Report type:	Phase I Site Appraisal (Desk Study)
Site:	Petre Wood, Phase 3
Client:	Alan Johnston Partnership LLP
Ref:	GRM/P8827/DS.1
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PETRE WOOD, PHASE 3

PHASE I SITE APPRAISAL (DESK STUDY) FOR ALAN JOHNSTON PARTNERSHIP LLP

Project Ref:
P8827

Date:
March 2019

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This report has been prepared in accordance with GRM's Accredited Quality Procedures.

If you have any queries regarding this report please contact the project manager in the first instance.

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Issue	Description of Revision	Signature

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1 INTRODUCTION

1.1 PREAMBLE

GRM Development Solutions Limited (GRM) has been appointed by Alan Johnston Partnership LLP (Client's Agent) to undertake a Phase I Site Appraisal (desk study). The desk study and site inspection form Phase I of the assessment and allow the geotechnical and geo-environmental setting of the site to be determined and the identification of areas of particular concern that require targeted investigation.

This site appraisal is intended to provide information that will assist decision making by identifying potential ground engineering and contamination issues.

GRM Standard Limitations of Reporting are provided in Appendix A of this report.

The Client proposes to develop the site with residential properties and associated infrastructure. The proposed end use includes gardens and soft landscaping. The outline development proposals provided by the Client are presented in Appendix B.

The Client has not informed GRM any potential development hazards.

1.2 OBJECTIVES OF THE SITE APPRAISAL

The principal aims of the Phase I Site Appraisal (desk study) are as follows:

a) Obtain information, from easily accessible sources, about the soil and groundwater conditions within the area of the site.

b) Determine the possible ground related geotechnical and contamination hazards within the site boundaries that may affect the proposed development.

c) Provide preliminary development recommendations.

d) Provide advice on further works required for the cost-effective reduction of risks to the development and procedures likely to satisfy regulators.

Whilst every effort has been made to pre-empt the likely requirements of the Local Authority and the Environment Agency, they are likely to have specific requirements that will need to be discussed and addressed at a later date.

2 PHASE I DESK STUDY AND SITE OBSERVATIONS

2.1 INFORMATION SOURCES

In addition to the general sources of information listed in Appendix A (i) the Client has supplied the following information that has been used in the assessment of the site:

- Site Location Plan.
- Proposed Development Layout.
- Topographical Survey.

2.2 SITE DESCRIPTION

2.2.1 Geographical Setting

The site is located approximately 7.5km north east of Blackburn town centre. The National Grid Reference (NGR) for the approximate centre of the site is SD 710 350. A Site Location and Boundary Plan is presented in Appendix C.

The site comprises an elongated, roughly rectangular shaped plot of grassed pastureland covering approximately 1.05 hectares. The north western boundary is formed by a grass embankment alongside the A59 (the road itself sits within a cutting), the north eastern boundary by wooden fencing and a small stream, the south eastern boundary by hedgerows and wooden fencing, and the western boundary by recently constructed residential properties from a previous phase of the development.

The land beyond the site boundaries comprises residential properties to the west, pasture land to the north (across from the A59) and to the east, and a school, playing fields and grassed fields to the south.

The topography of the site generally slopes down to the north at gradients of up to one in eight. There is a plateau of high elevation in south of the site, with the surrounding land sloping down to the north east and west. A highway embankment runs along the north western boundary. The land outside of the eastern, northern and western site boundaries slopes down away from the site, and the land to the south is generally flat lying or gently sloping.

2.2.2 Site Inspection Observations

The Site Features Plan/General Site Photographs presented in Appendix D illustrate the salient observations made during a site inspection on 1st March 2019.

The site is presently an unused area of overgrown grassed land with areas of dense undergrowth, along with a mature tree in the southern area and further mature trees along the southern boundary. Smaller trees are present sporadically in the northern half of the site, with mature trees along the northern boundary. A small area of marshy ground is present in the north eastern-most corner of site, with a small watercourse flowing to the north west along this boundary. Access to the site is gained from Petre Wood Crescent to the west, the access is currently secured with a timber fence.

One area of bonfire waste containing charred wood and metal was identified in the southern western area. Localised plastic litter and general waste was noted across the entire site.

Significant Features identified during site inspection:
Trees and hedgerow – deepened foundations in association with cohesive strata. **Mature Tree within development area** – potential tree protection order (discussion with Tree Officer recommended). **Marshy ground in the north east** – poor trafficability. **Minor watercourse** – potential receptor for the proposed development and a potential source of flooding. **A59 road along northern boundary** – source of noise pollution. **Bonfire waste** – localised potential source of contamination.

2.3 HISTORICAL DEVELOPMENT OF THE SITE

A review of the available historical Ordnance Survey (OS) maps gives an insight into the development of the site and can highlight potential hazards. Extracts of the maps reviewed are provided in Appendix E.

The earliest map reviewed (1844) shows the site to comprise part of a larger open field, with field boundaries/hedgerows running through the south western area and a stream running along the north eastern boundary. A widened field boundary is shown in the south of the sit in 1912, possibly representing a ditch which I no longer show from 1932 and potentially infilled. Apart from the field boundaries altering position, no significant changes are shown through to 1967 where a number of small structures and enclosed areas of land are shown in the south western corner, one of which is indicated as a glasshouse. A road cutting (A59) is shown along the north western boundary from 1969. The structures in the south of the site are no longer shown from approximately 1981, and are assumed to have been demolished, returning the site to an open area. No further significant changes are shown through to the most recent mapping (2014).

On the earliest map reviewed (1885) the area surrounding the site generally comprised open fields divided by hedgerows interspersed with mature trees, along with isolated farm buildings. A public house is shown 50m to the south and ponds are shown 200m to the south east and north west. A church and school are shown 130m to the south east from 1892 and a spring is indicated 120m to the east. The ponds are no longer shown from 1932 and are assumed to have been infilled; given their distance from the site they are unlikely to pose a risk from ground gas. Buildings associated with Petre House Farm are shown to the south from 1967 through to 2010. From 2014 the land directly south west of the site has been developed as residential properties.

Aerial photography (Google) from 2000 onwards generally show the site to be grassed with a number of parallel linear markings in the central area, possibly associated with keeping livestock. Aerial images dated April 2015 show the majority of the site to be devoid of vegetation, with a large stockpile in the centre of the site, before returning to grassland in the image dated 2018.

Significant Features identified on OS Maps:
Trees – deepened foundations in association with cohesive strata.

Adjacent development – potential for localised areas of made ground. **Made ground associated with stockpiles, ditch and previous structures** – potential source of contamination and deepened foundations. **Previous Buildings** – localised deepened foundations and buried structures. **Minor watercourse** – potential receptor for the proposed development and source of flooding. **A59 road along northern boundary** – source of noise pollution.

2.4 ANTICIPATED GEOLOGY

The BGS Geological Sheet for this area shows the site to be underlain by superficial deposits of Glacial Till generally comprising gravelly clay. The superficial deposits are recorded to be underlain by a solid geology of the Bowland Shale Formation comprising mudstone.

The local solid strata are reported to dip to the south east at 17 degrees.

The site is not indicated to be directly affected by faulting; there are no faults within 500m of the study site.

Localised made ground can be expected due to the demolition of former buildings, and presence of stockpiles.

Significant Features identified from geological data:
Cohesive strata – deepened foundations in association with trees. **Variable strata** – deepened foundations.

2.5 HYDROGEOLOGICAL INFORMATION

No detailed information regarding the depths to groundwater is available; however, the groundwater level is likely to be subject to seasonal variations.

The Environment Agency has classified the underlying superficial strata (Glacial Till) and solid strata (Bowland Shale Formation) as Secondary Undifferentiated Aquifers.

There are no recorded groundwater abstraction licenses within 2km of the site and the site is not recorded to be within a Source Protection Zone.

Information available at this stage suggests a groundwater flow direction towards the north east and south west following the local topography.

As the Glacial Till is likely to predominantly comprise clay and is unlikely to contain significant volumes of water, it is not considered to be a viable receptor. In addition, the Bowland Shale Formation is likely to predominantly comprise impermeable mudstone and will be overlain by the cohesive glacial strata, and so is also not considered to become a viable receptor.

Significant Features identified from hydrogeological data:
None identified.

2.6 HYDROLOGICAL INFORMATION

Local surface water features include streams along the north eastern boundary, flowing to the north west, and a stream 66m to the north west flowing to the north. Both these features are within the Ribble catchment.

There are no surface water abstraction licenses within 2km of the site.

Nearby recorded pollution incidents to controlled waters include three incidents of crude sewage with significant impact to water quality 146m to the west in November 2007, 117m to the west in February 2008 and 120m to the south west on March 2008. Given the age and location of these pollution incidents; and as the affected watercourse is downgradient of the site, they are considered unlikely to have impacted the site.

Current proposals show that no development is planned within approximately 50m of the stream, and this part of the site will be a landscaped area. Whilst there is the potential for any contamination to migrate towards the stream through over-land flow, it is considered that such migration would only occur during periods of heavy rainfall resulting in the mass flow of water which would dilute any potential contamination to acceptable levels. On this basis the risk posed to surface waters is considered to be very low. However; construction practices should ensure that the stream is not impacted by siltation during development of the site.

Significant Features identified from hydrological data:
Stream along north eastern boundary – potential receptor for site derived contamination and potential flood risk (very low risk due to distance from developable area).

2.7 FLOOD RISK

The site is not within 250m of an indicative fluvial floodplain and the Environment Agency's Internet based flood risk maps suggest there is no risk from river flooding on site. The Risk of Flooding from Rivers and the Sea (RoFRaS) is assessed as very low and the data indicated that the site is in an area with a less than 1 in 1000 chance of flooding in any given year.

The BGS suggests the site is within an area of potential groundwater flooding related to Superficial Deposits Flooding (shallow unconsolidated sedimentary aquifers overlying unproductive aquifers) and that the confidence level is high. A Phase II ground investigation would provide information on the local groundwater regime so that the risk can be assessed by the projects infrastructure engineer. Any risk associated with the groundwater regime should be catered for within the development infrastructure design.

A Flood Risk Assessment is recommended for this site as it is marginally over 1ha in size and has a stream running along the north western boundary. It is likely that the highways authority will require a Flood Risk Assessment due to the adjacent A59 road being directly downgradient.

Significant Flood Risk Features identified:
Site in excess of 1ha – Flood Risk Assessment required. **Adjacent stream to the north east** – Flood Risk Assessment required.

2.8 MINING

2.8.1 Coal

The site is not within an area recorded to require a Coal Authority mining report, and shallow coal is not identified on geological mapping. Therefore, the risk from coal mining is considered to be negligible.

Significant Mining Risks:
None identified.

2.8.2 Oil and Gas

GRM have conducted an on-line search, which has shown that the Oil and Gas Authority does record the site to be within an on-shore licence area (ref PEDL271); however, the site is not recorded to be within either an On-shore Hydrocarbon Field or a Shale Prospecting Area. Accordingly, whilst the site is within a licence area any future prospecting activities will require consideration of the sites current residential end use, which is likely to make exploration socially and commercially unacceptable in proximity to the site.

Significant Mining Risks:
None identified.

2.9 QUARRYING

There is no evidence of any non-coal mineral extraction having taken place within, or close to, the site area.

Significant Quarrying Risks:
None identified.

2.10 MINERAL RESOURCE PROTECTION

Mineral Resource Maps have been obtained from the BGS and show no sand and gravel or other mineral resources in proximity to the site. Overall it is considered unlikely that the site is underlain by significant and easily exploitable mineral reserves and so a detailed Mineral Risk Assessment is unlikely to be required. However, this should be confirmed with the local Minerals Officer.

Mineral Risk Assessment:
None Identified.

2.11 ENVIRONMENTAL INFORMATION

An Environmental Report has been acquired for the site. The full report is presented in Appendix F. A summary of the relevant information not included elsewhere in this report is presented below:

- One historical landfill site is recorded 102m to the south at Petre Garage. The same site is recorded to have been a licenced special waste transfer station in 1993. There is the potential for migration of ground gas from this feature, although the pathways are likely to be restricted due to the anticipated presence of cohesive strata.
- A household waste disposal centre was recorded 35m to the south in 1997 but is no longer present, and has been replaced with residential properties. As this area is down gradient of the site it is considered unlikely to have impacted it. Furthermore, it is likely that any remediation will have taken place during redevelopment.
- A petrol station is located 95m to the south and a garage 141m to the south, however due to the distance and underlying geology, they are considered unlikely to represent a potential source of hydrocarbon contamination which could impact the site.

Significant Features identified from Environmental data:
Offsite landfill site – potential source of ground gas (low risk).

2.12 ARCHAEOLOGY

Archaeological information has not been sought as part of this desk study and has not been identified as an issue by the Client. Some Local Authorities require at least an initial archaeological appraisal for development sites. GRM can undertake such appraisals if required. Archaeological investigations occasionally reveal ground-related problems from ancient times (prior to the 1st Edition OS maps) and can occasionally cause foundation and contamination development hazards.

Archaeological Hazards:
Not assessed.

2.13 INVASIVE PLANT SPECIES/ECOLOGY

GRM is not a specialist in this topic and has not conducted such a survey; however, we will endeavour to report easily recognisable issues such as Japanese Knotweed, Giant Hogweed, badger sets etc, when seen on site. No such issues were observed during the walkover; however, an ecological specialist should be consulted.

Invasive Plant Species/Ecological Hazards:
None identified.

2.14 RADON ASSESSMENT

The site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings' (BR211 2015). The site is not within an area recorded to require radon protection measures.

Radon Hazard:
None.

2.15 SUMMARY OF POTENTIAL GEOTECHNICAL/GENERAL HAZARDS

Potential geotechnical/general hazards have been identified in earlier sections and are summarised below.

Potential Hazard	Potential Consequence	Action
Previous buildings identified on historical mapping	Deepened foundations/buried structures	Ground investigation
Made ground associated with previous structures and stockpiles	Deepened foundations and source of contamination	Ground investigation
Shrinkable clay/trees in association with trees	Deepened foundations	Ground investigation plasticity testing/tree survey
Variable strata	Deepened foundations	Ground investigation
Highway Embankment along northern boundary	Development constraint	Discussion with the relevant highway authority
Potential risk from Superficial Deposits Flooding, adjacent stream and site greater than 1ha in size	Flooding	Flood Risk Assessment required.
Localised areas of marshy ground	Poor trafficability	Working platforms
Adjacent highway	Noise Pollution	Acoustic fencing
Existing mature tree in southern area	Possible Tree Protection Order	Arboricultural Assessment

Potential sources, pathways and receptors are summarised in the Phase I Conceptual Model in Section 3, which is based on current relevant guidance, the principles of which are set out in Appendix A (iii).

Where appropriate potential hazards to the proposed development are shown on the Hazard Plan (Ground Model) presented in Appendix G.

2.16 CONTAMINANTS OF CONCERN

In addition to the general contaminants listed in Appendix A (ii), the following site specific contaminants have been identified:

- Asbestos containing materials within made ground from the demolition of previous structures.

There is no evidence to suggest that the site has been subjected to recent agricultural practices and so pesticides are unlikely to warrant consideration.

3 PHASE I CONCEPTUAL SITE MODEL

HUMAN HEALTH			
Source	**Pathway**	**Receptor**	**Level of Risk**
Localised potentially contaminated made ground .	Indoor and outdoor inhalation of soil dust, the ingestion of, and dermal contact with, contaminated soil, soil dust and asbestos fibres, ingestion of vegetables that have taken up contamination and contaminated soil attached to vegetables.	End users.	Low.
Potential asbestos within made ground from demolition of previous structures.		Construction workers.	
Localised potentially contaminated made ground.	Inhalation of ground gas.	End users.	Very Low.
Offsite landfill site.			
Localised potentially contaminated made ground.	Water pipes.	End users.	Low.

CONTROLLED WATERS			
Localised potentially contaminated made ground.	Leaching of contaminants and lateral migration to surface waters by overland flow, during high rainfall events.	Stream along north eastern boundary.	Very low due to dilution factors.

4 CONTAMINATION / REMEDIATION RECOMMENDATIONS

The risk from ground contamination is considered low.

The risk from ground gas is considered to be very low.

Prior to development a ground investigation will be required, the scope of which is outlined in Section 6. At this stage, based on the desk study information available, it is considered that allowance be made for the following:

- Localised source removal of made ground.
- Standard water supply pipes should be suitable.
- Gas protection measures are unlikely to be required.

5 PRELIMINARY GEOTECHNICAL ASSESSMENT

It should be noted that the following comments and recommendations are based on the findings of this desk study which may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). Prior to development a ground investigation will be required to confirm the initial recommendations outlined below, the scope of which is outlined in Section 6. However, at this stage based on the desk based information available it is considered:

- The ground conditions are likely to comprise topsoil and limited made ground overlying clay. Rock is not expected to be present at shallow depth.
- Due to the suspected presence of cohesive soils and the presence of trees, particularly around the margins of the site, allowance should be made for deepening foundations in accordance with NHBC standards. At this stage it should be assumed that 50% of plots will require some degree of deepening below minimum depth and that around 25% of plots may require foundations deeper than 2.5m begl. Based on this, and assuming that deep soft and/or loose strata are not present, an allowance should be made for traditional foundation for 75% of the site and piled foundations for 25% of the site.
- At this stage allowance should be made for the use of suspended floors, due to the localised tree influence and potential presence of made ground.
- Overly aggressive ground conditions are not expected and standard concrete should be suitable.
- Given the anticipated geology the adoption of a soakaway drainage system is considered unlikely.
- Given the anticipated geology CBR values of between 2% and 3% are considered likely, when the shallow strata are suitably drained.

6 FURTHER INVESTIGATION

A Phase II ground investigation is recommended to determine more accurately the effect of the identified hazards on the development. Initially, this should include:

- A ground investigation designed to BS10175:2011 and BS5930:2015 and comprising window sampling, trial pitting and potentially cable percussion boreholes to confirm ground conditions and collect samples for analysis.
- Chemical analysis of soils followed by risk assessment so that the risk to human health and controlled waters can be determined.
- Based on the Phase I Conceptual Model (Section 3) the ground gas risk has been assessed as low. A ground gas investigation designed to current guidance will be required to determine the ground gas regime beneath the site and allow any necessary mitigation measures to be recommended. At this stage allowance for 6 visits over 3 months should be made to assess potential liabilities.
- Geotechnical soils testing of the founding strata to assess its character and suitable grades of buried concrete.

Following your review of this document, a copy of it should be submitted to the Planning Department of the Local Authority for comment and approval prior to any ground investigation works being undertaken, as this is often a condition of planning.

7 CONCLUSIONS

This Phase I Site Appraisal has shown the site is suitable for the proposed development, assuming compliance with all the recommendations contained within this report.

APPENDIX A

GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

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GENERAL APPRAISAL COMMENTS

i INFORMATION SOURCES

Where available the following sources have been used for the identification and assessment of potential ground hazards:

- Relevant British Standards
- British Geological Survey (BGS) Geology Map Scale 1:10,000 for local area
- British Geological Survey (BGS) Geology Map Scale 1:50,000/1:63,320
- BGS Memoir
- BGS Borehole Records
- BGS online viewer: http://www.bgs.ac.uk/data/mapViewers/home.html
- Environment Agency Groundwater Vulnerability Maps
- Historical Ordnance Survey (OS) Maps
- Environmental Data Report
- Environment Agency Website: http://www.environment-agency.gov.uk/
- Guidance for the Selection of Water Supply Pipes to be used in Brownfield Sites, UKWIR, 2010.
- Coal Authority Records / Coal Mining Report
- DEFRA/Environment Agency Contaminated Land publications and DoE Industry Profiles
- BRE Guide BR211 (2015), 'Radon: Guidance on protective measures for new buildings'
- HPA-RPD-033 (2007), 'Indicative Atlas of Radon in England and Wales'
- PHE-CRCE-032 (PHE, 2017), Radon in Homes in England: 2016 Data Report
- CIRIA C665 'Assessing risks posed by hazardous ground gases to buildings'
- BS8485:2015, 'Code of Practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'
- Other technical references used throughout this document are detailed in the text.

ii CONTAMINANTS OF CONCERN

The DoE Industry Profiles are normally used to assess likely contaminants from past land use and potential nearby industrial sources. For land uses where no profile is available, likely contaminants of concern are selected by GRM based on past experience of similar sites, a general screening suite of contaminants covered by CLEA and common contaminants from the Industry Profiles.

- Arsenic
- Cadmium
- Chromium
- Lead
- Mercury
- Selenium
- Copper
- Nickel
- Zinc
- Phenols
- cyanide (total)
- pH
- Water soluble sulphate
- PAH (polycyclic aromatic hydrocarbons)

Asbestos and PCBs are listed in the vast majority of profiles. PCBs are listed as the profiles expect electricity substations and switch boxes on all industrial sites. There is the potential for asbestos containing material to be mixed up with made ground, following any demolition works.

iii CONCEPTUAL MODEL METHODOLOGY

The consideration of contamination is based upon the principles of risk assessment, using the 'source-pathway-receptor' model in order to establish the presence, or potential presence, of a pollutant linkage.

To create a risk, contamination must have the potential to cause harm to susceptible targets or receptors such as humans, the water environment or the built environment. The potential for harm to occur requires three conditions to be satisfied to form a pollutant linkage:

- The presence of substances that may cause harm (SOURCE).
- The presence of a target which may be harmed (RECEPTOR).
- The existence of a plausible migration route between the source and the receptor (PATHWAY).

In the absence of a plausible pollutant linkage there is no risk. Where a potential linkage is identified in order for it not to pose a risk to the identified receptor it must be broken.

iv INTRUSIVE INVESTIGATION SAMPLING METHODOLOGY

The ground investigation (including fieldwork, sampling, monitoring and laboratory analyses) has been designed to identify and assess potential ground related problems and to allow cost effective solutions to be advised. It has been planned on the basis of the desk study, site inspection and the proposed development layout (where available). All fieldwork and soil descriptions were carried out in general accordance with relevant British Standards.

The exploratory holes have been positioned and advanced to depths to determine the general ground/groundwater/gas conditions below the site. A general grid pattern has been adopted, where possible, to provide sufficient information based on the current proposed layout scheme. Some holes have been targeted at particular hazards identified in the Phase I assessment. The resultant exploratory hole density is considered to be commensurate with the complexity of the site conditions and detail of information required for this phase of the investigation.

v GROUND GAS RISK ASSESSMENT METHODOLOGY

Gas monitoring programmes undertaken by GRM are designed to broadly comply with the recommendations outlined in CIRIA Report C665 'Assessing risks posed by hazardous ground gas to buildings' (2007) and BS8576 'Guidance on Investigations for ground gas – Permanent gases and Volatile Organic Compounds (VOCs) (2013).

To assess the risks posed by ground gases such as radon, carbon dioxide and methane, the relevant current guidance has been used. For radon the site has been assessed following the guidelines in 'Radon: guidance on protective measures for new dwellings (BR211: 2015)'. For methane and carbon dioxide the primary guidance document used to determine if protection measures are required is *BS8485:2015 Code of practice for the design of protective measures from methane and carbon dioxide ground gases for new buildings*. This uses hazardous gas flow rates (Q_{hg}), which are gas concentrations multiplied by borehole flow rates, to derive a Gas Flow Rate (GSV) for the site. The gas regime is then determined based on the GSV and other limiting factors such as gas concentrations.

Where flow is not recorded during the monitoring a default flow rate of 0.1l/hr will be used in the assessment to produce a positive result.

vi HUMAN HEALTH RISK ASSESSMENT METHODOLOGY

Guidance contained in the Environment Agency's CLEA Reports has been used to assess the risks posed to human health.

For residential developments that include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land with plant uptake' are used, i.e. a female with a start age class of one and an end age class of six. All pathways are considered including the consumption of home-grown vegetables.

For residential developments that do not include domestic gardens the default Tier 1 Assessment Criteria (TAC) for 'residential land without plant uptake' are used, i.e. a female with a start age class of

one and an end age class of six. All pathways are considered except the consumption of home-grown vegetables.
For commercial/industrial developments the default Tier 1 Assessment Criteria (TAC) for 'commercial/industrial' are used, i.e. a female with a start age class of sixteen and an end age class of eighteen. All pathways are considered except the consumption of home-grown vegetables.

The TAC used by GRM include Category 4 Screening Levels (C4SLs) published by DEFRA, values calculated by GRM using the CLEA v1.071 risk assessment, and values and Suitable for Use Levels (S4UL) developed by LQM/CIEH. The TAC used in the assessment are selected based on the lowest site specific SOM values returned as part of the chemical analysis.

Where soil chemical analysis results are found to exceed the TAC, Site-Specific Risk Assessments may be undertaken using the CLEA v1.071 risk assessment software using the age classes and pathways described above.

vii RISK TO SITE WORKERS – GENERAL COMMENTS

The risks to site workers are similar to those posed to site end users, although likely to be less severe due to the site workers' shorter exposure to the identified contamination. However, site workers (particularly groundworkers) are more likely to come into direct contact with contaminated soils due to the nature of their work. On this basis ground and construction workers should be provided with basic Personal Protective Equipment based on the site's general health and safety risk assessment, but including as a minimum safety footwear, gloves and overalls.

A site specific risk assessment should be carried out for all hazards identified within the ground investigation in accordance with current health and safety legislation. This assessment should identify any measures required to further reduce risks i.e. providing further Personal Protective Equipment, welfare facilities and if necessary preventing access to certain areas.

Demolition and dismantling of existing structures on the site must be carried out to a safe and acceptable standard, in accordance with current UK guidance and best practice. Whilst not ground related, asbestos and hazardous substances surveys should be conducted prior to any demolition.

Any unusual colours, odours and suspicious ground should be reported immediately to site management and then GRM.

Whilst this appraisal has considered the long-term effects of contamination, GRM can also help during the formulation of Health and Safety documentation, if required.

viii CONTROLLED WATERS RISK ASSESSMENT METHODOLOGY

Where the desk study and fieldwork do not reveal a potential source of contamination no leachate or groundwater testing will be performed. Where a potential source is identified the testing will comprise leachate testing on the material considered most likely to pose a risk, groundwater testing will be undertaken if water is present at shallow depth.

The UK Drinking Water Standards (UKDWS) or Environmental Quality Standards (EQS) are usually adopted for comparison with the leachate/groundwater test results. When the most sensitive receptor is considered to be the aquifer (groundwater) UKDWS will be adopted as the Initial Tier 1 screening values. Where the most sensitive receptor is a surface water feature the EQS values will be used as Initial Tier I Screening values.

ix CONSTRUCTION MATERIALS RISK ASSESSMENT METHODOLOGY

The 'screening levels' adopted for the assessment of risk to construction materials are taken from the following documents:

- UK Water Industry Research (UKWIR) Contamination thresholds for sub-surface water pipes, for the protection of buried pipes.
- Building Research Establishment (BRE) Special Digest SD1 (2005), 'Concrete in Aggressive Ground', for the protection of buried concrete.

x WASTE DISPOSAL, SITE WASTE MANAGEMENT PLANS AND MATERIAL MANAGEMENT PLANS

Under current Waste Management Regulations, waste soil materials produced from the site will require characterisation to enable it to be disposed of correctly.

The chemical analysis results included in this report should be provided to the relevant landfill operators to establish the characterisation of the waste, confirm its suitability for landfill disposal and provide estimated costings. If material is classified as hazardous, then the site will need to be registered with the Environment Agency prior to the movement of the waste. Depending on the receiving landfill's current permit, further chemical analysis, incorporating Waste Acceptance Criteria (WAC) leachate analysis, may be required.

All materials removed from the site will be classified as 'waste' and therefore must be removed by a suitably licensed carrier of waste. This applies whether or not the waste is contaminated. All waste removed to landfill will attract Landfill Tax.

The developer/builder is likely to be classed as the waste producer and therefore, has a duty of care to ensure that all waste is disposed of appropriately. This includes ensuring the waste carrier is licensed and disposes of the waste to a suitably licensed landfill site. They are also required to keep a paper trail from 'cradle to grave' including copies of the waste disposal tickets.

Efficient materials management on site is recommended as it can lead to significant cost savings when compared to the traditional side casting or single stockpile of arisings. GRM can assist in the production of Material Management Plans under the CL:AIRE Definition of Waste: Code of Practice. The DoWCoP enables:

- The direct transfer and re-use of clean naturally occurring soil materials between sites, and
- The re-use of both contaminated and uncontaminated materials on their site of origin and between sites within defined Cluster projects.

GRM can also undertake the role of Qualified Person and submit the DoW CoP project Declaration.

Likewise making the site as volume neutral as possible will reduce the costs of development. Whilst not a statutory requirement, Site Waste Management Plans allow better waste management practices, help to reduce the amount of waste produced and identify best environmental disposal options. Implementing a Site Waste Management Plan (SWMP) can reduce costs (increasing business profits) and maximise resource efficiency.

xi GEOTECHNICAL ASSESSMENT GENERAL COMMENTS

Where finished floor levels of proposed structures have not been provided by the Client, then for the purposes of initial assessment, GRM will assume that finished levels will not vary appreciably from the existing ground levels. If the depths of any underground engineering works (i.e. sewers, pumping stations etc.) are unknown they will not be taken in to account in the assessment and it will be assumed that any such works will not compromise foundation or ground stability.

Should the development proposals or finished levels be different from these assumptions then the comments/recommendations in the Geotechnical Assessment may require revising.

It should be noted that the results of window sampling and/or cable percussive boreholes may not give a true indication of a soils actual engineering properties (i.e. stability, mass structure etc). GRM consider that that prior to development trial pitting should be undertaken to confirm the recommendations in the Geotechnical Assessment.

xii GEOTECHNICAL ASSESSMENT – ENGINEERING GROUND TREATMENT

Near surface soils have the potential to be disturbed by weathering and site traffic. Precautions should always be taken to avoid this, as excessive disturbance may leads to more onerous floor slab designs, road cap thickness and increased amounts of off-site disposal etc.

Near surface soils may need treatment or reinforcing to allow safe movement of construction plant and labour. An assessment by the contractor should be undertaken once the type of machinery/plant needed to complete the development is known.

xiii GEOTECHNICAL ASSESSMENT – EXCAVATIONS

Excavation instability (over-break) can result in damage to existing services or structures (e.g. foundations, roads or boundary walls/fences) both on and off-site, as well as increased foundation concrete costs. In order to minimise this, all excavations deeper than 1.2m deep (or any excavation within 1.5m of any existing structure or service) should be supported. Full support should be provided to the full depth of all near vertically sided excavations in made ground, soft and very soft clays and granular soils. A reduction to intermediate support should be acceptable within firm and stiffer natural clays.

Wherever possible, man entry into excavations should be prevented; however, where this is not possible, entry to, and time spent in, excavations should be kept to a minimum.

The build program should be tailored to reflect the impact that deep excavations through potentially unstable strata can have on adjacent properties, so that they are not undermined.

All excavations on site should be in accordance with HSE guidelines and stability should be practically maintained at all times. Reference should be made to HSE construction information sheet No. 8 (Revision 1) 'Safety in Excavations'.

Care should be taken to ensure that falls from excavation faces do not adversely affect the integrity of foundation concrete.

If contaminated water enters excavations it should be removed and transported to an appropriate treatment facility by a suitably licensed carrier before construction begins.

xiv GEOTECHNICAL ASSESSMENT – SUBSTRUCTURES

Where practicable, existing buried construction should be fully removed; however, if this is not practicable all new foundations should be carried down to fully penetrate it and it should be broken well away from all new structures.

There may be existing structures and/or infrastructure in close proximity to the proposed development. New build foundations may be constructed next to pavements with existing underground services beneath them, or excavations may be required near existing footings associated with adjacent properties. These potential hazards need to be taken into consideration when designing foundations and the groundworker needs to be made aware of their potential impact during the redevelopment works. Foundations close to existing underground services or buildings may require alternative foundation techniques (such as piling) to protect the integrity of these structures.

The contractor for the works should carry them out in such a fashion so as to not cause excessive overbreak, concrete usage or undermine existing buildings/roads/ services that are to be retained.

xv GEOTECHNICAL ASSESSMENT – SOAKAWAYS

Soakaway testing in trial pits by GRM is broadly carried out in accordance with BRE DG 365 (2016). The testing comprises the excavation of a test pit to a suitable depth, and the placement of water into the pit. The level of water present is then monitored over time. For borehole installations, the permeability testing (falling head/rising head) is undertaken in accordance with BS5930.

If it is decided to proceed with the use of soakaway drainage, then the following general points should be noted:

- Soakaways should not be placed so that water can be discharged through potentially contaminated made ground.
- The Environment Agency may require soakaways to be sealed systems such that only roof run off falls to soakaway.

- Interceptors are likely to be required for soakaways for highway drainage. The adopting authority for the highways should be consulted at the earliest opportunity regarding the use of soakaways for highways drainage.
- Consideration of site levels and slopes should be taken into account during the design.
- The construction of all soakaways should be in accordance with the current building regulations.
- Soakaways should not be placed within 5m of a proposed building.
- Placement of soakaways needs to be considered so as to avoid ponding of water down slope.
- The base of a soakaway should not be below the highest recorded water level.
- The Environment Agency prefer 1m of dry soil to be present between the base of a soakaway and the water table to provide attenuation for contamination.

xvi GEOTECHNICAL ASSESSMENT – FOUNDATIONS

If soft or hard spots are encountered during foundation excavation then they should be replaced with suitably compacted material or the footings deepened to suitable strata, to avoid differential settlement.

If strata of differing bearing character (e.g. sand and clay) are encountered at foundation levels within the excavations for a single plot then the excavation depths should be altered as appropriate to ensure the foundations rest on a single stratum, or strata that will not induce differential settlement. Where this is impractical then GRM should be contacted to assess a reinforced concrete detail or an alternative foundation solution (e.g. piles or vibro-replacement).

NOTES ON LIMITATIONS

General

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

GRM Development Solutions Limited accepts no responsibility or liability for:

a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and

b) the consequences of this document being used by any third party with whom an agreement has not been executed.

Phase I Environmental Audits/ Desk Studies

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, GRM Development Solutions Limited reserves the right to review such information and as considered necessary and appropriate to modify the opinions accordingly. It should be noted that any risks identified in a Phase 1 report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits (Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, and controlled waters.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as provisional only and must, in any event, be confirmed by a commercial adviser.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. Whilst exploratory testing is intended to gain an accurate representation of the site, the very nature of sampling and testing is such that it cannot ensure that all localised conditions are detected

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Phase II Geo-environmental Investigations (Combined Geotechnical and Contamination Investigations)

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environment risks together with engineering and development implications. If costs have been included in relation to site development a commercial adviser must confirm these.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site for each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time the site work was conducted. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided take in to consideration, inter alia, currently available guidance relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

APPENDIX B

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- Structural Engineering Services
- Construction Management
- Site Services

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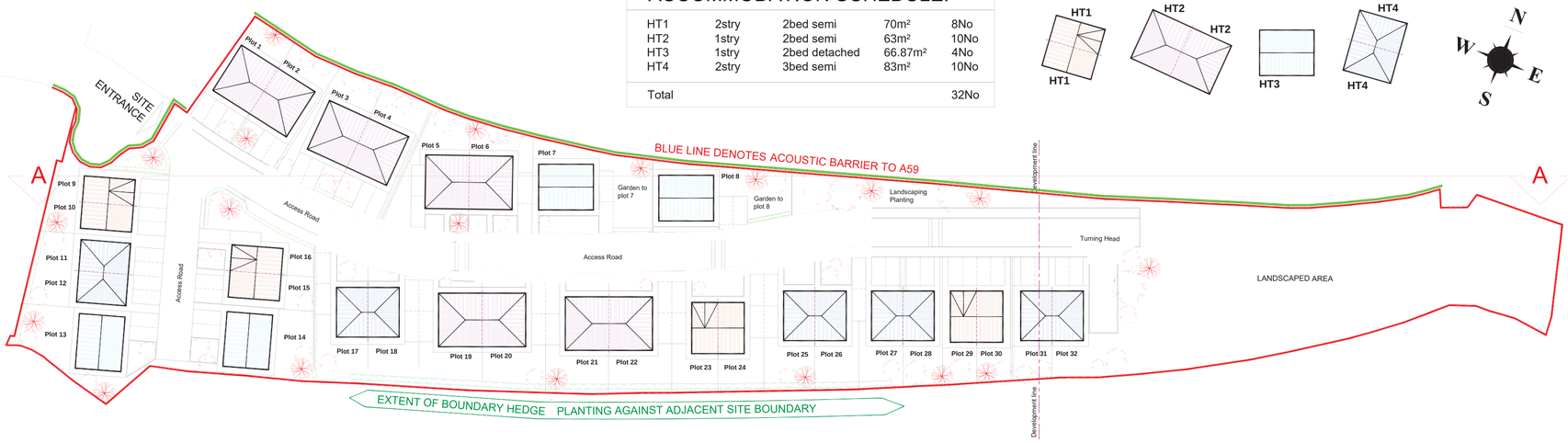
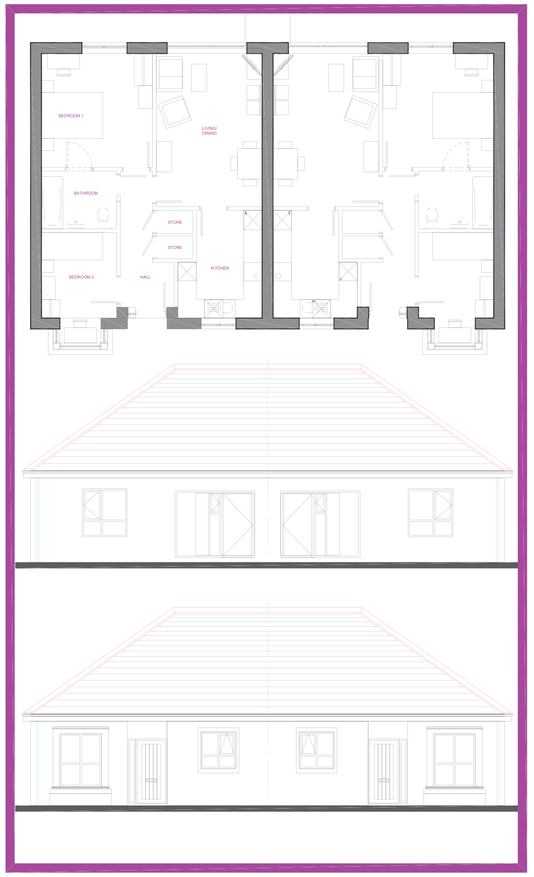
ACCOMMODATION SCHEDULE:

HT1	2stry	2bed semi	70m²	8No
HT2	1stry	2bed semi	63m²	10No
HT3	1stry	2bed detached	66.87m²	4No
HT4	2stry	3bed semi	83m²	10No
Total				32No

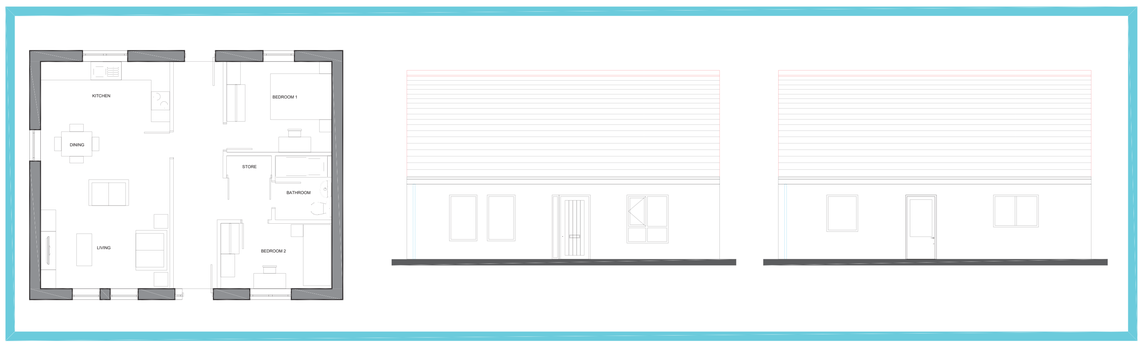


PROPOSED SITE LAYOUT
Scale 1:500 @ A1

HOUSE TYPE 1 70m² 2Bed Semi-detached



HOUSE TYPE 2 62m² 2Bed Bungalow



HOUSE TYPE 3 70m² 2Bed Bungalow

HOUSE TYPE 4 80m² 3Bed Semi-detached

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All written/scaled dimensions, setting out, levels floor areas etc. are subject to verification by Contractor(s) on site.

