

HILTON LANE PRESTWICH

PHASE 1: PRELIMINARY RISK ASSESSMENT

Job Number: LKC 21 1545
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Client: Leo Property Ltd



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1 Introduction

LK Consult Ltd (LKC) has been retained to carry out a Phase 1 Preliminary Risk Assessment (PRA) for Hilton Lane, Butterstile Close, Prestwich.

In accordance with current guidance (including LCRM¹ and the National Planning Policy Framework (NPPF)²), the PRA will include a site reconnaissance, site history, geology, hydrogeology, hydrology, mineral search and a landfill search. Information gathered from the desk study and site reconnaissance will be used to develop a contamination conceptual model for the site.

In addition, the information gathered will be used to identify potential geotechnical constraints associated with the redevelopment of the site.

Based on the findings of this report, an appropriate site investigation can be derived, if required.

Site details are provided in Table 1-1. Figure 1 shows the site location and boundary. Figure 2 shows the proposed development plan.

Site Location	Southwest end of Butterstile Close, south of Hilton Lane Prestwich, Manchester. Centred at approximate National Grid Reference 380930E 402410N.
Approximate Area	2000m ² .
Topography	67-69 metres Above Ordnance Datum (AOD). Site slopes gently from southeast-northwest. Hilton Lane situated higher than site.
Current Site Use	Vacant site comprising overgrown vegetation.
Purpose of Report	Planning.
Proposed Development	Residential housing with gardens / soft landscaping.

Table 1-1: Summary of site details

¹ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

² "National Planning Policy Framework." The Ministry of Housing, Communities and Local Government. February 2019.

2 Historical Review

2.1 Historical Map Review

In compiling the site history, LKC consulted Envirocheck historical mapping (Appendix A).

Table 2-1 summarises features on site.

Site Features	Location on Site	Dates Present		Comments
		From	To	
Vacant Land	Whole Site	1848	1932	
Unreferenced Building	E	1932	2016	Likely residential property. No longer annotated on most recent mapping (2021).
Unreferenced Building	SE	1952	1992	Small unreferenced building. No longer annotated by 1999 mapping.
Unreferenced Building	NE	1952	1979	Small unreferenced buildings (possibly domestic garages). No longer annotated by 1992 mapping.
Unreferenced Building	SW	1952	1960	Small unreferenced building. No longer annotated by 1968 mapping.
Embankments	SW	1848	1938	Potentially infilled feature. Annotated as refuse heap by 1952 mapping.
Refuse Heap	SW	1952	1968	No longer annotated by 1979 mapping.

Table 2-1: Summary of site features. Dates based on available historical map editions.

Table 2-2 summarises potentially contaminative land uses within approximately 50m and potentially infilled features within approximate 250m.

Surrounding Area Features	Distance (m)	Direction	Dates Present		Comments
			From	To	
Embankments	Adj	SW	1848	1938	Associated with Hilton Lane.
Refuse Heap	Adj	SW	1952	1968	No longer annotated by 1979 mapping.
Garage	5	NE	1970	2021	
Issues (watercourse)	15	NW	1848	1968	Annotated as flowing towards SW. No longer annotated by 1979 mapping.
Electricity Sub Station	20	SE	1952	2021	
Cuttings	25	SW	1952	1960	No longer annotated by 1968 mapping, potentially infilled feature.
Refuse Heap	30	SW	1952	1960	No longer annotated by 1968 mapping.
Burial Ground	30	SW	1932	2021	Associated with Synagogue.
Pond	40	NW	1909	1938	No longer annotated by 1952 mapping, potentially infilled feature.
Sand Pit	40	SE	1848	1848	No longer annotated by 1891 mapping, potentially infilled feature.

Table 2-2: Summary of potentially contaminative features within 50m and potentially infilled features with 250m. Dates are based on available historical map editions.

Plate 2-1 shows the features noted in Table 2-1 and 2-2.

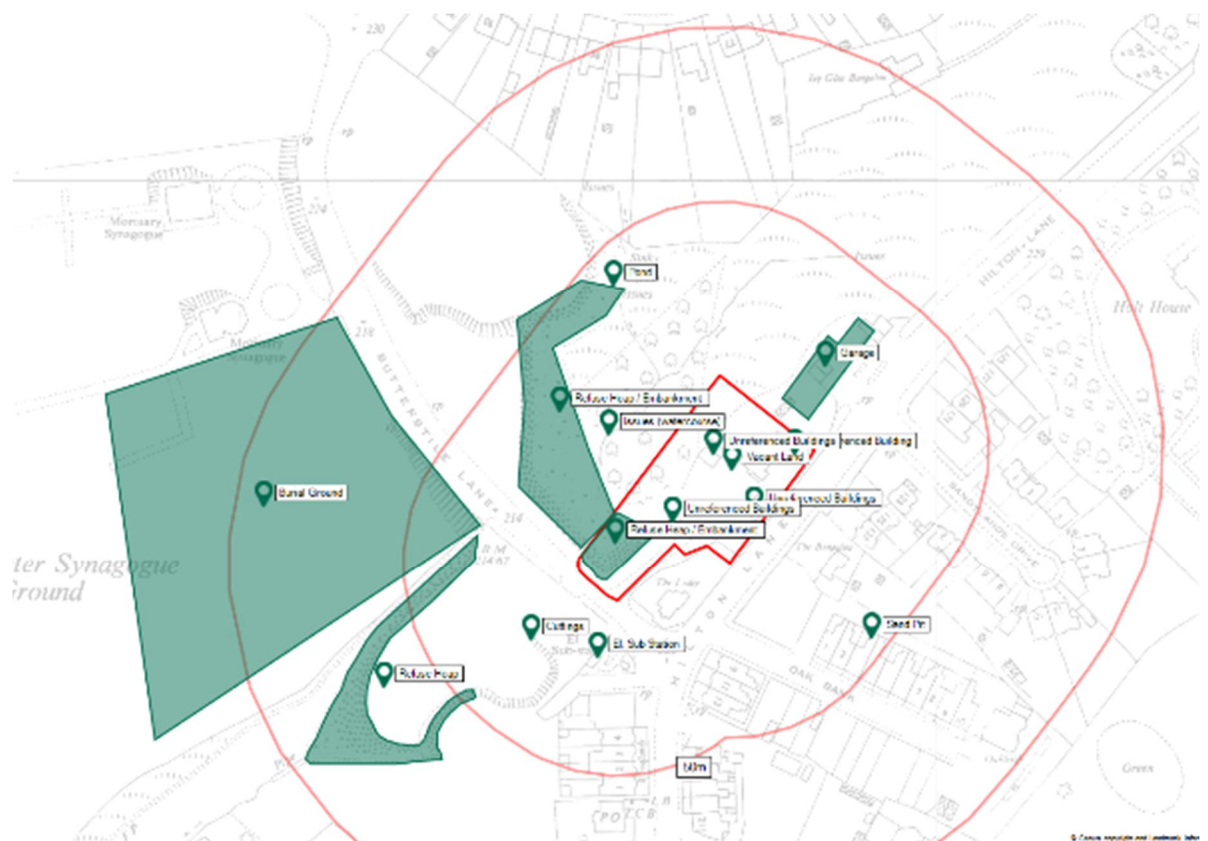


Plate 2-1: Historical features.

2.2 Previous Investigation

LKC have been provided by a Phase 1 Desk Study Site Investigation Report for the site previously undertaken by Geoinvestigate Ltd ('Phase 2 Desk Study Investigation of Hilton Lane, Prestwich' dated May 2017, report ref: G17219).

A summary of the historical map review is provided in the extract below:

Map Feature	Location	Appears	Absent	Notes
Residential development	Adjacent around site	1889	Present	Some development shown by 1889 by has rapidly expanded to include areas North, East and South of the site by 1956. This is likely to include development utilities and services.
Electrical substation	10m Southwest	1952	1995	Last appears on 1:2500 maps in 1995, but still present on site walkover.
River Irwell	480m Southwest	1848	Present	Unlikely to influence site.
Possible landfill	Adjacent north and on site	1952	Probably still on site	Prior to 1952 the road running along the Southern boundary shows an embankment. It is likely they began filling up this area with landfill material from 1952, encroaching from the north.
Reservoirs (3+)	500m South And 750m North And 750m East	1848 1889 1889	Present 2002 1985	Unlikely to influence site.
Stream	20m North	1893	1970	Part of small valley to north developed for housing from 2002.
Works	750m East And 500m South	1889 1931	Present 2014	Becomes part of Mountheath Industrial park by 1985.
Woodland	On site	1848	1956	Small woodland present on site
Building	On Site	1956	2002	Building present on site but gone by 2002. These may possibly have been garage given the building footprints.
Burial ground	Adjacent West	1931	Present	As part of the North Manchester Synagogue.
Power station	750m Southwest	1956	2002	Unlikely to influence site

NB: Quotation marks indicate descriptions taken directly from historical maps

NB. Arbitrary potential hazard assessment: Higher (amber), Moderate (yellow), Lower (green) – typically adjacent or nearby activity. Very Low (uncoloured) – typically distant activity

Extract 2.1 Summary of Historical OS map Land Use and Potential Hazard Identification

The report identified several potentially contaminative land uses and hazards on site and within the surrounding area. These include a refuse heap / landfill on site, and a burial ground, sand pits, other waste sites, a garage and electricity sub stations in the surrounding area.

An extract showing the conceptual model produced in the report is provided below. Based on the assessment of available information, it was concluded that possible presence of made ground / infilled ground on and near the site, surrounding residential development and nearby land uses are likely to represent the most plausible causes for contamination and / or hazard to the site. A Phase 2 intrusive investigation was recommended to include contamination testing, geotechnical testing and gas monitoring.

Potential Source	Nature of Hazard	Associated Contaminants	Pathway	Receptor	Preliminary Risk Rating
Made/infilled ground and contamination thereof from development and site landfill use, residential development and adjacent burial grounds And Landfills, electrical substations, car facilities and sand pits within close proximity to site.	Inorganic and organic chemical contaminants within soil.	Contaminants linked to filled ground. -Asbestos -Trace metals -PAHs -Petroleum hydrocarbons (TPH and BTEX) -PCB's	-Direct contact -Ingestion of soil -Ingestion of dust -Inhalation of vapour -Leaching into ground water	-Site Operatives -End Users -Vegetation -Controlled waters -Structures and services	Moderate
	Contaminants from claddings, roofing materials, insulation and boilers	Hazardous Gas (CO ₂ , CH ₄)	-Inhalation -Explosion risk	-Site Operatives -End Users	Moderate
Coal Mining And Vegetation induced clay changes.	Gas migration from coal measures geology	Hazardous Gas (CO ₂ , CH ₄ , H ₂ S)	-Inhalation -Explosion risk	-Site Operatives -End Users	Moderate
	Vegetation induced movement And Ground instability/Subsidence	N/A	Possible seasonal settlement/heave of soils/subsidence	Structures and services	Low

NB. Arbitrary potential hazard assessment: High (amber), Moderate (yellow), Low (green) – typically adjacent or nearby activity, Very Low (uncoloured) – typically distant activity.

3 Environmental Setting

A summary of environmental settings is presented in Table 3-1, based on a review of available environmental data.

