tip	1962 mapping	Polygon
Not shown	1148.0	N	Refuse Tip	1962 mapping	Polygon
Not shown	1220.0	NW	Refuse Tip	1962 mapping	Polygon
Not shown	1220.0	NW	Refuse Tip	1962 mapping	Polygon
Not shown	1277.0	N	Refuse Tip	1962 mapping	Polygon
Not shown	1277.0	N	Refuse Tip	1962 mapping	Polygon

3.2 Other Waste Sites

Records of operational waste treatment, transfer or disposal sites within 500m of the study site: 0

Database searched and no data found.

Records of non-operational waste treatment, transfer or disposal sites within 500m of the study site: 0

Report Reference: 00071671-11

Not shown	1390.0	SE	330053, 344957	Site Address: Gardden Industrial Estate, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Vehicle depollution facility Size: < 25000 tonnes Regis Licence Number: CLW002 Operator: Clwyd Breakers Ltd Surrendered Date: - Waste Management licence No: 102006 Annual Tonnage: 74999.0	Issue Date: 07/10/2010 Expiry Date: - Effective Date: - Status: Issued Modified: - Site Name: Clwyd Breakers Ltd Cancelled Date: - Correspondence Address: -
Not shown	1418.0	SE	330083, 344942	Site Address: Land / Premises At, Gardden Ind Est, Ruabon, Wrexham, Clwyd, LL14 6RG Type: Metal Recycling Site (mixed MRS's) Size: < 25000 tonnes Regis Licence Number: BEN001 Operator: Bennett D Surrendered Date: - Waste Management licence No: 37163 Annual Tonnage: 30000.0	Issue Date: 31/03/1999 Expiry Date: - Effective Date: - Status: Expired Modified: - Site Name: Clwyd Car Breakers Cancelled Date: - Correspondence Address: -

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site:

11

The following records are represented as points on the Current Land Uses map:

ID	Distance [m]	Direction	Company	Address	Activity	Category
1	24.0	N	P & G Motors Ltd	13, Hill Street, Rhosllanerchrugog, Wrexham, LL14 1LN	Vehicle Repair, Testing and Servicing	Repair and Servicing
2A	84.0	W	Alexanya Curtains	87, Market Street, Rhosllanerchrugog, Wrexham, LL14 2LB	Curtains and Blinds	Consumer Products
3	88.0	NE	Electricity Sub Station	LL14	Electrical Features	Infrastructure and Facilities
4A	94.0	W	The Co-operative Pharmacy	85, Market Street, Rhosllanerchrugog, Wrexham, LL14 2LB	Chemists and Pharmacies	Health Practitioners and Establishments
5	97.0	W	Electricity Sub Station	LL14	Electrical Features	Infrastructure and Facilities
6	104.0	NW	Telephone Exchange	LL14	Telecommunications Features	Infrastructure and Facilities
7	122.0	NE	Baker Scaffolding Ltd	Tryfan, Windsor Road, Rhosllanerchrugog, Wrexham, LL14 1ST	Construction and Tool Hire	Hire Services
8	168.0	NW	The Co-operative Pharmacy	57, Market Street, Rhosllanerchrugog, Wrexham, LL14 2LA	Chemists and Pharmacies	Health Practitioners and Establishments
9	174.0	SE	Shaft	LL14	Unspecified Quarries Or Mines	Extractive Industries
10	221.0	NW	Rhos Radio	23, Market Street, Rhosllanerchrugog, Wrexham, LL14 1AH	Electrical Equipment Repair and Servicing	Repair and Servicing
11	228.0	S	Electricity Sub Station	LL14	Electrical Features	Infrastructure and Facilities

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site:

1

The following petrol or fuel site records provided by Catalist are represented as points on the Current Land Use map:

ID	Distance [m]	Direction	NGR	Company	Address	LPG	Status
12	449.0	E	329785, 346289	Obsolete	The Garage, Hill Street, Hill Street, Rhosllanerchrugog, Wrexham, Chwyd, LL14 1LN	Not Applicable	Obsolete

4.3 Underground High Pressure Oil and Gas Pipelines

Records of high pressure underground pipelines within 500m of the study site:

0

Database searched and no data found.

Report Reference: 00071671-11

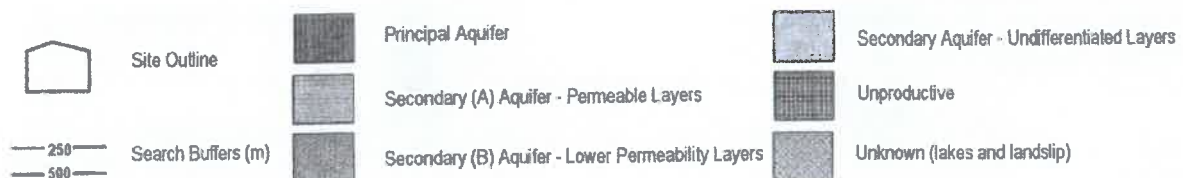
6a. Hydrogeology - Aquifer Within Superficial Geology



Aquifer Within Superficial Geology Legend

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6. Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Are there records of productive strata within the superficial geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure User Guide.

The following aquifer records are shown on the Aquifer within Superficial Geology Map (6a):

ID	Distance [m]	Direction	Designation	Description
3	0.0	On Site	Unproductive	These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow

6.2 Aquifer within Bedrock Deposits

Are there records of productive strata within the bedrock geology at or in proximity to the property? **Yes**

From 1 April 2010, the Environment Agency's Groundwater Protection Policy has been using aquifer designations consistent with the Water Framework Directive. For further details on the designation and interpretation of this information, please refer to the GroundSure User Guide.

The following aquifer records are shown on the Aquifer within Bedrock Geology Map (6b):

ID	Distance [m]	Direction	Designation	Description
1	0.0	On Site	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

Are there any Groundwater Abstraction Licences within 1000m of the study site? **No**

Database searched and no data found.

6.4 Surface Water Abstraction Licences

Are there any Surface Water Abstraction Licences within 1000m of the study site? **No**

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Report Reference: 00071671-11

Not shown	1455.0	SW	328000, 345400	River Name: Eitha Reach: Conf.r.dee W.park - Conf.trib.nr.penycae End/Start of Stretch: Start of Stretch NGR	A	A	A	A	-
-----------	--------	----	----------------	--	---	---	---	---	---

6.8 Detailed River Network

Are there any Detailed River Network entries within 500m of the study site?

Yes

The following Detailed River Network records are represented on the Hydrology Map (6d):

ID	Distance	Direction	Details
1	293.0	W	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: - River Type: Extended Culvert (greater than 50m) Catchment: - Drain: NO Main River Status: Currently Undefined
2	367.0	SW	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: - River Type: Tertiary River Catchment: - Drain: NO Main River Status: Currently Undefined
3	413.0	SW	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: - River Type: Extended Culvert (greater than 50m) Catchment: - Drain: NO Main River Status: Currently Undefined
4	467.0	W	River Name: - Water Course Name: - Welsh River Name: - Alternative Name: - River Type: Tertiary River Catchment: - Drain: NO Main River Status: Currently Undefined

6.9 Surface Water Features

Are there any surface water features within 250m of the study site?

No

Database searched and no data found.

7. Flooding

7.1 Zone 2 Flooding

Zone 2 floodplain estimates the annual probability of flooding as one in one thousand (0.1%) or greater from rivers and the sea but less than 1% from rivers or 0.5% from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 2 floodplain? **No**

Guidance: More detailed information on flooding may be available by ordering a GroundSure Floodview report. Please contact GroundSure for further details.

Database searched and no data found.

7.2 Zone 3 Flooding

Zone 3 estimates the annual probability of flooding as one in one hundred (1%) or greater from rivers and a one in two hundred (0.5%) or greater from the sea. Alternatively, where information is available they may show the highest known flood level.

Is the site within 250m of an Environment Agency indicative Zone 3 floodplain? **No**

Guidance: More detailed information on flooding may be available by ordering a GroundSure Floodview report. Please contact GroundSure for further details.

Database searched and no data found.

7.3 Flood Defences

Are there any Flood Defences within 250m of the study site? **No**

7.4 Areas benefiting from Flood Defences

Are there any areas benefiting from Flood Defences within 250m of the study site? **No**

Guidance: More detailed information on flooding may be available by ordering a GroundSure Floodview report. Please contact GroundSure for further details.

