



Phase 1

Environmental Assessment Report

**Billberry Close,
Whitefield, Manchester,
M45 8BL**

Date: 23rd February 2023

ENVIROSOLUTION LTD

Suite 53
3a Bridgewater Street
Liverpool
L1 0AB



EnviroSolution Ltd

Document Verification

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Executive Summary

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g., human health, buildings) following redevelopment is considered to be moderate.

This classification is due to previous site development and demolition works that have taken place within the site boundary. Made Ground is therefore likely to be present. Associated contaminants could include heavy metals, polycyclic aromatic hydrocarbons (PAHs) and asbestos.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

Disclaimer

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1 Introduction

1.1 Background

EnviroSolution Ltd was commissioned to undertake a Phase 1 Environmental Site Assessment at a site located at Billberry Close, Whitefield, Manchester, M45 8BL. This report was commissioned to provide information on the potential contamination status of the site.

1.2 Objectives

The objective of the preliminary environmental site assessment was:

1. To provide a summary of the environmental setting and historical land use of the site and immediate surrounding area.
2. To obtain information on the ground conditions present beneath the site.
3. To develop a conceptual site model and complete a generic quantitative risk assessment to identify any environmental risks and liabilities associated with ground conditions at the site.

1.3 Scope of Work

To achieve the objectives, the following scope of work was completed:

1. A desk-based study of the site comprising a review of available environmental information for the site such as geological and hydrogeological data and historical land use information.
2. A site walkover survey.
3. Assessment of potential hazards and constraints during construction and longer term.

This work has been devised to generally comply with the relevant principles and requirements of the following legalisation and guidance:

- Part IIA of the Environmental Protection Act, 1990 and Section 57 of the Environmental Act 1995;
- Contaminated Land (England) (Amendment) Regulations 2012 and Contaminated Land Statutory Guidance (DEFRA, April 2012);
- National Planning Policy Framework (Ministry of Housing, Communities and Local Government, February 2019);
- BS10175: 2011 +A2:2017 "Investigation of Potentially Contaminated Sites- Code of Practice"; and

- Environment Agency (2020) Land Contamination Risk Management Report LCRM “How to assess and manage the risks from land contamination”.

1.4 Information Sources

Historical Ordnance Survey maps have been obtained from historical records, ranging from 1848 to 2022. These maps provide high quality information on historical site use.

The British Geological Survey Geoindex database has been used to provide information on geo-environmental aspects of the site and the immediate surrounding area such as geological, hydrogeological and hydrological data.

The Environment Agency website (www.gov.uk/government/organisations/environment-agency) and Magic website (www.magic.gov.uk) was also used to obtain environmental information.

Industry Profiles produced by the Department of the Environment were utilised to obtain information on processes, materials and wastes associated with potential contaminative land uses near the site.

Readily available information sources have been used to produce this desk-based study. Additional information may be requested by the Local Planning Authority (e.g., local authority environmental information request).

2 The Site

2.1 Site Location

The site is located at Billberry Close, Whitefield, Manchester, M45 8BL. The British National Grid Reference for the approximate site centre is GR: 381698, 405925.

The site location is shown on **Figure 1** in **Appendix A**. The site walkover photographs are included in **Appendix B**.

2.2 Site Description

The site is an irregular shape and covers an approximate total area of 3,400 square metres.

The site is an open plot of green space, located on Billberry Close and Albert Road. The site is currently covered in grass lawn with a footpath running through it. The site is less than a 20-minute drive from the M62 and has multiple bus stops a 6-minute walk away. The site is bounded by residential properties north, south and east, as well as bounded by an agricultural field, west of the site.

The site is fairly flat with an average elevation of 94 aOD.

Land use in the surrounding area is predominantly agricultural and residential.

No petrol filling stations have been identified within a 250m radius of the site.

The existing site plan is shown on **Figure 2** which is included in **Appendix A**.

Development Proposals

The formal development plan is to propose 7 no. bungalows and associated works including parking and landscape spaces.

The proposed development plan is shown on **Figure 3** which is included in **Appendix A**.

2.3 Site History

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area is summarised in Table 1. Copies of the historical OS maps are included in **Appendix C**. A search buffer of 250m has been used.

Table 1 - Historic Mapping Review

Date	Scale	On Site	Off Site
1848	1:10,560	The site is occupied by agricultural fields.	The surrounding area is occupied by agricultural fields and a few residential areas.
1893	1:2,500	No significant change.	Albert Mill (Cotton) 80m north. 2x Reservoirs 70m north.
1894	1:10,560	No significant change.	Residential development on the north boundary of the site.
1909	1:2,500	No significant change.	Chimney 70m north. 1x Reservoir is labelled as a Gasometer reservoir. A Well 240m northeast.
1910	1:10,560	No significant change.	Tank 70m north
1923	1:10,560	No significant change.	No significant change.
1932	1:2,500	No significant change.	No significant change.
1932	1:10,560	No significant change.	No significant change.
1938	1:10,560	No significant change.	Further residential developments southwest.
1955-56	1:10,000	No significant change.	No significant change.
1956	1:2,500	No significant change.	Pump House 40m west. Electricity Substation 90m north. Public House (Albert Inn) 210m northeast.
1956-58	1:2,500	No significant change.	No significant change.
1965-68	1:10,000	No significant change.	No significant change.

Date	Scale	On Site	Off Site
1969-70	1:2,500	No significant change.	Tank 40m southwest. Corporation Yard 150m northeast. Electric Substation 150m south, 210m east and 200m northeast.
1970-71	1:2,500	No significant change.	No significant change.
1974-79	1:10,000	Southern area of the site has been developed on for a school.	The surrounding area has been heavily developed with residential development.
1977-85	1,2500	The central are of the site has been developed.	No significant change.
1983-86	1:10,000	No significant change.	No significant change.
1992	1:1,250	No significant change.	Electrical Substation 250m northwest.
1999	1:10,000	The existing development has been demolished. Footpath running along the site.	No significant change.
2022	1:10,000	No significant change.	Albert Mill (Cotton) appears removed along with reservoir, chimney and tank 70m north and developed into residential properties.

3 Environmental Setting

3.1 Geology

Geological maps of the area indicate that the site is directly underlain by glacial diamicton deposits (Till), deposited during the Pleistocene Epoch. The deposits mainly consist of unsorted and unstratified drift deposited directly by and underneath a glacier without subsequent reworking by water from the glacier. It consists of a heterogenous mixture of clay, sand, gravel, and boulders varying widely in size and shape.

The underlying bedrock is the Manchester Marls Formation, deposited during the Permian Period. The Manchester Marls Formation mainly consists of Red marl (calcareous mudstone and siltstone) with thin beds of fossiliferous marine limestone and dolomite; locally green; sandy in places especially in top part; local breccias and pebbly beds.

The nearest geological fault is located approximately 60m northeast of the site.

The borehole log (Ref: SD80NW13) was obtained from BGS online records located 300m southwest of the site. The borehole log penetrates 145.8m bgl and shows approximately 0.3m of topsoil, 0.3-11.9m of brown/blue clay with gravel and loamy sand, 11.9 – 22.6m of brown/red sand with loamy sand, 22.6-36.9m of hard/soft brown sandy clay, 41.2- 59.1m of red / variegated marl with small gravel, 64.6m of red and grey sandstone with small gravel and marl and then 143m of red sandstone and marl.

A copy of the geological maps is included in **Appendix D**. A copy of the BGS borehole records is included in **Appendix E**.

3.2 Radon

The site lies within an elevated band of radon potential where it is estimated that 1-3% of the properties are above the action level (medium probability). Basic radon protective measures are not deemed necessary for the development. Testing existing buildings and fitting radon prevention in new buildings might still be considered, particularly if there is a high-risk location such as a routinely occupied basement.

3.3 Coal Mining Activity

The site falls within a Coal Mining Reporting Area described as having minable coal deposits but does not lie within a 'Development High Risk Area' for coal mining, as defined by the Coal Authority. As such, it is considered that there are no coal mining related hazards which could affect the site.

A copy of the coal mining summary map is included in **Appendix F**.

3.4 Hydrogeology

The underlying superficial diamicton deposits (Till) is designated as a Secondary (undifferentiated) Aquifer, defined as; cases where it has not been possible to attribute either category A or B to a rock type. In most cases this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type.

The underlying Manchester Marls Formation, is designated as Secondary B, defined as; predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering. These are generally the water-bearing parts of the former non-aquifers.

The site is not located within a Source Protection Zone.

There are 1 no. groundwater abstraction licences located within a 1km radius.

Table 2 – Groundwater Abstraction Licences

Permit Holder Name	Use Description	Distance from Site
The Danish Crown Ltd.	Process Water	840m NW

A copy of the hydrogeological maps is included in **Appendix G**.

3.5 Hydrology

There is 1 no. significant surface water feature (rivers, lakes and reservoirs) located within a 1km radius of the site, The Heaton Park Reservoir is located 800m southeast of the site.

There are no minor surface water features located within a 250m radius of the site.

3.6 Flood Risk

The site lies within a Flood Zone 1 (low probability), land assessed as having less than a 1 in 1,000 annual probability of river flooding (0.01%) in any year (low risk). The completion of a detailed Flood Risk Assessment is not deemed necessary for this site.

A copy of the flood risk map is included in **Appendix H**.

3.7 Waste Management Facilities

There are 2 no. records of historical landfill sites located within a 1km radius of the site.

Table 3 – Historic Landfill Summary

Historic Landfill Site	Operation Dates	Waste Type	Distance from Site
Victoria Mill	Unknown	Inert	904m NW
Victoria Mill	Unknown	Unknown	920 NW

A copy of the historic landfill map is included in **Appendix I**.

There are no records of currently authorised landfill sites or sites operating under an environmental permit for waste operations within a 1km radius of the site.

3.8 Environmental Permits, Incidents and Registers

There are no records of sites located within a 1km radius of the development site operating under an environmental permit for discharges to water and groundwater.

There are no records of pollution incidents having occurred within a 1km radius of the site.

There are no records of development sites operating under an environmental installation permit within a 1km radius of the site.

3.9 Designated Environmentally Sensitive Sites

Records of designated environmentally sensitive sites located within a 1km radius of the site are summarised in Table 4 and shown on plans included in **Appendix J**.

Table 4 – Environmental Designations Summary

Features	Distance	Comments
Nitrate Vulnerable Zones	980m	The Nitrate Vulnerable Zone is located 980m southeast of the site.
Green Belt	275m	The Green Belt is 275m is located northwest of the site.

4 Preliminary Conceptual Site Model

4.1 Introduction

To assess the environmental risks present, a preliminary conceptual model has been developed for the site. This model has been developed using best practice guidelines in conjunction with the current assessment framework considering the development proposals. This preliminary conceptual model is based on the gathered desk-based information (e.g. historical OS data and data sourced from the EA, Geoindex and Magic databases).

The conceptual site model is a representation of the hypothesised relationships between sources, pathways and receptors which allows the identification of potential pollutant linkages and whether these linkages have the potential to comprise significant harm and/or pollution of controlled waters in relation to the site. This model comprises three elements:

Source – the key pollutant hazards associated with the site

Receptor – the key targets at risk from the sources

Pathway – the means by which the contaminant can cause harm to the receptor

If all three elements are present, then a potential pollutant linkage exists, and this may require further assessment.

4.2 Potential Contamination Sources

The site has been developed and occupied by school buildings since as far back as the 1970s. The buildings were demolished in the 1990s and the site has since remained as an open green space. Given the previous development, there is the potential for Made Ground to be present underneath the site. The Made Ground is expected to be comprised of demolition rubble and therefore, ground gas generation (i.e., methane and carbon dioxide) is considered unlikely. Associated contaminants could include heavy metals, hydrocarbons, polycyclic aromatic hydrocarbons (PAHs), solvents and asbestos.

A number of off-site land uses have been identified in the surrounding area (i.e., within a 250m radius) that have the potential to contaminate the shallow soils at the site. The land uses and their associated contaminants are summarised in Table 5 below:

Table 5 – Off-Site Land Use Summary

Land Use	Potential Contaminants
Chimney	Nitrates, sulphates and chlorides.
Electricity Sub-Station	Polychlorinated biphenyls (PCBs).
Mills	Solvents, Metals, Petroleum, and Polychlorinated biphenyls (PCBs).
Tanks	Hydrocarbons.

It is considered that the above land uses can be discounted as potential sources of contamination due to the distance ($\geq 70\text{m}$) and the presence of low permeability diamicton deposits which underlie the area which will act as an impermeable barrier, preventing migration of contaminants towards the site. Nearby borehole records show the glacial diamicton deposits to be comprised of cohesive clays.

The historic landfill sites can be discounted as potential sources of contamination due to the distance from site ($>900\text{m}$). Geological maps show generally low permeability diamicton in the areas to the north of the site.

4.3 Receptors

The potential receptors considered to be at risk from soil and groundwater contamination associated with the site are summarised in Table 6 below:

Table 6 - Receptor Description

Receptor	Details
Human (On Site)	- Construction workers - Future site users - Site visitors
Human (Off Site)	- Adjacent site users
Controlled Waters	- Secondary (undifferentiated) - Secondary B

Receptor	Details
	- Heaton Park Reservoir
Building/ construction materials	- Foundations - Buried services
Environmental Receptors	- Nitrate Vulnerable Zones - Green Belt

4.4 Pathways

The potential exposure pathways linking contamination with the receptors identified above are summarised in Table 7 below:

Table 7 - Exposure Pathways Summary

Receptor	Details of Exposure Pathway
Human (on-site)	- Direct ingestion of contaminated soil/groundwater - Dermal contact with soil/groundwater - Inhalation of gases and vapours
Human (off-site)	- Inhalation of fibres and particulates - Inhalation of migrating gases and vapours
Controlled waters	- Vertical and lateral migration of dissolved phase contaminants via preferential pathways to groundwater aquifers - Direct surface water run-off to surface water features
Building/construction	- Buried materials/services - Contact with contaminated soil and/or groundwater

4.5 Potential Pollution Linkages

4.5.1 Human Health

The formal development plan includes the construction of 7 no. bungalows. The development plans include areas of soft landscaping. This is considered to be a sensitive end use.

The presence of buildings and hardstanding would eliminate the risk of exposure, via the dermal contact and ingestion pathways to future site users to any ground contamination that may remain following development.

There could be a potential risk of exposure to any ground contamination that remains following redevelopment in any areas of soft landscaping, to future site users, via all possible exposure pathways.

Any ground gases (i.e., methane and carbon dioxide) and vapours that are present within the soils beneath the site could potentially ingress into future buildings through preferential pathways (e.g., service entry points). Therefore, there would be a risk of exposure via inhalation to future site users.

There is the potential for construction workers and adjacent land users to be exposed to soil and groundwater contamination during site redevelopment. However, the use of appropriate PPE and the adoption of suitable Health and Safety methods will help to reduce the risks posed to human health during this work.

4.5.2 Controlled Waters

The site is directly underlain by diamicton deposits (Till) which are designated as Secondary (undifferentiated) Aquifer. The diamicton is generally of low permeability and will act as an impermeable barrier, preventing any migration of potential contaminants.