Categories (data sources)			Details
Geology ^{1, 2}	Artificial		- No BGS recorded artificial.
	Superficial		- Hummocky (Moundy) Glacial Deposits (sand and gravel).
	Bedrock		- Chester Formation (sandstone) across majority of site. - Manchester Marls Formation (mudstone) mapped in NE.
	BGS Logs (<50m)		- None.
Hydro-geology ¹	Aquifer Designation	- Superficial	- Secondary A Aquifer.
		- Bedrock	- Secondary B Aquifer – NW of site. - Principal Aquifer – SW of site.
	Source Protection Zone (SPZ)		- Site not within an SPZ.
	Groundwater Abstractions (100m)		- None.
Hydrology ¹	Surface Water Courses (100m)		- None.
	Flooding risk		- Flood Zone 1.
	Surface Water Abstractions (100m)		- None.
	Discharge Consents		- None recorded on site.
	Pollution Incidents		- None recorded on site. - Nearest 3m W of site, 5 th September 1996, involving the release of oils (diesel, including agricultural. Category 3 – Minor Incident. Receiving water unknown.
Minerals & Mining ^{1,4,5}	Coal Mining		- Within a Coal Reporting Area. - Not within a Development High Risk Area.
	Surface Mineral Extractions (250m)		- 2no. within 250m of site: - 48m S – ‘Rainsough Sand Pit’. Opencast extraction of sand. Operations ceased. - 83m SE – ‘Broughton Park Sand Pit’. Opencast extraction of Sand. Operations ceased.
	Cheshire Brine Compensation District		- Not within Compensation District. - Not within Consultation Area.
	Non-Coal Mining Area		- Not within an area of conclusive metalliferous mining.
Ground Stability ¹	Collapsible Ground		- Very low hazard.
	Compressible Ground		- No hazard.
	Ground Dissolution		- No hazard.
	Landslide		- Very low hazard.
	Running Sand		- Low hazard.
	Shrinking / Swelling Clay		- No hazard.

Table 3-1: Summary of the environmental setting.

Notes: Distance in brackets is the distance from site that features are included. Where no distance given, features relate to on site only.

Data Sources:

1 Envirocheck Report (Appendix A & B)

2 BGS Sheet 85 1:50,000

3 BGS GeoIndex <http://mapapps2.bgs.ac.uk/geoindex/home.html>

4 The Coal Authority Web Mapping Services (WMS) /

Interactive Map Viewer <http://coal.decc.gov.uk/en/coal/cms/publications/data/map/map.aspx>

5 Cheshire Brine Subsidence Compensation Board Compensation District & Consultation Areas <http://www.cheshirebrine.com/wp-content/uploads/2016/11/NL08134-001-002.pdf>

Categories ^(data sources)		Details
Landfill Sites (250m) ¹	Known / Registered	- 2 within 250m of site. - Onsite W: 'Land at Butterstile Lane'. No data supplied. - 12m SW: 'Land at Rainsough Brow'. Deposited waste including household waste. First input data not supplied. Last input date December 1968.
	Potentially Infilled Land (non-water and water), based on Envirocheck Report	- 2no. features: onsite, 42m SE.
	Potentially infilled sites, based on LKC historical review	- 5no. features: See Table 2-1.
Radon Potential ¹		- <1% of homes above Action Level. No protective measures are necessary in the construction of new dwellings or extensions.
Designated Sites (50m) ¹		- 1no. within 50m of site. - 14m SW: Adopted Greenbelt.
Contemporary Trade Directory (50m) ¹		- 3no. within 50m of site. - 15m NE – 'Rainsough Garage'. Garage Services. Active. - 15m NE – 'Rainsough Filling Station Ltd'. Garage Services. inactive. - 15m NE – 'Rainsough Filling Station Ltd'. Garage Services. inactive.
Fuel Station Entries (50m) ¹		- 1no. within 50m of site. - 14m NE: 'Rainsough Filling Station'. Obsolete.
Unexploded Ordnance Risk (UXO)	Zetica Risk Map ⁶	- Low.
	Historical / Current Military Activity	- None identified within 100m

Table 3-1 Continued: Summary of the environmental setting.

Notes: Distance in brackets is the distance from site that features are included. Where no distance given, features relate to on site only.

Data Sources:

1 Envirocheck Report (Appendix A & B)

6 Zetica UXO Unexploded Bomb Risk Map (Appendix D)

4 Site Reconnaissance

A site reconnaissance was carried out on 08 October 2021. Hand dug trial holes were undertaken in accessible areas to confirm the shallow ground conditions.

Relevant features identified on site are summarised below:

- Site is currently vacant and comprises overgrown land. No buildings present on site at time of walkover.
- Large areas of the site are currently inaccessible due to dense vegetation. Areas of hardstanding were noted at the site entrance, and in southwest corner of site.
- The site is generally situated slightly lower than Hilton Lane, and slopes down from the boundary along Hilton Lane gently towards Butterstile Close (southeast to northwest). The surface on site is generally uneven.
- Site is bound by wooden fencing. A retaining wall is present along the boundary with Hilton Lane.
- Made ground was noted on the site surface (brick). Evidence of fly tipping was noted across site surface.
- A potential badger sett was identified in the centre of site. Evidence of paw prints noted around the sett.
- Site is accessed via a padlocked gate off Butterstile Close.
- No significant visual or olfactory evidence of contamination identified.

The surrounding area comprises:

- North West: Residential properties.
- North East: Garage (active).
- South East: Hilton Lane and residential properties.
- South West: Butterstile Lane and commercial properties.

Relevant photographs are provided in Plate 4-1.



Plate 4-1: Site photographs.

	
Photograph 3: Possible badger sett in centre of site.	Photograph 4: View of fly tipping on site.
	
Photograph 5: View of retaining wall along Hilton Lane.	Photograph 6: View of made ground on surface of site.

Plate 4-1 continued: Site photographs.

A hand dug pit was carried out in 1no. location in the centre of site only due to dense vegetation and is summarised in Plate 4-2.

HD101
GL-0.3m Made ground comprising dark brown gravelly silty sand with frequent brick fragments.

Plate 4-2: Hand Dug Pit Log.

5 Preliminary Conceptual Model

5.1 Introduction

The aim of the conceptual model is to provide a preliminary assessment of the likelihood of a pollutant linkage for each potential combination of contaminant, pathway and receptor. A conceptual model can be used to make an informed decision on the contamination risks associated with the site and whether further site investigation work is required.

The Sections below are therefore divided into potential contaminant, potential pathway and potential receptor as described in LCRM³, on the premise that, if there is no pollutant linkage, then there will be no risk to the receptor. The final Section provides an assessment of the potential pollutant linkages that may still be present on the site if redevelopment were to occur.

5.2 Potential Contaminants

Potential viable contamination sources are detailed in Table 5-1. These are split into onsite sources, offsite sources and underlying geology.

Potential Source	Contaminants
On Site	
Made Ground below some or all of the site (e.g. general made ground, refuse heap, embankments, recorded landfill on site)	- Demolition rubble, ash and clinker: Asbestos, heavy metals, sulphates, PAHs⁴. - Other fill material sources: Unknown organic / inorganic compounds. - If organic / putrescible material: Hazardous gas (principally carbon dioxide and methane). - Fuel, glycol and oil from potential former domestic garages.
Demolished buildings	- Asbestos Containing Material (ACM).
Surrounding Area	
Adjacent Garage	- Petroleum hydrocarbons from fuels and oils. - Ethylene glycol (anti-freeze). - Risk expected to be localised to northeast of site (if present).
Electricity Sub Station	- PCBs and transistor oils. - Not considered to be significant source of contamination due to distance from site, and given that feature is located at a lower level topographically to site and relative immobility of associated contaminants.
Burial Ground	- Nitrates, sulphates, chlorides, heavy metals, non-ferrous metals, inorganic contaminants such as phosphorus and calcium⁵. - Hazardous gas (principally carbon dioxide and methane). - Pathogens are not considered to be a risk due to the short half-life in the environment. - Not considered to pose significant risk due to distance from site and as large residential development has occurred between feature and site.
Landfills / offsite potentially infilled features within 250m	- Given size, distance and age of features, there is considered to be a source of hazardous gas (principally carbon dioxide and methane).

Table 5-1: Potential contamination sources.

³ Land Contamination Risk Management (LCRM) <https://www.gov.uk/government/publications/land-contamination-risk-management-lcrm>

⁴ Defra (2002). "Potential Contaminants for the Assessment of Land". R&D Publication CLR 8.

⁵ Environment Agency (2004). "Potential Groundwater Pollutants from Cemeteries".

5.3 Potential Receptors

Potential receptors are detailed in Table 5-2.

Receptors	
Human Health	- Future site users (including residents, visitors and site workers). - Offsite land users.
Controlled Waters	- Principal and Secondary B Aquifers. - No surface water receptor within influencing distance.
Buildings and structures.	
Potable water pipes.	
Flora within future gardens and landscaping.	

Table 5-2: Potential receptors.

5.4 Potential Pathways

Potential pathways are detailed in Table 5-3.

Pathways		
Soil	Human Health ⁶ (residential land use: houses with private gardens)	- Ingestion of soil. - Ingestion of soil-derived indoor dust. - Ingestion of contaminated vegetables. - Ingestion of soil attached to vegetables. - Dermal contact with soil. - Dermal contact with soil-derived indoor dust. - Inhalation of soil-derived outdoor dust. - Inhalation of soil-derived indoor dust. - Inhalation of vapours outside. - Inhalation of vapours inside.
		- Windblown dust and fibres to adjacent receptors.
		- Direct contact with receptors (building foundations, services).
		- Root uptake.
Water		- Surface run off will be mixed.
		- Infiltration into the ground, through potentially contaminated material (contamination possibly going into solution).
Water and Gas		- Migration through potentially permeable strata and preferential pathways. - Superficial (sand and gravel) is likely to be relatively permeable. - Bedrock (mudstone, sandstone) likely to be variably permeable. - Bedrock (sandstone) likely to be relatively permeable. - No preferential pathways are anticipated.
Gas		- Migration into buildings (e.g. via services) and accumulation of gases in confined spaces (potentially causing explosion if methane is present).

Table 5-3: Potential pathways.

5.5 Preliminary Contamination Conceptual Model

The Preliminary Contamination Conceptual Model is illustrated in Table 5-4 and has identified seven generic potential pollutant linkages.

Each linkage is described along with an assessment of the risk based upon guidance on probabilities and consequences outlined in CIRIA C552⁷.

In order to assess the potential risk for each pollutant linkage, an assessment of the magnitude of the potential consequence (severity) of the risk occurring and the

⁶ EA (2008). "Updated Technical Background to the CLEA Model". Science Report – SC050021/SR3.

⁷ CIRIA (2001). "Contaminated Land Risk Assessment: A Guide to Good Practice". C552.

magnitude of the probability (likelihood) of the risk occurring has been considered and classified. This is based on the guidance provided in CIRIA C552 and further details including a risk matrix is provided in Appendix E.

Where LKC identified a low to very low risk, targeted or low density intrusive investigation work, a watching brief (during construction work) or no investigation work will be recommended. This will be dependent on the nature of the site and the proposed development.

Where the risk falls into the moderate/low risk, LKC will undertake an assessment to establish what category the pollutant linkage will fall into (i.e. moderate or low risk will be chosen).

Where LKC identifies a moderate or higher risk, intrusive investigation work or precautionary remedial measures will be recommended.

It should be noted that there may be risk from short term exposure from contaminated soil to site workers. The Preliminary Contamination Conceptual Model deals with long term exposure to key receptors. Acute risks can be easily mitigated by good environmental management of the site during site works. Standard health and safety precautions (as per HSE guidance⁸) should be adopted by all workers involved with site enabling and construction works. Therefore, this receptor is not considered in the contamination conceptual model.

⁸ HSE (1991). "Protection of Workers and the General Public During Development of Contaminated Land". London HMSO.

