

FIRST CHOICE HOUSING ASSOCIATION

NR 2 NANT LAIS, MINERA, WREXHAM, LL11 3YY

**STAGE 1 - PHASE 1 – DESK STUDY AND PRELIMINARY GROUND
CONTAMINATION RISK ASSESSMENT**

REPORT No. E1330.S1.P1.R1

DECEMBER 2020



Client : FIRST CHOICE HOUSING ASSOCIATION

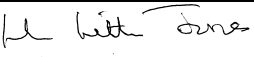
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	Page
1. Introduction	2
1.1 Terms of Reference	
1.2 Report Contents	
1.3 Information Sources	
2. Site Characteristics and History	3
2.1 Site Location	
2.2 General Site Description, Use and Topography	
2.3 Site Walkover and Inspection	
2.4 Site Development History	
3. Geology, Ground Stability and Environmental Setting	6
3.1 Geology	
3.2 Mining, Mineral Extraction and Ground Workings	
3.3 Natural Ground Subsidence and Movement	
3.4 Hydrogeology	
3.5 Hydrology	
3.6 Sensitive Land Uses	
3.7 Landfill and Landfill Gas	
3.8 Flood Risk	
3.9 Radon	
3.10 Contaminative Uses	
4. Environmental Data Searches	8
4.1 Registered Waste Treatment and Disposal Sites	
4.2 Regulated Industries	
4.3 Radioactive Sources	
4.4 Emissions to Air	
4.5 Pollution Incidents	
5. Conceptual Site Model and Preliminary Risk Assessment	9
5.1 Introduction and Site Development	
5.2 On-Site Contamination Sources and Hazards	
5.3 Off-Site Contamination Sources and Hazards	
5.4 Receptors and Targets	
5.5 Potential Exposure Pathways	
5.6 Preliminary Risk Assessment	
6. Conclusions and Recommendations	13
6.1 Conclusions	
6.2 Recommendations	
Appendices	
Appendix 1	- Historical Ordnance Survey Maps
Appendix 2	- EnviroInsight and GeoInsight Report
Appendix 3	- The Coal Authority Mining Report 510023342780001

1. INTRODUCTION

1.1 Terms of Reference

- 1.1.1 In December 2020 e-geo Solutions Ltd were commissioned by First Choice Housing Association to undertake a desk-based ground contamination study and risk assessment at a proposed residential development site at Number 2 Nant Lais, Minera, Wrexham.
- 1.1.2 The objective of the study was to collate and assess information on the sites history, the environmental (contamination), geological, mining and hydro-geological characteristics of the site, to undertake a preliminary hazard assessment in terms of potential contamination, and develop a Preliminary Conceptual Model to indicate potential contamination risks associated with the site and its redevelopment.
- 1.1.3 The study has been undertaken with reference to guidance in the 'Model Procedures for the Management of Land Contamination' (CLR11) and the BSI Publication 'Investigation of Potentially Contaminated Sites' – Code of Practice (BS10175). This report presents the findings of the preliminary site assessment, detailing the particular site characteristics and identifying potential contamination, environmental, mining and geo-environmental factors which could impact upon the redevelopment proposals.
- 1.1.4 This report has been prepared for the sole use of the Client, for the purposes described and no extended duty of care applies to other parties. Any other party using this report for any purpose whatsoever do so at their own risk and any duty of care to that party is specifically excluded.
- 1.1.5 The comments given, and opinions expressed, in this report are based on the information available at the time the report was compiled, however there may be additional information and data which becomes available at a later date which has an impact on the report content. Where data supplied by others has been used it has been assumed that the information is correct. No responsibility can be accepted by e-geo Solutions Ltd for inaccuracies within the data supplied by others.
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1.2 Report Contents

- 1.2.1 The report includes sections on:-

- Sources of Information
- Current and historical land use, including site inspection observations
- The sites geological, hydro-geological, hydrological and environmental setting
- Potential contaminants, receptors and pathways and the significance of pollutant linkages
- Risk assessment and recommendations for further quantification of risk and collection of additional data

1.3 Information Sources

- 1.3.1 Information on the site and its immediate surroundings has been collected from a range of sources including:-
- British Geological Survey Map 121 1:50,000 Solid and Drift Edition
 - Historical Ordnance Survey Maps
 - Aerial photographs and Google Earth
 - Information held by the Environment Agency on landfill sites, regulated industries, water abstractions and discharges, water quality, source protection zones, flood risk and incidents
 - The Environment Agency Groundwater Vulnerability Maps
 - GroundSure EnviroInsight and GeoInsight Report, Reference HMD-165-734769
 - The Coal Authority Mining Report 510023342780001
 - A site inspection and walkover survey.

2. SITE CHARACTERISTICS AND HISTORY

2.1 Site Location

- 2.1.1 The site is located on Nant Lais at the junction with the B5426 to the northwest of Coedpoeth, near Wrexham. The site location is shown on Figure 1. The site is bordered by residential properties to the west, south and east, and the B5426 to the north. The site is centred at Grid Ref 327733 351766.

