# PHASE I GEO-ENVIRONMENTAL SITE ASSESSMENT

**New Hall Barn**
**Blackburn Road**
**Ribchester**
**Lancashire**
**PR3 3ZQ**

**Prepared for:**

StantonAndrews

**Report Ref: 10-738-r1**
**Date Issued: August 2015**

e3p | Environmental | Energy | Engineering

**E3P**

Heliport Business Park,
Liverpool Road,
Eccles,
Manchester,
M30 7RU

Tel : + 00 (0) 161 707 9612
http:\\www. e3p.co.uk

Registered in England
No.: 807255262

# QUALITY ASSURANCE

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|---|---|
| REMARKS | ***FINAL*** |
| DATE | August 2015 |
| PREPARED BY | A Smith |
| QUALIFICATIONS | BSc (Hons), FGS |
| SIGNATURE |  |
| CHECKED BY | A Edgar |
| QUALIFICATIONS | BSc, MSc, AIEMA, MIEnvSc, CEnv |
| SIGNATURE |  |
| AUTHORISED BY | A Edgar |
| QUALIFICATIONS | BSc, MSc, AIEMA, MIEnvSc, CEnv |
| SIGNATURE |  |
| PROJECT NUMBER | 10-738 |

| **Executive Summary** | | |
|---|---|---|
| **Site Address** | New Hall Barn, Blackburn Road, Ribchester, Preston, PR3 3ZQ | |
| **Grid Reference** | E 366190, N 435350 | |
| **Site Area** | 0.46 Ha | |
| **Current Site Use** | The subject site is a parcel of land located immediately east of Ribchester off Blackburn Road situated upon the eastern embankment of the River Ribble and comprises a historic agricultural barn with associated outbuildings. | |
| **Proposed Development** | E3P understand that the client proposes to redevelop the site with the conversion of New Hall Barn to a 4-bed detached dwelling with associated access road, parking area, landscaping and adopted utility drainage infrastructure. | |
| **Environmental Setting** | *Drift Geology* | Alluvium Deposits – Clay / Silt, Sand & Gravel |
| | *Bedrock Geology* | Sabden Shale Formation - Mudstone. |
| | *Hydrogeology* | Secondary A Aquifer (both drift deposits and solid geology) not with a Groundwater Source Protection Zone or Drinking Water Safeguard Zone. |
| | *Hydrology* | River Ribble (35m W) of the site boundary. |
| | *Flood Risk* | Unaffected by flooding from rivers (Flood Zone 1). |
| | *Ecology* | Mature trees located across the northern profile of the site may house nesting birds or roosting bats. Additionally Himalayan Balsam is prevalent across the northern and western profile of the site. It is recommended that a full ecological appraisal is completed. |
| | *Industrial Land Uses* | No industrial land uses identified on-site or the immediate locality that may potentially prejudice the future redevelopment of the site for a low rise residential end use. |
| | *Compressible Ground and Subsidence Hazards* | Moderate hazard related to compressible ground is identified in the eastern sector of the site. |
| **Site History** | A review of the pertinent Ordnance Survey mapping confirmed the site has been occupied by New Hall Barn since the earliest available maps c. 1840s with associated out-buildings being constructed during the 20th century to present day.<br><br>No industrial developments have been recorded on-site or within the locality. | |
| **Utility Locations** | A formal drainage survey has not been completed however, sewer connections are likely to be present within Blackburn Road to the east. | |
| **Landfill Sites & Ground Gases** | There are no current or historic landfill sites located within 250m of the site.<br><br>A small infilled sand pit and Made Ground underlying existing structures are the only plausible sources of low-level ground gas which may pose a risk to construction workers and future site users. | |
| **Radon** | Unaffected – No special precautions required. | |
| **Coal Mining / Land Stability** | The site is not located within an area deemed to be at risk from ground instability arising from historic coal mining activities. | |

**Geotechnical Assessment**

The site is not anticipated to be underlain by any substantial depths of Made Ground and overlies predominantly cohesive Alluvium deposits which is in turn underlain by mudstone / siltstone bedrock. The Made Ground an Alluvium may be variable and could be prone to settlement. Assessment of these soils is recommended as the proposed works are likely to increase loadings on existing foundations.

The underlying predominantly cohesive natural drift deposits may provide a sub-grade formation to support proposed roads and infrastructure with a likely CBR in excess of 5%

The cohesive nature of the drift geology is unlikely to be suitable for soakaway drainage systems.

**Contaminated Land Assessment**

**Human Health**

A number of possible low-level sources of heavy metal and hydrocarbon contamination have been identified relating to existing structures and the likely presence of Made Ground and Asbestos Containing Material (ACM). Additionally, an in-filled sand pit has been identified on site which may be a potential source of ground gas. The aforementioned contaminants of concern may pose a risk to constructions workers who could come into contact with the impact during earthworks and/or future residential site users through dermal contact and ingestion of impacted soils. No other significant sources of contamination have been identified at the subject site or within the immediate surrounding area.

**Controlled Waters**

The Initial Conceptual Site Model has not identified any potential on-site sources of mobile contamination or complete pollutant linkages, as such the site is deemed to pose no unacceptable level of risk to controlled waters and the wider environ.

**Ground Gas**

A small infilled sand pit and Made Ground underlying existing structures are possible sources of low-level hazardous ground gas which may pose a risk to constructions workers and future end users.

**Recommendations**

A detailed Phase II intrusive Geo-Environmental Ground Investigation should be undertaken in order to confirm the findings of the initial conceptual site model and determine the strength of the underlying soils within the context of the proposed development.

## Table of Contents



## APPENDICES

# 1. INTRODUCTION

## 1.1 Background

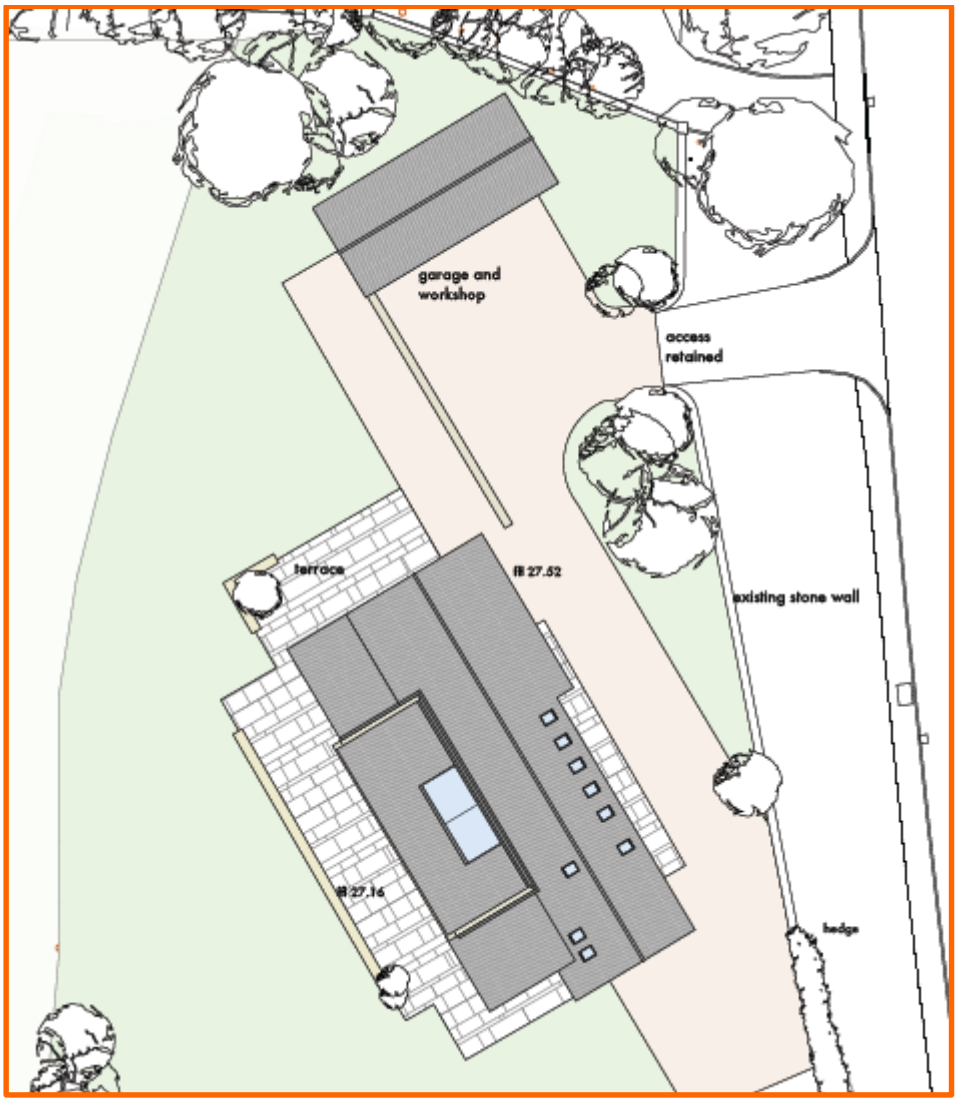
E3P Ltd has been commissioned by Stanton Andrews Architects to undertake a Phase I Geo-Environmental Site Assessment for a parcel of land currently occupied by New Hall Barn located off Blackburn Road, Ribchester, Preston, Lancashire; herein referred to as ***the site***.

