



PHASE I GEO-ENVIRONMENTAL SITE ASSESSMENT

**Clitheroe Road (Phase 3)
Barrow
Clitheroe
BB7 9AQ**

Prepared for:



Report Ref: 12-561-R01
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EXECUTIVE SUMMARY

Site Address	Land off Clitheroe Road (Phase 3), Barrow, Clitheroe BB7 9AQ	
Grid Reference	E 373730, N 437840	
Site Area	0.98 Hectares	
Current Site Use	<p>The subject site is a rectangular shaped parcel of land located c. 4.0km south of Clitheroe town centre.</p> <p>The site comprises two undeveloped fields divided by a fence through the central sector in a N to S orientation. Two sheds are located in the eastern field which appear to be used as stables.</p>	
Proposed Development	The client intend to develop the site for residential use; comprising the construction of 13 No. detached residential plots.	
Environmental Setting	<i>Drift Geology</i>	Glacial Till, Devensian – <i>Diamicton (Clay)</i> .
	<i>Bedrock Geology</i>	Clitheroe Limestone & Hodder Mudstone Formation
	<i>Hydrogeology</i>	The superficial deposits are Unproductive and are in turn underlain by a Secondary A Aquifer within the bedrock geology.
	<i>Groundwater Source Protection</i>	The site is not located within a Groundwater Source Protection Zone or Drinking Water Safeguard Zone.
	<i>Hydrology</i>	A small stream (tributary of the River Calder) is located <50m to the east of site.
	<i>Flood Risk</i>	The site is unaffected by flooding from rivers (Flood Zone 1).
	<i>Ecology</i>	No risk to ecology or aquatic ecosystems identified in the likely absence of contaminants.
	<i>Industrial Land Uses</i>	There are no hazardous installations or industrial land uses on-site or the immediate locality that may potentially prejudice the future development of the site for residential end use.
	<i>Subsidence Hazards</i>	None identified in data searches.
Site History	A review of the pertinent Ordnance Survey mapping dating from circa 1840s indicates the site has remained predominantly undeveloped land; except for three school buildings which extended into the central sector c. 1955-1975.	
Utility Locations	Service infrastructure is likely present within Clitheroe Road (west) and Whiteacre Lane (north).	
Landfill Sites & Ground Gases	<p>There are no landfill sites within a 250m radius of the site.</p> <p>Any localised Made Ground associated with the school buildings made present a low-level source of hazardous ground gas which may potentially pose a risk to human health.</p>	
Invasive Plant Species	No invasive plant species were observed during the site walkover.	
Radon	Lower Probability Area (<1% affected) – No protection measures required.	
Coal Mining / Land Stability	The site is not located within an area deemed to be at risk from ground instability arising from historic coal mining activities.	
Brine Pumping / Subsidence	The site is not located within an area deemed to be at risk from ground instability arising from historic brine pumping activities and/or salt extraction.	

EXECUTIVE SUMMARY

Geotechnical Risk

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

-  The site has remained predominantly undeveloped and as such the presence of Made Ground and relict foundations / sub-structures across the wider site is not anticipated.
-  However, three structures associated with Whiteacre School extended into the central portion of the site (from north of the site boundary) between 1955-1975 and therefore localised Made Ground underlying the former school buildings cannot be discounted;
-  No areas of in-filling have been identified and the site is not underlain by any historic mine workings or compressible ground / instability issues which may pose a future subsidence risk;
-  The underlying superficial geology will likely comprise a cohesive soil matrix and as such is unlikely to offer the required degree of permeability to make soak-away drainage viable in this instance;
-  Plot footings will require deepening in accordance with NHBC guidance 2016 Chapter 4.2 if the development incorporates any existing and proposed trees within the likely cohesive drift deposits; and
-  It is anticipated that the proposed dwellings will be constructed on traditional strip foundations. Proposed development levels will however dictate this.

Contaminated Land Risk Assessment

Human Health

No significant sources of contamination have been identified at the subject site or within the immediate locality that would pose a significant risk to human health or prejudice the future residential development at the site.

However, the potential for low-level contaminants within any localised Made Ground associated with the former school buildings cannot be discounted.

Controlled Waters

The Initial Conceptual Site Model has not identified any potential on-site sources of mobile contamination; as such there is no complete pollutant linkage and the site is deemed to pose a very low risk to the controlled water receptors.

Ground Gas

No significant sources of hazardous ground gas have been identified. However, the presence of any localised Made Ground may pose a low-level risk to constructions workers and residential end users

Recommendations

A Phase II intrusive Geo-Environmental Ground Investigation should be undertaken in order to confirm the findings of the Initial Conceptual Site Model and value engineer a development solution.

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Appendix III Drawings

Drawing No 12-561-001 – Site Location Plan

Drawing No 12-561-002 – Historical Features Plan

PWL Architecture (1218-PRE02) – Preliminary Development Scheme

Appendix IV Photograph

Appendix V Historical Maps

1. INTRODUCTION

1.1 Background

E3P Ltd have been commissioned by PWA Planning Ltd (the client) to undertake a detailed Phase I Geo-Environmental Site Assessment for a parcel of land located to the east of Clitheroe Road, Barrow; Clitheroe; herein referred to as **the site**.

This report is required to determine potential contaminated land and geotechnical liabilities associated with a proposed future residential development.

This parcel of land is Phase 3 of a wider development which includes two other parcels of land to the south currently under construction.

1.2 Proposed Development

E3P understands the client are involved with respect to the development of the site for residential end use; comprising the construction of 13 No. detached residential units with associated access road and adopted utility infrastructure.

The Preliminary Development Scheme is presented in excerpt Figure 1.1 (below) and Appendix III.

Figure 1.1 – Indicative Development Scheme



1.3 Objectives

The objectives of the Geo-Environmental Investigation are to:

- 📁 Review historical plans, geology, hydrogeology, site sensitivity, flood-plain issues, mining records and any local authority information available in order to complete a Desk Study in line with Environment Agency (EA) document Model Procedures for the Management of Contaminated Land (Contaminated Land Report 11 (CLR11));
- 📁 Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off-site receptors;
- 📁 Assess the desk study information and where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs; and,
- 📁 Provide recommendations regarding future works required and undertake a preliminary pre-construction cost appraisal.

1.4 Sources of Information

Background information was sought from the following sources:

- 📁 Envirocheck Search;
- 📁 Historical mapping dated 1848 to 2018. A selection of historical maps are reproduced in Appendix V;
- 📁 On-line planning records held by Ribble Valley Borough Council;
- 📁 Consultations with representatives of Ribble Valley Borough Council;
- 📁 Environment Agency Groundwater Vulnerability Map (www.environment-agency.gov.uk/wiyby);
- 📁 Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007); and,
- 📁 British Geological Survey Map.

1.5 Limitations

The limitations of this report are presented in Appendix I.

1.6 Confidentiality

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

1.7 Previous Reports

No previous reports have been made available for the subject site.

2. SITE SETTING

2.1 Site Details

Site Address	Land off Clitheroe Road, Barrow, Clitheroe BB7 9AQ
National Grid Reference	E 373730, N 437840
Site Area	0.98 Hectares

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

A site location map is presented in Appendix III as Drawing 12-561-001.

2.2 Current Site Use

E3P has undertaken a site walkover on the 8th May 2018 and a description of the key findings is summarised in Table 2.1.

Table 2.1 Site Description

SITE DESCRIPTION	
Occupancy / Use	The subject site is a rectangular shaped parcel of land located c. 4.0km south of Clitheroe town centre. The site comprises two undeveloped fields divided by a fence [Plate 4] through the central sector in a N to S orientation. Two sheds are located in the eastern field which appear to be used as stables [Plate 7].
Structures	There are no structures currently located within the site boundary.
Access	The site can be access through the adjacent development (Phase 2) from the south or via a gate leading from Whiteacre Lane in the NE corner [Plate 2].
Slope	The site is relatively flat with a slight fall in gradient to the south [Plate 5].
Retaining Structures	None identified.
Surface Cover (%)	Buildings: Nil
	Hardstand: Nil
	Soft Cover: 100%
Vegetation / Ecology	Mature trees are sporadically located around the site boundary [Plate 3 & 8]. A row of trees is also present within the southern portion of the site [Plate 6].
Invasive Plant Species	No invasive plant species were observed at the site.
Hazardous Material Storage	No Above Ground Storage Tanks (ASTs) or Underground Storage Tank (USTs) were observed at the site.
Asbestos Containing Material (ACM)	No ACM or Made Ground (which may potentially contain asbestos) was observed at the site.
Polychlorinated Biphenyl (PCB)	No equipment that may potentially contain PCB was observed at the site.
Waste Storage	No potentially hazardous waste streams are generated at the site.
Drainage	A formal drainage survey has not been completed under the scope of this report. Drainage infrastructure is likely present in Clitheroe Road (west).

2.3 Surrounding Area

The surrounding area land uses are summarised in Table 2.2.

Table 2.2 *Surrounding Land Uses*

DIRECTION	LAND USE
North	Residential Properties & Whiteacre Lane.
East	Woodland & Residential Properties.
South	Woodland & Residential Properties (Under Construction – Phase 2).
West	Residential Properties & Clitheroe Road.

3. SITE HISTORY

3.1 On-Site Historical Development

A review of historical mapping pertinent to the site is summarised in Table 3.1 below. The Historic Maps are presented in Appendix V.

Table 3.1 Site Historical Development

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1893 1:2,500	<p>The subject site is recorded as agricultural land with sporadic trees around the boundary.</p> <p>A field boundary encroaches into the southeast sector of the site.</p>	
1932 1:2,500	<p>No significant changes recorded.</p>	
1967-1969 1:2,500	<p>Whiteacre School is located to the north / east and three structures extend into the central portion of the site.</p> <p>These structures were demolished by c. 1978. The school was redeveloped for housing by 1989.</p> <p>No other significant changes recorded.</p>	
1992 1:2,500	<p>A field boundary now separates the site into a west and eastern field.</p> <p>No other significant changes recorded.</p>	

3.2 Off-Site Historical Development

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

Table 3.2 *Surrounding Potentially Contaminative Land Uses.*

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Corn Mill (with Electric Substation) <i>...Then Whalley Industrial Park</i>	200m	Pre 1967-Pre 1996 Pre 1996-Present	South
Whalley Abbey Print Works (Tanks) <i>...Then Engraving Works</i> <i>...Then Demolished</i>	250m	Pre 1893-Pre 1967 Pre 1967-Pre 2001 Pre 2001-Present	North

3.3 Planning History

EP3 has undertaken a review of on-line planning records held by Ribble Valley Borough Council and no environmentally pertinent information has been obtained for the subject site.

3.4 Anecdotal Information

No anecdotal geotechnical or environmentally pertinent information was identified following a web-based search of the area.

4. ENVIRONMENTAL SETTING

4.1 Geology and Hydrogeology

The British Geological Survey (BGS) map for the site, (1:50,000, Solid & Drift edition) and online records indicates the site is underlain by the geological sequence presented in Table 4.1.

Table 4.1 Summary of Underlying Geology

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	Glacial Till (Devensian)	Diamicton	Unproductive
Solid	Clitheroe Limestone Formation & Hodder Mudstone Formation	Limestone / Mudstone	Secondary A Aquifer

E3P has reviewed the BGS online records; the nearest available exploratory log relates to a borehole located c. 690m northeast of the study summarised in Table 4.2 (below).

Table 4.2 Summary of BGS Borehole Records

LOCATION	DEPTH	MADE GROUND	DRIFT	SOLID
Ref: SD73NW159	50.00	-	Boulder CLAY GL-8.00m bgl	SHALE 8.00-50.00m bgl

No faults are recorded within 250m of the site.

The Environmental Agency (EA) indicates the study site not is located within a Groundwater Source Protection Zone or a Drinking Water Safeguard Zone.

The nearest potable groundwater abstraction borehole is located c. 1970m southeast of the site operated by Wiswell Moor Meats.

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

It is likely that deeper regional groundwater may flow west towards the River Ribble.

4.2 Geotechnical Data

Geotechnical Data presented within a commercially available environmental database is summarised within Table 4.3.

Table 4.3 Summary of Geotechnical Data

HAZARD	DESIGNATION
Shrink-Swell Clay	Very Low Risk
Landslides	Very Low Risk
Ground Dissolution	Very Low Risk
Compressible Ground	No Recorded Risk
Collapsible Deposits	Very Low Risk
Running Sand	Very Low Risk
Natural Cavities	None recorded within 2000m
Man-made Cavities	None recorded within 2000m

4.3 Coal Mining

The Envirocheck Report states the site is in an area which may be affected by coal mining activity.

The Coal Authority operates a risk based approach to the assessment of potential instability issues associated with future development of land located within the pre-defined Coal Authority Consultation Areas. This risk based approach sub-divides the potential risk into 'Low & High' Risk Categories.

