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architecture : engineering : building consultancy



BARNSELY BIC, PHASE 5

PHASE 1 GEO ENVIRONMENTAL REPORT

BENELL INVESTMENTS LTD

JOB NO:10717/12

NOVEMBER 2012

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0.0 EXECUTIVE SUMMARY

The site is located within the Barnsley BIC premises off Wilthorpe Road, Barnsley, and comprises an area of existing car parking and soft landscaping. The site falls from South to North a total of approximately 4m. The proposals are for the construction of a two storey office/workshop building with associated car parking and soft landscaping.

The site has been in agricultural use until it's development as the Barnsley BIC in the 1990's.

Surrounding land has been developed as residential from around the 1920's. Redbrook Colliery was sunk around 1900, closing and then reopening as part of Dodworth Colliery, before closing in the late 1980's, thereafter becoming a Business Park.

The site lies on solid geology of Sandstone of the Pennine Middle Coal Measures Formation. No faulting is indicated to be present on site, nor are drift deposits.

Ground movement from past underground coal workings should by now have ceased. The site is not affected by current underground coal workings, or past or present opencasting. There is one known mine entry within 20m of the site. There are no records of mine gas emissions, or surface hazards, having required attention by the Coal Authority.

There are several recorded landfills reported within 1000m of the site generally comprising inert or commercial waste.

The site lies within Environment Agency (EA) Flood Zone 1, i.e. is within an area considered to have a risk of flooding of less than 1 in 1000 in any one year.

The site is shown to lie on a secondary minor aquifer. There are no licensed abstractions reported from the aquifer or surface waters within 1000m of the site.

The site is in a radon affected area but no radon protective measures are necessary in the construction of new buildings.

The Phase I Conceptual Site Model indicates that the site would appear to have a low risk of causing harm to controlled waters, however the risk to human health, based on the proposed commercial end uses, indicates a potential moderate risk to human health, principally due to the potential for elevated levels of ground gases, but also due to the potential presence of contaminants within near surface materials as a result of previous construction activity.

Phase II Investigations of trial pits and boreholes, with associated sampling, testing and monitoring, are recommended.

1.0 INTRODUCTION

- 1.1 William Saunders have been instructed by Bennell Investments Ltd to prepare a Phase 1 Geo Environmental Report for the proposed development at Barnsley BIC, Wilthorpe Road, Barnsley S75 1JQ.
- 1.2 This report considers published information including historical Ordnance Survey mapping, Coal Authority Mining Report and Envirocheck data; along with walkover site assessment, and develops a Phase I Preliminary Conceptual Site Model for the development.
- 1.3 This report makes recommendations for Phase II intrusive investigations.

2.0 SITE DESCRIPTION

2.1 Location

The site is located within the Barnsley BIC premises off Wilthorpe Road, Barnsley, and comprises an area of existing car parking and soft landscaping.

Location plans are given at Appendix A.

2.2 Description

The development site comprises an area of macadam car parking and soft landscaping within the boundaries of the Barnsley BIC.

The site is bounded by Wilthorpe Road to the North, Barnsley BIC buildings and parking to East and South, and residential development to the West.

The site falls from South to North a total of approximately 4m.

A Yorkshire Water sewer is reported to cross the site.

2.3 Proposals

The proposals are for the construction of a two storey office/workshop building with associated car parking and soft landscaping.

3.0 SITE HISTORY

3.1 Ordnance Survey

Archive Ordnance Survey maps have been reviewed as an indicator of the previous uses of the site. Findings are as follows:

3.1.1 1855 County Series (1:10,560)

The site is indicated to be an agricultural field abutting the Barnsley and Grange Moor Trust turnpike (now Wilthorpe Road).

The site is surrounded by agricultural land.

3.1.2 1892-4 County Series (1:10,560 & 1:2,500)

The site and surrounds are generally unchanged.

3.1.3 1906-07 County Series (1:10,560 & 1:2,500)

The site is unchanged, however Redbrook Colliery is present less than 100m to the North of the site.

3.1.4 1931-3 County Series (1:10,560 & 1:2,500)

The site is unchanged.

The site of the former Redbrook Colliery is marked with two 'old shafts' and a chimney, with an area of spoil. Small scale development, presumably residential, has commenced on the North side of the adjacent road.

3.1.5 1938 County Series (1:10,560)

The site is unchanged. Further residential development has taken place off Wilthorpe Road. Redbrook Colliery appears to have been reopened.