PL	Pathway	Receptor	Contaminants of Concern (CoC)	Probability	Consequence	Risk	Recommendations
1	- Dermal contact. - Inhalation of soil, fibres and dust. - Ingestion of soils, dust, vegetables, soil attached to vegetables. - Windblown dust.	- Future site users. - Offsite receptors.	- ACM. - Heavy metals. - PAHs. - Other organic / inorganic contaminants	Likely (given site history, site conditions and proposed end use)	Medium	Moderate	Intrusive investigation required. Soil analysis of CoC.
			- Petroleum hydrocarbons and glycol	Low Likelihood (Potential onsite domestic garages and NE boundary from offsite garage.)	Medium	Moderate / Low (localised) (Moderate assumed until ground conditions confirmed)	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
2	- Inhalation of vapours. - Migration via permeable strata and preferential pathways.	- Future site users. - Offsite receptors.	- Volatile contaminants (TPHCWG, PAHs).	Low Likelihood (Potential onsite domestic garages and NE boundary from offsite garage.)	Medium	Moderate / Low (localised) (Moderate assumed until ground conditions confirmed)	Targeted intrusive investigation required, to include PID testing. Soil analysis of CoC, subject to ground conditions encountered and PID testing.
3	- Inhalation of gas. - Migration via permeable strata and preferential pathways. - Explosion in confined spaces. - Exposure to radon.	- Future site users. - Buildings. - Offsite land users.	- Hazardous gas (carbon dioxide, methane).	Likely (given viable gas source and viable pathway)	Severe	High	Gas monitoring required.
			- Radon	Unlikely (as <1% of homes above action level)	Medium	Low	(<1%) No protective measures are necessary in the construction of new dwellings or extensions.
4	- Surface run-off. - Migration via permeable strata and preferential pathways. - Perched waters migration.	- Groundwater (Principal and Secondary B Aquifers).	- Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds.	Likely (Mobile contamination possible with possible pathway and given sensitivity of underlying Principal Aquifer)	Medium	Moderate	Intrusive investigation required. Groundwater sampling, subject to ground conditions encountered. Analysis of CoC.
5	- Sulphate attack on concrete.	- Building structure.	- Sulphate.	Likely (Given site history, site conditions, geology and direct contact / pathway)	Mild	Moderate / Low (moderate assumed until ground conditions confirmed)	Intrusive investigation required. Soil analysis of CoC.
6	- Ingestion of tainted water supply.	- Future site users. - Water pipes.	- Organic contaminants such as petroleum hydrocarbons, naphthalene, volatile compounds.	Likely (Given site history, site conditions and pathway)	Medium	Moderate	Intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
7	- Direct contact (plant uptake).	- Flora.	- Phytotoxic contaminants such as heavy metals.	Likely (Given site history, site conditions and proposed end use)	Minor	Low	Low density intrusive investigation required. Soil analysis of CoC.

Table 5-4: Preliminary Contamination Conceptual Model.

Notes: PL = Pollutant Linkage. Contaminant of Concern (CoC) - See Table 5-1 for contamination sources. Site conditions based on observations during site reconnaissance.

6 Preliminary Geotechnical Risk Assessment

Table 6-1 summarises the possible geotechnical constraints of the site, based on the site history, environmental settings and site reconnaissance. Investigation work will be required to confirm the risks and provide a detailed geotechnical assessment and foundation design.

Coal Mining	Site is not within a Development High Risk Area. No further assessment required.
Slope Stability	Site is relatively flat. No significant slope stability risk anticipated. No further assessment required.
Envirocheck Ground Stability Hazards	No to low hazard identified. No further action required.
Made Ground	Unknown depth and constituent of made ground across the site. Possible in-ground structures from previous developments. Unlikely to be a suitable founding strata unless engineering work is undertaken.
Superficial	Unknown strength of soils for foundation design.
Bedrock	Unknown depth to bedrock.
Groundwater	Unknown depth and variability of groundwater. Shallow / fluctuating groundwater can affect the strength of the soil, particularly in granular ground. Shallow groundwater can also affect construction works.
Plasticity	Plasticity of clay deposits should be confirmed, particularly where trees are present or proposed, to identify the shrink / swell risk.
Sulphate	Unknown sulphate content of the made ground and natural.
Road / Pavement Design	Unknown CBR values for footpath and road design.

Table 6-1: Summary of geotechnical constraints.

7 Summary Conclusions and Recommendations

7.1 Summary Conclusions

Table 7-1 summarises the site details, historical review, environmental settings and site reconnaissance.

Current Site Use	Vacant land comprising overgrown vegetation.
Proposed Development	8no. residential dwellings with gardens / soft landscaping.
Main Historical Features	Onsite: unreferenced buildings, embankments, refuse heap, landfill. Surrounding Area: sand pit, ponds, refuse heaps, embankment, electricity substation, burial ground.
Geology / Hydrogeology	Artificial: No BGS recorded artificial. Superficial: Glaciofluvial deposits (sand and gravel). Secondary B and Principal Aquifer. Bedrock: Chester Formation (sandstone) underlying majority of site, Manchester Marls Formation (mudstone) underlying north of site, Lower Coal Measures. Principal Aquifer and Secondary B Aquifer.
Landfills / Infilled ground	2no. recorded landfills within 250m of site, including 1no. on site. Potentially infilled ground identified on site and within 250m of site.
Site walkover	Site is currently vacant and comprises overgrown land. Possible badger sett identified. Fly tipping noted across surface. Site access from Butterstile Close via padlocked gate.

Table 7-1: Summary of site details, historical review, environmental settings and site reconnaissance.

A preliminary contamination conceptual model has been produced by LKC, which is summarised in Table 7-2.

Pollutant Linkage		Risk	Recommendations
PL1: Contaminants posing a risk to future site users via dermal contact, ingestion and inhalation (of soil, dust, fibres and vegetables).	ACM, heavy metals, PAHs, other organic / inorganic contaminants	Moderate	Intrusive investigation required. Soil analysis of CoC.
	Petroleum hydrocarbons & glycol	Moderate / Low (localised)	Targeted intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
PL2: Volatile contaminants posing a risk to future site users via the inhalation of vapours.	Petroleum hydrocarbons & glycol	Moderate / Low (localised)	Targeted intrusive investigation required, to include PID testing. Soil analysis of CoC, subject to ground conditions encountered and PID testing.
PL3: Gas posing a risk to buildings and future site users via the migration of gas into building causing explosion and asphyxiation.	Carbon dioxide & methane	High	Gas monitoring required.
	Radon	Low	(<1%) No protective measures are necessary in the construction of new dwellings or extensions.
PL4: Mobile contamination posing a risk to controlled waters via the migration through permeable strata.		Moderate	Intrusive investigation required. Groundwater sampling, subject to ground conditions encountered. Analysis of CoC.
PL5: Sulphate posing a risk to building via direct contact (sulphate attack).		Moderate / Low	Intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
PL6: Organic contaminants posing a risk to water pipes.		Moderate	Intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.
PL7: Phytotoxic metals posing a risk to flora via root uptake.		Low	Low density intrusive investigation required. Soil analysis of CoC, subject to ground conditions encountered.

Table 7-2: Summary risk table.

Where moderate / low risk had been identified, the assumed risk is shown in bold.

A preliminary geotechnical assessment has been carried out by LKC. Table 7-3 summarises the geotechnical constraints.

Coal Mining	Within coal reporting area. Not within Development High Risk Area. No further assessment required.
Slope Stability	No further assessment required.
Made Ground	Unknown depth and constituent of made ground across the site.
Superficial	Unknown strength of soils for foundation design.
Bedrock	Unknown depth to bedrock.
Groundwater	Unknown depth and variability of groundwater.
Plasticity	Plasticity of clay deposits, if present, should be confirmed. No clay recorded on site.
Sulphate	Unknown sulphate content of the made ground and natural.
Road / Pavement Design	Unknown CBR values for footpath and road design should be calculated.

Table 7-3: Summary of geotechnical constraints.

7.2 Recommendations

Recommendations are provided in Table 7-4.

Contamination status	There is sufficient information on the potential contaminative status of the site to allow conditional approval of a planning application, based on the proposed end use detailed in the PRA.
Further assessment recommendations	Phase 2 intrusive investigation required. Phase 2 investigation to be carried out in line with current guidance, including BS10175 ⁹ , BS5930 ¹⁰ CIRIA C665 ¹¹ , RB17 ¹² and BS8485 ¹³ . Either 'exploratory investigation': 1 sample per 25-50m square centres. Or 'detailed investigation': 1 sample per 10-25m square centres. Plus targeted investigation locations in areas of concern (contamination and geotechnical). To be agreed with the Local Authority.
Type of investigation work	Boreholes and / or trial pits.
PL 1, 2, 5, 6, 7	Intrusive investigation work recommended to confirm ground conditions across the site. Testing of contaminants of concern based on preliminary conceptual model and field observations (PID tests and visual / olfactory evidence).
PL 3	Gas monitoring required. Gas monitoring: monitoring wells to be installed in boreholes, monitoring frequency and period subject to anticipated risk.
PL 4	Groundwater sampling, subject to ground conditions encountered.
Reporting	Information from the above can be used to carry out a contamination and geotechnical assessment and provide a remediation strategy for the site.

Table 7-4: Recommendations.

Further Considerations are summarised in Table 7-5.

Ecology	A potential badger sett was identified on site during the site reconnaissance. It is recommended that an Ecologist is consulted prior to any intrusive investigation being undertaken.
----------------	--

Table 7-5: Further considerations.

⁹ British Standard (2017). "Investigation of Potentially Contaminated Sites – Code of Practice". BS10175:2017.

¹⁰ British Standard (2015). "Code of Practice for Ground Investigations". BS5930:2015.

¹¹ CIRIA (2007). "Assessing Risks Posed by Hazardous Ground Gases to Buildings". CIRIA C665.

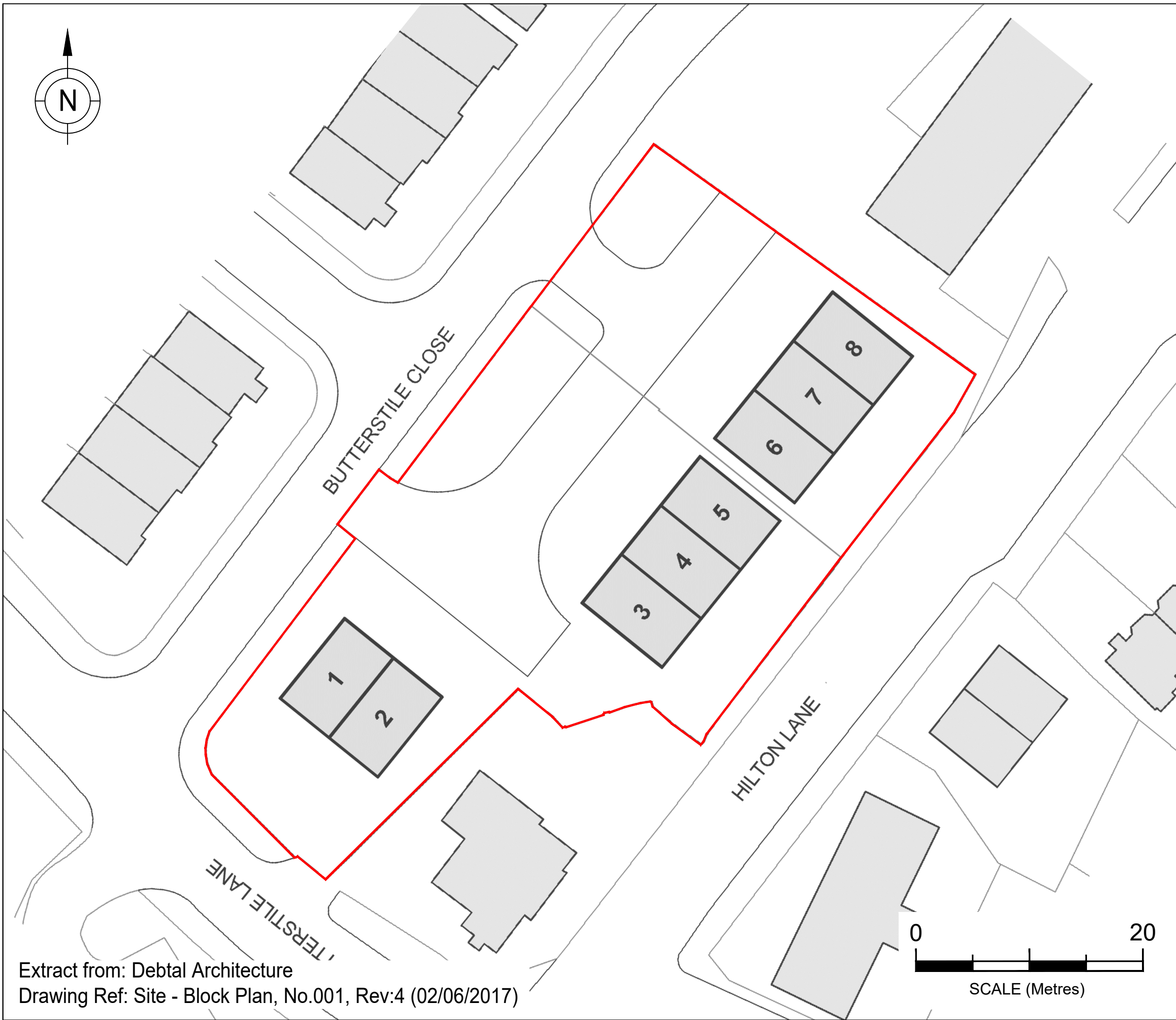
¹² CL:AIRE Research Bulletin RB17 (November 2012) "A Pragmatic Approach to Ground Gas Risk Assessment".