To determine the initial risk classification of the proposed development site, a search of the Coal Authority Gazetteer (<http://mapapps2.bgs.ac.uk/coalauthority/home.html>) has been undertaken to assess the locality of the proposed development in relation to known or potential areas of mining risk.

The results of this search confirmed that the proposed development site is located within an area deemed to at a **Low Risk** from historic mine workings therefore no further assessment is required.

4.4 Brine Workings

The site is not situated in an area affected by brine pumping / extraction or rock salt mining.

4.5 Hydrology

The nearest watercourse is a stream located c. 38m east of the site at its nearest approach.

The site is predominantly located within a currently defined Flood Risk Zone 1; defined as land as having a less than 1 in 1,000 annual probability of river or sea flooding.

In addition, the Envirocheck report confirms the site to have potential for groundwater flooding to occur at the site.



4.6 Radon Risk Potential

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

4.7 Industrial Land Uses






There is one Trade Directory entry listed within a 250m radius of the site; this relates to Red Moon Catering (catering equipment) located c. 238m south of the site.

The Envirocheck report records indicate there are two Fuel Station entries located within a 2000m radius of the site; as detailed below:

-  Pendle Garage – Clitheroe Road (276m SW) – *Obsolete / Closed*; and
-  Co-op Clitheroe – Ribble Valley Enterprise Park (523m NE) – *Open*.

4.8 Hazardous Substance Consents

The Envirocheck Report confirms the absence of the following Hazardous Installations within 1.0km of the site:

-  Control of Major Accident Hazard (COMAH) Sites
-  Explosive Sites;
-  Notification of Installation Handling Hazardous Substances (NIHHS);
-  Planning Hazardous Substance Consents; and,
-  Planning Hazardous Substance Enforcements.

4.9 Sensitive Land Uses

There are residential properties located immediately adjacent to the north and west of the site.

No other potentially sensitive land uses have been identified within a 250m radius of the site.

4.10 Site Sensitivity Assessment

The site is assessed to be located within a **Moderate** sensitivity setting as discussed in Table 4.4.

Table 4.4 Site Sensitivity Assessment

SENSITIVITY PROFILE	DISCUSSION	RATING
Sensitive land uses within close proximity (e.g. residential, school, nursery, local nature reserves etc.)	Residential properties are located within a 50m radius of the site.	High
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a Groundwater Source Protection Zone or Drinking Water Safeguard Area.	Low
Distance to the closest groundwater abstraction point.	There are no commercial groundwater abstraction boreholes within a 500m radius.	Low
	There are no potable groundwater abstraction boreholes within influencing distance of the site. The nearest is located c. 1970m SE.	
Aquifer Classification in Superficial Drift Deposits.	The superficial deposits are predominantly Unproductive within the Glacial Till and therefore not considered a sensitive receptor in this instance.	Low
Aquifer classification in Bedrock.	The Secondary A Aquifer is considered a potential receptor in this instance; however the overall sensitivity of this receptor is reduced given the absence of any potable groundwater boreholes within close proximity.	Low
Is the site underlain by low permeability Drift to depths in excess of 10.0m?	There are no boreholes records within 500m of the site. The nearest is located c. 690m NE and recorded boulder CLAY to 8m bgl.	Low
	However, the exact drift conditions for the site cannot be known without an intrusive GI.	
Is the site located within 50m of a surface watercourse?	A watercourse is located c. 38m east of the site at its nearest approach.	High
Overall Site Environmental Sensitivity		Moderate

4.11 Unexploded Ordnance

The regional unexploded bomb risk map from Zetica indicates that the site is an area of Lancashire considered to be at *Low Risk* from possible Unexploded Ordnance (UXO) resulting from Second World War air-delivered ordnance.

4.12 Preliminary Geotechnical Assessment

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

- 📦 The site has remained predominantly undeveloped and as such the presence of Made Ground and relict foundations / sub-structures across the wider site is not anticipated.
- 📦 However, three structures associated with Whiteacre School extended into the central portion of the site (from north of the site boundary) between 1955-1975 and therefore localised Made Ground underlying the former school buildings cannot be discounted;
- 📦 No areas of in-filling have been identified and the site is not underlain by any historic mine workings or compressible ground / instability issues which may pose a future subsidence risk;
- 📦 The underlying superficial geology will likely comprise a cohesive soil matrix and as such is unlikely to offer the required degree of permeability to make soak-away drainage viable in this instance;
- 📦 Plot footings will require deepening in accordance with NHBC guidance 2016 Chapter 4.2 if the development incorporates any existing and proposed trees within the likely cohesive drift deposits; and
- 📦 It is anticipated that the proposed dwellings will be constructed on traditional strip foundations. Proposed development levels will however dictate this.

5. CONSULTATIONS

5.1 Contaminated Land Officer

E3P has submitted an enquiry with the Contaminated Land Officer at Ribble Valley Borough Council regarding potential contaminated land issues and/or development constraints and a response is awaited.

Any pertinent information received will be issued as an addendum to this report.

5.2 Landfill Sites and Waste Treatment Sites

The Envirocheck report states there are no landfill sites (current or historic) or waste treatment facilities within a 250m radius of the site.

5.3 Regulatory Database

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250m of the subject site and not otherwise detailed in the report.

Table 5.1 Summary of Environmental Data

RECORD	ENTRIES WITHIN 250m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified (N/A).
Authorised industrial processes (IPC/IPPC/LAPPC).	0	N/A
Fuel Stations Entries	0	N/A
Licensed radioactive substances	0	N/A
Enforcements, prohibitions or prosecutions	0	N/A
Discharge Consents	0	N/A
Pollution Incidents	1	The incident was of minor severity and occurred in May 1995 involving the release of inert suspended solids. The incident is not thought to have a residual impact on the application site.
Consents issued under the Planning (Hazardous Substances) Act 1990	0	N/A
Control of Major Accident Hazard (COMAH) sites	0	N/A

6. INITIAL CONCEPTUAL SITE MODEL

6.1 Initial CSM







In accordance with Environment Agency, CLR 11 (2004) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P Ltd has developed an initial CSM to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 6.1.

Table 6.1 Initial Conceptual Site Model

SOURCE	EXPOSURE	POTENTIAL PATHWAY
Human Health		
Heavy Metals & non-volatile PAH in and Made Ground	Dermal Contact and Ingestion Consumption of Home-grown Produce	Construction Workers Residential End Users
<p>Discussion: No significant sources of heavy metals, non-volatile PAH and TPH compounds have been identified at the site; other than potential for localised Made Ground associated with the historic school structures; and as such there is considered to be a very low risk to human health.</p> <p>Asbestos containing material may be presented within any localised Made Ground; however, given the predominantly undeveloped undeveloped nature of the site; the wide spread presence of any asbestos or contaminants is not anticipated.</p> <p>If impacted soils area present, a suitable cover system designed in accordance with BRE465 (<i>Cover Systems for Land Regeneration</i>) or localised mitigation may be required.</p>		
Hazardous Ground Gases	Vapour Inhalation Volatilisation to Indoor Air	Construction Workers Residential End Users
<p>Discussion: The presence of any localised Made Ground may represent a potential source of hazardous ground gas which can accumulate within deep excavations or migrate through permeable strata, foundation structures and/or service ducting and pose a potential low-level risk to construction workers and future residential site users.</p> <p>Carbon dioxide and methane have asphyxiation and explosive risks, respectively.</p> <p>If the underlying Made Ground is found to be actively gassing the risk to construction workers can be mitigated through appropriate management of confined space entry.</p> <p>Should a ground gas risk be identified to end users, the risks can be mitigated through the adoption of suitable control measures within the building construction using guidance presented within CIRIA 665 (<i>Assessing Risk Posed by Hazardous Ground Gases to Buildings</i>) and BS8485 (<i>Code of Practice for the Characterisation and Remediation from Ground Gas in Affected Developments</i>).</p>		
Controlled Waters		
Hydrocarbons / PAH in Made Ground	Lateral & Vertical Migration	Unnamed Stream Secondary A Aquifer
<p>Discussion: The presence of soluble phase contaminants within the soils is not anticipated.</p> <p>The Secondary A Aquifer underlying the site is not considered a sensitive receptor; furthermore in the absence of any potentially contaminative sources or potable water abstraction boreholes within a 1970m radius the overall sensitivity of this receptor is significantly reduced.</p> <p>A stream is located within 50m of the site; however, in the absence of any potential sources of contaminants the risk to controlled waters is considered to be very low.</p>		

SOURCE	EXPOSURE	POTENTIAL PATHWAY
Buildings and Infrastructure		
pH & Sulphate	Corrosion of Concrete	Foundation / Concrete
<p>Discussion: Assessment must be undertaken to confirm the levels of pH and sulphate within the underlying strata and in particular any Made Ground deposits so that a concrete classification can be determined.</p>		
Ecology		
None identified	N/A	N/A
<p>Discussion: In the likely absence of any potential sources of mobile contaminants, no risk to ecology or aquatic ecosystems has been identified.</p>		

7. CONCLUSIONS AND RECOMMENDATIONS

Contamination Issues	
Human Health	<p>No significant sources of contamination have been identified at the subject site or within the immediate locality that would pose a significant risk to human health or prejudice the future residential development at the site.</p> <p>However, the potential for low-level contaminants within any localised Made Ground associated with the former school buildings cannot be discounted.</p>
Controlled Waters	<p>The Initial Conceptual Site Model has not identified any potential on-site sources of mobile contamination; as such the site is deemed to pose a very low risk to controlled waters.</p>
Ground Gas	<p>No significant sources of hazardous ground gas which may pose a low-level risk to constructions workers and residential end users have been identified.</p>
Radon	<p>Lower Probability Area (<1% affected) – No radon protection measures required.</p>
Potable Waters	<p>Based on existing information, that the use of Poly-Ethylene Pipe (PE) for water supply infrastructure will likely be suitable for proposed residential development.</p>
Geotechnical Issues	
<p>The following potential geotechnical constraints have been identified at the site:</p> <ul style="list-style-type: none">  The site has remained predominantly undeveloped and as such the presence of Made Ground and relict foundations / sub-structures across the wider site is not anticipated.  However, three structures associated with Whiteacre School extended into the central portion of the site (from north of the site boundary) between 1955-1975 and therefore localised Made Ground underlying the former school buildings cannot be discounted;  No areas of in-filling have been identified and the site is not underlain by any historic mine workings or compressible ground / instability issues which may pose a future subsidence risk;  The underlying superficial geology will likely comprise a cohesive soil matrix and as such is unlikely to offer the required degree of permeability to make soak-away drainage viable in this instance;  Plot footings will require deepening in accordance with NHBC guidance 2016 Chapter 4.2 if the development incorporates any existing and proposed trees within the likely cohesive drift deposits; and  It is anticipated that the proposed dwellings will be constructed on traditional strip foundations. Proposed development levels will however dictate this. 	

END OF REPORT

APPENDIX I LIMITATIONS



1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the Client as indicated in Section 1.2.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos-containing materials this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re-interpretation of the report, in whole or in part.