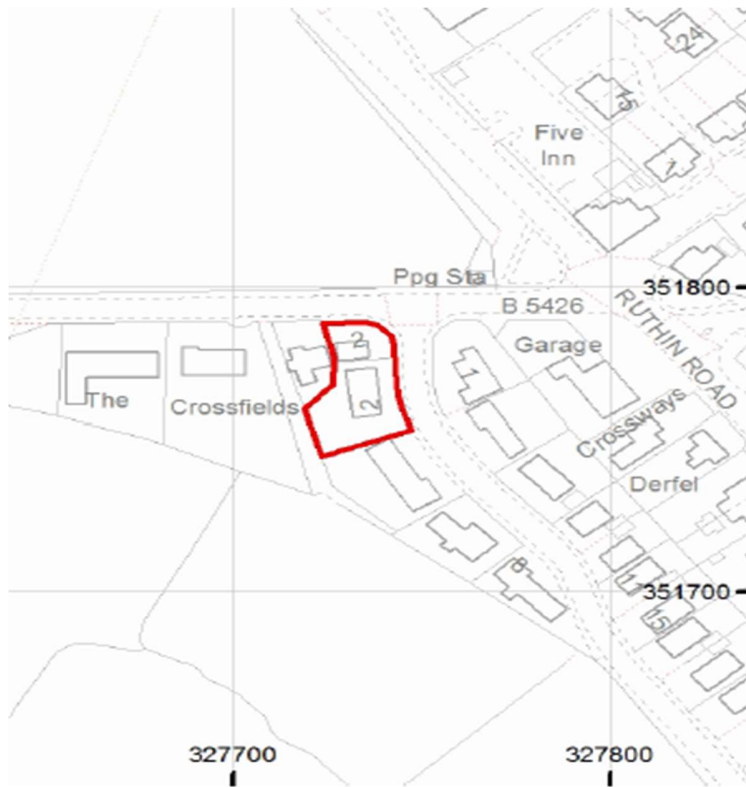


Figure 1 – Site Location

2.2 General Site Description, Use and Topography

- 2.2.1 The site area is at the junction of the Nant Lais housing estate road and the B5426. The site comprises a relatively new two storey brick built residential property with adjacent double garage surrounded by small grassed lawns and paved patio and parking areas. An aerial photograph of the site is presented as Figure 2.
- 2.2.1 The site is flat and level and at a similar elevation as the surrounding land.



Figure 2 – Aerial Photograph and Site Context

2.3 Site Walkover and Inspection

2.3.1 An inspection of the site was undertaken in December 2020. The following features and aspects were noted:

Overall Site

- The majority of the site is occupied by a relatively new brick built two storey residential property in good condition. Surrounding the property are paved paths and a small patio to the west.
- Adjacent to the property and to the north is a double garage with a paved access and parking area.
- To the south west, south and south east are areas of lawn.
- The site area is flat and level with the northern portion slightly 'cut' into the ground relative to the ground to the north and northwest.
- There is no evidence of storage of raw materials or wastes on site and no evidence of spills or fires.

Adjacent Land

- To the west and south of the site there is another property and then agricultural land.
- To the east is Nant Lais and then a residential property.
- To the north the B5426 and then agricultural land.
- Overall the site area is at the boundary between agricultural land to the west and north and residential properties to the east and southeast.

2.4 Site Development History

2.4.1 An examination of old Ordnance Survey maps dating from 1874 has been undertaken. Selected map extracts are presented in Appendix 1.

2.4.2 The following site development history has been compiled from the old Ordnance Survey maps:

1873/74 - Grid Ref: 327733, 351767 County Series 1:2,500

On-Site

The site is agricultural land.

Surrounding Land within 100m

The surrounding land is agricultural land with a row of 20 small houses and a 'smithy' 75m northwest.

Surrounding Land within 250m

Minera Hall is 150m west and there are two coal shafts 130m and 180m southeast with associated 'tipped spoil'. The Afon Clywedog is in a valley 200m southwest.

Surrounding Land to 1000m

There is a railway line 400m north and Minera Lead Mines are 800m southwest.

1899 - Grid Ref: 327733, 351767 County Series 1:2,500

On-Site

The site is as in 1873/74.

Surrounding Land

The surrounding land is as in 1873/74.

1912 - Grid Ref: 327733, 351767 County Series 1:2,500

On-Site

The site is as in 1899.

Surrounding Land

The surrounding land is as in 1899.

1961/62 - Grid Ref: 327733, 351767 National Series 1:2,500

On-Site

The site is as in 1812.

Surrounding Land

The surrounding land is generally as it was 1912 but Five Crosses garage has been built 75m east with residential properties to the southeast of it. There are two small structures immediately west and a property 'Hafoty' immediately further west. The coal shafts are no longer indicated but the 'small tips' remain.

1984 - Grid Ref: 327733, 351767 National Series 1:2,500

On-Site

There is a residential property on the site with adjacent structure.

Surrounding Land

The surrounding land is generally as in 1962 but the 'Twenty houses have been demolished and replaced with a public house. There are 'engineering works' 110m and 180m north northeast. Two properties have been built to the southeast and an additional property to the west.

1989 - Grid Ref: 327733, 351767 National Series 1:1,250

On-Site

The site is as in 1984.

Surrounding Land

The surrounding land is as in 1984, with the addition of more properties along and extended Nant Lais.

3. GEOLOGY, GROUND STABILITY AND ENVIRONMENTAL SETTING

3.1 Geology

- 3.1.1 The British Geological Survey Map No. No.121 indicates that the near surface deposits below the site are Glacial Till deposits of the Devensian Diamicton till formation. The solid geology below the site comprises sandstone of the Pennine Lower and Middle Coal Measures Formation.
- 3.1.2 The Glacial Till deposits will comprise clay and silt with varying proportions of sand and gravel of locally derived rock. The deposits are likely to be present to depths of 15 m. The deposits will be of low permeability.
- 3.1.3 The bedrock directly below the site comprises fine grained argillaceous rocks of sandstone. The rock will typically be of moderate to low permeability with groundwater movement governed by the fracture condition of the bedrock.
- 3.1.4 There is made ground shown 199m north east of the site.

3.2 Mining, Mineral Extraction and Ground Workings

- 3.2.1 There are no historical surface ground working features on site. The nearest BritPits feature is the Minera Coal Pit 152m south east where deep coal was mined.
- 3.2.2 The nearest historical surface workings features are 'Unspecified Heaps' 121m south east, dated 1938 and 224m north east dated 1960.
- 3.2.3 The nearest shaft is a disused shaft 146m south east (1900). The nearest colliery is 376m east (1949).
- 3.2.4 A non-residential mining report by the Coal Authority (Ref 510023342780001) (Appendix 3) indicates the following:
- the property is in a surface area that could be affected by underground mining in 2 seams of coal at 70m to 100m depth, and last worked in 1884. All movement due to mining of these coal seams should have stopped by now
 - the property is not within a surface area that could be affected by present underground mining
 - the property is not in an area likely to be affected from any planned future underground coal mining
 - there are no known shafts or mine entries within the site or within 20 metres of the boundary
 - the Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31st October 1994
 - the Coal Authority has no record of a mine gas emission requiring action

3.3 Natural Ground Subsidence and Movement

- 3.3.1 There is a very low risk of ground subsidence from natural hazards within the site boundary. There is a very low risk of ground movement due to landslides.
- 3.3.2 There is a very low risk of shrinkage or swelling of the ground strata as the strata is of low plasticity. There is a negligible risk from compressible deposits being present below the site. There is a very low risk of running sand deposits being present below the site. There is a negligible risk of ground dissolution. There is a very low risk of collapsible deposits below the site.