The site does not lie within a Source Protection Zone.

There is 1 no. groundwater abstraction licence located within 1km radius of the site, shown in Table 2. However, it can be discounted due to the distances from the site (>840m) and the low sensitivity end use (industrial).

There is a single significant surface water feature within a 1km radius of the site, The Heaton Park Reservoir is located 800m southeast of the site. Migration of pollutants via direct surface water run-off is therefore deemed unlikely.

Overall, the risk to controlled waters is deemed to be moderate to low.

4.5.3 Building/Construction Materials/Buried Services

The presence of any soil and groundwater contaminants beneath the site could potentially impact on construction materials for future new developments, such as below ground structures and services. Concrete foundations are particularly sensitive to aggressive ground conditions, i.e., sulphate attack.

If ground gases and vapour are present in the soil beneath the site, then there would be the potential risk of ingress into new properties which could present a risk of explosion.

4.6 Environmental Designations

The proposed development is not considered to pose a risk to the identified environmental designations.

4.7 Preliminary Hazard Assessment

A preliminary hazard assessment is presented in Table 8. The preliminary hazard assessment is a qualitative assessment of the risks posed by each potential pollutant linkage described above and is used to identify the requirement for additional work (e.g., intrusive ground investigation).

Table 8 – Preliminary Hazard Assessment

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Contaminated soil	Ingestion (via soil dust), inhalation (via soil dust and vapours), ingestion through dirty hands, dermal contact with soil/water.	Future site users Adjacent site users Construction workers	2	3	Moderate	On-site contamination source potential identified. Proposed gardens will provide exposure pathways, Impermeable superficial deposits will limit the migration of off-site contaminants to the site.
Contaminated soil groundwater	Direct contact	Buildings/ services	2	3	Moderate	On-site contamination source potential identified. Proposed foundations and buried services in direct contact with potentially contaminated soils.
Contaminated groundwater	Downward or lateral migration Surface water run-off	Secondary (undifferentiated) Secondary B Heaton Park Reservoir	1	3	Low	On-site contamination source identified. Impermeable superficial deposits will limit the migration of contaminants to sensitive controlled water receptors. The site does not lie within a Source Protection Zone. There are no sensitive groundwater abstraction licences located nearby.

Source 1	Pathway	Receptor	Likelihood	Effect	Risk	Assessment
Ground gas / vapours Radon	Inhalation, ingress into buildings	Buildings / services Future site users Adjacent site users Construction workers	1	4	Low	Off-site sources of ground gases have been discounted based on distance from site and the presence of impermeable superficial deposits. The site lies within a medium probability area for radon. However, basic radon protective measures are deemed not necessary.

Using Risk Matrix (Table 8) Degree of Risk (R) = Likelihood (L) x Effect (E)

Table 8 - Risk Matrix, Degree of Risk (R) = Likelihood (L) x Effect (E)

Likelihood	Description	Probability	Effect (E)	Description
5	Almost certain	>70%		
4	Probable	50-70%	4	Severe
3	Likely	30-50%	3	Medium
2	Unlikely	10-30%	2	Mild
1	Negligible	<10%	1	Minor
Risk (R)	Risk Level	Action		
1-5	Low	None required		
6-10	Moderate	Further assessment via Phase 2 intrusive ground investigation.		
>10	High	Further assessment via Phase 2 intrusive ground investigation.		

5 Conclusions and Recommendations

The preliminary environmental site assessment indicates that the site can be classified as moderate risk in terms of contamination and the risks to the identified receptors (e.g., human health, buildings) following redevelopment is considered to be moderate.

This classification is due to previous site development and demolition works that have taken place within the site boundary. Made Ground is therefore likely to be present. Associated contaminants could include heavy metals, polycyclic aromatic hydrocarbons (PAHs) and asbestos.

It is recommended a Phase 2 intrusive ground investigation is undertaken prior to site redevelopment to obtain additional information on the ground conditions and the contamination status. The investigation should be carried out by qualified and competent persons. The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the Phase 2 intrusive works.

APPENDICES

The map displays a residential neighborhood with a central area highlighted in red and labeled "THE SITE". The site is bounded by Albert Road to the north and west, and Billberry Close to the south and east. Surrounding streets include Ogden Close, Alden Close, Regal Close, Kenmore Road, Brook Drive, Brook Close, Hazel Road, Staiway Road, and Edwards Drive. A scale bar in the bottom right corner shows 30m and 100ft. The map is sourced from mapbox and Ordnance Survey.

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Site Location Map

Figure 1



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Existing Site Plan

Figure 2



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Proposed Development Plan

Figure 3

Appendix B – Site Photographs



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View adjacent to the properties, looking east, along Billbery Close.



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East Boundary.



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North-western Boundary.



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North Boundary.



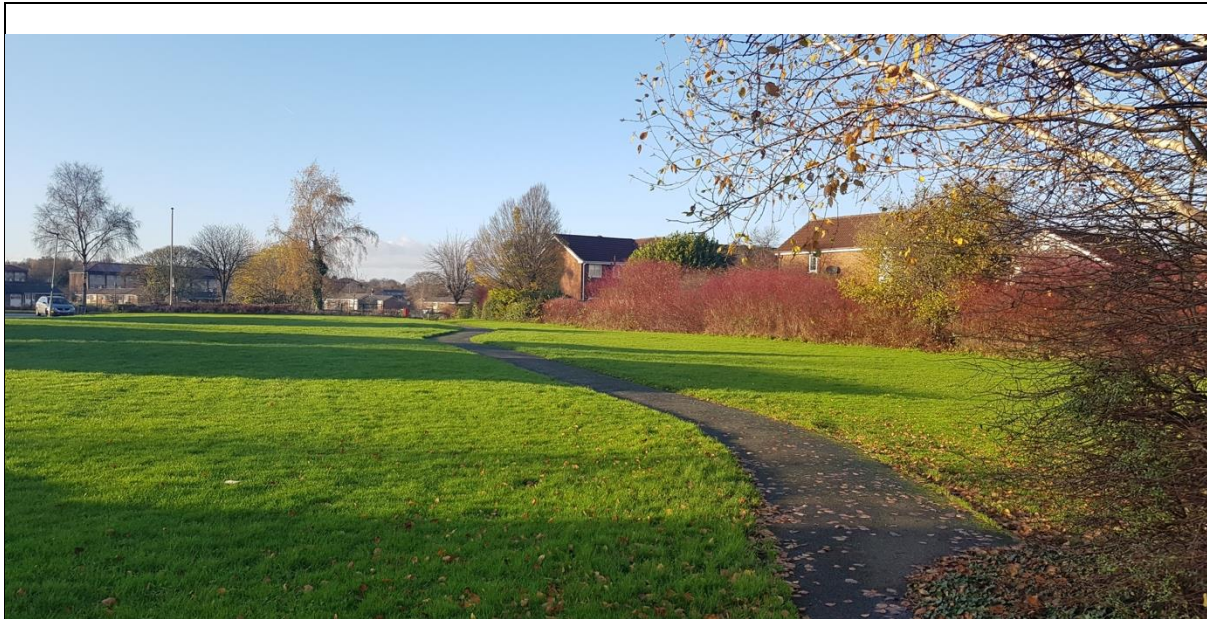
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Southern Boundary.



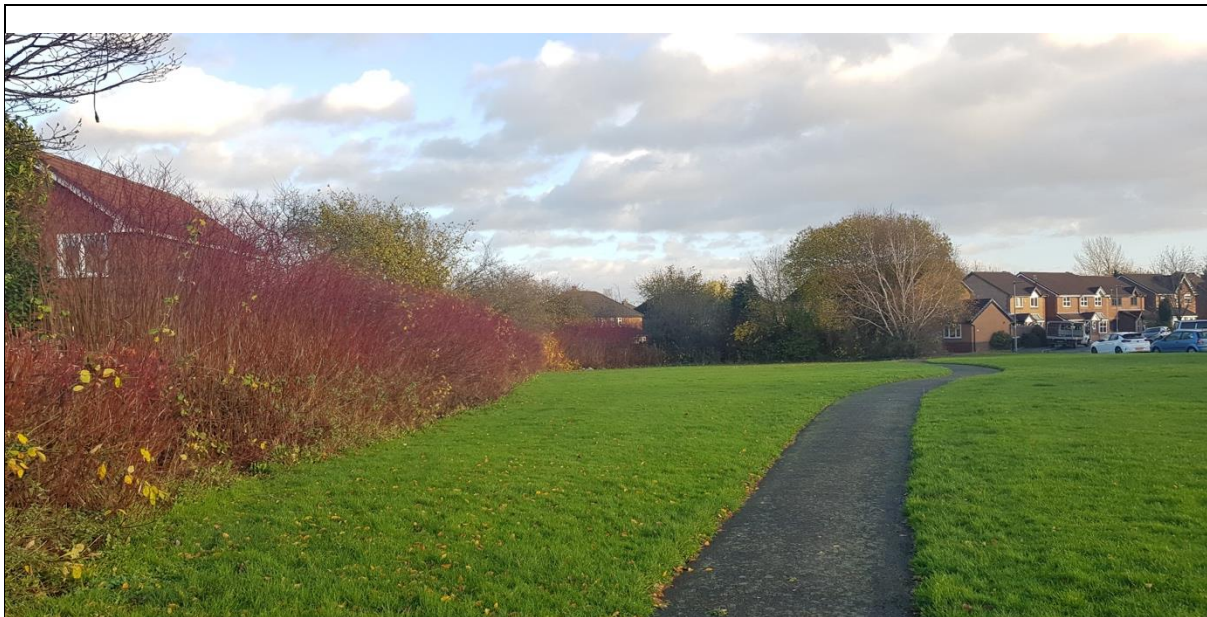
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View looking east.



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View looking west.