APPENDIX II GLOSSARY



TERMS

AST	Above Ground Storage Tank	SGV	Soil Guideline Value
BGS	British Geological Survey	SPH	Separate Phase Hydrocarbon
BSI	British Standards Institute	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
BTEX	Benzene, Toluene, Ethylbenzene, Xylenes	SPT	Standard Penetration Test
CIEH	Chartered Institute of Environmental Health	SVOC	Semi Volatile Organic Compound
CIRIA	Construction Industry Research Association	UST	Underground Storage Tank
CLEA	Contaminated Land Exposure Assessment	VCCs	Vibro Concrete Columns
CSM	Conceptual Site Model	VOC	Volatile Organic Compound
DNAPL	Dense Non-Aqueous Phase Liquid (chlorinated solvents, PCB)	WTE	Water Table Elevation
DWS	Drinking Water Standard	m	Metres
EA	Environment Agency	km	Kilometres
EQS	Environmental Quality Standard	%	Percent
GAC	General Assessment Criteria	%v/v	Percent volume in air
GL	Ground Level	mb	Milli Bars (atmospheric pressure)
GSV	Gas Screening Value	l/hr	Litres per hour
HCV	Health Criteria Value	µg/l	Micrograms per Litre (parts per billion)
ICSM	Initial Conceptual Site Model	ppb	Parts Per Billion
LNAPL	Light Non-Aqueous Phase Liquid (petrol, diesel, kerosene)	mg/kg	Milligrams per kilogram (parts per million)
ND	Not Detected	ppm	Parts Per Million
LMRL	Lower Method Reporting Limit	mg/m³	Milligram per metre cubed
NR	Not Recorded	m bgl	Metres Below Ground Level
PAH	Polycyclic Aromatic Hydrocarbon	m bcl	Metre Below Cover Level
PCB	Poly-Chlorinated Biphenyl	mAOD	Metres Above Ordnance Datum (sea level)
PID	Photo Ionisation Detector	kN/m²	Kilo Newtons per metre squared
QA	Quality Assurance	µm	Micro metre
SGV	Soil Guideline Value		

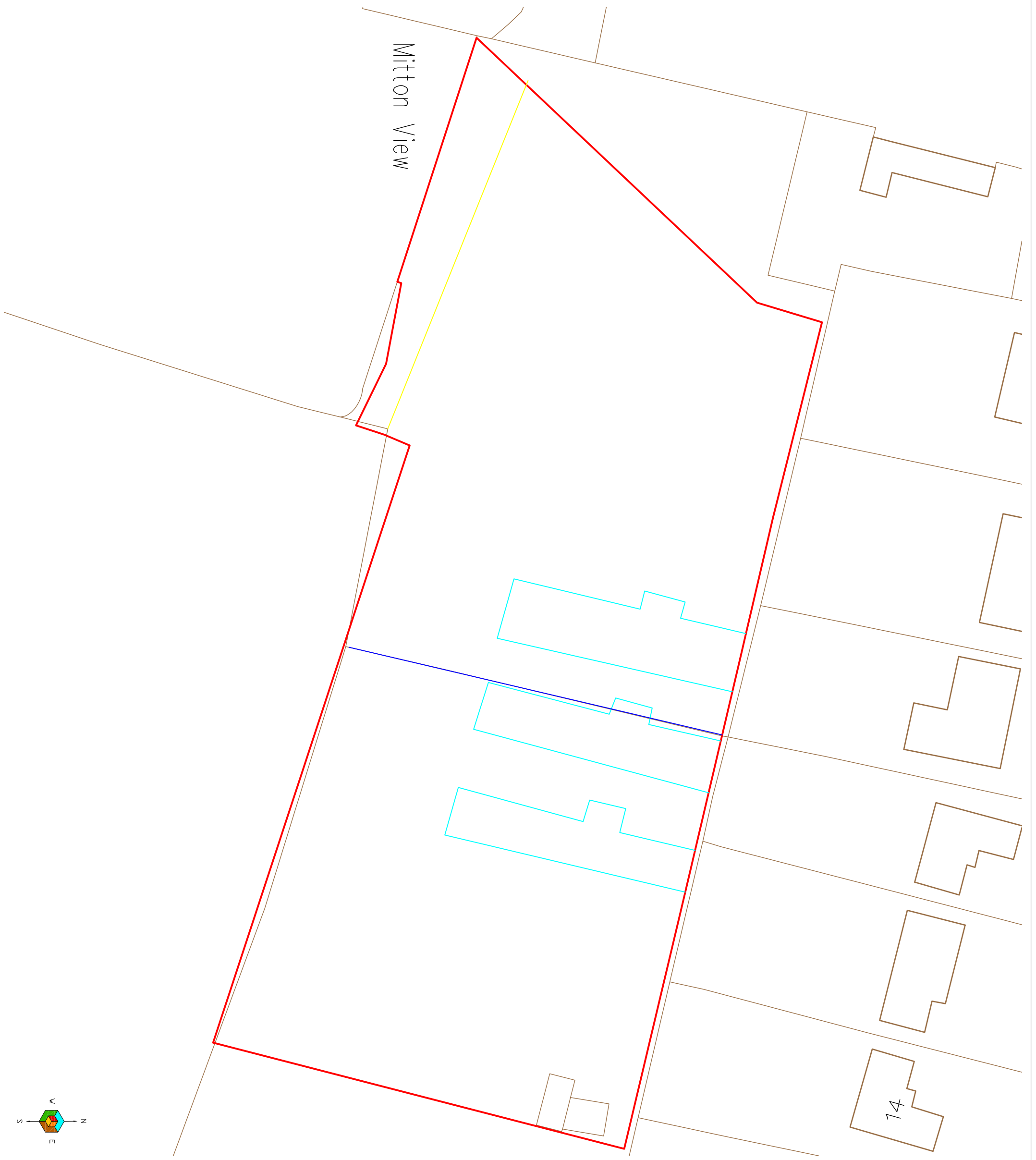
APPENDIX III DRAWINGS



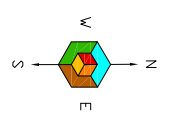


Drawing 12-561-R01 - Site Location Plan





- Historical Features**
- Former Field Boundary (Pre 1893 - Pre 1932)
 - Former School Buildings (Pre 1955 - Pre 1975)
 - Field Boundary (Pre 1983 - Present)



Phase	P1	-	24.05.2018	DRAFT	HM	MD
	Revision		Date	Issue	Drawn	Authorised

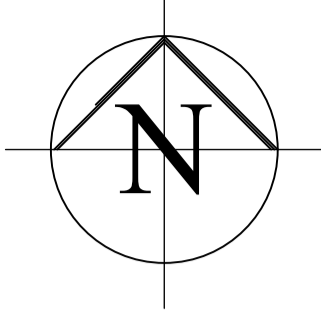
Client	PWA Planning	
	Job No:	Date:
Drawing No:	12-561	24.05.2018
Scale:	NTS	

Job Title:	Clitheroe Road, Barrow Phase 3	Drawing Title:	Historic Features Plan
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 E-mail: info@e3p.co.uk
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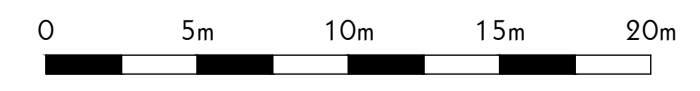


The Studio 29 Bent Lane Leyland Preston PR25 4HP
Tel 01772 467404 E Mail info@pwlarchitecture.com

Title
Preliminary Proposed
Site Layout

Project
Proposed Development at
Clitheroe Road, Barrow
Phase 3

Scale 1:250@A1	Date October 2017
Drawn PL	Drwg No 1218-PRE02



APPENDIX IV PHOTOGRAPHS





PLATE 1 – PRIVATE ACCESS FROM ADJACENT FIELD TO THE EAST



PLATE 2 – PRIVATE ACCESS LEADING FROM WHITEACRE LANE





PLATE 3 – THE WESTERN PORTION OF THE SITE LOOKING NORTHEAST



PLATE 4 – POST & WIRE FENCE WHICH SEPERATES THE TWO FIELDS

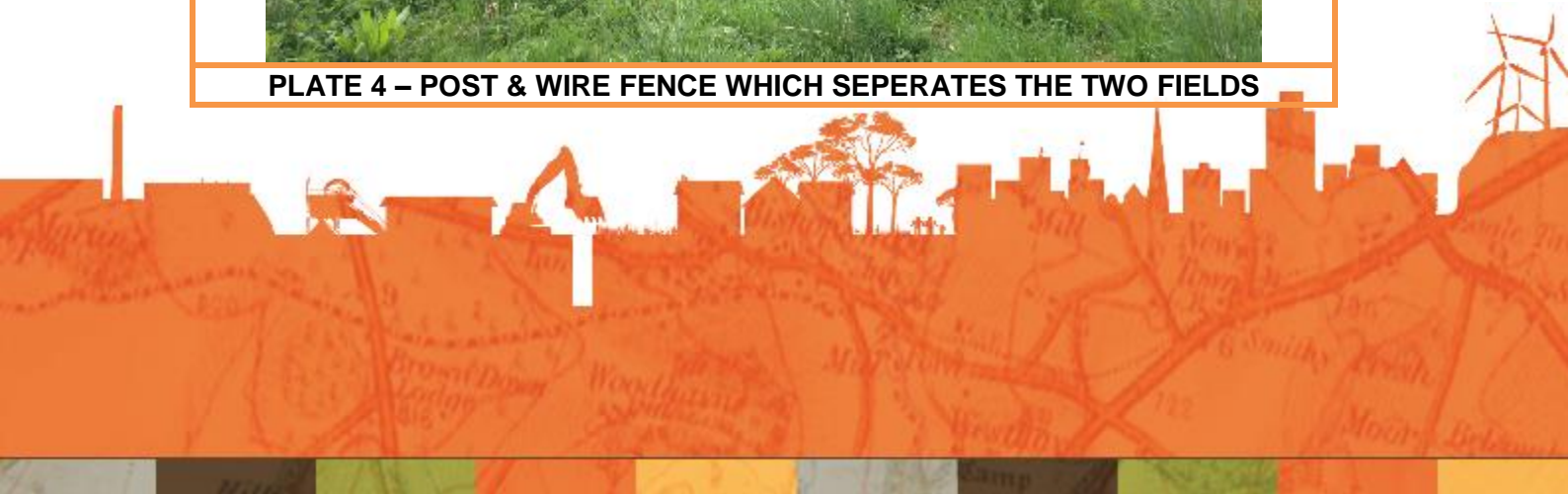




PLATE 5 – VIEW OF THE SITE LOOKING WEST



PLATE 6 –MATURE TREES ADJACENT TO THE SOUTHERN BOUNDARY

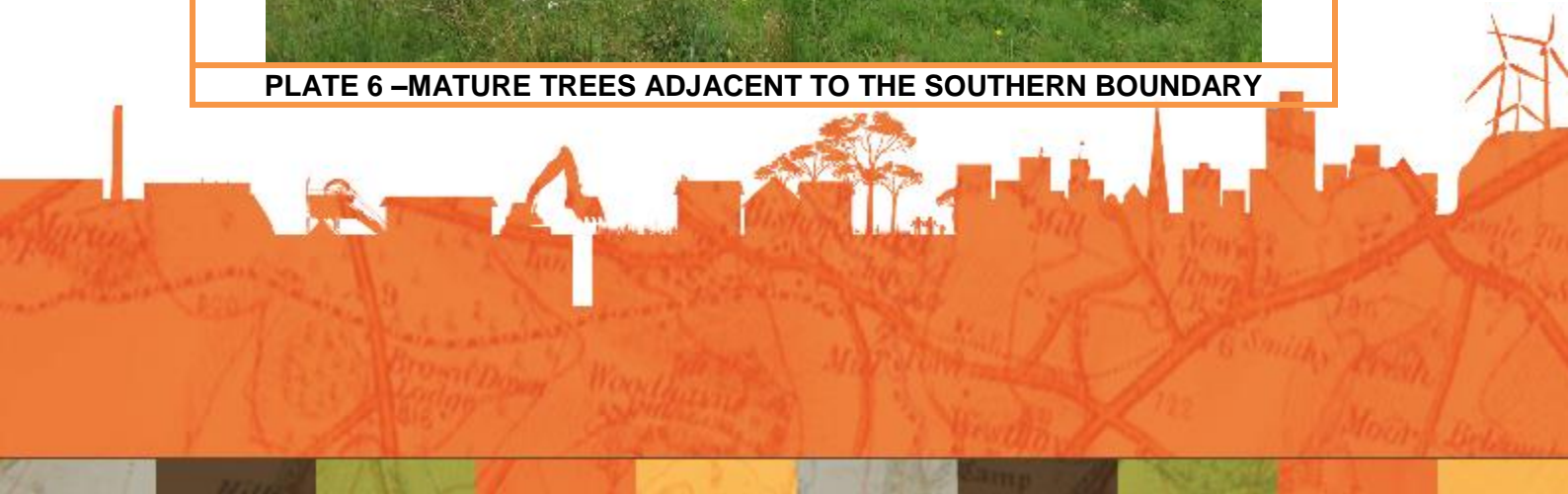
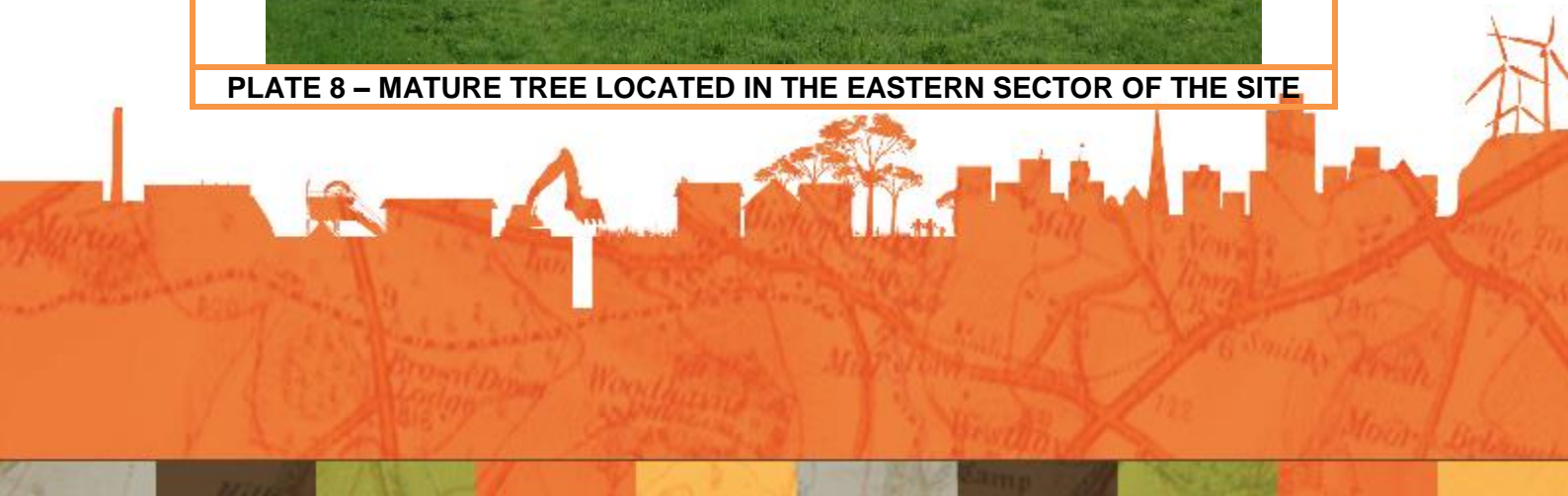