3.4 Hydrogeology

- 3.4.1 The superficial (drift) deposits below the site are classed as 'Secondary' undifferentiated aquifer. The aquifer can be either classed A or B depending on the soil type but were previously classed as a minor or non-aquifer.
- 3.4.2 The bedrock below the site is classed as a 'Secondary A' aquifer. These are 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. They were previously minor aquifers.

3.4.3 There are no Groundwater Abstraction Licences or Potable abstractions within 500m. There are no Surface water Abstraction points within 2000m of the site. There are no source protection zones within 500m of the site.

3.4.4 The soil vulnerability is classed as low with low permeable soils over a minor aquifer.

3.5 **Hydrology**

3.5.1 The nearest watercourse is the Afon Clywedog and is 206m south and is an inland river not affected by tidal action but has no direct connection to the site.

3.6 **Sensitive Land Uses**

3.6.1 There are no Sites of Special Scientific Interest within 500m of the site.

3.7 **Landfill and Landfill Gas**

3.7.1 There are no Local Authority/NRW historic landfill sites within 500m of the site.

3.8 **Flood Risk**

3.8.1 The site is not within a Zone 2 floodplain area as defined by the Environment Agency. A Zone 2 floodplain is one where the annual probability of flooding is 0.1% (one in one thousand) or greater from rivers and the sea but less than 1.0% from rivers or 0.5% from the sea.

3.8.2 There is a negligible risk of groundwater flooding.

3.9 **Radon**

3.9.1 The site is within a radon affected area with between 1% and 3% of properties above the Action Level as defined by the Health Protection Agency. No radon protection measures will be necessary.

3.10 **Contaminative Uses**

3.10.1 There are no significant potentially contaminative industrial land uses that have occurred at the site. There is a historical garage 21m east (1962 to 1989)

4. ENVIRONMENTAL DATA SEARCHES

4.1 Registered Waste Treatment and Disposal Sites

- 4.1.1 There is 1 licenced waste site 401m north west of the site, owned by S and K Mathews Skip Hire.

4.2 Regulated Industries

- 4.2.1 There are no industrial sites holding licences or authorisations within 500m.

4.3 Radioactive Sources

- 4.3.1 There are no Radioactive Source Authorisations or records of Category 3 or 4 Radioactive Substances within 500m of the site.

4.4 Emissions to Air

- 4.4.1 There are no known sites subject to local air pollution control under Part I of the Environmental Protection Act 1990 within 500m of the site.

4.5 Pollution Incidents

- 4.5.1 There are no records of Environment Agency pollution incidents which occurred on the site. There are 7 records within 500, but all had minor/no impact.

5. CONCEPTUAL SITE MODEL AND PRELIMINARY RISK ASSESSMENT

5.1 Introduction and Site Development

- 5.1.1 In accordance with current guidance the information collated during the preliminary site assessment has been reviewed to establish the conceptual model for the site and area of development. The conceptual model is based upon the identification and assessment of potential 'hazards', identified or suspected from the results of the preliminary assessment; the potential 'receptors' that may be affected based on the proposed site end use; and the anticipated 'pathways' to those receptors.
- 5.1.2 The proposed site development involves the conversion of the existing dwelling and double garage into one and two person flats. The existing structures will remain in their present form and the only addition will be a constructed link between the garage and existing dwelling containing a bathroom. There are no changes to the external areas other than provision of additional parking areas to the front of the property. A proposed site payout is shown as Figure 3.



Figure 3 – Proposed Layout

5.2 On-Site Contamination Sources and Hazards

- 5.2.1 The main data source for the hazard identification is information on the sites and surrounding lands previous and present use, and information collected during the site inspection. From the assessment of this data the potential source, type and location of any contamination hazard has been identified.
- 5.2.2 The information indicates that prior to the construction of the present property and double garage the site was undeveloped agricultural land.
- 5.2.3 The site topography suggests that the development platform was created by a very shallow 'cut' along the northern and northwest boundary. No imported fills or made up ground are anticipated on site.
- 5.2.4 Although mining activities were carried out in the area the nearest mine or area of wastes was more than

120m south east.

5.2.5 No coal mining has taken place below the site at depths which could impact on the ground surface at the site.

5.2.6 No significant potential on-site contamination sources or hazards have been identified as present on site.

5.3 Off-Site Contamination Sources and Hazards

5.3.1 The information indicates that there are no likely significant off-site contamination sources that could impact on the site. There is a garage 21m east, but no records of fuel storage tanks and the garage is at a lower elevation than the site. Although coal mining has been carried out in the area there is no evidence to indicate there is a risk from mine workings, mine wastes or mine gas. Minera lead mine was located approximately 800m southwest. There is no likelihood of mine waste being present on the site, however windblown dust may have carried to the site.

5.4 Receptors and Targets

5.4.1 During and following site redevelopment the principal receptors to any contamination hazard will be:

Receptor Type	Target	Presence (Y/N)	Comment
Humans on site	Future site users, occupiers	Y	Property to be used for residential purposes. Potential contact and ingestion if exposed to contaminated ground strata
Humans on site	Site construction workers	Y	Groundworks required during construction phase
Humans off site	Adjacent site users, occupiers	Y	Residential properties to east, south and west Potential contact only with mobile contamination.
Buildings and construction materials	New buildings, buried concrete and services	Y	Small building extension and minor groundworks for foundations
Flora and fauna	Crops and livestock	N	Non present on site
Ecosystems	Ecological system or organism	N	Non present
Controlled waters	Surface Water	N	None within influencing distance
Controlled waters	Ground Water - Shallow	N	Secondary 'minor or non-aquifer.' aquifer in drift
Controlled waters	Ground Water - Deep	Y	Secondary aquifer in bedrock at depth

5.5 Potential Exposure Pathways

5.5.1 The following potential exposure pathways, if contamination is present, during and following site redevelopment have been identified and assessed:

Human Exposure Pathways

Exposure Pathway	Existence/ Likelihood	Comment
Humans future site users – Ingestion of soil	Unlikely	Building to be redeveloped for residential purposes with garden area. Possible ingestion of contaminated soils
Humans future site users – Ingestion of vegetables	Possible	Building to be redeveloped for residential purposes with garden area. Presently lawned but possible ingestion of vegetables if grown in contaminated soils
Humans future site users – Ingestion of soil on vegetables	Unlikely	Building to be redeveloped for residential purposes with garden area. Presently lawned but possible ingestion of soil on vegetables if grown in contaminated soils
Humans future site users – Ingestion of dust	Unlikely	Building to be redeveloped for residential purposes with garden area. Possible ingestion of contaminated wind blow dust
Humans future site users – Dermal contact with soil	Possible	Building to be redeveloped for residential purposes with garden area. Possible contact with exposed contaminated soils

Humans future site users – Dermal contact with dust	Unlikely	Building to be redeveloped for residential purposes with garden area. Possible contact with contaminated windblown dust
Humans future site users – Inhalation of dust	Unlikely	Building to be redeveloped for residential purposes with garden area. Possible inhalation of contaminated dust
Humans future site users – Inhalation of gasses outside	None	No gas sources
Humans future site users – Inhalation of gasses inside	None	No gas sources
Humans construction workers – dermal contact, ingestion of soils and dust	None	Construction activities will involve minor groundworks but controlled by appropriate PPE
Humans construction workers – Inhalation of gasses	None	Construction activities will involve groundworks but in open atmosphere

Environmental Exposure Pathways

Receptor	Pathway	Existence/ Likelihood	Comment
Buildings and construction materials	Materials contact	Unlikely	Foundations and services in the ground
	Build-up of gasses	None	No source
Flora and fauna	Root uptake	None	No crops or livestock will be on site
	Leaf contact	None	
	Ingestion	None	
	Inhalation	None	
	Dermal contact	None	
Ecosystems	Ingestion	None	No sensitive ecosystems on site
	Dermal contact	None	
Controlled water -Surface waters	Flow via drains	None	No receptors
	Horizontal migration	None	No receptors
Controlled Water – Shallow Ground water	Vertical migration	None	Low permeability strata will prevent migration into minor/non aquifer in drift
Controlled Water – Ground water	Vertical migration	None	Depth and overlying low permeability strata in bedrock will prevent migration to minor aquifer

5.6 Preliminary Risk Assessment

5.6.1 The Conceptual Model involves the identification of risks associated with the site. In order for there to be any risk to exist, a "Source - Pathway - Receptor" linkage must be established. This linkage requires:

- A source of contamination in, or under the ground which has the potential to cause harm or to cause pollution of controlled waters.
- A pathway is one or more routes or means by, or through which a receptor is being exposed to or affected by a contaminant or, could be so exposed or affected by a contaminant
- A receptor that could be a living organism, a group of living organisms, an ecological system or property

5.6.2 The identification of each of these three elements is linked to the identification of the others. A pathway can only be identified if it is capable of exposing an identified receptor to an identified contaminant. That particular contaminant should likewise be capable of harming or, in the case of controlled waters, be capable of polluting

that particular receptor.

- 5.6.3 If a pollutant source, pathway and receptor are found to be present then there is a risk to the identified receptor. If there is an absence of any part of the source, pathway or receptor process, there is no risk.
- 5.6.4 At the proposed development site, no significant potential sources of contamination have been identified from on site or off-site activities. However, some small-scale contamination from the historical spoil waste tips at Minera lead mine and transported as wind blow dust may have impacted the near surface soils at the site. There are garden areas at the development site and possible pathways to receptors may exist following site redevelopment if elevated concentrations of contaminants are present. An assessment of the 'Source – Pathway – Receptor' linkages is presented in the table below. There is no risk from past coal mining activities.

Receptor	Pathway	Linkage Probability	Consequence	RISK
Humans future site users	Ingestion of soil	Unlikely	Moderate	Medium to Low
Humans future site users	Ingestion of vegetables	Possible	Minor	Medium to Low
Humans future site users	Ingestion of soil on vegetables	Unlikely	Moderate	Medium to Low
Humans future site users	Ingestion of dust	Unlikely	Minor	Low
Humans future site users	Dermal contact with soil	Possible	Minor	Medium to Low
Humans future site users	Dermal contact with dust	Unlikely	Minor	Low
Humans future site users	Inhalation of dust	Unlikely	Minor	Low
Humans future site users	Inhalation of gasses outside	None	Minor	None
Humans future site users	Inhalation of gasses inside	None	Moderate	None
Humans construction workers	Dermal contact, ingestion	None	Minor	None
Humans construction workers	Inhalation of gasses	None	Moderate	None
Buildings and construction materials	Materials contact	Unlikely	None	None
	Build up of gasses	None	Major	None
Flora and fauna	Root uptake	None	Minor	None
	Leaf contact	None	Minor	None
	Ingestion	None	Minor	None
	Inhalation	None	Minor	None
	Dermal contact	None	Minor	None
Ecosystems	Ingestion	None	Minor	None
	Dermal contact	None	None	None
Controlled water -Surface waters	Flow via drains	None	Minor	None
	Migration in groundwater	None	None	None
Controlled Water – Ground water	Vertical migration	None	Minor	None
Controlled Water – Ground water	Vertical migration	None	Minor	None

Descriptor	Description	Descriptor	Description
Almost certain	Likely to occur on many occasions	Almost certain	Death
Likely	Will probably recur but not persistent	Likely	Permanent harm
Possible	May recur occasionally	Possible	Semi-permanent injury/damage
Unlikely	Not expected to happen but is possible	Unlikely	Short term harm/damage
None	Will not happen	None	No injury or adverse outcome

6. CONCLUSIONS AND RECOMMENDATIONS

6.1 Conclusions

6.1.1 The information collected has allowed an assessment of the geological, mining, hydro geological and potential contamination status of the site to be made. The assessment has identified that contaminants generated and deposited by wind blown dusts could be present on site that present a risk to:

- Humans from contaminants within the near surface soils in garden areas

6.2 Recommendations

6.2.1 It is recommended that to prove the current status of any contamination at the site and to establish the potential risk that an 'Intrusive Contamination Investigation' is undertaken to address the gaps in information. This will determine the nature of ground materials below the site, the presence, nature, and extent of any ground contamination, and quantify the risks. The proposed intrusive investigation should involve:

Item	Method	Purpose and Specification
Shallow trial pit investigation	BS10175 and BS5930	Construct 5 Nr trial pits to 1m depth to expose and sample shallow ground strata across the site.
Chemical analysis	MCETS and UKAS accredited laboratory	Analysis of approximately 8 soil samples for metal contaminants including. Suite 1 – pH, arsenic, cadmium, chromium (hexavalent and total), lead, copper, nickel, zinc, boron, selenium, mercury

Appendix 1 - Historical Ordnance Survey Maps

Site Details:

2, NANTLAIS, MINERA,
WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: County Series

Map date: 1873-1874

Scale: 1:2,500

Printed at: 1:2,500



Surveyed 1873
Revised 1873
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Surveyed 1874
Revised 1874
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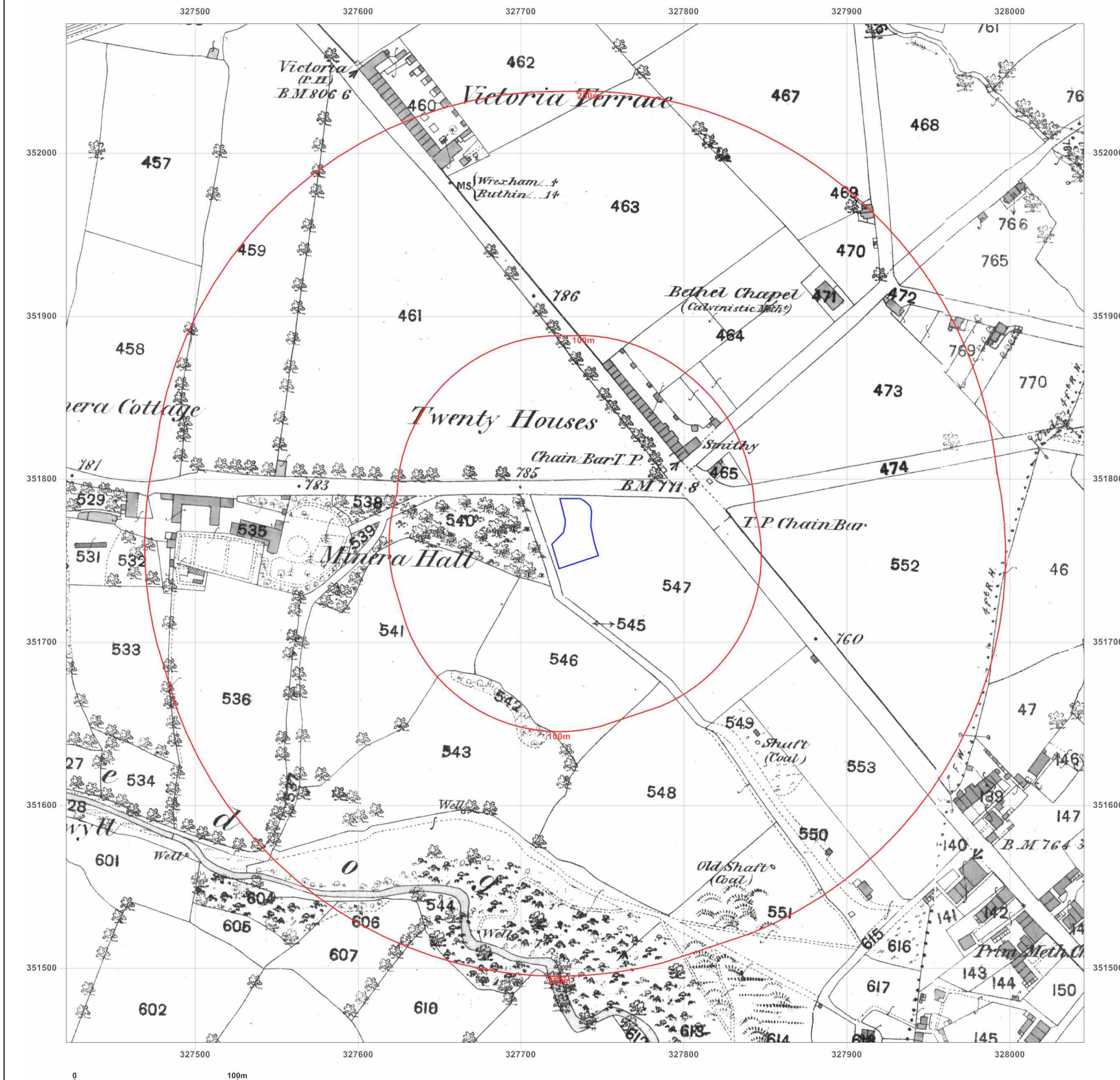


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Map legend available at:
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Site Details:

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Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: County Series