This report is required to determine potential contaminated land and geotechnical liabilities associated with a proposed future residential development / extension of the existing barn.

## 1.2 Proposed Development

It is understood that Stanton Andrews Architects are acting on behalf of their client for a proposed conversion of New Hall Barn to a 4-bed detached dwelling with associated access road, garage / parking area, landscaping and adopted utility drainage infrastructure.

The proposed development layout is presented in Figure 1.1 below:



## 1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

- Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));

- Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;

- Assess the desk study information and where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,

- Provide recommendations regarding future works required and undertake a preliminary pre-construction cost appraisal.

## 1.4 Sources of Information

Background information was sought from the following sources:

- Envirocheck Search;
- Historical mapping dated 1847 to 2014. A selection of historical maps are reproduced in Appendix IV;
- On-line planning records held by Ribble Valley Borough Council;
- Consultations with representatives of by Ribble Valley Borough Council;
- Environment Agency Groundwater Vulnerability Map (www.environment-agency.gov.uk/wiyby);
- Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and,
- British Geological Survey Map.

## 1.5 Limitations

The limitations of this report are presented in Appendix I.

## 1.6 Confidentiality

E3P has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from E3P; a charge may be levied against such approval.

# 2. SITE SETTING

## 2.1 Site Details

| | |
|---|---|
| **Site Address** | New Hall Barn, Blackburn Road, Ribchester, Preston PR3 3ZQ |
| **National Grid Reference** | E 366190, N 435350 |
| **Site Area** | 0.46 Ha |

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 10-738-001.

## 2.2 Current Site Use

| **SITE DESCRIPTION** | | |
|---|---|---|
| **Occupancy/use** | The subject site is a roughly rectangular shaped parcel of land located immediately east of Ribchester off Blackburn Road and comprises an historic barn with associated outbuildings situated upon the eastern embankment of the River Ribble. | |
| **Structures** | A number of structure currently exist on site which include:<br>▪ Main Barn (brick and sandstone with slate roof);<br>▪ 3 No. wooden sheds (partly collapsed) with plastic or steel roof panels;<br>▪ A brick-built shed with corrugated asbestos cement-bonded roof; and<br>▪ A breezeblock shed with slate roof. | |
| **Access** | The site is accessed from the east via Blackburn Road. | |
| **Slope** | The site is relatively flat with only nominal topographical variance. However, the embankment of the River Ribble bordering the west of the site boundary slopes gradually towards the northern profile, however the southern portion of the site lies adjacent to a more steep-sided gradient to the watercourse below. | |
| **Retaining structures** | None identified. | |
| **Surface Cover (%)** | Buildings: | 35 |
| | Hardstand: | 10 |
| | Soft cover: | 45 |
| **Vegetation/Ecology** | A number of mature and semi-mature trees are located across the northern profile of the site bordering New Hall.<br>Himalayan Balsam is widespread across the northern and western profile of the site along the river embankment. No other invasive species were identified. | |
| **Hazardous Material Storage** | A number of plastic storage containers were discarded on site which may have contained hydrocarbons (lubricants, fuel and engine oils etc) which may be a | |

| | |
|---|---|
| | potential source of impact to near surface soils through leakage or spillages, however this a could not be confirmed during the site inspection. |
| **Asbestos Containing Material (ACM)** | ACM was identified during the site walkover present within the building fabric (roof panels) and given the age of the structures the presence of ACM within the underlying Made Ground cannot be discounted. |
| **Polychlorinated Biphenyls (PCBs)** | No equipment that may potentially contain PCBs was observed at the site. |
| **Waste Storage** | No potentially hazardous waste streams are generated at the site. |
| **Drainage** | A review of online records has indicated that both surface and foul sewer connections are present within Blackburn Road and the residential properties to the west of the site. |

## 2.3 Surrounding Area

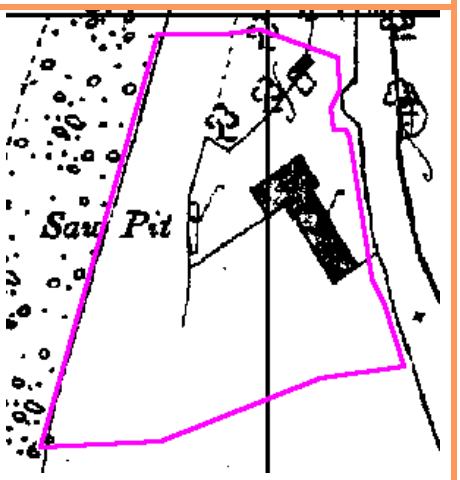
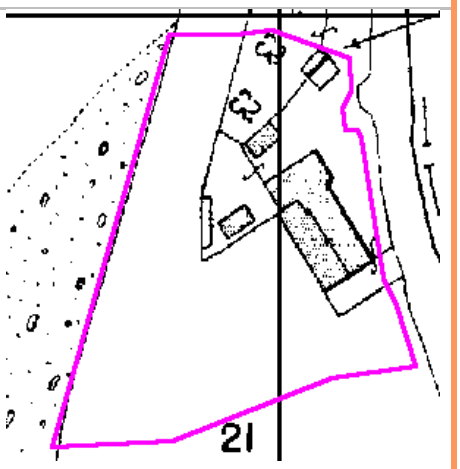
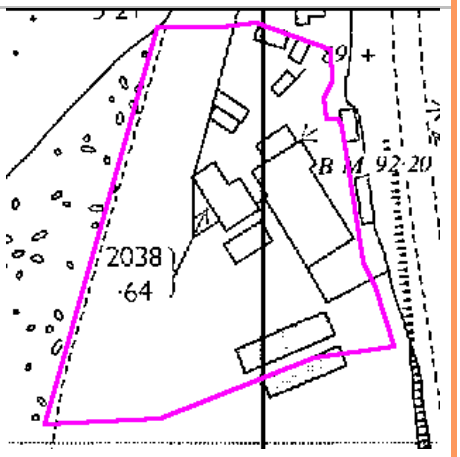
The surrounding area land uses are summarised below:

| DIRECTION | LAND USE |
|---|---|
| **North** | New Hall (Residential Dwelling). |
| **East** | Blackburn Road & Agricultural Fields. |
| **South** | Agricultural Fields. |
| **West** | River Ribble & Agricultural Fields. |