NORTH

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This drawing where applicable must be read in conjunction with other relevant specifications and drawings

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rev	description	drwn	auth	date

mda ARCHITECTS
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EMAIL: INFO@MDAARCHITECTS.CO.UK

client: FRANK DUFFIN

project: PHASE 3, PETRE WOOD, LANGHO

project no: 1410

drawing no: MDA(02)

date drawn: October 2018

rev: -

description: PROPOSED SITE LAYOUT
SITE SECTION AND HOUSETYPES

scale: 1:500 @ A1

drawn by: GRT

authorised by: SMD

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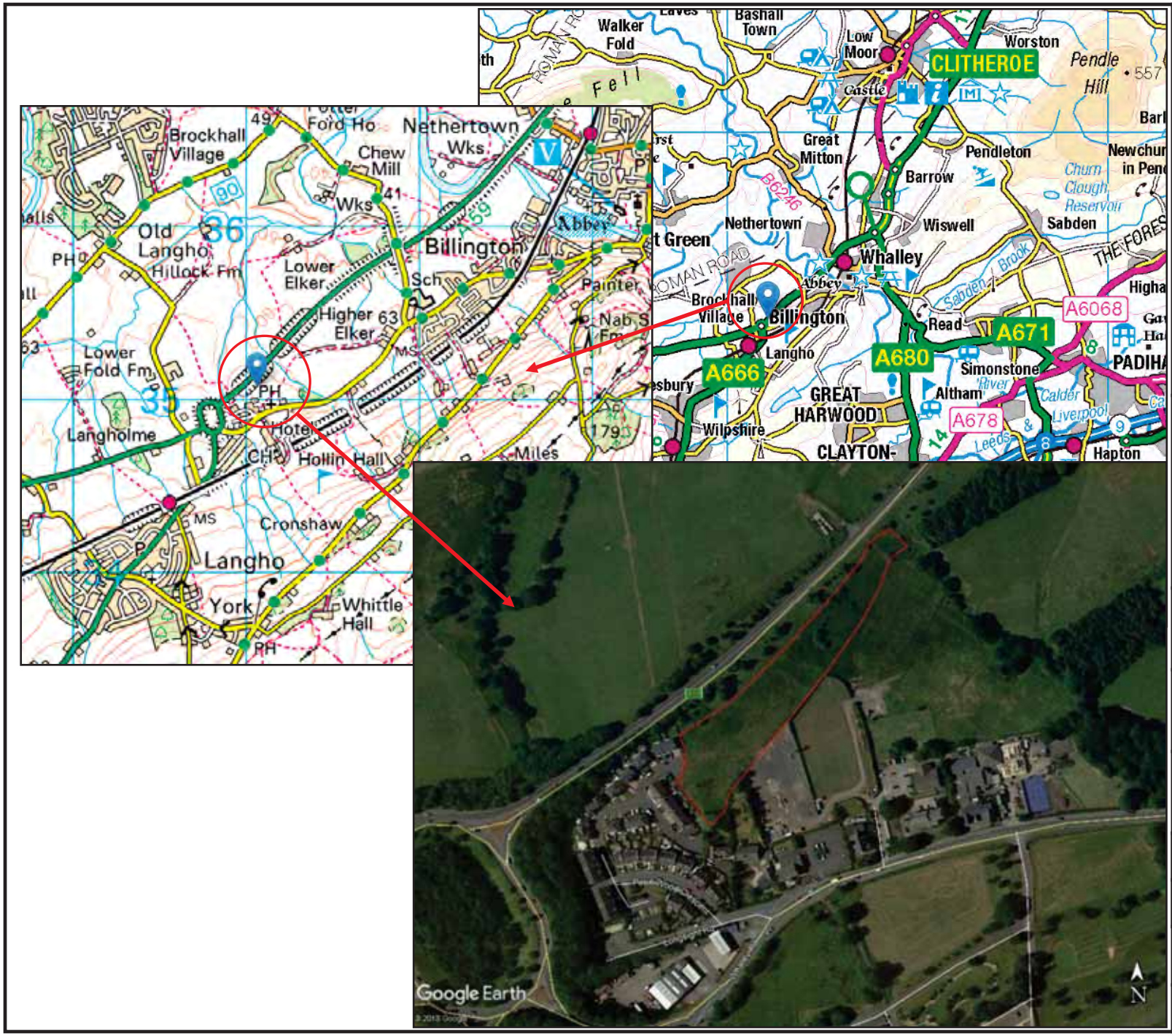

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CLIENT:
Alan Johnston Partnership LLP

PROJECT:
Petre Wood, Phase 3

TITLE:
Site Location Plan

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
RP	03/2019
PROJECT No:	DRAWING No:
P8827	1

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Alan Johnston Partnership LLP

PROJECT:
Petre Wood, Phase 3

TITLE:
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CLIENT:
Alan Johnston Partnership LLP

PROJECT:
Petre wood, Phase 3

TITLE:
Site Features Plan

SCALE@SIZE :	ISSUE:
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RP	03/2019
PROJECT No:	DRAWING No:
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Photograph 1

Photograph 2

Photograph 3

Photograph 4

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CLIENT:
Alan Johnston Partnership LLP

PROJECT:
Petre wood, Phase 3

TITLE:
General Site Photographs

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Photograph 5

Photograph 6

Photograph 7

Photograph 8

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CLIENT:
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PROJECT:
Petre wood, Phase 3

TITLE:
General Site Photographs

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NTS	FINAL
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PROJECT No:	DRAWING No:
P8827	3b

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Trees scattered onsite.

Hedgerows, wooden and wire fencing make up the majority of site boundaries

Brook adjacent to site boundary

Site access

Adjacent construction project

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CLIENT:
Alan Johnston Partnership LLP

PROJECT:
Petre wood, Phase 3

TITLE:
Sit Features Plan

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PROJECT No:	DRAWING No:
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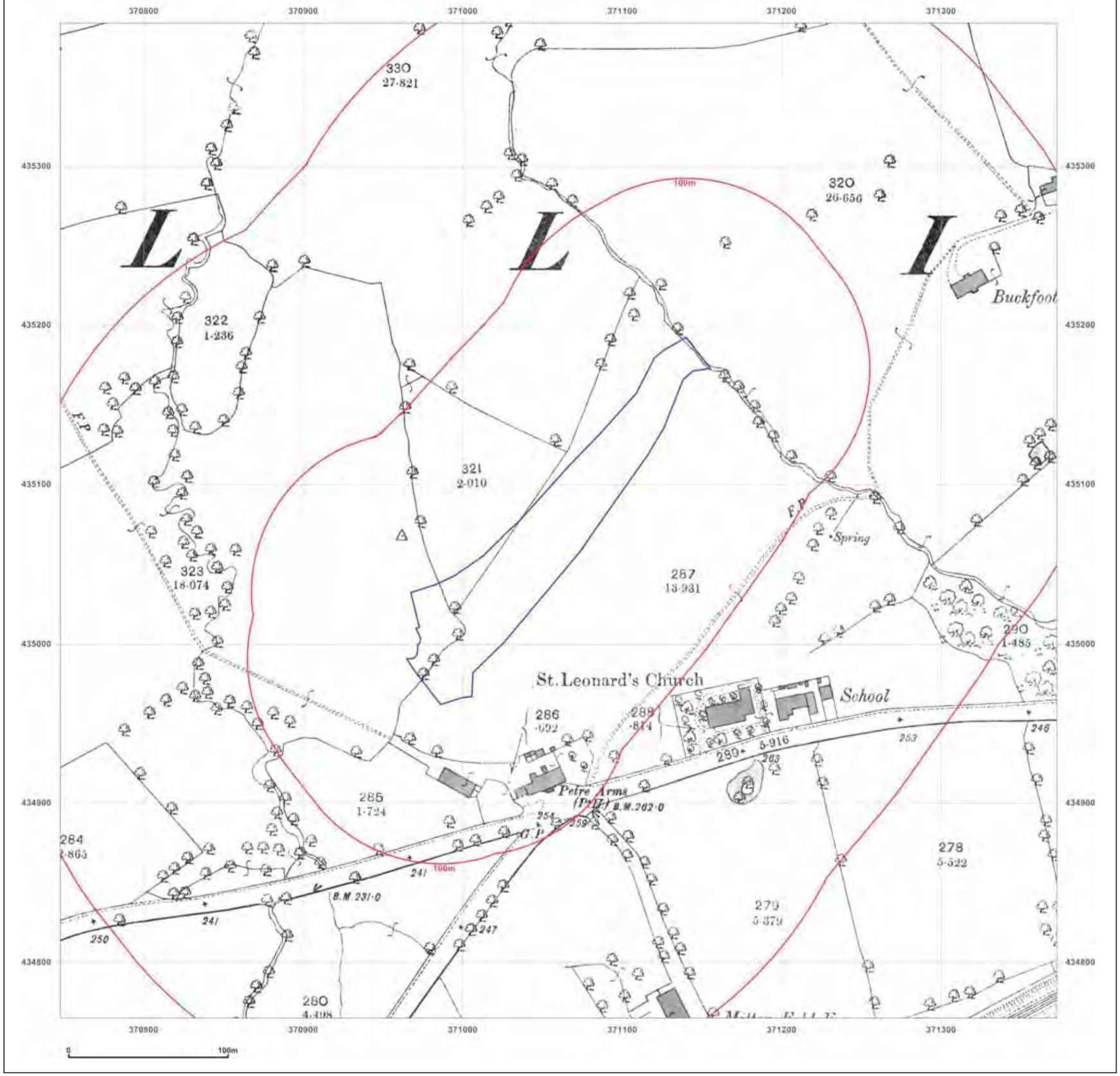

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Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

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Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series
Map date: **1892**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1892
Revised 1892
Edition N/A
Copyright N/A
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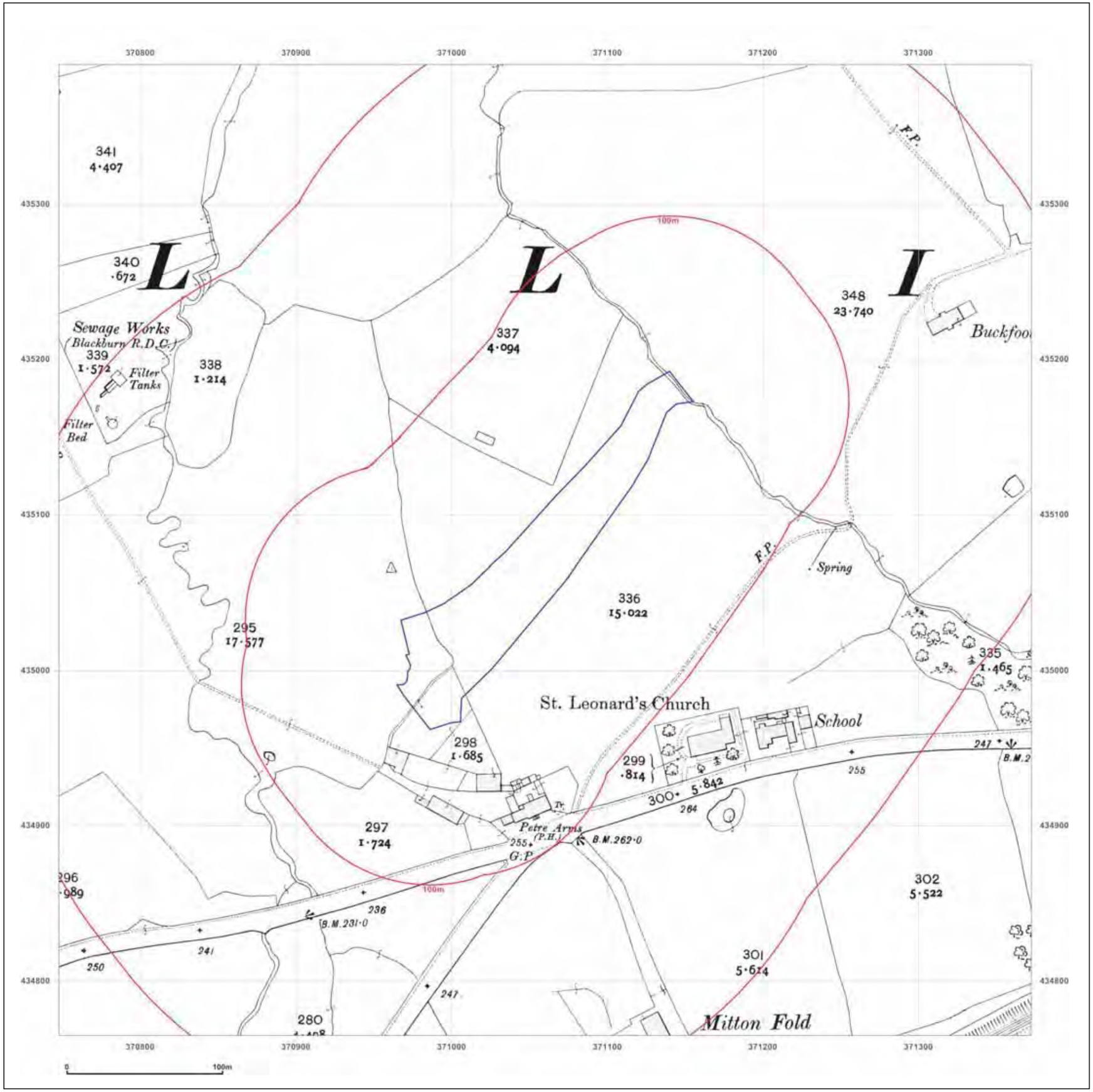

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Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series

Map date: 1912

Scale: 1:2,500

Printed at: 1:2,500

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Revised 1912
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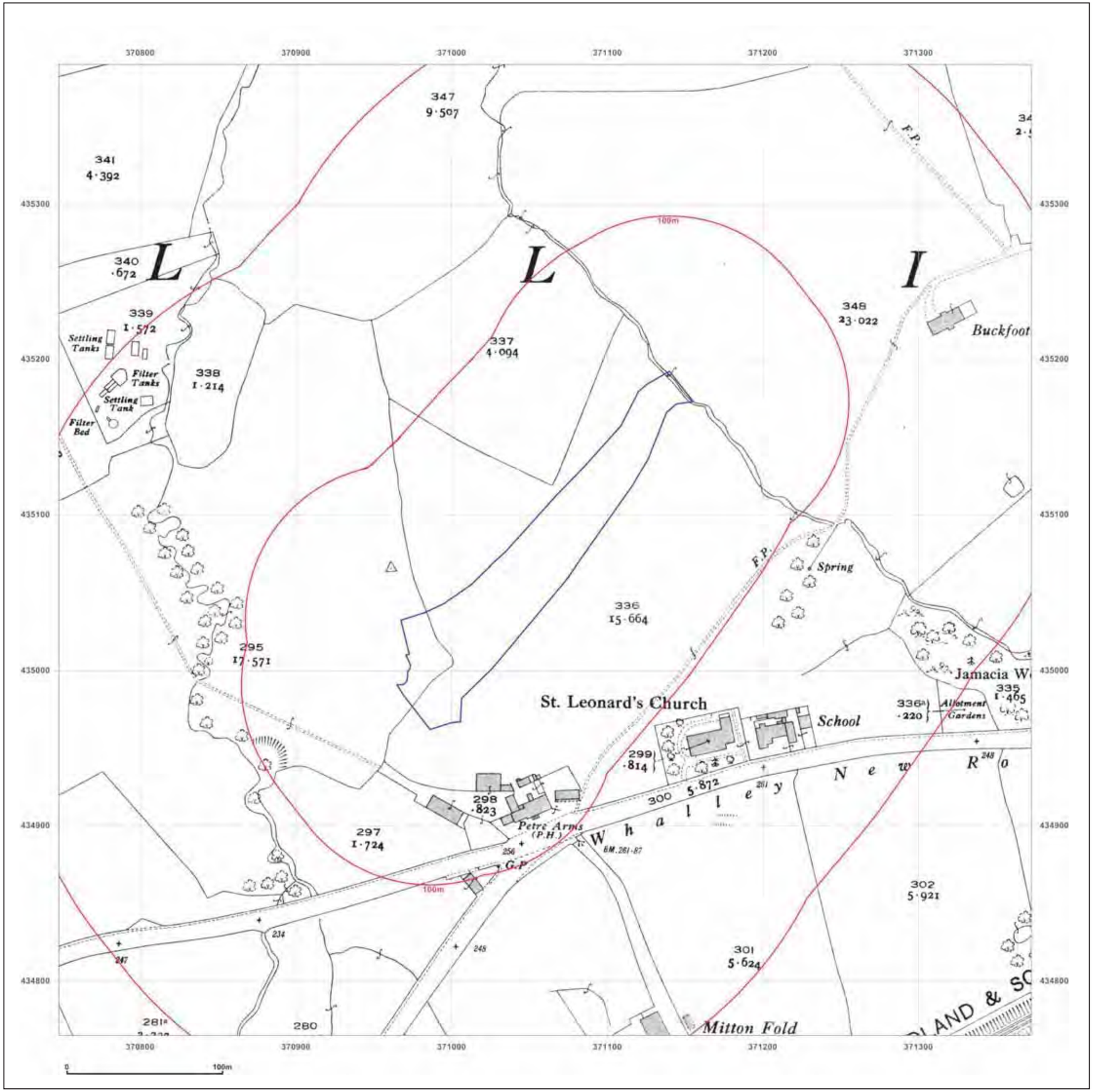

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Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series
Map date: 1932
Scale: 1:2,500
Printed at: 1:2,500

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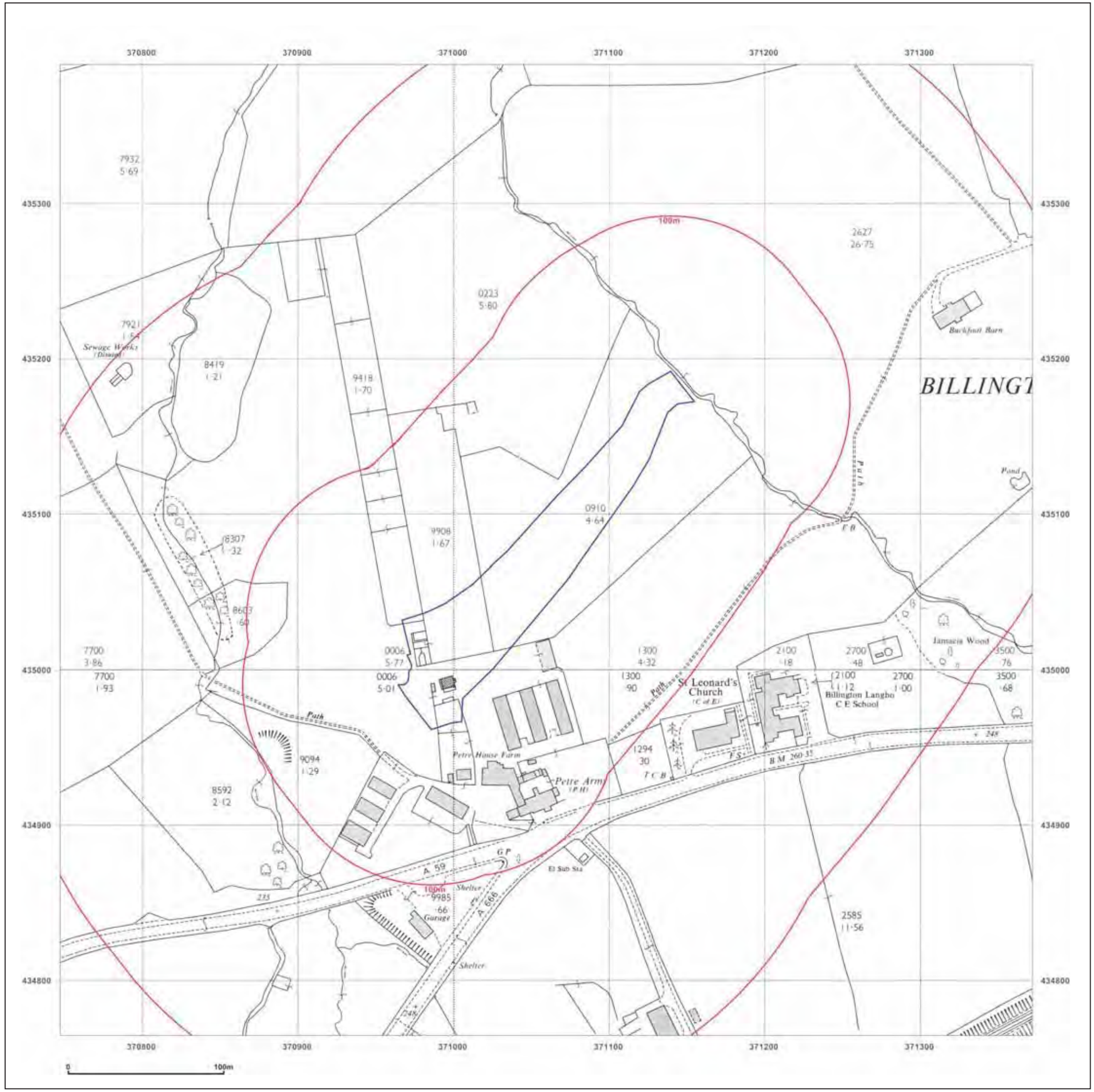

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Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1967-1968**

Scale: 1:2,500

Printed at: 1:2,500

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Edition N/A
Copyright 1968
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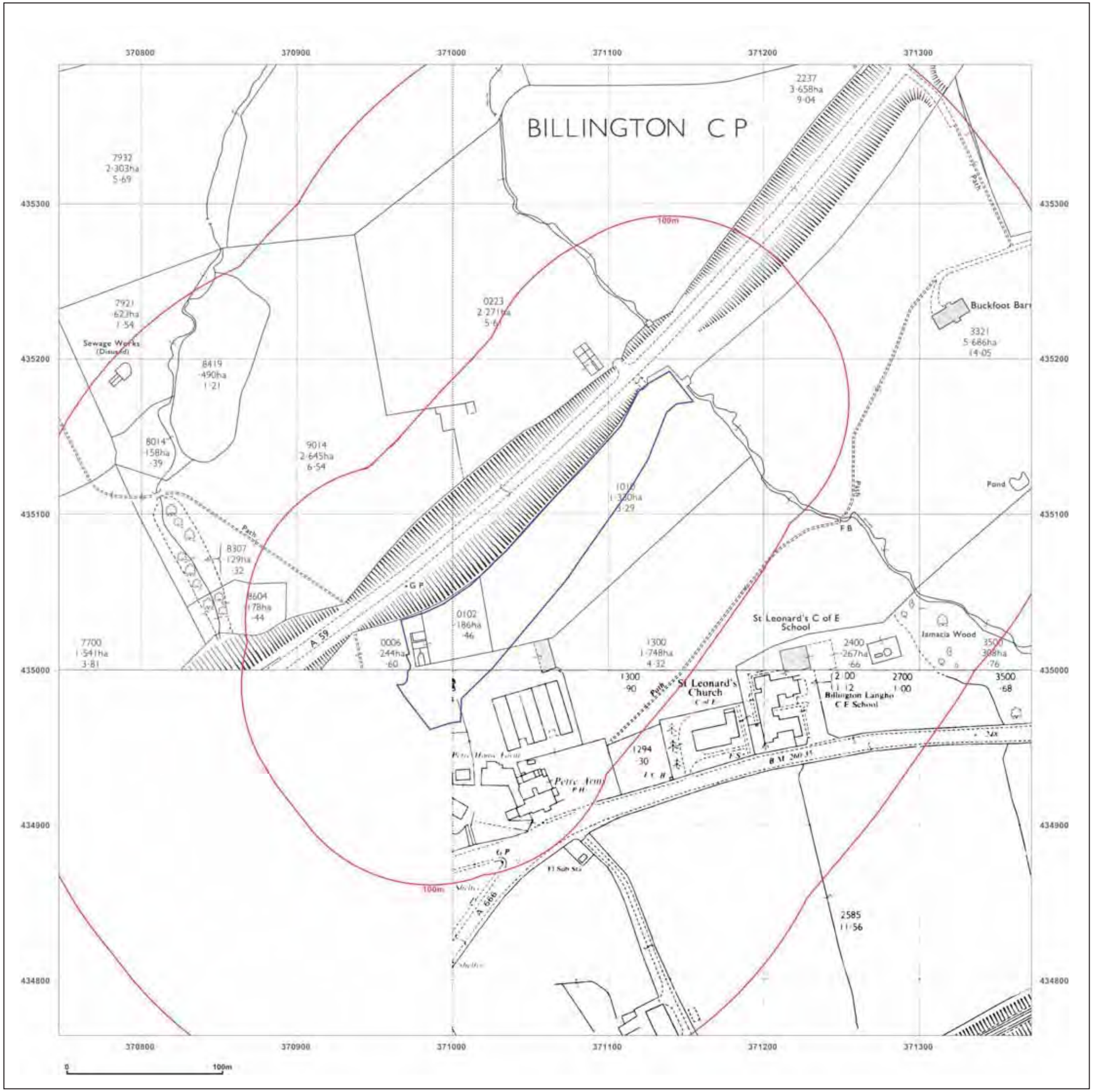

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Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1969-1972**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1972
Revised 1972
Edition N/A
Copyright 1973
Levelled 1961

Surveyed N/A
Revised N/A
Edition N/A
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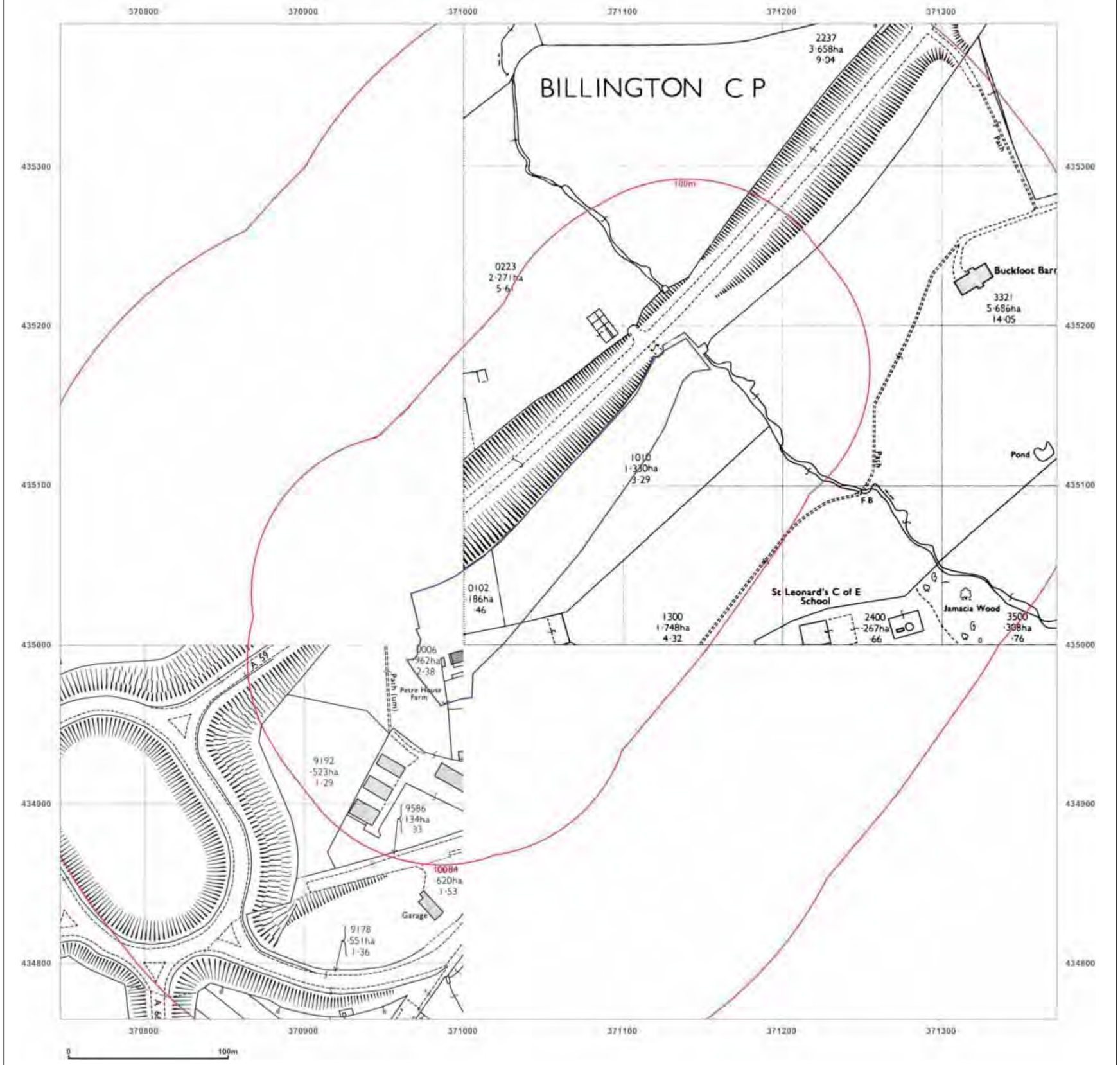

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Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1973-1976**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1973
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Revised 1976
Edition N/A
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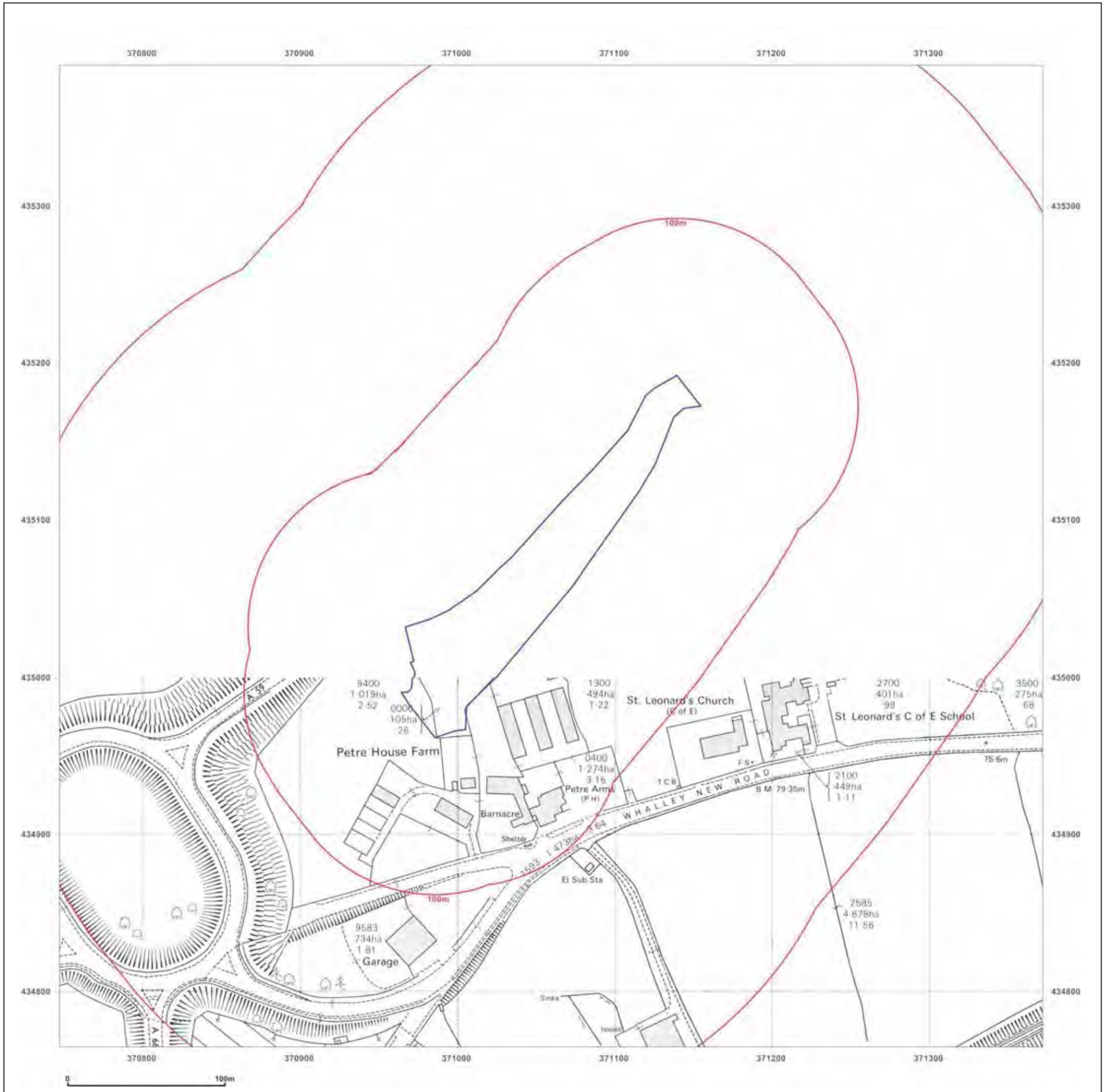

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Blackburn. ,Petre Wood Cl,
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Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1981**

Scale: 1:2,500

Printed at: 1:2,500

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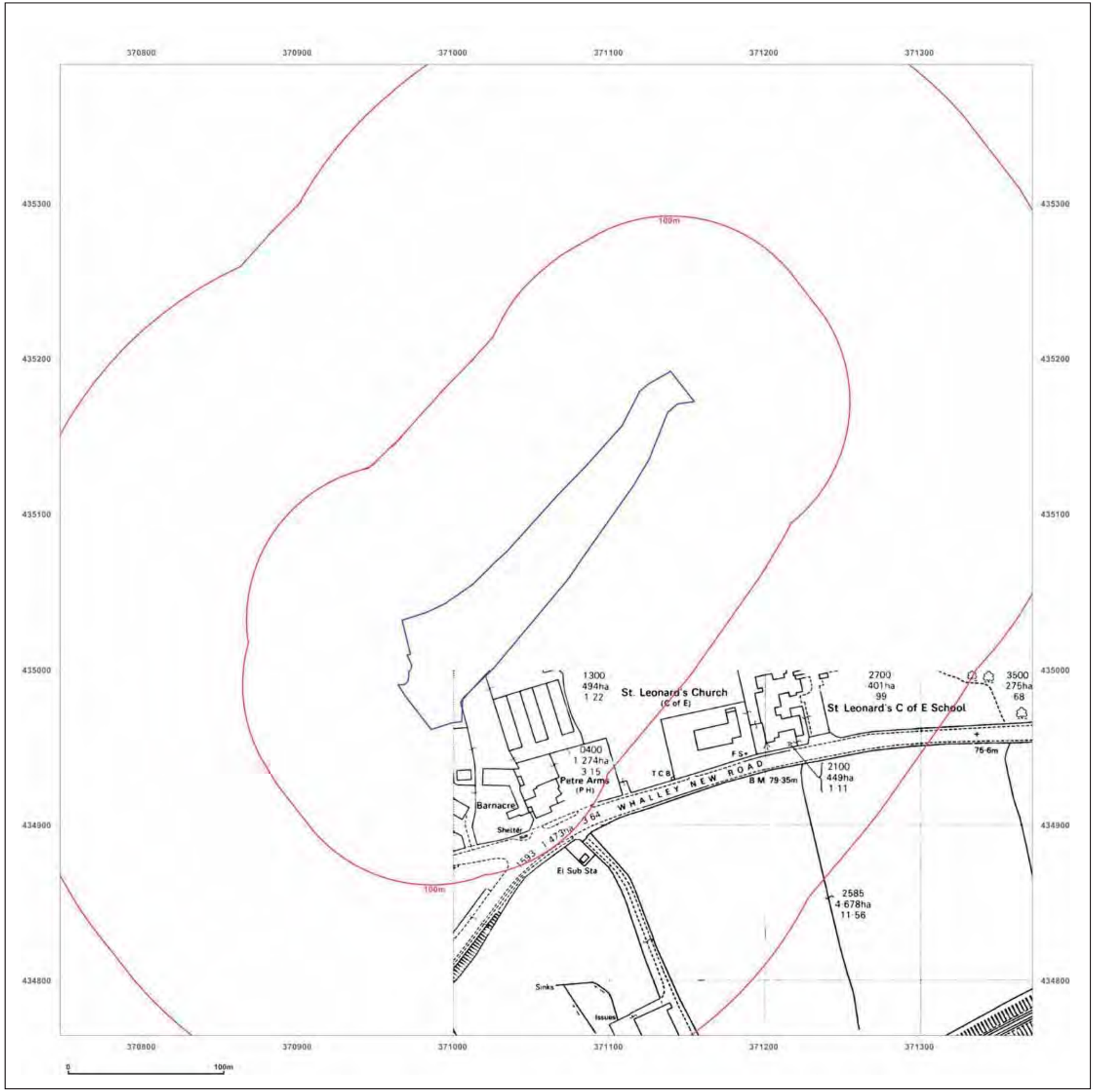

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid
Map date: 1982
Scale: 1:2,500
Printed at: 1:2,500

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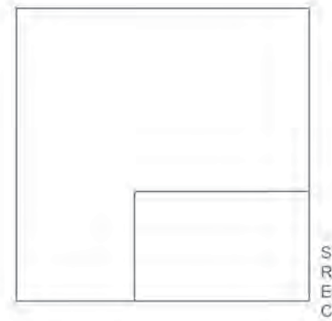

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Site Details:

Petre Wood Cl, Langho,
Blackburn. ,Petre Wood Cl,
Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1992**

Scale: 1:2,500

Printed at: 1:2,500

N
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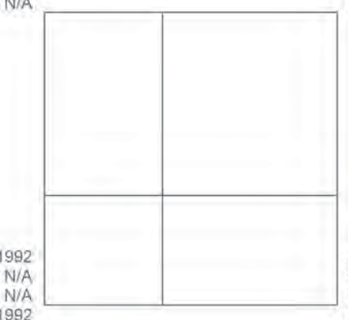
Surveyed 1992
Revised N/A
Edition N/A
Copyright 1992
Levelled N/A