¹³ BSI (2015). "Code of Practice for the Design of Protective Measures for Methane and Carbon Dioxide Ground Gases for New Buildings". BS8485:2015.

Figures



Client: Leo Property Ltd				Title: Site Location & Boundary Plan		
Site: Hilton Lane, Butterstile Close, Prestwich				Scale (see scale bar): 1:25,000 & 1:1,500 @ A4		
Job No.: LKC 21 1545	Drawn By: HM	Checked By: PQ	Drawn: Feb 2021	Figure: 1	Revision:	



KEY
 Site Boundary

Sampling Locations and features annotated by LK Consult Ltd are approximate and are based upon observed measurements unless otherwise stated. Do not scale from this drawing and work from marked dimensions only. All dimensions and features should be confirmed on site by the Contractor. Where this drawing includes information provided to LK Consult Ltd by others, LK Consult Ltd gives no warranty, representation or assurance as to the accuracy of such information.



Client: **Leo Property Ltd**

Site: **Hilton Lane, Butterstile Close, Prestwich**

Title: **Proposed Development Plan**

Job No.: LKC 21 1545	Scale (See Scale Bar): See Scale Bar	Figure: 2	Revision:
Drawn By: AC	Checked By: HM	Drawn: Oct 2021	

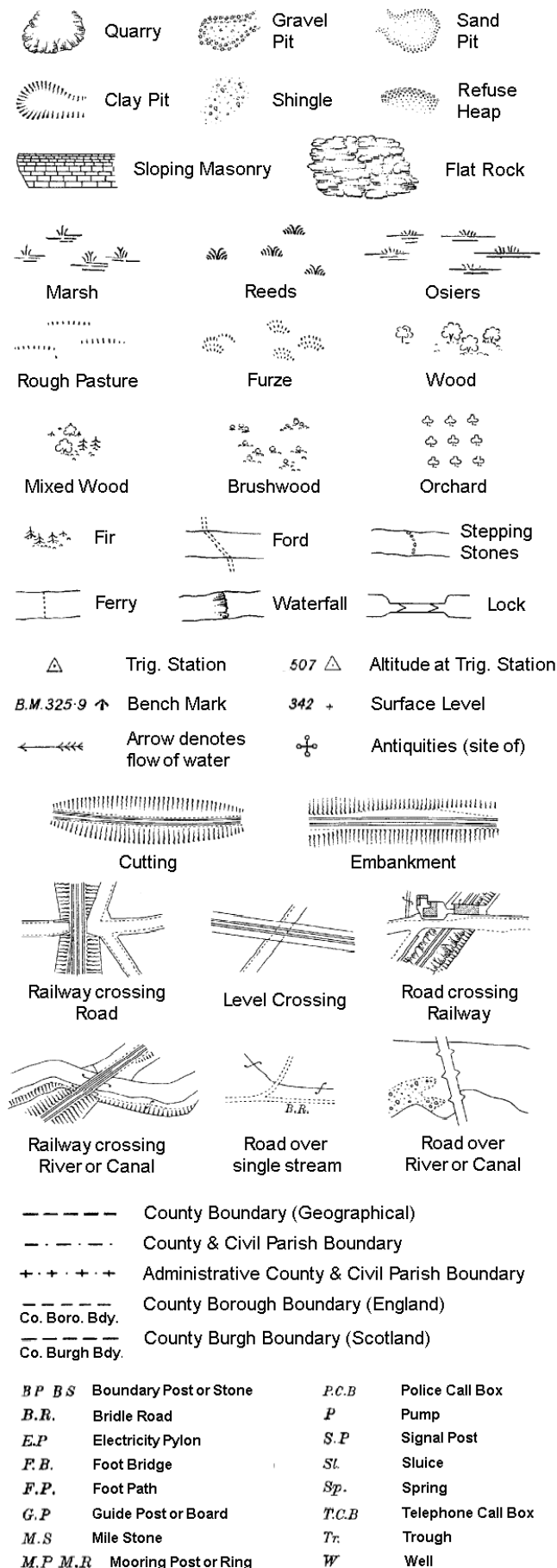
Extract from: Debtal Architecture
Drawing Ref: Site - Block Plan, No.001, Rev:4 (02/06/2017)

Appendix A

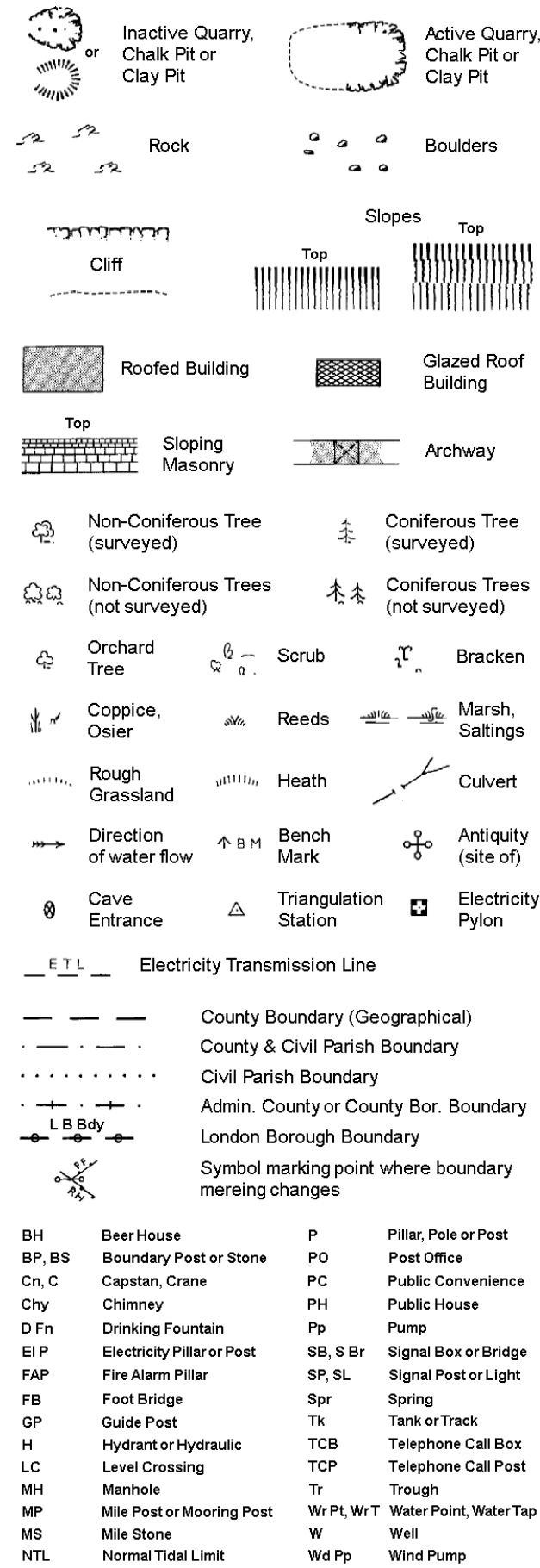
Historical Maps

Historical Mapping Legends

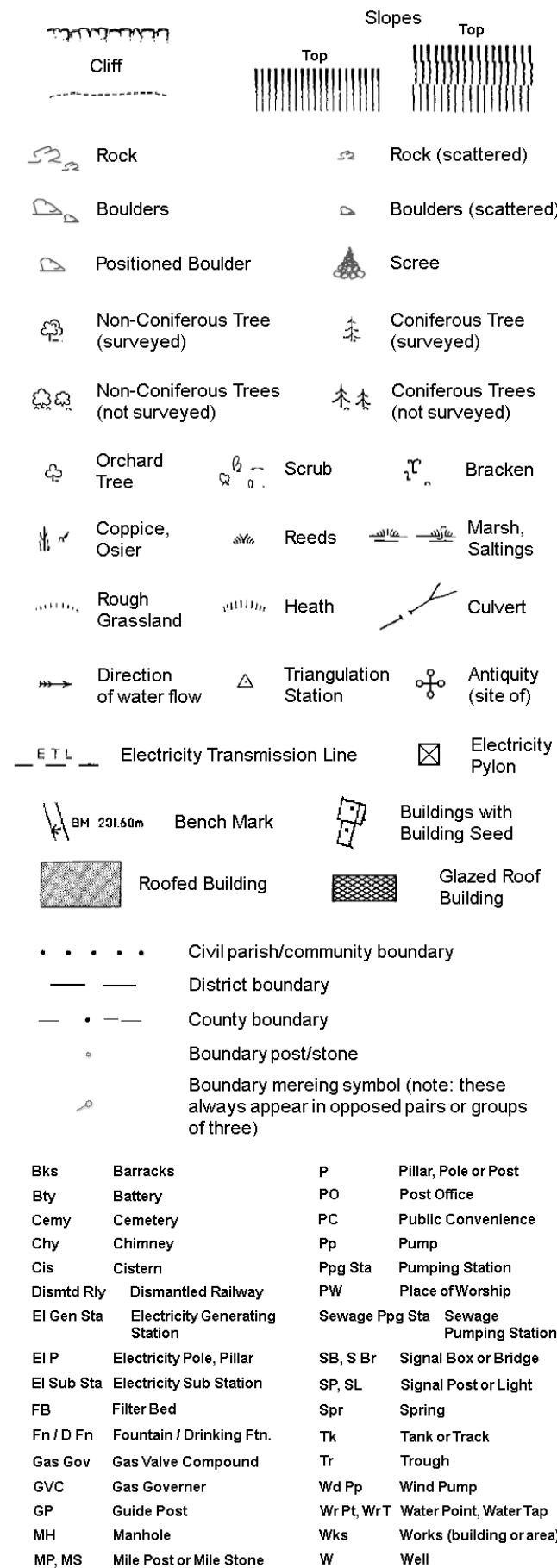
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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



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

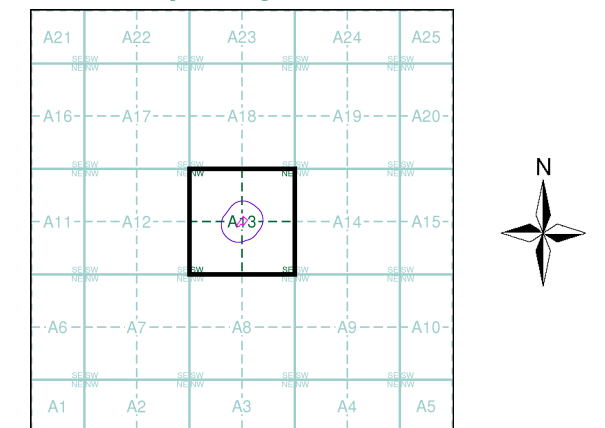


GROUP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lancashire And Furness	1:2,500	1893	2
Lancashire And Furness	1:2,500	1909	3
Lancashire And Furness	1:2,500	1932	4
Ordnance Survey Plan	1:1,250	1952 - 1953	5
Ordnance Survey Plan	1:2,500	1953 - 1954	6
Ordnance Survey Plan	1:1,250	1957 - 1970	7
Additional SIMs	1:1,250	1957 - 1989	8
Ordnance Survey Plan	1:2,500	1960	9
Additional SIMs	1:1,250	1983 - 1989	10
Additional SIMs	1:1,250	1988	11
Large-Scale National Grid Data	1:1,250	1992	12
Large-Scale National Grid Data	1:1,250	1994	13
Large-Scale National Grid Data	1:1,250	1996	14
Historical Aerial Photography	1:2,500	2000	15

