

**STAGE 1 and 2 CONTAMINATION  
ASSESSMENT**

**GLAN LLYN, BWLCHGWYN  
WREXHAM**

**For: Mr Charles Osborne**

**October 2016**

**R2326-R01-v1**

## DOCUMENT CONTROL SHEET

**Report Title:** Glan Llyn, Bwlchgwyn, Wrexham  
Stage 1 and 2 – Contamination Assessment

**Client:** Mr Charles Osborne

**Report Reference Number:** R2326-R01-V1

**Report Status:** Final

**Version:** V1

**Report Date:** October 2016

|          | Name                               | Position   | Signature                                                                            | Date       |
|----------|------------------------------------|------------|--------------------------------------------------------------------------------------|------------|
| Author   | C Salwa<br>BSc MSc FGS             | Consultant |   | 20.10.2016 |
| Reviewer | B Thomas<br>BSc MSc MCIWEM<br>CEnv | Partner    |  | 20.10.2016 |

### Document Revision Record:

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|         |               |            |                                      |

## **LAND ADJACENT AT GLAN LLYN, BWLCHGWYN, WREXHAM**

### **STAGE 1 and 2 CONTAMINATION ASSESSMENT**

**For Charles Osborne**

**October 2016**

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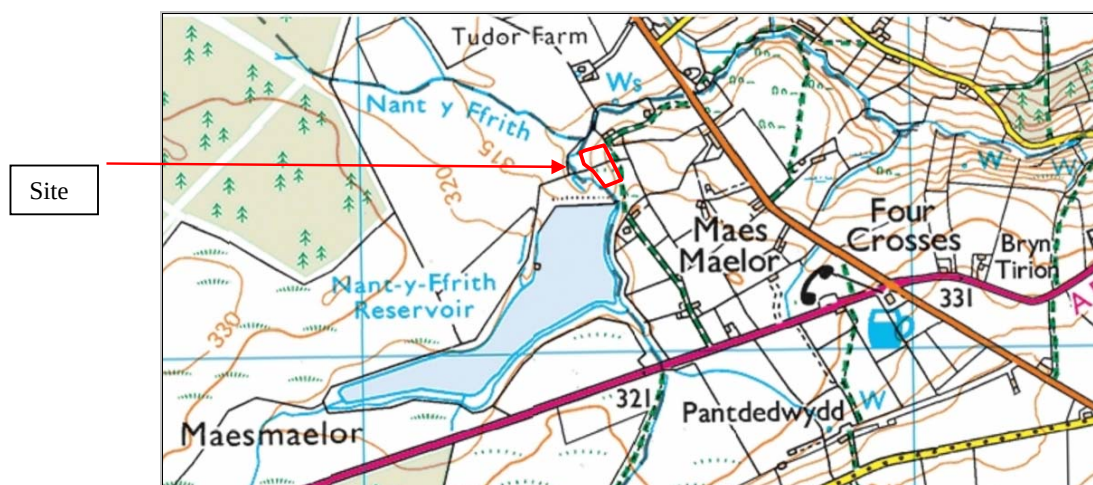
## 1. Introduction

- 1.1. Planning permission (ref: BRY P/2016/0686) has been granted by Wrexham County Borough Council (WCBC) permitting the construction of detached replacement dwelling with driveway and gardens on a parcel of land at Glan Llyn, Bwlchgwyn, Wrexham. Condition No 3 of the outline planning permission requires a phased investigation to identify the extent of contamination and any measures required to remediate the site, including post-development monitoring.
- 1.2. Mr Ch. Osborne instructed Smith Grant LLP (SGP) to undertake a Stage 2 Contamination Assessment at land at Glan Llyn, Bwlchgwyn Wrexham. A site location plan is provided below in Figure 1 and Drawing D01.
- 1.3. Site details are:

Table 1.1: Site Details

|                                |                                                             |
|--------------------------------|-------------------------------------------------------------|
| <b>Address</b>                 | Glan Llyn, Llanarmon Road, Bwlchgwyn, Wrexham, LL11 5YP     |
| <b>National Grid Reference</b> | 324459 353390                                               |
| <b>Local Authority</b>         | Wrexham County Borough Council                              |
| <b>Site Area</b>               | ca. 2,300m <sup>2</sup>                                     |
| <b>Current Nature of Site</b>  | Undeveloped agricultural land                               |
| <b>Site Access</b>             | Access from Ruthin Road (A525), Bwlchgwyn                   |
| <b>Proposed use</b>            | Detached replacement dwelling, gardens and landscaped areas |
| <b>Planning Ref</b>            | BRY P/2016/0686                                             |

Figure 1.1: Site Location



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- 1.4. This report describes the Stage 2 (intrusive) investigation undertaken by SGP in accordance with the partial requirements of Condition No. 3 (ref: BRY P/2016/0686) and a brief agreed with the client. The assessment methodology follows the framework described in the EA / DEFRA Contaminated Land Report 11: 'Model Procedures for the Management of Land Contamination' 2004.

**Table 1.2: Planning Conditions relating to Land Contamination**

|                                           |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Condition No 3<br/>BRY P/2016/0686</b> | <p>No development shall take place until a phased site investigation of the nature and extent of contamination has been carried out and submitted to and approved in writing by the Local Planning Authority. If any contamination is found during the site investigation, no part of the development shall commence until a scheme specifying the measures that will be taken to remediate the site to render it suitable for the development hereby permitted has been submitted to and approved in writing by the local planning authority.</p> <p>The site shall thereafter be remediated in accordance with the approved scheme. If during the course of development any contamination is found that has not been identified in the site investigation, no further development shall take place on those parts of the site where that contamination has been found until an additional scheme of remediation has been submitted to and approved in writing by the local planning authority for those parts of the site.</p> <p>The relevant parts of the site shall thereafter be remediated in accordance with the additional scheme of remediation.</p> |
|-------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

- 1.5. The scope of the investigation was to provide an assessment of the extent of any potential soil contamination on the site. On this basis, we have specifically targeted those areas of the site that are to comprise private residential gardens.
- 1.6. The study comprises a brief summary of previously obtained available information on the environmental setting of the site and the site's previous and current uses with respect to potential risks to the environment or human health. This report contains the results of site investigation undertaken, a quantitative risk assessment and where appropriate and makes recommendations, if necessary, for remedial actions appropriate to the future use of the site.
- 1.7. It should be noted that the information provided in the desk study is obtained from independent third party sources. It is provided in good faith, but no guarantee can be provided as to its accuracy. The Client should make independent inquiries on information provided in the desk study information that may impact on the proposed development. The desk study information is not necessarily exhaustive and further information relevant to the site may be available from other sources.

## 2. Information Sources

2.1. A desk study review of the site and its history has been undertaken to establish the former land usage and the potential for any historically derived sources of chemical contamination.

2.2. The desk study comprises a review of the following consultations and information sources:

**Table 2.1 Information Sources**

| date and reference                                                                                                                                  | author and source               | purpose and information content                                                                                                                                |
|-----------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Topography, geology, hydrogeology and hydrology</b>                                                                                              |                                 |                                                                                                                                                                |
| Promap                                                                                                                                              | Ordnance Survey (OS) Mapping,   | General mapping information including structures, boundaries, ground features, water features etc at various scales                                            |
| BGS map viewers:<br>Geology of Britain Viewer<br>Onshore GeoIndex                                                                                   | British Geological Survey (BGS) | Distribution of geological units at surface including drift deposits, bedrock and artificial ground, as well as, linear features and borehole database records |
| Radon Affected Areas,<br><a href="http://www.ukradon.org/information/ukmaps">http://www.ukradon.org/information/ukmaps</a>                          | Public Health England (PHE)     | Mapping defining radon affected areas in England & Wales                                                                                                       |
| Coal Authority Interactive Map<br><a href="http://mapapps2.bgs.ac.uk/coalauthority/home.html">http://mapapps2.bgs.ac.uk/coalauthority/home.html</a> | British Geological Survey (BGS) | The Coal Authority coal mining data in a national database. Information on past and present coal mining.                                                       |
| <b>Historical data</b>                                                                                                                              |                                 |                                                                                                                                                                |
| Historical Maps                                                                                                                                     | Ordnance Survey                 | Historical mapping at 1:10,560, 1:10,000 and 1:2,500 scales from 1871 onwards; site setting mapping                                                            |
| Aerial / satellite photography                                                                                                                      | Various sources                 | Historical images of site from 2006 till 2015                                                                                                                  |
| <b>Information review</b>                                                                                                                           |                                 |                                                                                                                                                                |
| <a href="http://www.magic.gov.uk">www.magic.gov.uk</a>                                                                                              | DEFRA                           | Web-based interactive map containing information on nature conservation areas                                                                                  |