# 3. SITE HISTORY

## 3.1 On-Site Historical Development

A review of historical mapping pertinent to the site is summarised in Table 3.1 below. In addition, historical site features are presented on Drawing No 10-743-002 in Appendix III.

| MAP EDITION | HISTORICAL LAND USE | HISTORICAL MAP EXCERPT |
|---|---|---|
| 1892-93<br>1:2500 | The site comprises a barn structure within the eastern profile of the site with a smaller unspecified structure in the northern sector set within an agricultural field.<br><br>A small Sand Pit is recorded to the west of the barn. |  |
| 1912<br>1:2500 | Two smaller unspecified structures are recorded adjacent to the west of the barn.<br><br>The Sand Pit is no longer recorded. |  |
| 1967-69<br>1:2500 | Further structures have been constructed to the north, west and south of the main barn building. |  |

| | | |
|---|---|---|
| **1994**<br>**1:2500** | No significant changes recorded and the site is recorded in its present day configuration. |  |

### 3.2 Off-Site Historical Development

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250m radius of the site is summarised below in Table 3.2.

| SURROUNDING FEATURE | DISTANCE | DATES | DIRECTION |
|---|---|---|---|
| **Earthwork / Excavation**<br>*… Then Infilled* | 180m | Pre 1932 – Pre 1967<br>Pre 1967 – Present | North |
| **Old Sand Pit** | 250m | Pre 1892 – Present | North |

### 3.3 Planning History

EP3 has undertaken a review of on-line planning records held by Ribble Valley Borough Council and a planning application relevant to the study site is recorded as Approved with Conditions (Ref: 3/2015/0321 dated 30/06/2015) for the conversion of the barn from agricultural building to residential dwelling on behalf of Mr David Gaffing.

No environmentally pertinent information has been obtained for the site.

### 3.4 Anecdotal Information

No anecdotal information was obtained following a web-based search of the area.

# 4. ENVIRONMENTAL SETTING

## 4.1 Geology and Hydrogeology

The British Geological Survey (BGS) map for the site, (Sheet 67, 1:50,000, Garstang Solid & Drift edition) indicate that the site is underlain by the following geological sequence:

| GEOLOGICAL UNIT | CLASSIFICATION | DESCRIPTION | AQUIFER CLASSIFICATION |
|---|---|---|---|
| **Drift** | Alluvium Deposits | Clay, Silt, Sand and Gravel | Secondary A Aquifer |
| **Solid** | Sabden Shale Formation | Mudstone & Siltstone | Secondary A Aquifer |

The Envirocheck Report indicates the study site is not within a Groundwater Source Protection Zone (GSPZ) or Drinking Water Safeguard Zone. There are two groundwater abstractions licenses within 2.0km radius of the site which relate to a borehole at Holmes Farm (649m NW) for general farming / agriculture and domestic supply.

Based on the local topography and location of surface watercourses it is considered likely that shallow groundwater, if present, will flow in a westerly direction, following topographical gradient towards the River Ribble.

## 4.2 Geotechnical Data

Geotechnical Data presented within the Envirocheck report identifies the following ground conditions:

| HAZARD | DESIGNATION |
|---|---|
| **Shrink-Swell Clay** | Very Low Hazard |
| **Landslides** | Very Low Hazard |
| **Ground Dissolution** | No Hazard |
| **Compressible Ground** | Moderate Hazard (Eastern Sector) |
| **Collapsible Deposits** | No Hazard |
| **Running Sand** | Low Hazard |

## 4.3 Coal Mining

The Envirocheck Report states the site is not be located within a coal mining affected area, therefore a Coal Authority Mining Report has not been obtained for the purposes of this assessment.

For the avoidance of doubt, E3P has reviewed the Coal Authority Interactive Map which confirms the following site:

- The site is not within a Development High Risk Area;
- There are no mine entries, surface mining (past or current), past shallow coal mine workings or coal outcrops within influencing distance of the site; and,
- The site is not located in proximity to any mine entry potential zone of influence.

Based on the above, the site is not considered to be located within an area that may be affected by shallow coal mining / extraction or subsidence. .

### 4.4 Hydrology

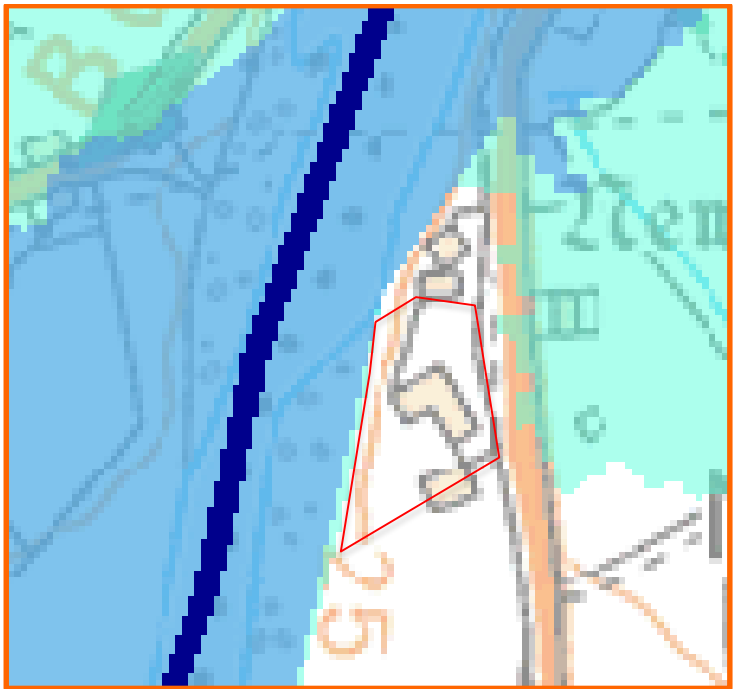
Surface water features (excluding ponds) in the vicinity of the subject site are as follows:

| SURFACE WATER FEATURE | QUALITY* | DISTANCE (m) | DIRECTION |
|---|---|---|---|
| River Ribble | B – Good | 32 | West |

*Chemical water quality as classified under the EA's General Quality Assessment (GQA) Scheme

A review of the EA web-site appears to indicate that the proposed development is entirely located within a currently defined Flood Risk Zone 1 (low risk); defined as land assessed as having a less than 1 in 1,000 annual probability of river or sea flooding (<0.1%).

An excerpt of the EA Flood Risk Map (Planning for Rivers & Sea) is shown below:



### 4.5 Radon Risk Potential

The Envirocheck Report indicates the site is situated in an area where less than 1% of homes are above the Action Level and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.

### 4.6 Industrial Land Uses

There are no Trade Directory entries within 250m radius of the site.

There are no active Fuel Station entries within a 2.0km radius of the site.

### 4.7 Sensitive Land Uses

The closest residential properties are located immediately adjacent to the northern boundary.

No other environmentally sensitive land uses have been identified within close proximity (<250m) to the subject site.

### 4.8 Site Sensitivity Assessment

The site is considered to be located within a **Low** sensitivity setting due to the following reasons:

- There are residential properties in close proximity to the study site;
- Drift deposits are mapped as cohesive Alluvium deposits;
- The underlying solid geology is classified as a Secondary A Aquifer;
- The closest groundwater abstractions is 649m to the NW;
- The site is not located within a Drinking Water Safeguard Zone or GSPZ;
- The River Ribble is located in close proximity (<35m) to the western boundary of the site; and
- Buildings and vegetation on-site may provide wildlife habitat.