PLATE 7 – TWO SHEDS IN THE EASTERN SECTOR OF THE SITE



PLATE 8 – MATURE TREE LOCATED IN THE EASTERN SECTOR OF THE SITE



APPENDIX V HISTORICAL MAP



Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500

Quarry **Gravel Pit** **Sand Pit**
Clay Pit **Shingle** **Refuse Heap**
Sloping Masonry **Flat Rock**
Marsh **Reeds** **Osiers**
Rough Pasture **Furze** **Wood**
Mixed Wood **Brushwood** **Orchard**
Fir **Ford** **Stepping Stones**
Ferry **Waterfall** **Lock**
Trig. Station **Altitude at Trig. Station**
B.M. 325.9 **Bench Mark** **Surface Level**
Arrow denotes flow of water **Antiquities (site of)**
Cutting **Embankment**
Railway crossing Road **Level Crossing** **Road crossing Railway**
Railway crossing River or Canal **Road over single stream** **Road over River or Canal**
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
County Borough Boundary (England)
County Burgh Boundary (Scotland)
Co. Boro. Bdy.
Co. Burgh Bdy.
BP BS Boundary Post or Stone **P.C.B** Police Call Box
B.R. Bridle Road **P** Pump
E.P Electricity Pylon **S.P** Signal Post
F.B. Foot Bridge **Sl** Sluice
F.P. Foot Path **Sp.** Spring
G.P Guide Post or Board **T.C.B** Telephone Call Box
M.S Mile Stone **Tr.** Trough
M.P M.R Mooring Post or Ring **W** Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250

Inactive Quarry, Chalk Pit or Clay Pit **Active Quarry, Chalk Pit or Clay Pit**
Rock **Boulders**
Cliff **Slopes** **Top**
Roofed Building **Glazed Roof Building**
Sloping Masonry **Archway**
Non-Coniferous Tree (surveyed) **Coniferous Tree (surveyed)**
Non-Coniferous Trees (not surveyed) **Coniferous Trees (not surveyed)**
Orchard Tree **Scrub** **Bracken**
Coppice, Osier **Reeds** **Marsh, Saltings**
Rough Grassland **Heath** **Culvert**
Direction of water flow **Bench Mark** **Antiquity (site of)**
Cave Entrance **Triangulation Station** **Electricity Pylon**
Electricity Transmission Line
County Boundary (Geographical)
County & Civil Parish Boundary
Civil Parish Boundary
Admin. County or County Bor. Boundary
London Borough Boundary
Symbol marking point where boundary mereing changes
BH Beer House **P** Pillar, Pole or Post
BP, BS Boundary Post or Stone **PO** Post Office
Cn, C Capstan, Crane **PC** Public Convenience
Chy Chimney **PH** Public House
D Fn Drinking Fountain **Pp** Pump
EI P Electricity Pillar or Post **SB, S Br** Signal Box or Bridge
FAP Fire Alarm Pillar **SP, SL** Signal Post or Light
FB Foot Bridge **Spr** Spring
GP Guide Post **Tk** Tank or Track
H Hydrant or Hydraulic **TCB** Telephone Call Box
LC Level Crossing **TCP** Telephone Call Post
MH Manhole **Tr** Trough
MP Mile Post or Mooring Post **Wr Pt, Wr T** Water Point, Water Tap
MS Mile Stone **W** Well
NTL Normal Tidal Limit **Wd Pp** Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250

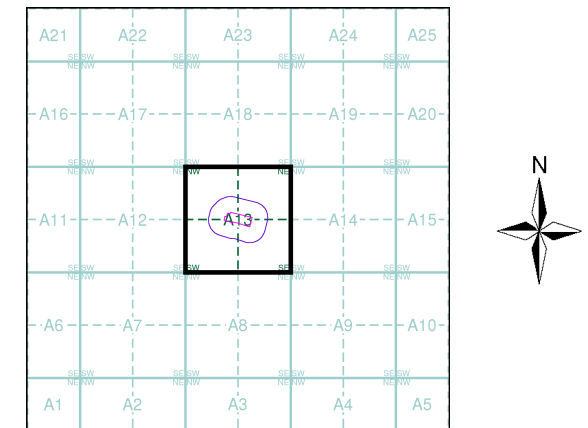
Cliff **Slopes** **Top**
Rock **Rock (scattered)**
Boulders **Boulders (scattered)**
Positioned Boulder **Scree**
Non-Coniferous Tree (surveyed) **Coniferous Tree (surveyed)**
Non-Coniferous Trees (not surveyed) **Coniferous Trees (not surveyed)**
Orchard Tree **Scrub** **Bracken**
Coppice, Osier **Reeds** **Marsh, Saltings**
Rough Grassland **Heath** **Culvert**
Direction of water flow **Triangulation Station** **Antiquity (site of)**
Electricity Transmission Line **Electricity Pylon**
B.M. 231.60m Bench Mark **Buildings with Building Seed**
Roofed Building **Glazed Roof Building**
Civil parish/community boundary
District boundary
County boundary
Boundary post/stone
Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)
Bks Barracks **P** Pillar, Pole or Post
Bty Battery **PO** Post Office
Cemy Cemetery **PC** Public Convenience
Chy Chimney **Pp** Pump
Cis Cistern **Ppg Sta** Pumping Station
Dismtd Rly Dismantled Railway **PW** Place of Worship
EI Gen Sta Electricity Generating Station **Sewage Ppg Sta** Sewage Pumping Station
EI P Electricity Pole, Pillar **SB, S Br** Signal Box or Bridge
EI Sub Sta Electricity Sub Station **SP, SL** Signal Post or Light
FB Filter Bed **Spr** Spring
Fn / D Fn Fountain / Drinking Ftn. **Tk** Tank or Track
Gas Gov Gas Valve Compound **Tr** Trough
GVC Gas Governor **Wd Pp** Wind Pump
GP Guide Post **Wr Pt, Wr T** Water Point, Water Tap
MH Manhole **Wks** Works (building or area)
MP, MS Mile Post or Mile Stone **W** Well



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Yorkshire	1:2,500	1894	3
Yorkshire	1:2,500	1908	4
Lancashire And Furness	1:2,500	1912	5
Lancashire And Furness	1:2,500	1932	6
Ordnance Survey Plan	1:2,500	1967 - 1969	7
Ordnance Survey Plan	1:2,500	1973 - 1978	8
Additional SIMs	1:2,500	1983 - 1989	9
Large-Scale National Grid Data	1:2,500	1992	10
Large-Scale National Grid Data	1:2,500	1995	11
Large-Scale National Grid Data	1:2,500	1995	12
Large-Scale National Grid Data	1:2,500	1996	13
Large-Scale National Grid Data	1:2,500	1996	14

Historical Map - Segment A13



Order Details

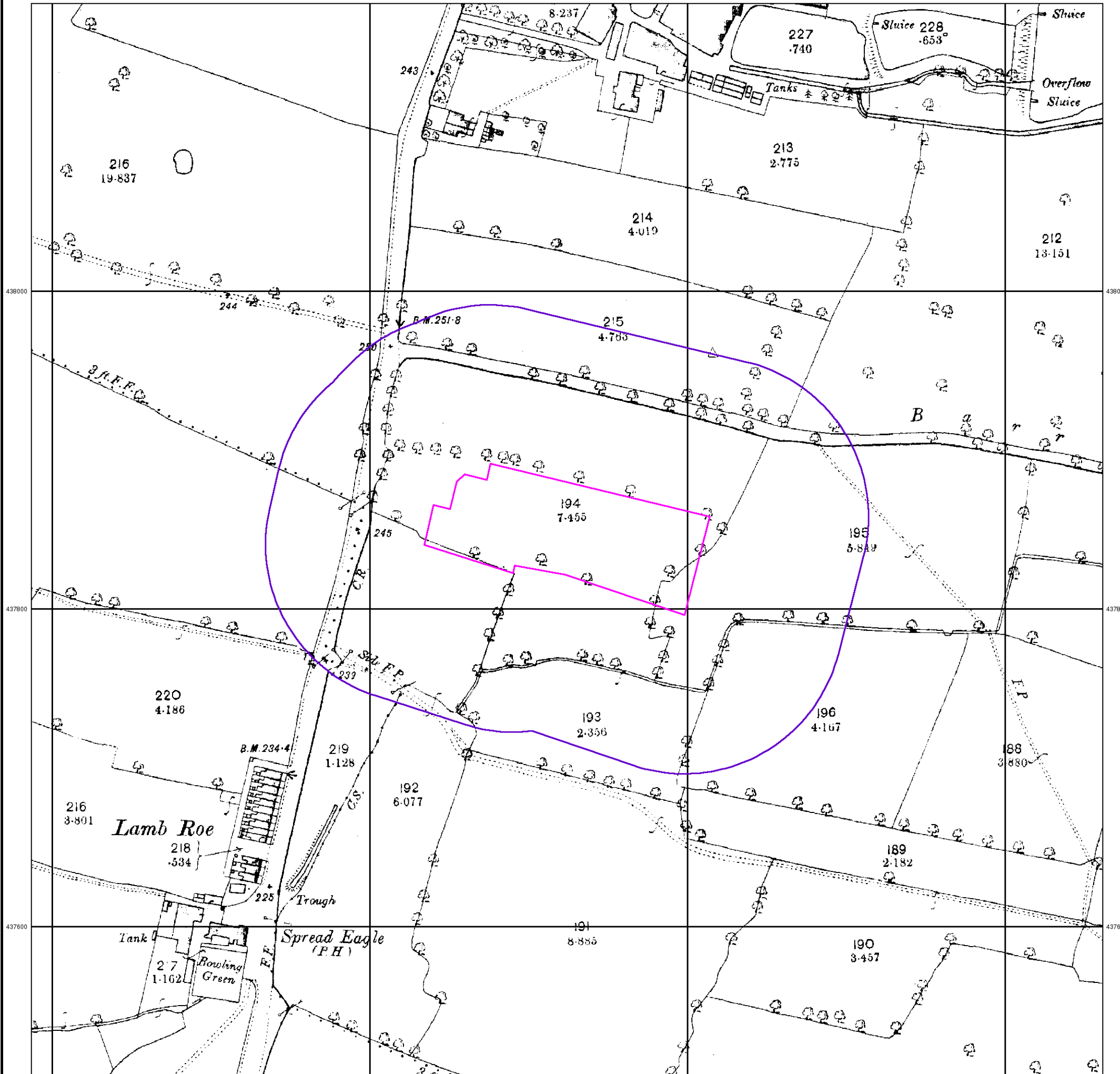
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 Search Buffer (m): 100

Site Details

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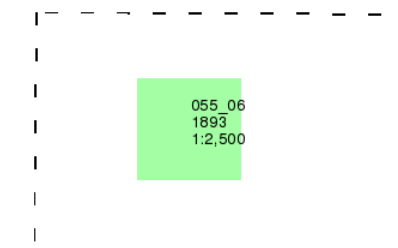
Lancashire And Furness

Published 1893

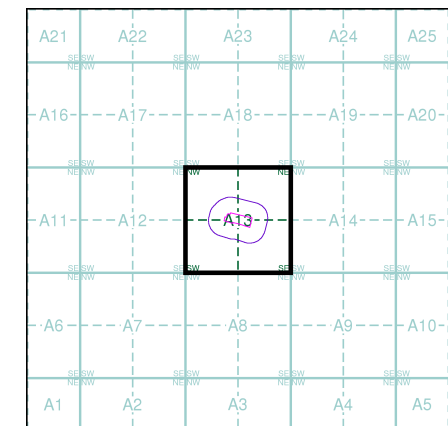
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