### 2.3. Previous Site Investigations

2.3.1. SGP is unaware of any previous studies or site investigations relating to ground contamination having been undertaken at the site.

### 2.4. Site Inspection

2.4.1. A site inspection was carried out by C. Salwa of SGP on 10 October, 2016. The inspection comprised a site walkover over all accessible areas of the site and the immediate surrounds.

### 3. Development History and Current Status

#### 3.1. Historical Development

3.1.1. The history of the site has been established by reviewing the historical Ordnance Survey maps and aerial photography of the area, collected as part of the desk study information.

3.1.2. The site is mapped as being undeveloped agricultural land before 1871: On the 1871 map the site is open land with one building observed, there are no changes until 1899 when another structure, a shed, is observed few meters south of the previously existing one. No significant changes are recorded since 1899 until the present.

3.1.3. The surrounding area has been mapped as agricultural land since 1871 onwards. No significant changes were observed since 1871 until 2016.

3.1.4. An area of extensive historical limestone quarries is located in Gwynfryn, about 1200m to the south southeast. Historical Minera lead mine is located approximately 3900m to the southeast and limestone quarries are located ca. 3800m to the north northwest of the site. There are no indications on the historical maps of any shafts or spoil tips on the site or in the immediate vicinity.

#### 3.2. Present Land Condition

3.2.1. A summary of existing significant features noted during SGP's site inspection, and examination of contemporary records, is presented below.

**Table 3.1: Present Land Condition**

|                         |                                                                                                                                                                                                                                                                                                                                                                                                                         |
|-------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site Description</b> | The site lies in a predominantly in agricultural area, and currently is not occupied.<br>The site consists of irregular parcel of land, trending approximately north-south Measuring approximately 22mx42m the site extends approximately 2300m <sup>2</sup> in area.<br>The site is generally slightly uneven, with terraced abandoned gardens and slopes towards the north and the west; Nant y Ffrith stream valley. |
| <b>Access</b>           | Currently the site can be accessed through a gate from a track along the southern boundary of the site.                                                                                                                                                                                                                                                                                                                 |
| <b>Boundaries</b>       | <b>North:</b> Overgrown with shrubs, small trees and brambles.<br><b>East:</b> Overgrown with shrub and brambles with remnants of an old stone wall.<br><b>South:</b> Access gate with fence.<br><b>West:</b> Overgrown with shrub and brambles with remnants of an old stone wall.                                                                                                                                     |
| <b>Structures</b>       | Currently there are two ruined stone structures comprising a historical dwelling and shed. These did not appear to contain any suspected asbestos containing materials or are of an age where such materials are likely to have been used in their initial construction.                                                                                                                                                |

---

|                               |                                                                                                   |
|-------------------------------|---------------------------------------------------------------------------------------------------|
| <b>Vegetation</b>             | The site is overgrown with sparse vegetation comprising shrubs, locally small trees and brambles. |
| <b>Rights of Way</b>          | None identified.                                                                                  |
| <b>Services and Utilities</b> | None identified                                                                                   |

### 3.3. Adequacy of Information

3.3.1. Whilst there are some gaps in the historical map coverage it is considered that the available mapping and other information provides adequate coverage of site and its immediate surroundings to inform the assessment of potential ground contamination.

## 4. Site Characterisation

4.1.1. The environmental setting of the site is described in Table 4.1 below. The descriptions include matters such as ecology and flooding which may indirectly inform the assessment of soil contamination risks, where there are any concerns regarding issues not dealt with elsewhere in this report a separate study by specialists should be obtained.