7.5 Areas used for Flood Storage

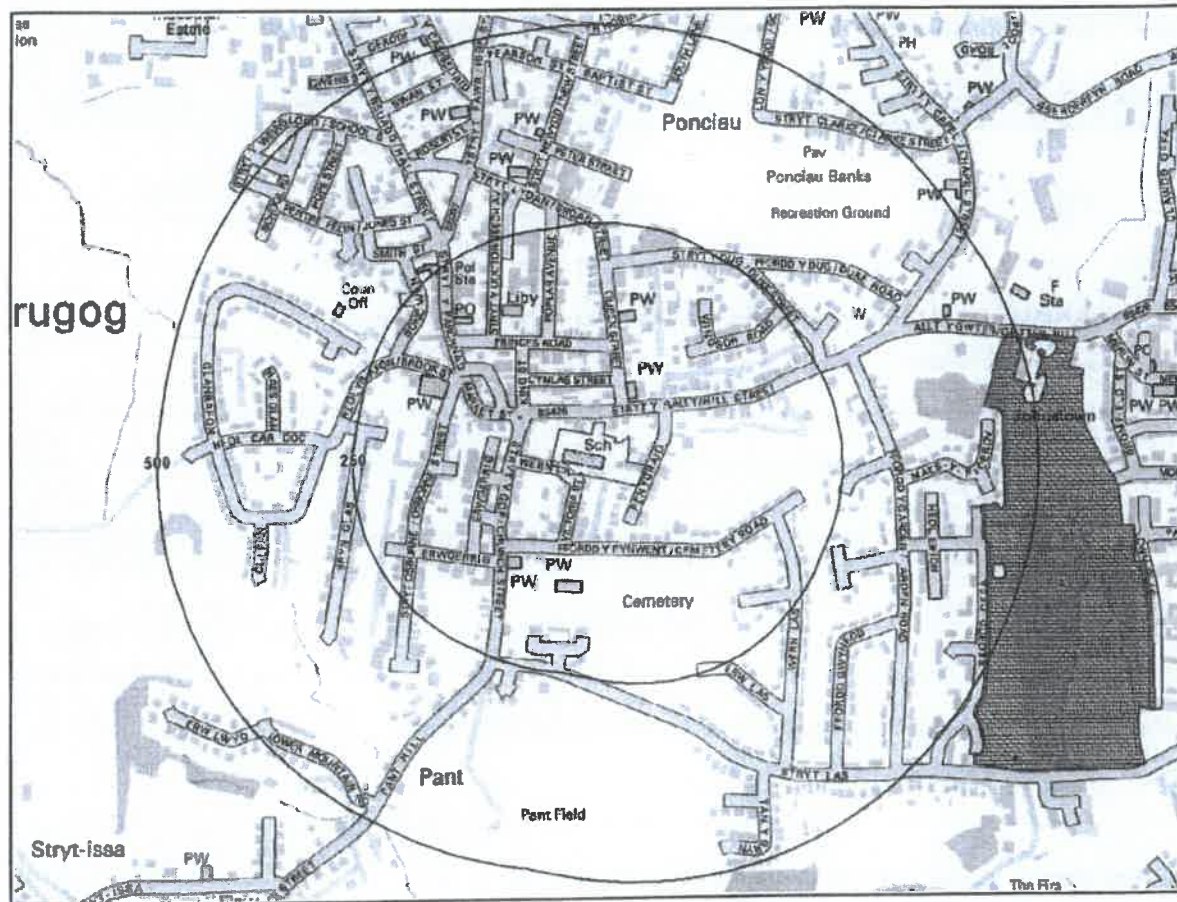
Are there any areas used for Flood Storage within 250m of the study site? **No**

Guidance: More detailed information on flooding may be available by ordering a GroundSure Floodview report. Please contact GroundSure for further details.

7.6 Groundwater Flooding Susceptibility Areas

Report Reference: 00071671-11

8. Designated Environmentally Sensitive Sites Map



Designated Environmentally Sensitive Sites Legend

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Database searched and no data found.

Records of National Parks (NP) within 500m of the study site:

0

Database searched and no data found.

Records of Nitrate Sensitive Areas within 500m of the study site:

0

Database searched and no data found.

10. Natural Hazards Findings

10.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information, please obtain a GroundSure Geology and Ground Stability Report. Available from our website. The following information has been found:

10.1.1 Shrink Swell

What is the maximum Shrink-Swell* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

10.1.2 Landslides

What is the maximum Landslide* hazard rating identified on the study site? **Very Low**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

10.1.3 Soluble Rocks

What is the maximum Soluble Rocks* hazard rating identified on the study site? **Null - Negligible**

Soluble rocks are not present in the search area. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

10.1.4 Compressible Ground

What is the maximum Compressible Ground* hazard rating identified on the study site? **Negligible**

The following natural subsidence information provided by the British Geological Survey is not represented on mapping:

Hazard

No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

11. Non CON29M Mining Information

11.1 Coal Mining

Are there any coal mining areas within 75m of the study site?

Yes

A Coal Authority CON29M Coal Mining and Brine Subsidence Claim Report is provided in Appendix 1 at the end of this report.

11.2 Shallow Mining

What is the hazard of subsidence relating to shallow mining on site (including a 150m buffer) ? **Moderate**

Guidance: Where moderate potential is indicated, this means that the rocks underlying the area are of a type known to have been mined at shallow depth in some parts of the UK, and that such working may be possible in your area. In these cases it is recommended that you seek further advice from a Royal Institute Chartered Surveyor (RICS), the local Building Control Officer, or by ordering a Geological Report from the BGS. It is also recommended that you obtain a Coal Authority mining search, which will provide a comprehensive search of former mining activity, including coal mining at deeper levels.

11.3 Brine Affected Areas

Are there any brine affected areas within 75m of the study site?

No

A Coal Authority CON29M Coal Mining and Brine Subsidence Claim Report is provided in Appendix 1 at the end of this report.

Standard Terms and Conditions

1 Definitions

In these conditions unless the context otherwise requires:

- "Beneficiary" means the Client or the customer of the Client for whom the Client has procured the Services.
- "Commercial" means any building which is not Residential.
- "Commission" means an order for Consultancy Services submitted by a Client.
- "Consultancy Services" mean consultancy services provided by GroundSure including, without limitation, carrying out interpretation of third party and in-house environmental data, provision of environmental consultancy advice, undertaking environmental audits and assessments, Site investigation, Site monitoring and related items.
- "Content" means any data, database or other information contained in a Report or Mapping which is provided to GroundSure by a Data Provider.
- "Contract" means the contract between GroundSure and the Client for the performance of the Services which arises upon GroundSure's acceptance of an Order or Commission and which shall incorporate these conditions, the relevant GroundSure User Guide, proposal by GroundSure and the content of any subsequent report, and any agreed amendments in accordance with clause 11.
- "Client" means the party that submits an Order or Commission.
- "Data Provider" means any third party providing Content to GroundSure.
- "Data Report" means reports comprising factual data with no professional interpretation in respect of the level of likely risk and/or liability available from GroundSure.
- "GroundSure" means GroundSure Limited, a company registered in England and Wales under number 03421028 and whose registered office is at Greater London House, Hampstead Road, London NW1 7EJ.
- "Intellectual Property" means any patent, copyright, design rights, service marks, moral rights, data protection rights, know-how, trademark or any other intellectual property rights.
- "Mapping" an historical map or a combination of historical maps of various ages, time periods and scales available from GroundSure.
- "Order" means an order form submitted by the Client requiring Services from GroundSure in respect of a specified Site.
- "Order Website" means online platform via which Orders may be placed.
- "Report" means a Risk Screening Report or Data Report for commercial or residential property available from GroundSure relating to the Site prepared in accordance with the specifications set out in the relevant User Guide.
- "Residential" means any building used as or suitable for use as an individual dwelling.
- "Risk Screening Report" means one of GroundSure's risk screening reports, comprising factual data with interpretation in respect of the level of likely risk and/or liability, excluding "Consultancy Services".
- "Services" means the provision of any Report, Mapping or Consultancy Services which GroundSure has agreed to carry out for the Client/Beneficiary on these terms and conditions in respect of the Site.
- "Site" means the land in respect of which GroundSure provides the Services.
- "User Guide" means the relevant current version of the user guide, available upon request from GroundSure.