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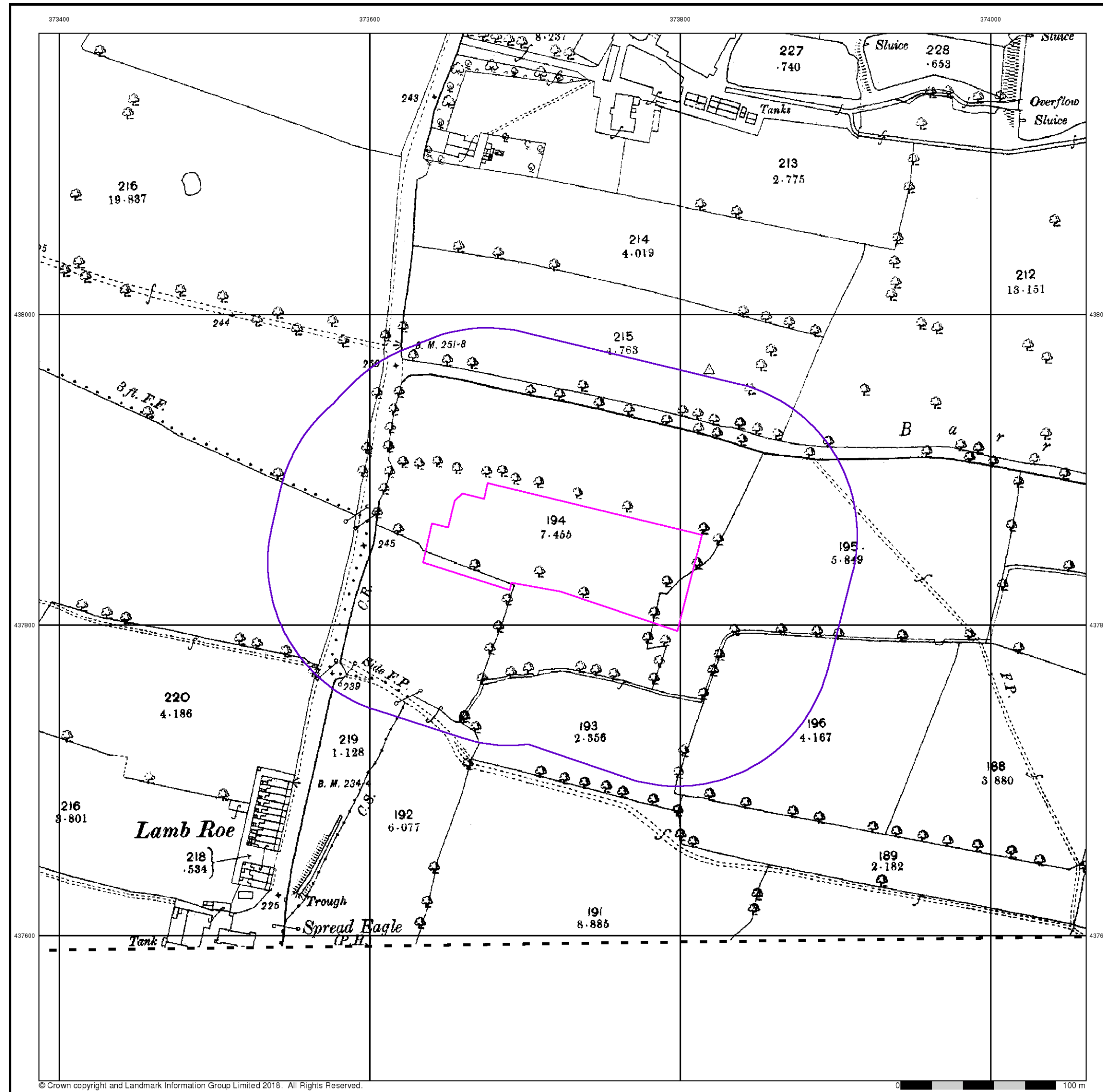
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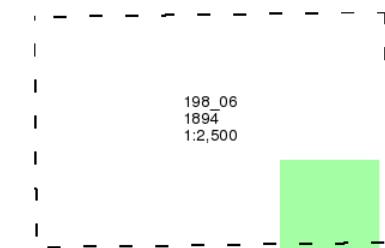
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Published 1894

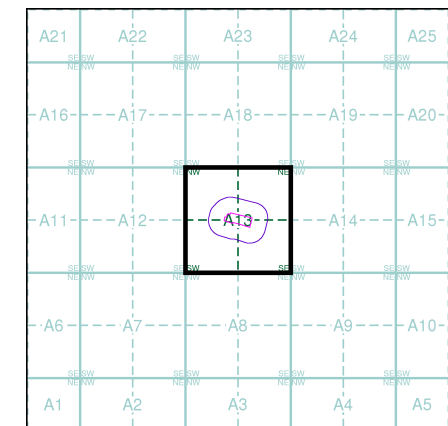
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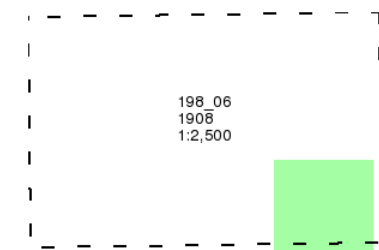
Yorkshire

Published 1908

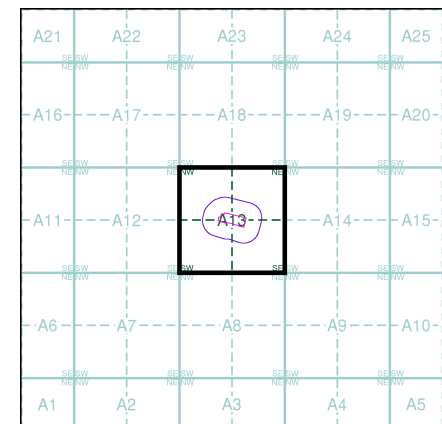
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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 Customer Ref: 12-561
 National Grid Reference: 373730, 437840
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Site Details

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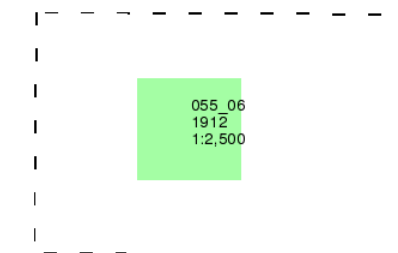
Lancashire And Furness

Published 1912

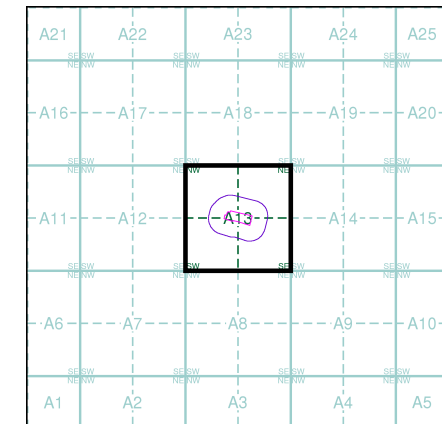
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Map Name(s) and Date(s)



Historical Map - Segment A13



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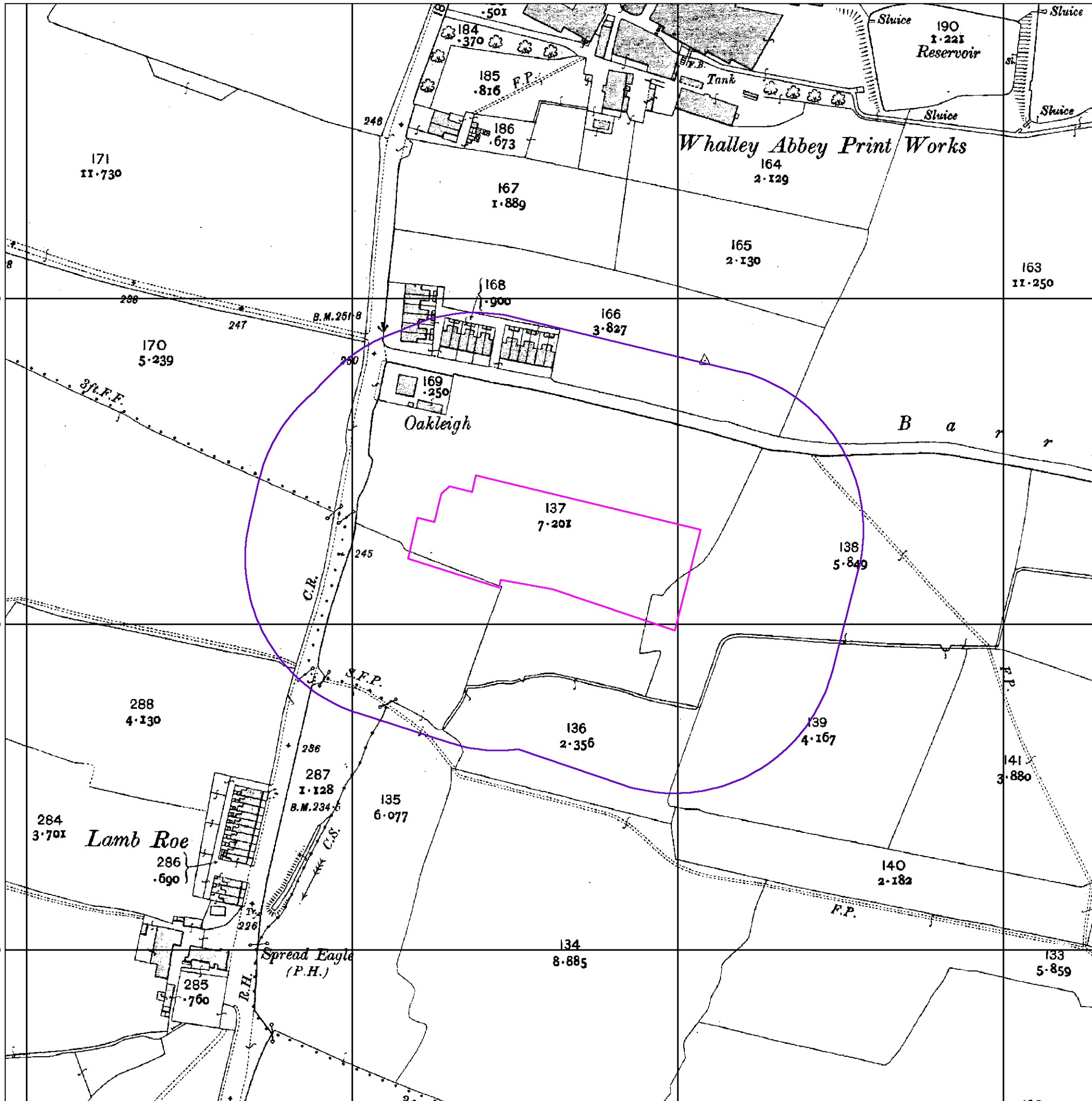
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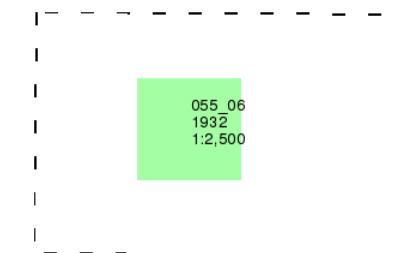
Lancashire And Furness

Published 1932

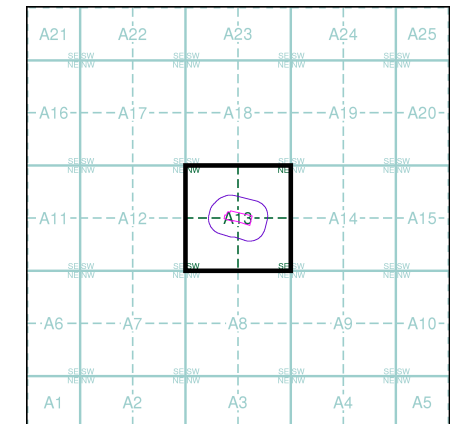
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Map Name(s) and Date(s)