**Table 4.1: Environmental Setting**

|                                    |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Site Setting</b>                | The site is located at land at Glyn Llan in Bwlchgwyn within rural and area setting. There are remnants of stone low-rise buildings with abandoned gardens. The rest of the area is undeveloped land with. The site access is off a rural track via gate, off Ruthin Road (A525).                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| <b>Topography</b>                  | The site is shown by Ordnance Survey mapping to be located at between about 315m aod to the south and 310m to the north and to the west, sloping from the south to the north and to the west towards Nant y Ffrith stream and watercourse between Nant y Ffrith stream and Nant y Ffrith Reservoir.                                                                                                                                                                                                                                                                                                                                                                                                                               |
| <b>Ground Conditions / Geology</b> | Reference to published geological information on the area indicates the following: <ul style="list-style-type: none"> <li>• Made ground is not anticipated to be widespread across the site.</li> <li>• According to BGS no superficial deposits are recorded on site.</li> <li>• Cefn-Y-Fedw Sandstone Formation – White and pale grey fine to medium grained sandstone of Namurian stage – Carboniferous Period.</li> </ul>                                                                                                                                                                                                                                                                                                     |
| <b>Hydrogeology / Groundwater</b>  | The site is underlain by a sandstone formation where minor aquifer (variably permeable) is expected and where water typically occurs in joints and fractures in rock.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |
| <b>Hydrology / Drainage</b>        | The site appeared to be relatively free draining at the time of the visit which took place in dry weather. No storm drains were evident on the site itself. Storm water is likely to either free drain through the soils and weathered bedrock or surface run-off.<br>The nearest surface watercourse is the Nant y Ffrith stream that flows towards the east northeast, north and northwest of the site.<br>The drainage is to the north and to the west towards the Nant y Ffrith stream.<br>The site is not indicated on NRW maps as being at risk of flooding from rivers although parts of the north and west may be at risk of flooding from surface waters and the north-westerly area at risk of flooding from reservoirs |
| <b>Radon</b>                       | The maps provided by Public Health England show the site to be within an area of elevated radon potential where some homes have a maximum radon potential of between 10% and 30 %.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                |
| <b>Ecology and Conservation</b>    | No invasive plants noted. No other features identified.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |
| <b>Mining</b>                      | The site is located outside the Coal Mining Reporting Area.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| <b>Landfilling</b>                 | There is no indication of any excavation or landfilling activities having taken place on either the site or in the immediate close proximity. Natural strata are expected to be present at shallow depth.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| <b>Industrial Land use</b>         | According to the freely available information the site is located within an agricultural area with no industrial activities in the immediate vicinity.                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |

|                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
|----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Risk of Gaseous Contamination</b>   | <p>Following the guidance given in the paper "A pragmatic approach to ground gas risk assessment for the 21<sup>st</sup> Century" Card and Wilson, 2011 and the CIRIA Report 665 the provisional assessment of the ground gas impacting the site establishes the following:</p> <ul style="list-style-type: none"><li>• No credible sources or pathways for landfill gas migration from any off-site landfill have been identified.</li><li>• The site has not been a registered landfill</li><li>• The Made Ground is not expected to be 5m deep or an average of 3m of thickness</li><li>• The site is not located on a carbonate rich rock that can produce carbon dioxide</li><li>• Radon protection measures are recommended for the site</li><li>• The site does not lie on a potential naturally organic soil or humic or degradable Made Ground soil</li></ul> <p>As such it is considered that gas monitoring is not required at the site.</p> |
| <b>Potentially Sensitive Land Uses</b> | <p>The site is not located in close proximity to any environmentally sensitive land uses.</p>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |

#### 4.2. Risks from soil contamination

4.2.1. The overall risk of soil contamination on the site is considered to be low.

4.2.2. The nearest significant source of contamination are the nearby lead mines and although the site is some distance from these, windblown dust deposits have impacted soils in the surrounding area.