### 4.9 Preliminary Geotechnical Assessment

The following potential geotechnical constraints have been identified at the site:

- The site is likely to be underlain by Made Ground associated with historic construction;
- Shallow relict structures and foundations are likely present underlying the existing barn structure and associated out-buildings;
- The underlying predominantly cohesive strata may provide a CBR in excess of 5%;
- The underlying geology is likely to comprise a cohesive soil matrix and as such is unlikely to be suitable for soak-away drainage in this instance.

# 5. CONSULTATIONS

## 5.1 Local Authority Contaminated Lane Officer

E3P has undertaken an enquiry with the Contaminated Land Officer at Ribble Valley Borough Council (RVBC) regarding potential contaminated land issues and a response is awaited. However, Due to the low sensitivity of the site, it is not considered this will identify any further environmentally pertinent information. Any information obtained will be issued as an addendum to this report.

## 5.2 Landfill Sites and Waste Treatment Sites

There are no recorded landfill (current or historic) or waste treatment sites located within a 250m radius of the study site.

## 5.3 Regulatory Database

The following information has been obtained from a commercially available environmental database. The summary table only includes records not otherwise detailed in the report.

| ENTRY | NUMBER WITHIN 250m RADIUS | DETAILS |
|---|---|---|
| Contaminated Land Register Entries and Notices | 0 | None Identified (N/A). |
| Authorised industrial processes (IPC/IPPC/LAPPC). | 0 | (N/A). |
| Fuel Stations Entries | 0 | (N/A). |
| Licensed radioactive substances | 0 | (N/A). |
| Enforcements, prohibitions or prosecutions | 0 | (N/A). |
| Discharge Consents | 3 | M. Grimshaw for Sewage Disposal - Treated Effluent – De Tabley Arms Hotel (87m NE); and Mr J Hindle for Sewage Disposal - Treated Effluent – Pear Tree Cottage (114m NW);<br>The receiving watercourse is the River Ribble. |
| Pollution Incidents | 2 | Two minor incidents (Category 3) occurred in 1991 of mud/clay/soil (where pollutant given) impacting the River Ribble. |
| Consents issued under the Planning (Hazardous Substances) Act 1990 | 0 | (N/A). |
| Control of Major Accident Hazard (COMAH) sites | 0 | (N/A). |

# 6. INITIAL CONCEPTUAL SITE MODEL

## 6.1 Initial CSM

In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P Ltd have developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area.

| SOURCE | EXPOSURE | POTENTIAL PATHWAY |
|---|---|---|
| **Human Health** | | |
| **Heavy Metals / Non-volatile PAHs** | Dermal Contact and Ingestion<br>Consumption of Home-grown Produce<br>Soil Ingestion | Construction Workers<br>Residential End Users |
| ***Discussion:***<br>The presence of any localised Made Ground and discarded storage containers may be a source of heavy metals and hydrocarbon compounds which may pose a short term risk to construction workers who may come into contact with impacted soils during earthworks. These risks can be mitigated through careful management of the demolition and earthworks so as to prevent impacted soils being exposed to constructions workers through the use of appropriate Personal Protective Equipment (PPE) and provision of welfare facilities.<br><br>If impacted soils area present, a suitable cover system design in accordance with BRE465 (*Cover Systems for Land Regeneration)* may be required with all garden / landscaped areas of the site. | | |
| **Asbestos Containing Material** | Dust / Fibre Inhalation | Construction Workers<br>Residential End Users |
| ***Discussion:***<br>While ACM was noted within the building fabric during the preliminary site walkover, and given the nature / age of the existing buildings on-site, the presence of ACM within the underlying Made Ground cannot be discounted.<br><br>ACM poses a risk through fibre and dust inhalation and if present may pose a risk to construction workers during any futures earthworks/demolition and to adjacent third party property should dust be generated during those works.<br><br>These risks can be mitigated through the development of a detailed enabling works strategy following guidance and protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (*Asbestos in Soil and Made Ground: A guide to understanding risk*).<br><br>The risk to the end users is likely to be mitigated by the presence of buildings and hard standing which will prevent the generation of dust and therefore exposure. Where landscaped areas are proposed a cover system as described above will provide a suitable mitigation. | | |
| **Hazardous Ground Gases** | Vapour Inhalation<br>Volatilisation to Indoor Air | Construction Workers<br>Residential End Users |
| ***Discussion:***<br>Made Ground underlying existing structures / hardstanding and a small in-filled sand pit may be a low-level sources of hazardous ground gases which can accumulate within deep excavations and pose a potential risk to construction workers.<br><br>Ground gas can also migrate through permeable strata, foundation structures and/or service ducting and accumulate within confined spaces where they may pose a risk to residential end users. | | |

| | | |
|---|---|---|
| **Controlled Waters** | | |
| **Mobile Contaminants** | Vertical / Lateral Migration | River Ribble<br>Secondary A Aquifer |
| ***Discussion:***<br>In the absence of any significant sources of mobile contaminants, no significant risk to controlled waters has been identified. | | |
| **Buildings and Infrastructure** | | |
| **pH & Sulphate** | Corrosion of Concrete | Foundations / Concrete |
| ***Discussion:***<br>Presence of pH and sulphate within Made Ground deposits may result in corrosion of buried concrete within the proposed development. Assessment must be undertaken to confirm the levels of pH and sulphate within Made Ground deposits and thus determine the concrete classification. | | |
| **Ecology** | | |
| **None Identified** | Migration towards River Ribble | Aquatic Ecosystems |
| ***Discussion:***<br>In the absence of any significant sources, no significant risk to aquatic ecology has been identified. | | |

# 7. CONCLUSIONS AND RECOMMENDATIONS

| | |
|---|---|
| **Current Environmental Impact** | |
| The subject site is a rectangular shaped parcel of land located immediately east of Ribchester off Blackburn Road and comprises an historic barn with associated outbuildings situated upon the eastern bank of the River Ribble.<br><br>E3P has attended site and based on a non-intrusive assessment, the discarded AST, potential ACM within the building fabric, Made Ground underlying existing structures and historic in-filled sand pit are all potential sources of soil derived contamination and hazardous ground gases. | |
| **Contamination Issues** | |
| Current | None identified. |
| Historical | Based on the historical Ordnance Survey mapping dating from the late 1840s, a number of possible low-level sources of heavy metal and hydrocarbon contamination have been identified relating to existing structures and the likely presence of Made Ground and Asbestos Containing Material (ACM). Additionally, an in-filled sand pit has been identified on site which may be a potential source of ground gas.<br><br>However, any potential risks can be mitigated through further detailed assessment and subsequent remediation and/or adoption of appropriate construction measures. |
| **Geotechnical Issues** | |
| The site is not anticipated to be underlain by any substantial depths of Made Ground and overlies predominantly cohesive Alluvium deposits which is in turn underlain by mudstone / siltstone bedrock. The Made Ground an Alluvium may be variable and could be prone to settlement. Assessment of these soils is recommended as the proposed works are likely to increase loadings on existing foundations.<br><br>The underlying predominantly cohesive natural drift deposits may provide a sub-grade formation to support proposed roads and infrastructure with a likely CBR in excess of 5%<br><br>The cohesive nature of the drift geology is unlikely to be suitable for soakaway drainage systems. | |
| **Recommendations** | |
| A detailed Phase II intrusive Geo-Environmental Ground Investigation should be undertaken in order to confirm the findings of the initial conceptual site model and determine an economic enabling works strategy. | |

**END OF REPORT**

# APPENDIX I
# LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.

2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.

3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.