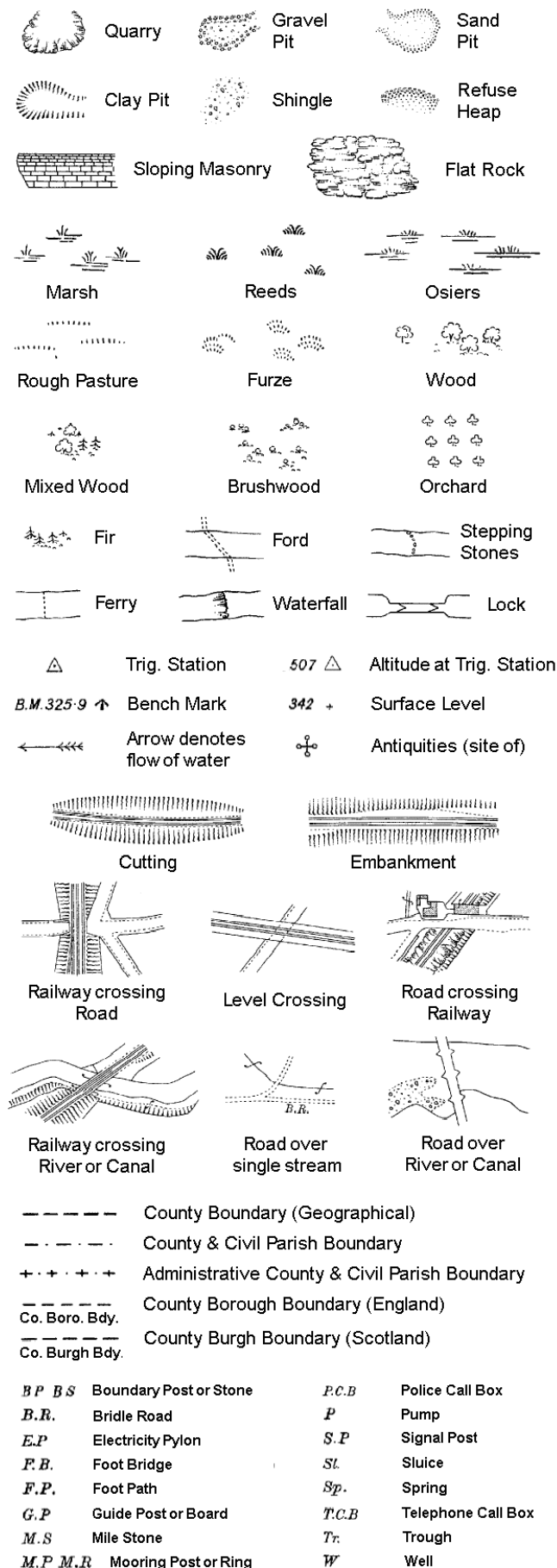
enviro|solution

**View looking of the northern boundary,
looking east.**

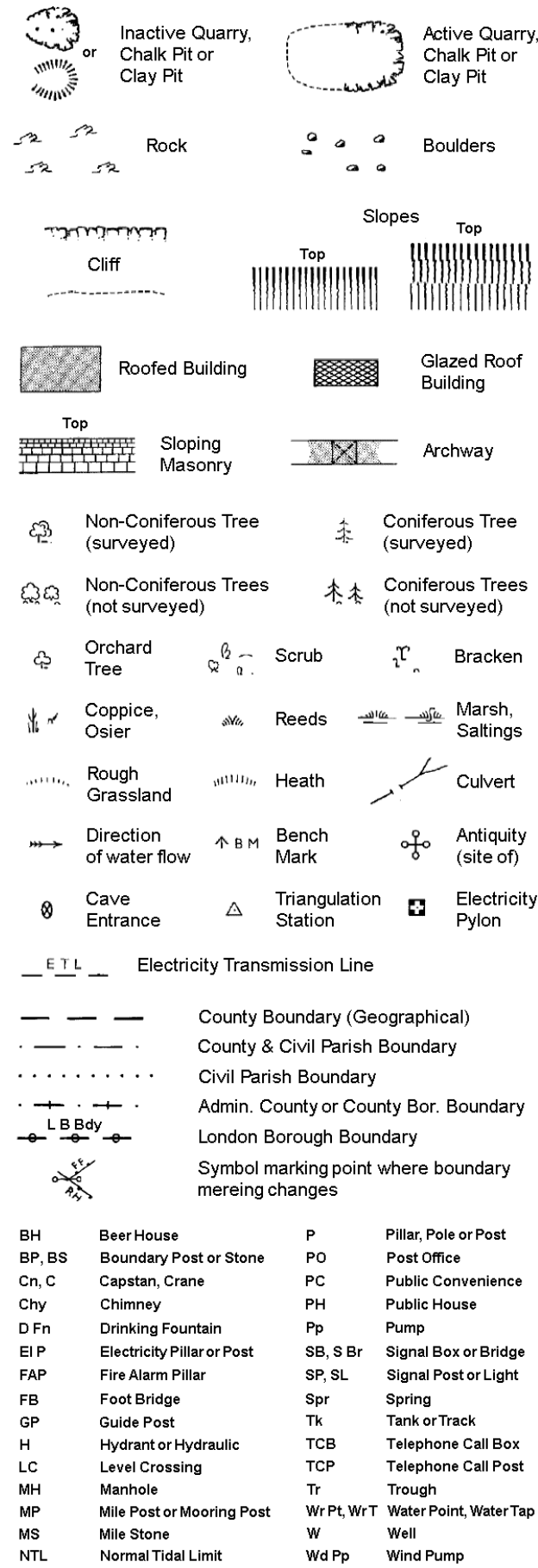
Appendix C – Historic Maps

Historical Mapping Legends

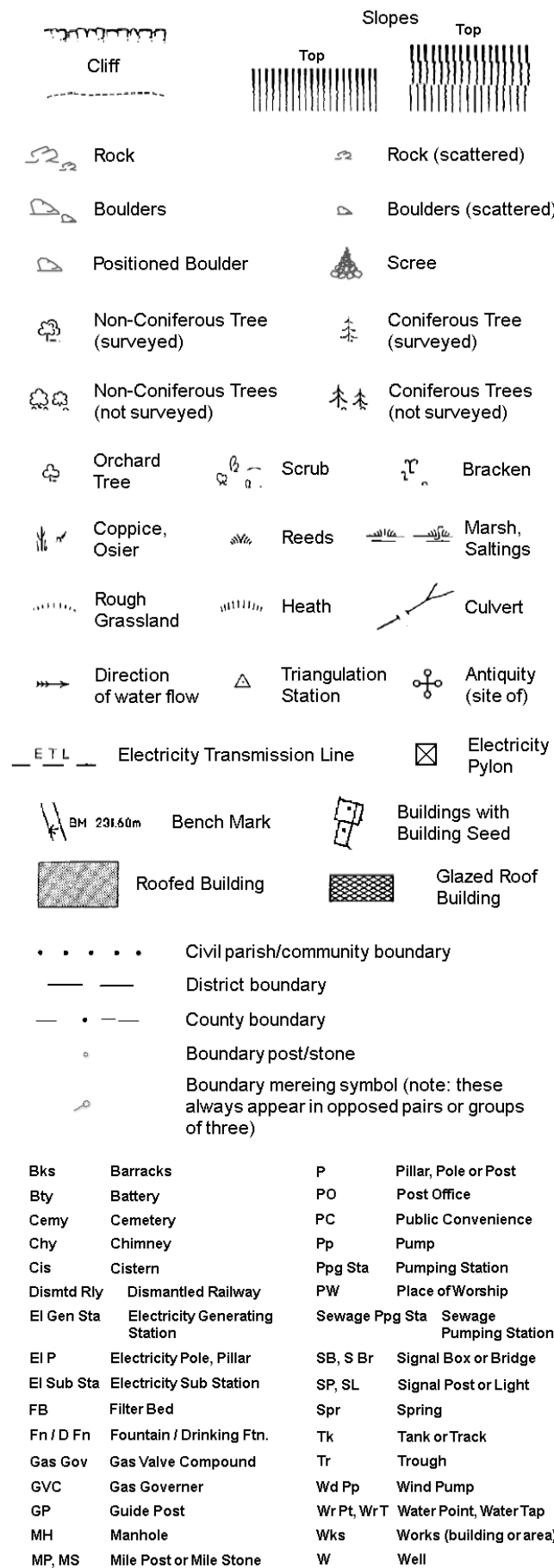
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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



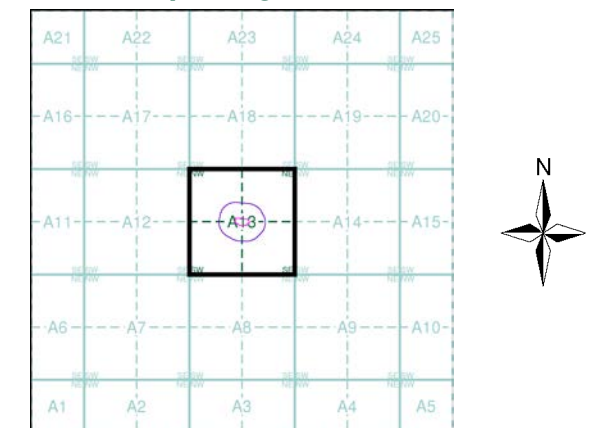
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Historical Mapping & Photography included:

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	1956	5
Ordnance Survey Plan	1:2,500	1956 - 1958	6
Ordnance Survey Plan	1:1,250	1969 - 1970	7
Ordnance Survey Plan	1:2,500	1970 - 1971	8
Additional SIMs	1:1,250	1977 - 1985	9
Additional SIMs	1:2,500	1981	10
Ordnance Survey Plan	1:1,250	1984	11
Ordnance Survey Plan	1:2,500	1986	12
Additional SIMs	1:2,500	1986	13
Large-Scale National Grid Data	1:1,250	1992	14
Large-Scale National Grid Data	1:1,250	1992 - 1994	15
Large-Scale National Grid Data	1:1,250	1996	16

Historical Map - Segment A13



Order Details

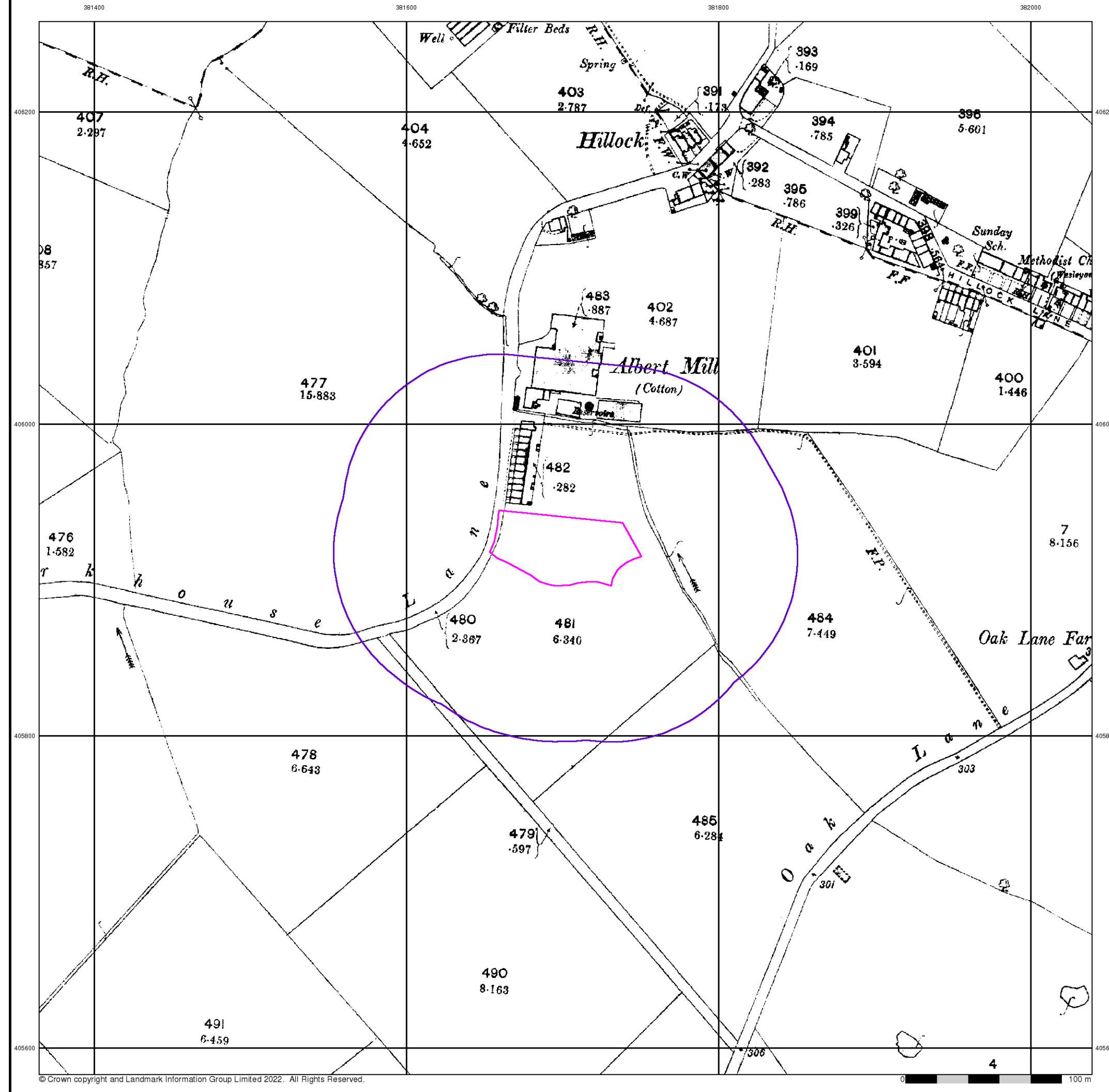
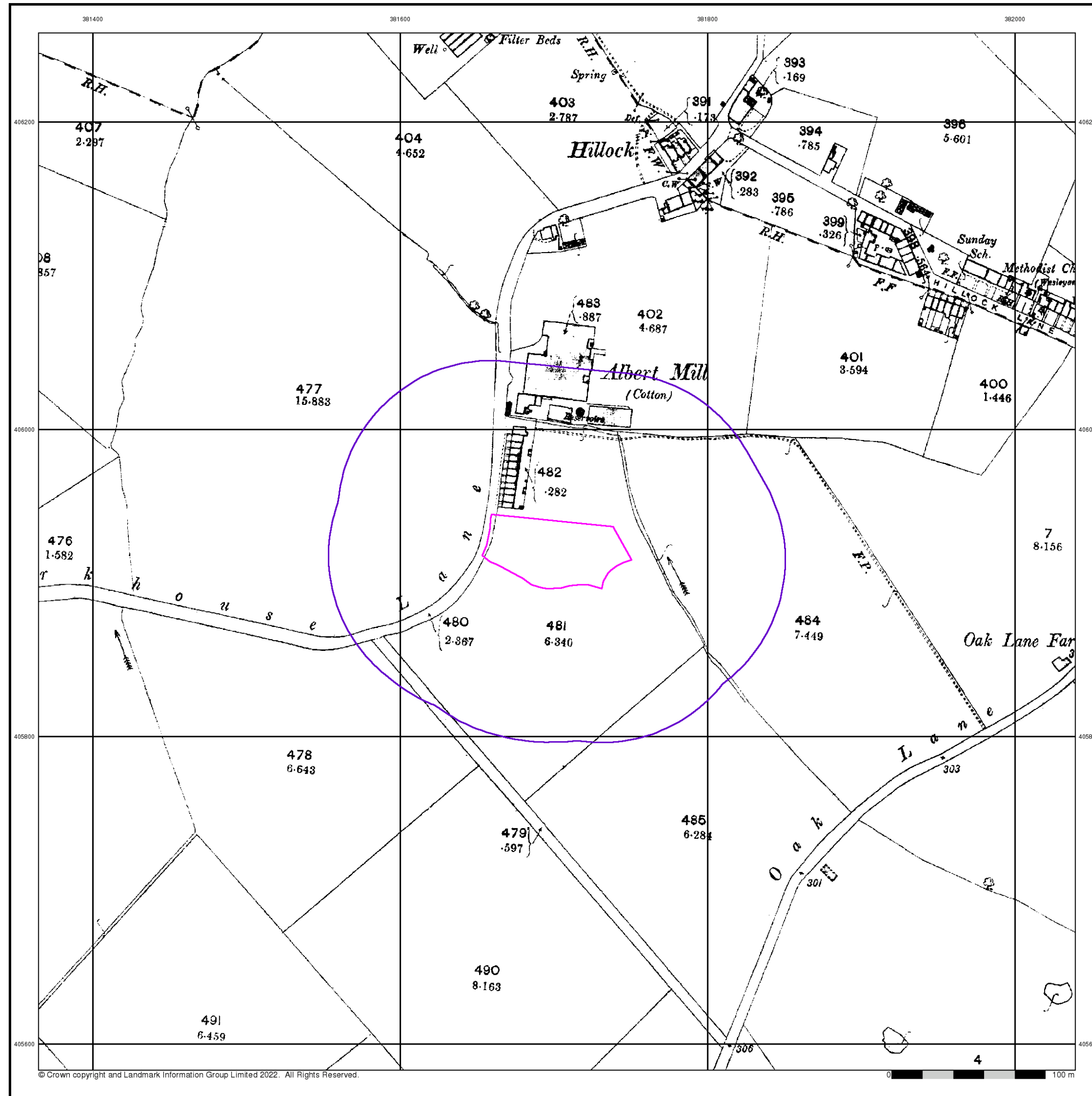
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Customer Ref: ES301122
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Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

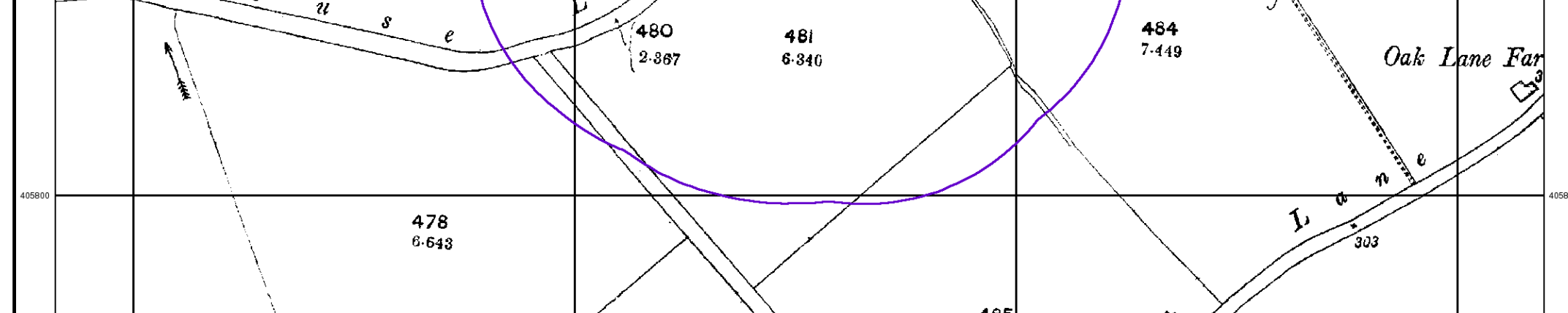
4, Billberry Close, Whitefield, MANCHESTER, M45 8BL