4.2.3. The site is in an area where full radon protection measures are required.

---

## 5. Ground Investigation Methodology and Results

### 5.1. Objectives and Rationale

5.1.1. The Stage 1 assessment identified the potential presence of elevated concentrations of heavy metals (principally lead, cadmium and zinc), within the shallow soils across the site, largely associated with the widespread deposition of windblown dust from the local historical lead mine sites nearby, although the site is of sufficient distance for these risks to be considered low.

5.1.2. It was therefore determined that representative soil samples should be collected from near-surface locations for chemical analysis of a range of metals / metalloids to inform the human health risk assessment for garden soils following redevelopment.

### 5.2. Fieldwork

5.2.1. The site investigation comprised 6 hand-dug trial pits to permit visual inspection of shallow strata and to obtain samples from the topsoil and shallow natural strata. Trial pit locations are shown on drawing 001. The investigation was undertaken on 10 October 2016 by SGP Consultant C Salwa.

5.2.2. Works involved:

- excavation of 6 trial holes (ES1-ES6) to depths of between 0.2 and 0.3 bgl (the locations of which are provided in Drawing D01);
- visual inspection of all soil arisings;
- collection of 6 soil samples from varying strata.

5.2.3. The sampling locations were positioned so as to provide representative information from the proposed garden areas at depths where future exposure of residents can reasonably be anticipated.

### 5.3. Chemical Analysis

5.3.1. All chemical analysis of soils was carried out by Jones Environmental Laboratories, Deeside, working where possible to MCERTS and / or ISO 17025 accreditation. Soil samples were stored in appropriate containers as advised by the laboratory, placed in a cool box, and delivered to Jones Environmental within 6 hours of collection. Chain of custody documentation was completed and is retained by SGP.

5.3.2. Samples were analysed for cadmium, lead and zinc.

### 5.4. Field Observations

5.4.1. Thin topsoil was present in all entries apart from ES5 which was located in an area where the turf had been stripped. Topsoil is represented by blackish dark brown gravelly to very gravelly

slightly clayey sand. Gravel is fine to coarse angular sandstone. Below the topsoil and at formation in the area of ES5 subsoils are a yellowish brown very gravelly sand, gravel is fine to coarse angular sandstone with cobbles and boulders of sandstone (Weatheread Cefn-Y-Fedw Sandstone Formation). Photographs of the entries are provided below:

**Table 5.1: Site Photographs**

|                                                                                    |                                                                                    |                                                                                      |
|------------------------------------------------------------------------------------|------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
|   |   |   |
| Sample ES1                                                                         | Sample ES2                                                                         | Sample ES3                                                                           |
|  |  |  |
| Sample ES4                                                                         | Sample ES5                                                                         | Sample ES6                                                                           |

## 5.5. Results of Soil Chemical Analysis

5.5.1. The complete soil analytical data are presented in Appendix A and are summarised below in Table 5.2.

5.5.2. The results of the soil analyses are compared to human health critical values (CVs) for initial screening purposes. The CVs adopted are appropriate to the environmental setting and proposed future residential with garden use of the site, and are taken primarily from Category 4 Screening Level (C4SL) which is the statutory guidance value for Part 2A of the Environmental Protection Act 1990 where the level of risk posed is defined as 'acceptably low'. This value was therefore used as part of the screening levels for this investigation for the main contaminant of concern; lead.

5.5.3. For other contaminants, SGP have therefore referred to the most up-to-date Generic Assessment Criteria (GACs) for residential land-use in order to carry out a preliminary assessment of the soil test results. The "Suitable for Use" Criteria (S4ULs) published by LQM/CIEH<sup>1</sup>. All criteria assume a low (1%) soil organic matter as a conservative approach.