Historical Map - Segment A13



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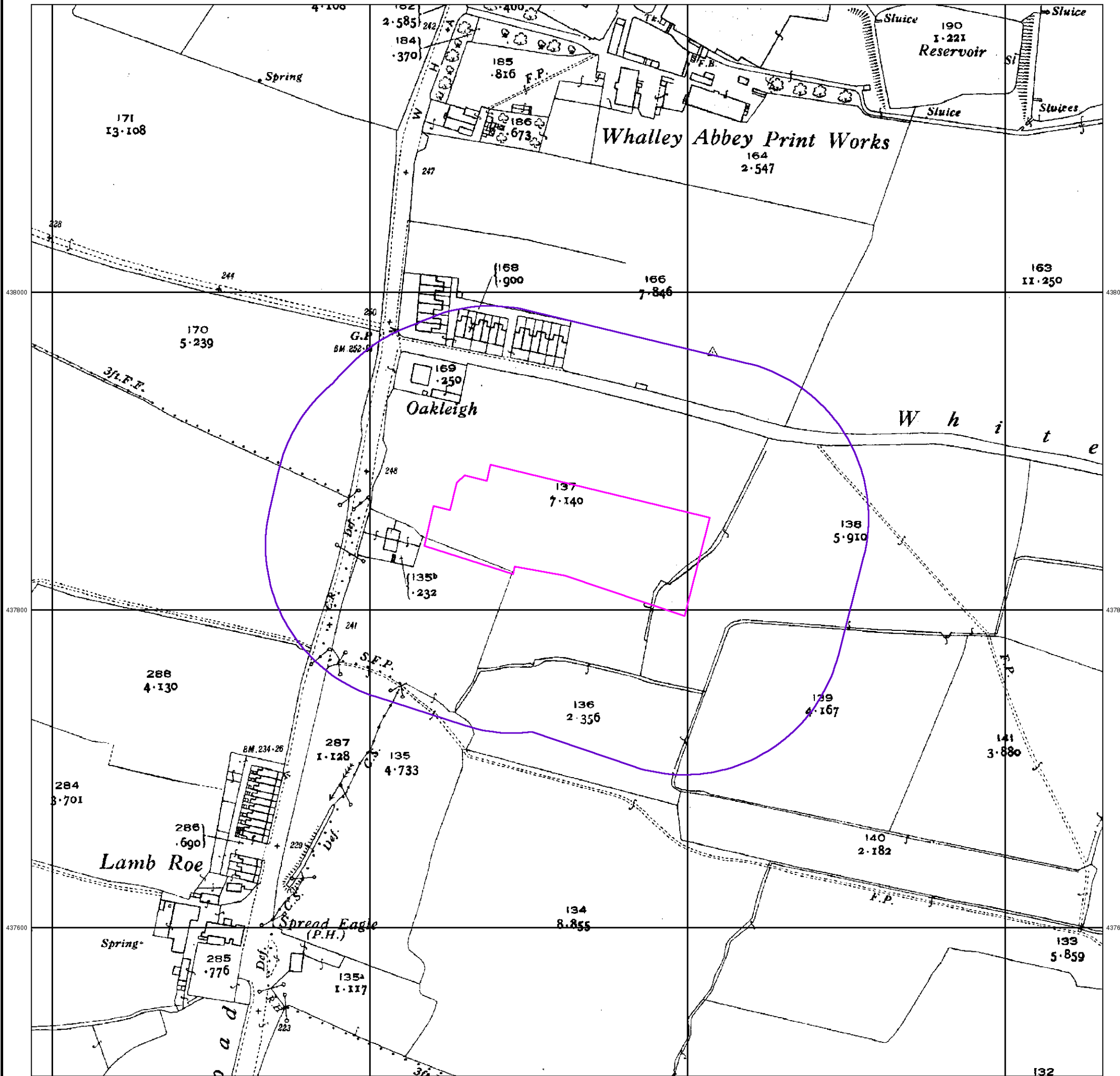
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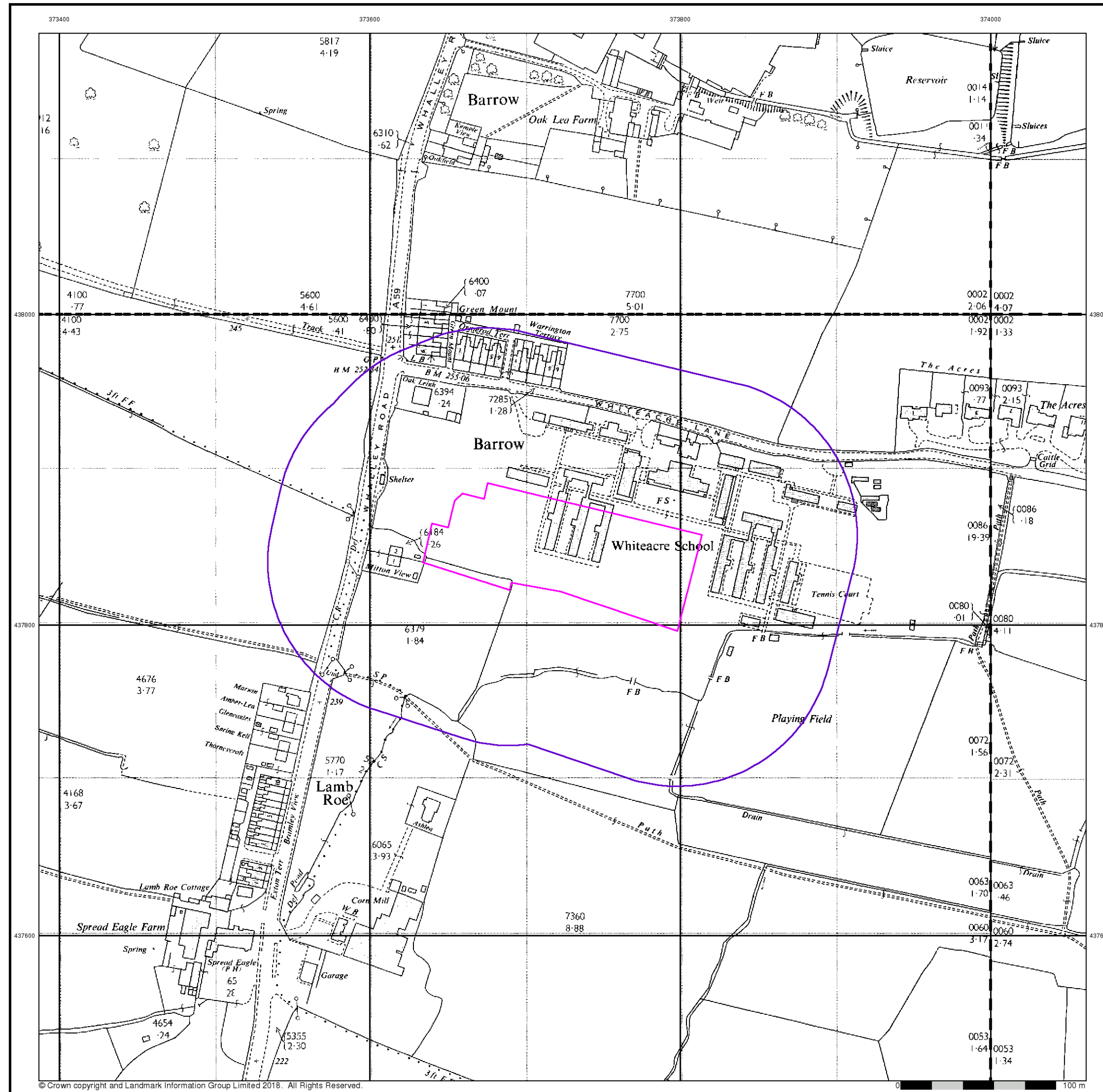
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Ordnance Survey Plan

Published 1967 - 1969

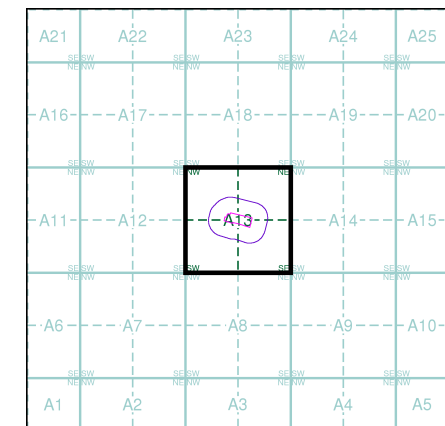
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Map Name(s) and Date(s)

SD7338 1967 1:2,500	SD7438 1967 1:2,500
SD7337 1968 1:2,500	SD7437 1969 1:2,500

Historical Map - Segment A13



Order Details

Order Number: 167253287_1_1
 Customer Ref: 12-561
 National Grid Reference: 373730, 437840
 Slice: A
 Site Area (Ha): 0.98
 Search Buffer (m): 100

Site Details

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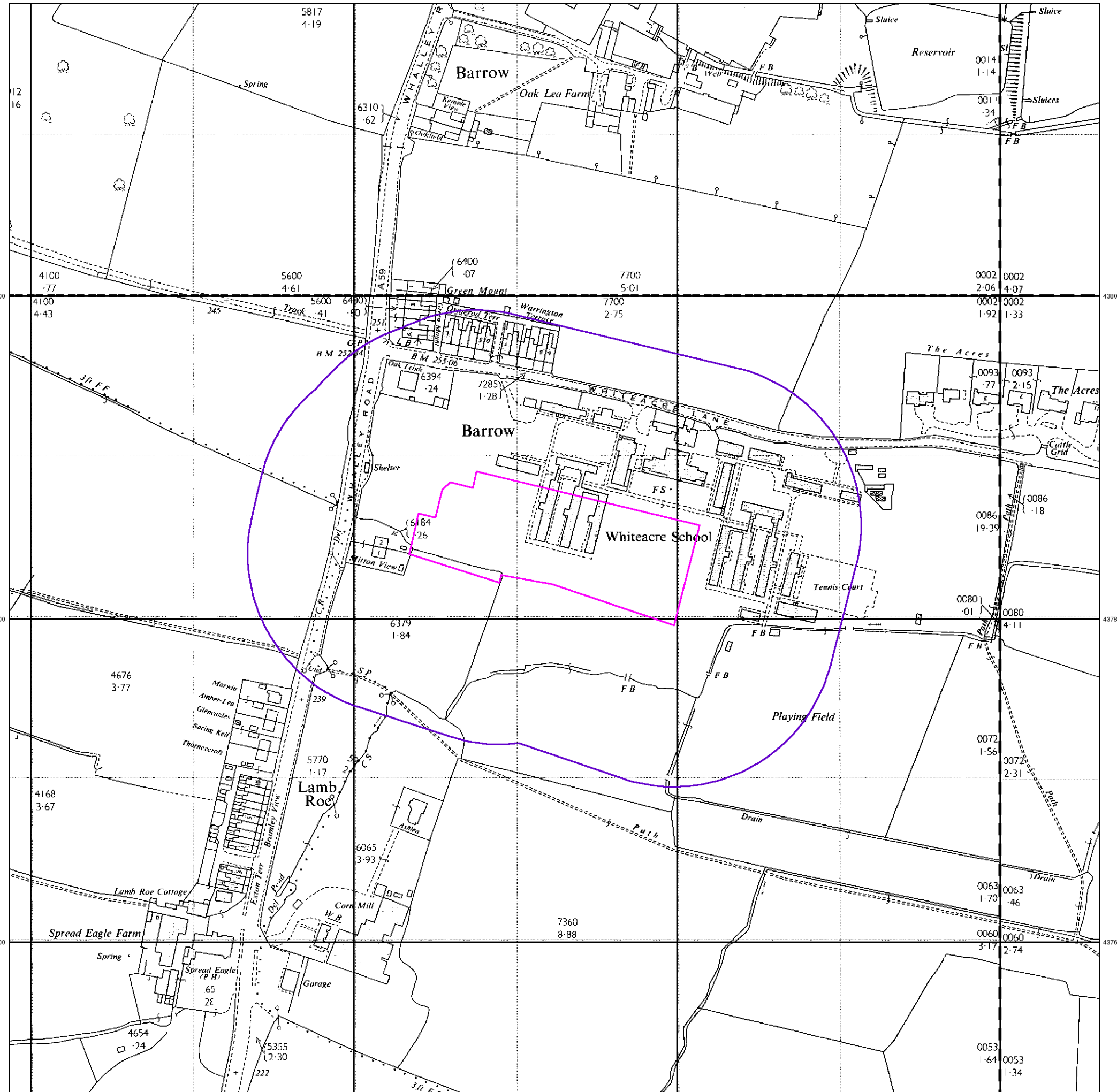
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373400

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374000





Ordnance Survey Plan

Published 1973 - 1978

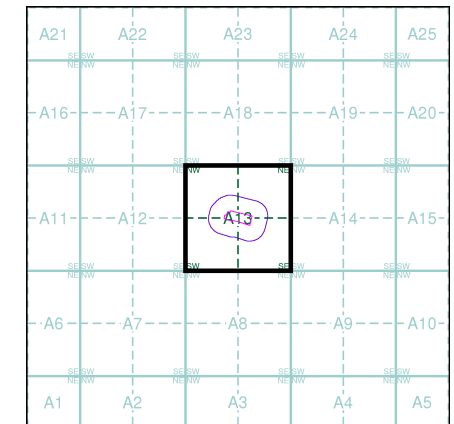
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Map Name(s) and Date(s)