2 Scope of Services

- 2.1 GroundSure agrees to carry out the Services in accordance with the Contract and to the extent set out therein.
- 2.2 GroundSure shall exercise all the reasonable skill, care and diligence to be expected of experienced environmental consultants in the performance of the Services.
- 2.3 The Client acknowledges that it has not relied on any statement or representation made by or on behalf of GroundSure which is not set out and expressly agreed in the Contract.
- 2.4 Terms and conditions appearing on a Client's order form, printed stationery or other communication, including invoices, to GroundSure, its employees, servants, agents or other representatives or any terms implied by custom, practice or course of dealing shall be of no effect and these terms and conditions shall prevail over all others.
- 2.5 In the event that a Client/Beneficiary opts to take out insurance in conjunction with or as a result of the Services, such insurance shall be subject solely to the terms of any policy issued to it in that respect and GroundSure will have no liability therefor.
- 2.6 GroundSure's quotations/proposals are valid for a period of 30 days only. GroundSure reserves the right to withdraw any quotation at any time before GroundSure accepts an Order or Commission. GroundSure's acceptance of an Order or Commission shall be effective only where such acceptance is in writing and signed by GroundSure's authorised representative or where accepted via GroundSure's Order Website.
- 3 The Client's obligations
- 3.1 The Client shall ensure the Beneficiary complies with and is bound by the terms and conditions set out in the Contract and shall provide that GroundSure may in its own right enforce such terms and conditions against the Beneficiary pursuant to the Contracts (Rights of Third Parties) Act 1999. The Client shall be liable for all breaches of the Contract by the Beneficiary as if they were breaches by the Client. The Client shall be solely responsible for ensuring that the Report/Mapping ordered is appropriate and suitable for the Beneficiary's needs.
- 3.2 The Client shall (or shall procure that the Beneficiary shall) supply to GroundSure as soon as practicable and without charge all information necessary and accurate relevant data including any specific and/or unusual environmental information relating to the Site known to the Client/Beneficiary which may pertain to the Services and shall give such assistance as GroundSure shall reasonably require in the performance of the Services (including, without limitation, access to a Site, facilities and equipment as agreed in the Contract).
- 3.3 Where Client/Beneficiary approval or decision is required, such approval or decision shall be given or procured in reasonable time as not to delay or disrupt the performance of any other part of the Services.
- 3.4 The Client shall not and shall not knowingly permit the Beneficiary to, save as expressly permitted by these terms and conditions, re-sell, alter, add to, amend or use out of context the content of any Report, Mapping or, in respect of any Services, information given by GroundSure. For the avoidance of doubt, the Client and Beneficiary may make the Report, Mapping or GroundSure's findings available to a third party who is considering acquiring the whole or part of the Site, or providing funding in relation to the Site, but such third party cannot rely on the same unless expressly permitted under clause 4.
- 3.5 The Client is responsible for maintaining the confidentiality of its user name and password if using GroundSure's internet ordering service and accepts responsibility for all activity that occurs under such account and password.
- 4 Reliance
- 4.1 Upon full payment of all relevant fees and subject to the provisions of these terms and conditions, the Client and Beneficiary are granted an irrevocable royalty-free licence to access the information contained in a Report, Mapping or in a report prepared by GroundSure in respect of or arising out of Consultancy Services. The Services may only be used for the benefit of the Client and those persons listed in clauses 4.2 and 4.3.
- 4.2 In relation to Data Reports, Mapping and Risk Screening Reports, the Client shall be entitled to make Reports available to (i) the Beneficiary, (ii) the Beneficiary's professional advisers, (iii) any person providing funding to the Beneficiary in relation to the Site (whether directly or as part of a lending syndicate), (iv) the first purchaser or first tenant of the Site (v) the professional advisers and lenders of the first purchaser or tenant of the Site. Accordingly GroundSure shall have the same duties and obligations to those persons in respect of the Services as it has to the Client and those persons shall have the benefit of any of the Client's rights under the Contract as if those persons were parties to the Contract. For the avoidance of doubt, the limitations of GroundSure's liability as set out in clauses 7 and 11.6 shall apply.
- 4.3 In relation to Consultancy Services, reliance shall be limited to the Client, Beneficiary and named parties on the Report.
- 4.4 Save as set out in clauses 4.2 and 4.3 and unless otherwise agreed in writing with GroundSure, any other party considering the information supplied by GroundSure as part of the Services, including (but not limited to) insurance underwriters, does so at their own risk and GroundSure has no legal obligations to such party unless otherwise agreed in writing.
- 4.5 The Client shall not and shall not knowingly permit any person (including the Beneficiary) who is provided with a copy of any Report, (except as permitted herein or by separate agreement with GroundSure) to: (a) remove, suppress or modify any trade mark, copyright or other proprietary marking from the Report or Mapping; (b) create any product which is derived directly or indirectly from the data contained in the Report or Mapping; (c) combine the Report or Mapping with, or incorporate the Report or Mapping into any other information data or service; or (d) re-format or otherwise change (whether by modification, addition or enhancement) data or images contained in the Report or Mapping.
- 4.6 Notwithstanding clause 4.5, if the Client acts in a professional capacity, it may make reasonable use of a Report and/or findings made as a result of Consultancy Services to advise Beneficiaries. However, GroundSure shall have no liability in respect of any opinion or report given to such Beneficiaries by the Client or a third party.

5 Fees and Disbursements

- 5.1 GroundSure shall charge the Client fees at the rate and frequency specified in the Contract together, in the case of Consultancy Services, with all proper disbursements incurred by GroundSure in performing the Services. For the avoidance of doubt, the fees payable for the Services are as set out in GroundSure's written proposal, Order Website or Order acknowledgement form. The Client shall in addition pay all value added tax or other tax payable on such fees and disbursements in relation to the provision of the Services.
- 5.2 Unless GroundSure requires prepayment, the Client shall promptly pay all fees disbursements and other monies due to GroundSure in full without deduction, counterclaim or set off together with such value added tax or other tax as may be required within 30 days from the date of GroundSure's invoice or such other period as may be agreed in writing between GroundSure and the Client ("Payment Date"). GroundSure reserves the right to charge interest which shall accrue on a daily basis from 30 days after the date of Payment until the date of payment (whether before or after judgment) at the rate of five per cent per annum above the Bank of England base rate from time to time.
- 5.3 In the event that the Client disputes the amount payable in respect of GroundSure's invoice it shall notify GroundSure no later than 28 days after the date thereof that it is in dispute. In default of such notification the Client shall be deemed to have agreed the amount thereof. As soon as reasonably practicable following receipt of a notification in respect of any disputed invoice, a member of the management team at GroundSure shall contact the Client and the parties shall use all reasonable endeavours to resolve the dispute.
- 6 Intellectual Property
- 6.1 Subject to the provisions of clause 4.1, the Client and the Beneficiary hereby acknowledge that all Intellectual Property in the Services and Content are and shall remain owned by either GroundSure or the Data Providers and nothing in these terms purports to transfer or assign any rights to the Client or the Beneficiary in respect of the Intellectual Property.
- 6.2 The Client shall acknowledge the ownership of the Content where such Content is incorporated or used in the Client's own documents, reports, systems or services whether or not these are supplied to a third party.
- 6.3 Data Providers may enforce any breach of clauses 6.1 and 6.2 against the Client or Beneficiary.
- 6.4 The Client acknowledges that the proprietary rights subsisting in copyright, database rights and any other intellectual property rights in respect of any data and information contained in any Report are and shall remain (subject to clause 11.1) the property of GroundSure and/or any third party that has supplied data or information used to create a Report, and that these conditions do not purport to grant, assign or transfer any such rights in respect thereof to a Client and/or a Beneficiary.
- 6.5 The Client and each of the parties set out in clause 4.2 are permitted to make up to 8 (commercial) or 2 (residential) printed copies of the Report only. Further copies of the Report may not be made in whole or in part without the prior written permission of GroundSure who shall be entitled to make a charge for each additional copy.
- 6.6 The Client shall (and shall procure that any recipients of the Report as permitted under clause 4.2 shall):
 - (i) not remove, suppress or modify any trademark, copyright or other proprietary marking belonging to GroundSure or any third party from the Services;
 - (ii) use the information obtained as part of the Services in respect of the subject Site only, and shall not store or reuse any information obtained as part of the Services provided in respect of adjacent or nearby sites;

Appendix 1

The Coal Authority CON29M Coal Mining and Brine Subsidence Claim report



**British
Geological Survey**

NATURAL ENVIRONMENT RESEARCH COUNCIL

BGS ID: 142470 : BGS Reference: SJ24NE44/E

British National Grid (27700) : 329290,346180

Report an issue with this borehole

<< < Prev Page 1 of 3 Next > >>



SOUTH LANC'S BORING CO. (U.K.) LTD.

CHAPEL STREET · PEMBERTON · WIGAN

Telephone — Wigan 83437/8

BOREHOLE RECORD SHEET

Job No. 1972

Date 17.4.73

Location Y5401 WERN RHOSLLANERCHROGDE

29264618

Carried out for JAMES WILLIAMSON & PARTNERS

Borehole No. 3

Diameter 4"

Ground Level

Scale 1:125

DESCRIPTION	O.S.	LEGEND	DEPTH	THICK- NESS	SAMPLE	S.P.T. VALUE	WATER LEVELS
MUDS GRAIND TARMACADDED			0-1	1-1			
Loose dark grey MUDSTONE fragments			1-2	1-2			
Firm grey CLAY			2-4	1-3			
Firm yellowish brown silty CLAY.			3-7	3-3			
Firm yellowish brown weathered MUDSTONE.			7-0	1-2			
Hard light grey SILTSTONE.			8-2	12-4			
Very hard light grey SILTSTONE with occasional thin bands of firm brown MUDSTONE.			20-6	0-4			
Soft black SHALE OLD WORKINGS			21-0	0-3			
Firm black COAL			21-3	1-9			
Firm black SHALE			23-2	1-2			
Firm grey MUDSTONE.			24-4				END OF BORE

Undisturbed Sample



Disturbed Sample



Water Sample



Standard Penetration



SOUTH LANCs. BORING CO. (U.K.) LTD.

CHAPEL STREET · PEMBERTON · WIGAN

Telephone — Wigan 83-37/8

BOREHOLE RECORD SHEET

Job No. 1972

Date 17.4.73

Location YSGOL Y WERN RHOSLLANERCHUGOR

Carried out for JAMES WILLIAMSON & PARTNERS

2929408

Borehole No. 5

Diameter 4"

Ground Level

Scale 1:125

DESCRIPTION	O.S.D.	LEGEND	DEPTH	THICK- NESS	SAMPLE	WATER LEVELS
TOP SOIL			0-3	0-3		
Firm yellowish brown stony silty CLAY.			2-1			
Firm yellowish brown weathered MUDSTONE			2-4	2-2		
Firm light grey MUDSTONE			4-6	1-2		
Hard light grey SILTSTONE with occasional thin bands of firm brown MUDSTONE			5-8	7-6		
Medium to hard grey SILTSTONE			13-4	1-5		
Soft brown MUDSTONE			14-9	0-3		
Hard grey SILTSTONE			15-2	5-7		
Firm black SHALE			20-9	2-0		
Firm grey MUDSTONE			22-9	0-9		
			23-8			END OF BORE

Undisturbed Sample



Disturbed Sample



Water Sample



Standard Penetration



APPENDIX E

Borehole and Trial Pit Logs

DRILLHOLE LOG

2of

AGS3 I/K DH 1413 WERN SCHOOL RHOS.GPJ GINT STD AGS 3 1 GDT 17/9/13

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

DRILLHOLE LOG

Project Wern School, Rhos				DRILLHOLE No BH2	
Job No 1413	Date 10-01-13	Ground Level (m) 165.90	Co-Ordinates ()		
Contractor				Sheet 1	