Surveyed 1992
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Edition N/A
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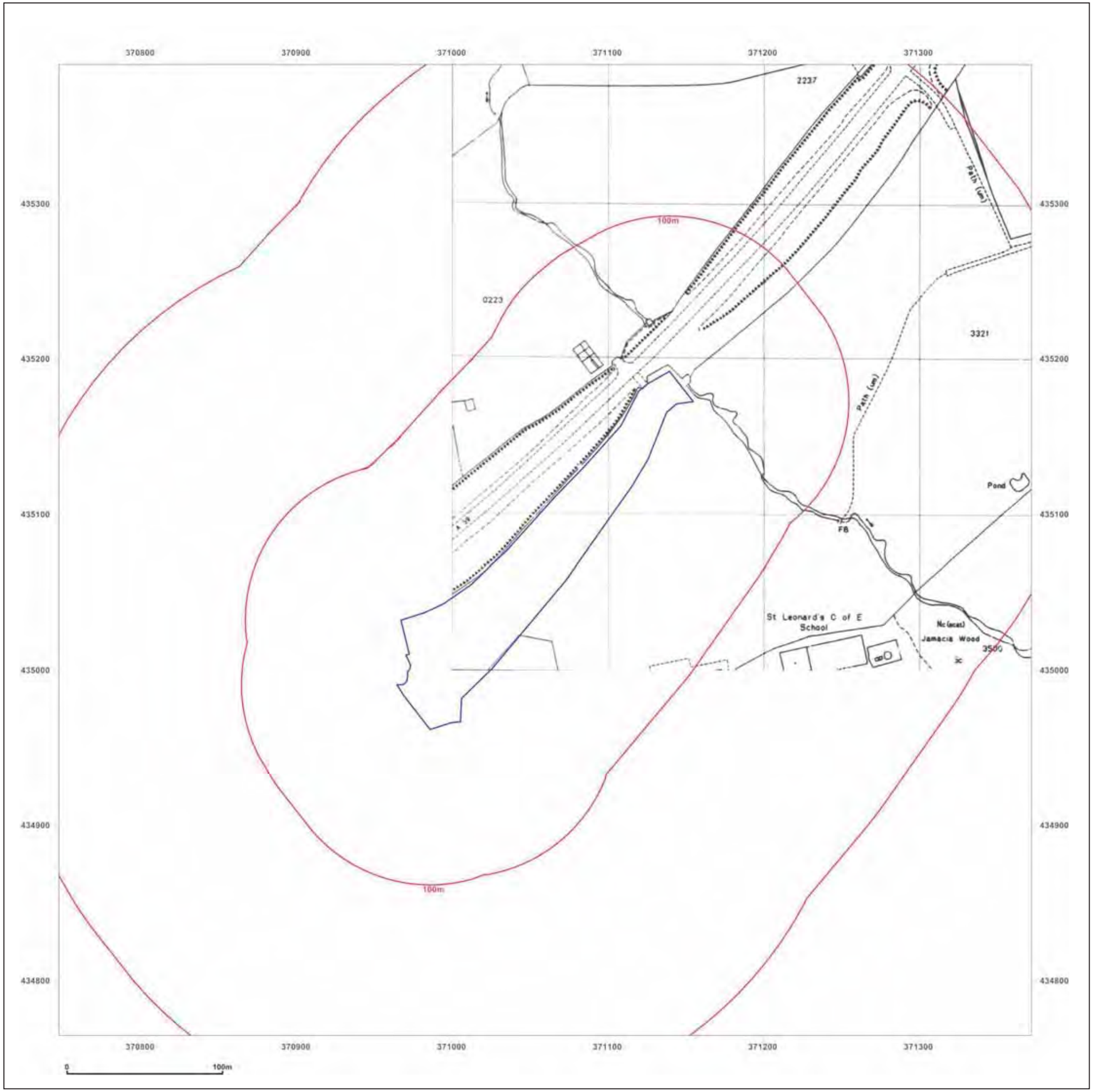

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid
Map date: **1993**
Scale: 1:2,500
Printed at: 1:2,500

N
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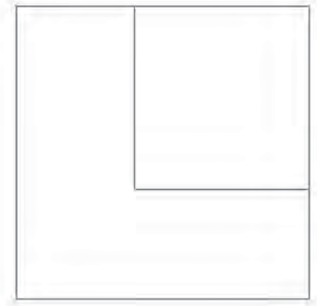
Surveyed 1993
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A



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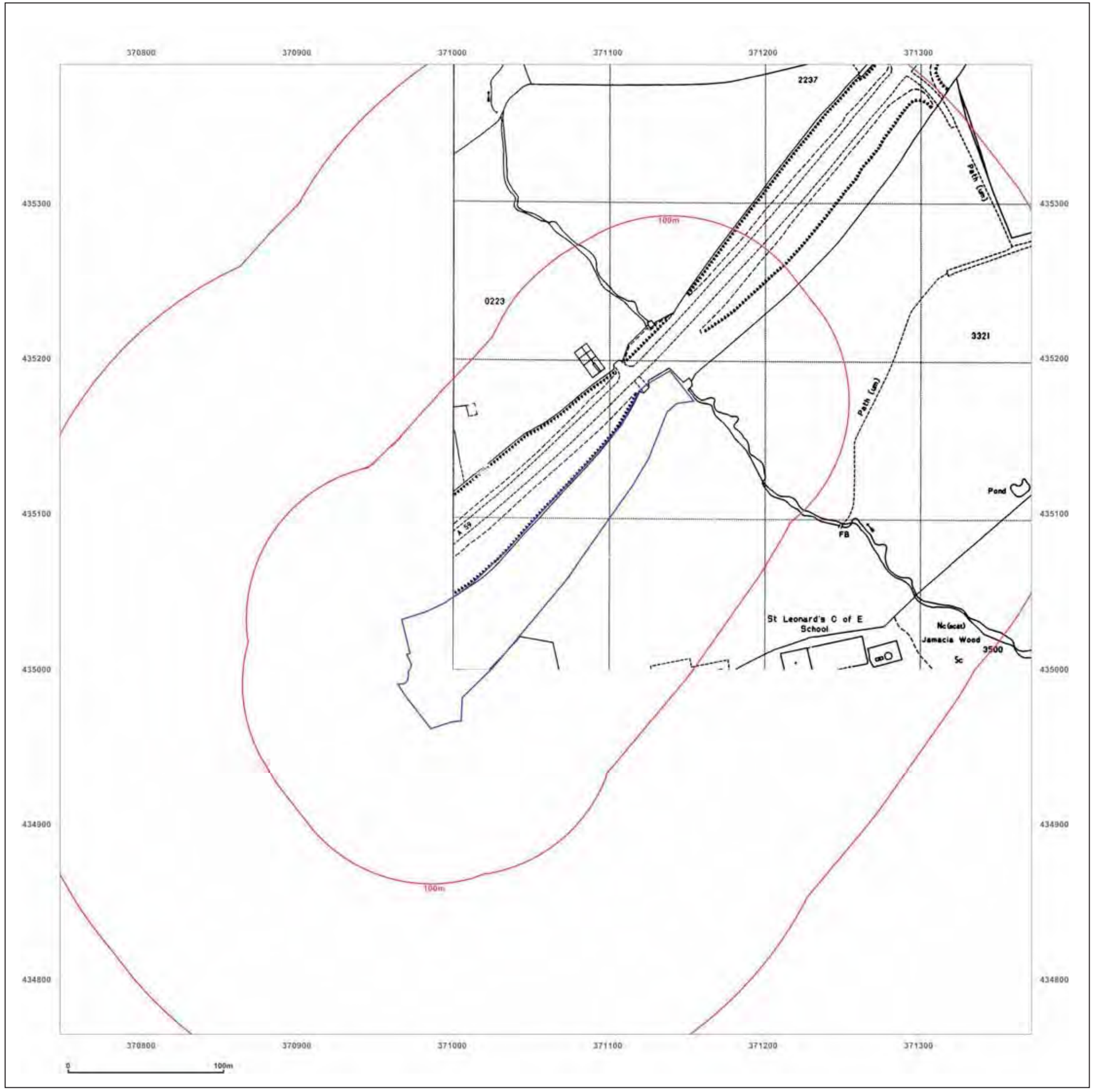

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1993**

Scale: 1:2,500

Printed at: 1:2,500

N
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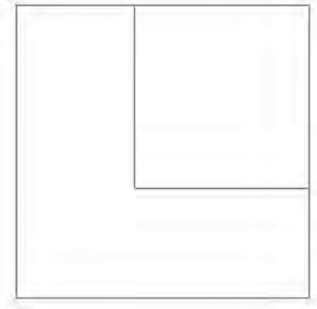
Surveyed N/A
Revised N/A
Edition N/A
Copyright 1993
Levelled N/A



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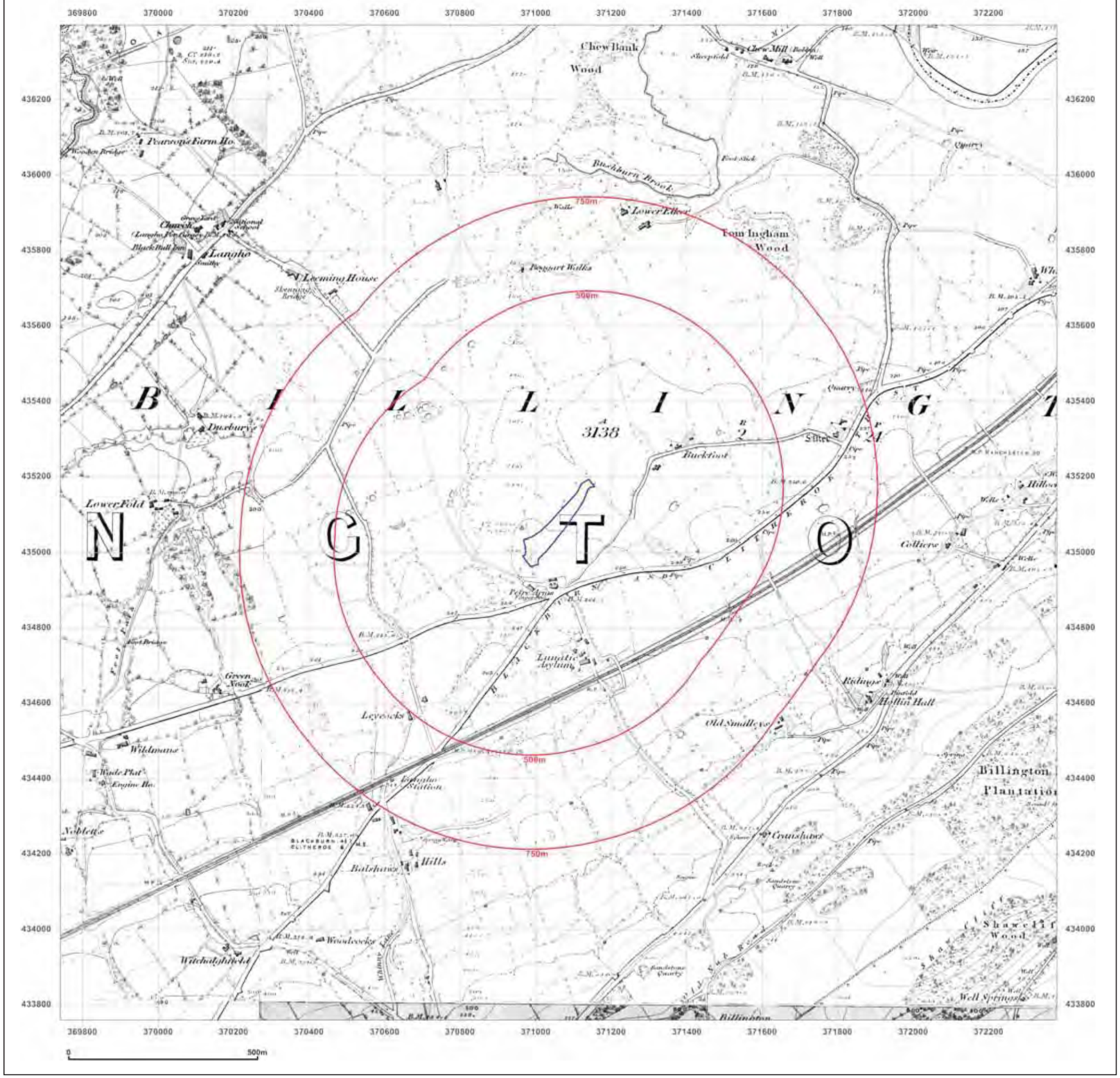

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series

Map date: **1844-1848**

Scale: 1:10,560

Printed at: 1:10,560

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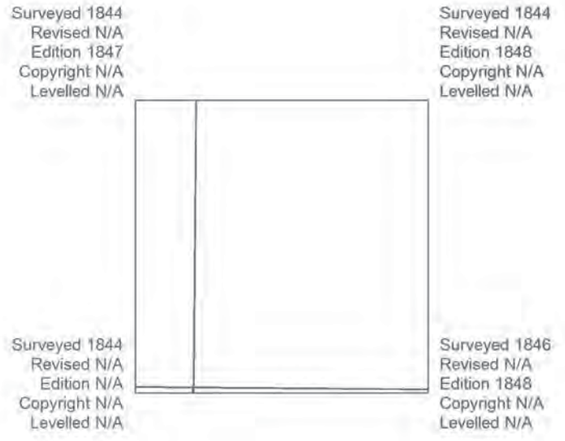

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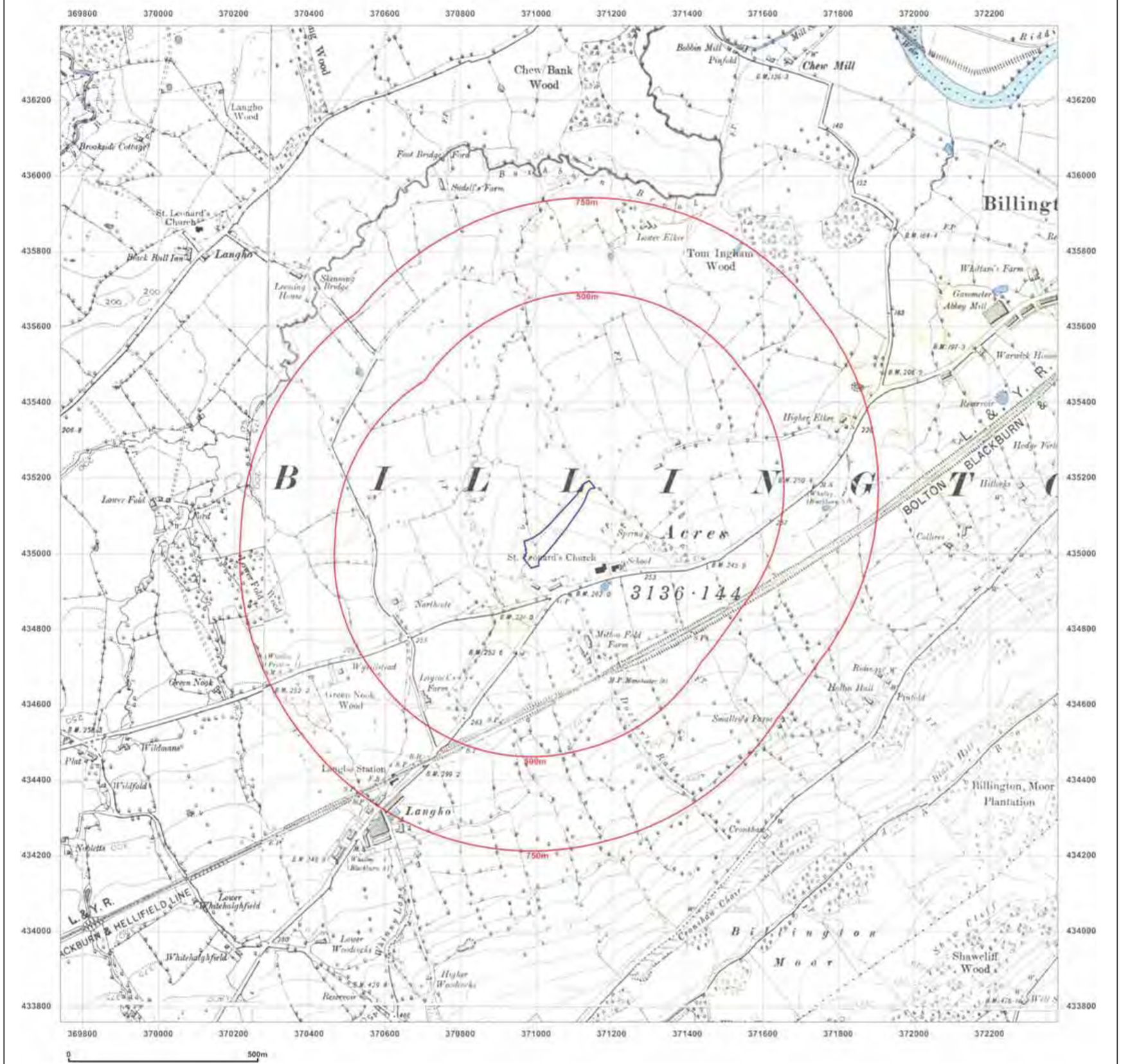

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Site Details:

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Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series

Map date: **1892**

Scale: 1:10,560

Printed at: 1:10,560

N
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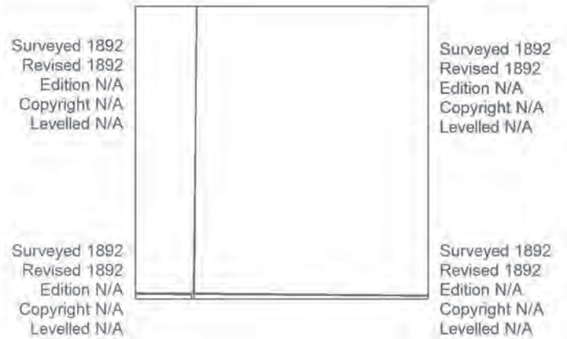

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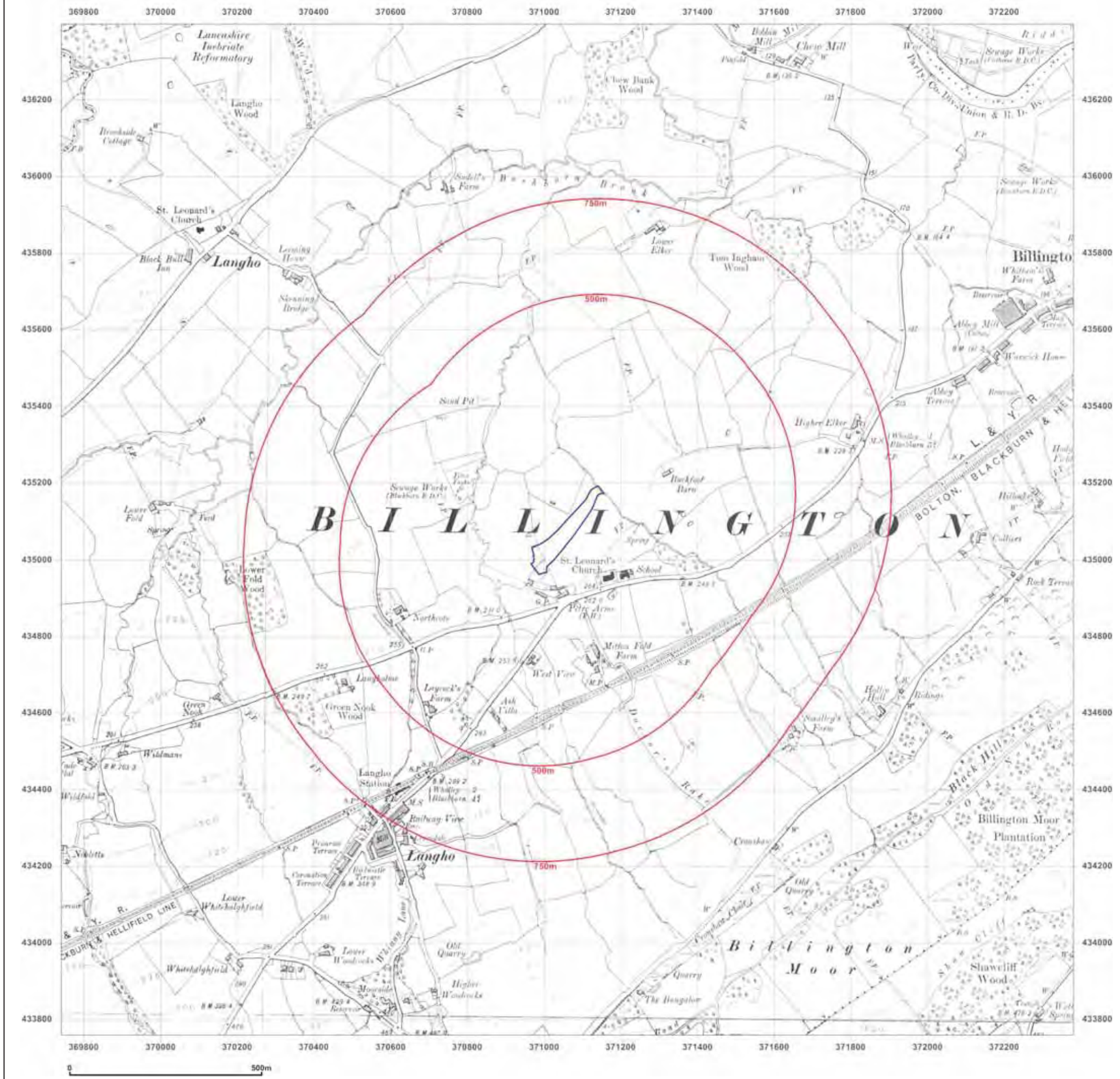

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series

Map date: **1909-1910**

Scale: 1:10,560

Printed at: 1:10,560

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W E
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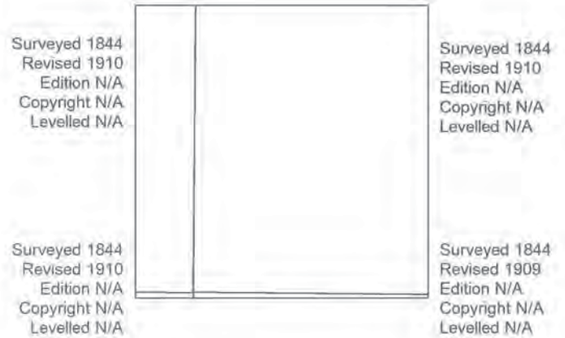

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Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: County Series

Map date: **1929-1933**

Scale: 1:10,560

Printed at: 1:10,560

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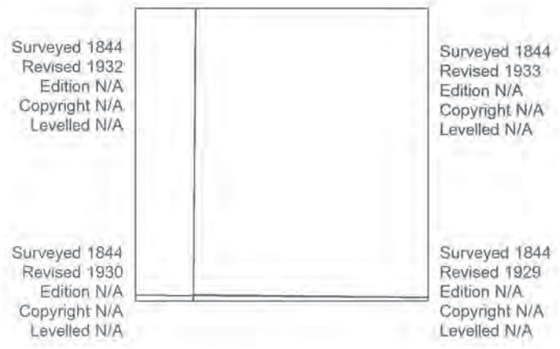

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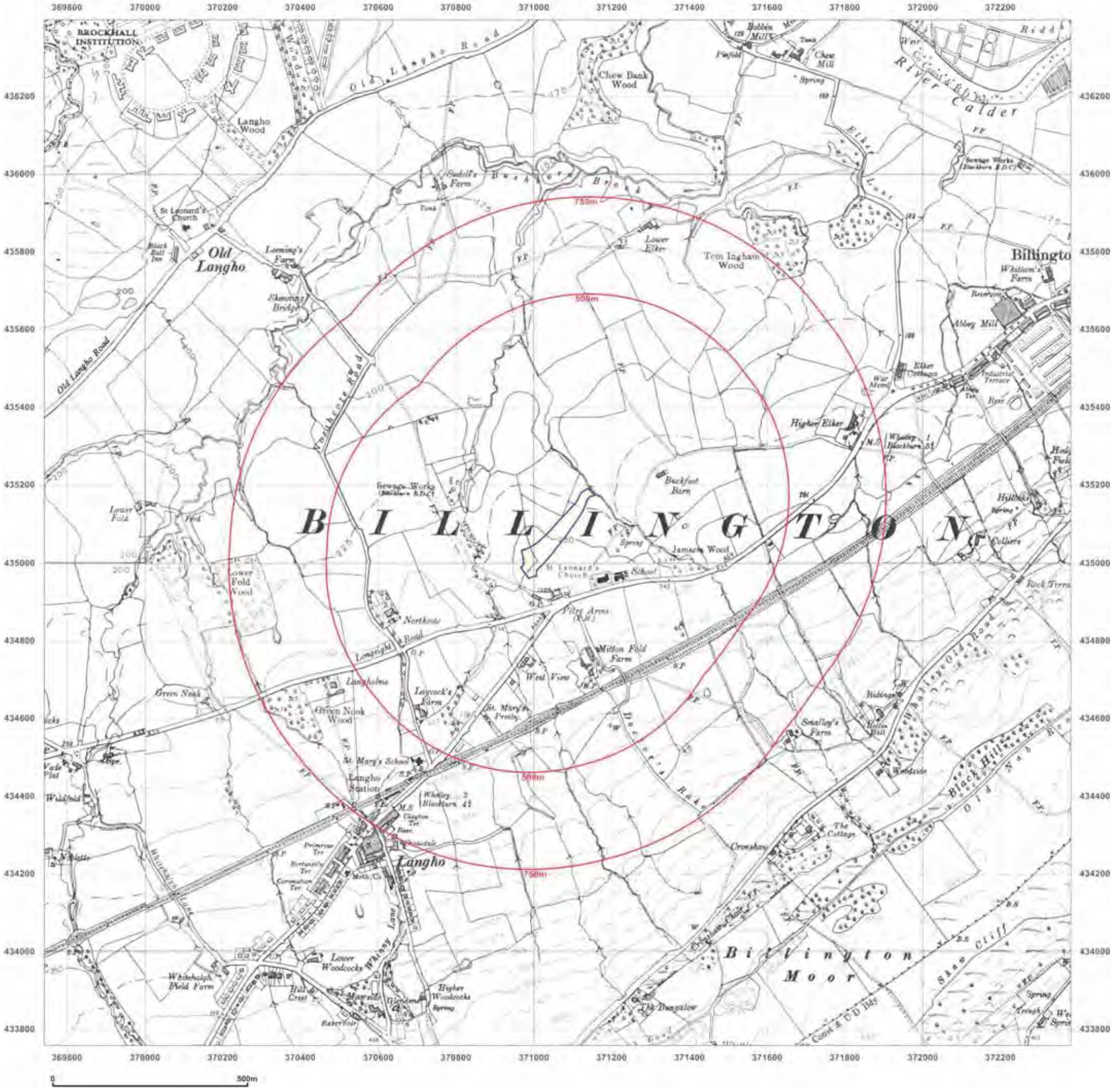

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: Provisional
Map date: **1950-1951**
Scale: 1:10,560
Printed at: 1:10,560

N
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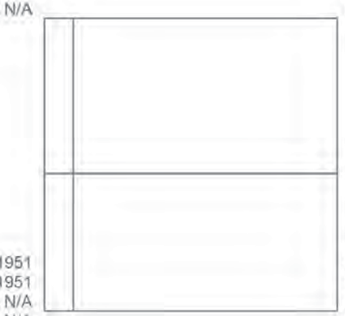
Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1950
Revised 1950
Edition N/A
Copyright N/A
Levelled N/A



Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1950
Revised 1950
Edition N/A
Copyright N/A
Levelled N/A

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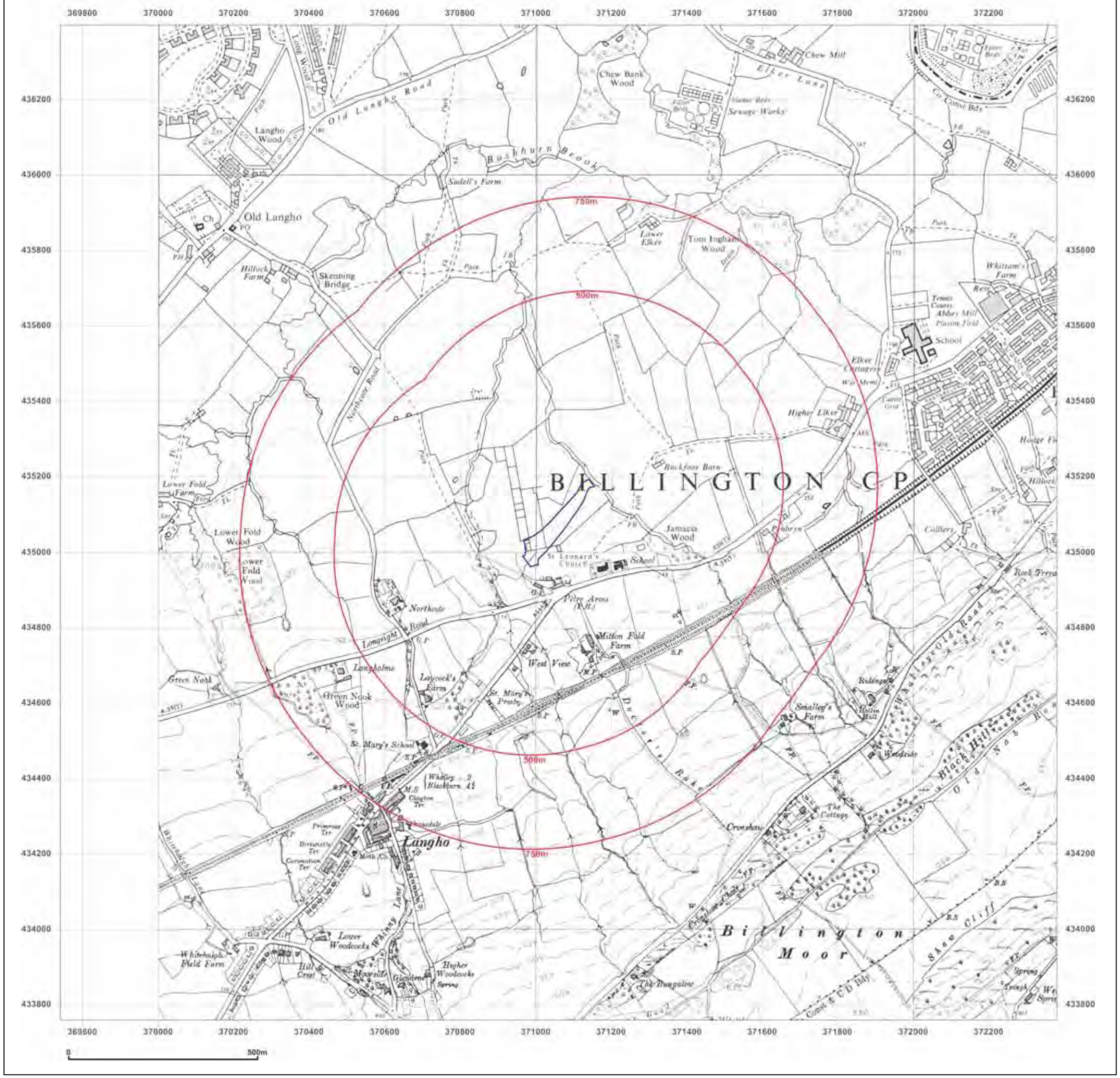

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: Provisional
Map date: **1966-1969**
Scale: 1:10,560
Printed at: 1:10,560

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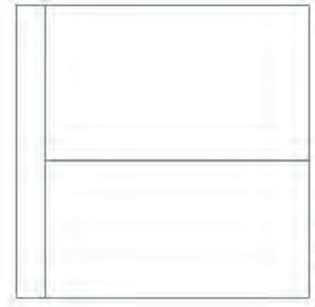
Surveyed 1969
Revised 1969
Edition N/A
Copyright N/A
Levelled N/A



Surveyed N/A
Revised 1966
Edition 1955
Copyright N/A
Levelled N/A

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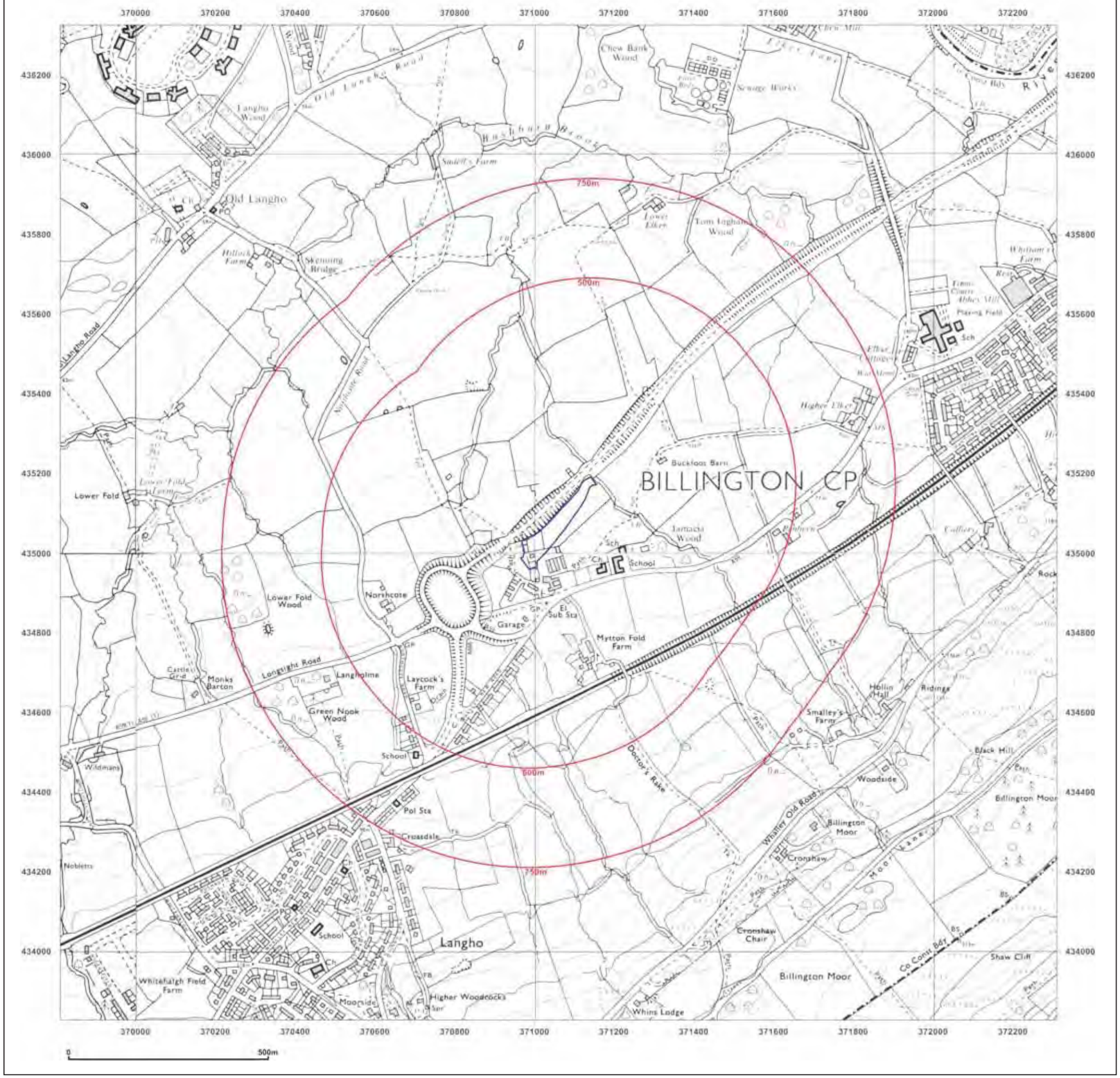

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1970-1976**

Scale: 1:10,000

Printed at: 1:10,000

N
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Surveyed 1970
Revised 1970
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1972
Revised 1973
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1975
Revised 1976
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1973
Revised 1973
Edition N/A
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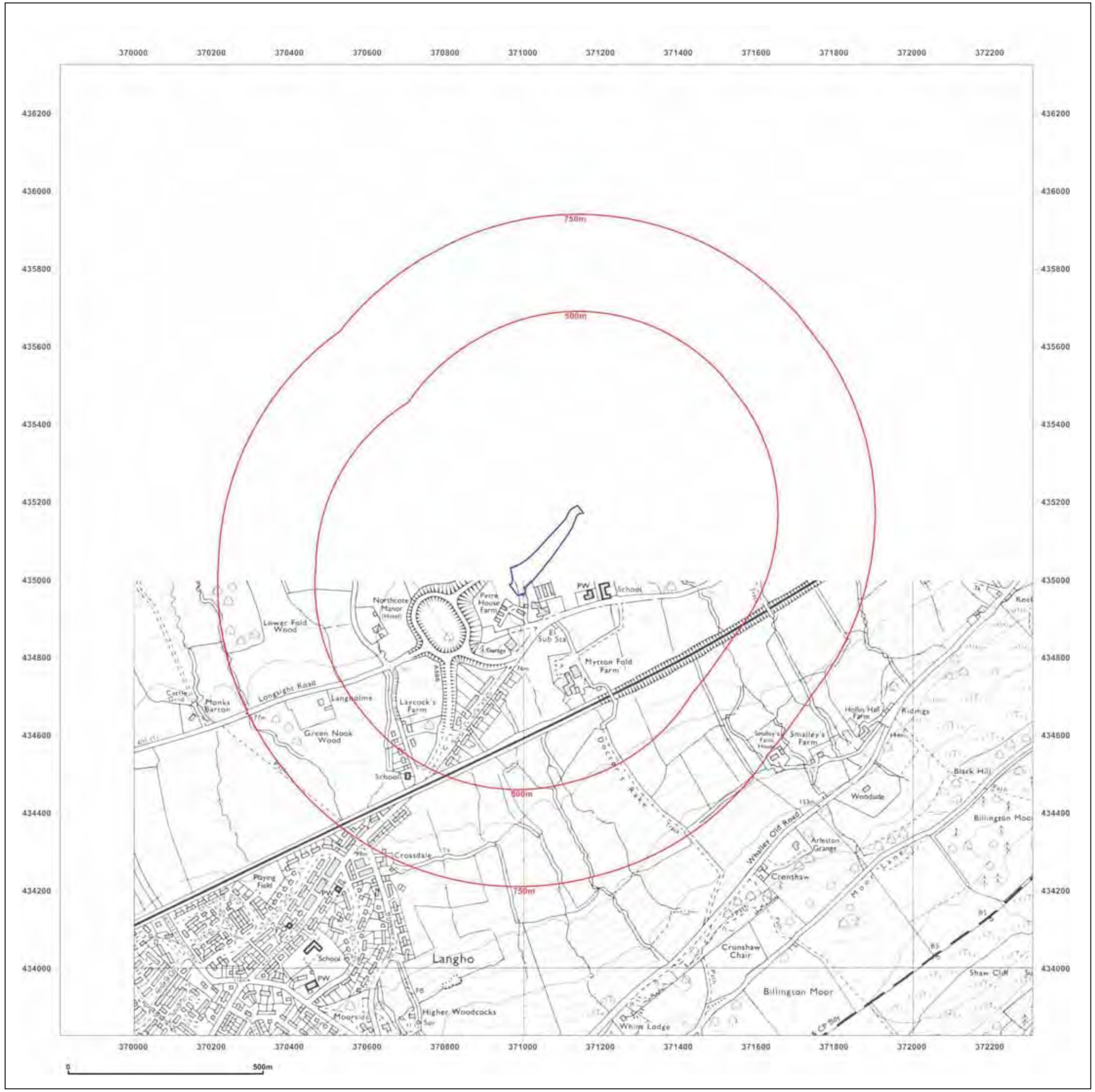

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **1991**

Scale: 1:10,000

Printed at: 1:10,000

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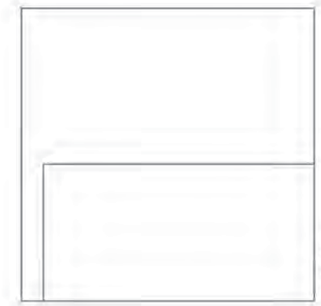