Landmark®
INFORMATION GROUP

Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

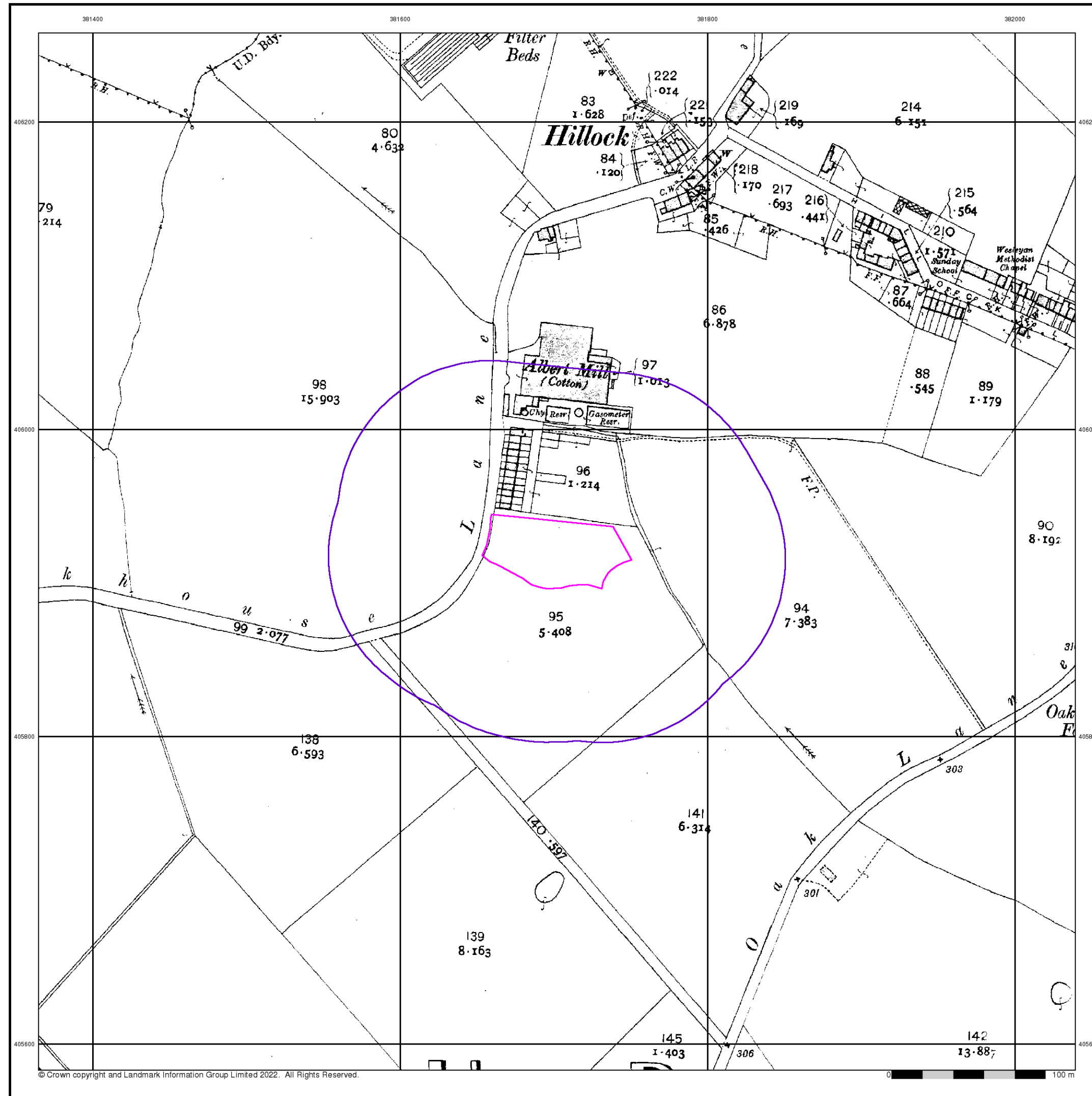


Historical Map - Segment A13



Order Details
Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details
4, Billberry Close, Whitefield, MANCHESTER, M45 8BL



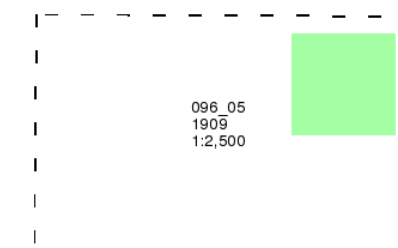
Lancashire And Furness

Published 1909

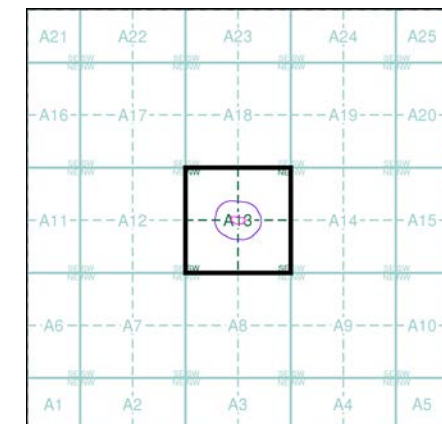
Source map scale - 1:2,500

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

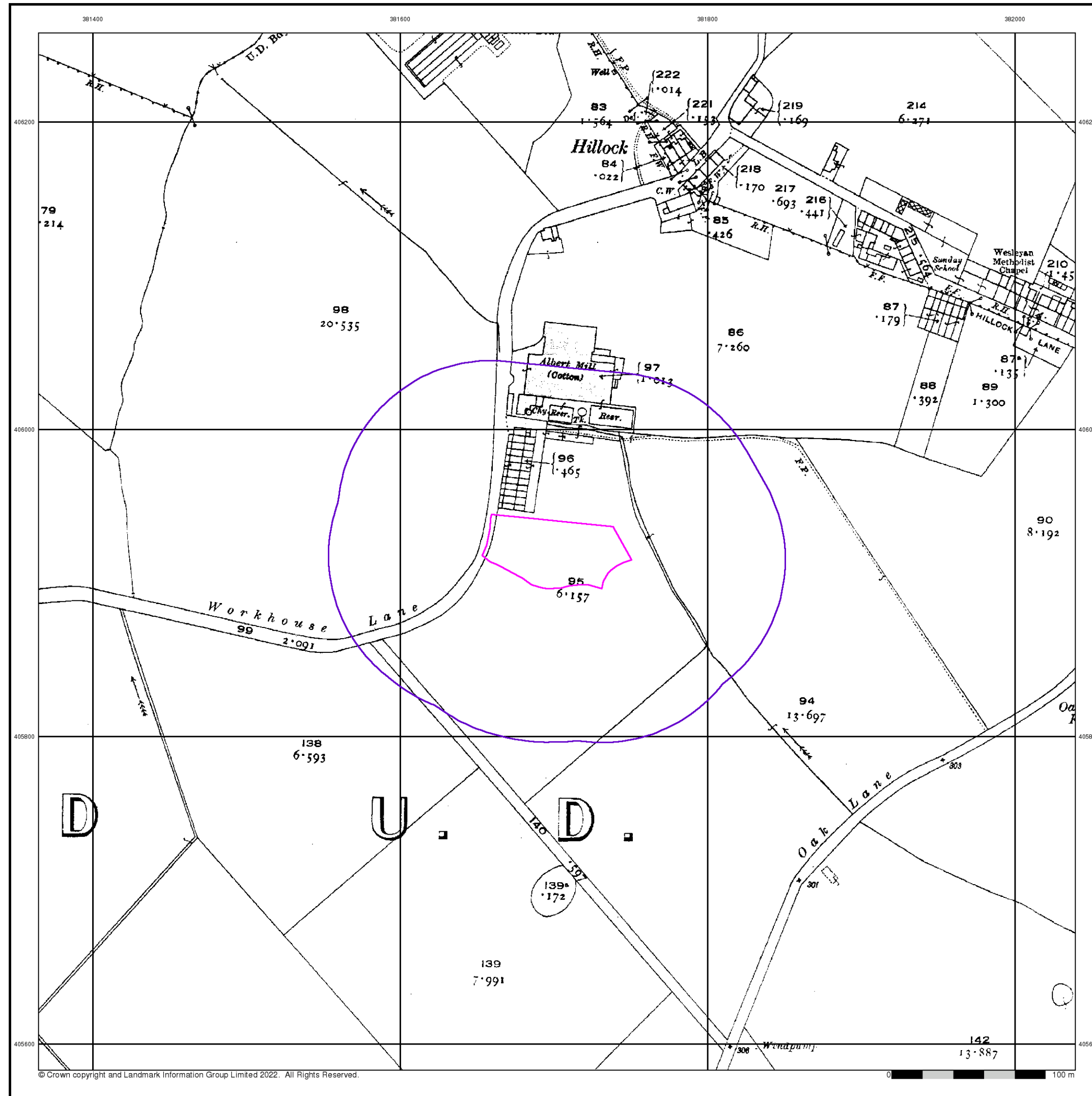


Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

4, Billberry Close, Whitefield, MANCHESTER, M45 8BL



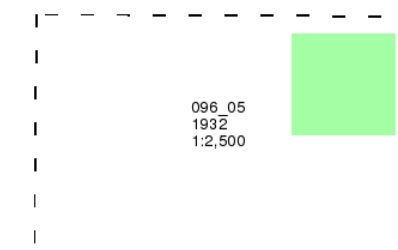
Lancashire And Furness

Published 1932

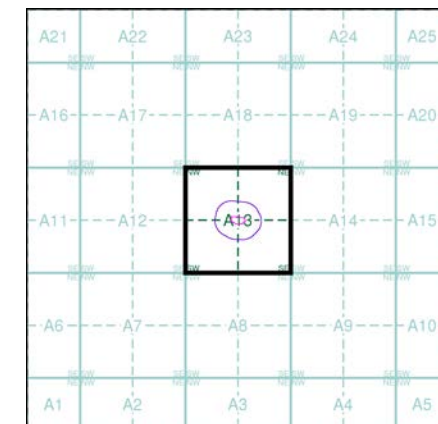
Source map scale - 1:2,500

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

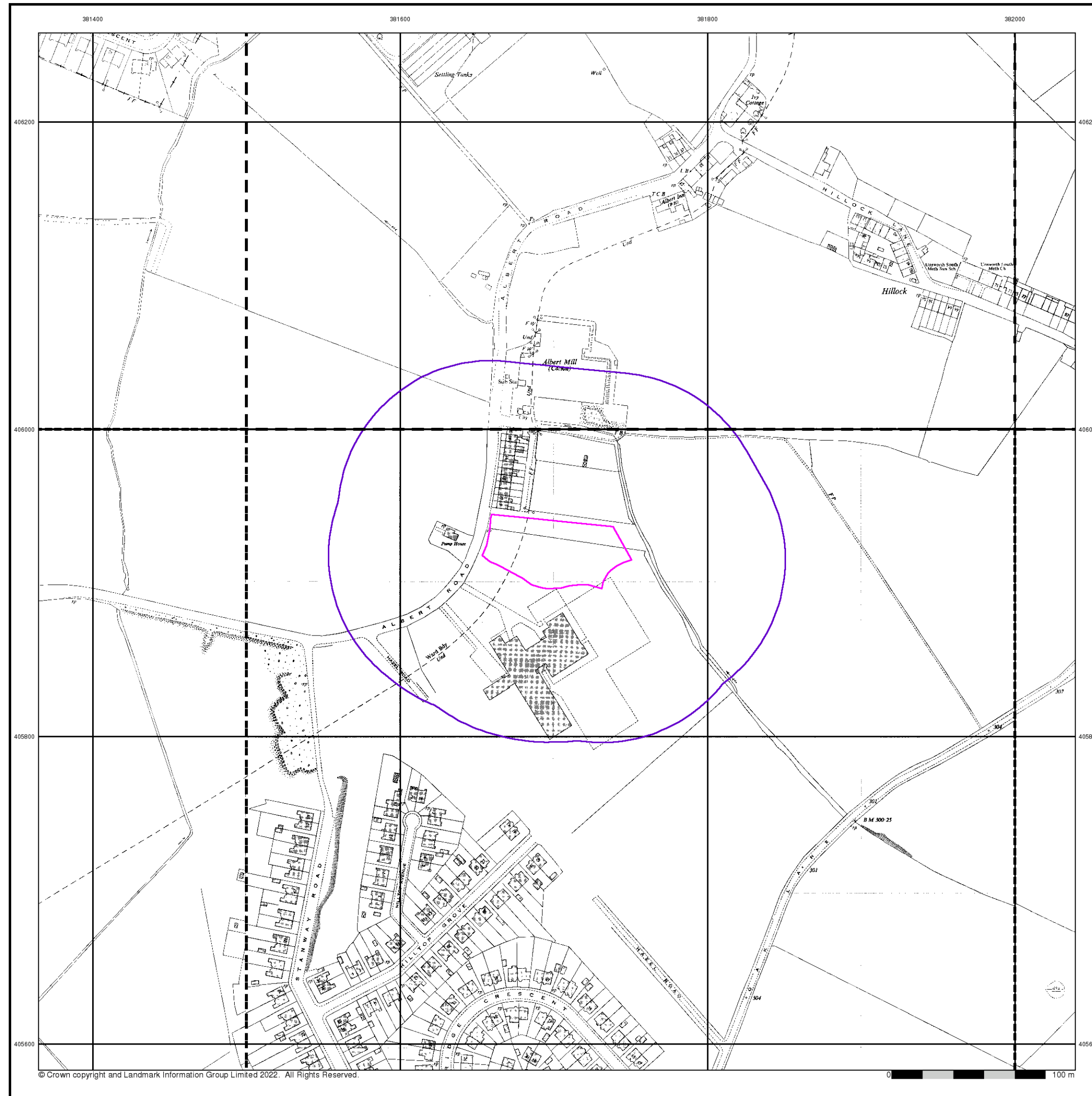


Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1956

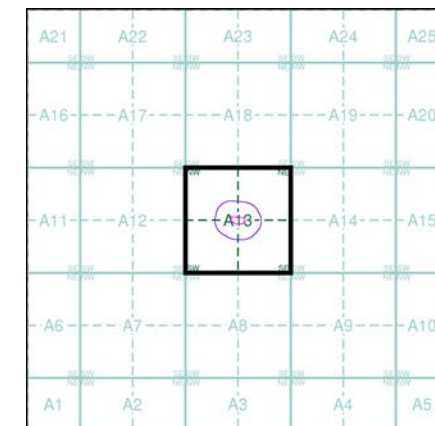
Source map scale - 1:1,250

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)

SD8106SW 1956 1:1,250	SD8106SE 1956 1:1,250	SD8206SW 1956 1:1,250
SD8105NW 1956 1:1,250	SD8105NE 1956 1:1,250	SD8205NW 1956 1:1,250