RUN DETAILS						STRATA		Geology	Instrument/ Backfill
Depth Date	TCR (SCR) RQD	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
						Discontinuities	Detail		
			165.85		0.05			MADE GROUND: Tarmac MADE GROUND: Brown and grey ashy sand with brown clay	
					(5.35)				
			160.50		5.40			Brown sandy gravelly CLAY. Probable made ground	
					(3.00)				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS	
Date	Time	Depth	Casing	Core Dia mm	Strike	Water Standing	From	To	Type	Returns		
												Logging based on flush returns from open hole drilling
All dimensions in metres Scale 1:50			Client Beech Developments			Method/ Plant Used Klemm KR709			Logged By TD			

AGS3 UK OH 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3_1.GDT 17/1/13

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

DRILLHOLE LOG

Project Wern School, Rhos				DRILLHOLE No BH2	
Job No 1413	Date 10-01-13	Ground Level (m) 165.90	Co-Ordinates ()		
Contractor					Sheet 3

RUN DETAILS						STRATA		Geology	Instrument/ Backfill
Depth	TCR (SCR)	(SPT) Fracture Spacing	Red'cd Level	Legend	Depth (Thick- ness)	DESCRIPTION			
Date	RQD					Discontinuities	Main		
			148.50		(1.40)		drilling. Possible backfilled workings Dark grey and black MUDSTONE with coal stringers		
					(3.00)		Alternating bands of light grey and dark grey MUDSTONE		
			145.50		20.40				

Drilling Progress and Water Observations							Rotary Flush				GENERAL REMARKS	
Date	Time	Depth	Casing	Core Dia mm	Strike	Water Standing	From	To	Type	Returns		
												Logging based on flush returns from open hole drilling
All dimensions in metres Scale 1:50			Client Beech Developments			Method/ Plant Used Klemm KR709		Logged By TD				

AGS3 UK DH 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3 1.GDT 17/1/13

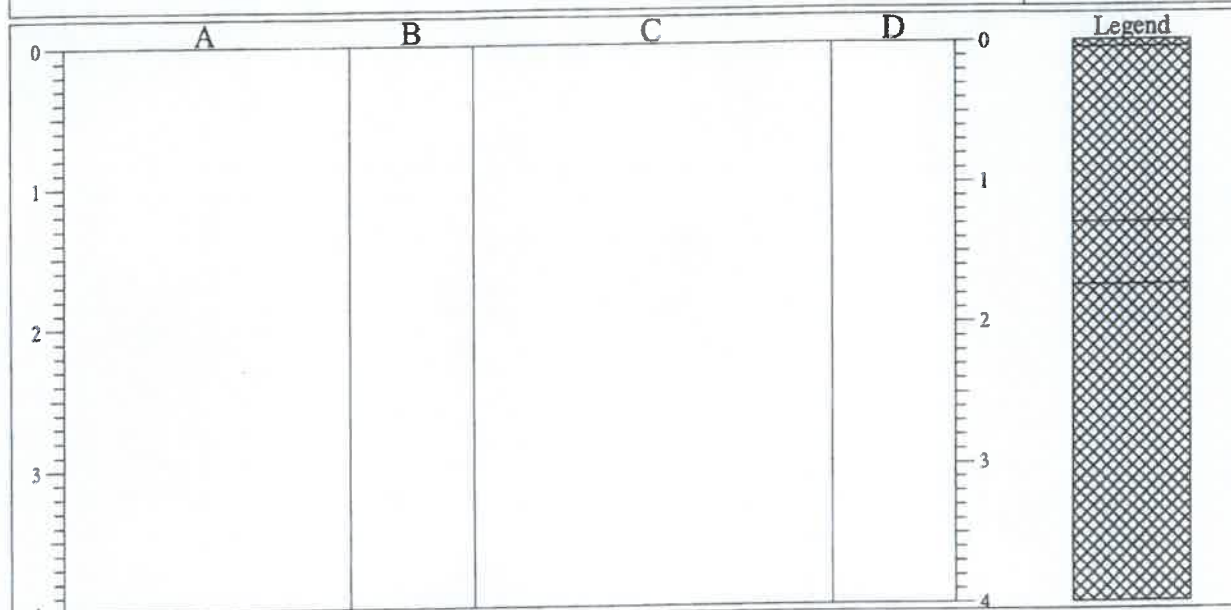
DRILLHOLE LOG

20.3AGS3 UK OH 1413 WERN SCHOOL RHOS.GPJ QINT STD AGS3_1.GDT 17/1/13

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

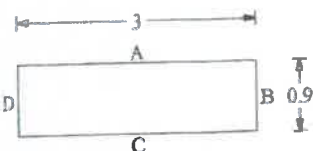
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP1
Job No 1413	Date 09-01-13	Ground Level (m) 165.90	Co-Ordinates ()	
Contractor				Sheet 1 of 2



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.05		MADE GROUND: Tarmac			
0.05-1.30		MADE GROUND: Loose whole and part bricks with some matrix of firm brown slightly sandy clay and black ash sand			
		0.05 - 0.95 over top of slab: MADE GROUND: Loose grey very sandy angular fine to coarse gravel sub-base with thin (60 - 140mm) layer of very soft pink grout on top of slab	0.60	J X2	
		1.05 Top of slab. Slab 600mm thick shuttered edge with visqueen at base over 100 to 200mm blinding layer			
1.30-1.75		MADE GROUND: Firm, locally soft, brown slightly sandy slightly gravelly CLAY with pockets of black ash sand, occasional part and whole bricks			
1.75-4.60		MADE GROUND: Loose black silty gravelly SAND of ash with fragments of ceramic, glass, bone. Occasional glass bottles. Locally becoming clayey			

Shoring/Support: None
 Stability: Minor collapsing of pit walls



GENERAL REMARKS

Dry

AGS3 UK TP 1413 WERN SCHOOL RHOS.GPJ GINT STD AGS 3 1.GDT 17/1/13

All dimensions in metres
 Scale 1:50

Client **Beech Developments**

Method/
 Plant Used

13T tracked

Logged By
TD

TRIAL PIT 1



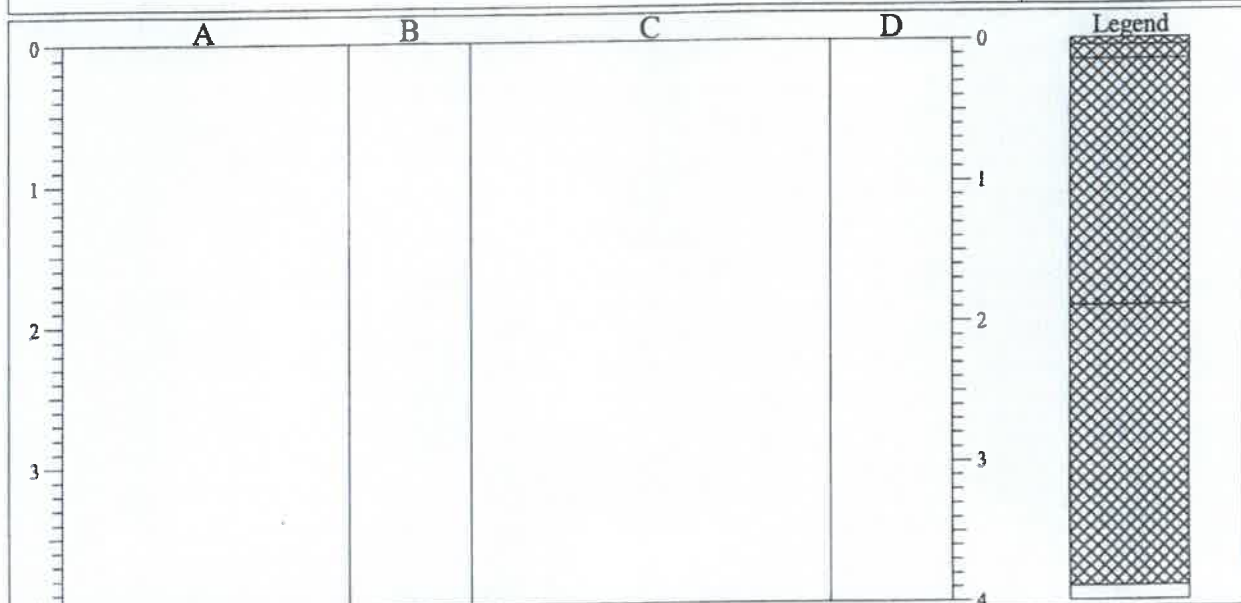
TRIAL PIT 2



GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

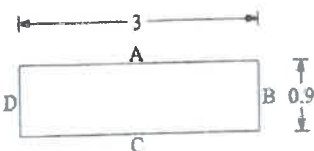
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP3
Job No 1413	Date 09-01-13	Ground Level (m) 166.00	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.05		MADE GROUND: Tarmac			
0.05-0.15		MADE GROUND: Yellow brown sandy medium and coarse GRAVEL of limestone hardcore			
0.15-1.90		0.05 - 0.95 over top of slab: MADE GROUND: Loose grey very sandy angular fine to coarse gravel sub-base with thin (60 - 140mm) layer of very soft pink grout on top of slab MADE GROUND: Firm, locally soft, brown slightly sandy slightly gravelly CLAY with pockets of black ash sand, occasional part and whole bricks 0.95 Top of slab. Slab 600mm thick shuttered edge with visqueen at base over 250mm blinding layer			
1.90-3.90		MADE GROUND: Loose black silty gravelly SAND of ash with fragments of ceramic, glass, bone. Locally becoming clayey			