4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not be made known or accessible.

5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.

6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.

7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.

8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.

9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.

10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.

# APPENDIX II
# GLOSSARY

## TERMS

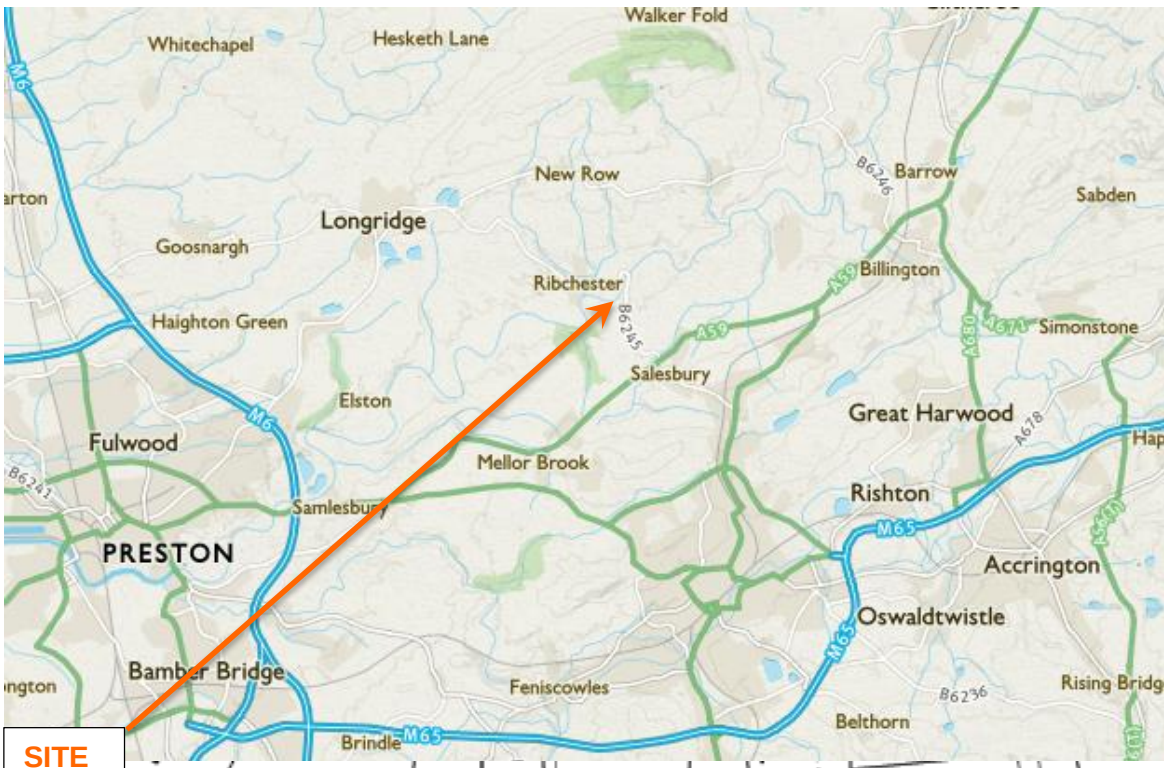
| | |
|---|---|
| AST | Above Ground Storage Tank |
| BGS | British Geological Survey |
| BSI | British Standards Institute |
| BTEX | Benzene, Toluene, Ethylbenzene, Xylenes |
| CIEH | Chartered Institute of Environmental Health |
| CIRIA | Construction Industry Research Association |
| CLEA | Contaminated Land Exposure Assessment |
| CSM | Conceptual Site Model |
| DNAPL | Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB) |
| DWS | Drinking Water Standard |
| EA | Environment Agency |
| EQS | Environmental Quality Standard |
| GAC | General Assessment Criteria |
| GL | Ground Level |
| GSV | Gas Screening Value |
| HCV | Health Criteria Value |
| ICSM | Initial Conceptual Site Model |
| LNAPL | Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene) |
| ND | Not Detected |
| LMRL | Lower Method Reporting Limit |
| NR | Not Recorded |
| PAH | Poly Aromatic Hydrocarbon |
| PCB | Poly-Chlorinated Biphenyl |
| PID | Photo Ionisation Detector |
| QA | Quality Assurance |
| SGV | Soil Guideline Value |
| SPH | Separate Phase Hydrocarbon |
| Sp.TPH (CWG) | Total Petroleum Hydrocarbon (Criteria Working Group) |
| SPT | Standard Penetration Test |
| SVOC | Semi Volatile Organic Compound |
| UST | Underground Storage Tank |
| VCCs | Vibro Concrete Columns |
| VOC | Volatile Organic Compound |
| WTE | Water Table Elevation |

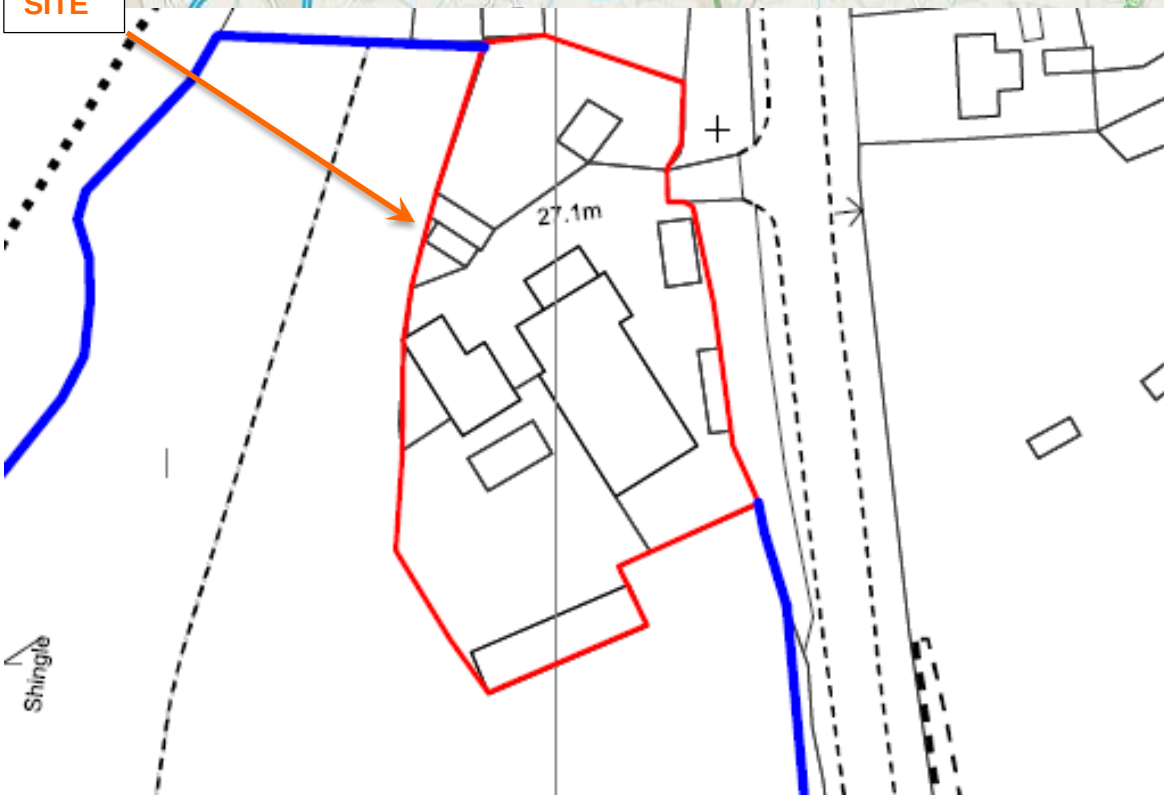
## UNITS

| | |
|---|---|
| m | Metres |
| km | Kilometres |
| % | Percent |
| %v/v | Percent volume in air |
| mb | Milli Bars (atmospheric pressure) |
| l/hr | Litres per hour |
| µg/l | Micrograms per Litre (parts per billion) |

| | |
|---|---|
| ppb | Parts Per Billion |
| mg/kg | Milligrams per kilogram (parts per million) |
| ppm | Parts Per Million |
| $mg/m^3$ | Milligram per metre cubed |
| m bgl | Metres Below Ground Level |
| m bcl | Metre Below Cover Level |
| mAOD | Metres Above Ordnance Datum (sea level) |
| $kN/m^2$ | Kilo Newtons per metre squared |
| µm | Micro metre |