<sup>1</sup> Copyright Land Quality Management Ltd, reproduced with permission; Publication Number S4UL3102. All rights reserved

**Table 5.2: Summary of Soils Analysis**

| Contaminant | Number of Samples | Range of Concentrations (mg/kg or indicated) | Soil standard adopted and concentration (mg/kg or indicated) | Exceedances |
|-------------|-------------------|----------------------------------------------|--------------------------------------------------------------|-------------|
| Cadmium     | 6                 | <0.1-1.1                                     | S4UL 11                                                      | None        |
| Lead        | 6                 | 21-156                                       | C4SL 200                                                     | None        |
| Zinc        | 6                 | 46-618                                       | S4UL 3700                                                    | None        |

Notes to table:

S4UL: LQM/CIEH Suitable for Use Levels (S4ULs), residential without home grown produce land use, (at 1% SOM). Copyright Land Quality Management Ltd. Reproduced with permission publication number S4UL 3102. All rights reserved.

C4SL: Category 4 Screening Levels published by CL:AIRE (C4SLs); 'residential without home grown produce land use' (at 1% SOM)

5.5.4. No exceedances were reported for the heavy metals cadmium, lead and zinc.

## 6. Updated Conceptual Model and Risk Assessment

### 6.1. Methodology

6.1.1. Information from the desk study and site investigation has been used to identify the likely source-pathway-target relationships that may exist at the site during and following the proposed development. Principal factors that may determine potential sources of contamination at the site, receptor vulnerability and potential pathways have been identified and each assessed in turn to revise the Conceptual Site Model (CSM).

### 6.2. Sources of Contamination

6.2.1. Apart from possible radon, for which full protective measures are recommended to reduce risks, no other significant sources of contamination anticipated on the site were confirmed in the topsoil and shallow subsoil.

6.2.2. Lead is not expected to have higher concentrations at deeper levels, typically in the area potential source of lead contamination is the aerial deposition by either dust from local lead mines and associated spoil tips or smelter emissions.

### 6.3. Revised Risk Assessment

6.3.1. Moderately elevated levels of lead were identified on site. Concentrations do not pose a significant risk to human health as do not exceed conservative assessment criteria.

6.3.2. The typical form of metal mineralisation in the area is highly insoluble metal sulphides such as galena and sphalerite, indicating that leaching and water pollution from the site is likely to be insignificant, particularly in the context of the surrounding area.

6.3.3. The concentrations of zinc and cadmium within the shallow soils are unlikely to pose a risk to plant growth.

---

## 7. Conclusions and Recommendations

7.1.1. Given the concentrations of cadmium, lead and zinc below the adopted standards no remediation is required within the shallow surface soils across the site.

7.1.2. The maps provided by Public Health England show the site to be within an area of elevated radon potential where some homes have a maximum radon potential of between 10% and 30 % and full protective measures are recommended.