Surveyed 1990
Revised 1991
Edition N/A
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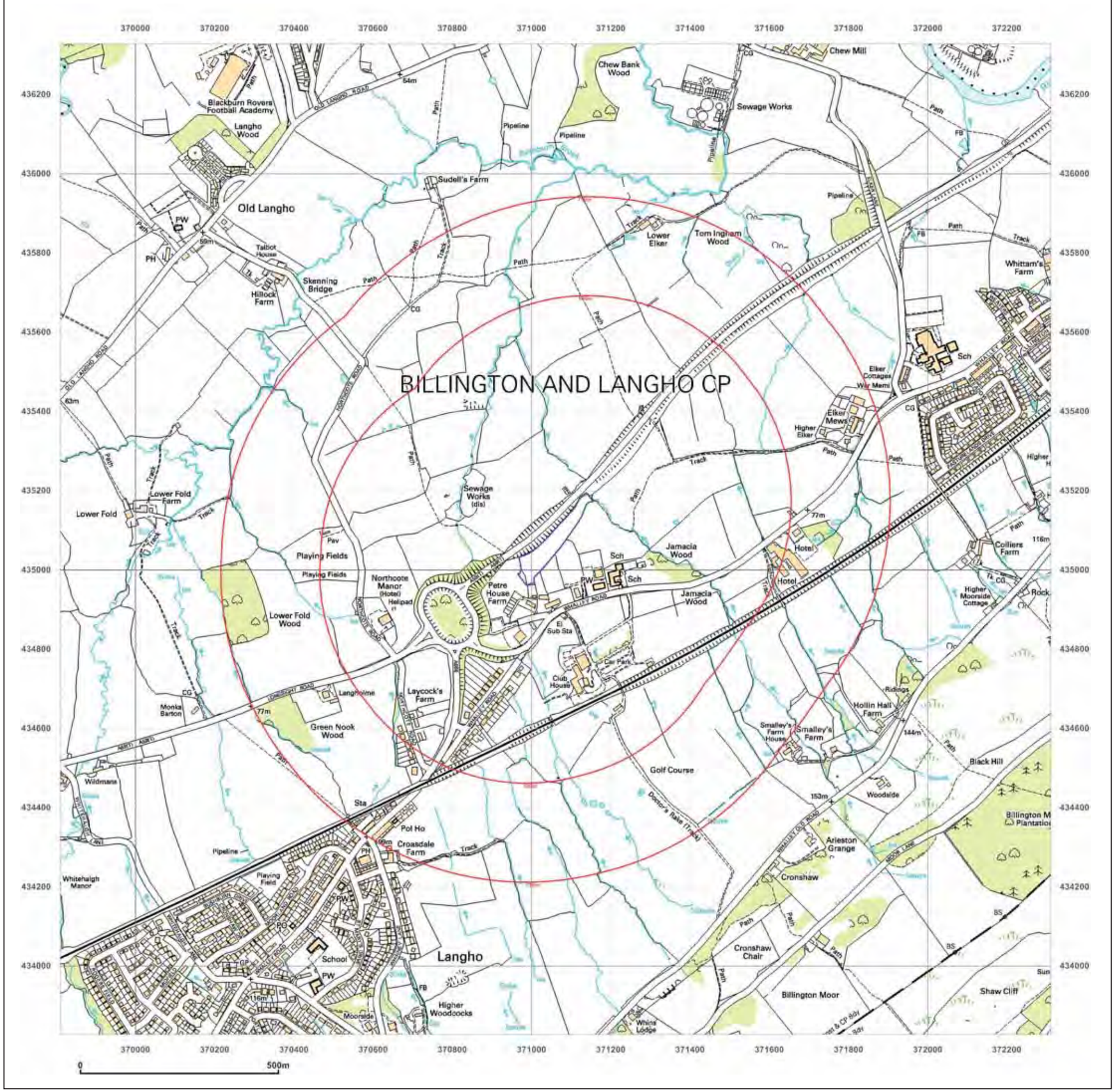

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: 1:10,000 Raster

Map date: **2002**

Scale: 1:10,000

Printed at: 1:10,000

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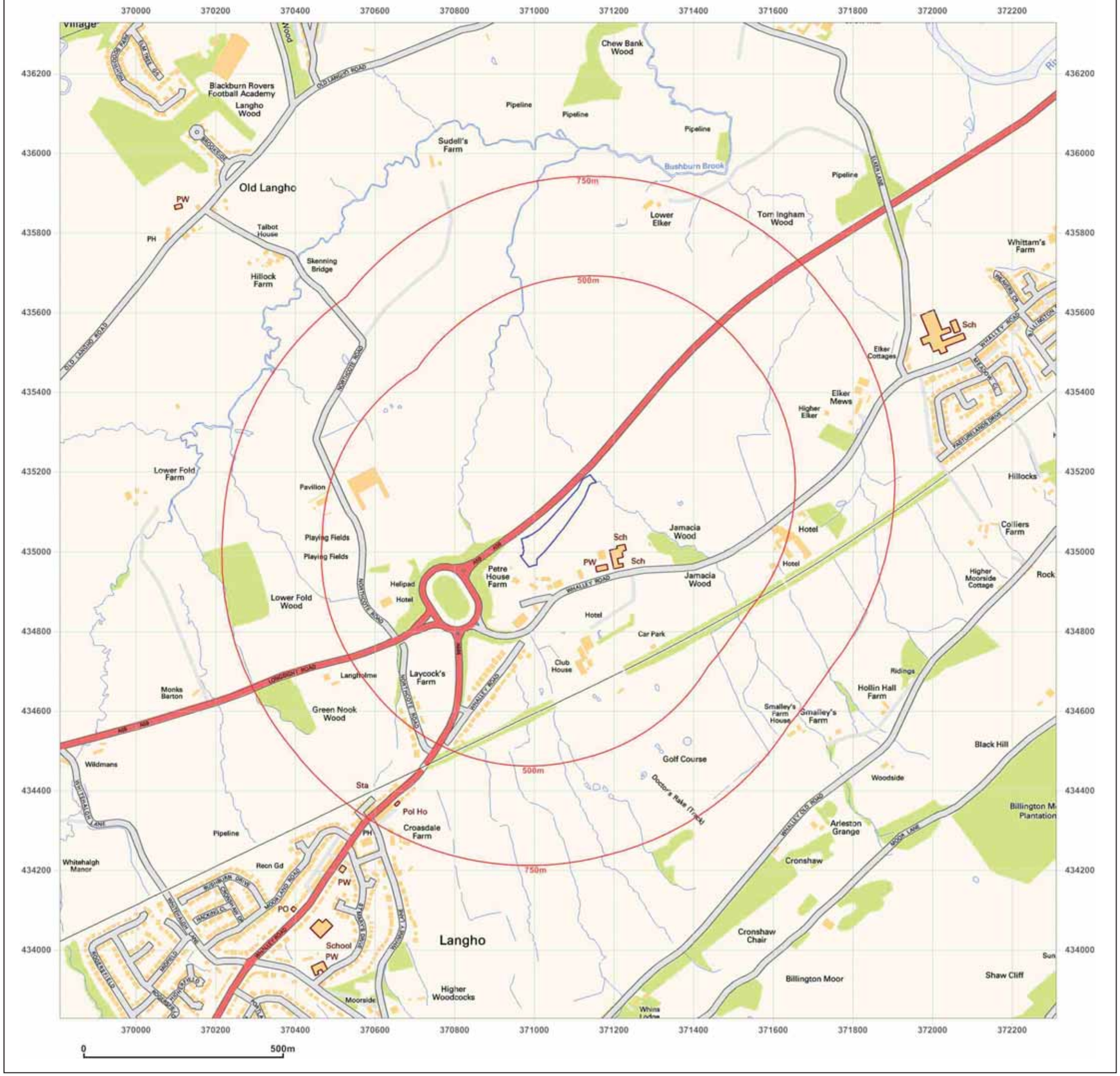

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: **2010**

Scale: 1:10,000

Printed at: 1:10,000

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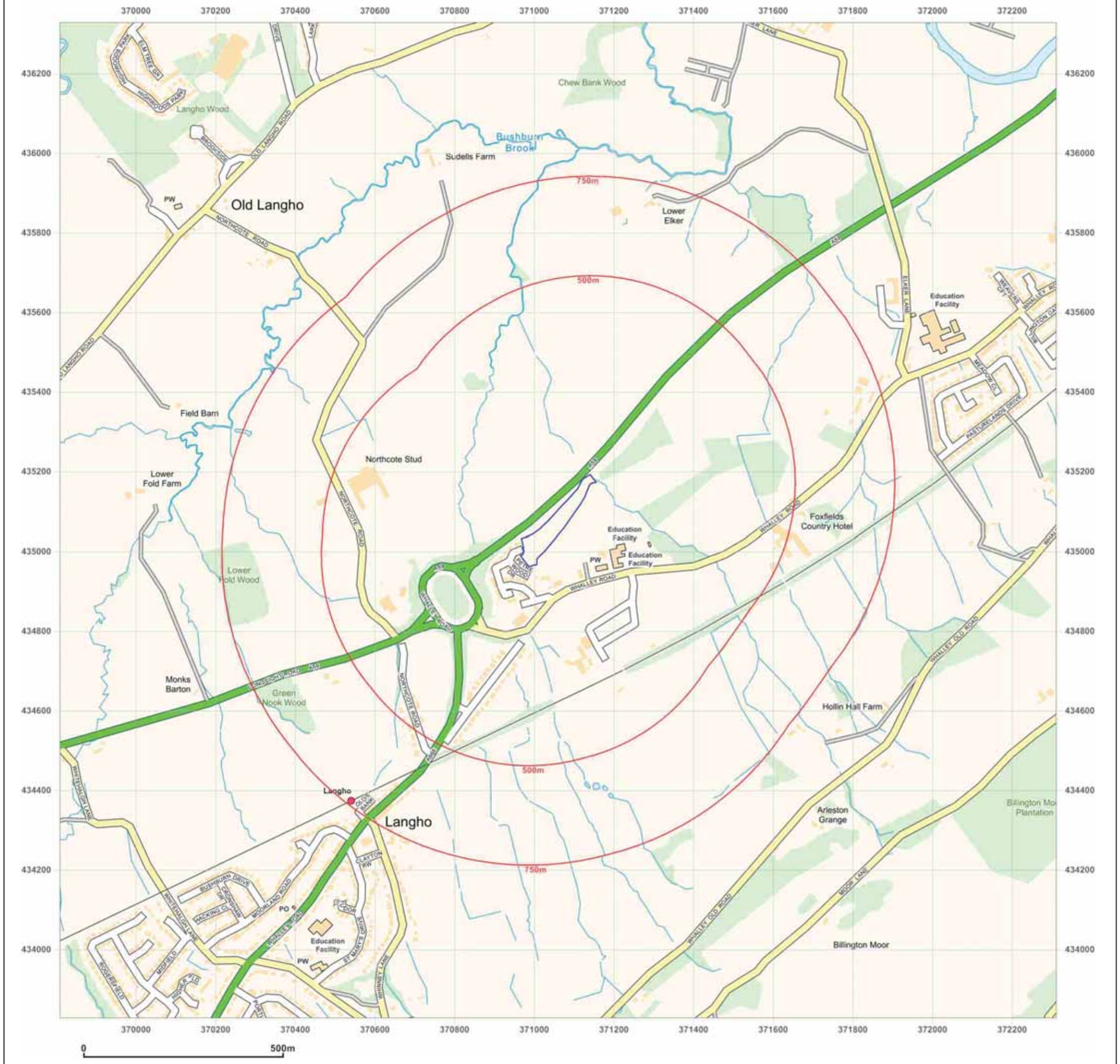

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Site Details:

Petre Wood Cl, Langho, Blackburn. ,Petre Wood Cl, Langho,Blackburn,BB6 8FD

Client Ref: EMS_529183_711716
Report Ref: EMS-529183_711716
Grid Ref: 371060, 435077

Map Name: National Grid

Map date: 2014

Scale: 1:10,000

Printed at: 1:10,000

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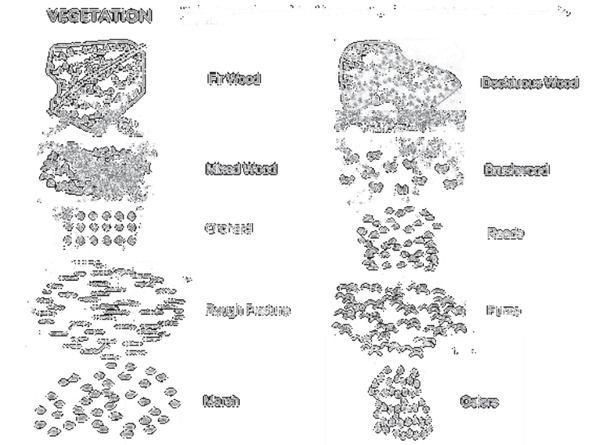
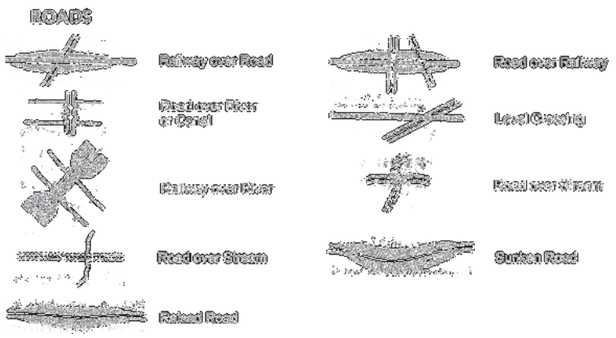
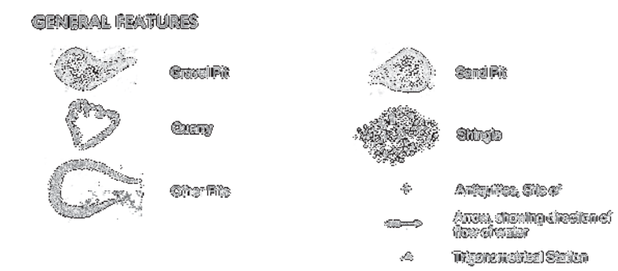
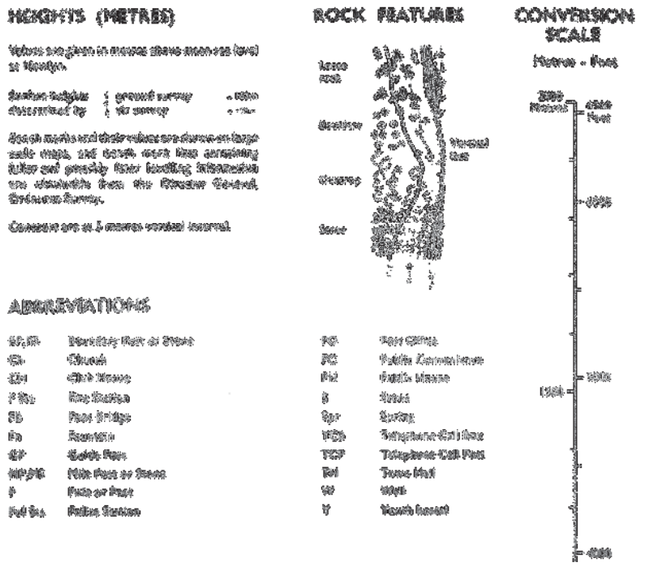
County Series 1:10,560 scale

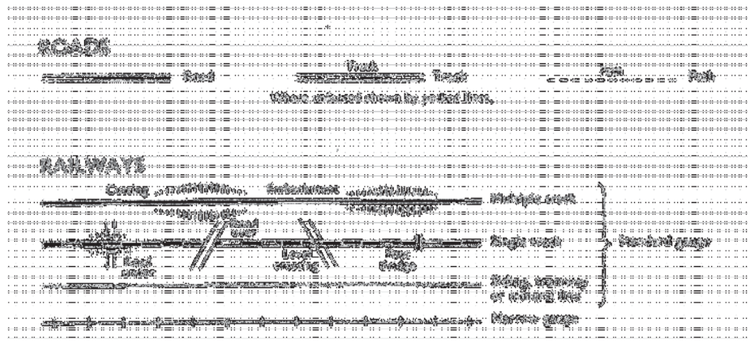


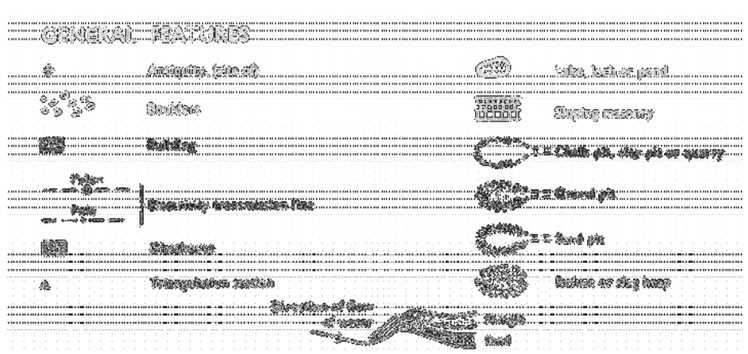


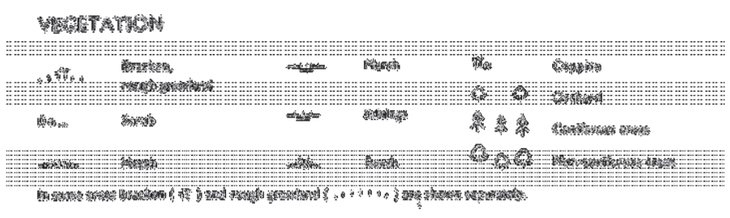


National Grid 1:10,000 scale









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Historical Map Pack Legend

County Series & National Grid

1:10,560 scale

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Technical Helpline

Tel 08444159000

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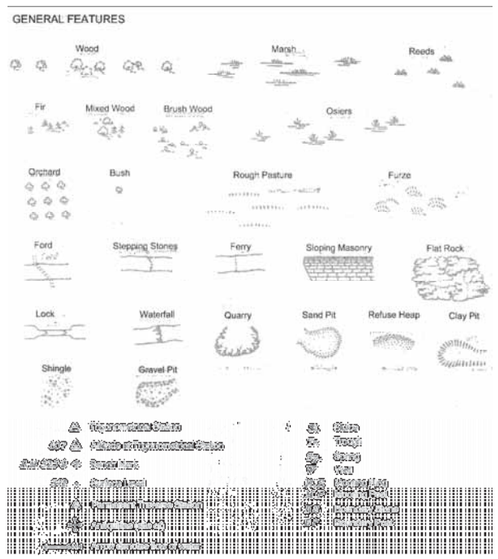
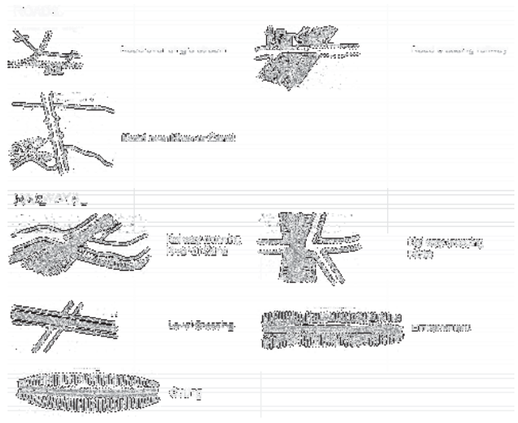
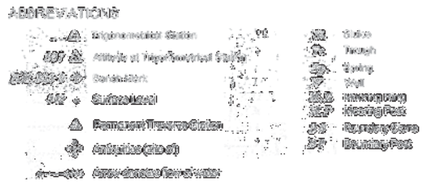
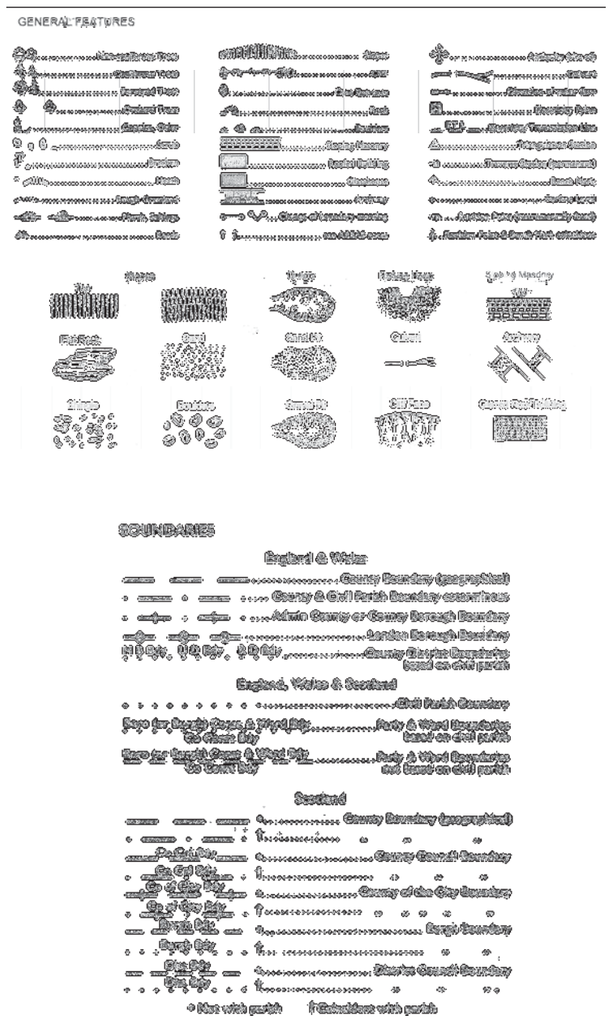
County Series 1:2,500 scale

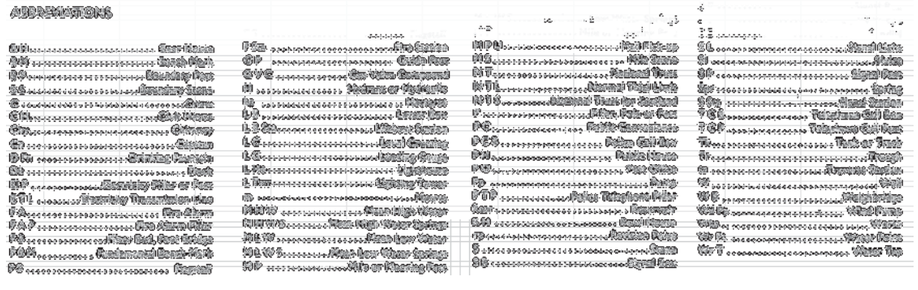






National Grid 1:2,500 / 1:1,250 scale





GroundSure

Historical Map Pack Legend

County Series

1:1,250 scale

~

County Series & National Grid

1:2,500 scale

Information present on these legends is sourced from the same Ordnance Survey mapping as the maps used in this product.

If you have a query regarding any of the maps provided within this map pack, please contact GroundSure's technical helpline. We will endeavour to answer any queries you may have.

Technical Helpline:

Tel 08444159000

groundsureinsight@groundsure.com
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APPENDIX F

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EmapSite

Masdar House, 1 Reading Road,
Eversley, RG27 0RP

Report Reference: EMS-529183_711717

Your Reference: EMS_529183_711717

Report Date 26 Feb 2019

Report Delivery Method: Email - pdf

Geo Insight

Address: Petre Wood Cl, Langho, Blackburn. , Petre Wood Cl, Langho, Blackburn, BB6 8FD,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Geo Insight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

Yours faithfully,

emapsite customer services team

Enc.
Groundsure Geo Insight

Geo Insight

Address:	**Petre Wood Cl, Langho, Blackburn. , Petre Wood Cl, Langho, Blackburn, BB6 8FD,**
Date:	**26 Feb 2019**
Reference:	**EMS-529183_711717**
Client:	**EmapSite**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	03-Apr-2017
Grid Reference:	371049,435066
Site Size:	1.0423ha

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Overview of Findings

The Groundsure Geo Insight provides high quality geo-environmental information that allows geo-environmental professionals and their clients to make informed decisions and be forewarned of potential ground instability problems that may affect the ground investigation, foundation design and possibly remediation options that could lead to possible additional costs.

The report is based on the BGS 1:50,000 and 1:10,000 Digital Geological Map of Great Britain, BGS Geosure data; BRITPITS database; Non-coal mining data and Borehole Records, Coal Authority data including brine extraction areas, PBA non-coal mining and natural cavities database, Johnson Poole and Bloomer mining data and Groundsure's unique database including historical surface ground and underground workings.

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

Section 1: Geology 1:10,000 Scale		
1.1 Artificial Ground	1.1 Is there any Artificial Ground/ Made Ground present beneath the study site at 1:10,000 scale?	No
1.2 Superficial Geology and Landslips	1.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site at 1:10,000 scale?*	Yes
	1.2.2 Are there any records of landslip within 500m of the study site boundary at 1:10,000 scale?	No
1.3 Bedrock, Solid Geology and linear features	1.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	1.3.2 Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale?	No

Section 2: Geology 1:50,000 Scale		
2.1 Artificial Ground	2.1.1 Is there any Artificial Ground/ Made Ground present beneath the study site?	No
	2.1.2 Are there any records relating to permeability of artificial ground within the study site*boundary?	No
2.2 Superficial Geology and Landslips	2.2.1 Is there any Superficial Ground/Drift Geology present beneath the study site?*	Yes
	2.2.2 Are there any records of permeability of superficial ground within 500m of the study site?	Yes
	2.2.3 Are there any records of landslip within 500m of the study site boundary?	No
	2.2.4 Are there any records relating to permeability of landslips within the study site* boundary?	No

Section 2: Geology 1:50,000 Scale

2.3 Bedrock, Solid Geology and linear features	2.3.1 For records of Bedrock and Solid Geology beneath the study site* see the detailed findings section.	
	2.3.2 Are there any records relating to permeability of bedrock ground within the study site boundary?	Yes
	2.3.3 Are there any records of linear features within 500m of the study site boundary?	No

Section 3: Radon

3. Radon	3.1Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
	3.2Radon Protection	No radon protective measures are necessary.

Section 4: Ground Workings	On-site	0-50m	51-250	251-500	501-1000
4.1 Historical Surface Ground Working Features from Small Scale Mapping	1	0	10	Not Searched	Not Searched
4.2 Historical Underground Workings from Small Scale Mapping	0	0	0	0	0
4.3 Current Ground Workings	0	0	0	0	1

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.1 Historical Mining	0	0	0	0	0
5.2 Coal Mining	0	0	0	0	1
5.3 Johnson Poole and Bloomer Mining Area	0	0	0	0	0
5.4 Non-Coal Mining*	2	0	0	0	3
5.5 Non–Coal Mining Cavities	0	0	0	0	0
5.5 Natural Cavities	0	0	0	0	0

Section 5: Mining, Extraction & Natural Cavities	On-site	0-50m	51-250	251-500	501-1000
5.6 Brine Extraction	0	0	0	0	0
5.7 Gypsum Extraction	0	0	0	0	0
5.8 Tin Mining	0	0	0	0	0
5.9 Clay Mining	0	0	0	0	0

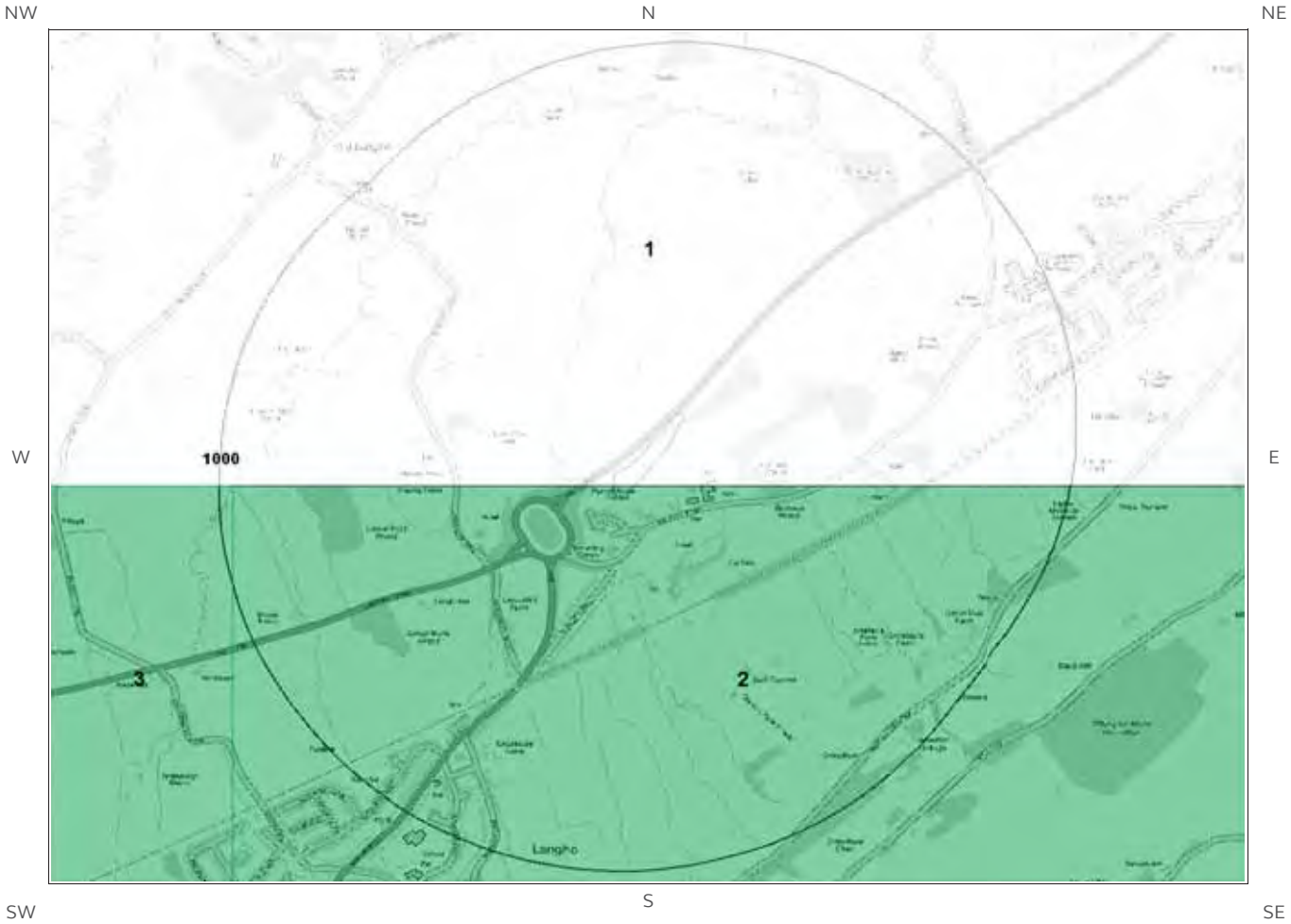
Section 6: Natural Ground Subsidence	On-site
6.1 Shrink-Swell Clay	Very Low
6.2 Landslides	Low
6.3 Ground Dissolution of Soluble Rocks	Negligible
6.4 Compressible Deposits	Negligible
6.5 Collapsible Deposits	Very Low
6.5 Running Sand	Very Low

Section 7: Borehole Records	On-site	0-50m	51-250
7 BGS Recorded Boreholes	3	1	11

Section 8: Estimated Background Soil Chemistry	On-site	0-50m	51-250
8 Records of Background Soil Chemistry	4	0	0

Section 9: Railways and Tunnels	On-site	0-50m	51-250	250-500
9.1 Tunnels	0	0	0	Not Searched
9.2 Historical Railway and Tunnel Features	0	0	0	Not Searched
9.3 Historical Railways	0	0	0	Not Searched
9.4 Active Railways	0	0	0	Not Searched
9.5 Railway Projects	0	0	0	0

1:10,000 Scale Availability



1_10,000 Availability Legend

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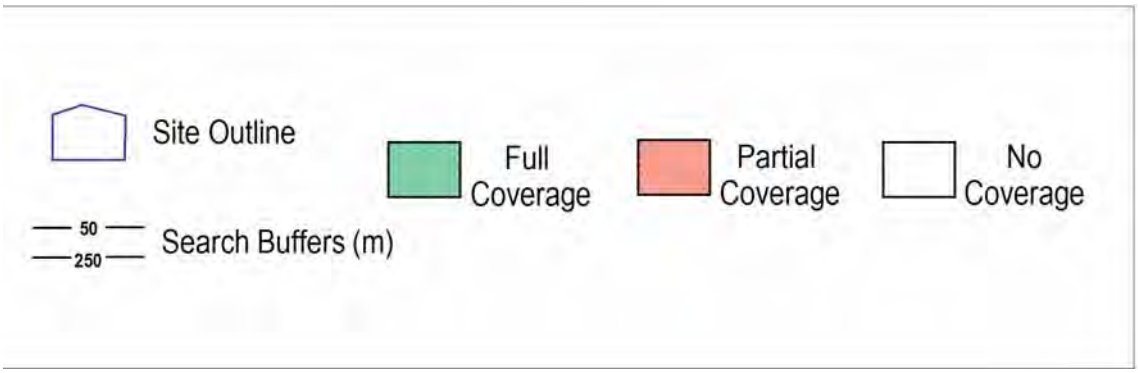


Availability of 1:10,000 Scale Geology Mapping

The following information represents the availability of the key components of the 1:10,000 scale geological data.

ID	Distance	Artificial Coverage	Superficial Coverage	Bedrock Coverage	Mass Movement Coverage
1	0.0	No deposits are mapped	No coverage	No coverage	No coverage
2	0.0	Some deposits are mapped	Full	Full	Some deposits are mapped
3	965.0	Some deposits are mapped	Full	Full	Some deposits are mapped

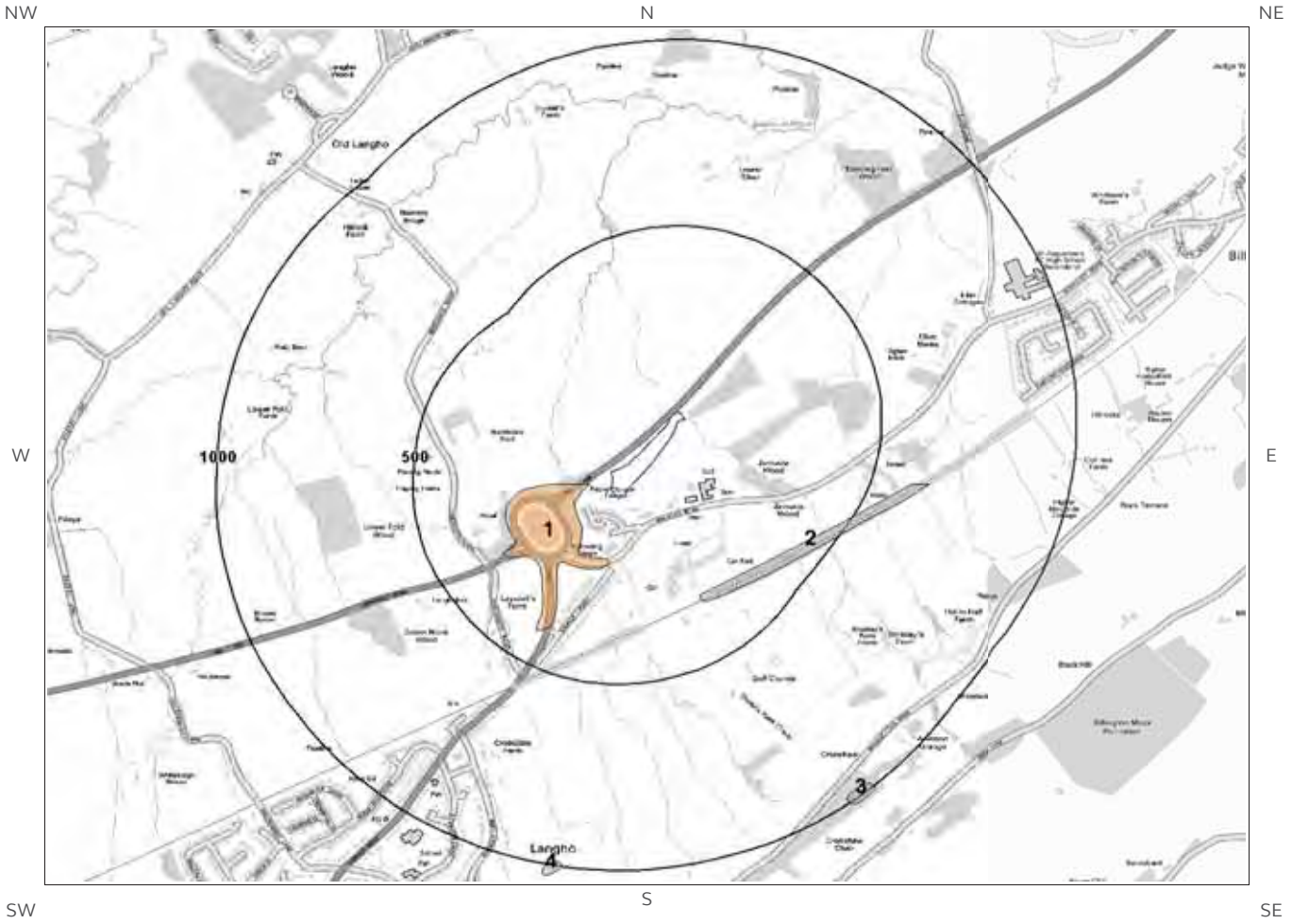
Guidance: The 1:10,000 scale geological interpretation is the most detailed generally available from BGS and is the scale at which most geological surveying is carried out in the field. The database is presented as four types of geology (artificial, mass movement, superficial and bedrock), although not all themes are mapped or available on every map sheet. Therefore a coverage layer showing the availability of the four themes is presented above.

The definitions of coverage are as follows:

Geology	Full Coverage	Partial Coverage	No Coverage
Bedrock	The whole tile has been mapped	Some but not all the tile has been mapped	No coverage
Superficial	The whole tile has been mapped	Some but not all of the tile has been mapped	No coverage
Artificial	Some deposits are mapped on this tile	-	No deposits are mapped
Mass Movement	Some deposits are mapped on this tile	-	No coverage

1 Geology (1:10,000 scale).

1.1 Artificial Ground map (1:10,000 scale)



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

1. Geology 1:10,000 scale

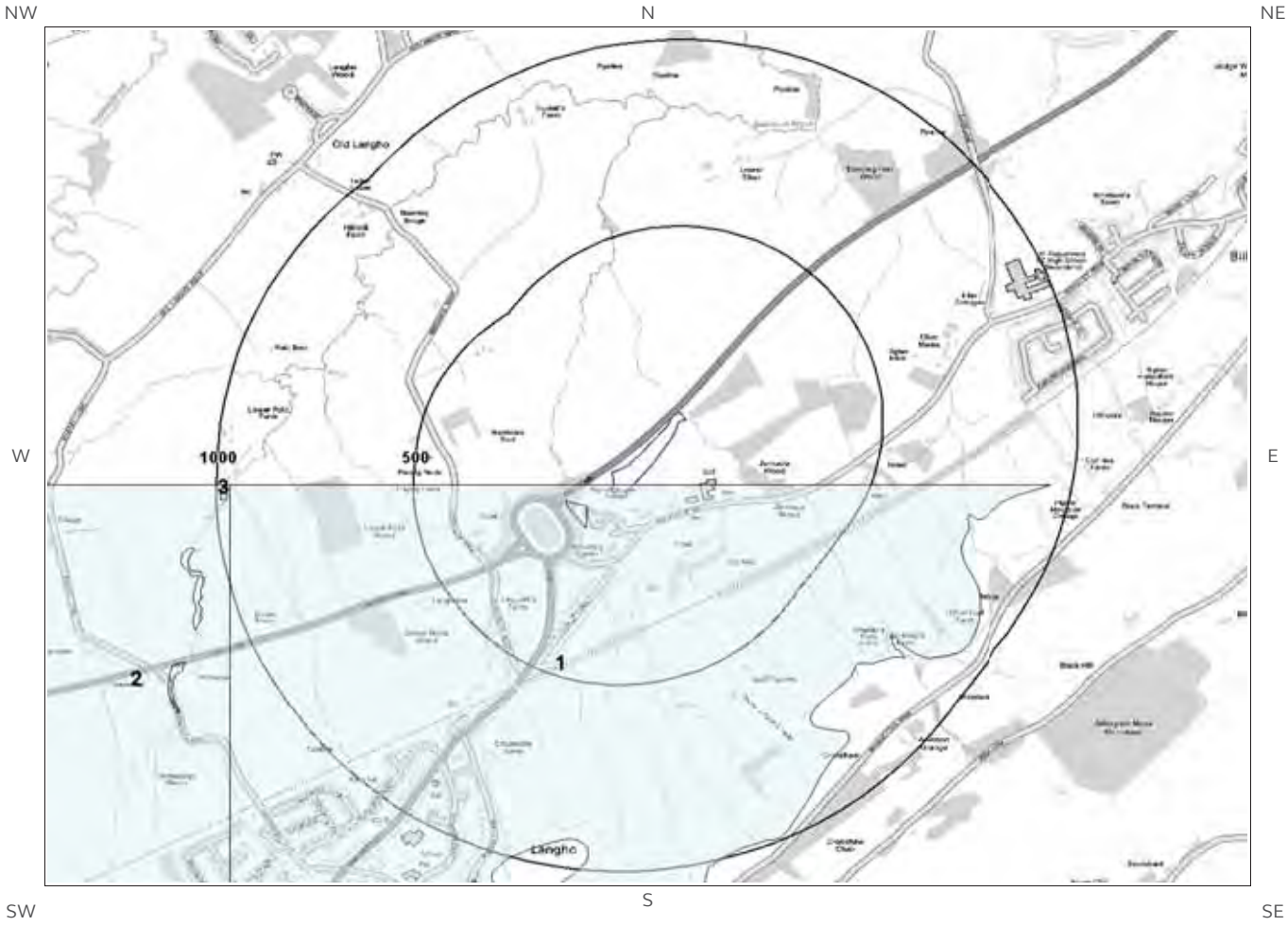
1.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

Are there any records of Artificial/ Made Ground within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	51.0	W	MGR-ARTDP	Made Ground (Undivided)	Artificial Deposit
2	324.0	SE	WGR-VOID	Worked Ground (Undivided)	Void

1.2 Superficial Deposits and Landslips map (1:10,000 scale)



Artificial Ground Legend

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Site Outline

500
1000
Search Buffers (m)

1.2 Superficial Deposits and Landslips

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping

1.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary at 1:10,000 scale? Yes

ID	Distance (m)	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton

1.2.2 Landslip

Are there any records of Landslip within 500m of the study site boundary at 1:10,000 scale?