# APPENDIX III
# DRAWINGS




*Drawing 10-738-001 - Site Location Plan*


Key:

*Site Features*

- Himalayan Balsam Area
- Brick Sandstone Construction
- Hardstanding
- Wood Construction
- AST's
- ACM Brick and Sandstone Construction
- Breeze block Building

Notes:

| Phase | Revision | Date | Issue | Drawn | Authorised |
|---|---|---|---|---|---|
| P1 | - | 23-07-2015 | DRAFT | JN | MD |

Client: Stanton Andrews

Job No: 10738

Date: 23-07-2015

Drawing No: 002

Scale: @ A3

Job Title: New Hall Barn, Preston

Drawing Title: Site Features Plan

Environmental Energy Engineering Partnerships Ltd
City Heliport & Business Centre
Eccles, Manchester, M30 7RU
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk


Key:

*Historical Features*

- Former Buildings (Pre 1912)
- Former Buildings (Pre 1967 - Pre 1994)

Notes:
All outbuildings associated with main barn as storage and animal shelters

| Phase | Revision | Date | Issue | Drawn | Authorised |
|---|---|---|---|---|---|
| P1 | - | 24-07-2015 | DRAFT | RW | MD |

Client: Stanton Andrews

Job No: 10738

Date: 24-07-2015

Drawing No: 003

Scale: NTS @ A3

Job Title: New Hall Barn, Preston

Drawing Title: Historical Features Plan

Environmental Energy Engineering Partnerships Ltd
City Heliport & Business Centre
Eccles, Manchester, M30 7RU
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