Historical Map - Segment A13



Order Details

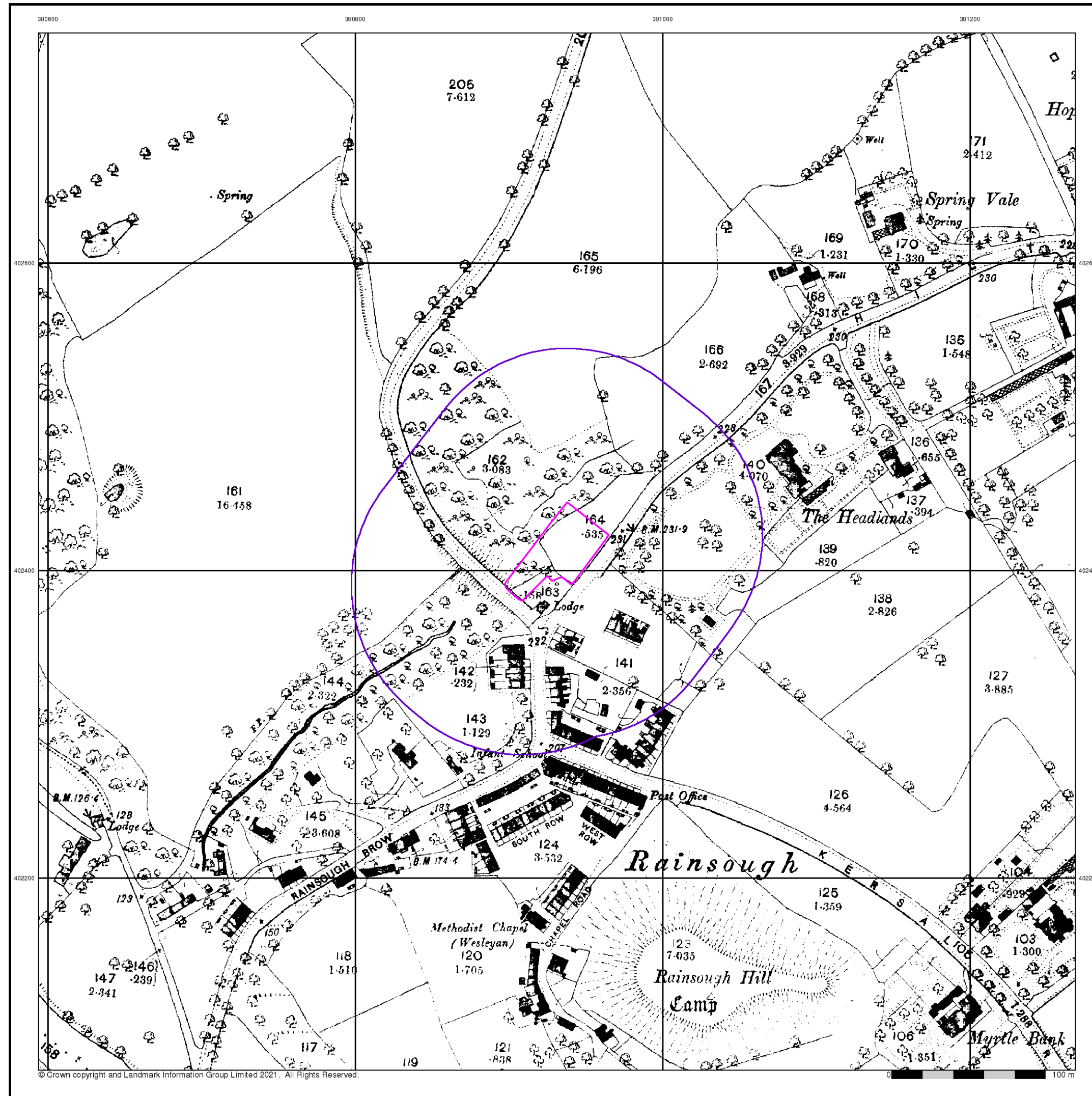
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National Grid Reference: 380930, 402410
Slice: A
Site Area (Ha): 0.2
Search Buffer (m): 100

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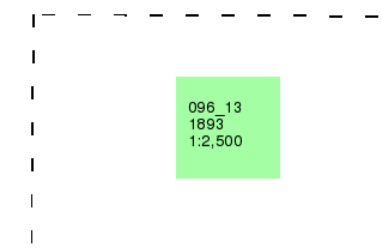
Lancashire And Furness

Published 1893

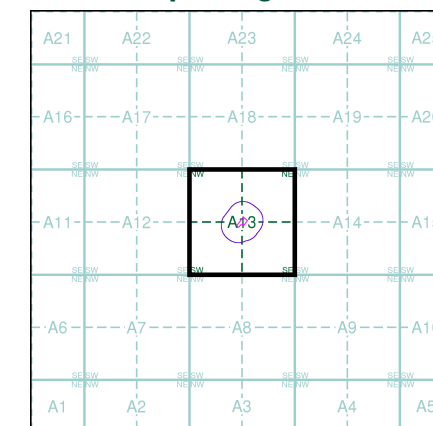
Source map scale - 1:2,500

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



Order Details

Order Number: 285847885_1_1
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Lancashire And Furness

Published 1909

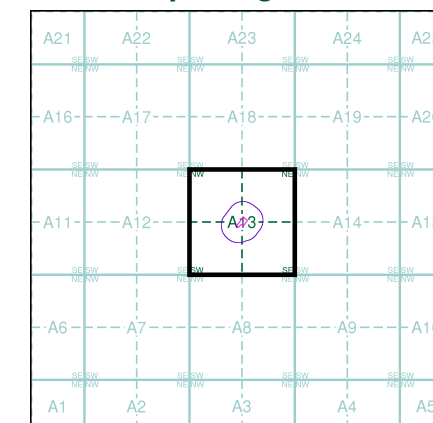
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered 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)

096_13
1909
1:2,500

Historical Map - Segment A13



Order Details

Order Number: 285847885_1_1
 Customer Ref: LKC 21 1545
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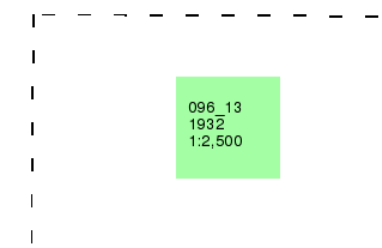
Lancashire And Furness

Published 1932

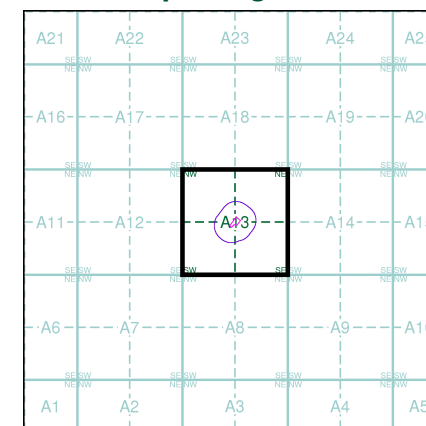
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered 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



Order Details

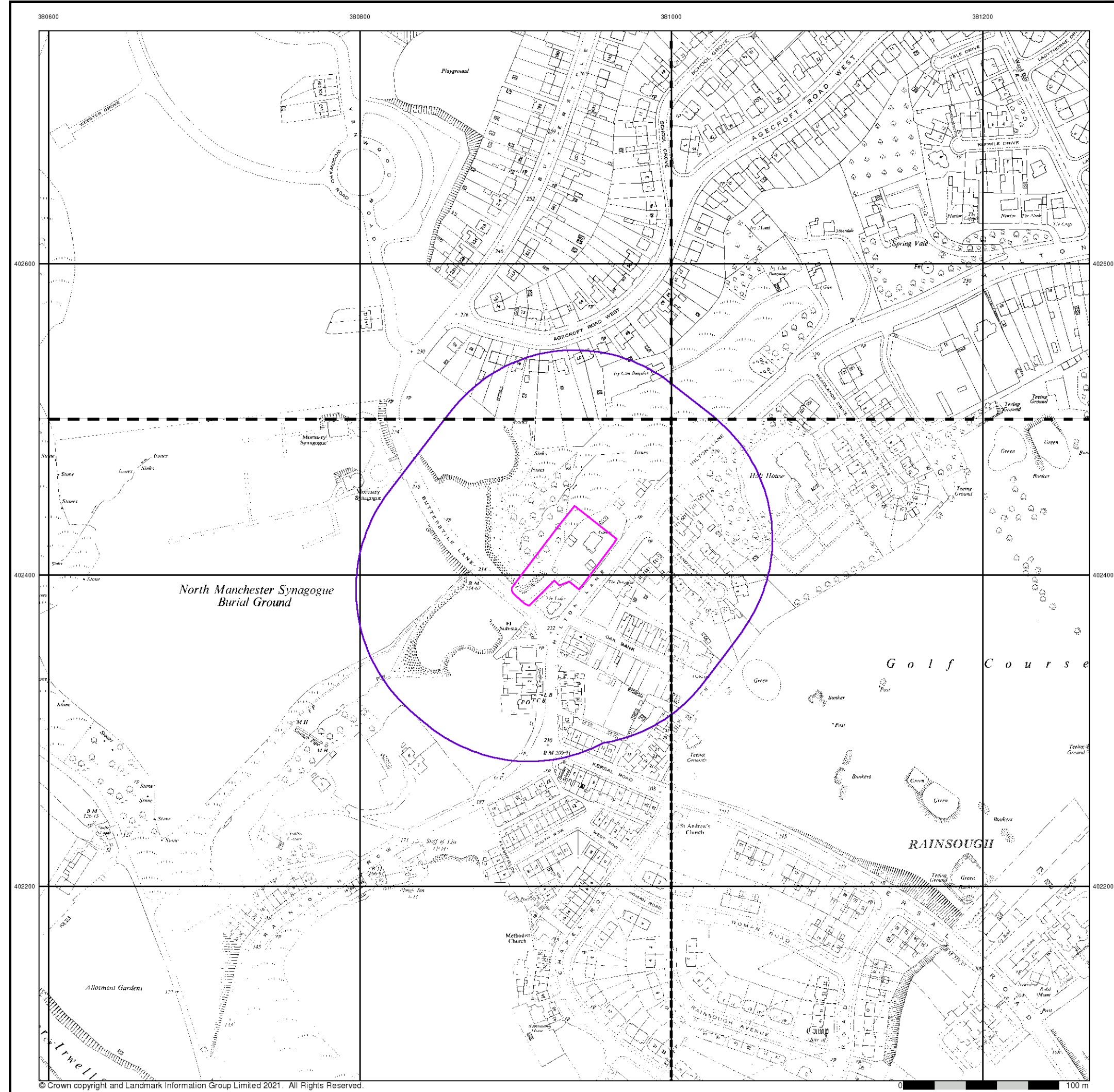
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Ordnance Survey Plan

Published 1952 - 1953

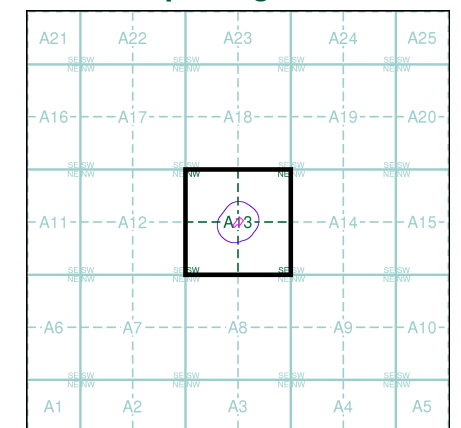
Source map scale - 1:1,250

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)