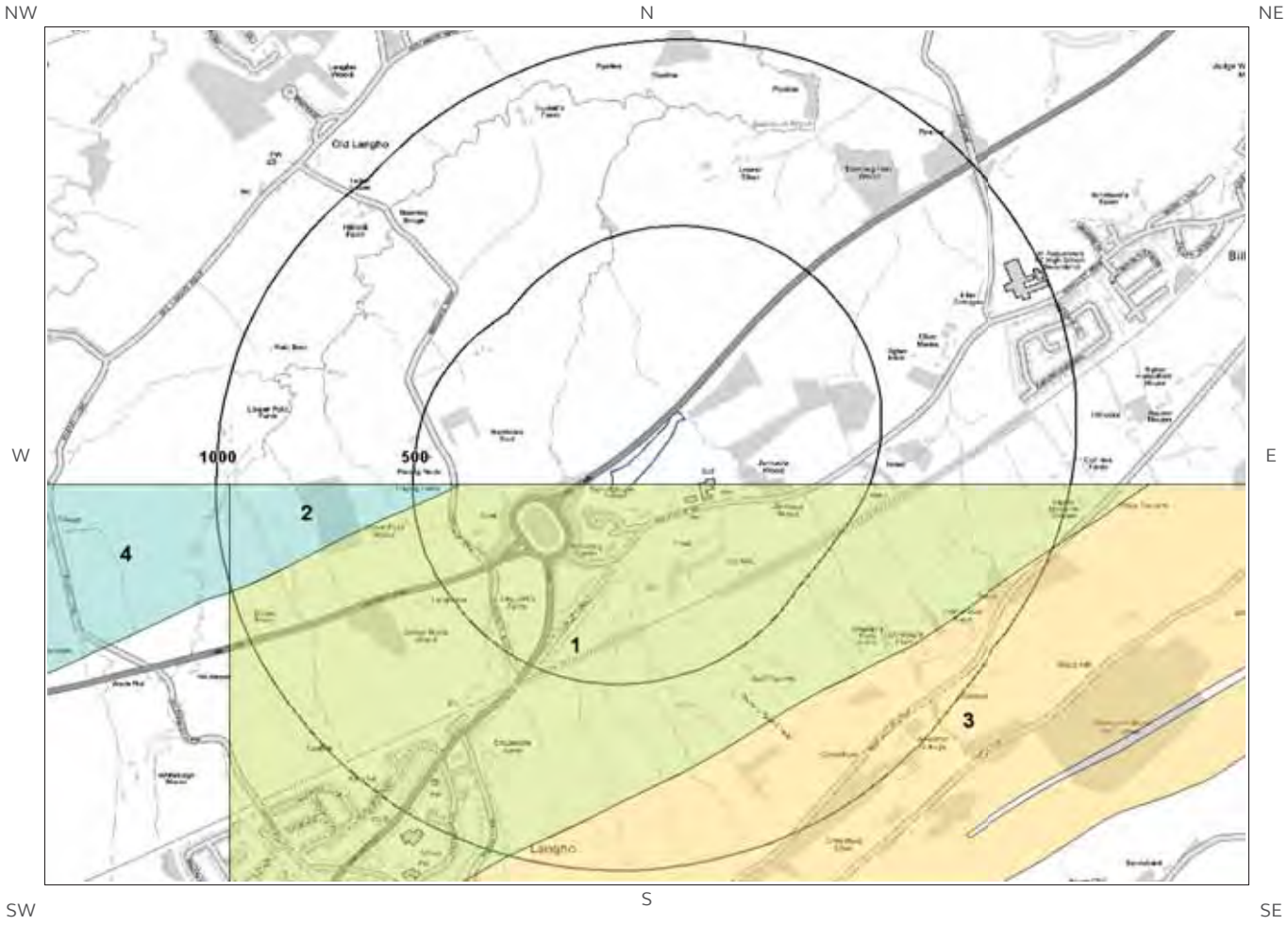
No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:10,000 scale

This Geology shows the main components as discrete layers, these are: Artificial / Made Ground, Superficial / Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

1.3 Bedrock and linear features map (1:10,000 scale)



Bedrock and linear features Legend

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Site Outline

500
1000
Search Buffers (m)

1.3 Bedrock and linear features

The following geological information represented on the mapping is derived from 1:10,000 scale BGS Geological mapping.

1.3.1 Bedrock/ Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary at 1:10,000 scale.

ID	Distance (m)	Direction	LEX Code	Description	Rock Age
1	0.0	On Site	BSG-MDST	Bowland Shale Formation - Mudstone	Yeadonian Sub-age - Asbian Age
2	382.0	W	CRAV-MDST	Craven Group - Mudstone	Yeadonian Sub-age - Chadian Age

1.3.2 Linear features

Are there any records of linear features within 500m of the study site boundary at 1:10,000 scale? No

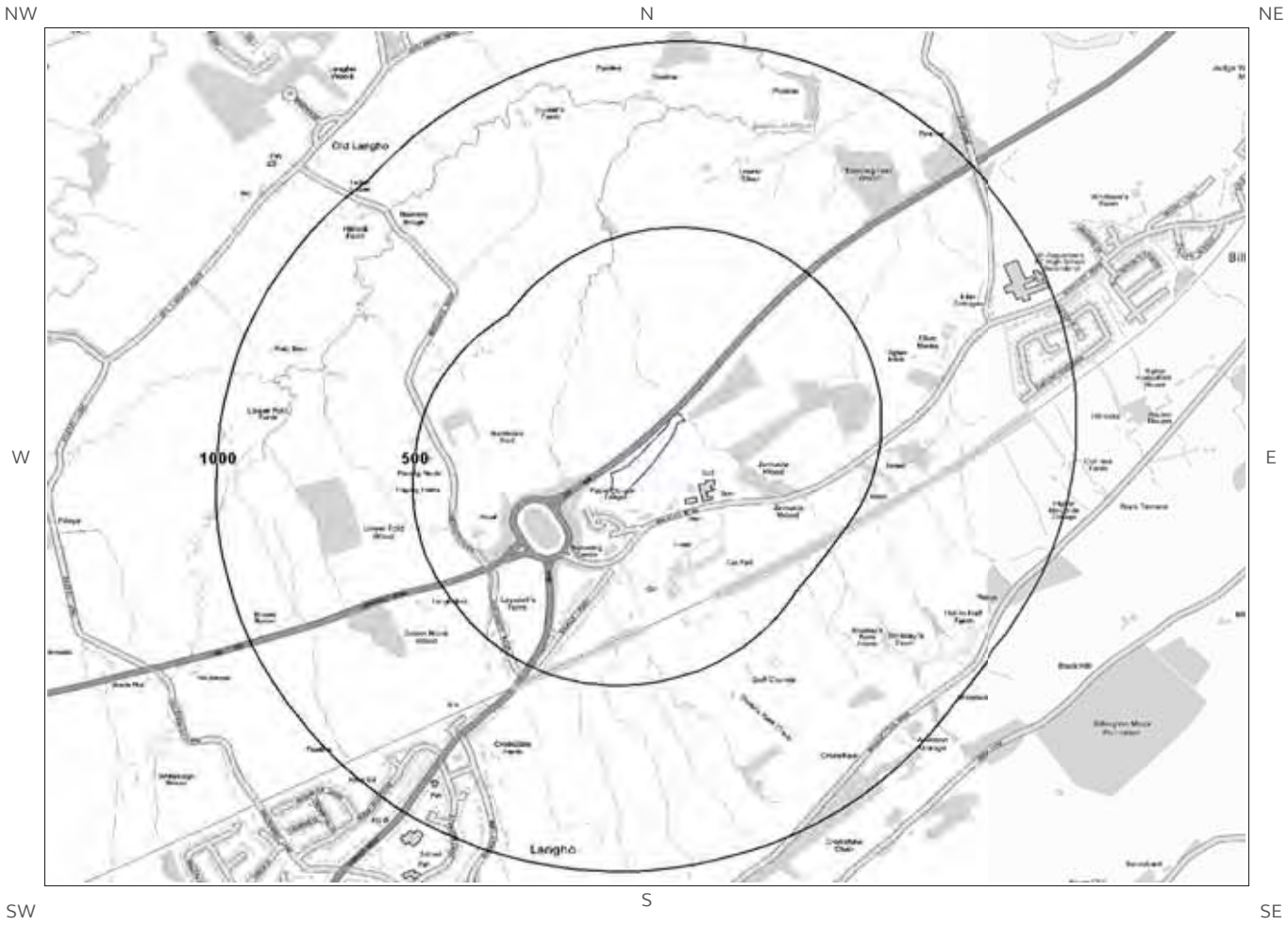
Database searched and no data found at this scale.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of great Britain at 1:10,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/ Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2 Geology 1:50,000 Scale

2.1 Artificial Ground map



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Site Outline

500
1000
Search Buffers (m)

Made Ground (undivided)

Worked Ground (undivided)

Infilled Ground

Disturbed Ground (undivided)

Landscaped Ground (undivided)

Reclaimed Ground

2. Geology 1:50,000 scale

2.1 Artificial Ground

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 068

2.1.1 Artificial/ Made Ground

Are there any records of Artificial/ Made Ground within 500m of the study site boundary? No

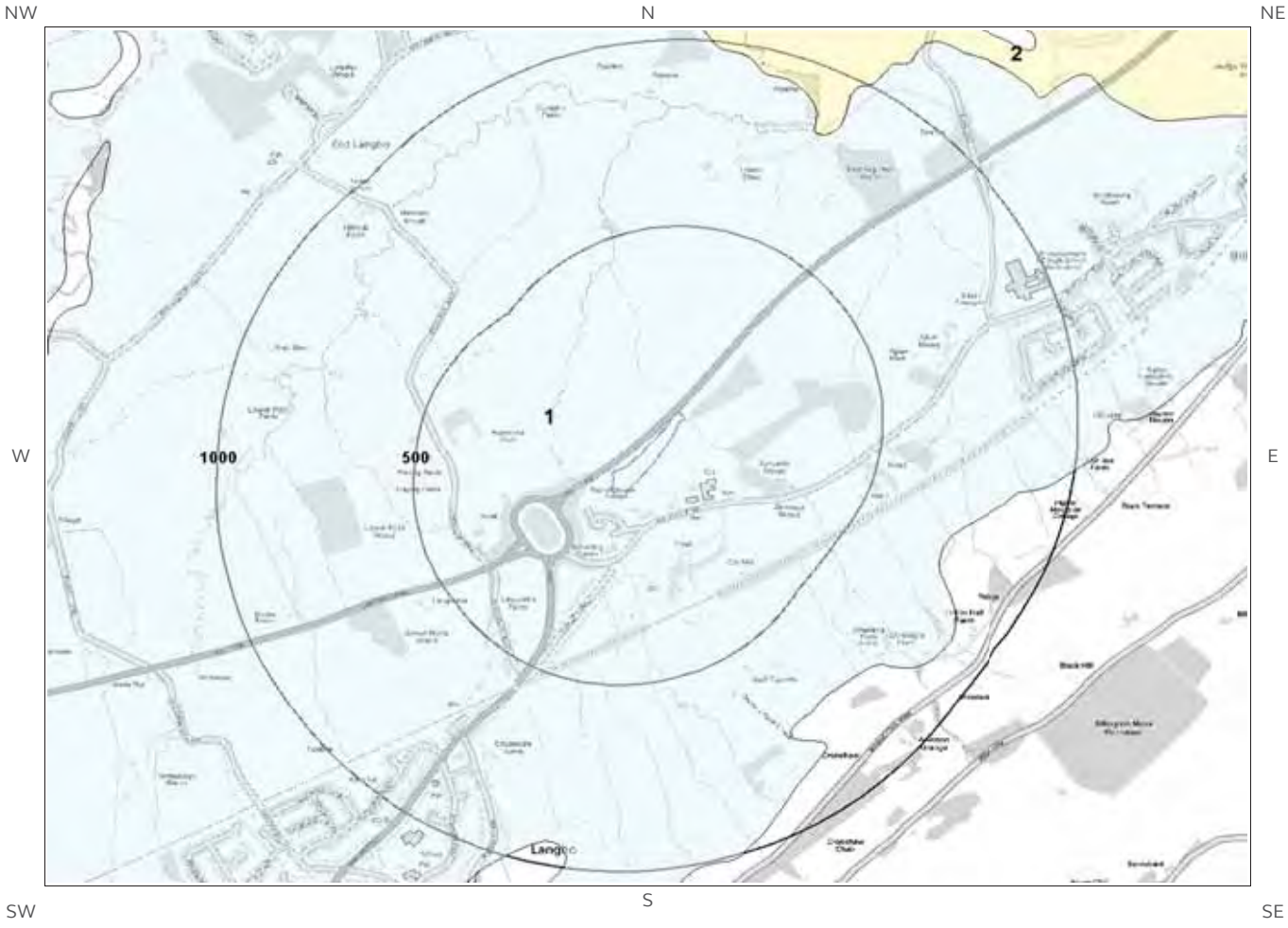
Database searched and no data found.

2.1.2 Permeability of Artificial Ground

Are there any records relating to permeability of artificial ground within the study site boundary? No

Database searched and no data found.

2.2 Superficial Deposits and Landslips map (1:50,000 scale)



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Site Outline

500
1000
Search Buffers (m)

2.2 Superficial Deposits and Landslips

2.2.1 Superficial Deposits/ Drift Geology

Are there any records of Superficial Deposits/ Drift Geology within 500m of the study site boundary? Yes

ID	Distance	Direction	LEX Code	Description	Rock Description
1	0.0	On Site	TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

2.2.2 Permeability of Superficial Ground

Are there any records relating to permeability of superficial ground within the study site boundary? Yes

Distance (m)	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Mixed	High	Low
0.0	On Site	Mixed	High	Low

2.2.3 Landslip

Are there any records of Landslip within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

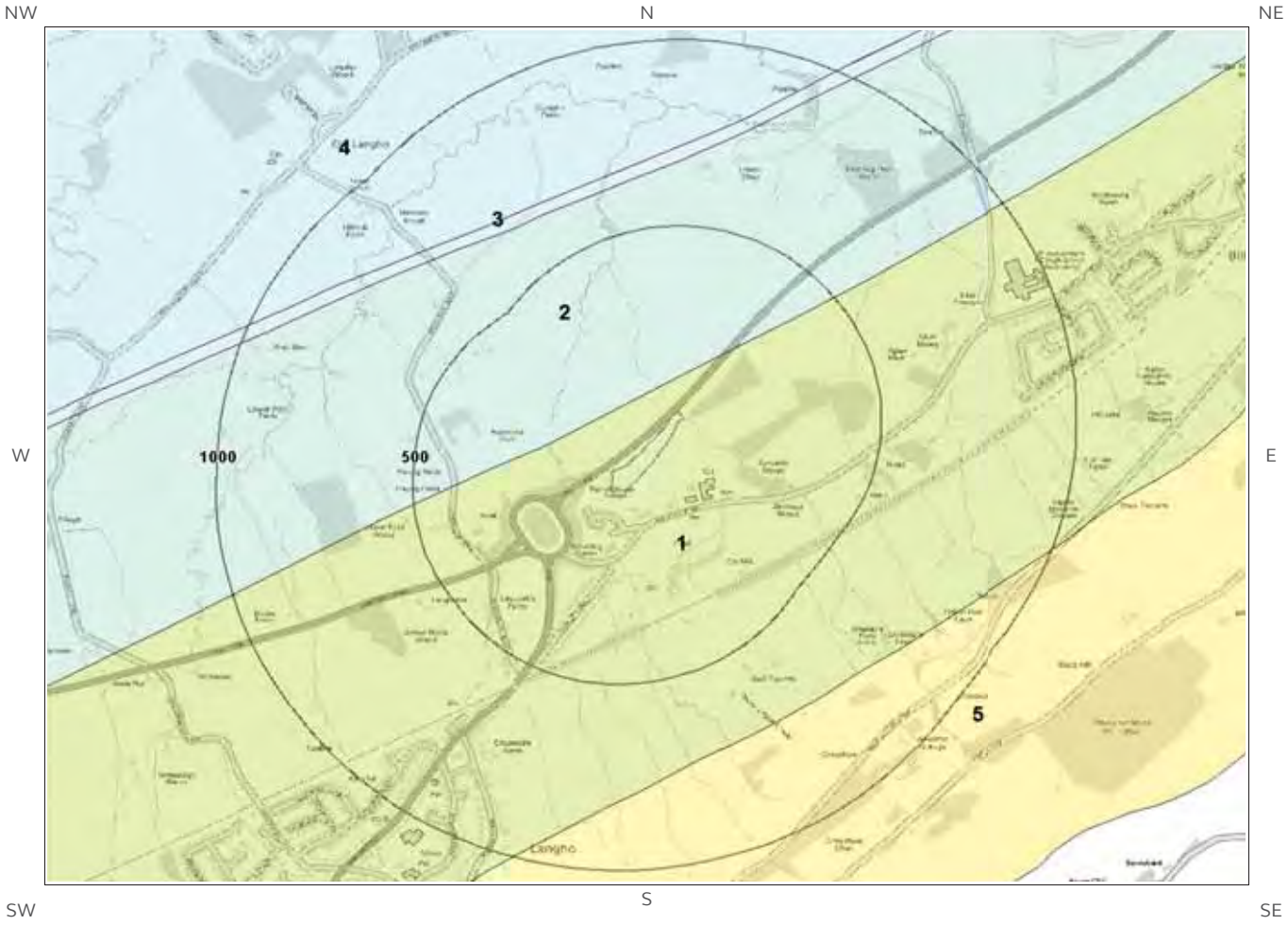
This Geology shows the main components as discrete layers, there are: Artificial/ Made Ground, Superficial/ Drift Geology and Landslips. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nationwide coverage.

2.2.4 Landslip Permeability

Are there any records relating to permeability of landslips within the study site boundary? No

Database searched and no data found.

2.3 Bedrock and linear features map (1:50,000 scale)



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Site Outline

500
1000
Search Buffers (m)

2.3 Bedrock, Solid Geology & linear features

The following geological information represented on the mapping is derived from 1:50,000 scale BGS Geological mapping, Sheet No: 068

2.3.1 Bedrock/Solid Geology

Records of Bedrock/Solid Geology within 500m of the study site boundary:

ID	Distance	Direction	LEX Code	Rock Description	Rock Age
1	0.0	On Site	BSG-MDST	BOWLAND SHALE FORMATION - MUDSTONE	VISEAN
2	85.0	NW	RKM-MDST	RAD BROOK MUDSTONE MEMBER - MUDSTONE	VISEAN

2.3.2 Permeability of Bedrock Ground

Are there any records relating to permeability of bedrock ground within the study site boundary? Yes

Distance	Direction	Flow Type	Maximum Permeability	Minimum Permeability
0.0	On Site	Fracture	Low	Low
0.0	On Site	Fracture	Low	Low

2.3.3 Linear features

Are there any records of linear features within 500m of the study site boundary? No

Database searched and no data found.

The geology map for the site and surrounding area are extracted from the BGS Digital Geological Map of Great Britain at 1:50,000 scale.

This Geology shows the main components as discrete layers, these are: Bedrock/Solid Geology and linear features such as faults. These are all displayed with the BGS Lexicon code for the rock unit and BGS sheet number. Not all of the main geological components have nation wide coverage.

3 Radon Data

3.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The property is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

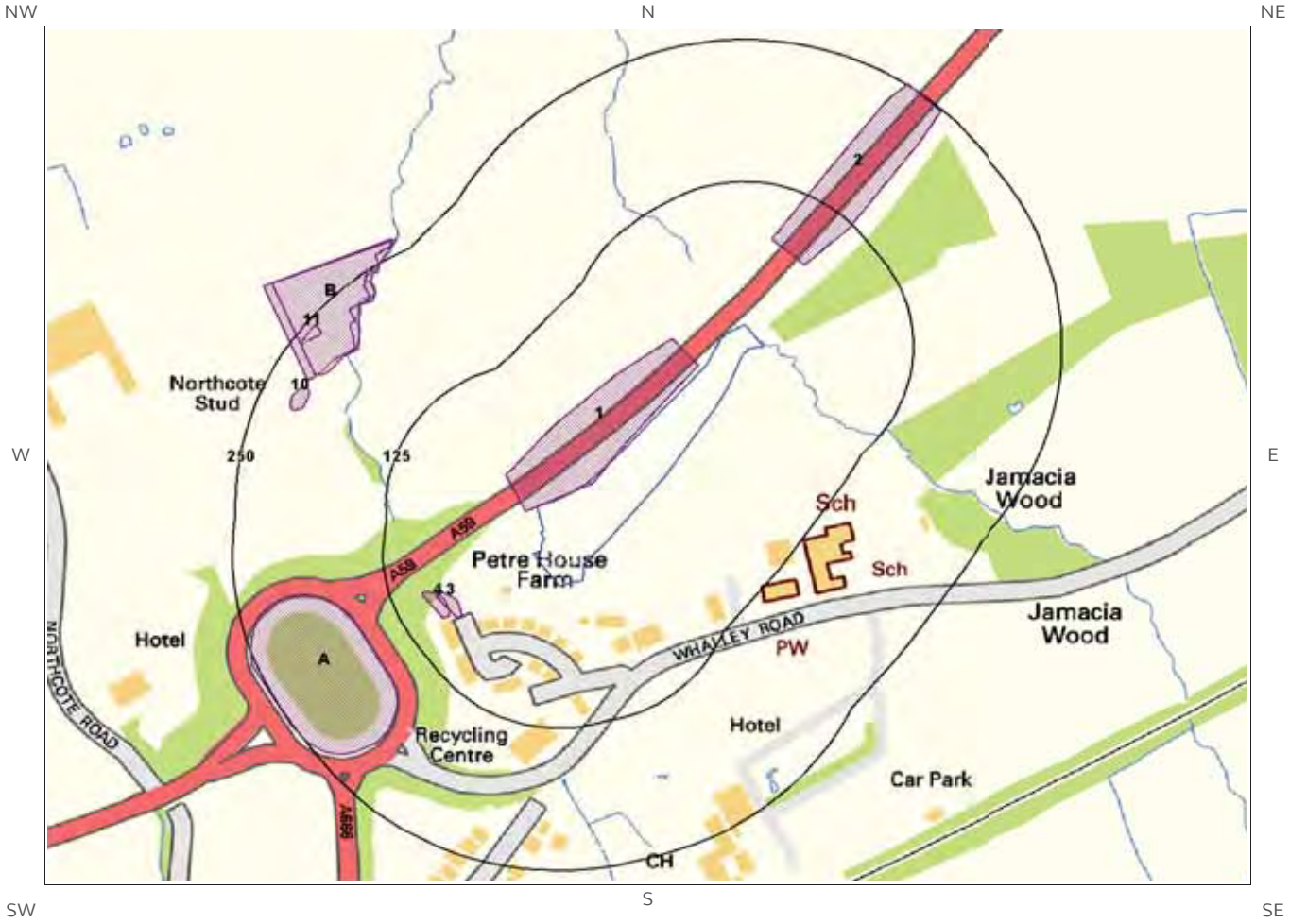
The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

3.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

---

4 Ground Workings map



Ground Workings Legend

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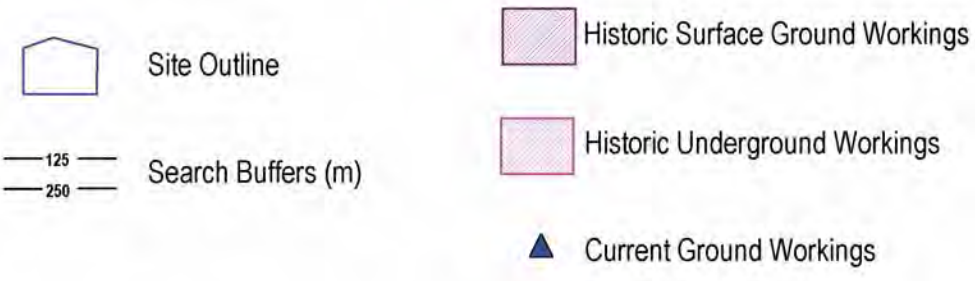


4 Ground Workings

4.1 Historical Surface Ground Working Features derived from Historical Mapping

This dataset is based on Groundsure's unique Historical Land Use Database derived from 1:10,560 and 1:10,000 scale historical mapping

Are there any Historical Surface Ground Working Features within 250m of the study site boundary? Yes

ID	Distance (m)	Direction	NGR	Use	Date
1	0.0	On Site	371022 435104	Cuttings	1973
2	72.0	NE	371233 435324	Cuttings	1973
3	76.0	SW	370895 434945	Unspecified Pit	1950
4	84.0	SW	370884 434945	Unspecified Pit	1933
5A	157.0	SW	370791 434884	Unspecified Pit	1981
6A	157.0	SW	370791 434884	Unspecified Pit	1976
7B	202.0	NW	370799 435208	Sewage Works	1950
8B	205.0	NW	370786 435163	Sewage Works	1933
9B	205.0	NW	370786 435163	Sewage Works	1910
10	212.0	NW	370771 435127	Refuse Heap	1846
11	235.0	NW	370780 435183	Filler Tanks	1910

4.2 Historical Underground Working Features derived from Historical Mapping

This data is derived from the Groundsure unique Historical Land Use Database. It contains data derived from 1:10,000 and 1:10,560 historical Ordnance Survey Mapping and includes some natural topographical features (Shake Holes for example) as well as manmade features that may have implications for ground stability. Underground and mining features have been identified from surface features such as shafts. The distance that these extend underground is not shown.

Are there any Historical Underground Working Features within 1000m of the study site boundary? No

Database searched and no data found.

4.3 Current Ground Workings

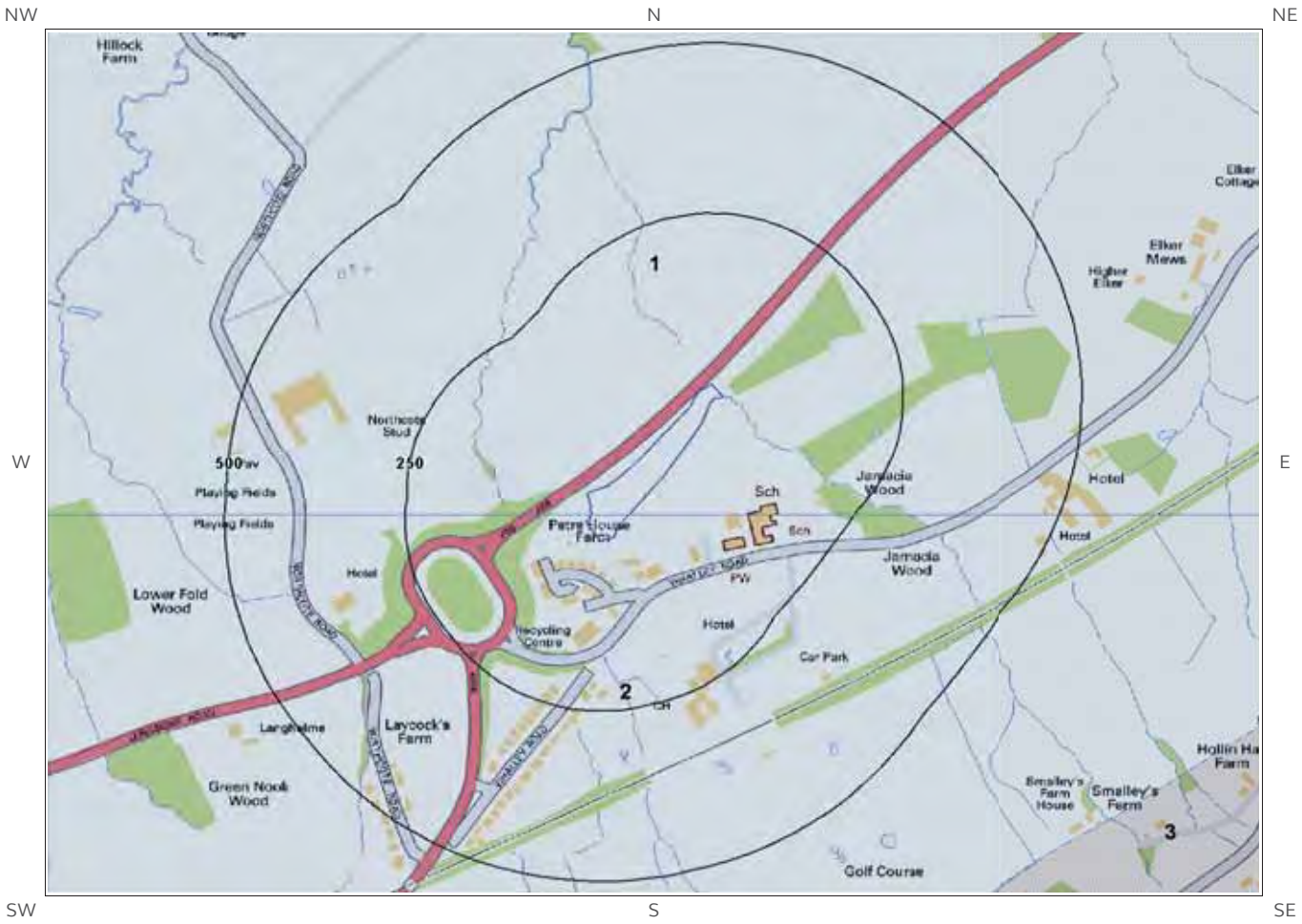
This dataset is derived from the BGS BRITPITS database covering active; inactive mines; quarries; oil wells; gas wells and mineral wharves; and rail deposits throughout the British Isles.

Are there any BGS Current Ground Workings within 1000m of the study site boundary? Yes

The following Current Ground Workings information is provided by British Geological Survey:

ID	Distance (m)	Direction	NGR	Commodity Produced	Pit Name	Type of working	Status
Not shown	773.0	E	371882 435435	Clay & Shale	Buckfoot	A surface mineral working. It may be termed Quarry, Sand Pit, Clay Pit or Opencast Coal Site	Ceased

5 Mining, Extraction & Natural Cavities map



Mining, Extraction and Natural Cavities Legend

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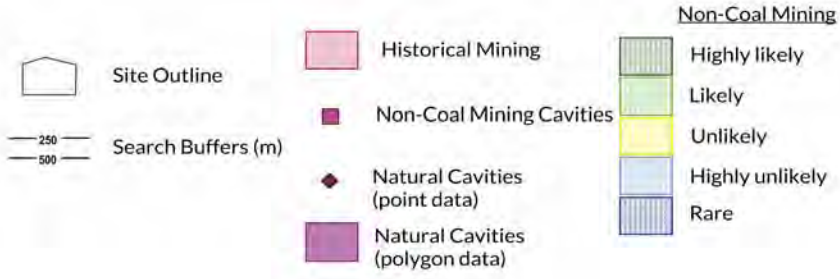


5 Mining, Extraction & Natural Cavities

5.1 Historical Mining

This dataset is derived from Groundsure unique Historical Land-use Database that are indicative of mining or extraction activities.

Are there any Historical Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.2 Coal Mining

This dataset provides information as to whether the study site lies within a known coal mining affected area as defined by the coal authority.

Are there any Coal Mining areas within 1000m of the study site boundary? Yes

The following Coal Mining information provided by the Coal Authority is not represented on Mapping:

Distance (m)	Direction	Details
862.0	E	The study site is located within the specified search distance of an identified mining area. Further details concerning this can be obtained from the Coal Authority Helpline on 0845 762 6848.

5.3 Johnson Poole and Bloomer

This dataset provides information as to whether the study site lies within an area where JPB hold information relating to mining.

Are there any JPB Mining areas within 1000m of the study site boundary? No

The following information provided by JPB is not represented on mapping: Database searched and no data found.

5.4 Non-Coal Mining

This dataset provides information as to whether the study site lies within an area which may have been subject to non-coal historic mining.

Are there any Non-Coal Mining areas within 1000m of the study site boundary? Yes

The following non-coal mining information is provided by the BGS:

ID	Distance (m)	Direction	Name	Commodity	Assessment of likelihood
1	0.0	On Site	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
2	0.0	On Site	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
3	714.0	SE	Not available	Vein Mineral	Sporadic underground mining of restricted extent may have occurred. Potential for difficult ground conditions are unlikely and localised and are at a level where they need not be considered
Not shown	965.0	W	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
Not shown	965.0	W	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

5.5 Non-Coal Mining Cavities

This dataset provides information from the Peter Brett Associates (PBA) mining cavities database (compiled for the national study entitled “Review of mining instability in Great Britain, 1990” PBA has also continued adding to this database) on mineral extraction by mining.

Are there any Non-Coal Mining cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.6 Natural Cavities

This dataset provides information based on the Peter Brett Associates natural cavities database. The dataset is made up of points and polygons. Where polygons are used these represent an area in which it is expected the cavities could be found. It does not indicate that cavities are present everywhere within the polygon, and caution should be used in the interpretation of this data.

Are there any Natural Cavities within 1000m of the study site boundary? No

Database searched and no data found.

5.7 Brine Extraction

This data provides information from the Cheshire Brine Subsidence Compensation Board.

Are there any Brine Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.8 Gypsum Extraction

This dataset provides information on Gypsum extraction from British Gypsum records.

Are there any Gypsum Extraction areas within 1000m of the study site boundary? No

Database searched and no data found.

5.9 Tin Mining

This dataset provides information on tin mining areas and is derived from tin mining records. This search is based upon postcode information to a sector level..

Are there any Tin Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

5.10 Clay Mining

This dataset provides information on Kaolin and Ball Clay mining from relevant mining records.

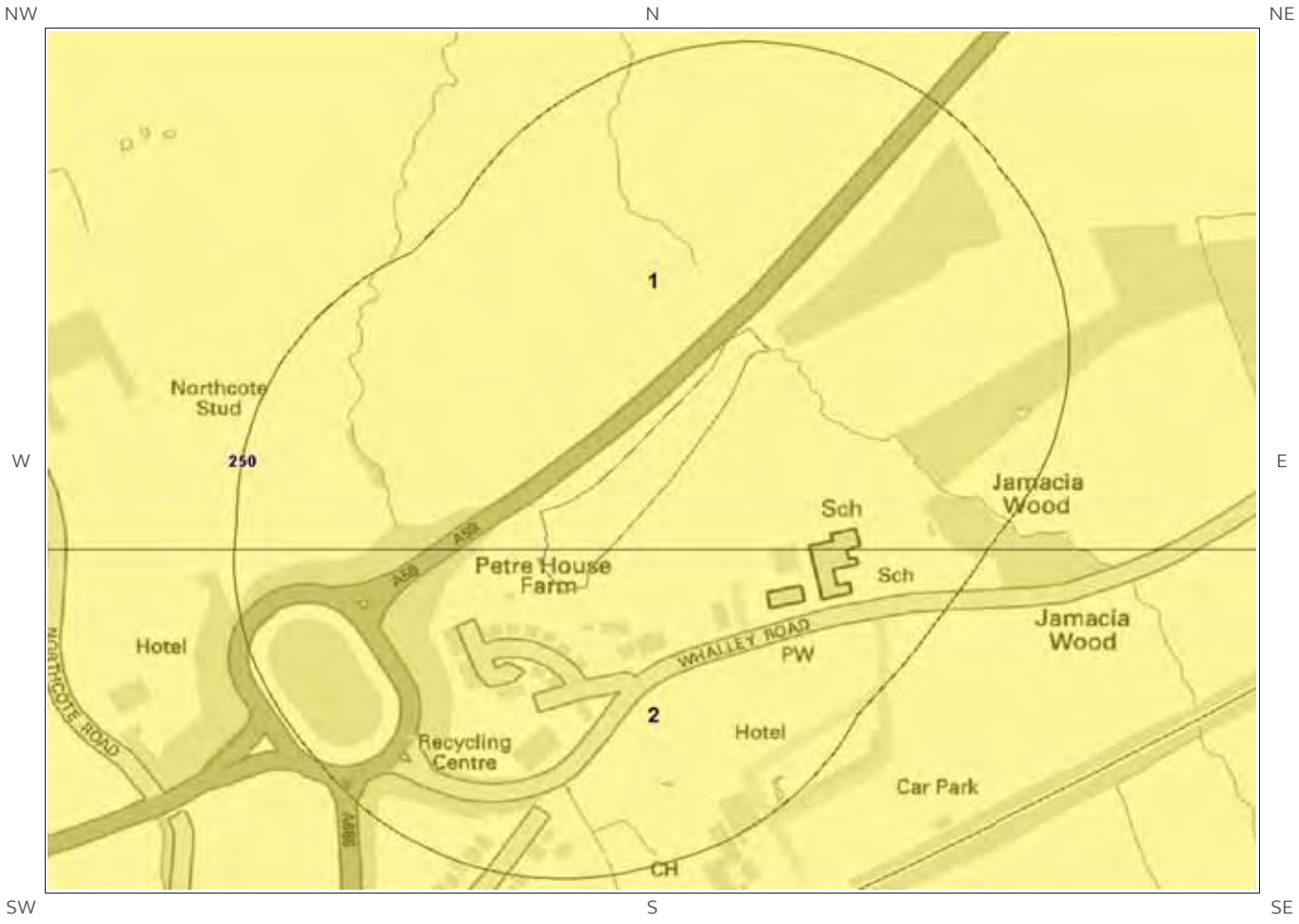
Are there any Clay Mining areas within 1000m of the study site boundary? No

Database searched and no data found.