# APPENDIX IV
# PHOTOGRAPHS

**PLATE 1 – MAIN BARN BUILDING (CENTRAL SECTOR)**

**PLATE 2 – PARTIALLY COLLAPSED SHED (SOUTHERN SECTOR )**

**PLATE 3 – COLLAPSED SHED (EASTERN BOUNDARY)**

**PLATE 4 – BREEZE BLOCK BUILDING (NORTHERN SECTOR)**

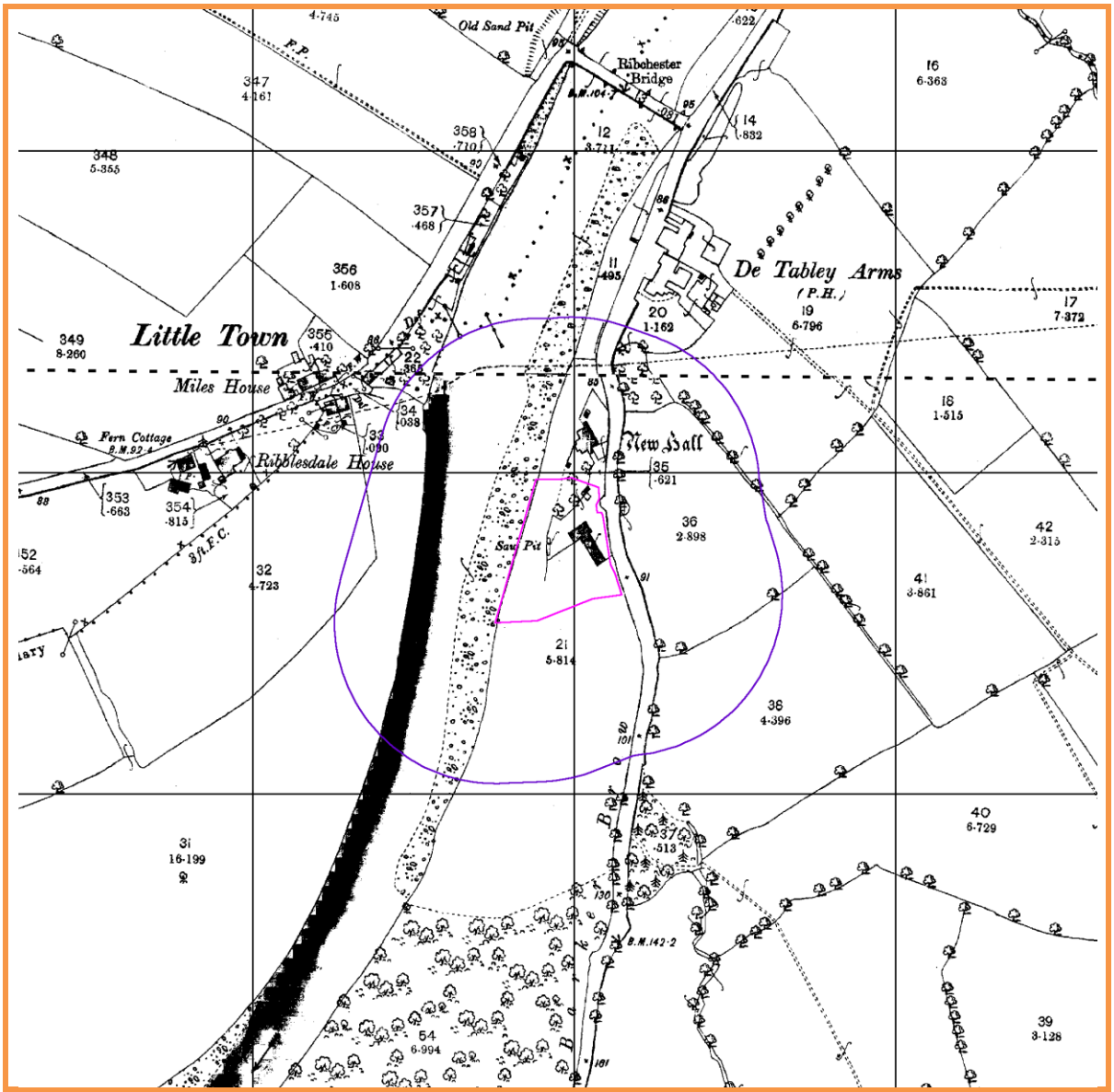
**PLATE 5 – SHED (NORTHEAST SECTOR)**

**PLATE 6 – PARTIALLY COLLAPSED SHED (EASTERN BOUNDARY)**

**PLATE 7 – PLASTIC AST ADJACENT TO NORTHERN SHED**

**PLATE 8 - HIMALAYAN BALSAM LOCATED ACROSS NORTHERN SECTOR**

# APPENDIX V
# HISTORICAL MAPS

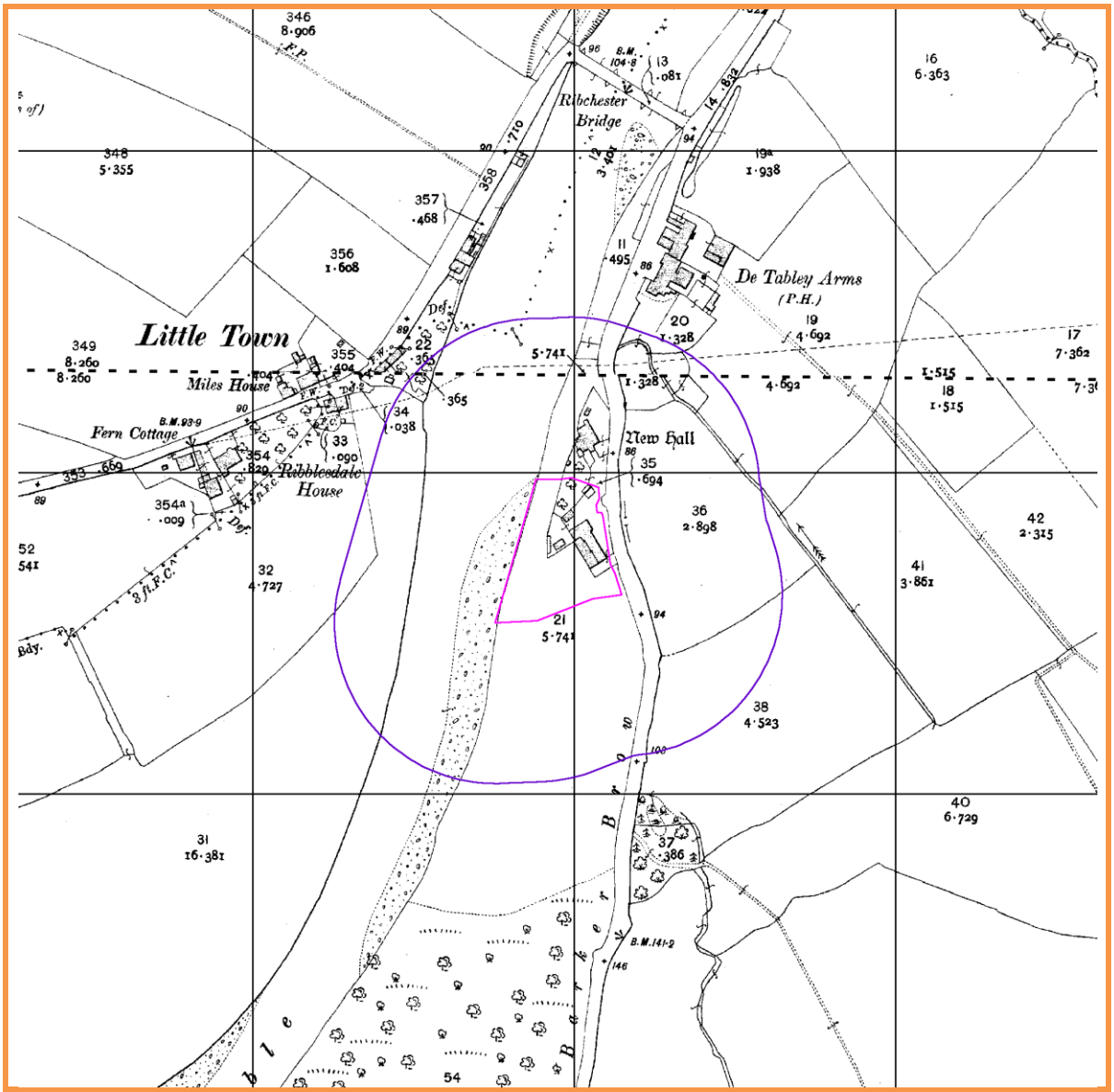