Shoring/Support: None
 Stability: Minor collapsing of pit



GENERAL REMARKS

Dry

All dimensions in metres Scale 1:50	Client Beech Developments	Method/ Plant Used 13T tracked	Logged By TD
--	------------------------------	--------------------------------------	-----------------

AGS3 UK TP 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3 1.GDT 17/1/13



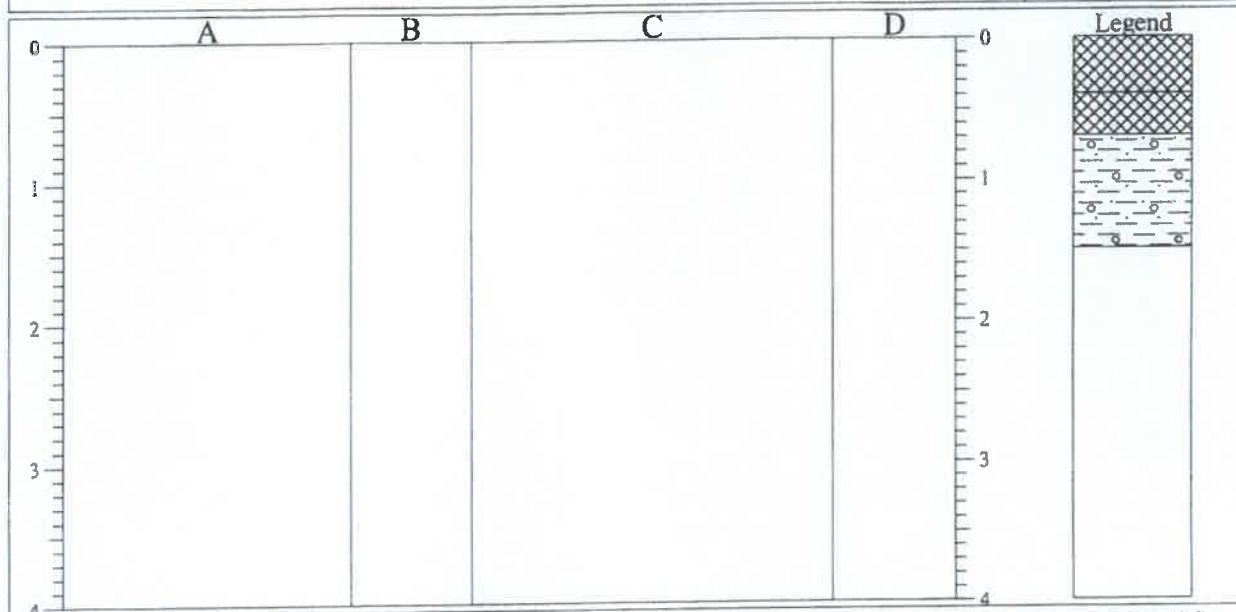
TRIAL PIT 4



GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

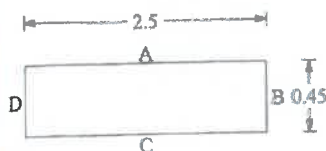
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP5
Job No 1413	Date 09-01-13	Ground Level (m) 170.50	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.40		MADE GROUND: Loose dark grey sandy angular fine to coarse GRAVEL of mudstone with occasional mudstone cobbles and coal fragments			
0.40-0.70		MADE GROUND: Brown gravelly angular COBBLES of sandstone with some matrix of firm brown sandy clay	0.35	J X2	
0.70-1.50		Firm locally stiff brown mottled orange brown slightly sandy slightly gravelly CLAY	0.75	D	

Shoring/Support: None
 Stability: Sides remained vertical



GENERAL REMARKS

Dry

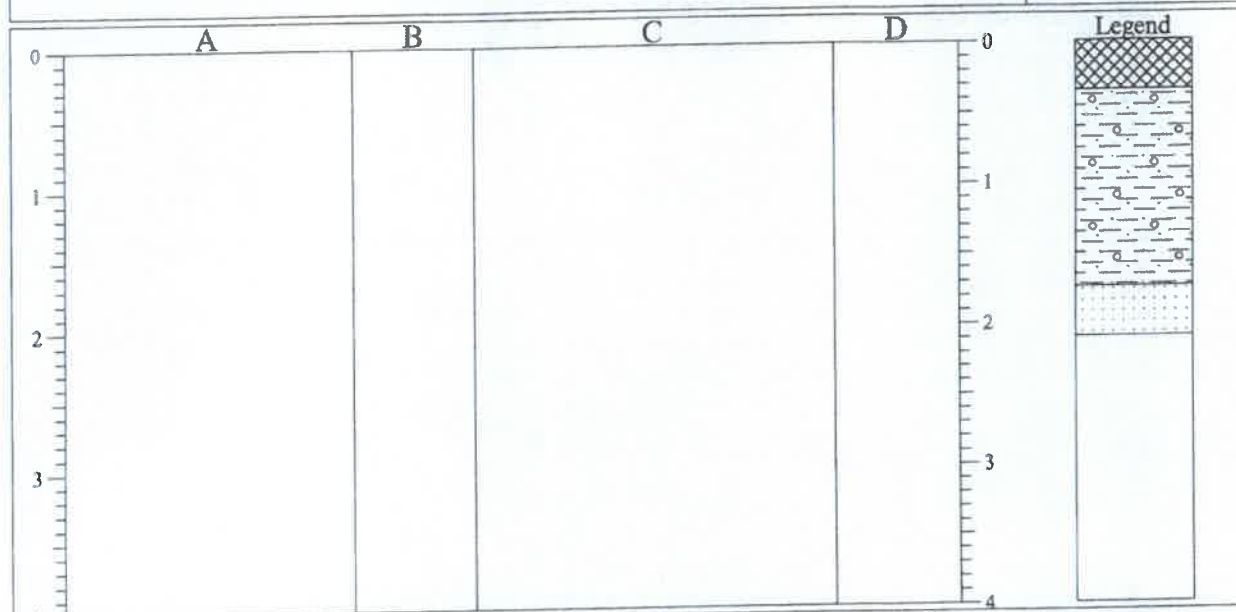
AGS3 UK TP 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3_1.GDT 17/1/13

All dimensions in metres Scale 1:50	Client Beech Developments	Method/ Plant Used 13T tracked	Logged By TD
--	------------------------------	--------------------------------------	-----------------

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP6
Job No 1413	Date 09-01-13	Ground Level (m) 170.50	Co-Ordinates ()	
Contractor				Sheet 1 of 1



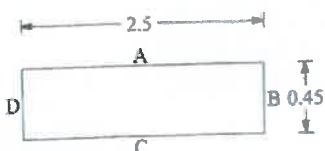
STRATA

SAMPLES & TESTS

Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.35		MADE GROUND: Loose dark grey sandy angular fine to coarse GRAVEL of mudstone with occasional mudstone cobbles and coal and brick fragments	0.35	D	
0.35-1.75		Stiff yellow brown mottled grey slightly sandy slightly gravelly CLAY 0.60 becoming brown			
1.75-2.10		Moderately weak very thinly bedded brown fine grained SANDSTONE with occasional laminations of grey mudstone			

T STD AGS 3 1.90T 1/7/13

Shoring/Support: None
 Stability: Sides remained vertical



GENERAL REMARKS

Dry

AGS3 UK TP 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3.1.GDT 17/1/13

All dimensions in metres
 Scale 1:50

Client **Beech Developments**

Method/
 Plant Used

13T tracked

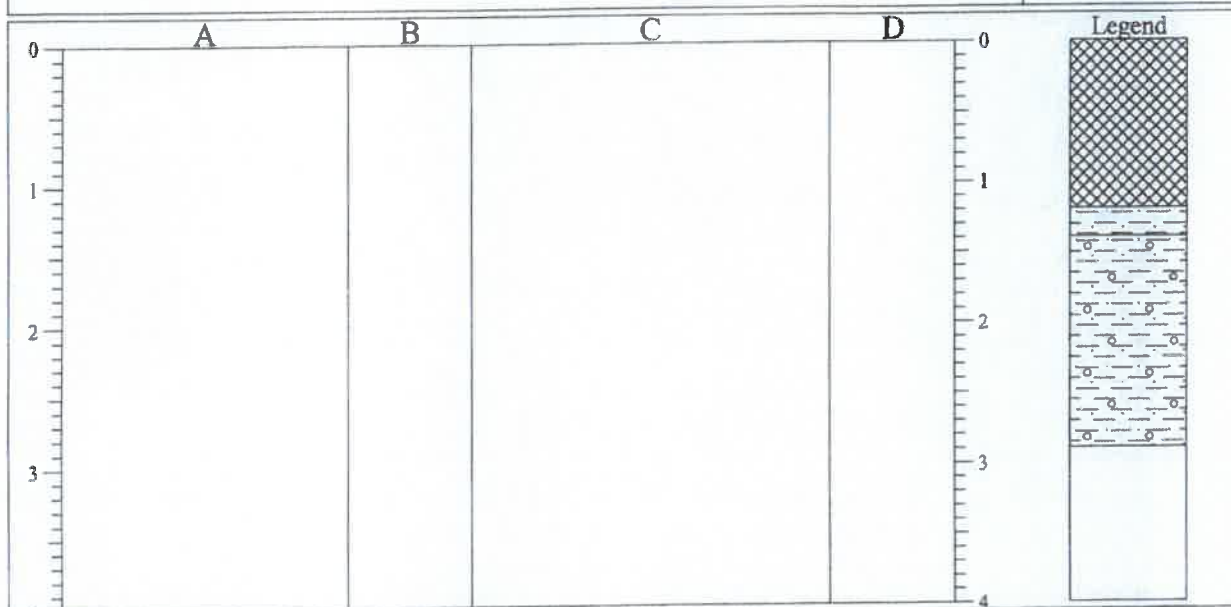
Logged By

TD

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

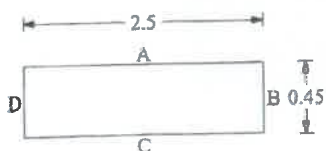
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP7
Job No 1413	Date 09-01-13	Ground Level (m) 172.75	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.20		MADE GROUND: Loose dark grey sandy angular fine to coarse GRAVEL of mudstone with occasional mudstone cobbles and gravel of red brown burnt shale			
1.20-1.40		Soft greenish grey slightly sandy CLAY			
1.40-2.90		Firm locally stiff brown slightly sandy slightly gravelly CLAY			