---

6 Natural Ground Subsidence

6.1 Shrink-Swell Clay map



Shrink Swell Clay Legend

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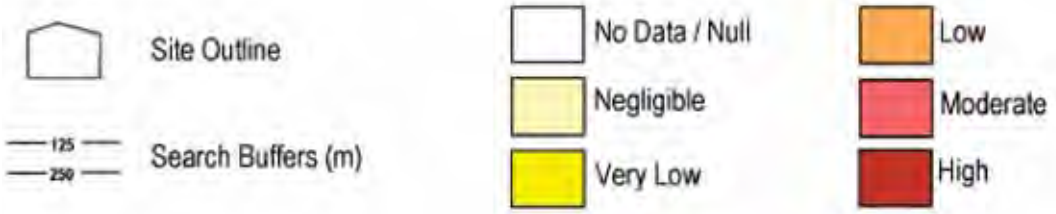
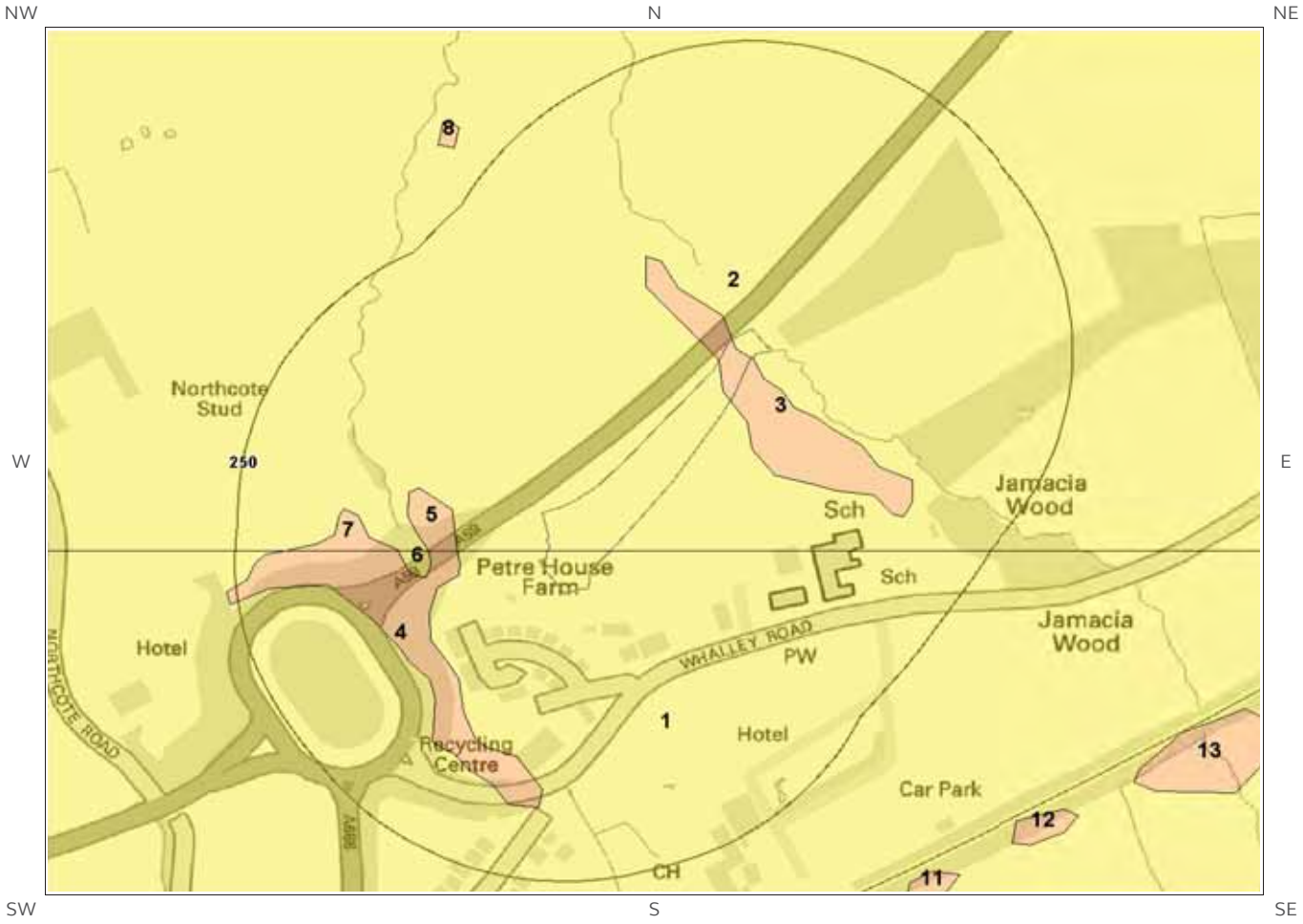


6.2 Landslides map



Landslides Legend

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6.3 Ground Dissolution of Soluble Rocks map

Ground Dissolution Soluble Rocks Legend

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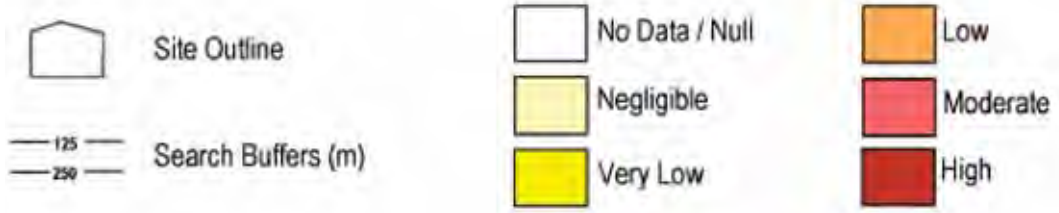
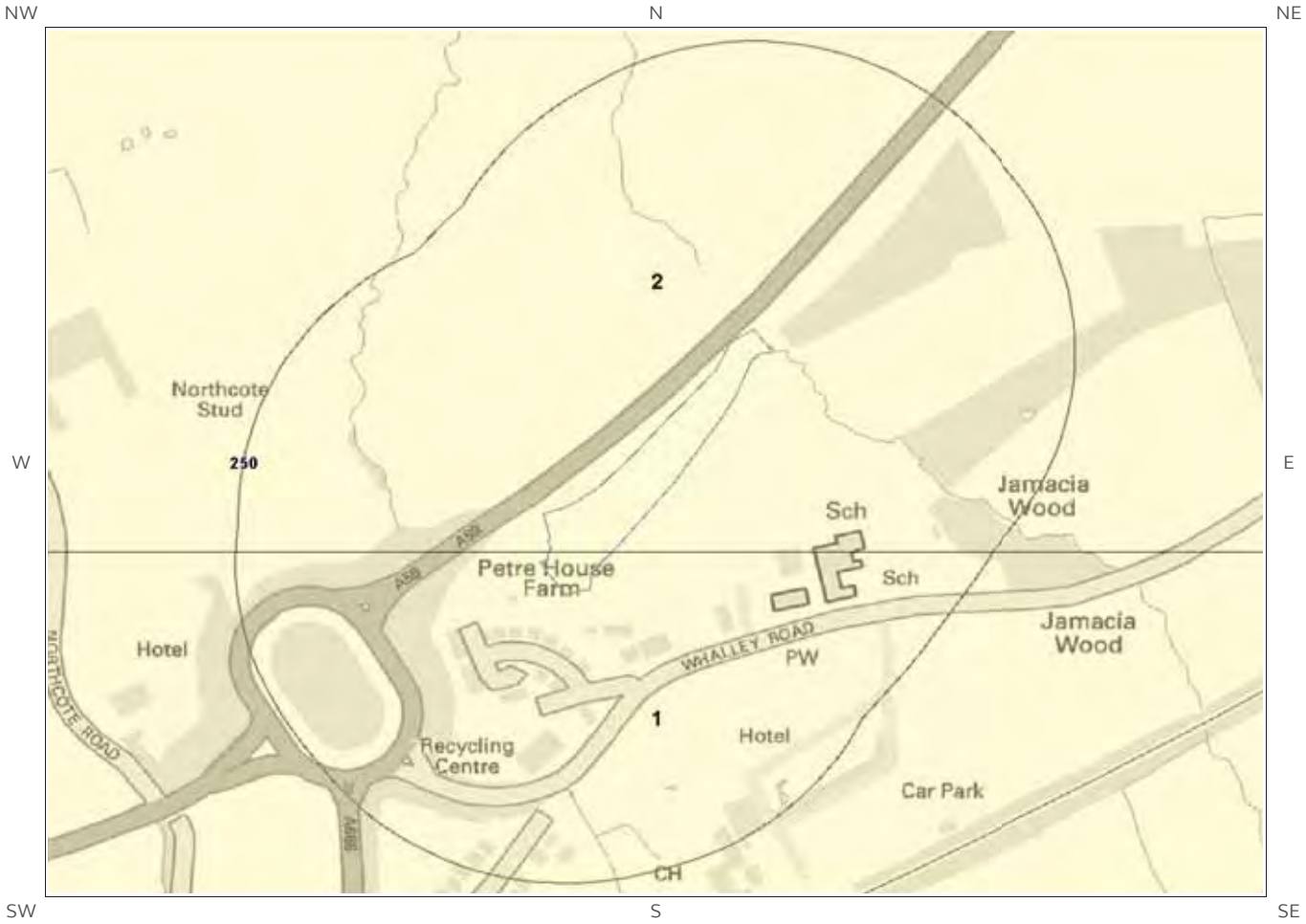


6.4 Compressible Deposits map



Compressible Deposits Legend

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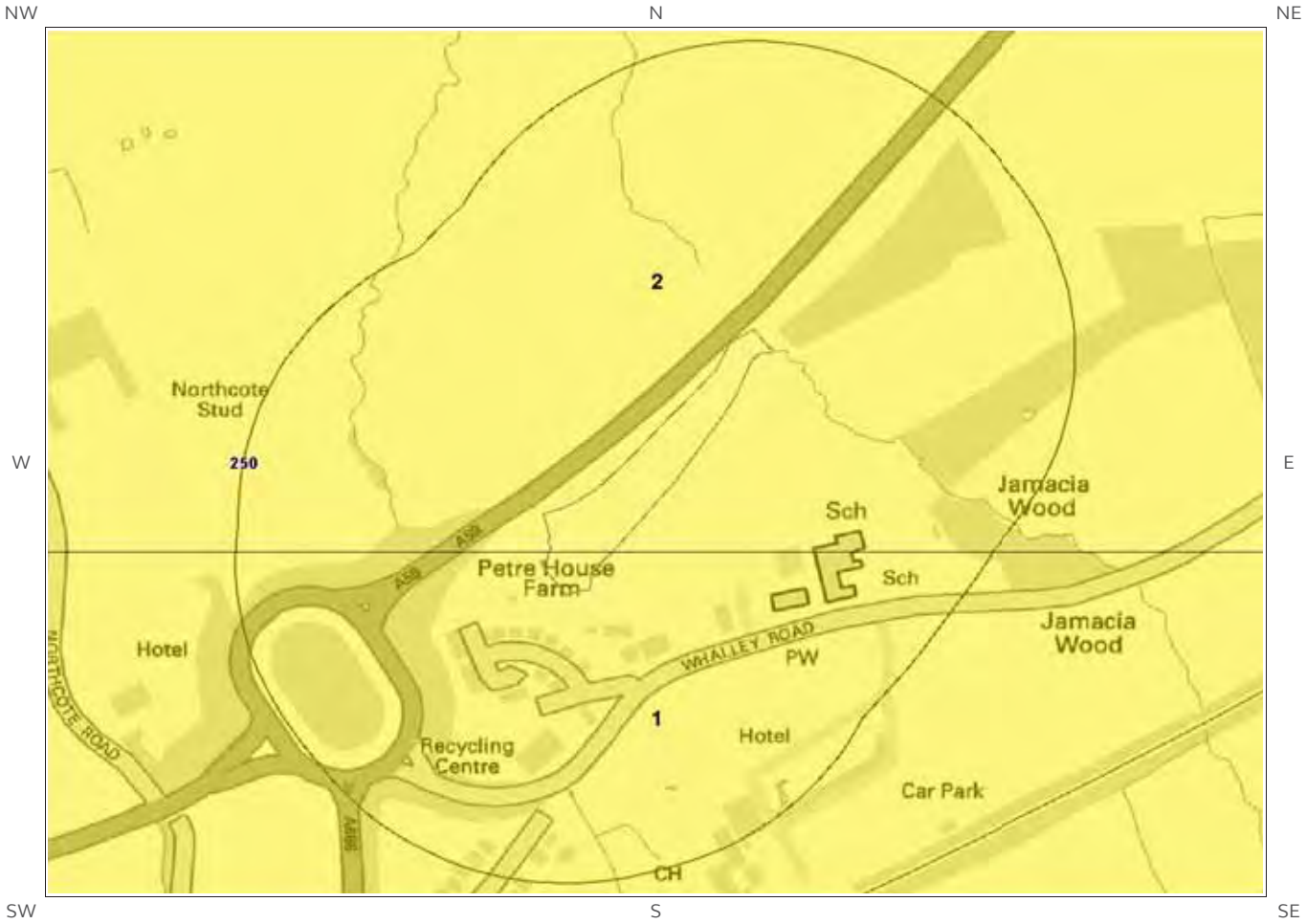
6.5 Collapsible Deposits map



Collapsible Deposits Legend

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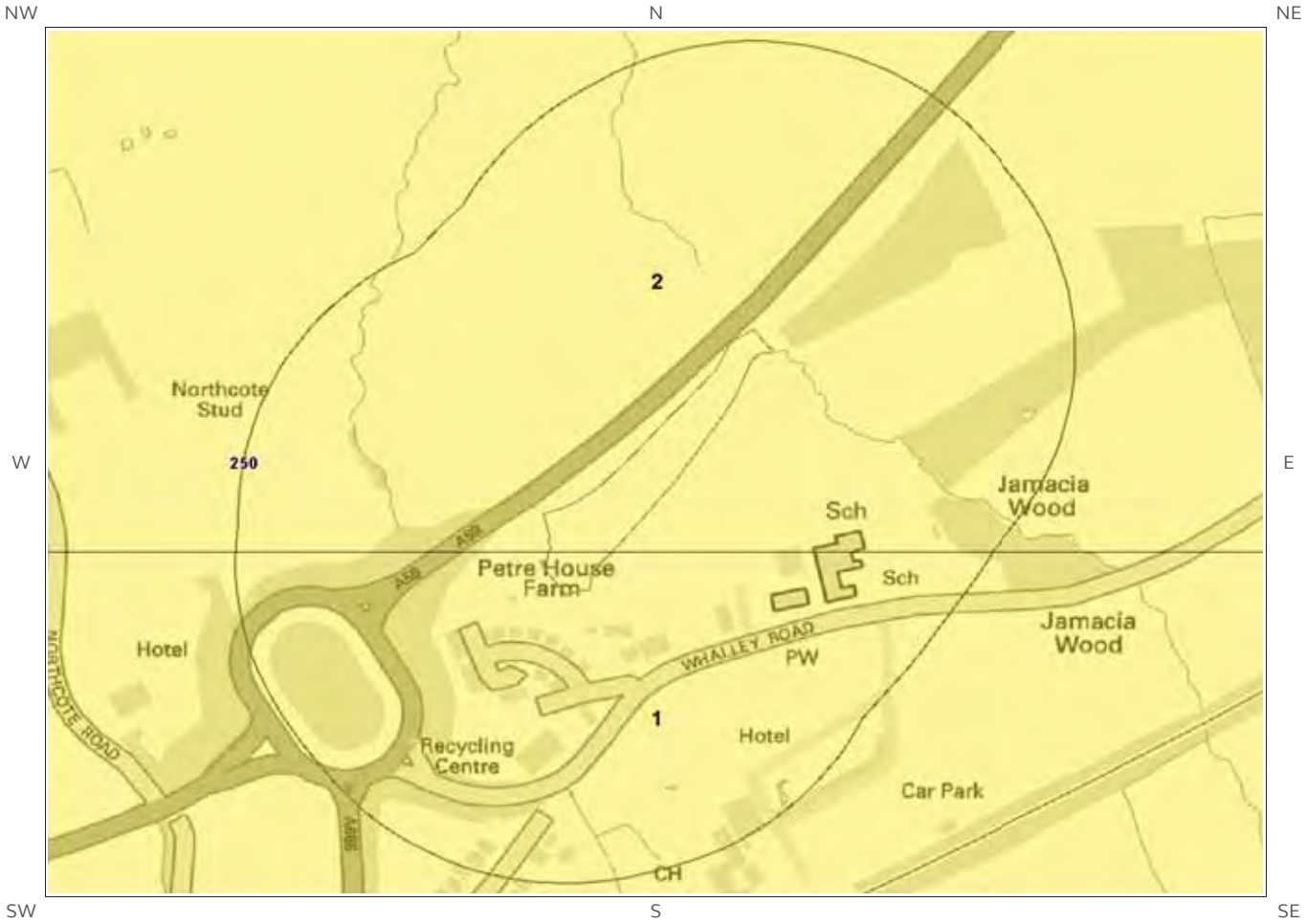
6.6 Running Sand map



Running Sand Legend

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6 Natural Ground Subsidence

The National Ground Subsidence rating is obtained through the 6 natural ground stability hazard datasets, which are supplied by the British Geological Survey (BGS).

The following GeoSure data represented on the mapping is derived from the BGS Digital Geological map of Great Britain at 1:50,000 scale.

What is the maximum hazard rating of natural subsidence within the study site*[*] boundary? Low

6.1 Shrink-Swell Clays

The following Shrink Swell information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.
2	0.0	On Site	Very Low	Ground conditions predominantly low plasticity. No special actions required to avoid problems due to shrink-swell clays. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with shrink-swell clays.

6.2 Landslides

The following Landslides information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.
2	0.0	On Site	Very Low	Slope instability problems are unlikely to be present. No special actions required to avoid problems due to landslides. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with landslides.

* This includes an automatically generated 50m buffer zone around the site

ID	Distance (m)	Direction	Hazard Rating	Details
3	0.0	On Site	Low	Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property - no significant increase in insurance risk due to natural slope instability problems.

6.3 Ground Dissolution of Soluble Rocks

The following Ground Dissolution information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.
2	0.0	On Site	Negligible	Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

6.4 Compressible Deposits

The following Compressible Deposits information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.
2	0.0	On Site	Negligible	No indicators for compressible deposits identified. No special actions required to avoid problems due to compressible deposits. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with compressible deposits.

6.5 Collapsible Deposits

The following Collapsible Rocks information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

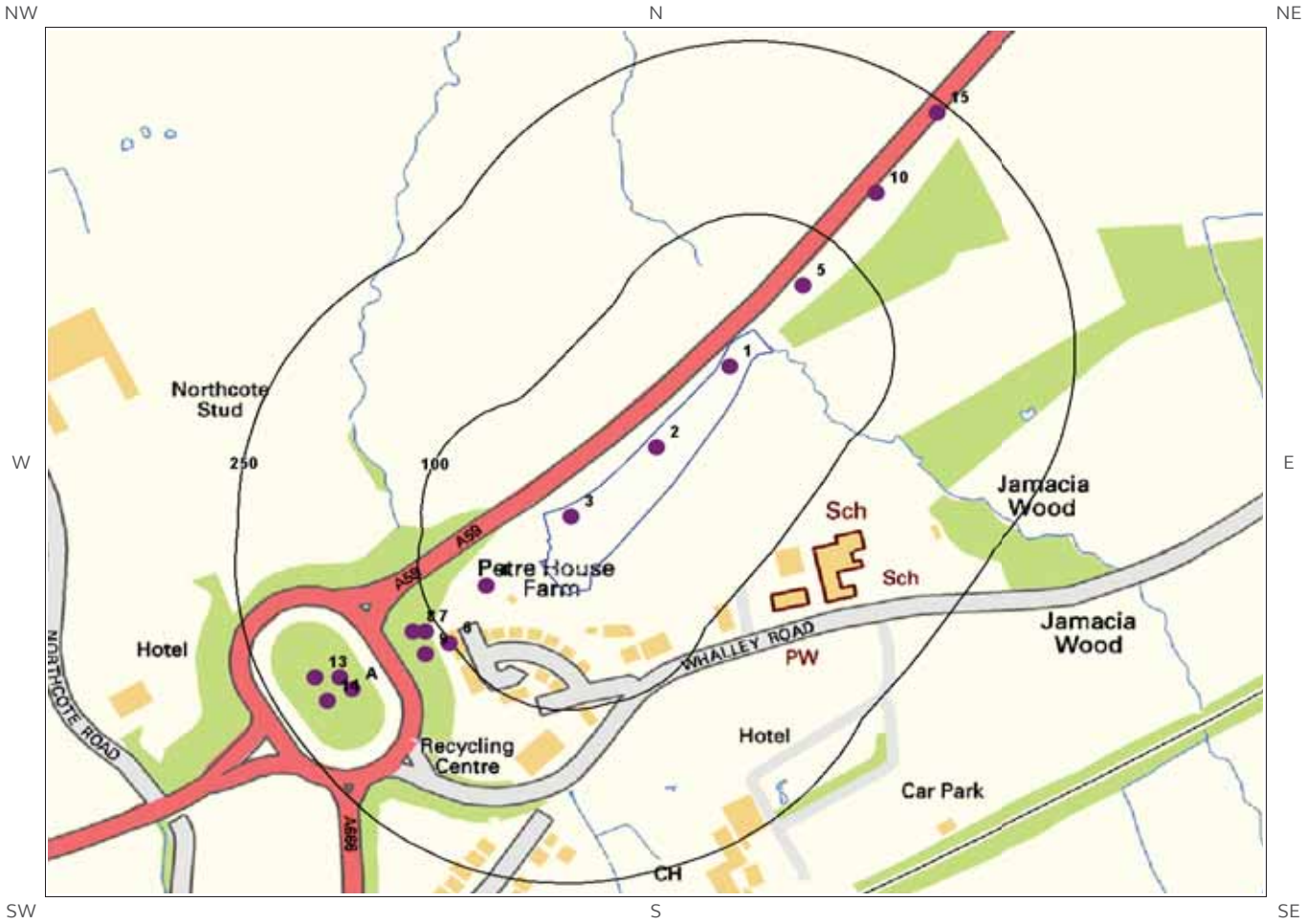
ID	Distance (m)	Direction	Hazard Rating	Details
2	0.0	On Site	Very Low	Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

6.6 Running Sands

The following Running Sands information provided by the British Geological Survey:

ID	Distance (m)	Direction	Hazard Rating	Details
1	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.
2	0.0	On Site	Very Low	Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

7 Borehole Records map



Borehole Records Legend

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Site Outline

Search Buffers (m)

125

250

Borehole Locations

7 Borehole Records

The systematic analysis of data extracted from the BGS Borehole Records database provides the following information.

Records of boreholes within 250m of the study site boundary: 15

ID	Distance (m)	Direction	NGR	BGS Reference	Drilled Length	Borehole Name
1	0.0	On Site	371120 435160	SD73NW7	7.32	A59 WALLEY-CLITHEROE BY-PASS BH114
2	0.0	On Site	371060 435090	SD73NW6	7.32	A59 WALLEY-CLITHEROE BY-PASS BH115
3	0.0	On Site	370990 435030	SD73NW5	11.58	A59 WALLEY-CLITHEROE BY-PASS BH116
4	49.0	SW	370920 434970	SD73SW29	6.86	A59 WHALLEY-CLITHEROE BY-PASS 117
5	55.0	NE	371180 435230	SD73NW8	6.1	A59 WALLEY-CLITHEROE BY-PASS BH113
6	102.0	SW	370890 434920	SD73SW27	5.82	A59 WHALLEY-CLITHEROE BY-PASS 5826/3
7	113.0	SW	370870 434930	SD73SW26	3.35	A59 WHALLEY-CLITHEROE BY-PASS 5826/2
8	121.0	SW	370860 434930	SD73SW25	3.66	A59 WHALLEY-CLITHEROE BY-PASS 5826/1
9	124.0	SW	370870 434910	SD73SW28	4.42	A59 WHALLEY-CLITHEROE BY-PASS 5826/4
10	155.0	NE	371240 435310	SD73NW9	9.14	A59 WALLEY-CLITHEROE BY-PASS BH112
11A	190.0	SW	370810 434880	SD73SW23	5.64	A59 WHALLEY-CLITHEROE BY-PASS 5825/3
12A	193.0	SW	370800 434890	SD73SW22	5.64	A59 WHALLEY-CLITHEROE BY-PASS 5825/2
13	210.0	SW	370780 434890	SD73SW21	4.88	A59 WHALLEY-CLITHEROE BY-PASS 5825/1
14	212.0	SW	370790 434870	SD73SW24	5.87	A59 WHALLEY-CLITHEROE BY-PASS 5825/4
15	240.0	NE	371290 435380	SD73NW10	7.62	A59 WALLEY-CLITHEROE BY-PASS BH111

The borehole records are available using the hyperlinks below: Please note that if the donor of the borehole record has requested the information be held as commercial-in-confidence, the additional data will be held separately by the BGS and a formal request must be made for its release.

#1: scans.bgs.ac.uk/sobi_scans/boreholes/25504
#2: scans.bgs.ac.uk/sobi_scans/boreholes/25503
#3: scans.bgs.ac.uk/sobi_scans/boreholes/25502
#4: scans.bgs.ac.uk/sobi_scans/boreholes/26116
#5: scans.bgs.ac.uk/sobi_scans/boreholes/25505
#6: scans.bgs.ac.uk/sobi_scans/boreholes/26114
#7: scans.bgs.ac.uk/sobi_scans/boreholes/26113
#8: scans.bgs.ac.uk/sobi_scans/boreholes/26112
#9: scans.bgs.ac.uk/sobi_scans/boreholes/26115
#10: scans.bgs.ac.uk/sobi_scans/boreholes/25506
#11A: scans.bgs.ac.uk/sobi_scans/boreholes/26110
#12A: scans.bgs.ac.uk/sobi_scans/boreholes/26109
#13: scans.bgs.ac.uk/sobi_scans/boreholes/26108
#14: scans.bgs.ac.uk/sobi_scans/boreholes/26111
#15: scans.bgs.ac.uk/sobi_scans/boreholes/25507

8 Estimated Background Soil Chemistry

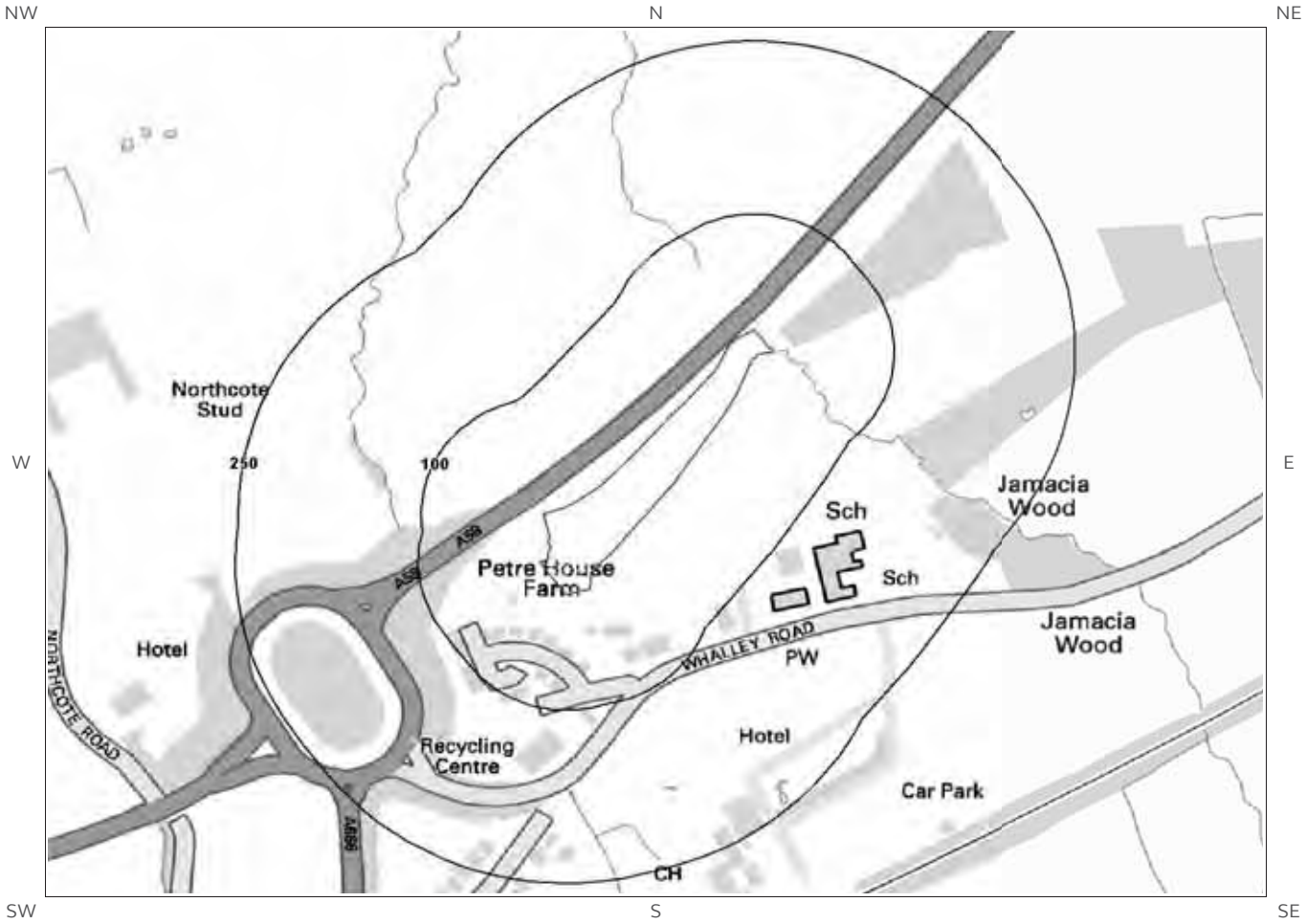
Records of background estimated soil chemistry within 250m of the study site boundary: 4

For further information on how this data is calculated and limitations upon its use, please see the Groundsure Geo Insight User Guide, available on request.

Distance (m)	Direction	Sample Type	Arsenic (As)	Cadmium (Cd)	Chromium (Cr)	Nickel (Ni)	Lead (Pb)
0.0	On Site	Sediment	15 - 25 mg/kg	2.2 - 3.0 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	15 - 25 mg/kg	1.8 - 2.2 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	Sediment	15 - 25 mg/kg	1.8 - 2.2 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg
0.0	On Site	RuSoilExAs	15 - 25 mg/kg	2.2 - 3.0 mg/kg	60 - 90 mg/kg	15 - 30 mg/kg	<100 mg/kg

*As this data is based upon underlying 1:50,000 scale geological information, a 50m buffer has been added to the search radius.

9 Railways and Tunnels map



Railways and Tunnels Legend

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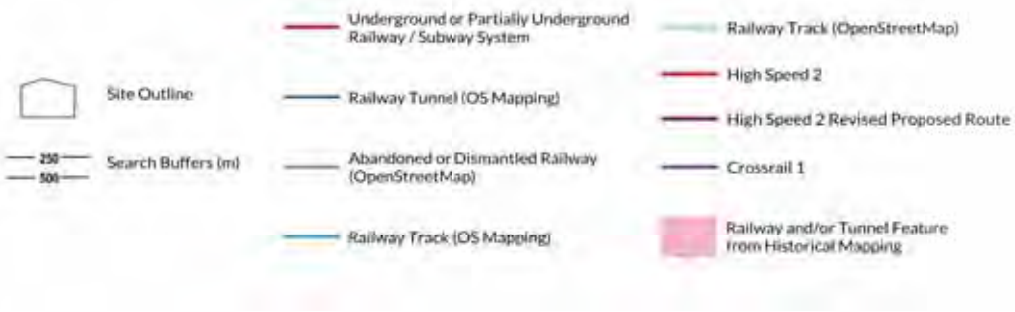

9 Railways and Tunnels

9.1 Tunnels

This data is derived from OpenStreetMap and provides information on the possible locations of underground railway systems in the UK - the London Underground, the Tyne & Wear Metro and the Glasgow Subway.

Have any underground railway lines been identified within the study site boundary?	No
Have any underground railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

This data is derived from Ordnance Survey mapping and provides information on the possible locations of railway tunnels forming part of the UK overground railway network.

Have any other railway tunnels been identified within the site boundary?	No
Have any other railway tunnels been identified within 250m of the site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.2 Historical Railway and Tunnel Features

This data is derived from Groundsure's unique Historical Land-use Database and contains features relating to tunnels, railway tracks or associated works that have been identified from historical Ordnance Survey mapping.

Have any historical railway or tunnel features been identified within the study site boundary?	No
Have any historical railway or tunnel features been identified within 250m of the study site boundary?	No

Database searched and no data found.

Any records that have been identified are represented on the Railways and Tunnels map.

9.3 Historical Railways

This data is derived from OpenStreetMap and provides information on the possible alignments of abandoned or dismantled railway lines in proximity to the study site.

Have any historical railway lines been identified within the study site boundary?	No
Have any historical railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.4 Active Railways

These datasets are derived from Ordnance Survey mapping and OpenStreetMap and provide information on the possible locations of active railway lines in proximity to the study site.

Have any active railway lines been identified within the study site boundary?	No
Have any active railway lines been identified within 250m of the study site boundary?	No

Database searched and no data found.

Multiple sections of the same track may be listed in the detail above
Any records that have been identified are represented on the Railways and Tunnels map.

9.5 Railway Projects

These datasets provide information on the location of large scale railway projects High Speed 2 and Crossrail 1 .

Is the study site within 5km of the route of the High Speed 2 rail project?	No
Is the study site within 500m of the route of the Crossrail 1 rail project?	No

Further information on proximity to these routes, the project construction status and associated works can be obtained through the purchase of a Groundsure HS2 and Crossrail 1 Report.

The route data has been digitised from publicly available maps by Groundsure. The route as provided relates to the Crossrail 1 project only, and does not include any details of the Crossrail 2 project, as final details of the route for Crossrail 2 are still under consultation.

Please note that this assessment takes account of both the original Phase 2b proposed route and the amended route proposed in 2016. As the Phase 2b route is still under consultation, Groundsure are providing information on both options until the final route is formally confirmed. Practitioners should take account of this uncertainty when advising clients.

Contact Details

emapsite

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Fax: 0115 936 3276.
Email:**enquiries@bgs.ac.uk**
Web:**www.bgs.ac.uk**
BGS Geological Hazards Reports and general geological enquiries

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Leicestershire
LE12 6HX

The Coal Authority

200 Lichfield Lane
Mansfield
Notts NG18 4RG
Tel: 0345 7626 848
DX 716176 Mansfield 5
www.coal.gov.uk

Public Health England

Public information access office
Public Health England, Wellington House
133-155 Waterloo Road, London, SE1 8UG
https://www.gov.uk/government/organisations/public-health-england
Email: **enquiries@phe.gov.uk**
Main switchboard: 020 7654 8000

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DY5 3LH
Tel: +44 (0) 1384 262 000
Email:**enquiries.gs@jpb.co.uk**
Website: **www.jpb.co.uk**

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Adanac Drive, Southampton
SO16 0AS

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Website: http://www.ordnancesurvey.co.uk/

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https://www.groundsure.com/terms-and-conditions-feb11-2019

EmapSite

Masdar House, 1 Reading Road,
Eversley, RG27 0RP

Groundsure Reference:	EMS-529183_711718
Your Reference:	EMS_529183_711718
Report Date	26 Feb 2019
Report Delivery Method:	Email - pdf

Enviro Insight

Address: Petre Wood Cl, Langho, Blackburn. , Petre Wood Cl, Langho, Blackburn, BB6 8FD,

Dear Sir/ Madam,

Thank you for placing your order with Groundsure. Please find enclosed the **Groundsure Enviro Insight** as requested.

If you would like further assistance regarding this report then please contact the emapsite customer services team on 0118 9736883 quoting the above report reference number.

Yours faithfully,

emapsite customer services team

Enc.
Groundsure Enviroinsight

Enviro Insight

Address:	**Petre Wood Cl, Langho, Blackburn. , Petre Wood Cl, Langho, Blackburn, BB6 8FD,**
Date:	**26 Feb 2019**
Reference:	**EMS-529183_711718**
Client:	**EmapSite**

NW N NE

W E

SW S SE

Aerial Photograph Capture date:	03-Apr-2017
Grid Reference:	371049,435066
Site Size:	1.0423ha

Report Reference: EMS-529183_711718
Client Reference: EMS_529183_711718

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Overview of Findings

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

Section 1: Historical Industrial Sites	On-site	0-50	51-250	251-500
1.1 Potentially Contaminative Uses identified from 1:10,000 scale mapping	1	0	18	24
1.2 Additional Information – Historical Tank Database	0	0	0	2
1.3 Additional Information – Historical Energy Features Database	0	0	3	0
1.4 Additional Information – Historical Petrol and Fuel Site Database	0	0	0	2
1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database	0	0	3	0
1.6 Historical military sites	0	0	0	0
1.7 Potentially Infilled Land	1	0	10	17

Section 2: Environmental Permits, Incidents and Registers	On-site	0-50m	51-250	251-500
2.1 Industrial Sites Holding Environmental Permits and/or Authorisations				
2.1.1 Records of historic IPC Authorisations	0	0	0	0
2.1.2 Records of Part A(1) and IPPC Authorised Activities	0	0	0	0
2.1.3 Records of Red List Discharge Consents	0	0	0	0
2.1.4 Records of List 1 Dangerous Substances Inventory sites	0	0	0	0
2.1.5 Records of List 2 Dangerous Substances Inventory sites	0	0	0	0
2.1.6 Records of Part A(2) and Part B Activities and Enforcements	0	0	1	0
2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations	0	0	0	0
2.1.8 Records of Licensed Discharge Consents	0	0	3	0
2.1.9 Records of Water Industry Referrals	0	0	0	0
2.1.10 Records of Planning Hazardous Substance Consents and Enforcements within 500m of the study site	0	0	0	0
2.2 Records of COMAH and NIHHS sites	0	0	0	0
2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents				
2.3.1 National Incidents Recording System, List 2	0	0	3	0
2.3.2 National Incidents Recording System, List 1	0	0	0	0
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990	0	0	0	0

Section 3: Landfill and Other Waste Sites	On-site	0-50m	51-250	251-500	501-1000	1000-1500
3.1 Landfill Sites						
3.1.1 Environment Agency/Natural Resources Wales Registered Landfill Sites	0	0	0	0	0	Not searched
3.1.2 Environment Agency/Natural Resources Wales Historic Landfill Sites	0	0	1	0	0	1
3.1.3 BGS/DoE Landfill Site Survey	0	0	0	0	0	0
3.1.4 Records of Landfills in Local Authority and Historical Mapping Records	0	0	0	0	0	2
3.2 Landfill and Other Waste Sites Findings						
3.2.1 Operational and Non-Operational Waste Treatment, Transfer and Disposal Sites	0	1	0	0	Not searched	Not searched
3.2.2 Environment Agency/Natural Resources Wales Licensed Waste Sites	0	0	5	0	0	0

Section 4: Current Land Use	On-site	0-50m	51-250	251-500
4.1 Current Industrial Sites Data	0	0	6	Not searched
4.2 Records of Petrol and Fuel Sites	0	0	1	0
4.3 National Grid Underground Electricity Cables	0	0	0	0
4.4 National Grid Gas Transmission Pipelines	0	0	0	0

Section 5: Geology	
5.1 Records of Artificial Ground and Made Ground present beneath the study site	None identified
5.2 Records of Superficial Ground and Drift Geology present beneath the study site	Identified
5.3 For records of Bedrock and Solid Geology beneath the study site see the detailed findings section.	