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SD8002SE 1952 1:1,250	SD8102SW 1953 1:1,250

Historical Map - Segment A13

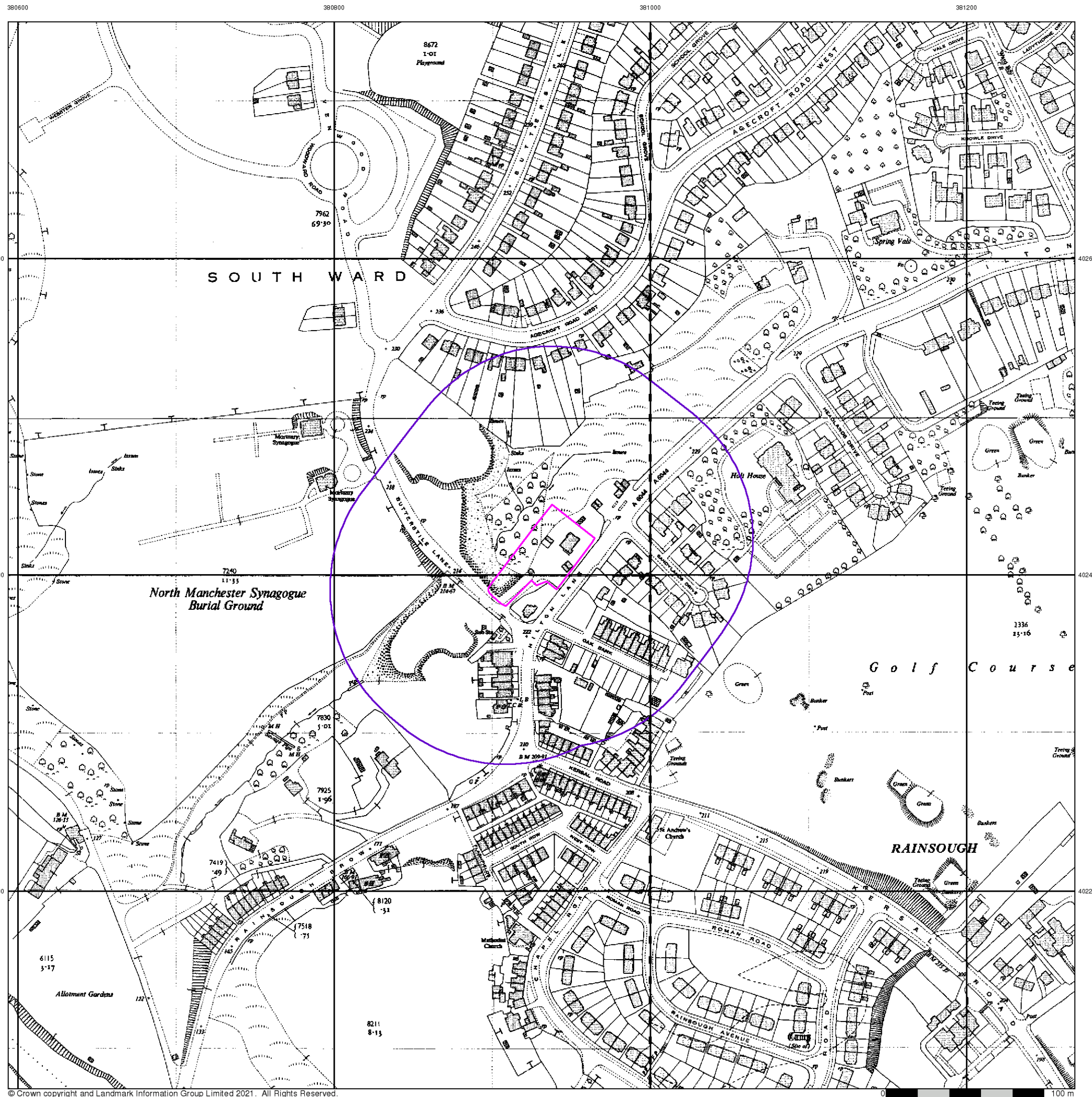


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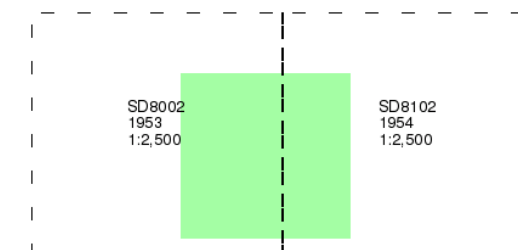
ORDNANCE SURVEY PLAN

Published 1953 - 1954

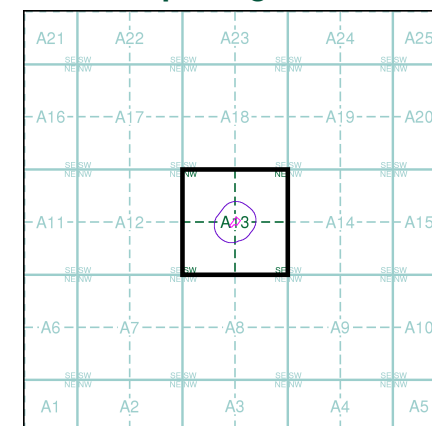
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered 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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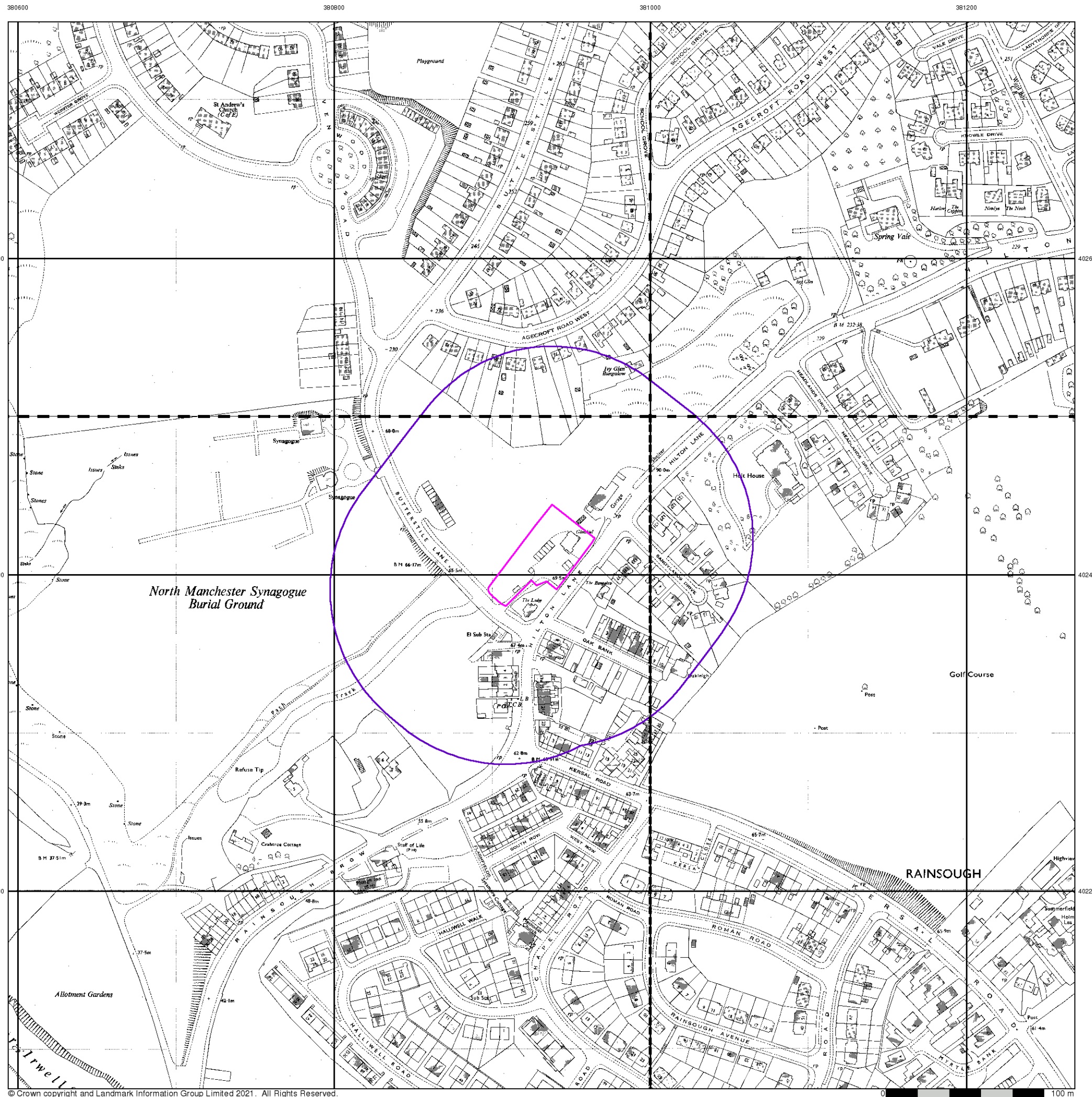
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Ordnance Survey Plan

Published 1957 - 1970

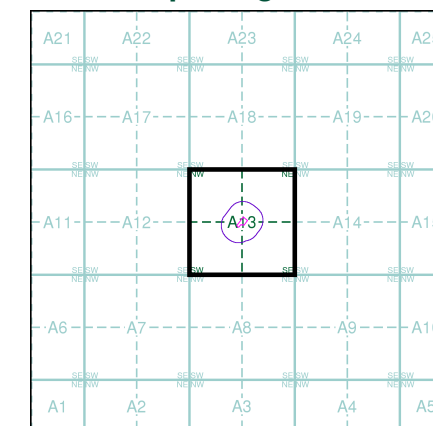
Source map scale - 1:1,250

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)

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SD8002SE 1970 1:1,250	SD8102SW 1970 1:1,250