Shoring/Support: None
 Stability: Collapsing in mudstone fill



GENERAL REMARKS

Dry

All dimensions in metres
 Scale 1:50

Client **Beech Developments**

Method/
 Plant Used

13T tracked

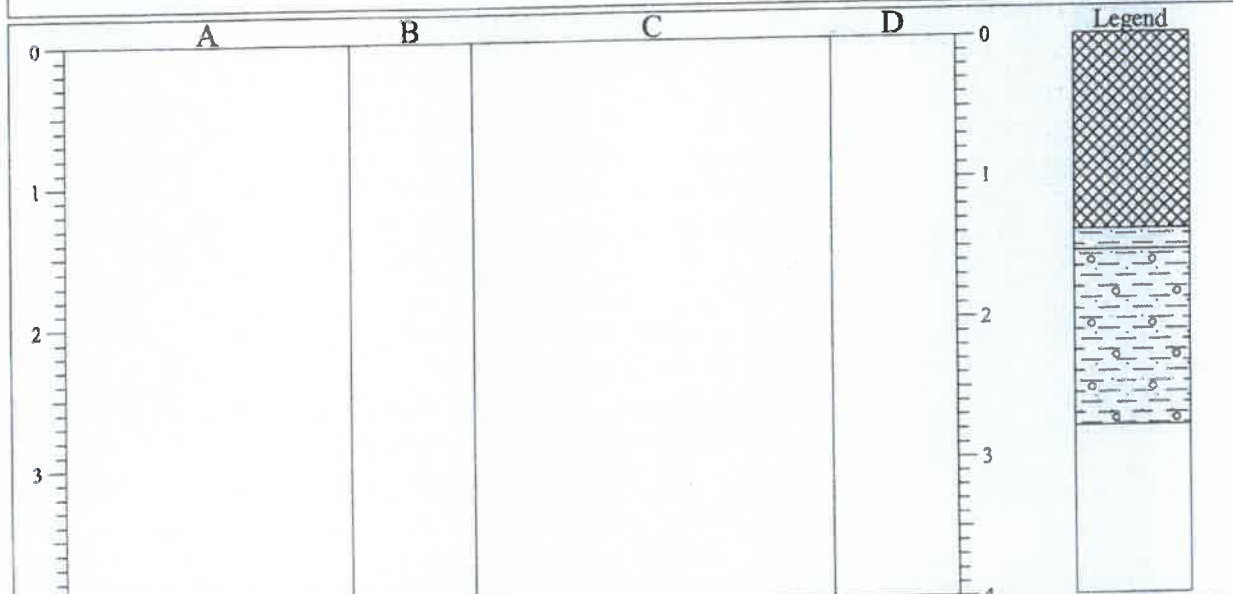
Logged By

TD

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

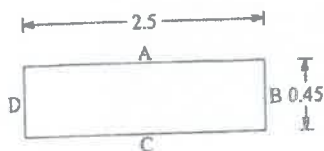
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP8
Job No 1413	Date 09-01-13	Ground Level (m) 173.00	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-1.40		MADE GROUND: Loose dark grey sandy angular fine to coarse GRAVEL of mudstone with occasional mudstone cobbles and gravel of red brown burnt shale and coal fragments	0.50	J X2	
1.40-1.55		Soft greenish grey slightly sandy CLAY			
1.55-2.80		Stiff brown locally mottled grey slightly sandy slightly gravelly CLAY			

Shoring/Support: None
 Stability: Collapsing in mudstone fill



GENERAL REMARKS

Dry

AGSS UK TP 1413 WERN SCHOOL, RHOS.GPJ GINT STD AGS 3, 1.GDT 17/1/13

All dimensions in metres
 Scale 1:50

Client Beech Developments

Method/
 Plant Used

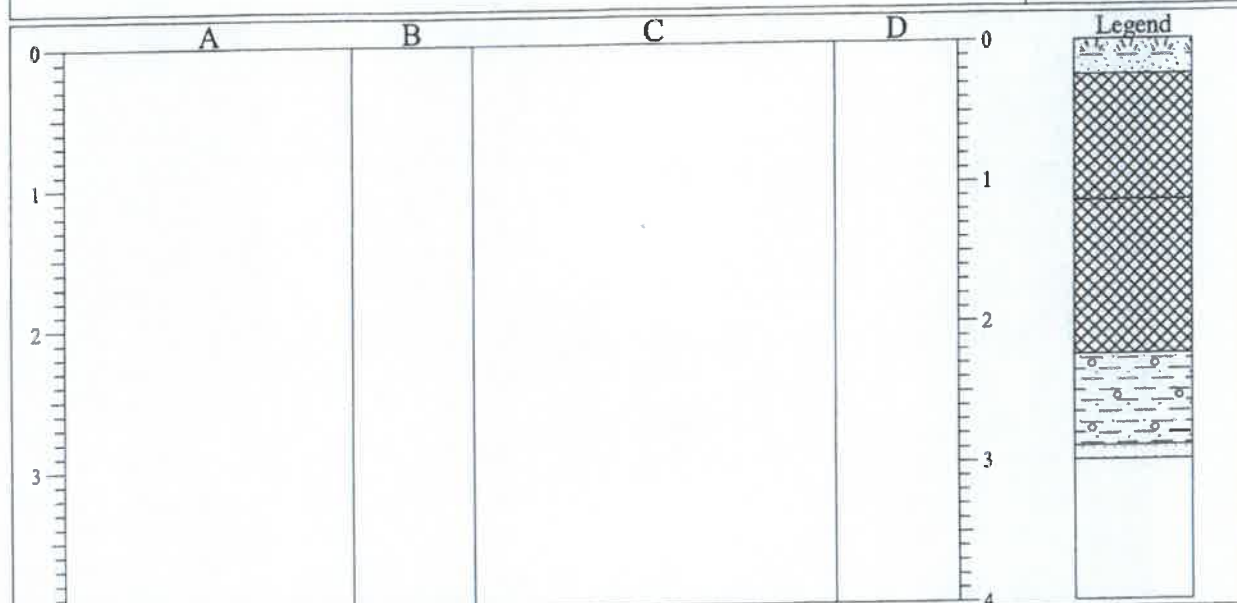
13T tracked

Logged By
 TD

GroundSolve Ltd
 Chester Road
 CH4 0DH
 Telephone: 01244 661361
 Fax: 01244 661289

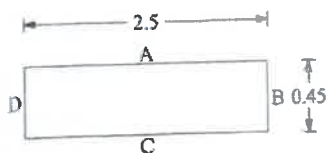
TRIAL PIT LOG

Project Wern School, Rhos				TRIAL PIT No TP9
Job No 1413	Date 09-01-13	Ground Level (m) 173.00	Co-Ordinates ()	
Contractor				Sheet 1 of 1



STRATA			SAMPLES & TESTS		
Depth	No	DESCRIPTION	Depth	No	Remarks/Tests
0.00-0.25		TOPSOIL			
0.25-1.15		MADE GROUND: Loose dark grey sandy angular fine to coarse GRAVEL of mudstone with occasional mudstone cobbles and gravel of red brown burnt shale and coal fragments	0.40	J X2	
1.15-2.25		MADE GROUND: Stiff grey gravelly CLAY. Gravel is mudstone			
2.25-2.90		Firm orange brown slightly sandy slightly gravelly CLAY			
2.90-3.00		Brown highly weathered fine grained SANDSTONE			

Shoring/Support: None
 Stability: Sides remained vertical



GENERAL REMARKS

Dry

AGS3 UK TP 1413 WERN SCHOOL, RHOS, GFI GINT STD AGS 3, 1, GDT 17/1/13

All dimensions in metres
 Scale 1:50

Client **Beech Developments**

Method/
 Plant Used

13T tracked

Logged By
TD

APPENDIX F
Physical Test Results

GroundSolve LTD
Unit 2, The Old School
Brynsiencyn
Llanfairpwll
Anglesey
LL61 6HZ
Contract: Ysgol Y Wern, Rhos

Date: 21 January 2013
Test Report Ref: STR 308358

Page 1 of 1

LABORATORY TEST REPORT

TEST REQUIREMENTS: To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with
BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S41453
Client Ref. :	TP5 @ 0.75m
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/01/2013
Date of Start of Test:	16/01/2013
Sampling Location:	TP5 @ 0.75m
Name of Source:	Site Won
Method of Sampling:	Disturbed Tub Sample
Sampled By:	Client
Soil Description:	Orange/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

History of sample:	:	Natural state/After wet sieving
% Materials passing 425µm	=	98
Plastic Limit	=	19
Liquid Limit	=	35
Plasticity Index	=	16

Comments

None

Certificate
Prepared by:- 
Meical Owen
Assistant Laboratory Manager

Approved by: 
Eric Goulden
Technical Manager

GroundSolve LTD
Unit 2, The Old School
Brynsiencyn
Llanfairpwll
Anglesey
LL61 6HZ
Contract: Ysgol Y Wern, Rhos

Date: 21 January 2013
Test Report Ref: STR 308360

Page 1 of 1

LABORATORY TEST REPORT

TEST REQUIREMENTS:

To determine the Plastic Limit, Liquid Limit, and Plasticity Index of sample in accordance with
BS 1377:Part 2:1990 Clause 5.3, Clause 4.3, and Clause 5.4.