Historical Map - Segment A13

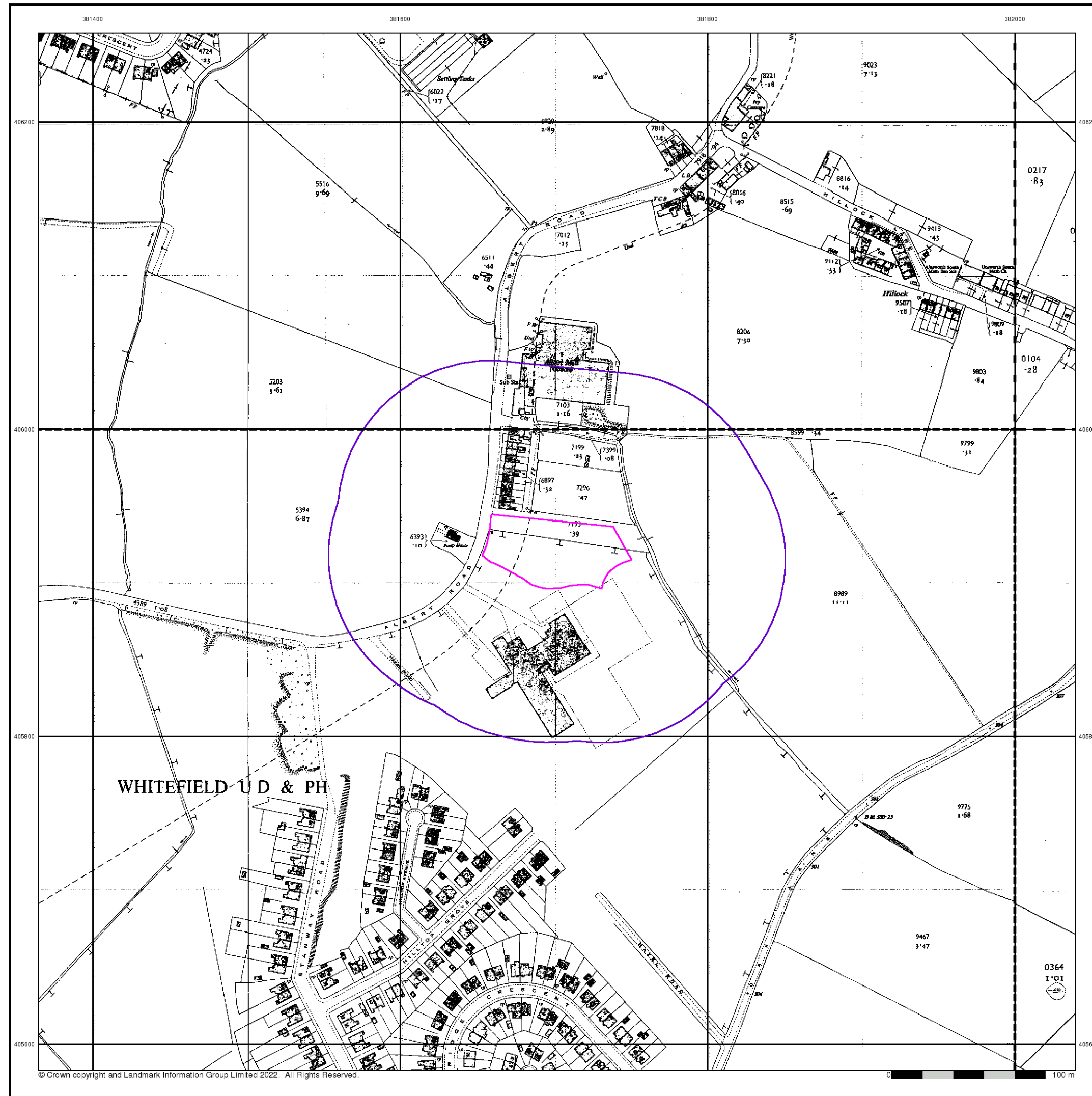


Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1956 - 1958

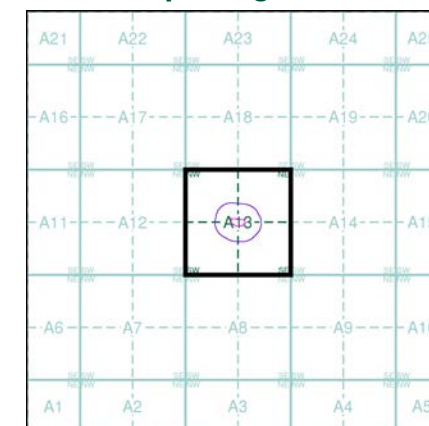
Source map scale - 1:2,500

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)

SD8106 1956 1:2,500	SD8206 1958 1:2,500
SD8105 1956 1:2,500	SD8205 1958 1:2,500

Historical Map - Segment A13

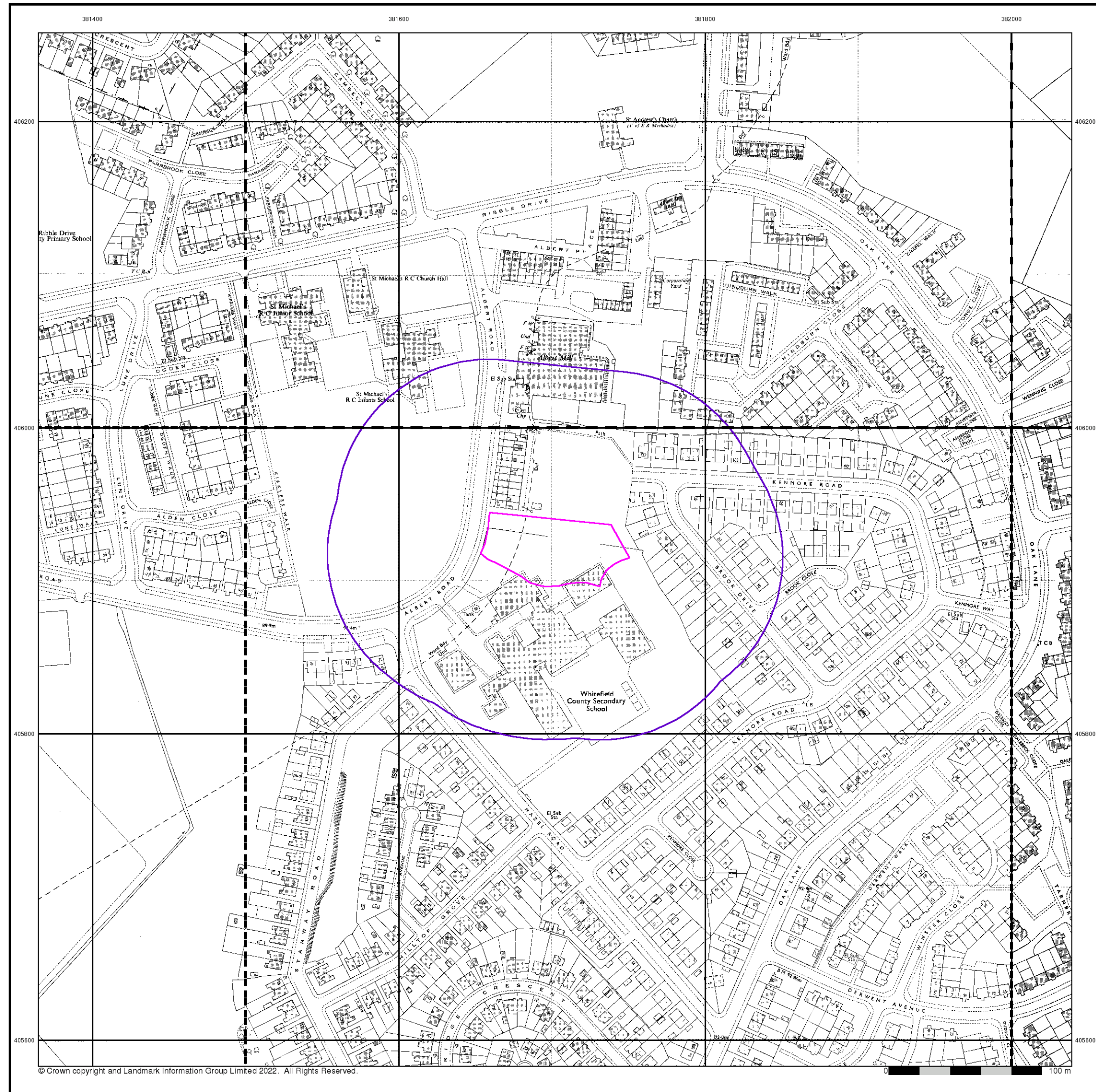


Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1969 - 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)

SD8106SW 1969 1:1,250	SD8106SE 1969 1:1,250	SD8206SW 1970 1:1,250
SD8105NW 1969 1:1,250	SD8105NE 1969 1:1,250	SD8205NW 1969 1:1,250

Historical Map - Segment A13

Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

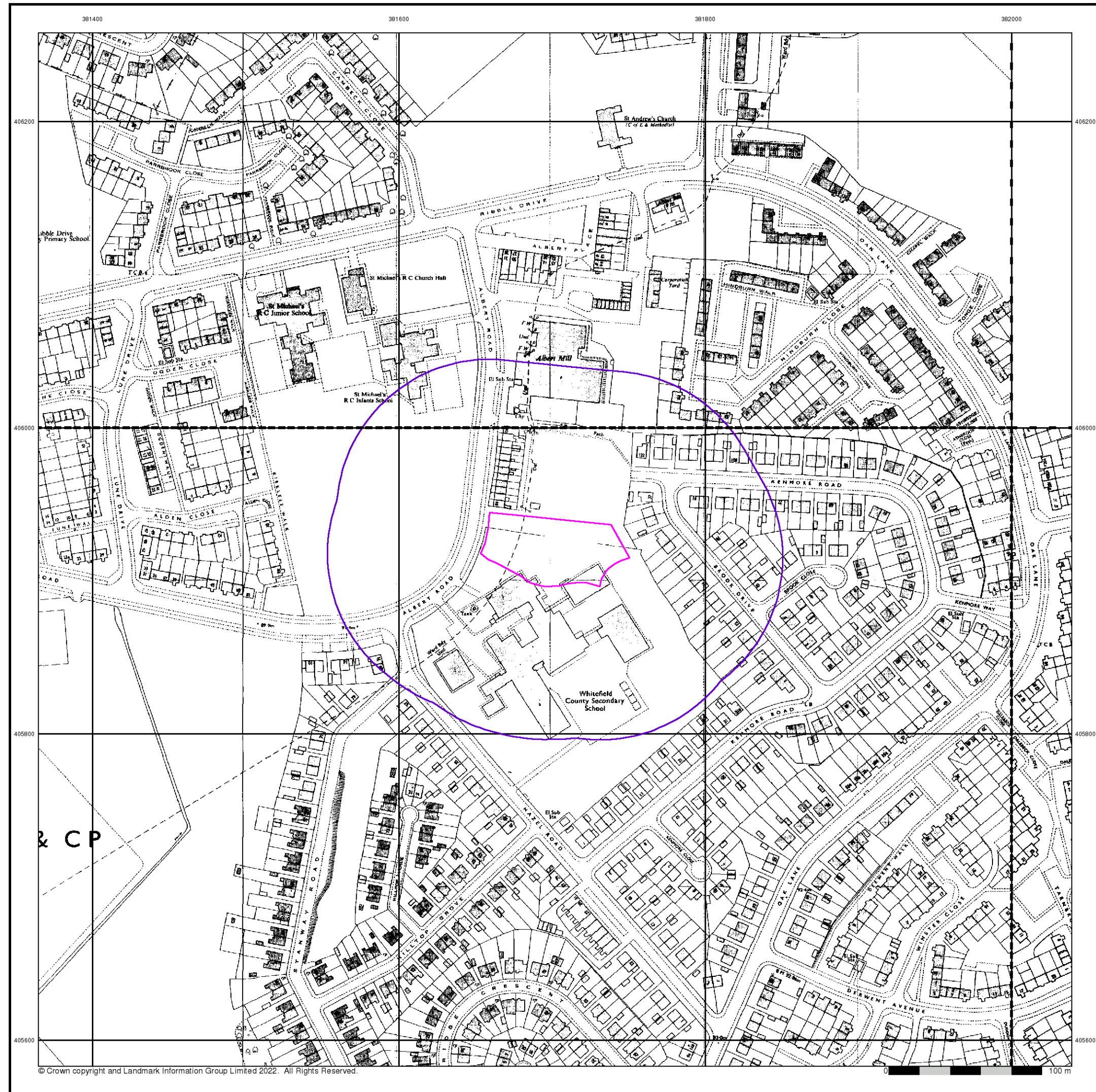
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Ordnance Survey Plan

Published 1970 - 1971

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)

SD8106 1970 12,500	SD8105 1970 12,500	SD8205 1971 12,500
--------------------------	--------------------------	--------------------------

Historical Map - Segment A13

Order Details

Order Number:	304554061_1_1
Customer Ref:	ES301122
National Grid Reference:	381700, 405920
Slice:	A
Site Area (Ha):	0.34
Search Buffer (m):	100

Site Details

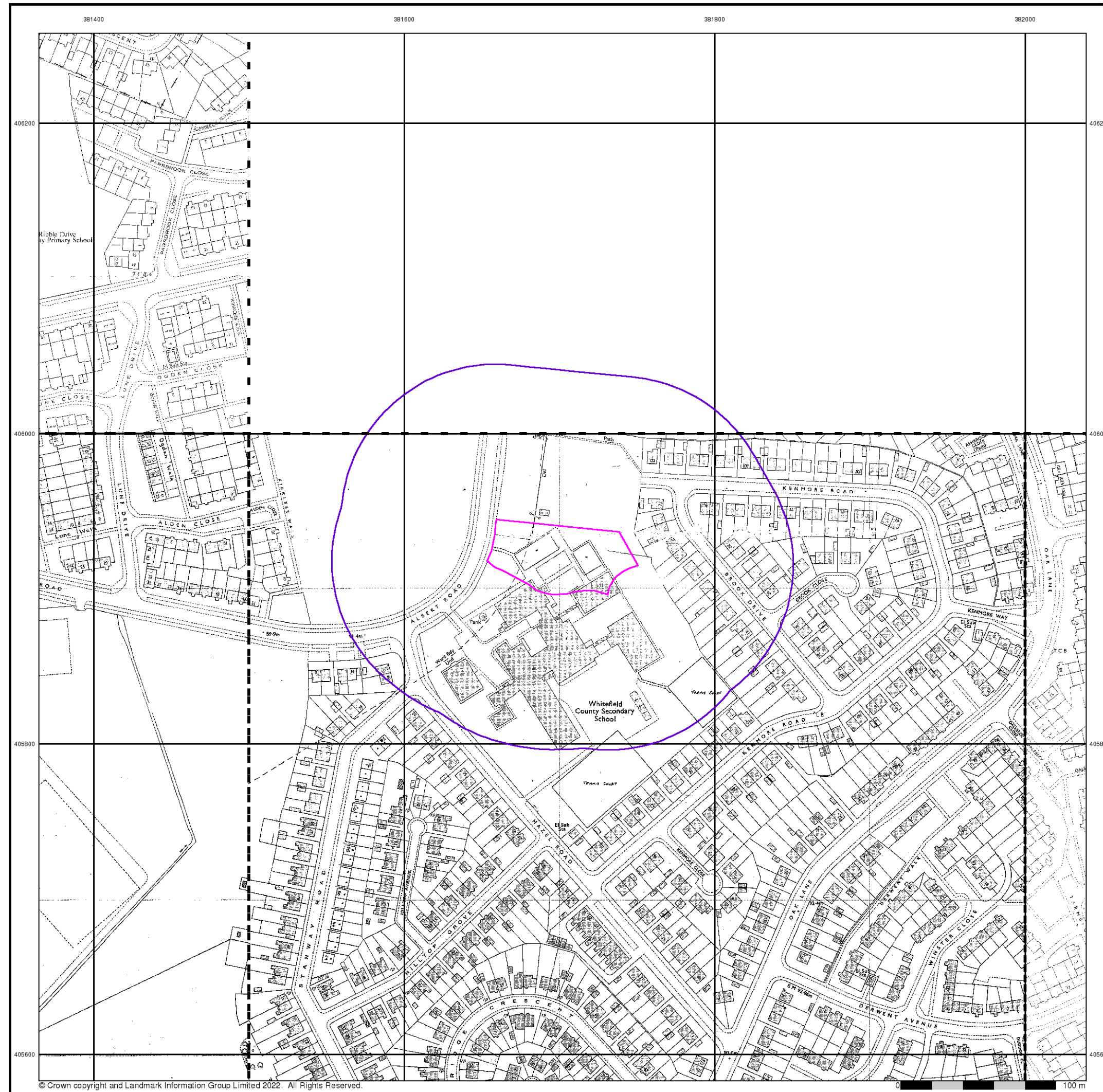
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Additional SIMs