3.1.6 1948 County Series (1:10,560)

No significant changes.

3.1.7 1959 OS Plan (1:1,250)

The site remains undeveloped.

The colliery has continued development and expansion.

3.1.8 1966 & 1973 OS Plan (1:10,000)

No significant changes.

3.1.9 1986 Additional Data (1:1,250)

The site remains unchanged.

The colliery has been further developed and is now named as Dodworth Colliery (Redbrook Shaft).

3.1.10 1993 OS Plan (1:10,000 & 1:1,250)

The first phases of Barnsley BIC has now been developed, including the subject site. Dodworth Colliery has closed and is now Redbrook Business Park.

3.1.11 2000 OS Mapping (1:10,000)

No significant changes.

3.1.12 2012 OS Mapping (1:10,000)

The latest phase of the Barnsley BIC is shown. Otherwise the site and surroundings are unchanged.

3.2 **Summary**

The site has been in agricultural use until it's development as the Barnsley BIC in the 1990's.

Surrounding land has been developed as residential from around the 1920's. Redbrook Colliery was sunk around 1900, closing and then reopening as part of Dodworth Colliery, before closing in the late 1980's, thereafter becoming a Business Park.

4.0 LAND USE

4.1 The Site

Current use of the proposed development site is as a business centre car park.

Previous use has been agricultural.

4.2 Surroundings

Current use of the immediate surroundings is as a business centre and residential properties.

Previous use has been agricultural.

5.0 ENVIRONMENTAL SETTING

A package of environmental data has been obtained from Envirocheck, to be found at Appendix C.

5.1 Geology

British Geological Survey 1:10,000 scale mapping indicates the site to lie on solid geology of Sandstone of the Pennine Middle Coal Measures Formation.

No faulting is indicated to be present on site.

No drift deposits or made ground are indicated to be present.

5.2 Mining

A Coal and Brine Report has been obtained from the Coal Authority. Brine extraction is not relevant to this site.

The site is in the likely zone of influence from workings in 7no. coal seams between 50 and 410m below ground level, last worked in 1986. Ground movement from these workings should by now have ceased.

The site is not affected by current underground coal workings.

The site is not in an area currently licensed or where a licence application has been made for underground coal removal, however, reserves of coal are present which could be worked in the future.

There is one known mine entry within 20m of the site for which there are no records of treatment, if any. Further enquiry of the Coal Authority has identified that the shaft location was noted from "former British Coal records" with no further details of the original source, with the shaft not appearing on records held by the Coal Authority. There are no known faults due to coal mining.

The site is not affected by past, present or proposed future opencast mining.

There are no records of mine gas emissions, or surface hazards, having required attention by the Coal Authority, although we note that the Redbrook Shaft has a ventilation compound with flame trap and methane sampling point.

5.3 Landfills

There are several recorded landfills reported within 1000m of the site generally comprising inert or commercial waste.

The nearest of these are at Redbrook Business Park (believed colliery spoil) some 70m NW, and Autogel (Inert and Commercial) some 140m NW.

5.4 Hydrology

The site has no watercourses in its immediate vicinity, however there is a stream 200m to the East running North to the River Dearne, some 1000m away. The Red Brook runs some 700m West of the site, also connecting to the Dearne.

The site lies within Environment Agency (EA) Flood Zone 1, i.e. is within an area considered to have a risk of flooding of less than 1 in 1000 in any one year.

5.5 Hydrogeology

The site is shown to lie on a secondary minor aquifer.

Soils are classified as having low leaching potential.

The site does not lie within a Source Protection Zone.

There are no licensed abstractions reported from the aquifer within 1000m of the site.

5.6 Waters

5.6.1 Discharge Consents

There are three discharge consents to Controlled Waters within 1000m of the site, all of which are storm effluent from Yorkshire Water Sewers, 750m West of the site and into Red Brook.

5.6.2 Pollution Incidents to Controlled Waters

Five pollution incidents are reported within 1000m of the site, between 1990 and 1998, none of which are connected with the site.

5.6.3 Water Abstractions

There are no licenced abstractions from surface waters within 1000m of the site.

5.7 **Ground Gas**

The British Geological Survey indicates that the site is in a radon affected area but no radon protective measures are necessary in the construction of new buildings.

5.8 **Ecological**

Natural England's 'Nature on the Map' does not indicate any statutorily protected land within an influencing distance of the site.