**Historical Map**

Dated: 1892-93

Original Scale: 1:2,500

North

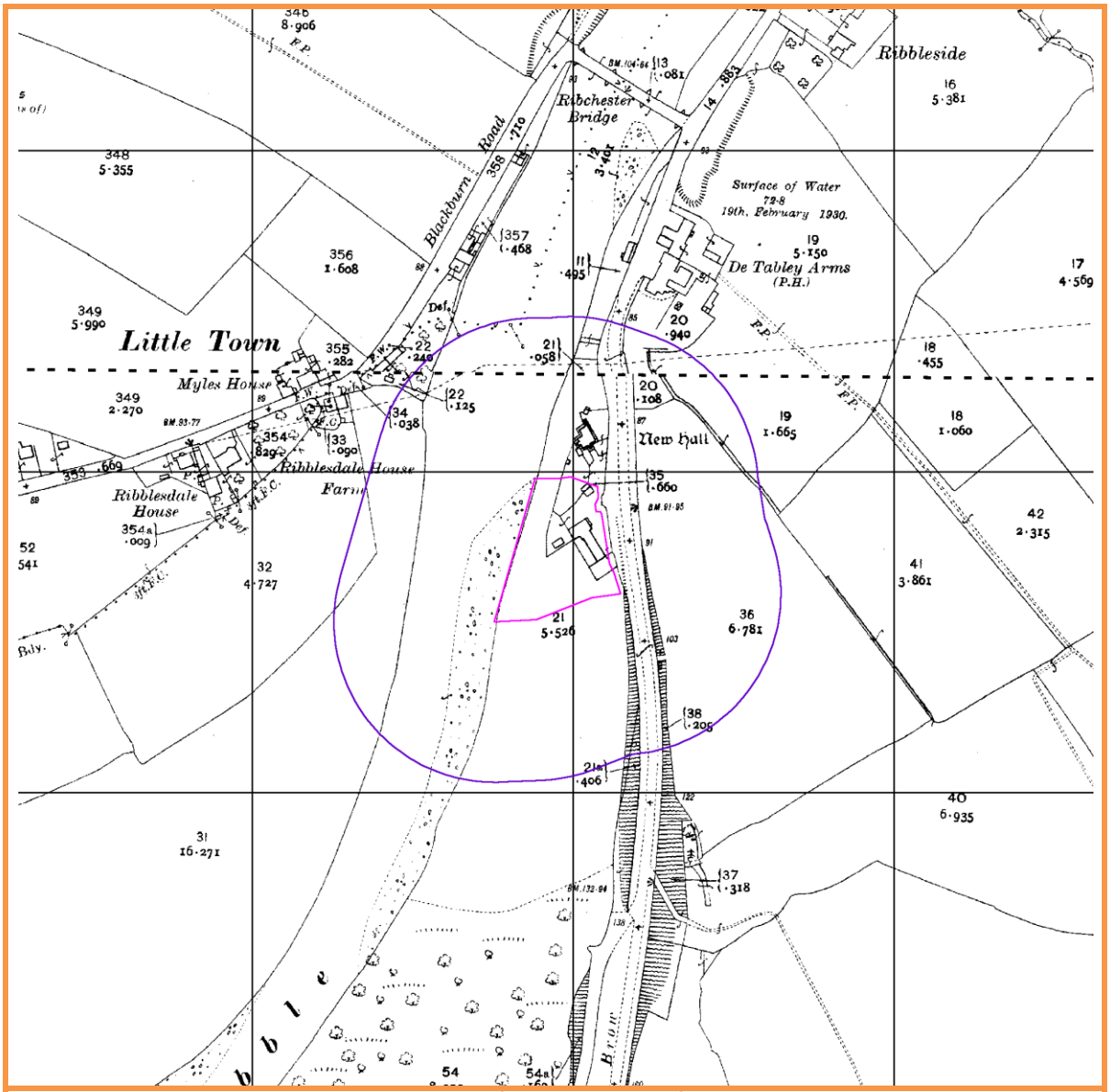



**Historical Map**

Dated: 1912

Original Scale: 1:2,500

North

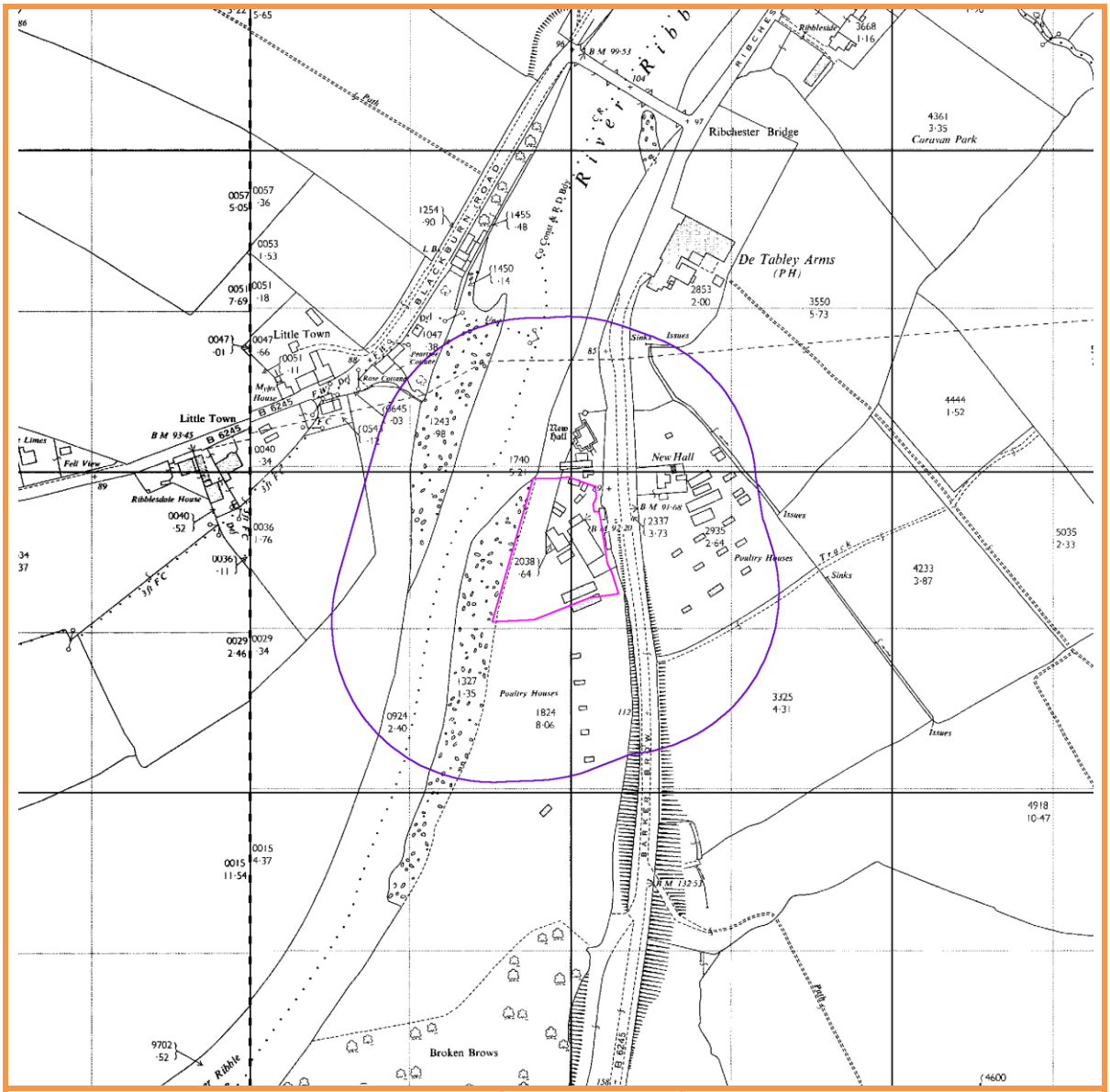



**Historical Map**

Dated: 1932

Original Scale: 1:2,500

North

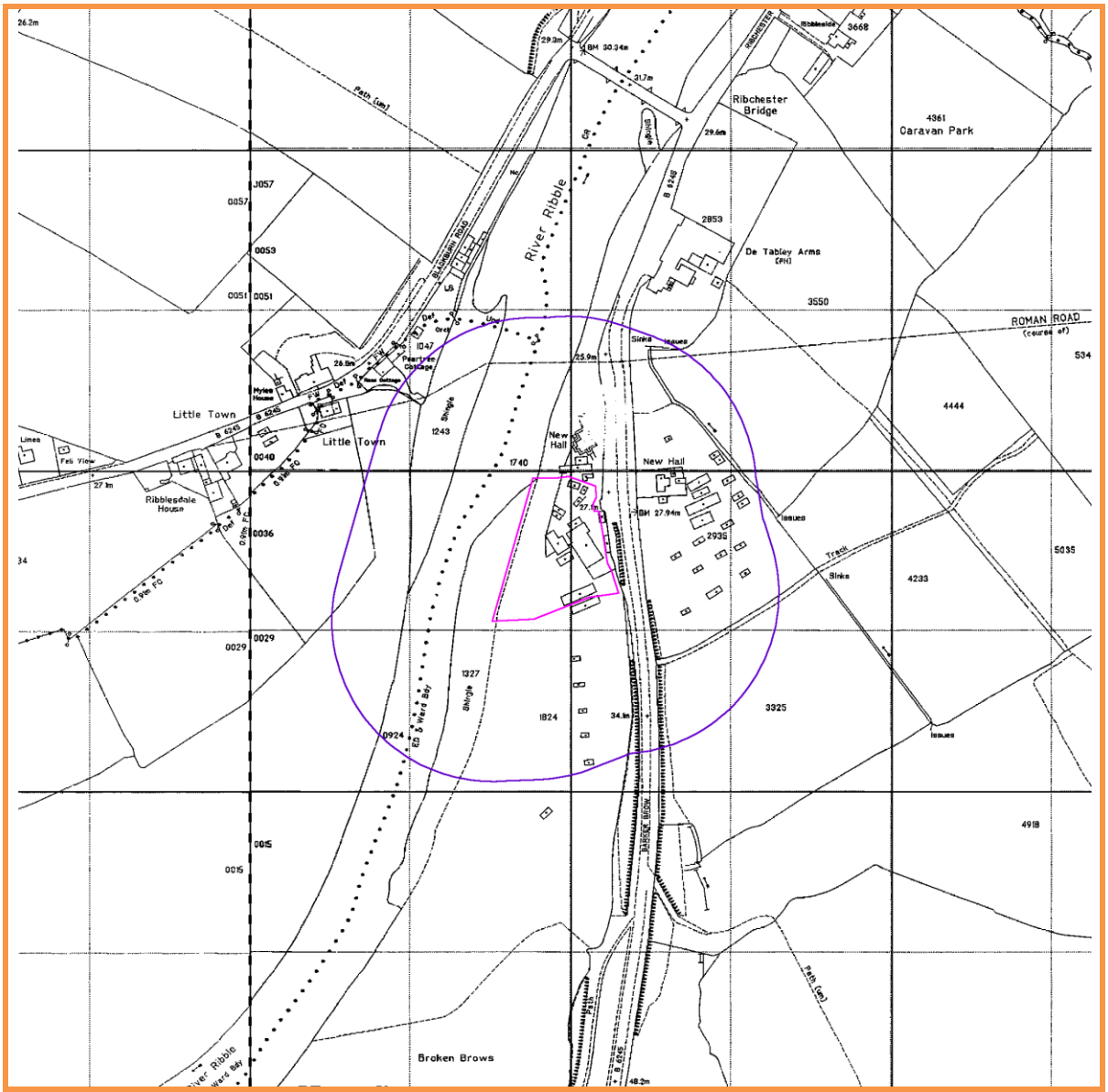



**Historical Map**

Dated: 1967-69

Original Scale: 1:2,500

North




**Historical Map**

Dated: 1994

Original Scale: 1:2,500

North