Map date: 1899

Scale: 1:2,500

Printed at: 1:2,500



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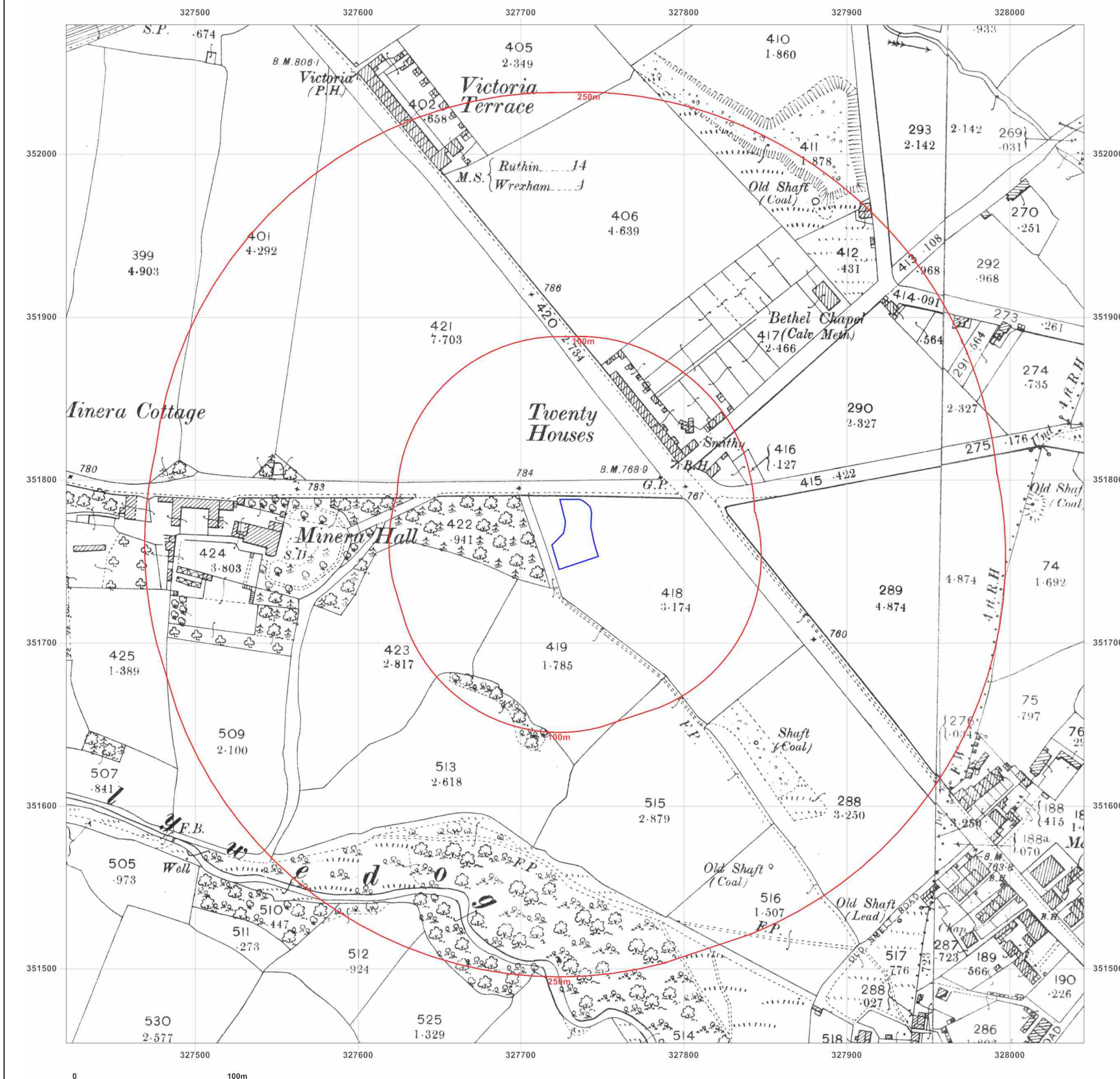


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Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1961-1962

Scale: 1:2,500

Printed at: 1:2,500



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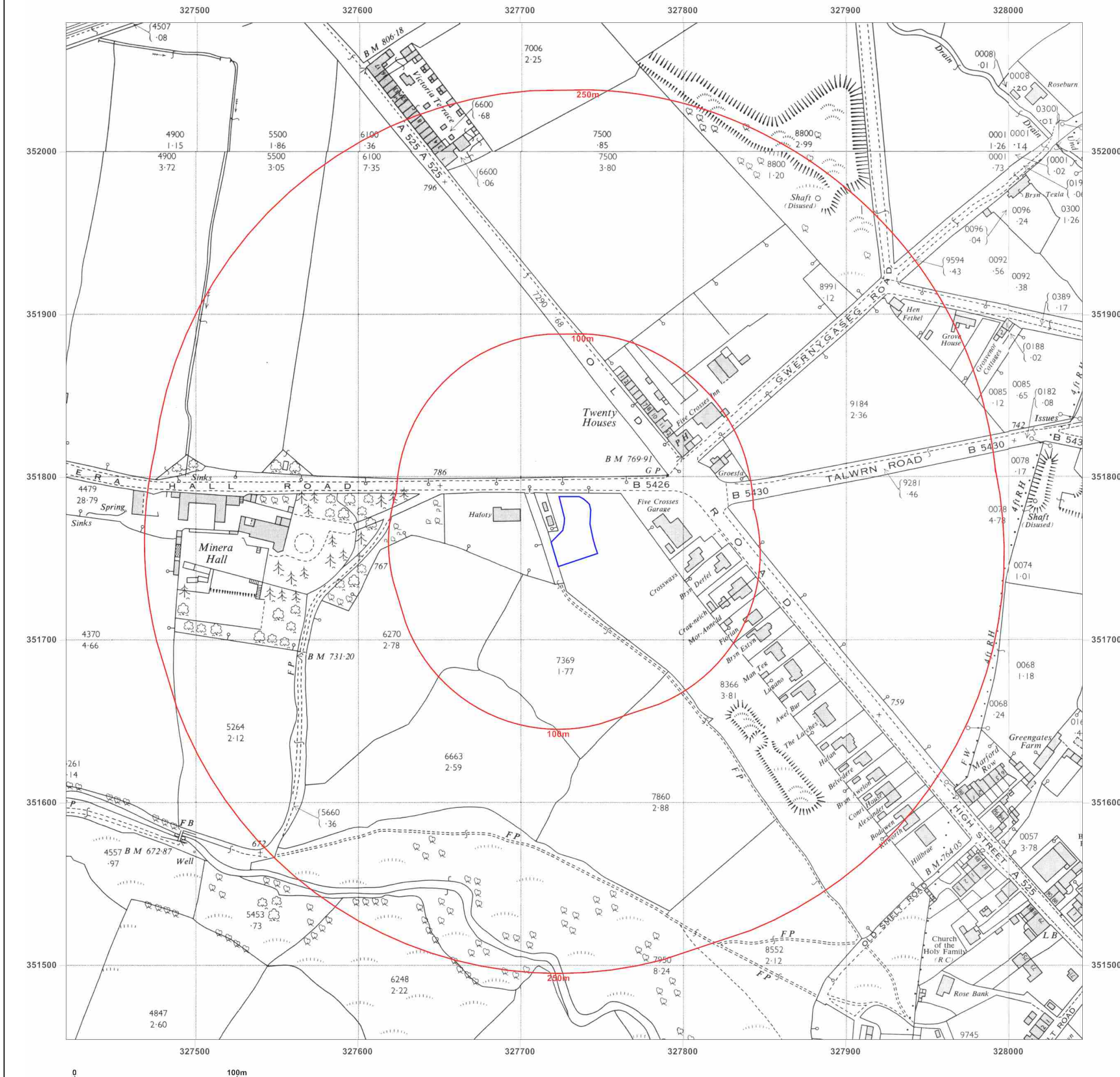


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Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1963-1967