Published 1977 - 1985

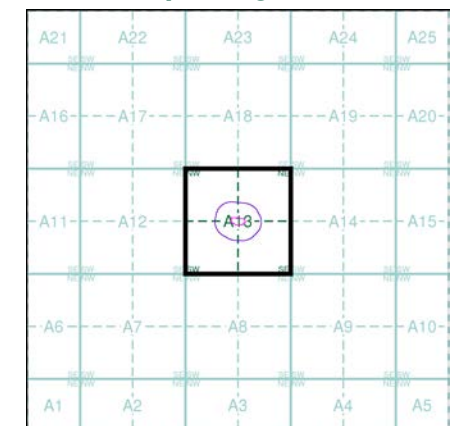
Source map scale - 1:1,250

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)

SD8106SW	1978	1:1,250
SD8105NW	1985	1:1,250
SD8105NE	1978	1:1,250
SD8205NW	1977	1:1,250

Historical Map - Segment A13

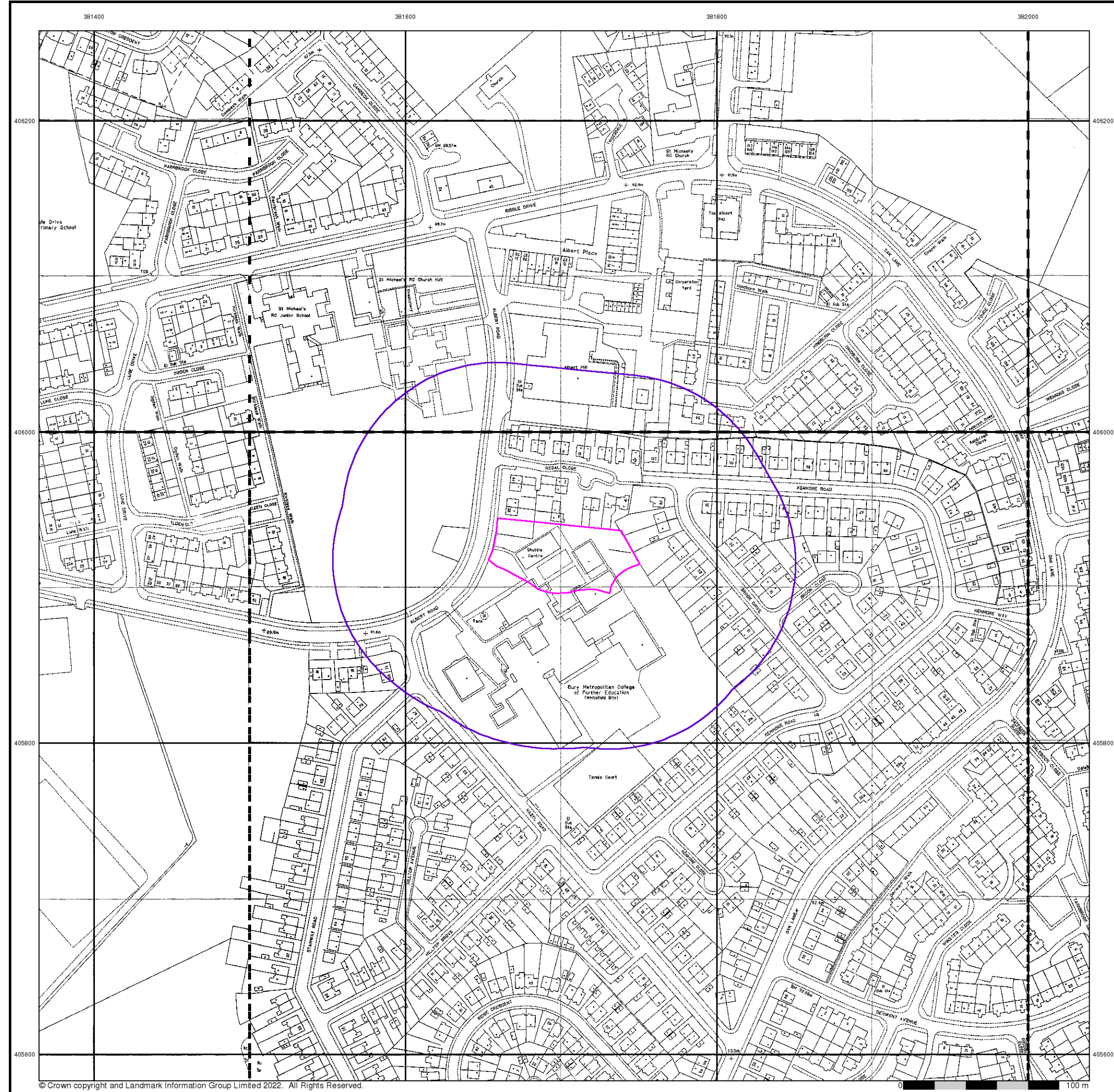


Order Details

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National Grid Reference: 381700, 405920
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Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

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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)

SD8106SW 1992 1:1,250	SD8106SE 1992 1:1,250	SD8206SW 1992 1:1,250
SD8105NW 1992 1:1,250	SD8105NE 1992 1:1,250	SD8205NW 1992 1:1,250

Historical Map - Segment A13

Order Details

Order Number: 304554061_1_1
Customer Ref: ES301122
National Grid Reference: 381700, 405920
Slice: A
Site Area (Ha): 0.34
Search Buffer (m): 100

Site Details

4, Billberry Close, Whitefield, MANCHESTER, M45 8BL

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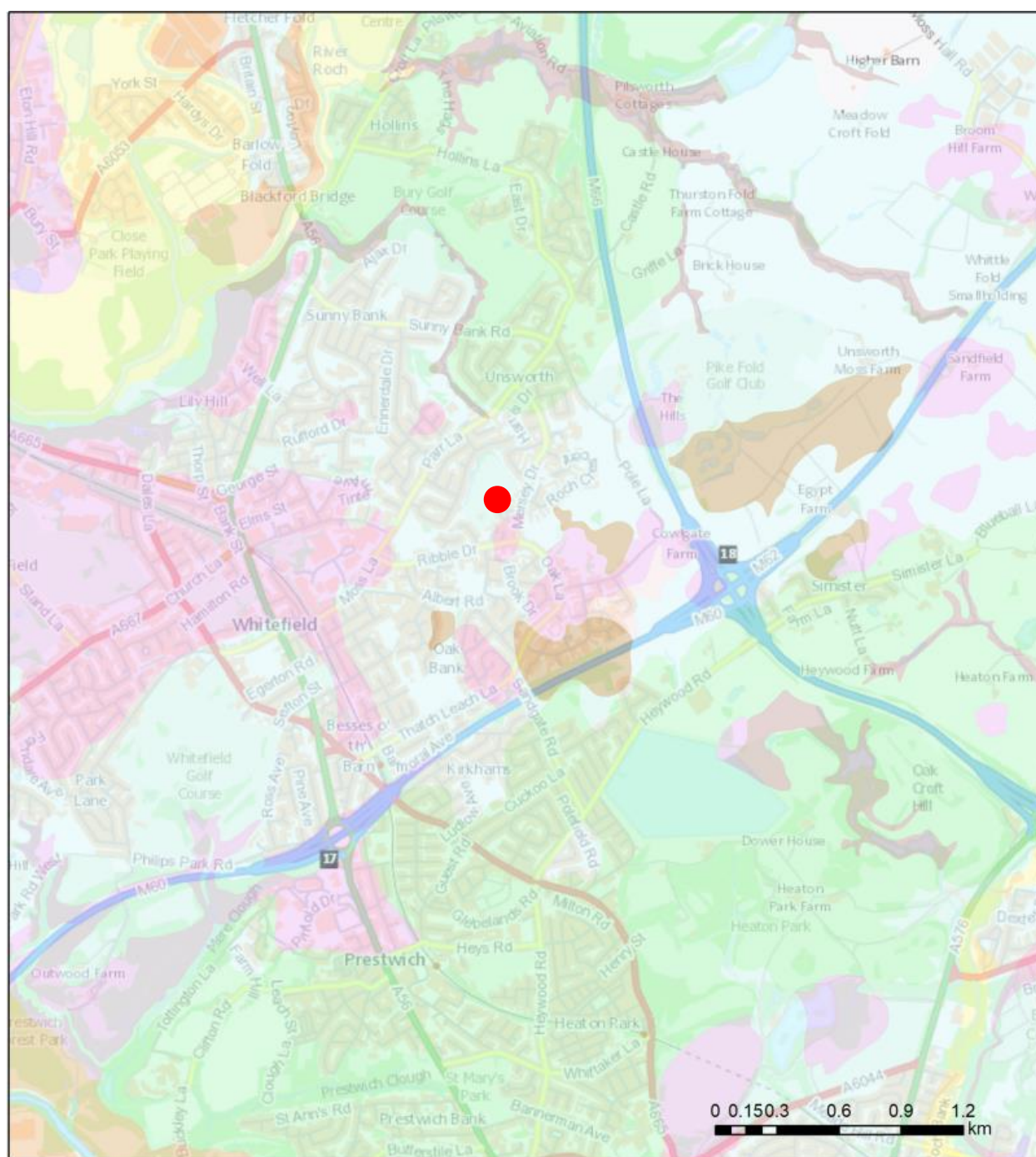
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Appendix D – Geological Maps



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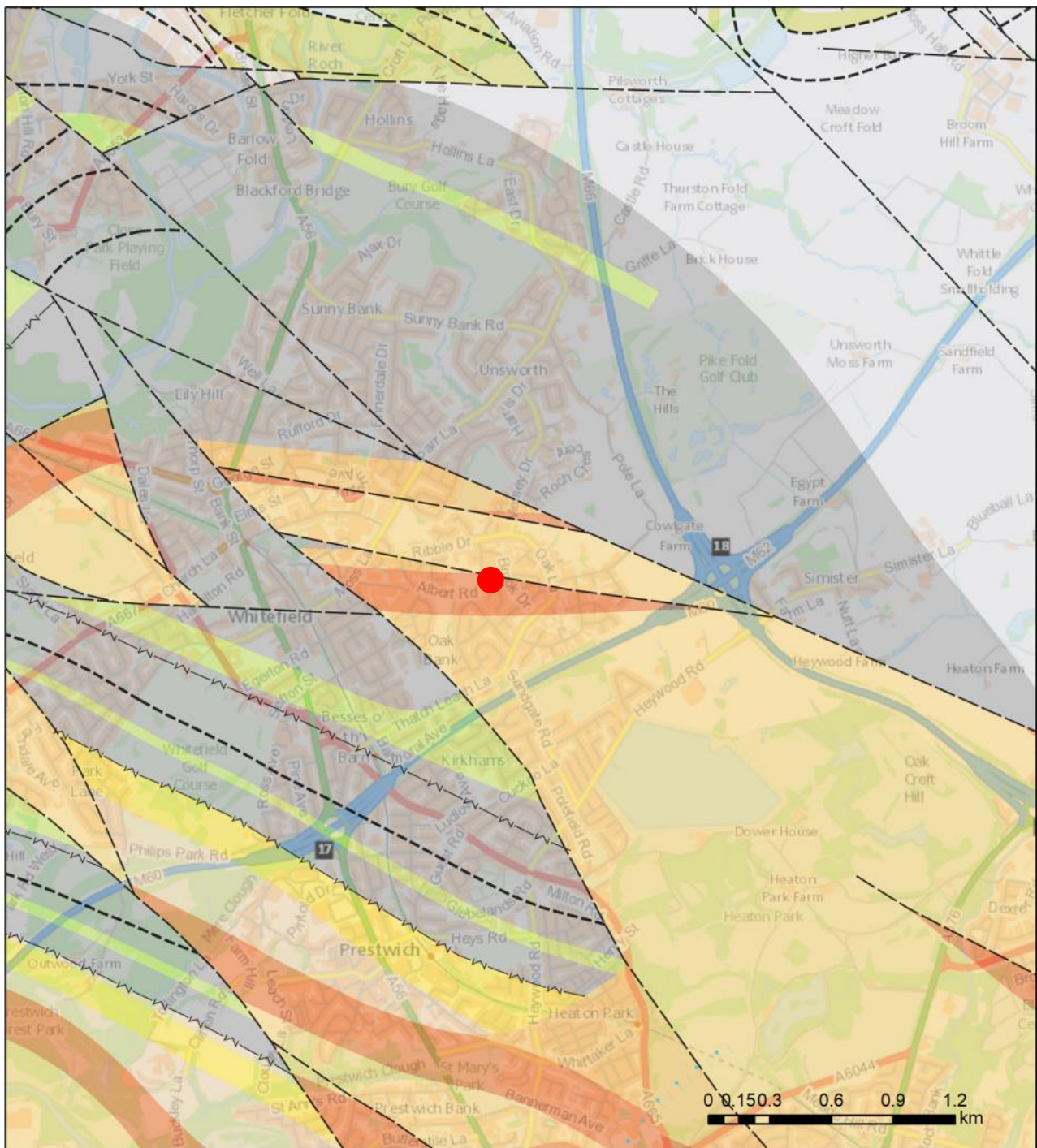
Superficial Geology

Superficial deposits 1:50,000 scale

	<u>GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL</u>
	<u>TILL, DEVENSIAN - DIAMICTON</u>
	<u>GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY AND SILT</u>
	<u>HUMMOCKY (MOUNDY) GLACIAL DEPOSITS, DEVENSIAN - DIAMICTON</u>
	<u>ALLUVIUM - CLAY, SILT, SAND AND GRAVEL</u>
	<u>HEAD - CLAY, SILT, SAND AND GRAVEL</u>
	<u>RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL</u>
	<u>LACUSTRINE DEPOSITS - SAND AND GRAVEL</u>
	<u>PEAT - PEAT</u>

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Superficial Geology Key



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Bedrock Geology

Bedrock geology 1:50,000 scale

	<u>PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>CHESTER FORMATION - SANDSTONE</u>
	<u>COLLYHURST SANDSTONE FORMATION - SANDSTONE</u>
	<u>BLENFIRE ROCK - SANDSTONE</u>
	<u>NEWTON HEATH SANDSTONE - SANDSTONE</u>
	<u>WORSLEY DELF ROCK - SANDSTONE</u>
	<u>MANCHESTER MARLS FORMATION - MUDSTONE</u>

Linear features 1:50,000 scale

	Buried_channel_Margin
	Coal_seam_Inf
	Coal_seam_Obs
	Fault_Inf_Crossmark_on_downthrow_side
	Marine_band

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Bedrock Geology Key

Appendix E – BGS Borehole

JOHN THOM LTD.

1° 85 27 LANCs 96 NW
CONTINUATION. 13 15

Journal of Bore Hole at Messrs Mark Fletcher & Sons Ltd.