	SD7438	
	1973	
	1:2,500	
SD7337		SD7437
1978		1978
1:2,500		1:2,500

Historical Map - Segment A13



Order Details

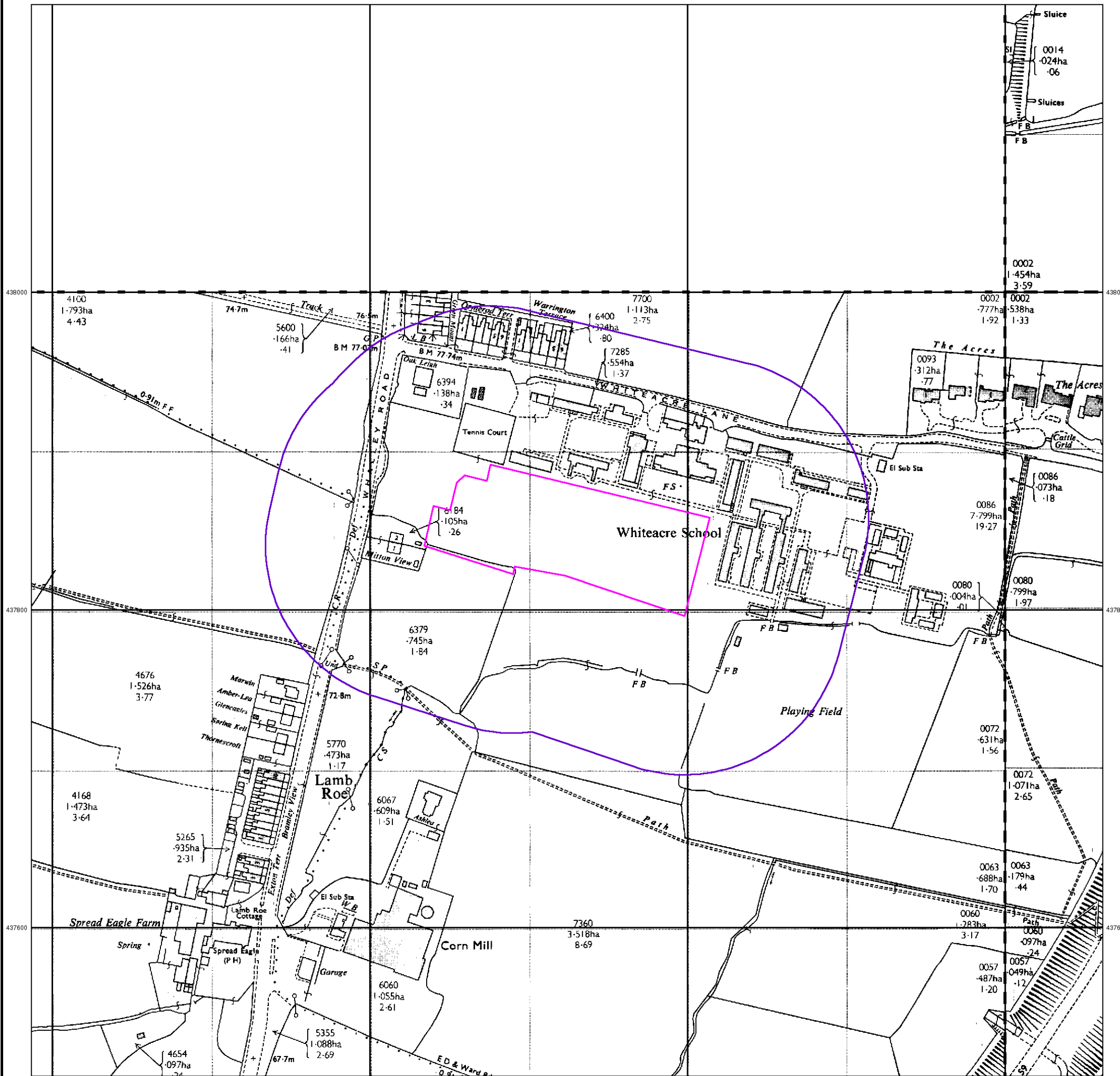
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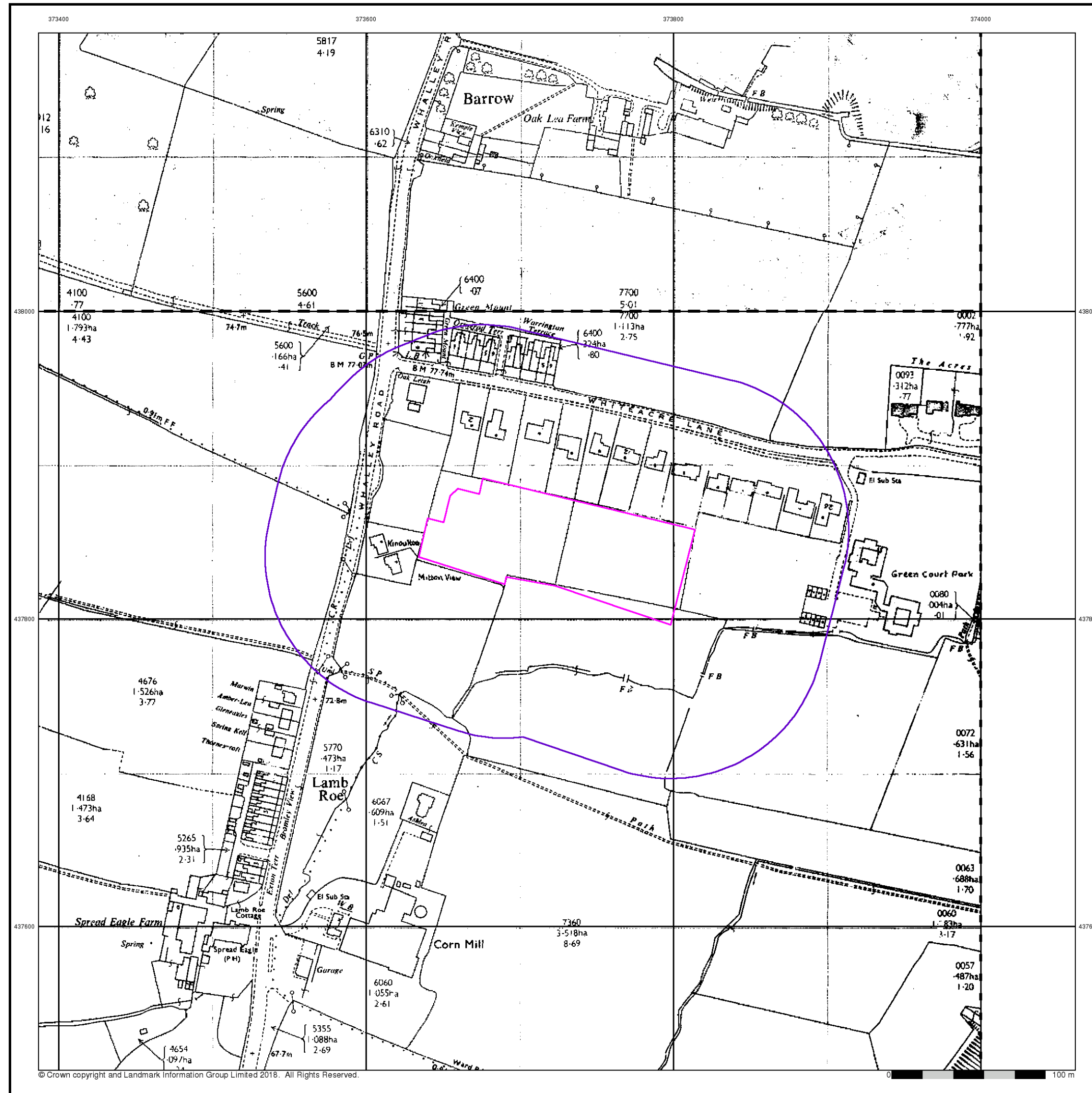
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Additional SIMs

Published 1983 - 1989

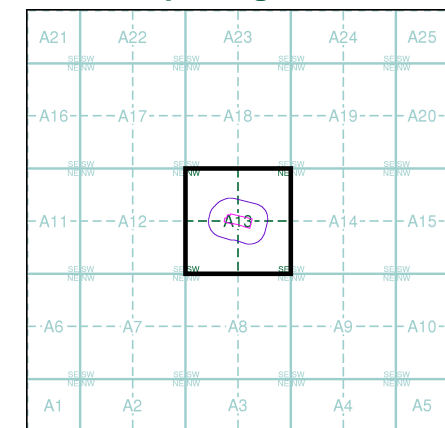
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD7338	1983	1:2,500
SD7337	1989	1:2,500

Historical Map - Segment A13



Order Details

Order Number: 167253287_1_1
 Customer Ref: 12-561
 National Grid Reference: 373730, 437840
 Slice: A
 Site Area (Ha): 0.98
 Search Buffer (m): 100

Site Details

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Large-Scale National Grid Data

Published 1992

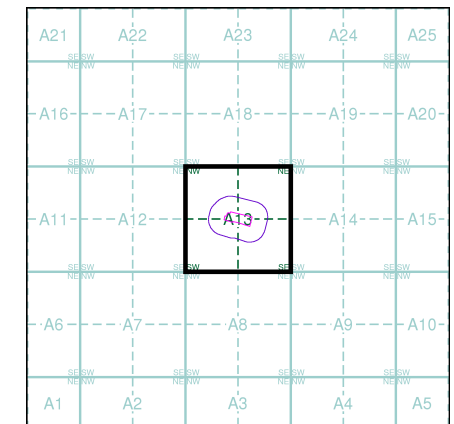
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

SD7338	SD7438
1992	1992
12,500	12,500
SD7337	SD7437
1992	1992
12,500	12,500

Historical Map - Segment A13



Order Details

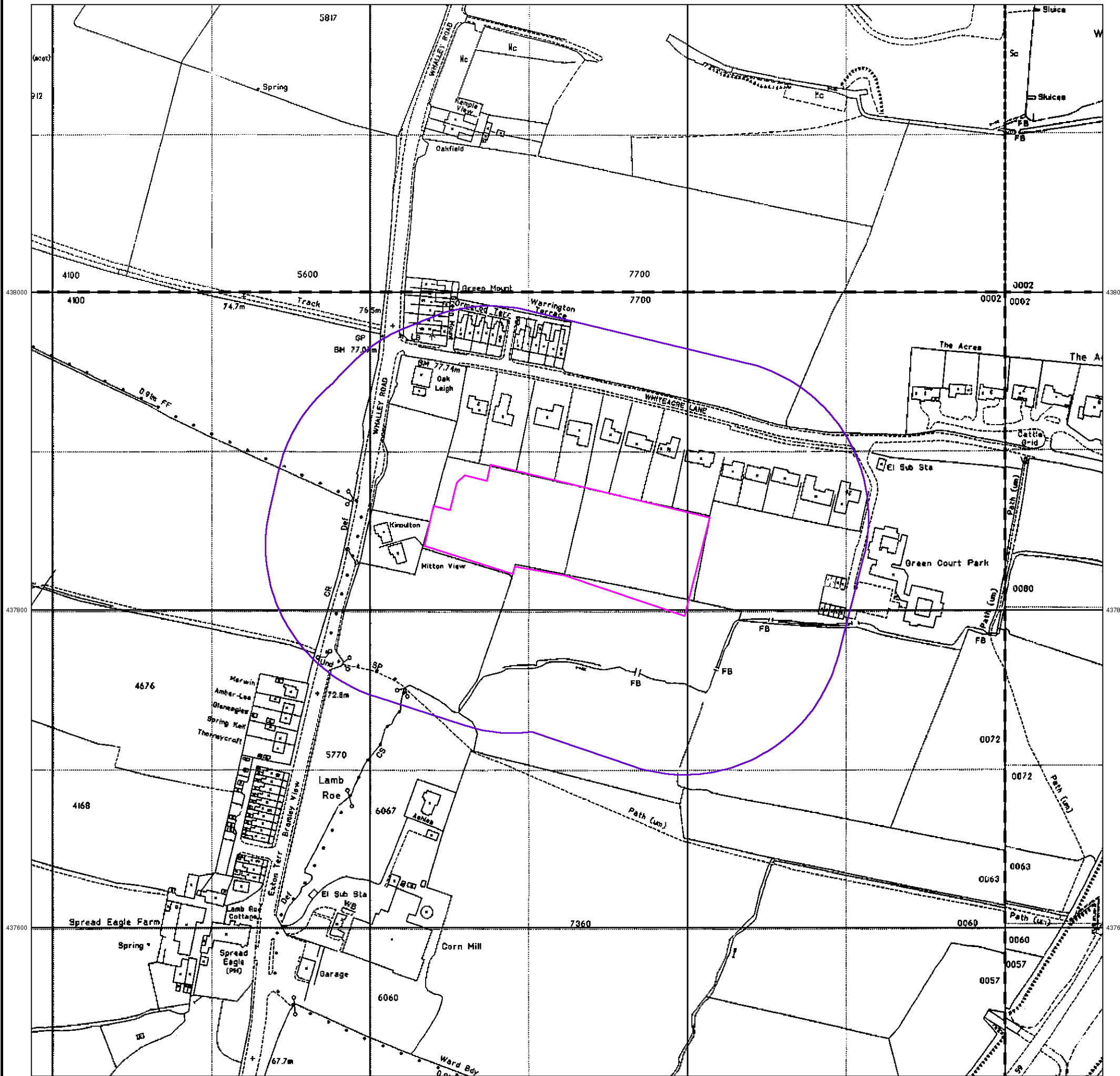
Order Number: 167253287_1_1
 Customer Ref: 12-561
 National Grid Reference: 373730, 437840
 Slice: A
 Site Area (Ha): 0.98
 Search Buffer (m): 100