### Limitations

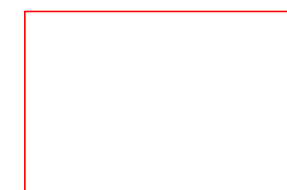
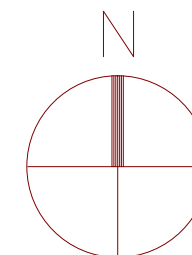
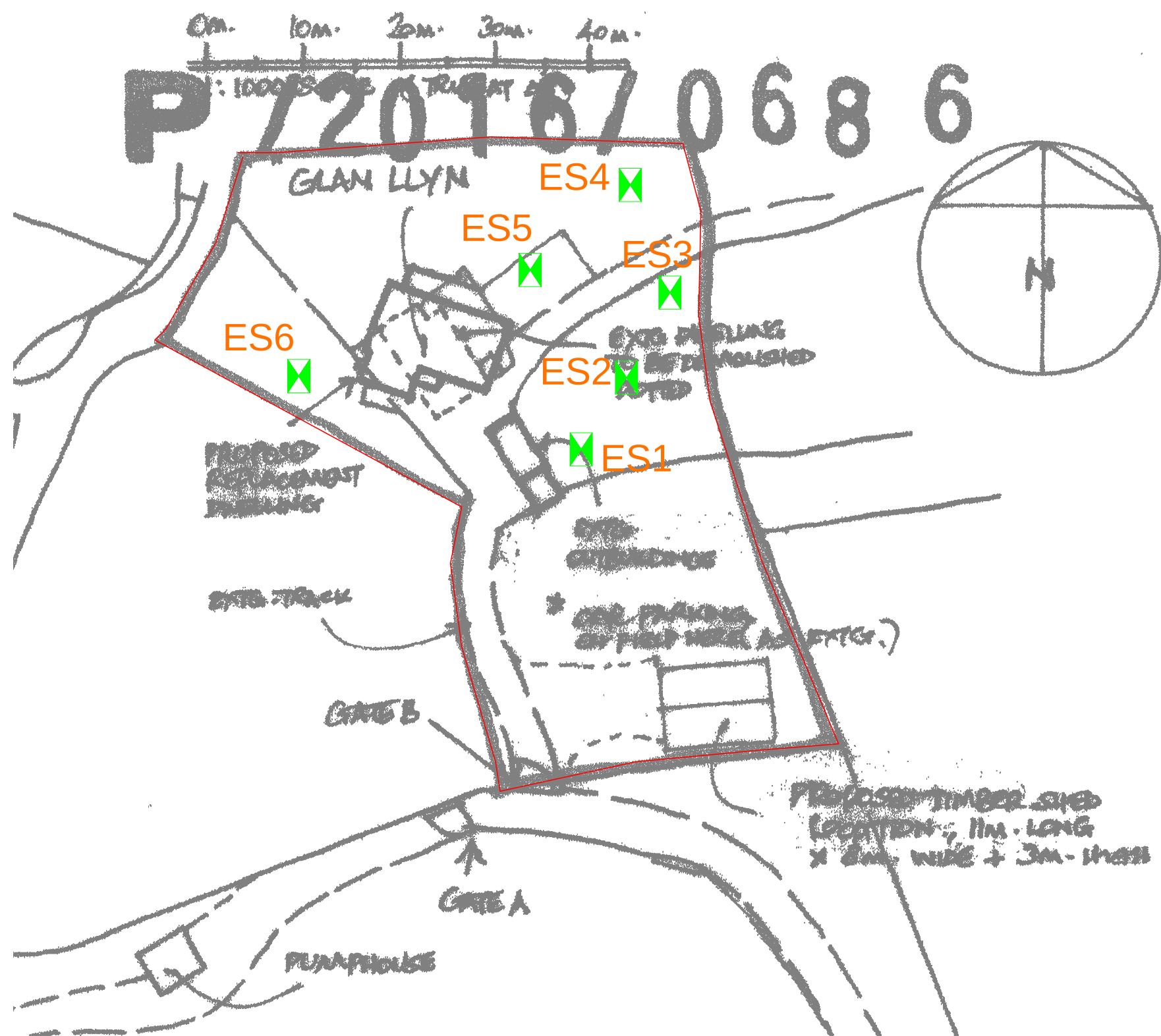
7.1.3. SGP reserves the right to alter any of the foregoing information in the event of new information being disclosed or provided and in the light of changes to legislation, guidelines and responses by the statutory and regulatory authorities.

7.1.4. This report has been prepared by Smith Grant LLP, for the sole and exclusive use of Mr Charles Osborne. The benefit of this report may not be assigned to any other party without the prior agreement in writing of Smith Grant LLP. Reasonable skill, care and diligence have been exercised within the timescale and budget available, and in accordance with the technical requirements of the brief.

7.1.5. Notwithstanding the efforts made by the professional team in undertaking the assessment and preparing this report, it is possible that other ground conditions and contamination as yet undetected may exist. Reliance on the findings of this report must therefore be limited accordingly. Such reliance must be based on the whole report and not on extracts which may lead to incomplete or incorrect conclusions when taken out of context.

## **DRAWING D01**

### **Sampling Locations**



Indicative Boundary  
(based on sketch plan  
provided)

Locations of samples:

 ES1 sample



Smith Grant LLP  
Station House, Station Road  
Ruabon, Wrexham LL14 6DL

Tel: 01978 822367  
Fax: 01978 8247182

www.smithgrant.co.uk  
email: consult@smithgrant.co.uk

Project:  
Glan Llyn - Bwlchgwyn  
Wrexham

Drawing:  
SGP Site Investigation Locations

|        |    |          |     |
|--------|----|----------|-----|
| Drawn: | CS | Checked: | BJT |
|--------|----|----------|-----|

|       |            |        |                   |
|-------|------------|--------|-------------------|
| Date: | 12/10/2016 | Scale: | not to scale @ A3 |
|-------|------------|--------|-------------------|

|         |       |         |     |
|---------|-------|---------|-----|
| Job No: | R2326 | Drg No: | 001 |
|---------|-------|---------|-----|