Section 6: Hydrogeology and Hydrology	0-500m
6.1 Records of Strata Classification in the Superficial Geology within 500m of the study site	Identified
6.2 Records of Strata Classification in the Bedrock Geology within 500m of the study site	Identified

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
6.3 Groundwater Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.4 Surface Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.5 Potable Water Abstraction Licences (within 2000m of the study site)	0	0	0	0	0	0
6.6 Source Protection Zones (within 500m of the study site)	0	0	0	0	Not searched	Not searched
6.7 Source Protection Zones within Confined Aquifer	0	0	0	0	Not searched	Not searched
6.8 Groundwater Vulnerability and Soil Leaching Potential (within 500m of the study site)	1	0	0	0	Not searched	Not searched

Section 6: Hydrogeology and Hydrology

	0-500m					
	On-site	0-50m	51-250	251-500	501-1000	1000-1500
6.9 Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site	No	No	No	No	No	No
6.10 Ordnance Survey MasterMap Water Network entries within 500m of the site	0	2	34	58	Not searched	Not searched
6.11 Surface water features within 250m of the study site	No	Yes	Yes	Not searched	Not searched	Not searched

Section 7: Flooding

7.1 Enviroment Agency Zone 2 floodplains within 250m of the study site	None identified
7.2 Environment Agency/Natural Resources Wales Zone 3 floodplains within 250m of the study site	None identified
7.3 Risk of flooding from Rivers and the Sea (RoFRaS) rating for the study site	Very Low
7.4 Flood Defences within 250m of the study site	None identified
7.5 Areas benefiting from Flood Defences within 250m of the study site	None identified
7.6 Areas used for Flood Storage within 250m of the study site	None identified
7.7 Maximum BGS Groundwater Flooding susceptibility within 50m of the study site	Potential at Surface
7.8 BGS confidence rating for the Groundwater Flooding susceptibility areas	High

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.1 Records of Sites of Special Scientific Interest (SSSI)	0	0	0	0	0	0
8.2 Records of National Nature Reserves (NNR)	0	0	0	0	0	0
8.3 Records of Special Areas of Conservation (SAC)	0	0	0	0	0	0
8.4 Records of Special Protection Areas (SPA)	0	0	0	0	0	0
8.5 Records of Ramsar sites	0	0	0	0	0	0
8.6 Records of Ancient Woodlands	0	0	0	0	0	4
8.7 Records of Local Nature Reserves (LNR)	0	0	0	0	0	0
8.8 Records of World Heritage Sites	0	0	0	0	0	0
8.9 Records of Environmentally Sensitive Areas	0	0	0	0	0	0

Section 8: Designated Environmentally Sensitive Sites

	On-site	0-50m	51-250	251-500	501-1000	1000-2000
8.10 Records of Areas of Outstanding Natural Beauty (AONB)	0	0	0	0	0	0
8.11 Records of National Parks	0	0	0	0	0	0
8.12 Records of Nitrate Sensitive Areas	0	0	0	0	0	0
8.13 Records of Nitrate Vulnerable Zones	1	0	0	0	1	1
8.14 Records of Green Belt land	0	0	0	1	0	1

Section 9: Natural Hazards

9.1 Maximum risk of natural ground subsidence	Very Low
9.1.1 Maximum Shrink-Swell hazard rating identified on the study site	Very Low
9.1.2 Maximum Landslides hazard rating identified on the study site	Low
9.1.3 Maximum Soluble Rocks hazard rating identified on the study site	Negligible
9.1.4 Maximum Compressible Ground hazard rating identified on the study site	Negligible
9.1.5 Maximum Collapsible Rocks hazard rating identified on the study site	Very Low
9.1.6 Maximum Running Sand hazard rating identified on the study site	Very Low
9.2 Radon	
9.2.1 Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level?	The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.
9.2.2 Is the property in an area where Radon Protection are required for new properties or extensions to existing ones as described in publication BR211 by the Building Research Establishment?	No radon protective measures are necessary.

Section 10: Mining

10.1 Coal mining areas within 75m of the study site	None identified
10.2 Non-Coal Mining areas within 50m of the study site boundary	Identified
10.3 Brine affected areas within 75m of the study site	None identified

Using this report

The following report is designed by Environmental Consultants for Environmental Professionals bringing together the most up-to-date market leading environmental data. This report is provided under and subject to the Terms & Conditions agreed between Groundsure and the Client. The document contains the following sections:

1. Historical Industrial Sites

Provides information on past land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. Potentially Infilled Land features are also included. This search is conducted using radii of up to 500m.

2. Environmental Permits, Incidents and Registers

Provides information on Regulated Industrial Activities and Pollution Incidents as recorded by Regulatory Authorities, and sites determined as Contaminated Land. This search is conducted using radii up to 500m.

3. Landfills and Other Waste Sites

Provides information on landfills and other waste sites that may pose a risk to the study site. This search is conducted using radii up to 1500m.

4. Current Land Uses

Provides information on current land uses that may pose a risk to the study site in terms of potential contamination from activities or processes. These searches are conducted using radii of up to 500m. This includes information on potentially contaminative industrial sites, petrol stations and fuel sites as well as high pressure gas pipelines and underground electricity transmission lines.

5. Geology

Provides information on artificial and superficial deposits and bedrock beneath the study site.

6. Hydrogeology and Hydrology

Provides information on productive strata within the bedrock and superficial geological layers, abstraction licences, Source Protection Zones (SPZs) and river quality. These searches are conducted using radii of up to 2000m.

7. Flooding

Provides information on river and coastal flooding, flood defences, flood storage areas and groundwater flood areas. This search is conducted using radii of up to 250m.

8. Designated Environmentally Sensitive Sites

Provides information on the Sites of Special Scientific Interest (SSSI), National Nature Reserves (NNR), Special Areas of Conservation (SAC), Special Protection Areas (SPA), Ramsar sites, Local Nature Reserves (LNR), Areas of Outstanding Natural Beauty (AONB), National Parks (NP), Environmentally Sensitive Areas, Nitrate Sensitive Areas, Nitrate Vulnerable Zones and World Heritage Sites and Scheduled Ancient Woodland. These searches are conducted using radii of up to 2000m.

9. Natural Hazards

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

10. Mining

Provides information on areas of coal and non-coal mining and brine affected areas.

11. Contacts

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

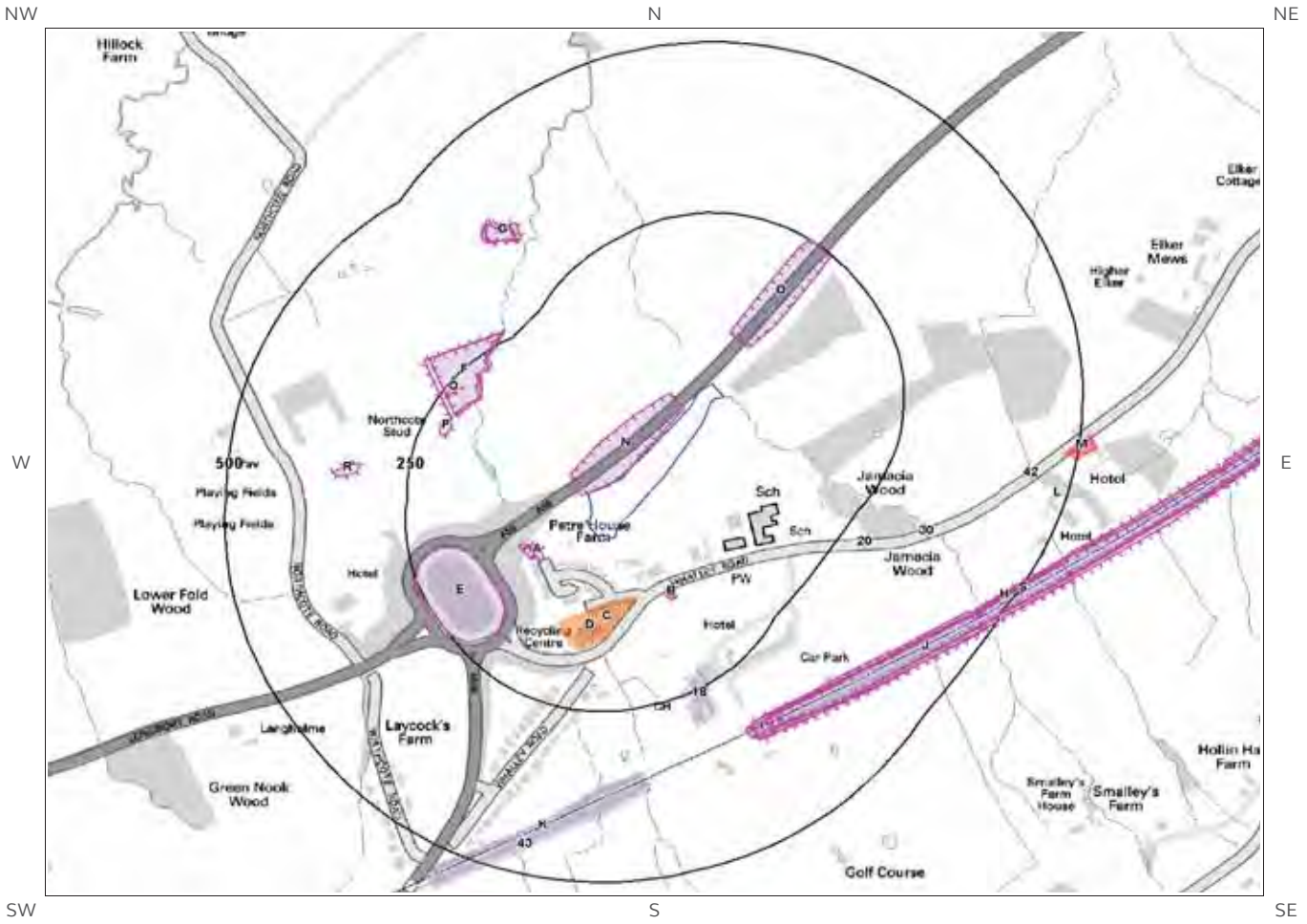
Note: Maps

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

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

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

1. Historical Land Use



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Site Outline

250
500
Search Buffers (m)

Historical 1:10,000 and 1:10,560 scale mapping

Industrial Land Use

Potentially Infilled Land

Historical 1:2,500, 1:1,250 and 1:500 scale mapping

Energy Features

Petrol Stations

Historical military sites

Tanks

Garages

1. Historical Industrial Sites

1.1 Potentially Contaminative Uses identified from 1:10,000 scale Mapping

The systematic analysis of data extracted from standard 1:10,560 and 1:10,000 scale historical maps provides the following information:

Records of sites with a potentially contaminative past land use within 500m of the search boundary: 43

ID	Distance [m]	Direction	Use	Date
1N	0	On Site	Cuttings	1973
2O	72	NE	Cuttings	1973
3A	76	SW	Unspecified Pit	1950
4A	84	SW	Unspecified Pit	1933
5C	88	S	Garage	1981
6B	104	SE	Electricity Substation	1981
7B	108	SE	Electric Substation	1991
8B	108	SE	Electric Substation	1973
9D	113	S	Garage	1991
10C	117	S	Garage	1976
11D	121	S	Garage	1973
12E	157	SW	Unspecified Pit	1981
13E	157	SW	Unspecified Pit	1976
14F	202	NW	Sewage Works	1950
15F	205	NW	Sewage Works	1933
16F	205	NW	Sewage Works	1910
17P	212	NW	Refuse Heap	1846
18	225	SE	Lunatic Asylum	1846
19Q	235	NW	Filler Tanks	1910
20	275	SE	Pipe	1846
21R	318	W	Refuse Heap	1846
22I	330	SE	Cuttings	1846
23H	331	SE	Cuttings	1892
24G	332	NW	Unspecified Pit	1950
25G	332	NW	Unspecified Pit	1973
26G	332	NW	Unspecified Pit	1969
27H	332	SE	Cuttings	1933
28H	332	SE	Cuttings	1910
29G	333	NW	Unspecified Pit	1933
30	335	SE	Pipe	1846
31G	335	NW	Sand Pit	1910
32S	335	SE	Cuttings	1846
33I	338	SE	Cuttings	1991
34I	338	SE	Cuttings	1950

35I	338	SE	Cuttings	1973
36J	341	SE	Cuttings	1950
37J	341	SE	Cuttings	1991
38J	341	SE	Cuttings	1973
39K	345	S	Railway Sidings	1910
40K	345	S	Railway Sidings	1933
41K	348	S	Railway Sidings	1950
42	435	E	Pipe	1846
43	456	S	Railway Building	1950

1.2 Additional Information – Historical Tank Database

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

Records of historical tanks within 500m of the search boundary: 2

ID	Distance (m)	Direction	Use	Date
44L	484	E	Unspecified Tank	1972
45L	484	E	Unspecified Tank	1967

1.3 Additional Information – Historical Energy Features Database

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

Records of historical energy features within 500m of the search boundary: 3

ID	Distance (m)	Direction	Use	Date
46B	103	SE	Electricity Substation	1992
47B	104	SE	Electricity Substation	1981
48B	104	SE	Electricity Substation	1968

1.4 Additional Information – Historical Petrol and Fuel Site Database

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

Records of historical petrol stations and fuel sites within 500m of the search boundary: 2

ID	Distance (m)	Direction	Use	Date

49M	479	E	Filling Station	1967
50M	479	E	Filling Station	1972

1.5 Additional Information – Historical Garage and Motor Vehicle Repair Database

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

Records of historical garage and motor vehicle repair sites within 500m of the search boundary: 3

ID	Distance (m)	Direction	Use	Date
51C	88	S	Garage	1981
52D	89	S	Garage	1997
53C	117	S	Garage	1976

1.6 Historical military sites

Certain military installations were not noted on historic mapping for security reasons. Whilst not all military land is necessarily of concern, Groundsure has researched and digitised a number of Ordnance Factories and other military industrial features (e.g. Ordnance Depots, Munitions Testing Grounds) which may be of contaminative concern. This research was drawn from a number of different sources, and should not be regarded as a definitive or exhaustive database of potentially contaminative military installations. The boundaries of sites within this database have been estimated from the best evidence available to Groundsure at the time of compilation.

Records of historical military sites within 500m of the search boundary: 0

Database searched and no data found.

1.7 Potentially Infilled Land

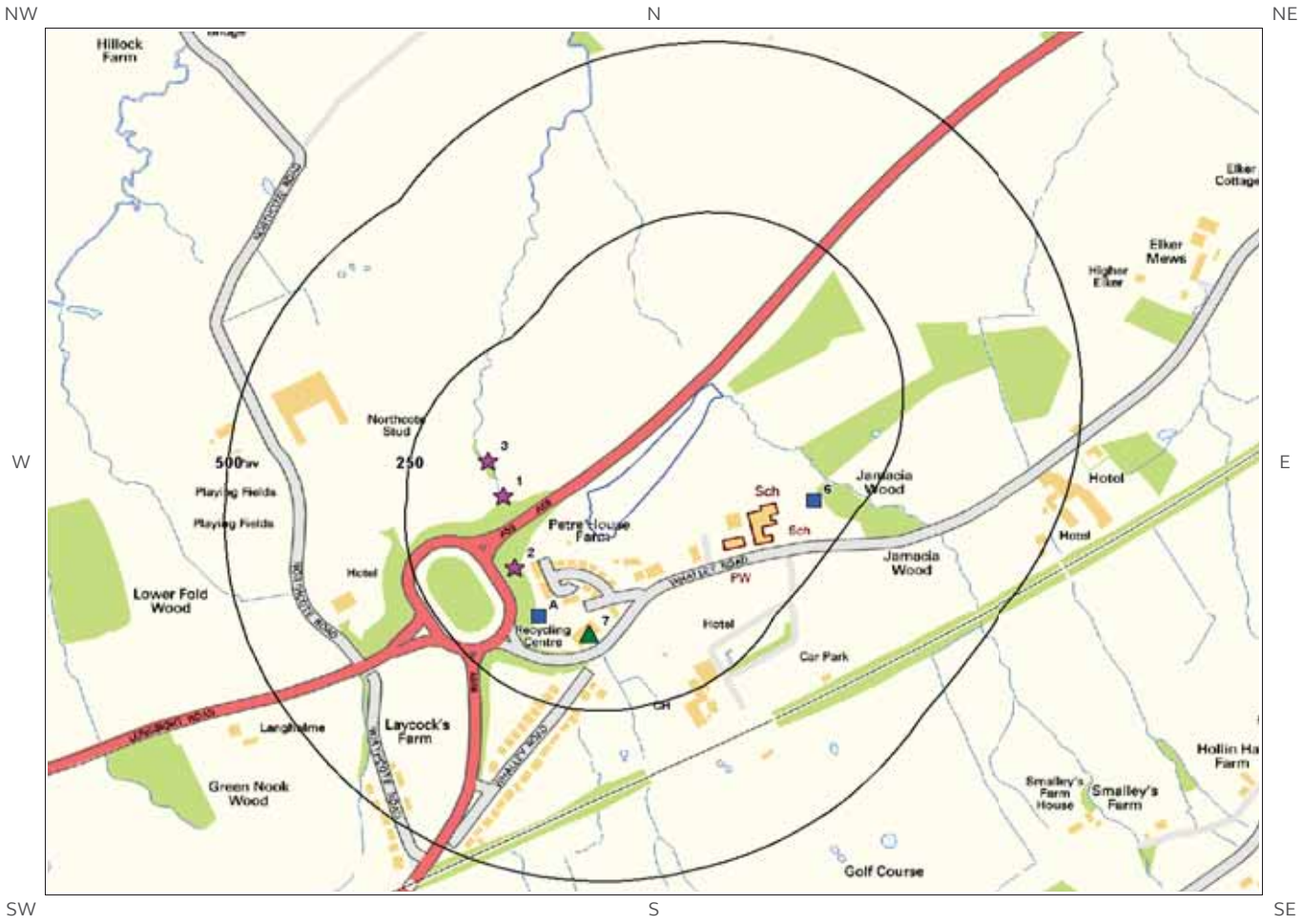
Records of Potentially Infilled Features from 1:10,000 scale mapping within 500m of the study site: 28

The following Historical Potentially Infilled Features derived from the Historical Mapping information is provided by Groundsure:

ID	Distance(m)	Direction	Use	Date
54N	0	On Site	Cuttings	1973
55O	72	NE	Cuttings	1973
56A	76	SW	Unspecified Pit	1950
57A	84	SW	Unspecified Pit	1933
58E	157	SW	Unspecified Pit	1981
59E	157	SW	Unspecified Pit	1976
60F	202	NW	Sewage Works	1950
61F	205	NW	Sewage Works	1910
62F	205	NW	Sewage Works	1933
63P	212	NW	Refuse Heap	1846
64Q	235	NW	Filler Tanks	1910

65R	318	W	Refuse Heap	1846
66I	330	SE	Cuttings	1846
67H	331	SE	Cuttings	1892
68G	332	NW	Unspecified Pit	1950
69G	332	NW	Unspecified Pit	1973
70G	332	NW	Unspecified Pit	1969
71H	332	SE	Cuttings	1933
72H	332	SE	Cuttings	1910
73G	333	NW	Unspecified Pit	1933
74G	335	NW	Sand Pit	1910
75S	335	SE	Cuttings	1846
76I	338	SE	Cuttings	1950
77I	338	SE	Cuttings	1991
78I	338	SE	Cuttings	1973
79J	341	SE	Cuttings	1991
80J	341	SE	Cuttings	1950
81J	341	SE	Cuttings	1973

2. Environmental Permits, Incidents and Registers Map



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

2. Environmental Permits, Incidents and Registers

2.1 Industrial Sites Holding Licences and/or Authorisations

Searches of information provided by the Environment Agency/Natural Resources Wales and Local Authorities reveal the following information:

2.1.1 Records of historic IPC Authorisations within 500m of the study site:

0

Database searched and no data found.

2.1.2 Records of Part A(1) and IPPC Authorised Activities within 500m of the study site:

0

Database searched and no data found.

2.1.3 Records of Red List Discharge Consents (potentially harmful discharges to controlled waters) within 500m of the study site:

0

Database searched and no data found.

2.1.4 Records of List 1 Dangerous Substances Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.5 Records of List 2 Dangerous Substance Inventory Sites within 500m of the study site:

0

Database searched and no data found.

2.1.6 Records of Part A(2) and Part B Activities and Enforcements within 500m of the study site:

1

The following Part A(2) and Part B Activities are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
7	141	S	370969 434822	Address: Petre Service Station, Whalley Road, Langho, Blackburn, BB6 8AB Process: Unloading of Petrol into Storage at Service Stations Status: Current Permit Permit Type: Part B	Enforcement: No Enforcements Notified Date of Enforcement: No Enforcements Notified Comment: No Enforcements Notified

2.1.7 Records of Category 3 or 4 Radioactive Substances Authorisations:

0

Database searched and no data found.

2.1.8 Records of Licensed Discharge Consents within 500m of the study site:

3

The following Licensed Discharge Consents records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
4A	141	SW	370900 434850	Address: LANGHO SEWER, RIBBLE VALLEY, LANCASHIRE Effluent Type: SEWAGE DISCHARGES - SEWER STORM OVERFLOW - WATER COMPANY Permit Number: 01LA1546 Permit Version: 1	Receiving Water: TRIB BUSHBURN BROOK Status: REVOKED - UNSPECIFIED Issue date: - Effective Date: 13-Jul-1967 Revocation Date: 13/07/1967
5A	141	SW	370900 434850	Address: PETRE ARMS ROUNDABOUT, LANGHO, RIBBLE VALLEY, LANCASHIRE Effluent Type: SEWAGE DISCHARGES - STW STORM OVERFLOW/STORM TANK - WATER COMPANY Permit Number: 01RIB0017 Permit Version: 1	Receiving Water: STREAM TRIB BUSHBURN BROOK Status: POST NRA LEGISLATION WHERE ISSUE DATE > 31-AUG-89 (HISTORIC ONLY) Issue date: - Effective Date: 01-Apr-1991 Revocation Date: -
6	192	SE	371280 435020	Address: ST LEONARDS C OF E PRIMARY SCHOOL, WHALLE NEW ROAD, LANGHO, BLACKBURN, BB6 8 AB Effluent Type: SEWAGE DISCHARGES - FINAL/TREATED EFFLUENT - NOT WATER COMPANY Permit Number: 017190640 Permit Version: 1	Receiving Water: TRIBUTARY OF BUSHBURN BROOK Status: NEW CONSENT (WRA 91, S88 & SCHED 10 AS AMENDED BY ENV ACT 1995) Issue date: 21/09/1999 Effective Date: 21-Sep-1999 Revocation Date: -

2.1.9 Records of Water Industry Referrals (potentially harmful discharges to the public sewer) within 500m of the study site:

0

Database searched and no data found.

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

0

Database searched and no data found.

2.2 Dangerous or Hazardous Sites

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

Database searched and no data found.

2.3 Environment Agency/Natural Resources Wales Recorded Pollution Incidents

2.3.1 Records of National Incidents Recording System, List 2 within 500m of the study site:

3

The following NIRS List 2 records are represented as points on the Environmental Permits, Incidents and Registers Map:

ID	Distance (m)	Direction	NGR	Details	
1	117	W	370850.0 435027.0	Incident Date: 14-Feb-2008 Incident Identification: 564069.0 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 3 (Minor) Air Impact: Category 4 (No Impact)
2	120	SW	370866.0 434922.0	Incident Date: 25-Mar-2008 Incident Identification: 573188.0 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)
3	146	W	370828.0 435078.0	Incident Date: 11-Nov-2007 Incident Identification: 544427.0 Pollutant: Sewage Materials Pollutant Description: Crude Sewage	Water Impact: Category 2 (Significant) Land Impact: Category 4 (No Impact) Air Impact: Category 4 (No Impact)

2.3.2 Records of National Incidents Recording System, List 1 within 500m of the study site:

0

Database searched and no data found.

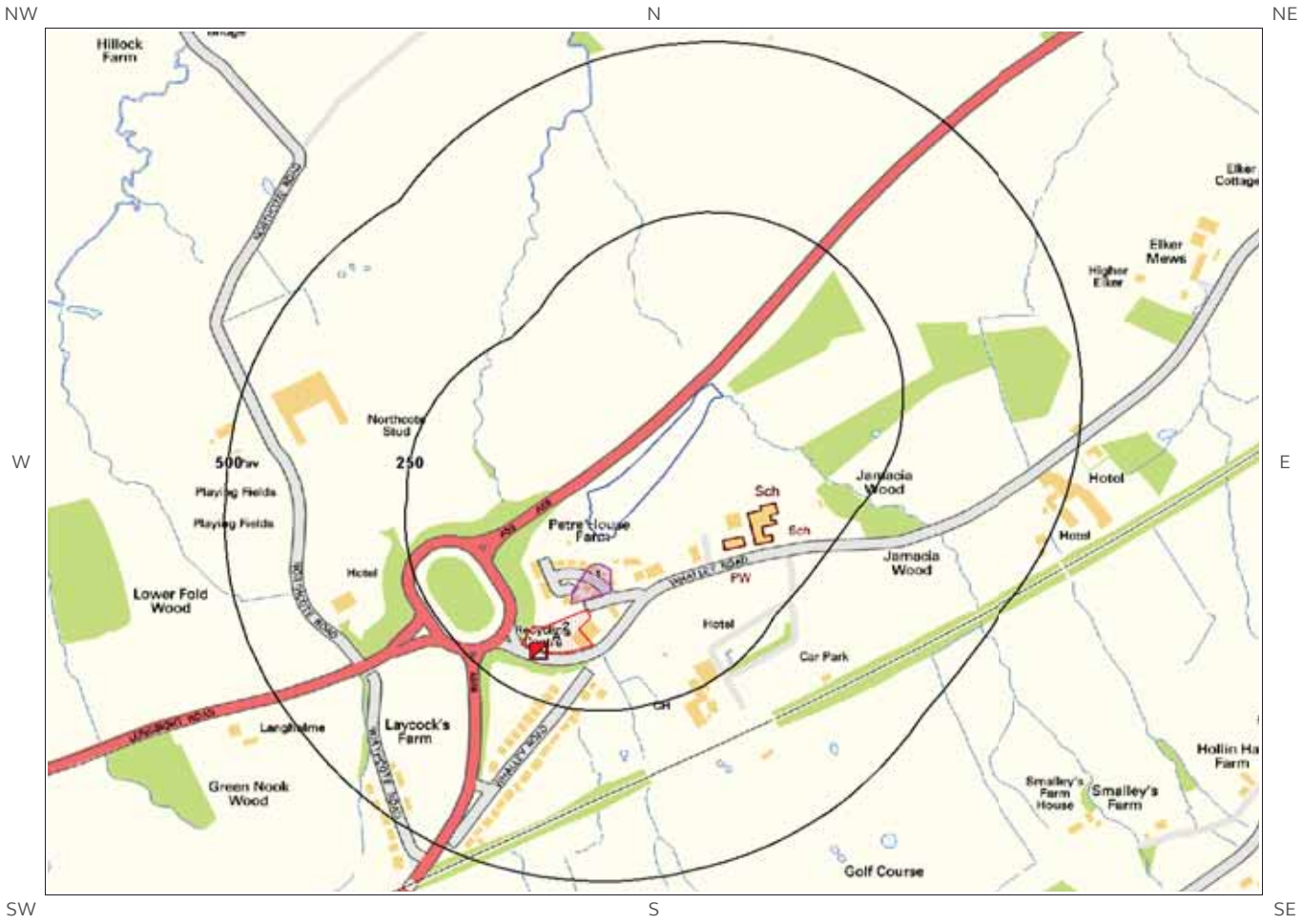
2.4 Sites Determined as Contaminated Land under Part 2A EPA 1990

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

Database searched and no data found.

---

3. Landfill and Other Waste Sites Map



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Site Outline

250 / 500 Search Buffers (m)

EA/NRW Active Landfill

EA/NRW Historic Landfill

BGS / DoE Survey Landfill

Historic and Planned Waste Sites

EA/NRW Licensed Waste Site

Local Authority/Historical Mapping Landfill Records

3. Landfill and Other Waste Sites

3.1 Landfill Sites

3.1.1 Records from Environment Agency/Natural Resources Wales landfill data within 1000m of the study site:

0

Database searched and no data found.

3.1.2 Records of Environment Agency/Natural Resources Wales historic landfill sites within 1500m of the study site:

2

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

ID	Distance (m)	Direction	NGR	Details	
2	102	S		Site Address: Petre Garage, Northcote Mannor Hotel, Langho, Lancashire Waste Licence: - Site Reference: K1/03/030 Waste Type: Waste unknown Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: -
Not shown	1448	NE		Site Address: Whalley Sewage Works, Riding Lane, Whalley, Blackburn, Lancashire Waste Licence: - Site Reference: K1/03/022 Waste Type: Commercial, Household Environmental Permitting Regulations (Waste) Reference: -	Licence Issue: Licence Surrendered: Licence Holder Address: - Operator: - Licence Holder: - First Recorded: - Last Recorded: 31-Dec-1973

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

0

Database searched and no data found.

3.1.4 Records of Landfills from Local Authority and Historical Mapping Records within 1500m of the study site:

2

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

ID	Distance (m)	Direction	NGR	Site Address	Source	Data Type
Not shown	1446	NE	372229 436277	Refuse Tip	1974 mapping	Polygon
Not shown	1446	NE	372229 436277	Refuse Tip	1966 mapping	Polygon

3.2 Other Waste Sites

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

1

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details		
1	35	S	370972 434898	Type of Site: Household Waste Disposal Centre Site Address: N/A	Planning Application Reference: N/A Date: 1997	Further Details: N/A Data Source: Historic Mapping Data Type: Polygon

3.2.2 Records of Environment Agency/Natural Resources Wales licensed waste sites within 1500m of the study site:

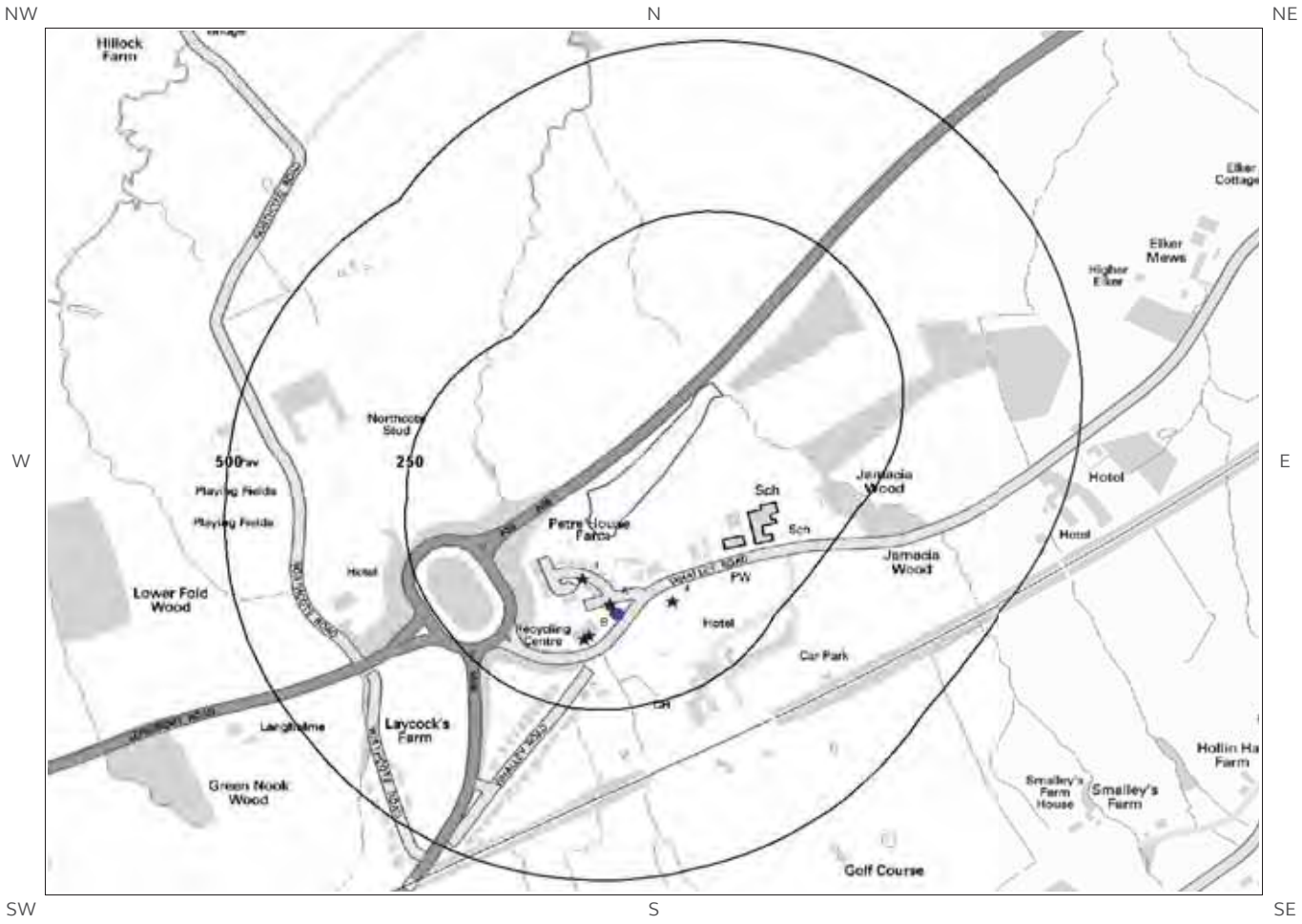
5

The following waste treatment, transfer or disposal sites records are represented as points on the Landfill and Other Waste Sites map:

ID	Distance (m)	Direction	NGR	Details	
4A	183	SW	370900 434800	Site Address: Longsight Road, Langho, Blackburn, Lancashire, BB6 8AB Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIT021 EPR reference: - Operator: Sita (Lancashire) Ltd Waste Management licence No: 54116 Annual Tonnage: 0.0	Issue Date: 14/05/1993 Effective Date: - Modified: 18/02/2000 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Petre Arms H W D C Correspondence Address: Tustin Court, Portway, Preston, Lancashire, PR2 2YQ
5A	183	SW	370900 434800	Site Address: Land/premises At, Longsight Road, Langho, Blackburn, Lancashire, BB6	Issue Date: 14/05/1993 Effective Date: -

ID	Distance (m)	Direction	NGR	Details	
				8AB Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIT021 EPR reference: EA/EPR/RP3991CU/V003 Operator: Sita (Lancashire) Ltd Waste Management licence No: 54116 Annual Tonnage: 0.0	Modified: 28/01/2003 Surrendered Date: 20/06/2011 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Petre Arms H W R C Correspondence Address: -
6A	183	SW	370900 434800	Site Address: Land/premises At, Longsight Road, Langho, Blackburn, Lancashire, BB6 8AB Type: Household Waste Amenity Site Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIT021 EPR reference: EA/EPR/RP3991CU/V003 Operator: Sita (Lancashire) Ltd Waste Management licence No: 54116 Annual Tonnage: 0.0	Issue Date: 14/05/1993 Effective Date: - Modified: 28/01/2003 Surrendered Date: 20/06/2011 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Petre Arms H W R C Correspondence Address: -
7A	183	SW	370900 434800	Site Address: Land/premises At, Longsight Road, Langho, Blackburn, Lancashire, BB6 8AB Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIT021 EPR reference: EA/EPR/RP3991CU/V003 Operator: Sita Lancashire Ltd Waste Management licence No: 54116 Annual Tonnage: 0.0	Issue Date: 14/05/1993 Effective Date: - Modified: 28/01/2003 Surrendered Date: 20/06/2011 Expiry Date: - Cancelled Date: - Status: Surrendered Site Name: Petre Arms H W R C Correspondence Address: -
8A	183	SW	370900 434800	Site Address: Longsight Road, Langho, Blackburn, Lancashire, BB6 8AB Type: Special Waste Transfer Station Size: < 25000 tonnes Environmental Permitting Regulations (Waste) Licence Number: SIT021 EPR reference: - Operator: Sita U K Ltd Waste Management licence No: 54116 Annual Tonnage: 4999.0	Issue Date: 14/05/1993 Effective Date: - Modified: 28/01/2003 Surrendered Date: - Expiry Date: - Cancelled Date: - Status: Modified Site Name: Petre Arms H W D C Correspondence Address: Tustin Court, Portway, Preston, Lancashire, PR2 2YQ

4. Current Land Use Map



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Site Outline

Search Buffers (m)
250
500

Current Industrial Sites

Petrol & Fuel Sites

Electricity Transmission Cables

Gas Transmission Pipelines

4. Current Land Uses

4.1 Current Industrial Data

Records of potentially contaminative industrial sites within 250m of the study site: 6

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

ID	Distance (m)	Direction	Company	NGR	Address	Activity	Category
1	63	SW	Gas Governor Station	370960 434905	Lancashire, BB6	Gas Features	Infrastructure and Facilities
2A	95	S	Mercury Filling Station	370998 434868	Whalley Road, Langho, Blackburn, Lancashire, BB6 8AB	Petrol and Fuel Stations	Road and Rail
3A	105	S	Mercury Petroleum	371003 434858	Petre Petrol Station, Whalley Road, Billington, Lancashire, BB6 8AB	Petrol and Fuel Stations	Road and Rail
4	124	SE	Electricity Sub Station	371085 434872	Lancashire, BB6	Electrical Features	Infrastructure and Facilities
5B	141	S	Petre Garage Ltd	370969 434822	Whalley Road, Langho, Blackburn, Lancashire, BB6 8AB	Vehicle Repair, Testing and Servicing	Repair and Servicing
6B	148	S	Malcolm E Taylor Ltd	370962 434816	Whalley Road, Langho, Blackburn, Lancashire, BB6 8AB	Agricultural Contractors	Contract Services

4.2 Petrol and Fuel Sites

Records of petrol or fuel sites within 500m of the study site: 1

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

ID	Distance (m)	Direction	NGR	Company	Address	LPG	Status
7A	112	S	371008 434852	GULF	Whalley Road, Langho, Blackburn, Lancashire, BB6 8AB	No	Open

4.3 National Grid High Voltage Underground Electricity Transmission Cables

This dataset identifies the high voltage electricity transmission lines running between generating power plants and electricity substations. The dataset does not include the electricity distribution network (smaller, lower voltage cables distributing power from substations to the local user network). This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high voltage underground electricity transmission cables within 500m of the study site: 0

Database searched and no data found.

4.4 National Grid High Pressure Gas Transmission Pipelines

This dataset identifies high-pressure, large diameter pipelines which carry gas between gas terminals, power stations, compressors and storage facilities. The dataset does not include the Local Transmission System (LTS) which supplies gas directly into homes and businesses. This information has been extracted from databases held by National Grid and is provided for information only with no guarantee as to its completeness or accuracy. National Grid do not offer any warranty as to the accuracy of the available data and are excluded from any liability for any such inaccuracies or errors.

Records of National Grid high pressure gas transmission pipelines within 500m of the study site: 0

Database searched and no data found.

---

5. Geology

5.1 Artificial Ground and Made Ground

Database searched and no data found.

The database has been searched on site, including a 50m buffer.

5.2 Superficial Ground and Drift Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
TILLD-DMTN	TILL, DEVENSIAN	DIAMICTON

5.3 Bedrock and Solid Geology

The database has been searched on site, including a 50m buffer.