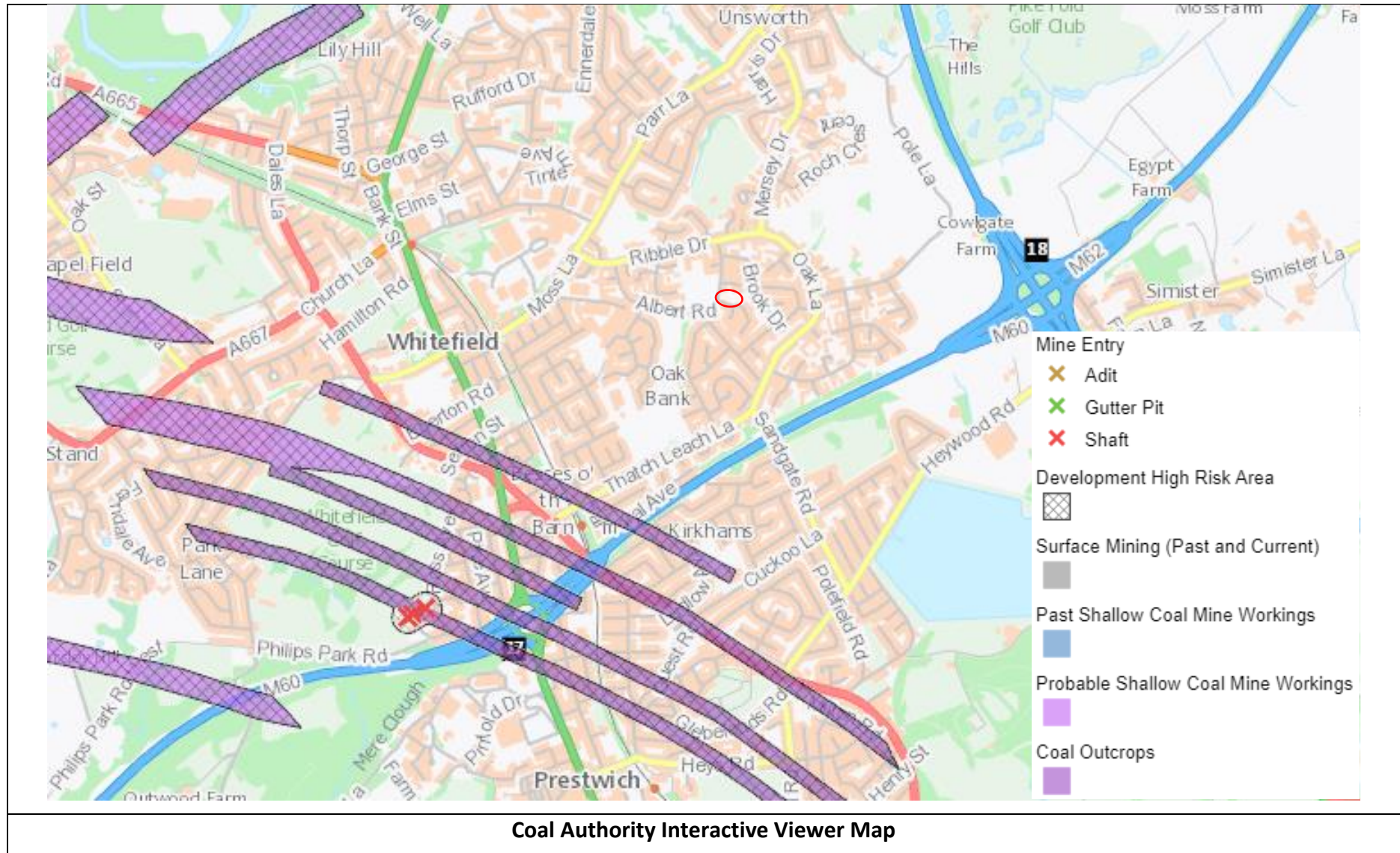
Whitefield. Bore 1936-37
Site in Woodhouse Lane
150 yds S.W. of Albert Hall
Marked in Fieldship Repts.

Labelled NO 6 on Map. 8163 0590

1'0"	Soil.	1'0"	0.30
4'0"	Brown Clay.	5'0"	1.52
1'0"	Blue Clay.	6'0"	1.83
3'0"	Loamy Sand.	9'0"	2.74
22'0"	Brown Clay.	31'0"	9.45
4'0"	Gravel	35'0"	10.67
4'0"	Sand.	39'0"	11.89
4'0"	Sand (Brown)	43'0"	13.11
3'0"	Sand (Red)	46'0"	14.02
8'0"	Sand.	54'0"	16.46
1'0"	Red Sand.	55'0"	16.76
14'0"	Dark Brown Loamy Sand.	69'0"	21.03
5'0"	Loamy Sand.	74'0"	22.56
5'0"	Sandy Clay.	79'0"	24.08
10'0"	Sandy Clay (Brown)	89'0"	27.13
11'0"	Soft Sandy Clay (Brown)	100'0"	30.48
3'0"	Soft Sandy Clay.	103'0"	31.39
10'0"	Hard Sandy Clay.	113'0"	34.44
8'0"	Hard Brown Sandy Clay.	121'0"	36.88
14'0"	Red Marl.	135'0"	41.15
4'6"	Red Marl.	139'6"	42.52
5'6"	Hard Variegated Marl.	145'0"	44.20
17'0"	Variegated Marl.	162'0"	49.38
5'0"	Variegated Marl.	167'0"	50.90
1'6"	Small Gravel.	167'6"	51.05
19'6"	Variegated Marl.	187'0"	57.00
7'0"	Red Marl.	194'0"	59.13
2'6"	Red Sandstone.	196'6"	59.89
15'6"	Soft Red Sandstone.	212'0"	64.62
5'0"	Red Sandstone.	217'0"	66.14
104'6"	Soft Red Sandstone.	320'6"	97.69
14'6"	Red Sandstone.	335'0"	102.11
48'6"	Soft Red Sandstone.	383'6"	116.89
15'0"	Red Sandstone.	398'6"	121.46
12'6"	Soft Red Sandstone.	411'0"	125.27
21'6"	Red Sandstone.	432'6"	131.83
4'0"	Red Sandstone with small gravel.	436'6"	133.05
28'6"	Soft Red Sandstone.	465'0"	141.73
4'0"	Red Sandstone & Marl.	469'0"	142.95
1'0"	Marl.	470'0"	143.26
1'0"	Red & Grey Sandstone & Marl.	471'0"	143.56
6'0"	Sandy Marl.	477'0"	145.39
1'0"	Marl.	478'0"	145.69
4"	Marl.	478'4"	145.79

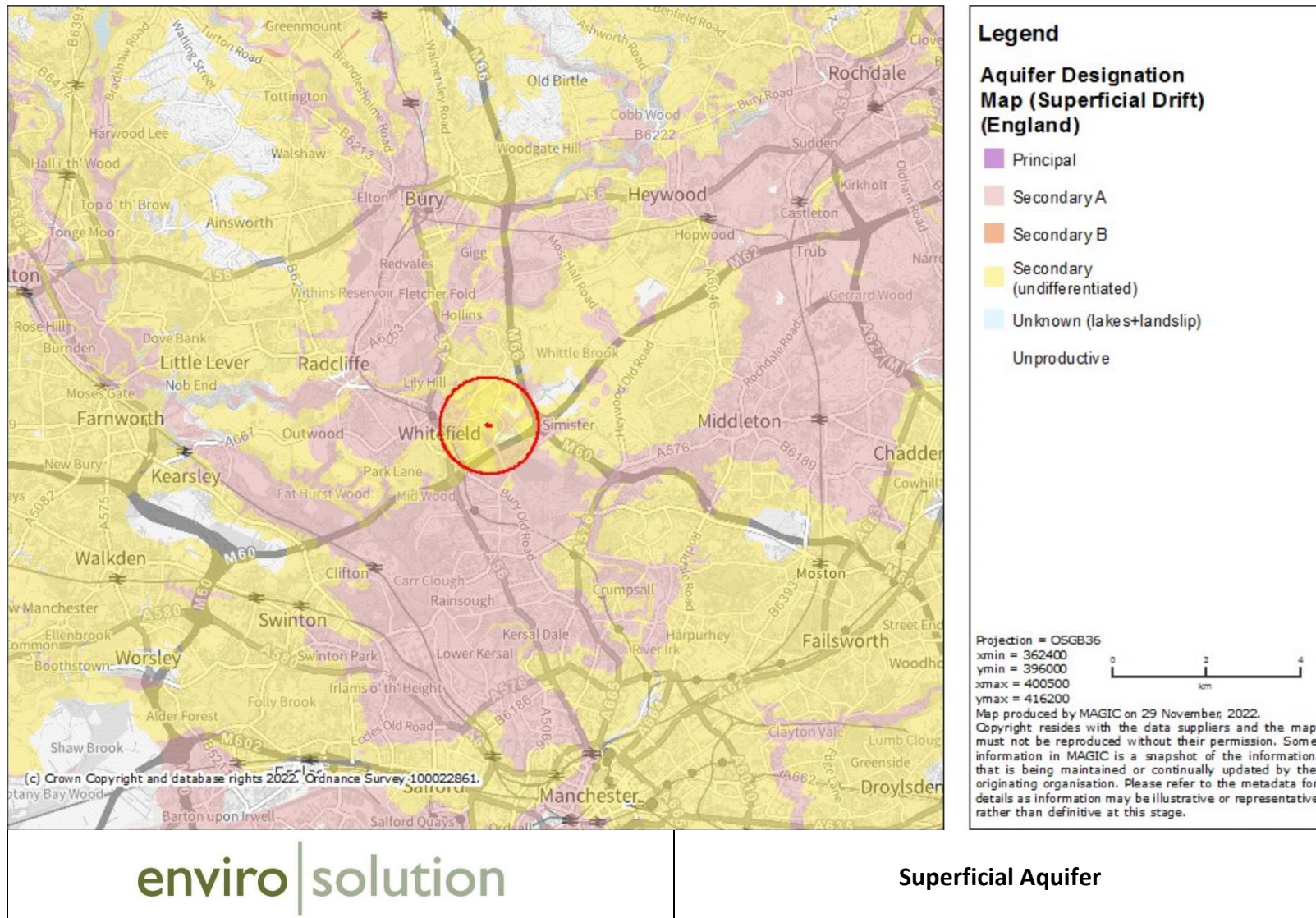
85/96 NW 10-15 (f)

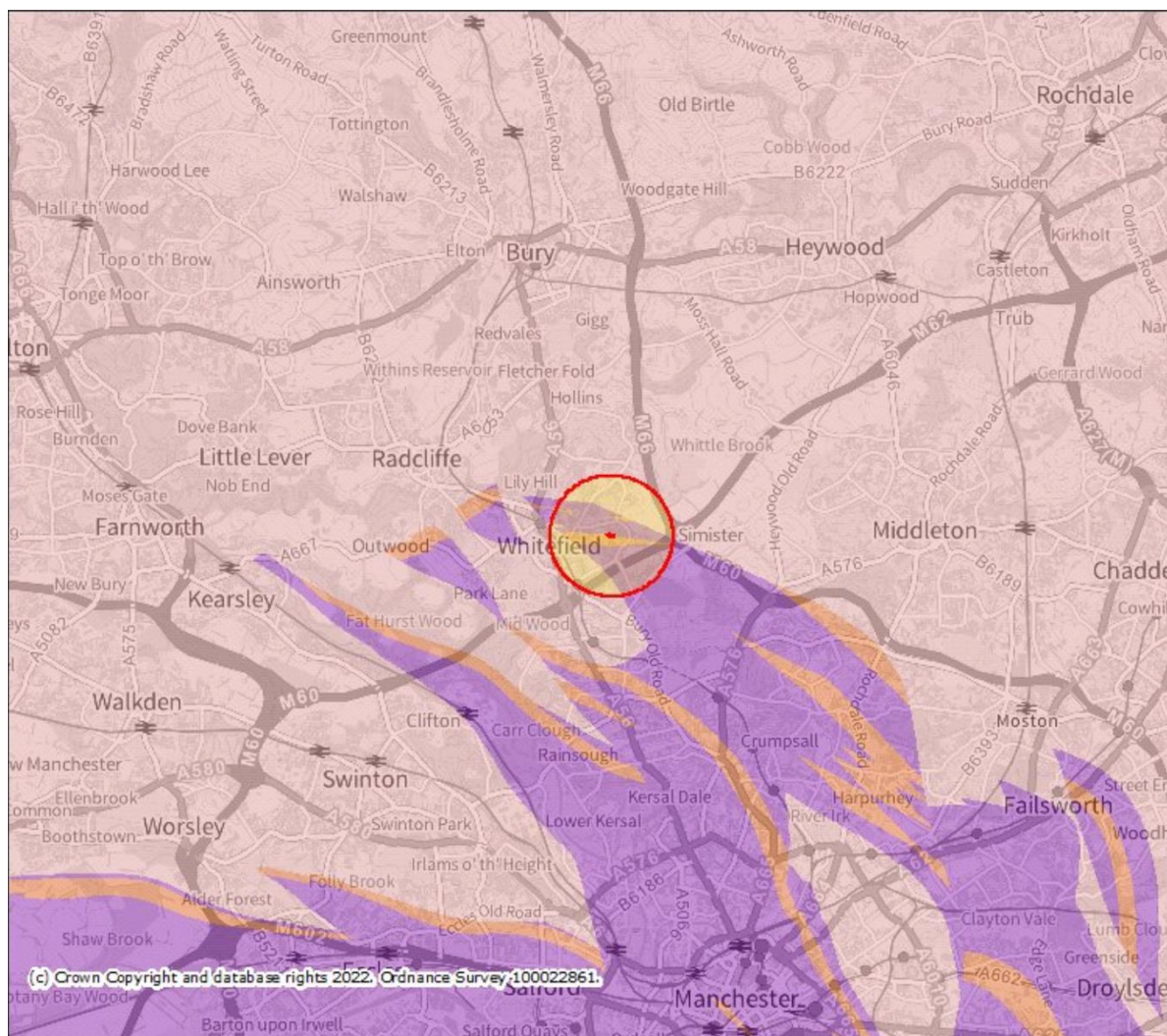
Appendix F – Coal Mining Summary Map



Coal Authority Interactive Viewer Map

Appendix G – Hydrogeological Maps





Legend

Aquifer Designation Map (Bedrock) (England)

- Principal
- Secondary A
- Secondary B
- Secondary (undifferentiated)
- Unproductive