SAMPLE DETAILS:

Certificate of sampling received:	No
Laboratory Ref. No:	S41453
Client Ref. :	TP6 @ 0.35m
Date and Time of Sampling:	Unknown
Date of Receipt at Lab:	14/01/2013
Date of Start of Test:	16/01/2013
Sampling Location:	TP6 @ 0.35m
Name of Source:	Site Won
Method of Sampling:	Disturbed Tub Sample
Sampled By:	Client
Soil Description:	Orange/brown sandy very silty CLAY
Target Specification:	N/A

RESULTS:

History of sample:	:	Natural state/After wet sieving
% Materials passing 425µm	=	91
Plastic Limit	=	17
Liquid Limit	=	29
Plasticity Index	=	12

Comments

None

Certificate

Prepared by:-



Meical Owen
Assistant Laboratory Manager

Approved by:



Eric Goulden
Technical Manager





ALcontrol Laboratories

Unit 7-8 Hawarden Business Park
Manor Road (off Manor Lane)
Hawarden
Deeside
CH5 3US
Tel: (01244) 528700
Fax: (01244) 528701
email: mkt@alcontrol.com
Website: www.alcontrol.com

Ground Solve
Unit 7
Well House Barns
Chester Road
Bretton
Cheshire
CH4 0DH

Attention: Mike Scott

CERTIFICATE OF ANALYSIS

Date:	04 February 2013
Customer:	H_GRSOLVE_BRE
Sample Delivery Group (SDG):	130113-21
Your Reference:	1413
Location:	Wern School
Report No:	210835

We received 6 samples on Friday January 11, 2013 and 6 of these samples were scheduled for analysis which was completed on Monday February 04, 2013. Accredited laboratory tests are defined within the report, but opinions, interpretations and on-site data expressed herein are outside the scope of ISO 17025 accreditation.

Should this report require incorporation into client reports, it must be used in its entirety and not simply with the data sections alone.

All chemical testing (unless subcontracted) is performed at ALcontrol Hawarden Laboratories.

Approved By:

Sonia McWhan
Operations Manager





CERTIFICATE OF ANALYSIS

SDG: 130113-21
 Job: H_GRSOLVE_BRE-62
 Client Reference: 1413

Location: Wern School
 Customer: Ground Solve
 Attention: Mike Scott

Order Number: 1413tjd
 Report Number: 210835
 Superseded Report:

SOLID

Results Legend



Test

No Determination
Possible

Lab Sample No(s)

Customer
Sample Reference

AGS Reference

Depth (m)

Container

Phenols by HPLC (S)

All

NDPs: 0
Tests: 6

X X X X X X

Phenols by HPLC (W)

All

NDPs: 0
Tests: 1

X

Sample description

All

NDPs: 0
Tests: 5

X X X X X

Total Dissolved Solids

All

NDPs: 0
Tests: 1

X

Total Organic Carbon

All

NDPs: 0
Tests: 6

X X X X X X

Total Sulphate

All

NDPs: 0
Tests: 1

X

6785544
 6785543
 6785542
 6785541
 6785540
 6785539

MAC
 TP9
 TP8
 TP5
 TP2
 TP1

0.40
 0.50
 0.35
 0.45
 0.60

250g Amber Jar (AL)
 1kg TUB
 250g Amber Jar (AL)
 250g Amber Jar (AL)
 250g Amber Jar (AL)
 250g Amber Jar (AL)
 250g Amber Jar (AL)

CERTIFICATE OF ANALYSIS

Validated

SDG: 130113-21
 Job: H_GRSOLVE_BRE-62
 Client Reference: 1413

Location: Wern School
 Customer: Ground Solve
 Attention: Mike Scott

Order Number: 1413tjd
 Report Number: 210835
 Superseded Report:

Results Legend			Customer Sample R	TP1	TP2	TP5	TP6	TP6	WAC
#	ISO17025 Accredited		Depth (m)	0.50	0.45	0.35	0.50	0.40	
M	mCERTS accredited		Sample Type	Sol/Solid	Sol/Solid	Sol/Solid	Sol/Solid	Sol/Solid	Sol/Solid
dis. Slt	Aqueous / settled sample		Date Sampled						
tot. Slt	Dissolved / filtered sample		Sample Time						
>	Total / unfiltered sample		Date Received	11/01/2013	11/01/2013	11/01/2013	11/01/2013	11/01/2013	11/01/2013
"	Subcontracted test		SDG Ref	130113-21	130113-21	130113-21	130113-21	130113-21	130113-21
	% recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery		Lab Sample No.(s)	6765639	6765640	6765641	6765642	6765643	6765644
(7)	Trigger breach confirmed		AGS Reference						
1-48	Sample deviation (see appendix)								
Component	LOD/Units	Method							
Moisture content ratio	%	PM024							12 \$
Loss on ignition	<0.7 %	TM018							13.9 \$ M
Sulphate, 2:1 water soluble	<0.002 g/l	TM019	0.0176 \$ M		0.0579 \$ M		0.0344 \$ M		
Mineral oil >C10-C40	<1 mg/kg	TM061							249 \$ #
EPH Surrogate % recovery**	%	TM061							119 \$ M
EPH Band >C28-C40	<35 mg/kg	TM061							231 \$
EPH Band >C35-C40	<35 mg/kg	TM061							62.2 \$
EPH Band >C10-C28	<35 mg/kg	TM061							624 \$
EPH Range >C10 - C40	<35 mg/kg	TM061							932 \$ M
Phenol	<0.01 mg/kg	TM062 (S)	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M
Cresols	<0.01 mg/kg	TM062 (S)	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	
Xylenols	<0.015 mg/kg	TM062 (S)	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	
2,3,5-Trimethylphenol	<0.01 mg/kg	TM062 (S)	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	<0.01 \$ M	
2-Isopropylphenol	<0.015 mg/kg	TM062 (S)	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	<0.015 \$ M	
Phenols, Total Detected monohydric	<0.035 mg/kg	TM062 (S)							<0.035 \$ M
Phenols, Total Detected 5 speciated	<0.06 mg/kg	TM062 (S)	<0.06 \$ M	<0.06 \$ M	<0.06 \$ M	<0.06 \$ M	<0.06 \$ M	<0.06 \$ M	
Organic Carbon, Total	<0.2 %	TM132	3.64 \$ #	21.3 \$ #	31.6 \$ #	0.723 \$ #	7.28 \$ #	6.8 \$ #	6.17 \$ #
pH	1 pH Units	TM133	8.09 \$ M	8.32 \$ M	7.25 \$ M	8.29 \$ M	8.42 \$ M	8.17 \$ M	
Sulphur, Elemental	<10 mg/kg	TM136	10.7 \$ M	14.5 \$ M	51.2 \$ M	<10 \$ M	<10 \$ M	<10 \$ M	
Cyanide, Total	<1 mg/kg	TM153	<1 \$ M	<1 \$ M	<1 \$ M	<1 \$ M	<1 \$ M	<1 \$ M	
PCB congener 28	<3 µg/kg	TM168							<3 \$ M
PCB congener 52	<3 µg/kg	TM168							<3 \$ M
PCB congener 101	<3 µg/kg	TM168							<3 \$ M
PCB congener 118	<3 µg/kg	TM168							<3 \$ M
PCB congener 138	<3 µg/kg	TM168							<3 \$ M
PCB congener 153	<3 µg/kg	TM168							<3 \$ M
PCB congener 180	<3 µg/kg	TM168							<3 \$ M
Sum of detected PCB 7 Congeners	<21 µg/kg	TM168							<21 \$
Sulphide, Easily liberated	<15 mg/kg	TM180	<15 \$ #	<15 \$ #	<15 \$ #	<15 \$ #	<15 \$ #	<15 \$ #	<15 \$ #
Arsenic	<0.6 mg/kg	TM181	10.6 \$ M	15.4 \$ M	16.9 \$ M	7.08 \$ M	14.4 \$ M	11.3 \$ M	
Boron	<0.7 mg/kg	TM181	3.01 \$ #	33.7 \$ #	6.49 \$ #	2.09 \$ #	3.67 \$ #		
Cadmium	<0.02 mg/kg	TM181	1.43 \$ M	3.74 \$ M	0.326 \$ M	0.414 \$ M	4.21 \$ M	1.55 \$ M	

SDG: 130113-21
Job: H_GRSOLVE_BRE-62
Client Reference: 1413

Location: Wern School
Customer: Ground Solve
Attention: Mike Scott

Order Number: 1413tjd
Report Number: 210835
Superseded Report:

# ISO17828 accredited. mCERTS accredited. Aqueous / filtered sample. Dissolved / filtered sample. Total / unfiltered sample. Subcontracted test. % recovery of the surrogate standard to check the efficiency of the method. The results of individual compounds within samples aren't corrected for the recovery Trigger breach confirmed Sample deviation (see appendix)		Customer Sample R	WAC			
Depth (m)	Sample Type	Date Sampled	Sample Time	Date Received	SDG Ref	
Lab Sample No.(s)				11/01/2013	130113-21	6765544
AGS Reference						
Component	LOD/Units	Method				
GRO Surrogate % recovery**	%	TM089	48	2 §		
Methyl tertiary butyl ether (MTBE)	<5 µg/kg	TM089	<5	2 § M		
Benzene	<10 µg/kg	TM089	<10	2 § M		
Toluene	<2 µg/kg	TM089	<2	2 § M		
Ethylbenzene	<3 µg/kg	TM089	<3	2 § M		
m,p-Xylene	<6 µg/kg	TM089	<6	2 § M		
o-Xylene	<3 µg/kg	TM089	<3	2 § M		
sum of detected mpo xylene by GC	<9 µg/kg	TM089	<9	2 §		
sum of detected BTEX by GC	<24 µg/kg	TM089	<24	2 §		
GRO >C5-C10	<10 µg/kg	TM089	16	§		

CERTIFICATE OF ANALYSIS

SDG: 130113-21
Job: H_GRSOLVE_BRE-62
Client Reference: 1413

Location: Wern School
Customer: Ground Solve
Attention: Mike Scott

Order Number: 1413tjd
Report Number: 210835
Superseded Report:

Extractable Petroleum Hydrocarbons (EPH) By GC-FID

EPH (DRO) (C10-C40)

Sample No	Customer Sample Ref.	Depth	Matrix (mg/kg)	EPH	Interpretation
6795765	WAC		SOLID	932	Fuel oil.

Extractable Petroleum Hydrocarbons (formally Diesel Range Organics) :- Any compound extractable in n-hexane within the carbon range C10-C40, includes Aliphatic (Min Oil), Aromatic (PAHs) and naturally occurring compounds.

CERTIFICATE OF ANALYSIS

SDG:	130113-21	Location:	Wern School	Order Number:	1413jd
Job:	H_GRSOLVE_BRE-62	Customer:	Ground Solve	Report Number:	210835
Client Reference:	1413	Attention:	Mike Scott	Superseded Report:	

Table of Results - Appendix

Method No	Reference	Description	Wet/Dry Sample ¹	Surrogate Corrected
PM001		Preparation of Samples for Metals Analysis		
PM024	Modified BS 1377	Soil preparation including homogenisation, moisture screens of soils for Asbestos Containing Material		
PM114		Leaching Procedure for CEN Two Stage Batch Test 2:1/6:1 Cumulative		
TM018	BS 1377: Part 3 1990	Determination of Loss on Ignition		
TM019	Modified: US EPA Method 9056	Determination of Anions in Soils using Ion Chromatography		
TM061	Method for the Determination of EPH, Massachusetts Dept. of EP, 1998	Determination of Extractable Petroleum Hydrocarbons by GC-FID (C10-C40)		
TM062 (S)	National Grid Property Holdings Methods for the Collection & Analysis of Samples from National Grid Sites version 1 Sec 3.9	Determination of Phenols in Soils by HPLC		
TM089	Modified: US EPA Methods 8020 & 602	Determination of Gasoline Range Hydrocarbons (GRO) and BTEX (MTBE) compounds by Headspace GC-FID (C4-C12)		
TM090	Method 5310, AWWA/APHA, 20th Ed., 1999 / Modified: US EPA Method 415.1 & 9060	Determination of Total Organic Carbon/Total Inorganic Carbon in Water and Waste Water		
TM104	Method 4500F, AWWA/APHA, 20th Ed., 1999	Determination of Fluoride using the Kone Analyser		
TM123	BS 2690: Part 12:1981	The Determination of Total Dissolved Solids in Water		
TM132	In-house Method	ELTRA CS800 Operators Guide		
TM133	BS 1377: Part 3 1990; BS 6068-2.5	Determination of pH in Soil and Water using the GLpH pH Meter		
TM136	Method 17.10, Second Site property, March 2003	Determination of Sulphur by HPLC		
TM152	Method 3125B, AWWA/APHA, 20th Ed., 1999	Analysis of Aqueous Samples by ICP-MS		
TM153	Method 4500A,B,C, I, M AWWA/APHA, 20th Ed., 1999	Determination of Total Cyanide, Free (Easily Liberatable) Cyanide and Thiocyanate using the Skalar SANS+ System Segmented Flow Analyser		
TM168	EPA Method 8082, Polychlorinated Biphenyls by Gas Chromatography	Determination of WHO12 and EC7 Polychlorinated Biphenyl Congeners by GC-MS in Soils		
TM180	Sulphide in waters and waste waters 1991 ISBN 01 175 7186 SCA rec. 2007 (unpublished)	The Determination Of Easily Liberated Sulphide In Soil Samples by Ion Selective Electrode Technique		
TM181	US EPA Method 6010B	Determination of Routine Metals in Soil by ICap 6500 Duo ICP-OES		
TM182	CEN/TC 292 - WI 292046-characterization of waste-leaching Behaviour Tests- Acid and Base Neutralization Capacity Test	Determination of Acid Neutralisation Capacity (ANC) Using Autotitration in Soils		
TM183	BS EN 23506:2002, (BS 6068-2.74:2002) ISBN 0 580 36924 3	Determination of Trace Level Mercury in Waters and Leachates by PSA Cold Vapour Atomic Fluorescence Spectrometry		
TM184	EPA Methods 325.1 & 325.2	The Determination of Anions in Aqueous Matrices using the Kone Spectrophotometric Analysers		
TM213	In-house Method	Rapid Determination of PAHs by GC-FID		
TM218	Microwave extraction - EPA method 3546	Microwave extraction - EPA method 3546		
TM221	Inductively Coupled Plasma - Atomic Emission Spectroscopy. An Atlas of Spectral Information: Winge, Fassel, Peterson and Floyd	Determination of Acid extractable Sulphate in Soils by IRIS Emission Spectrometer		
TM259	by HPLC	Determination of Phenols in Waters and Leachates by HPLC		

¹ Applies to Solid samples only DRY indicates samples have been dried at 35°C. NA = not applicable.

CERTIFICATE OF ANALYSIS

SDG: 130113-21
 Job: H_GRSOLVE_BRE-62
 Client Reference: 1413

Location: Wern School
 Customer: Ground Solve
 Attention: Mike Scott

Order Number: 1413jd
 Report Number: 210835
 Superseded Report:

Appendix
General

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

2. Samples will be run in duplicate upon request, but an additional charge may be incurred.

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

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

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

6. When requested, the individual sub sample scheduled will be analysed in house for the presence of asbestos fibres and asbestos containing material by our documented in house method TMD48 based on HSG 248 (2005), which is accredited to ISO17025. If a specific asbestos fibre type is not found this will be reported as "Not detected". If no asbestos fibre types are found all will be reported as "Not detected" and the sub sample analysed deemed to be clear of asbestos. If an asbestos fibre type is found it will be reported as detected (for each fibre type found). Testing can be carried out on asbestos positive samples, but, due to Health and Safety considerations, may be replaced by alternative tests or reported as No Determination Possible. The quantity of asbestos present is not determined unless specifically requested.

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

8. If appropriate preserved bottles are not received preservation will take place on receipt. However, the integrity of the data may be compromised.

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

10. Metals in water are performed on a filtered sample, and therefore represent dissolved metals -total metals must be requested separately.

11. Results relate only to the items tested.

12. LODs for wet tests reported on a dry weight basis are not corrected for moisture content.

13. Surrogate recoveries -Most of our organic methods include surrogates, the recovery of which is monitored and reported. For EPH, MO, PAH, GRD and VOCs on soils the result is not surrogate corrected, but a percentage recovery is quoted. Acceptable limits for most organic methods are 70 -130 %.

14. Product analyses -Organic analyses on products can only be semi-quantitative due to the matrix effects and high dilution factors employed.

15. Phenols monohydric by HPLC include phenol, cresols (2-Methylphenol, 3-Methylphenol and 4-Methylphenol) and Xylenols (2,3 Dimethylphenol, 2,4 Dimethylphenol, 2,5 Dimethylphenol, 2,6 Dimethylphenol, 3,4 Dimethylphenol, 3,5 Dimethylphenol)

16. Total of 5 speciated phenols by HPLC includes Phenol, 2,3,5-Trimethyl Phenol, 2-Isopropylphenol, Cresols and Xylenols (as detailed in 15).

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

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

19. Mercury results quoted on soils will not include volatile mercury as the analysis is performed on a dried and crushed sample.

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

21. For all leachate preparations (NRA, DIN, TCLP, BSEN 12457-1, 2, 3) volatile loss may occur, as we do not employ zero headspace extraction.

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

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

Sample Deviations

1	Container with Headspace provided for volatiles analysis
2	Incorrect container received
3	Deviation from method
4	Holding time exceeded before sample received
5	Sampled on date not provided
6	Sample holding time exceeded in laboratory
7	Sample holding time exceeded due to sampled on date
8	Sample Holding Time exceeded - Late arrival of instructions.

Asbestos

Identification of Asbestos in Bulk Materials & Soils

The results for identification of asbestos in bulk materials are obtained from supplied bulk materials which have been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

The results for identification of asbestos in soils are obtained from a homogenised sub sample which has been examined to determine the presence of asbestos fibres using ALcontrol Laboratories (Hawarden) in-house method of transmitted/polarised light microscopy and central stop dispersion staining, based on HSG 248 (2005).

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

Visual Estimation Of Fibre Content

Estimation of fibre content is not permitted as part of our UKAS accredited test other than

Trace -Where only one or two asbestos fibres were identified

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

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