Historical Map - Segment A13



Order Details

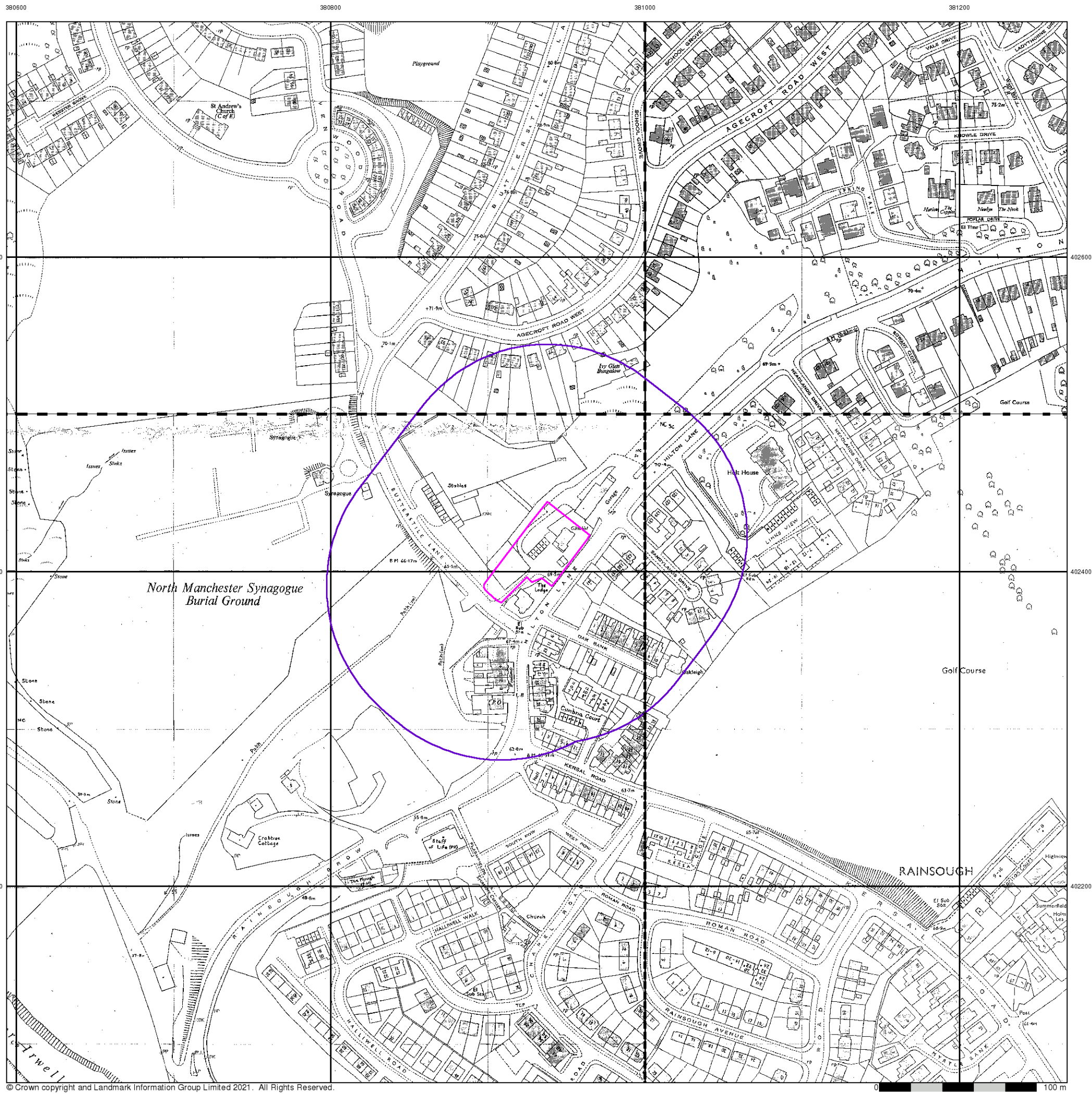
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Additional SIMs

Published 1957 - 1989

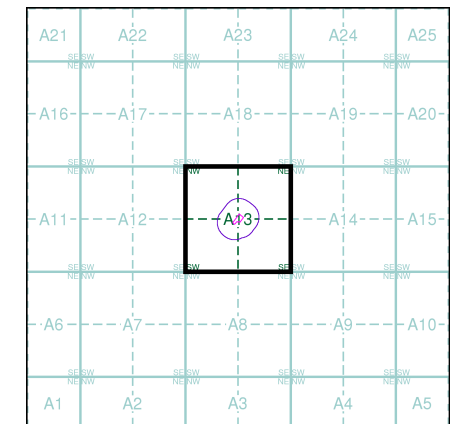
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The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information 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)

SD8002NE 1957 1:1,250	SD8102NW 1963 1:1,250
SD8002SE 1989 1:1,250	SD8102SW 1988 1:1,250

Historical Map - Segment A13



Order Details

Order Number: 285847885_1_1
Customer Ref: LKC 21 1545
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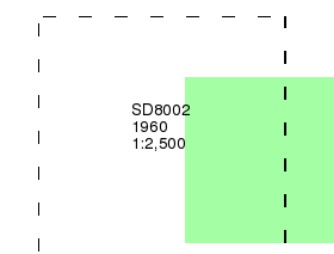
Ordnance Survey Plan

Published 1960

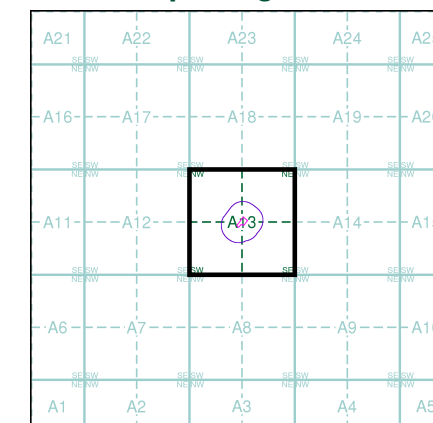
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

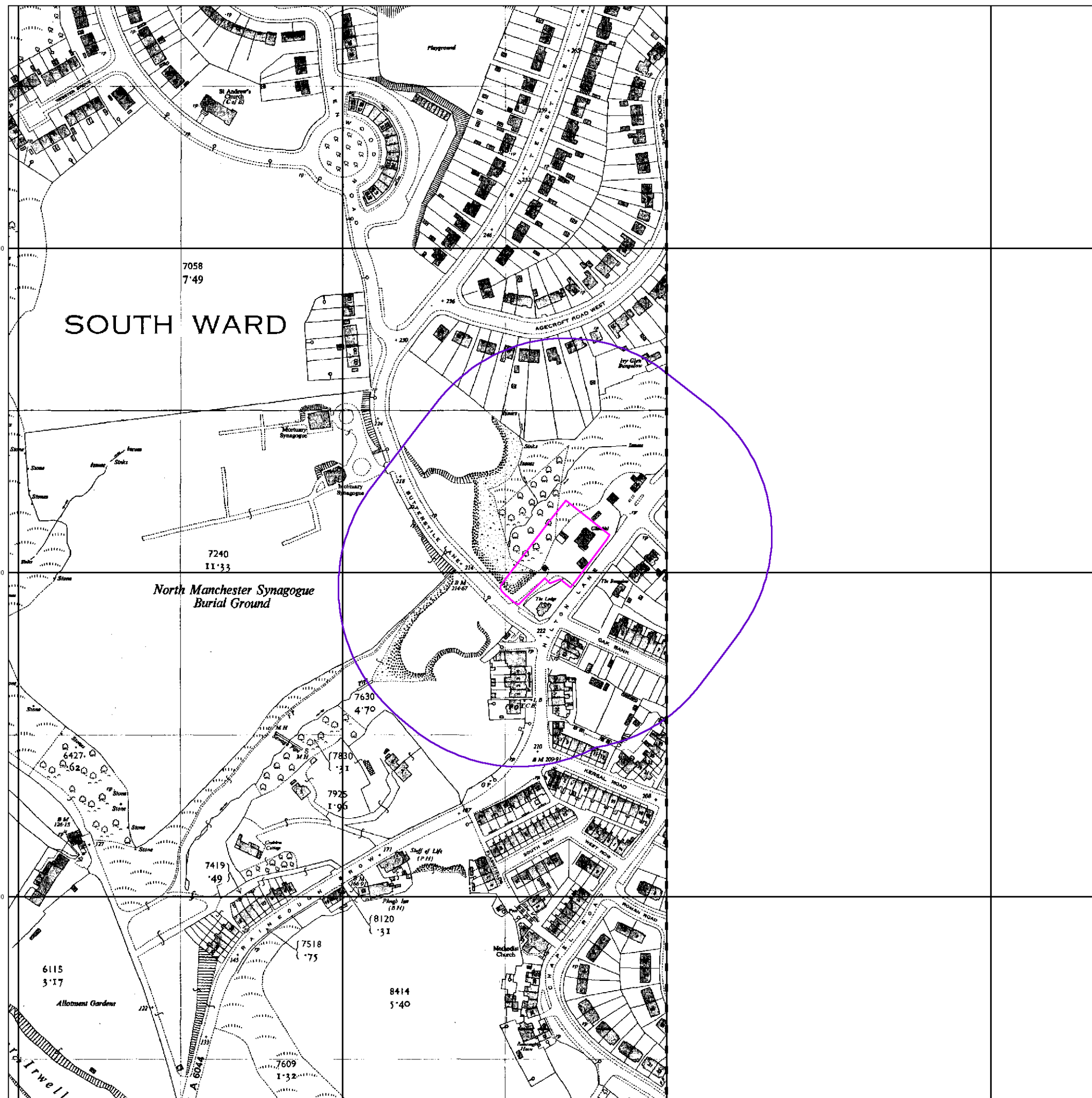
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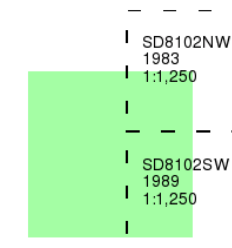
Additional SIMs

Published 1983 - 1989

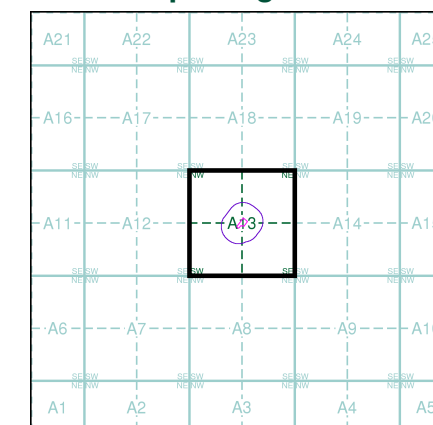
Source map scale - 1:1,250

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)



Historical Map - Segment A13



Order Details

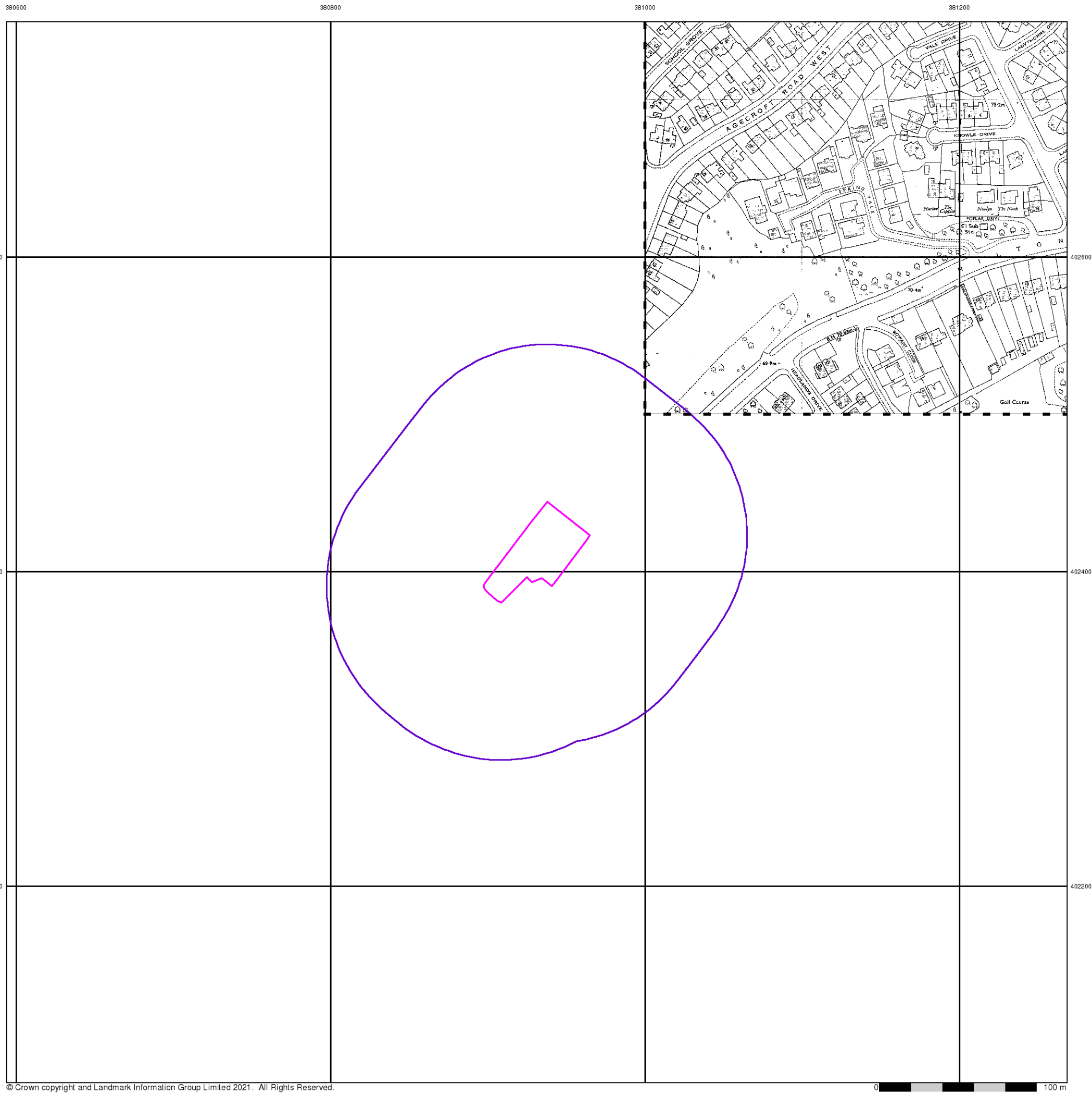
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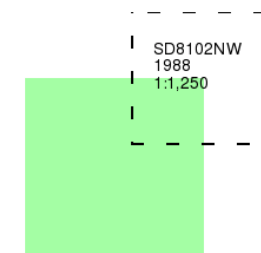