Scale: 1:2,500

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Revised 1967
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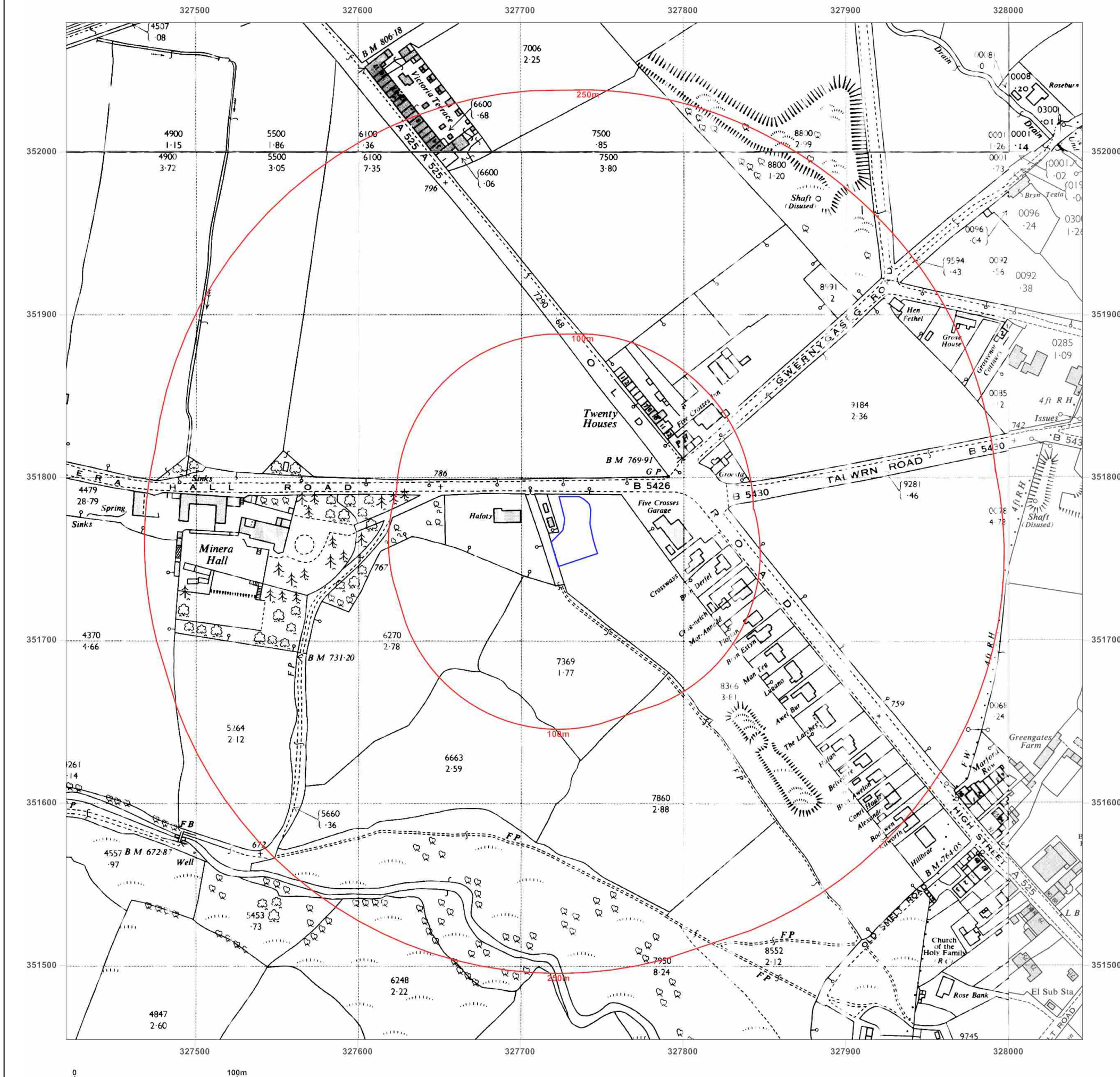


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Site Details:

2, NANTLAIS, MINERA,
WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1973-1977

Scale: 1:2,500

Printed at: 1:2,500



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Revised N/A
Edition N/A
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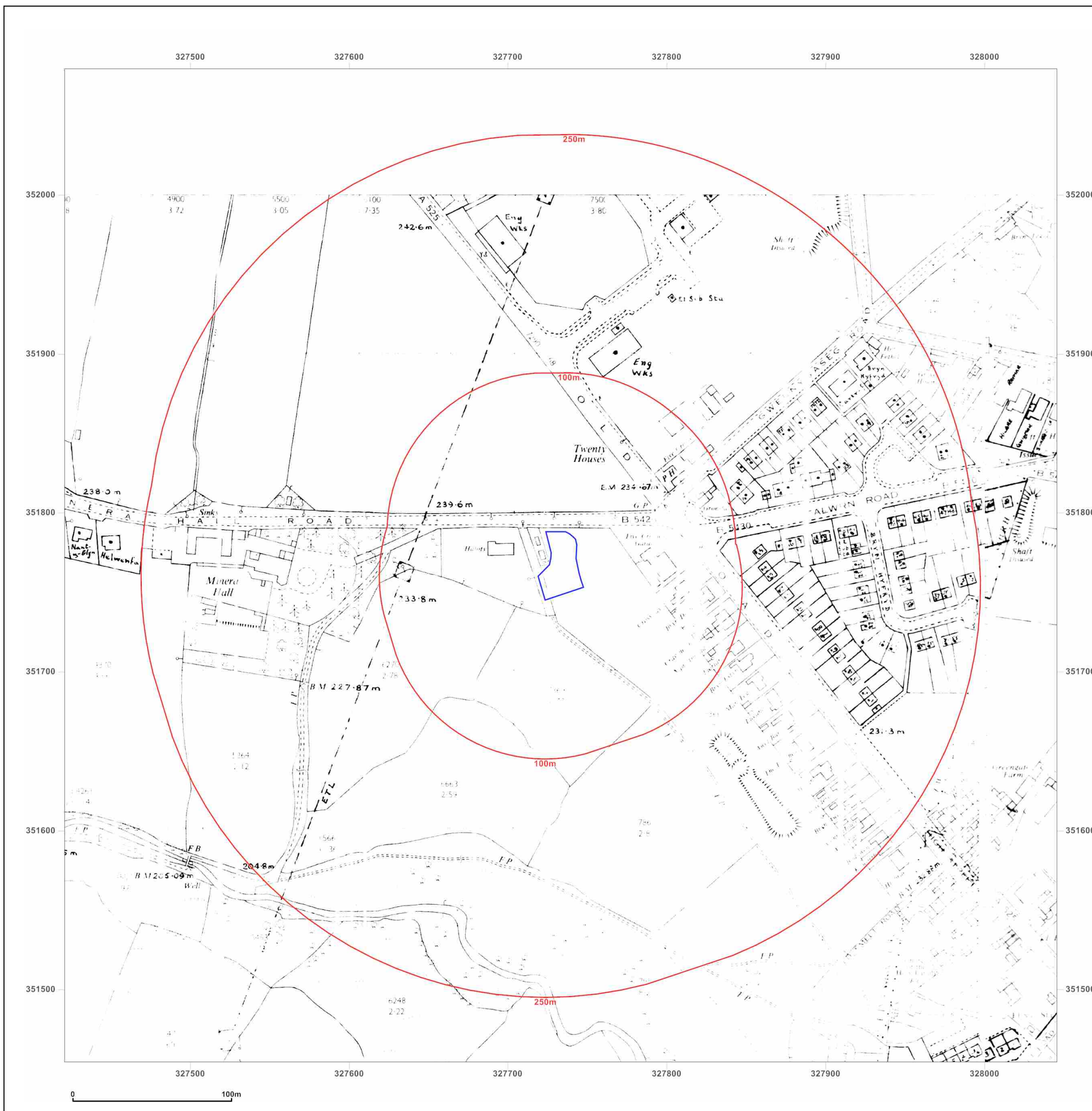