Lex Code	Description	Rock Type
BSG-MDST	BOWLAND SHALE FORMATION	MUDSTONE

(Derived from the BGS 1:50,000 Digital Geological Map of Great Britain)

6 Hydrogeology and Hydrology

6a. Aquifer Within Superficial Geology

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Site Outline

250 — 500 — Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

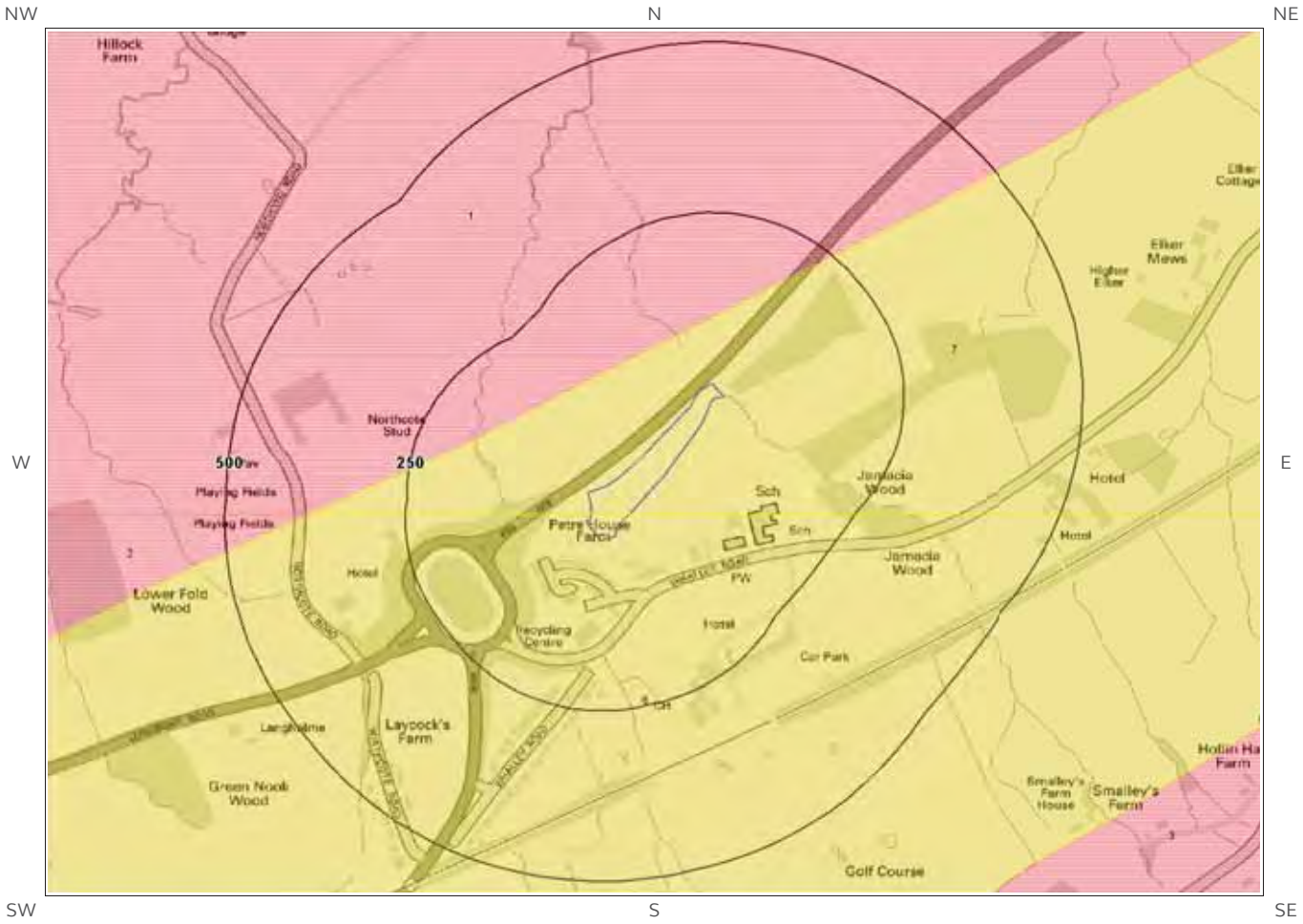
Secondary (B) Aquifer - Lower Permeability Layers

Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

6b. Aquifer Within Bedrock Geology and Abstraction Licences



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Site Outline

250 / 500 Search Buffers (m)

Principal Aquifer

Secondary (A) Aquifer - Permeable Layers

Secondary (B) Aquifer - Lower Permeability Layers

Groundwater Abstraction Licence

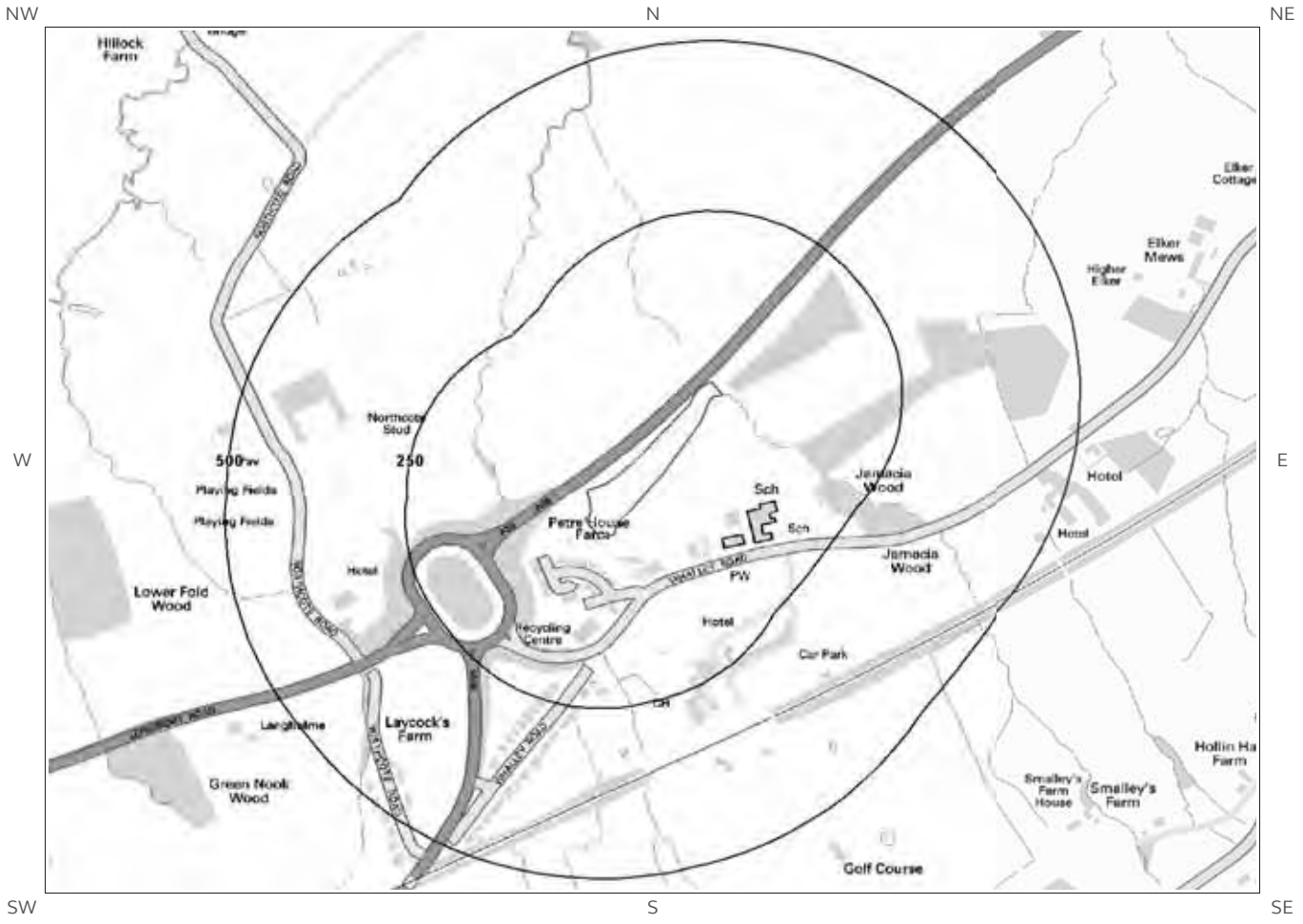
Secondary Aquifer - Undifferentiated Layers

Unproductive

Unknown (lakes and landslip)

Surface Water Abstraction Licence

6c. Hydrogeology – Source Protection Zones and Potable Water Abstraction Licences



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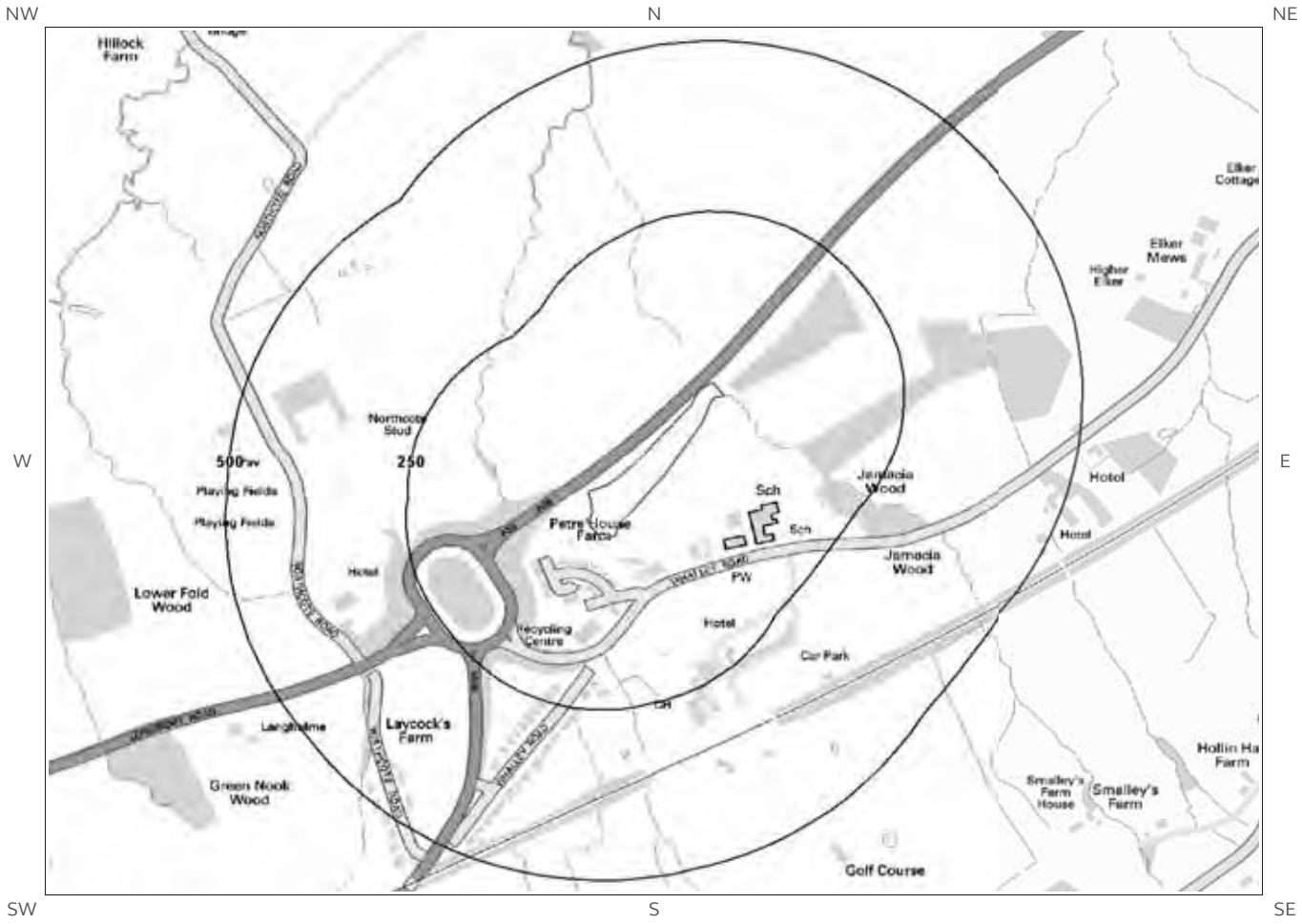
6d. Hydrogeology – Source Protection Zones within confined aquifer



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Site Outline

250 — 500 — Search Buffers (m)

Source Protection Zone 1 - Inner Catchment

Source Protection Zone 2C - Outer Catchment within Confined Aquifer

Source Protection Zone 3C - Total Catchment within Confined Aquifer

Potable Water Abstraction Licence

6e. Hydrology – Watercourse Network and River Quality

NW N NE

W E

SW S SE

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Site Outline

250 500 Search Buffers (m)

Tidal River
Inland River
Underground or Elevated Tidal River
Underground or Elevated Inland River
Foreshore
General Quality Assessment: Chemistry

Canal
Underground or Elevated Canal
Lock or Flight of Locks
Lake, Reservoir, or Marsh
Drain or Transfer
General Quality Assessment: Biology

6.Hydrogeology and Hydrology

6.1 Aquifer within Superficial Deposits

Records of strata classification within the superficial geology at or in proximity to the property Yes

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

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

ID	Distance (m)	Direction	Designation	Description
2	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
3	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type

6.2 Aquifer within Bedrock Deposits

Records of strata classification within the bedrock geology at or in proximity to the property Yes

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

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

ID	Distance (m)	Direction	Designation	Description
6	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
7	0	On Site	Secondary (undifferentiated)	Assigned where it is not possible to attribute either category A or B to a rock type. In general these layers have previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type
1	85	NW	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers
2	385	W	Secondary A	Permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers

6.3 Groundwater Abstraction Licences

Groundwater Abstraction Licences within 2000m of the study site None identified

Database searched and no data found.

6.4 Surface Water Abstraction Licences

Surface Water Abstraction Licences within 2000m of the study site — None identified

Database searched and no data found.

6.5 Potable Water Abstraction Licences

Potable Water Abstraction Licences within 2000m of the study site — None identified

Database searched and no data found.

6.6 Source Protection Zones

Source Protection Zones within 500m of the study site — None identified

Database searched and no data found.

6.7 Source Protection Zones within Confined Aquifer

Source Protection Zones within the Confined Aquifer within 500m of the study site — None identified

Historically, Source Protection Zone maps have been focused on regulation of activities which occur at or near the ground surface, such as prevention of point source pollution and bacterial contamination of water supplies. Sources in confined aquifers were often considered to be protected from these surface pressures due to the presence of a low permeability confining layer (e.g. glacial till, clay). The increased interest in subsurface activities such as onshore oil and gas exploration, ground source heating and cooling requires protection zones for confined sources to be marked on SPZ maps where this has not already been done.

Database searched and no data found.

6.8 Groundwater Vulnerability and Soil Leaching Potential

Environment Agency/Natural Resources Wales information on groundwater vulnerability and soil leaching potential within 500m of the study site — Identified

Distance (m)	Direction	Classification	Soil Vulnerability Category	Description
0	On Site	Minor Aquifer/Low Leaching Potential	L	Soils in which pollutants are unlikely to penetrate the soil layer because either water movement is largely horizontal, or they have the ability to attenuate diffuse pollutants.

6.9 River Quality

Environment Agency/Natural Resources Wales information on river quality within 1500m of the study site — None identified

6.9.1 Biological Quality:

Database searched and no data found.

6.9.2 Chemical Quality:

Database searched and no data found.

6.10 Ordnance Survey MasterMap Water Network

Ordnance Survey MasterMap Water Network entries within 500m of the study site

This watercourse information is provided by Ordnance Survey MasterMap Water Network. The data provides a detailed centre line following the curve of the waterway precisely, so all distances provided in the report should be understood as measurements to the centreline rather than a measurement to the nearest point of the watercourse. Underground watercourses are inferred from entry and exit points so caution is advised in using these to indicate precise locations of underground watercourses when planning site investigation and development.

The following Ordnance Survey MasterMap Water Network records are represented on the Hydrology Map (6e):

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
1	1 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
1	1	Not Specified	Inland river not influenced	Catchment Area: Ribble

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	NE		by normal tidal action.	Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
2	2 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
2	2 NE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	66 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
3	66 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
4	86 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
4	86 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
5	106 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
5	106 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	115 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
6	115 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
7	116 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
7	116 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				conditions) Average Width in Watercourse Section (m): Not Provided
8	117 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
8	117 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Not provided Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
9	119 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
9	119 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
10	170 S	Not Specified	Lake, loch or reservoir.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.2
11	170 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
10	170 S	Not Specified	Lake, loch or reservoir.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.2
11	170 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
12	173 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
12	173 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	175 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
13	175 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
14	178 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
14	178 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
15	182 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
15	182 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
16	183 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	183 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
16	183 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
17	183 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
18	204 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
18	204 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	209 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
19	209 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
20	274	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	S			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	274 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
21	298 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	298 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
22	300 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	300 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
23	324 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	324 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
24	326 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	326 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
25	336 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	336 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
26	341 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): Not Provided
26	341 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
27	357 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.8
Not shown	357 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 1.8
28	360 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
28	360 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
29	370 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
29	370 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
30	372 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	372 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
31	382 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
31	382 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
32	385 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
32	385 SW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
33	401 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	401 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
34	404 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	404 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
35	420 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	420 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
36	438 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
Not shown	438 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): 2.0
37	440 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
38	440 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	440 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	440	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
	S			Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
39	442 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	442 E	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
40	445 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
40	445 NW	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
41	447 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	447 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
42	449 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	449 W	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
43	454 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
43	454 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
44	457 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	457 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: Underground Permanence: Watercourse contains water year round (in normal conditions)

ID	Distance/ Direction	Name	Type of Watercourse	Additional Details
				Average Width in Watercourse Section (m): Not Provided
45	467 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	467 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
46	471 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	471 S	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
47	485 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
47	485 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
48	498 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided
Not shown	498 SE	Not Specified	Inland river not influenced by normal tidal action.	Catchment Area: Ribble Relationship to Ground Level: On ground surface Permanence: Watercourse contains water year round (in normal conditions) Average Width in Watercourse Section (m): Not Provided

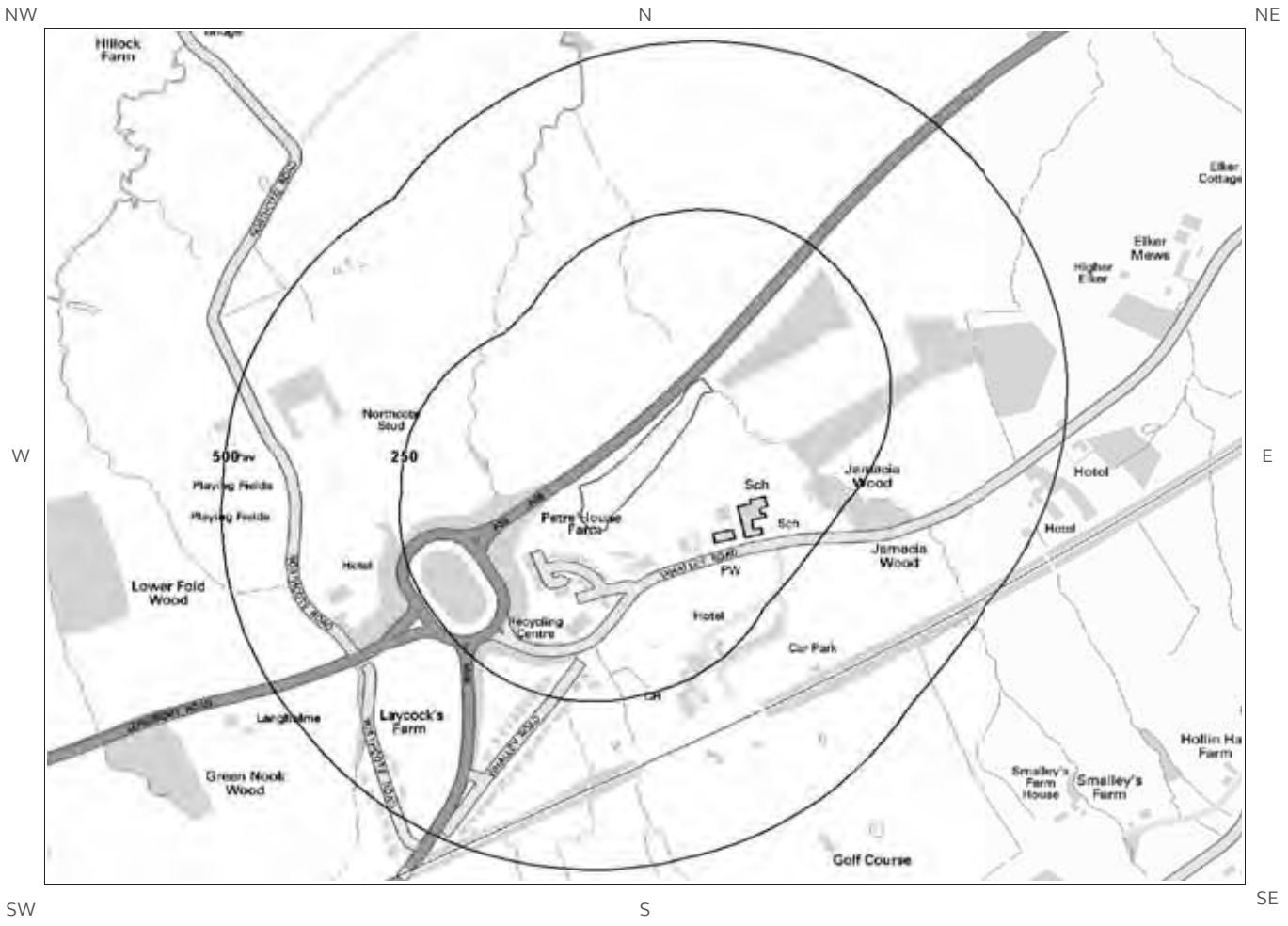
6.11 Surface Water Features

Surface water features within 250m of the study site — Identified

The following surface water records are not represented on mapping:

Distance (m)	Direction
2	NE
69	NW
119	W
121	SE
173	S
178	NW
202	NW
205	S
209	S
233	S

7a. Environment Agency/Natural Resources Wales Flood Map for Planning (from rivers and the sea)



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Site Outline

100
250
Search Buffers (m)

Zone 2 Floodplain

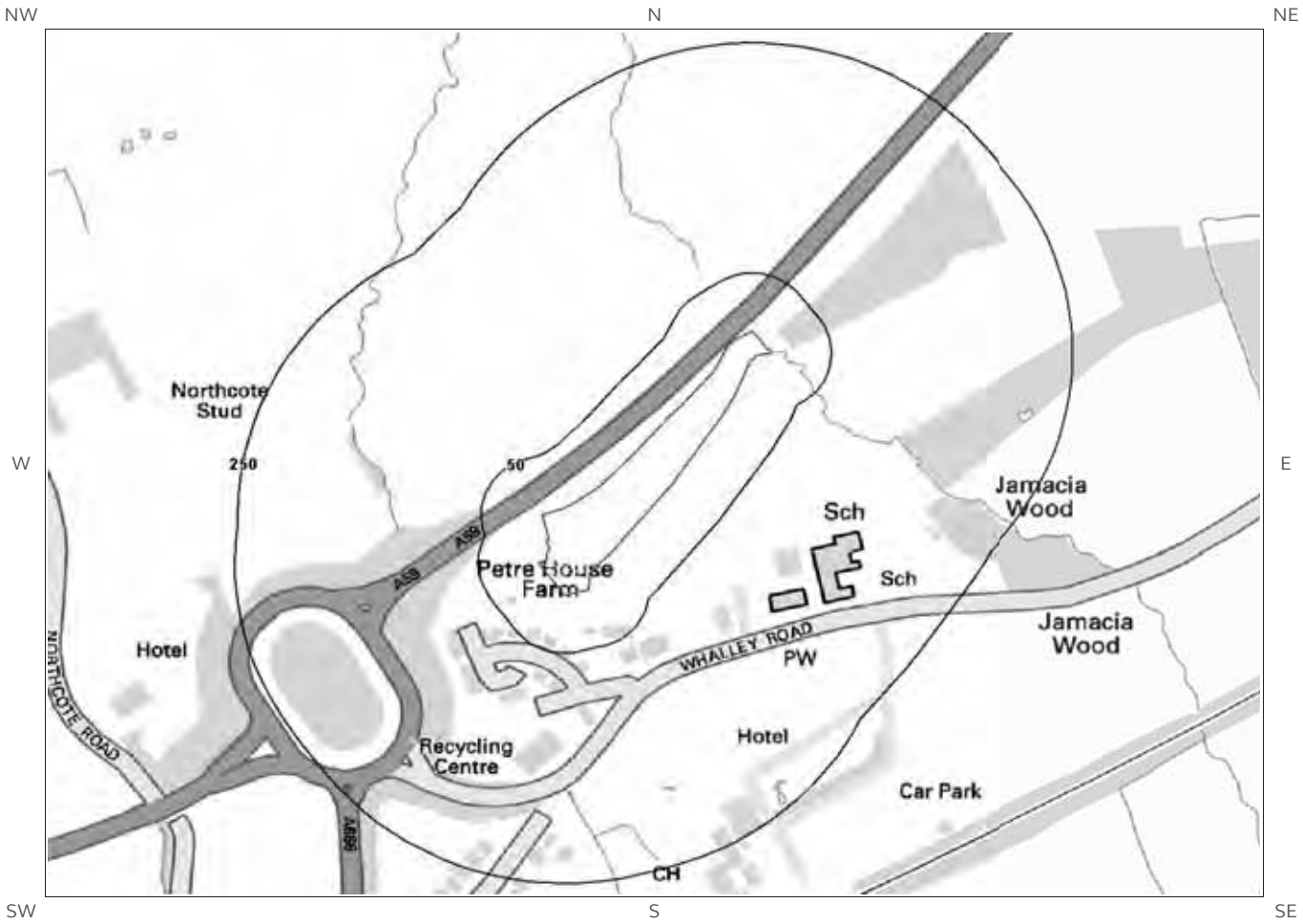
Zone 3 Floodplain

Flood Defences

Area used for Flood Storage

Area Benefiting from Flood Defences

7b. Environment Agency/Natural Resources Wales Risk of Flooding from Rivers and the Sea (RoFRaS) Map



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Site Outline

100
250
Search Buffers (m)

RoFRaS Rating

Very Low

Low

Medium

High

7 Flooding

7.1 River and Coastal Zone 2 Flooding

Environment Agency/Natural Resources Wales Zone 2 floodplain within 250m — None identified

Environment Agency/Natural Resources Wales Zone 2 floodplains estimate the annual probability of flooding as between 1 in 1000 (0.1%) and 1 in 100 (1%) from rivers and between 1 in 1000 (0.1%) and 1 in 200 (0.5%) from the sea. Any relevant data is represented on Map 7a – Flood Map for Planning:

Database searched and no data found.

7.2 River and Coastal Zone 3 Flooding

Environment Agency/Natural Resources Wales Zone 3 floodplain within 250m — None identified

Zone 3 shows the extent of a river flood with a 1 in 100 (1%) or greater chance of occurring in any year or a sea flood with a 1 in 200 (0.5%) or greater chance of occurring in any year. Any relevant data is represented on Map 7a – Flood Map for Planning.

Database searched and no data found.

7.3 Risk of Flooding from Rivers and the Sea (RoFRaS) Flood Rating

Highest risk of flooding onsite — Very Low

The Environment Agency/Natural Resources Wales RoFRaS database provides an indication of river and coastal flood risk at a national level on a 50m grid with the flood rating at the centre of the grid calculated and given above. The data considers the probability that the flood defences will overtop or breach by considering their location, type, condition and standard of protection.

RoFRaS data for the study site indicates the property is in an area with a Very Low (less than 1 in 1000) chance of flooding in any given year.

7.4 Flood Defences

Flood Defences within 250m of the study site — None identified

Database searched and no data found.

7.5 Areas benefiting from Flood Defences

Areas benefiting from Flood Defences within 250m of the study site — None identified

7.6 Areas benefiting from Flood Storage

Areas used for Flood Storage within 250m of the study site	None identified

7.7 Groundwater Flooding Susceptibility Areas

7.7.1 British Geological Survey groundwater flooding susceptibility areas within 50m of the boundary of the study site: Identified

Clearwater Flooding or Superficial Deposits Flooding	Superficial Deposits Flooding

Notes: Groundwater flooding may either be associated with shallow unconsolidated sedimentary aquifers which overlie unproductive aquifers (Superficial Deposits Flooding), or with unconfined aquifers (Clearwater Flooding).

7.7.2 Highest susceptibility to groundwater flooding in the search area based on the underlying geological conditions

Potential at Surface

Where potential for groundwater flooding to occur at surface is indicated, this means that given the geological conditions in the area groundwater flooding hazard should be considered in all land-use planning decisions. It is recommended that other relevant information e.g. records of previous incidence of groundwater flooding, rainfall, property type, and land drainage information be investigated in order to establish relative, but not absolute, risk of groundwater flooding.

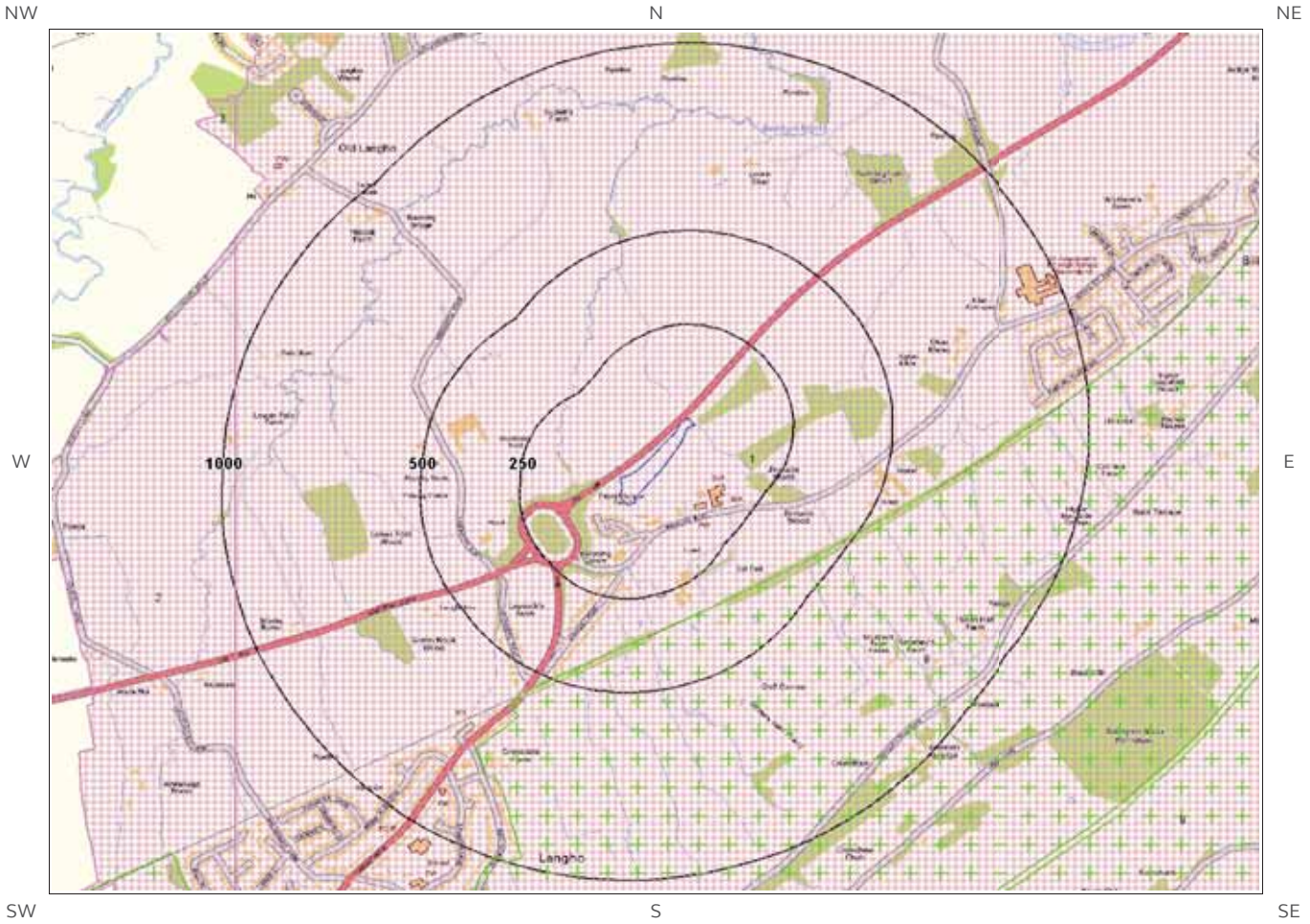
7.8 Groundwater Flooding Confidence Areas

British Geological Survey confidence rating in this result	High

Notes: Groundwater flooding is defined as the emergence of groundwater at the ground surface or the rising of groundwater into man-made ground under conditions where the normal range of groundwater levels is exceeded.

The confidence rating is on a threefold scale - Low, Moderate and High. This provides a relative indication of the BGS confidence in the accuracy of the susceptibility result for groundwater flooding. This is based on the amount and precision of the information used in the assessment. In areas with a relatively lower level of confidence the susceptibility result should be treated with more caution. In other areas with higher levels of confidence the susceptibility result can be used with more confidence.

8. Designated Environmentally Sensitive Sites Map



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Site Outline

100 / 250 Search Buffers (m)

AONB

National Park

SSSI

Special Protection Areas

Nitrate Vulnerable Zones

Green Belt

Environmentally Sensitive Areas

Special Areas of Conservation

World Heritage Sites

Nitrate Sensitive Areas

Ancient Woodland

National Nature Reserve

Local Nature Reserves

Ramsar Sites

8. Designated Environmentally Sensitive Sites

Designated Environmentally Sensitive Sites within 2000m of the study site	Identified

8.1 Records of Sites of Special Scientific Interest (SSSI) within 2000m of the study site:

0

Database searched and no data found.

8.2 Records of National Nature Reserves (NNR) within 2000m of the study site:

0

Database searched and no data found.

8.3 Records of Special Areas of Conservation (SAC) within 2000m of the study site:

0

Database searched and no data found.

8.4 Records of Special Protection Areas (SPA) within 2000m of the study site:

0

Database searched and no data found.

8.5 Records of Ramsar sites within 2000m of the study site:

0

Database searched and no data found.

8.6 Records of Ancient Woodland within 2000m of the study site:

4

The following records of Designated Ancient Woodland provided by Natural England/Natural Resources Wales are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	Ancient Woodland Name	Data Source
Not shown	1633	N	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1670	N	UNKNOWN	Ancient and Semi-Natural Woodland
Not shown	1863	SE	DEAN WOOD	Ancient and Semi-Natural Woodland
Not shown	1952	N	MITTON WOOD	Ancient and Semi-Natural Woodland

8.7 Records of Local Nature Reserves (LNR) within 2000m of the study site:

0

Database searched and no data found.

8.8 Records of World Heritage Sites within 2000m of the study site:

0

Database searched and no data found.

8.9 Records of Environmentally Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.10 Records of Areas of Outstanding Natural Beauty (AONB) within 2000m of the study site:

0

Database searched and no data found.

8.11 Records of National Parks (NP) within 2000m of the study site:

0

Database searched and no data found.

8.12 Records of Nitrate Sensitive Areas within 2000m of the study site:

0

Database searched and no data found.

8.13 Records of Nitrate Vulnerable Zones within 2000m of the study site:

3

The following Nitrate Vulnerable Zone records produced by DEFRA are represented as polygons on the Designated Environmentally Sensitive Sites Map:

ID	Distance (m)	Direction	NVZ Name	Data Source
1	0	On Site	New	DEFRA
2	965	W	New	DEFRA
3	1299	NW	New	DEFRA

8.14 Records of Green Belt land within 2000m of the study site:

2

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ID	Distance	Direction	Green Belt Name	Local Authority Name
8	334	SE	Liverpool, Manchester and West Yorks Greenbelt	Ribble Valley
9	1389	SE	Liverpool, Manchester and West Yorks Greenbelt	Hyndburn District (B)

9. Natural Hazards Findings

9.1 Detailed BGS GeoSure Data

BGS GeoSure Data has been searched to 50m. The data is included in tabular format. If you require further information on geology and ground stability, please obtain a Groundsure Geo Insight, available from our website. The following information has been found:

9.1.1 Shrink Swell

Maximum Shrink-Swell* hazard rating identified on the study site — Very Low

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

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

9.1.2 Landslides

Maximum Landslide* hazard rating identified on the study site — Low

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

Hazard
Possibility of slope instability problems after major changes in ground conditions. Consideration should be given to stability if changes to drainage or excavations take place. Possible increase in construction cost to reduce potential slope stability problems. Existing property no significant increase in insurance risk due to natural slope instability problems.

9.1.3 Soluble Rocks

Maximum Soluble Rocks* hazard rating identified on the study site — Negligible

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

Hazard
Soluble rocks are present, but unlikely to cause problems except under exceptional conditions. No special actions required to avoid problems due to soluble rocks. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with soluble rocks.

* This indicates an automatically generated 50m buffer and site.

9.1.4 Compressible Ground

Maximum Compressible Ground* hazard rating identified on the study site — Negligible

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

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

9.1.5 Collapsible Rocks

Maximum Collapsible Rocks* hazard rating identified on the study site — Very Low

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

Hazard
Deposits with potential to collapse when loaded and saturated are unlikely to be present. No special ground investigation required or increased construction costs or increased financial risk due to potential problems with collapsible deposits.

9.1.6 Running Sand

Maximum Running Sand** hazard rating identified on the study site — Very Low

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

Hazard
Very low potential for running sand problems if water table rises or if sandy strata are exposed to water. No special actions required, to avoid problems due to running sand. No special ground investigation required, and increased construction costs or increased financial risks are unlikely due to potential problems with running sand.

* This indicates an automatically generated 50m buffer and site.

9.2 Radon

9.2.1 Radon Affected Areas

Is the property in a Radon Affected Area as defined by the Health Protection Agency (HPA) and if so what percentage of homes are above the Action Level? The site is not in a Radon Affected Area, as less than 1% of properties are above the Action Level.

The radon data in this report is supplied by the BGS/Public Health England and is the definitive map of Radon Affected Areas in Great Britain and Northern Ireland. The dataset was created using long-term radon measurements in over 479,000 homes across Great Britain and 23,000 homes across Northern Ireland, combined with geological data. The dataset is considered accurate to 50m to allow for the margin of error in geological lines, and the findings of this report supercede any answer given in the less accurate Indicative Atlas of Radon in Great Britain, which simplifies the data to give the highest risk within any given 1km grid square. As such, the radon atlas is considered indicative, whereas the data given in this report is considered definitive.

9.2.2 Radon Protection

Is the property in an area where Radon Protection are required for new properties or extensions to existing
ones as described in publication BR211 by the Building Research Establishment? No radon protective measures are necessary.

10. Mining

10.1 Coal Mining

Coal mining areas within 75m of the study site — None identified

Database searched and no data found.

10.2 Non-Coal Mining

Non-Coal Mining areas within 50m of the study site boundary — Identified

The following non-coal mining information is provided by the BGS:

Distance (m)	Direction	Name	Commodity	Assessment of likelihood
0.0	On Site	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered
0.0	On Site	Not available	Vein Mineral	Localised small scale underground mining may have occurred. Potential for difficult ground conditions are unlikely or localised and are at a level where they need not be considered

Past underground mine workings may occur. The rock types present in these areas are such that small mineral veins may be present on which it is possible that small scale mining has been undertaken and/or it is possible that limited underground extraction of other materials may have occurred. All such occurrences are likely to be of minor localised extent and infrequent. It should be noted, however, that there is always the possibility of the existence of other sub-surface excavations, such as wells, cess pits, follies, air raid shelters/bunkers and other military structures etc. that could affect surface ground stability but which are outside the scope of this dataset. However, if in a coalfield area you should still consider a Coal Authority mining search for the area of interest.

10.3 Brine Affected Areas

Brine affected areas within 75m of the study site — None identified
Guidance: No Guidance Required.

Contact Details

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Ordnance Survey
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Local Authority
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Web: https://www.ribblevalley.gov.uk/
Address: Council Offices, Church Walk, Clitheroe, Lancashire, BB7 2RA

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APPENDIX G

GRM Development Solutions provides multi-disciplinary consultancy services, UK-wide:

- Geotechnical and Geo-environmental Services
- Civil and Infrastructure Services
- Structural Engineering Services
- Construction Management
- Site Services

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Highway embankment, sloping down towards the A59 from site.

Brook adjacent to site boundary, disappears into culvert.

Area of historical buildings demolished by approximately 1981.

Area appearing to be influenced by a previous site stockpile, used during a previous phase of development. Potential source of Made Ground.

DO NOT SCALE

NOTES:

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info@grm-uk.com www.grm-uk.com

CLIENT: Alan Johnston Partnership LLP

PROJECT: Petre Wood, Phase 3

TITLE: Ground Model (Hazard Plan)

SCALE@SIZE :	ISSUE:
NTS	FINAL
DESIGN/DRAWN :	DATE:
RP	03/2019
PROJECT No:	DRAWING No:
P8827	5

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