Published 1988

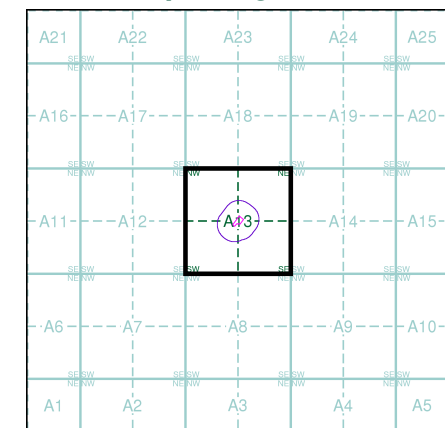
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The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information 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)



Historical Map - Segment A13

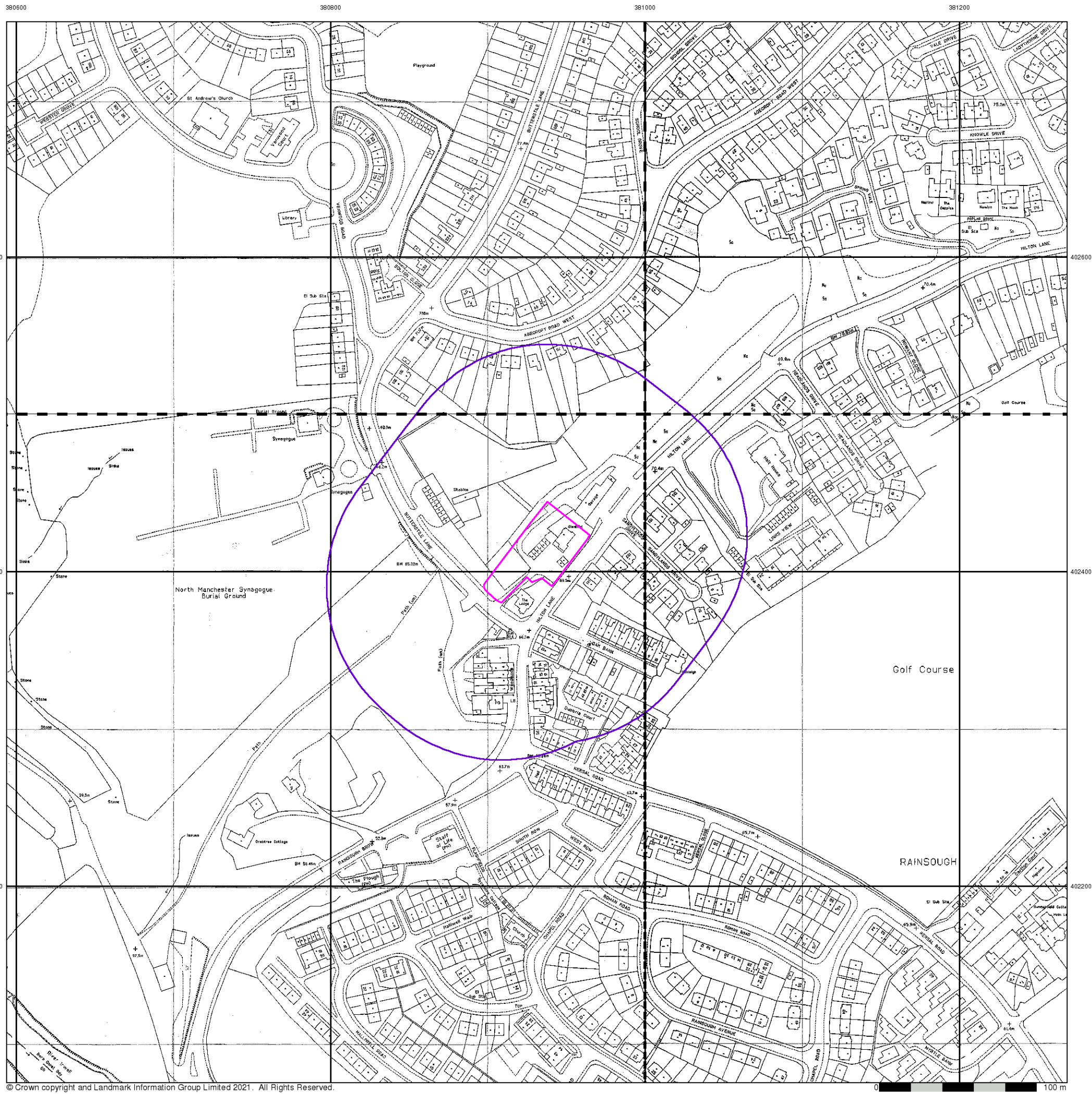


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Customer Ref: LKC 21 1545
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Slice: A
Site Area (Ha): 0.2
Search Buffer (m): 100

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Large-Scale National Grid Data

Published 1992

Source map scale - 1:1,250

'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)

SD8002NE 1992 1:1,250	SD8102NW 1992 1:1,250
SD8002SE 1992 1:1,250	SD8102SW 1992 1:1,250

Historical Map - Segment A13

A21	A22	A23	A24	A25
A16	A17	A18	A19	A20
A11	A12	A13	A14	A15
A6	A7	A8	A9	A10
A1	A2	A3	A4	A5

N

Order Details

Order Number: 285847885_1_1

Customer Ref: LKC 21 1545

National Grid Reference: 380930, 402410

Slice: A

Site Area (Ha): 0.2

Search Buffer (m): 100

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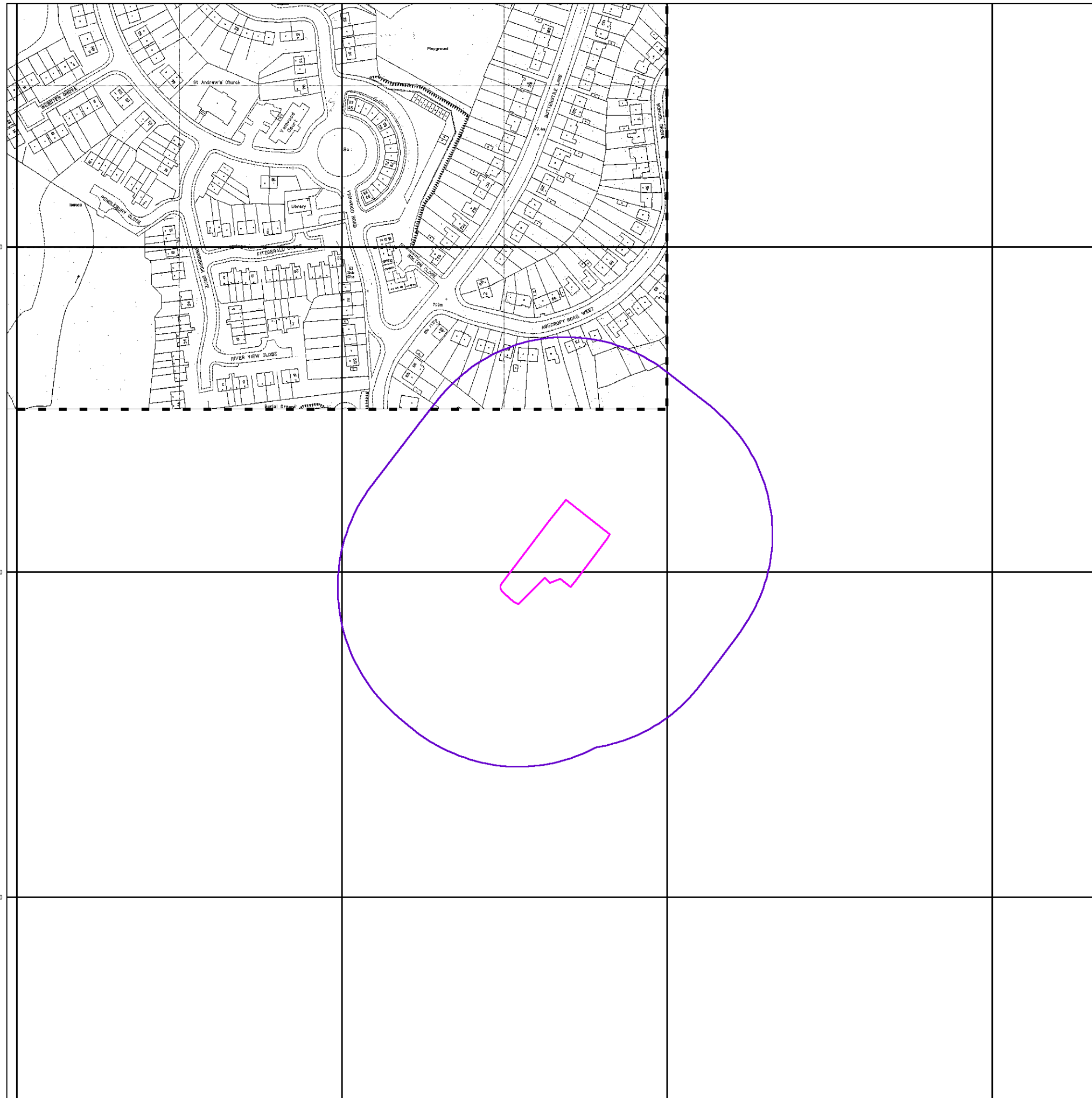
A Landmark Information Group Service v50.0 05-Oct-2021 Page 12 of 15

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0 100 m



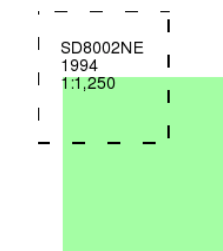
Large-Scale National Grid Data

Published 1994

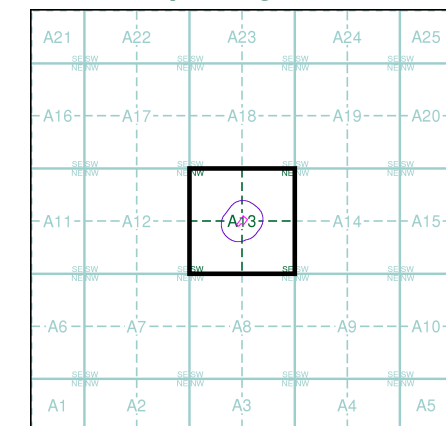
Source map scale - 1:1,250

'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



Order Details

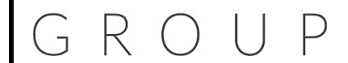
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Customer Ref: LKC 21 1545
National Grid Reference: 380930, 402410
Slice: A
Site Area (Ha): 0.2
Search Buffer (m): 100

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Published 1996

'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.

SD8102SW
1996
1:1,250

A 5x5 grid of points labeled A1 to A25. A 2x2 square is highlighted with a thick black border, centered on point A13. The square's corners are at A12, A14, A18, and A20. Point A13 is at the center of the square. The grid lines are dashed, and the points are labeled with their respective coordinates.



Order Number:	285847885_1_1
Customer Ref:	LKC 21 1545
National Grid Reference:	380930, 402410
Slice:	A
Site Area (Ha):	0.2
Search Buffer (m):	100

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