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Site Details:

2, NANTLAIS, MINERA,
WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1979-1984

Scale: 1:2,500

Printed at: 1:2,500



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Site Details:

2, NANTLAIS, MINERA,
WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1984-1989

Scale: 1:2,500

Printed at: 1:2,500



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Site Details:

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WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: National Grid

Map date: 1993

Scale: 1:2,500

Printed at: 1:2,500



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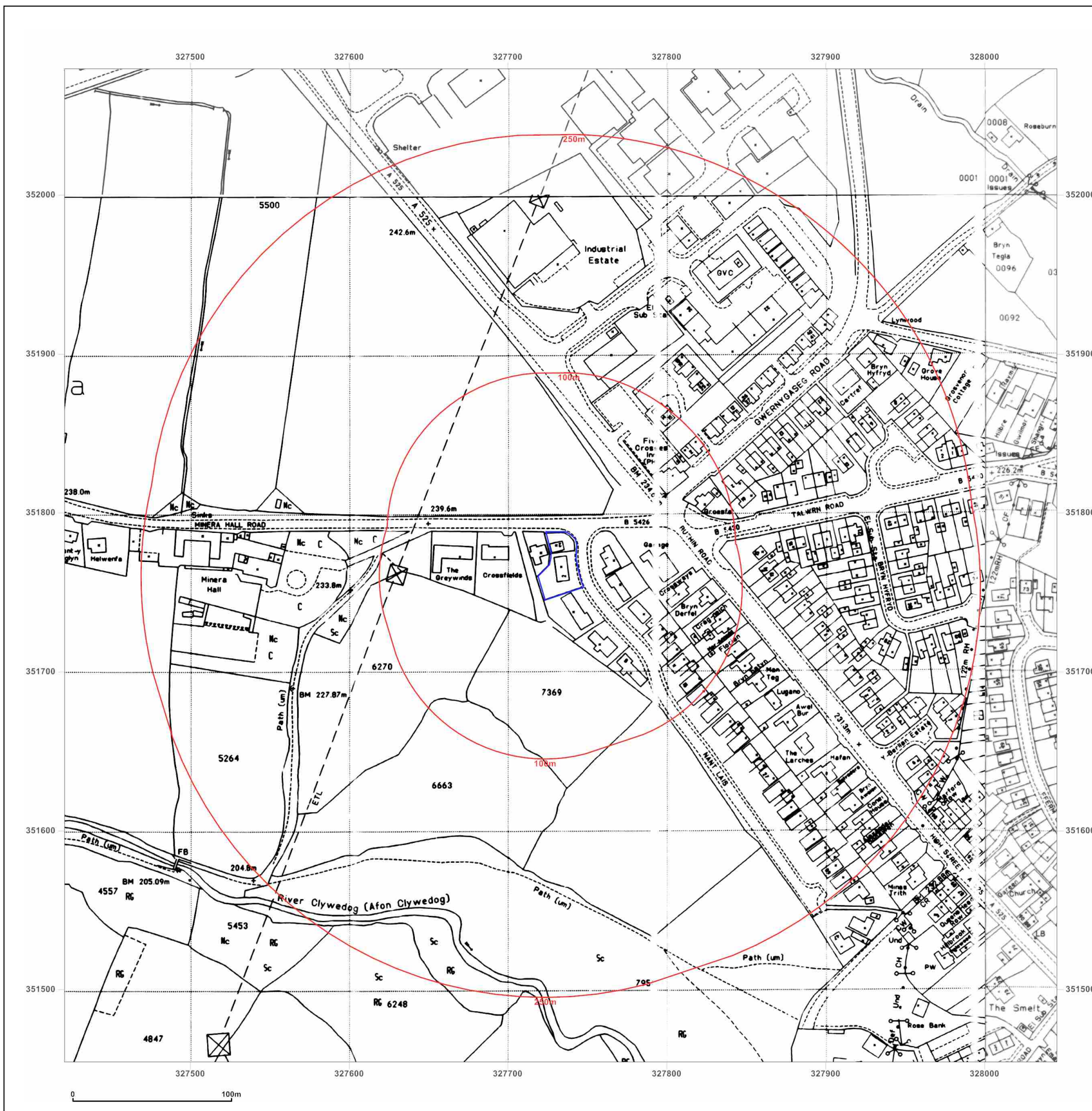


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Site Details:

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WREXHAM, LL11 3YY

Client Ref: E1330
Report Ref: HMD-165-7347688
Grid Ref: 327733, 351767

Map Name: LandLine

Map date: 2003

Scale: 1:1,250

Printed at: 1:1,250



2003



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