Projection = OSGB36

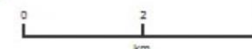
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ymin = 396000

xmax = 400500

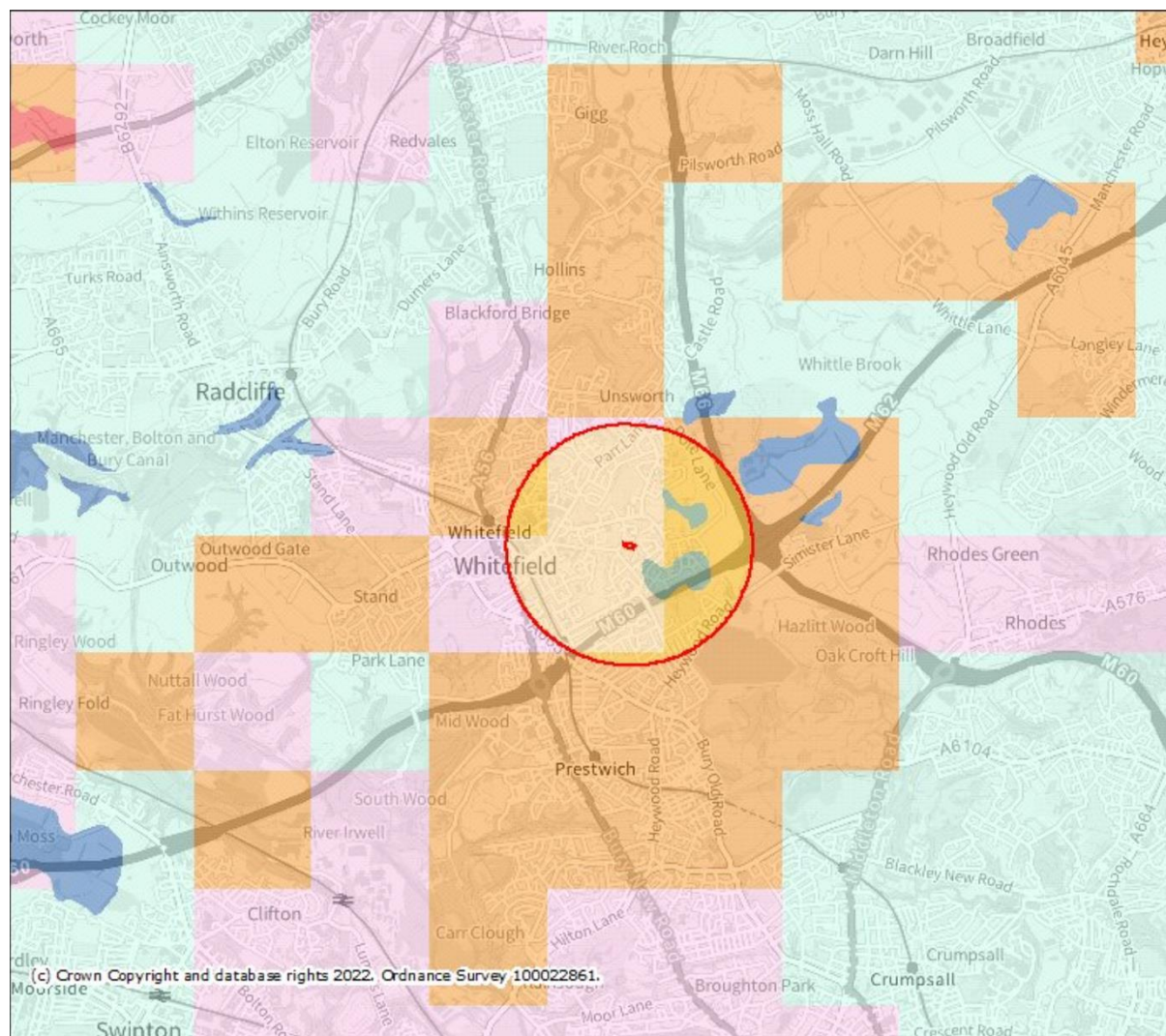
ymax = 416200

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Bedrock Aquifer



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Legend

Groundwater Vulnerability Map (England)

- Local Information
- Soluble Rock Risk
- High
- Medium - High
- Medium
- Medium - Low
- Low
- Unproductive

Projection = OSGB36

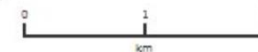
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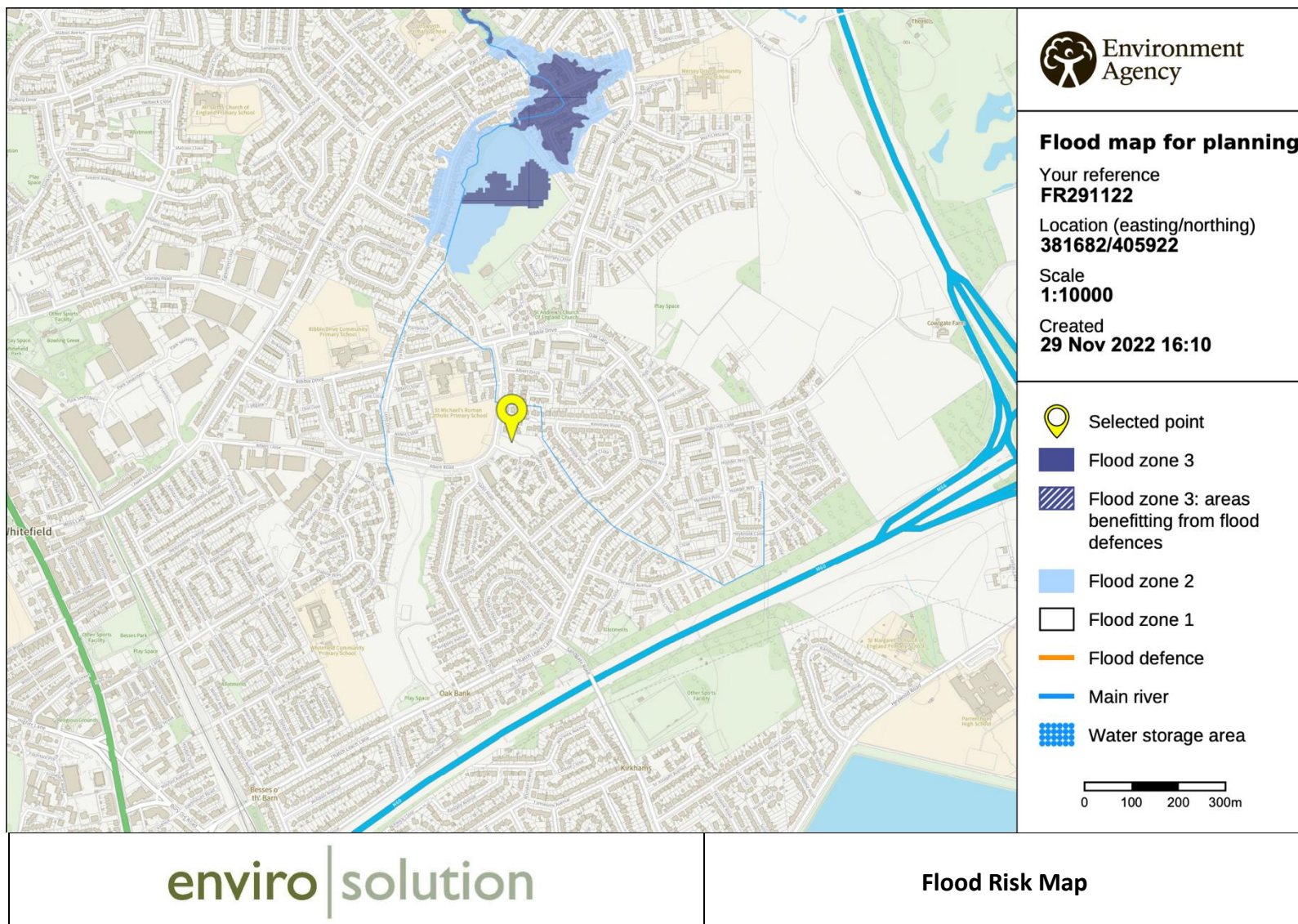
Map produced by MAGIC on 29 November, 2022.
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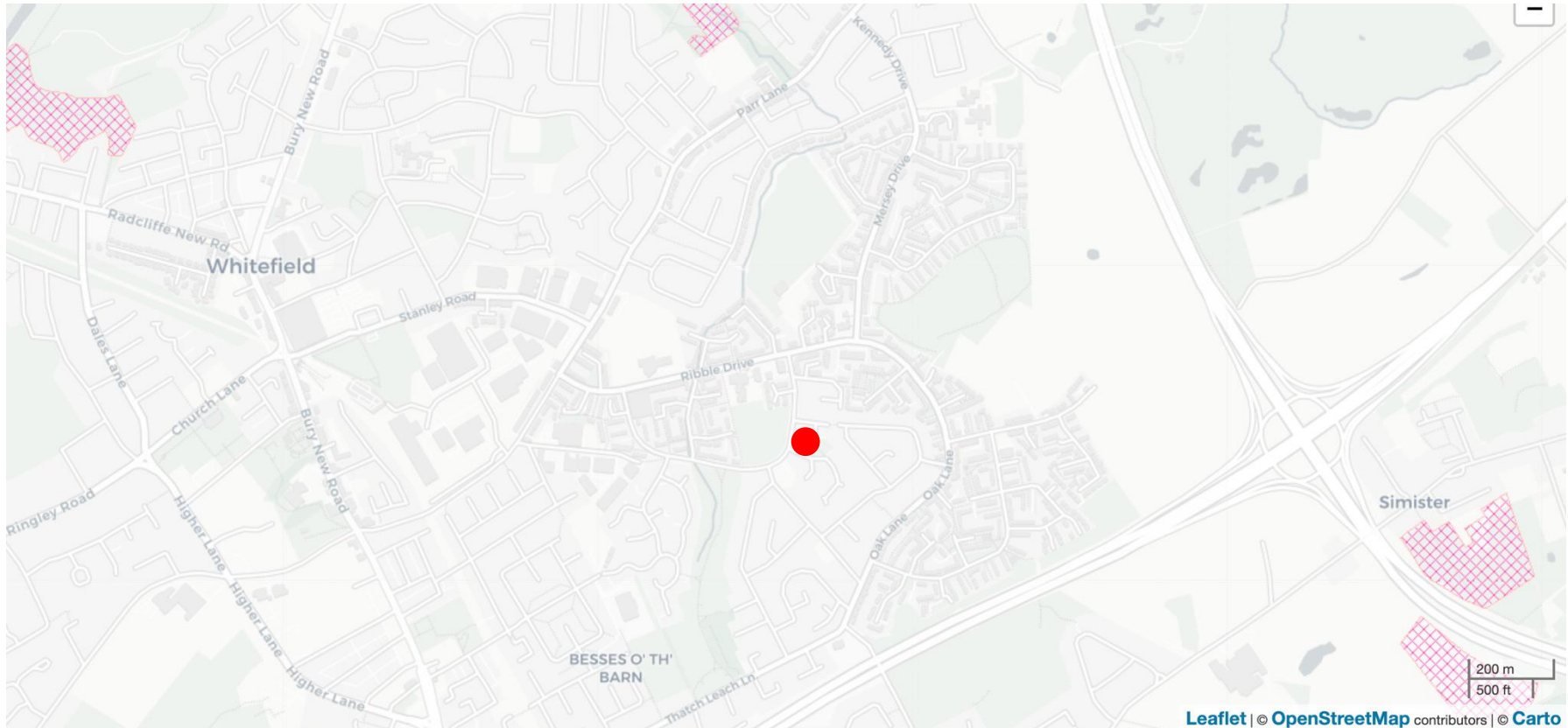
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Groundwater Vulnerability

Appendix H – Flood Risk Map



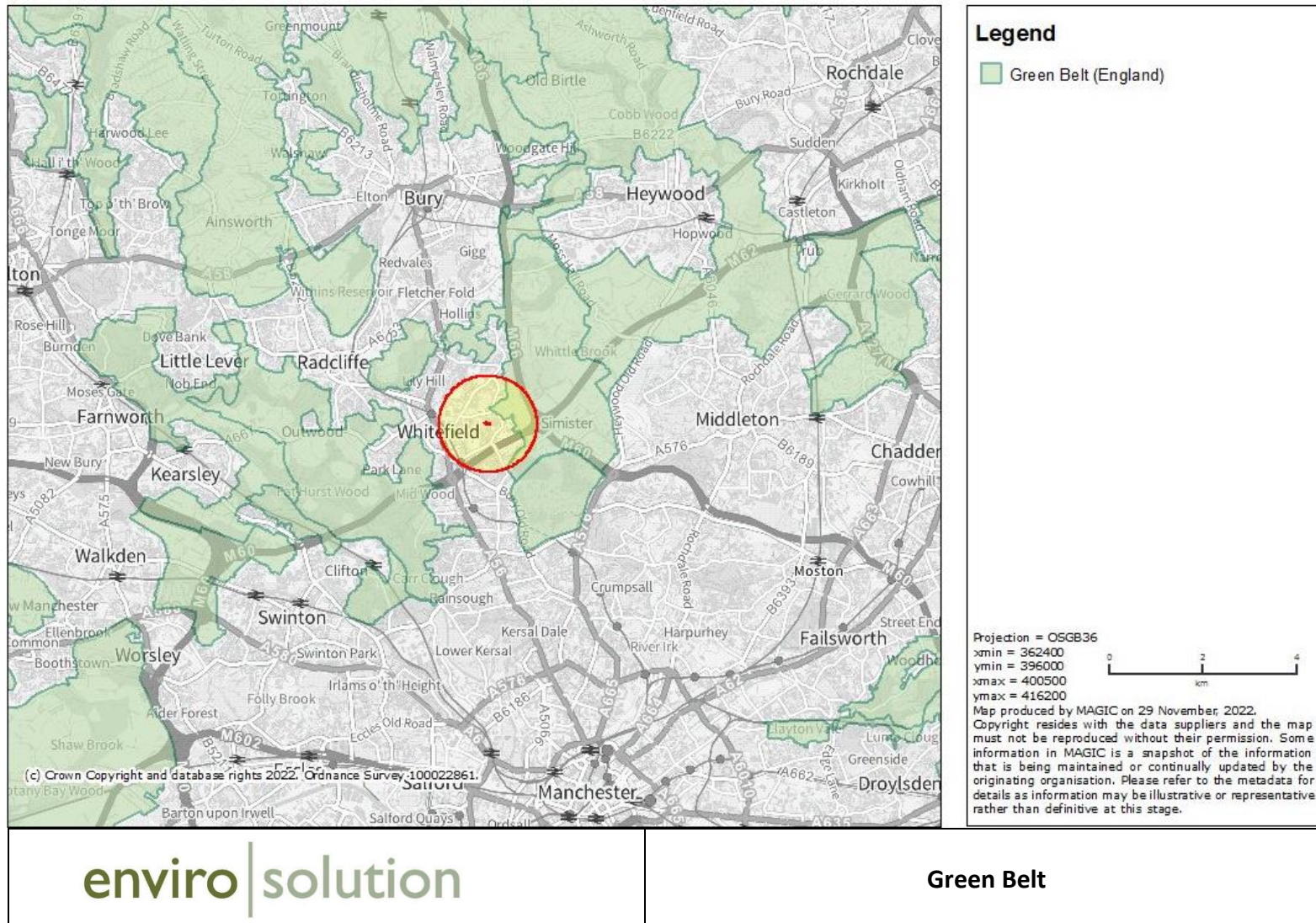
Appendix I – Historic Landfill Map



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Historic Landfill Map

Appendix J – Environmental Designations





Legend

Nitrate Vulnerable Zones
2017 Designations
(England)

Projection = OSGB36

xmin = 377000

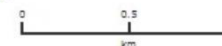
ymin = 404000

xmax = 385900

ymax = 408300

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Nitrate Vulnerable Zones