## **APPENDIX A**

### **Analytical Results**



# Jones Environmental Laboratory

Registered Address : Unit 3 Deeside Point, Zone 3, Deeside Industrial Park, Deeside, CH5 2UA. UK

Unit 3 Deeside Point  
Zone 3  
Deeside Industrial Park  
Deeside  
CH5 2UA

Smith Grant LLP  
Station House  
Station Road  
Ruabon  
Wrexham  
LL14 6DL

Tel: +44 (0) 1244 833780

Fax: +44 (0) 1244 833781



**Attention :** Ben Thomas  
**Date :** 20th October, 2016  
**Your reference :** R2326  
**Our reference :** Test Report 16/15532 Batch 1  
**Location :** Glan Llyn, Bwlchgwyn  
**Date samples received :** 11th October, 2016  
**Status :** Final report  
**Issue :** 1

Six samples were received for analysis on 11th October, 2016 of which six were scheduled for analysis. Please find attached our Test Report which should be read with notes at the end of the report and should include all sections if reproduced. Interpretations and opinions are outside the scope of any accreditation, and all results relate only to samples supplied.

All analysis is carried out on as received samples and reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected.

**Compiled By:**

**Bruce Leslie**  
**Project Co-ordinator**



**Client Name:** Smith Grant LLP  
**Reference:** R2326  
**Location:** Glan Llyn, Bwlchgwyn  
**Contact:** Ben Thomas

[illegible]

Please note that only samples that are deviating are mentioned in this report. If no samples are listed it is because none were deviating. Only analyses which are accredited are recorded as deviating if set criteria are not met.

## NOTES TO ACCOMPANY ALL SCHEDULES AND REPORTS

JE Job No.: 16/15532

### SOILS

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

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

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

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

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

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

All analysis is reported on a dry weight basis unless stated otherwise. Results are not surrogate corrected. Samples are dried at 35°C ±5°C unless otherwise stated. Moisture content for CEN Leachate tests are dried at 105°C ±5°C.

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

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

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

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

### WATERS

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

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

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

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

### DEVIATING SAMPLES

Samples must be received in a condition appropriate to the requested analyses. All samples should be submitted to the laboratory in suitable containers with sufficient ice packs to sustain an appropriate temperature for the requested analysis. If this is not the case you will be informed and any test results that may be compromised highlighted on your deviating samples report.

### SURROGATES

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

### DILUTIONS

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

### NOTE

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

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

Please include all sections of this report if it is reproduced

## ABBREVIATIONS and ACRONYMS USED

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

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| Test Method No. | Description                                                                                                                                                   | Prep Method No. (if appropriate) | Description                                                                                                                                   | ISO 17025 (UKAS) | MCERTS (UK soils only) | Analysis done on As Received (AR) or Dried (AD) | Reported on dry weight basis |
|-----------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------|------------------|------------------------|-------------------------------------------------|------------------------------|
| PM13            | A visual examination of the solid sample is carried out to ascertain sample make up, colour and any other inclusions. This is not a geotechnical description. | PM0                              | No preparation is required.                                                                                                                   |                  |                        | AR                                              |                              |
| TM30            | Determination of Trace Metal elements by ICP-OES (Inductively Coupled Plasma - Optical Emission Spectrometry). Modified US EPA Method 200.7 and 6010B         | PM15                             | Acid digestion of dried and ground solid samples using Aqua Regia refluxed at 112.5 °C. Samples containing asbestos are not dried and ground. | Yes              | Yes                    | AD                                              | Yes                          |
|                 |                                                                                                                                                               |                                  |                                                                                                                                               |                  |                        |                                                 |                              |
|                 |                                                                                                                                                               |                                  |                                                                                                                                               |                  |                        |                                                 |                              |
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