Site Details

Clitheroe Road, Phase 3, Barrow, CLITHEROE, BB7 9AQ



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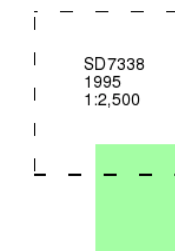
Large-Scale National Grid Data

Published 1995

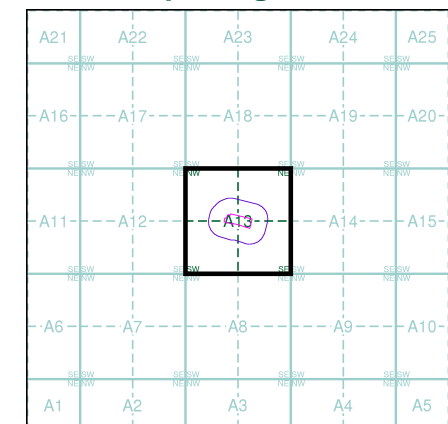
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



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373400

373600

373800

374000

5817

Nc(sect)

412

Spring

WYALLEY ROAD

Kempie View

Oakfield

BANK HOUSE

CRESTHURST CRESCENT

SPRING

4100

5600

438000

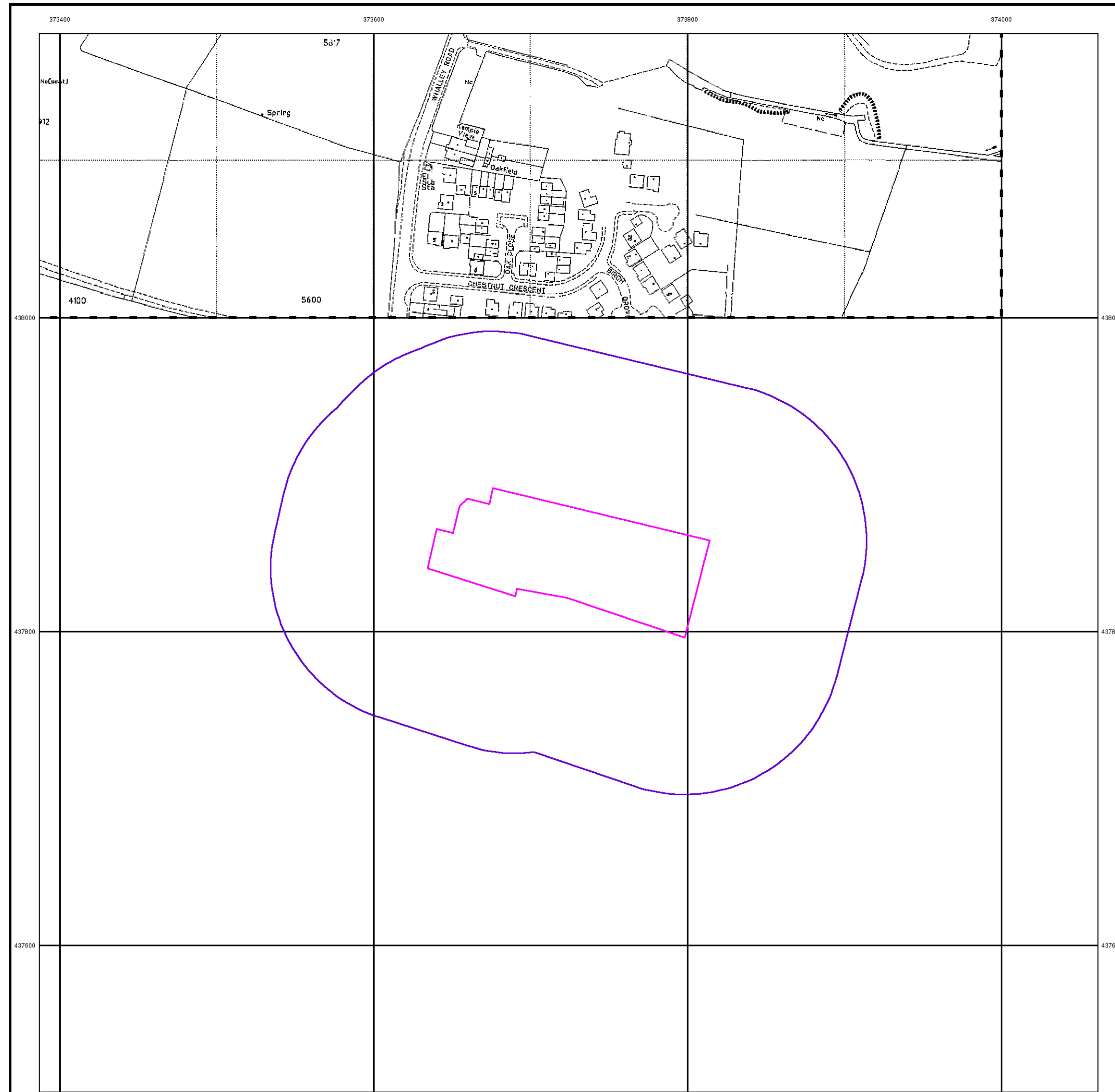
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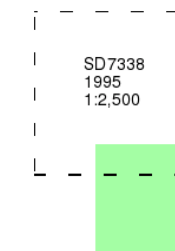
Large-Scale National Grid Data

Published 1995

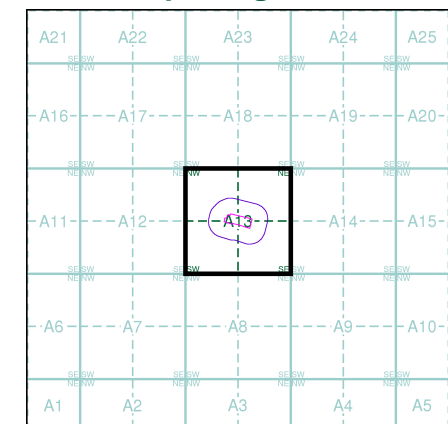
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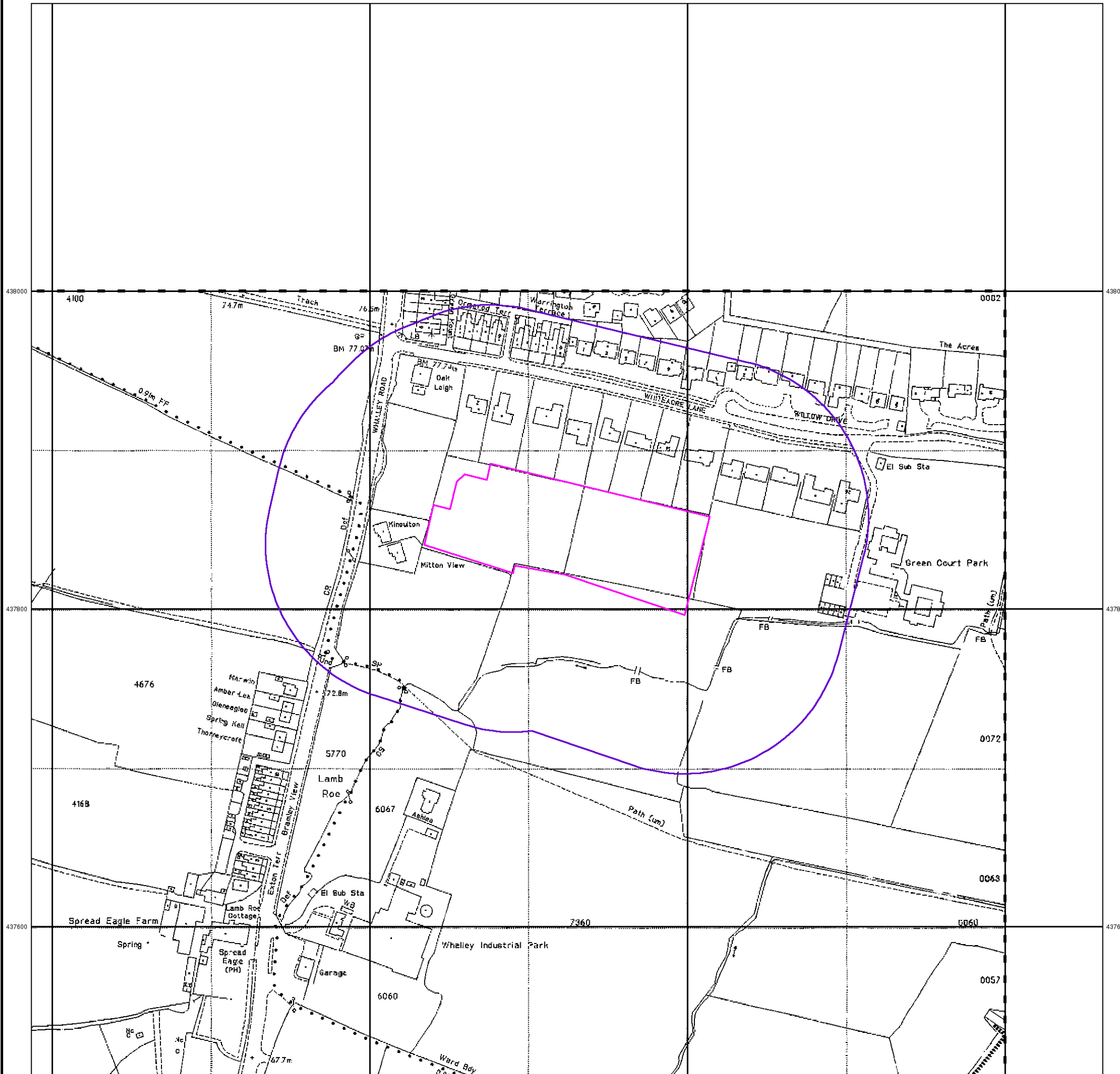
Clitheroe Road, Phase 3, Barrow, CLITHEROE, BB7 9AQ

373400

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0 100 m



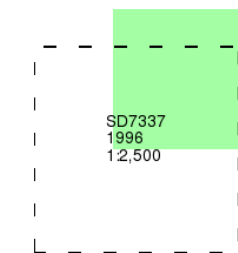
Large-Scale National Grid Data

Published 1996

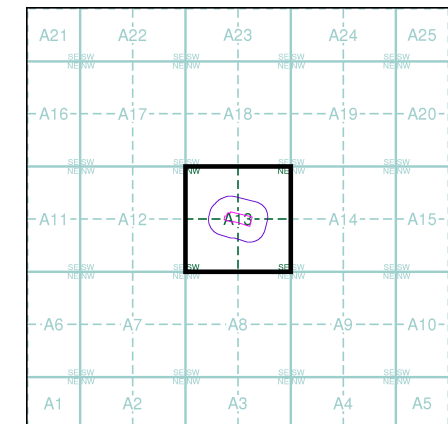
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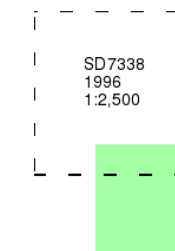
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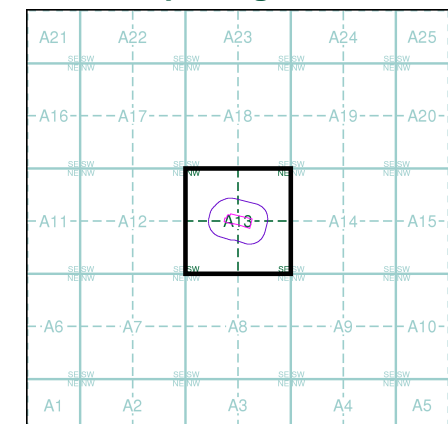
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