6.0 SITE WALKOVER

A walkover inspection of the site was undertaken on 13th November, 2012.

The weather was clear and dry.

The topography of the site was noted, in particular the gradients to the North. Some settlement of the existing car park was noted, with evidence in the South Eastern corner where a drainage manhole is clearly defined within the macadam surfacing. A mobile telephone mast is present to the Wilthorpe Road boundary. Trees to the Northern part of the site are several years old.

No evidence was noted to suggest contamination of the ground.

No noxious weeds were noted to be present.

7.0 REVIEW OF PREVIOUS WORK

7.1 No previous investigations have been made available for study.

8.0 PHASE I ENVIRONMENTAL RISK ASSESSMENT

The risk of any contaminants impacting on development is a function of the nature of the contaminant, the probability of exposure, the pathway by which exposure occurs and the likely effect on the receptor. A contaminant is defined by the Contaminated Land Exposure Assessment (CLEA) method as a substance that has the potential to cause harm, and a risk is considered to be present where a contaminant is present at sufficient concentration to cause harm and a pathway is present for a receptor to be exposed to that contaminant.

At this stage, the Phase 1 Risk Assessment is qualitative in nature, and aims to identify all potential source-pathway-receptor linkages irrespective of significance or uncertainty. The identification will cover the following scenarios:-

- Existing site conditions affecting the site itself,
- Existing site conditions affecting the environment more generally, and
- Existing off site conditions affecting the site.

8.1 Potential Pollution Sources

Based on the findings of this Phase 1 Report, the potential sources of contaminants are:-

On site

Mine gas

Yorkshire Water sewer

Construction activities

Radon gas

Off site

Landfill gas

8.2 Potential Pathways

Potential pathways are as follows:

- Ingestion through direct contact or edible vegetable uptake,
- Skin contact,
 - Inhalation,
 - Direct contact of buried structures,
 - Leaching to ground water,
 - Surface run off,
 - Accumulation of explosive or asphyxiative gases in confined spaces.

8.3 Potential Receptors

Human health

- Current site users,
- Construction workers,
- Future site users,
- Users of adjacent sites.

Construction materials

- Buried concrete in foundations,
- Buried water pipes.

Controlled waters

- Groundwater underlying the site, noted as a minor aquifer,
- Surface water.

▪ Flora and fauna

- Existing vegetation,
- Future development landscape planting,

8.4 Preliminary Conceptual Site Model

The Preliminary Conceptual Site Model (CSM) is a hypothetical review of the linkages between source, pathway and receptor as noted above. This is set within the identified ground and waters context of the site and the site’s proposed end use.

No significance or uncertainty is attributed to any source-pathway-receptor pollutant linkage at this stage.

In tabular form, the CSM and attributable risk is as follows:-

Source	Pathway	Receptor	Probability	Consequence	Risk
On site contaminants in near surface soils	Direct contact and ingestion	Long term – future site users	Unlikely	Medium	Low
		Short term – construction workers	Low	Medium	Moderate / low
	Inhalation of dust	Long term – future site users	Unlikely	Medium	Low
		Short term – construction workers	Unlikely	Medium	Low
	Leaching through infiltration	Minor aquifer	Low	Mild	Very low
On site Aggressive ground conditions	Contact with buried structures	Construction materials	Unlikely	Medium	Low
Ground gas	Build up in confined spaces	Long term – future site users	Low	Severe	Moderate
		Short term – construction workers	Low	Severe	Moderate

In summary, the site would appear to have a low risk of causing harm to controlled waters, however the risk to human health, based on the proposed commercial end uses, indicates a potential moderate risk to human health, principally due to the potential for elevated levels of

ground gases, but also due to the potential presence of contaminants within near surface materials as a result of previous construction activity.

9.0 RECOMMENDATIONS FOR FURTHER WORK

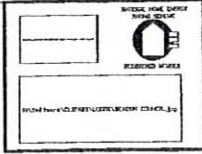
The Phase I investigation has noted potential geo-environmental risks as follows:-


- Ground gases entering the building and causing asphyxiation/explosion hazard
- Contact with near surface contaminants resulting in human health issues.
- Unknown but potentially aggressive ground resulting in deterioration of construction materials
- Noted settlement of external works possibly indicating soft soils at shallow depth.

The Phase II investigation should investigate these risks as follows:-

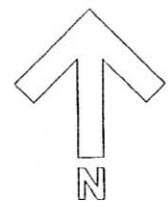
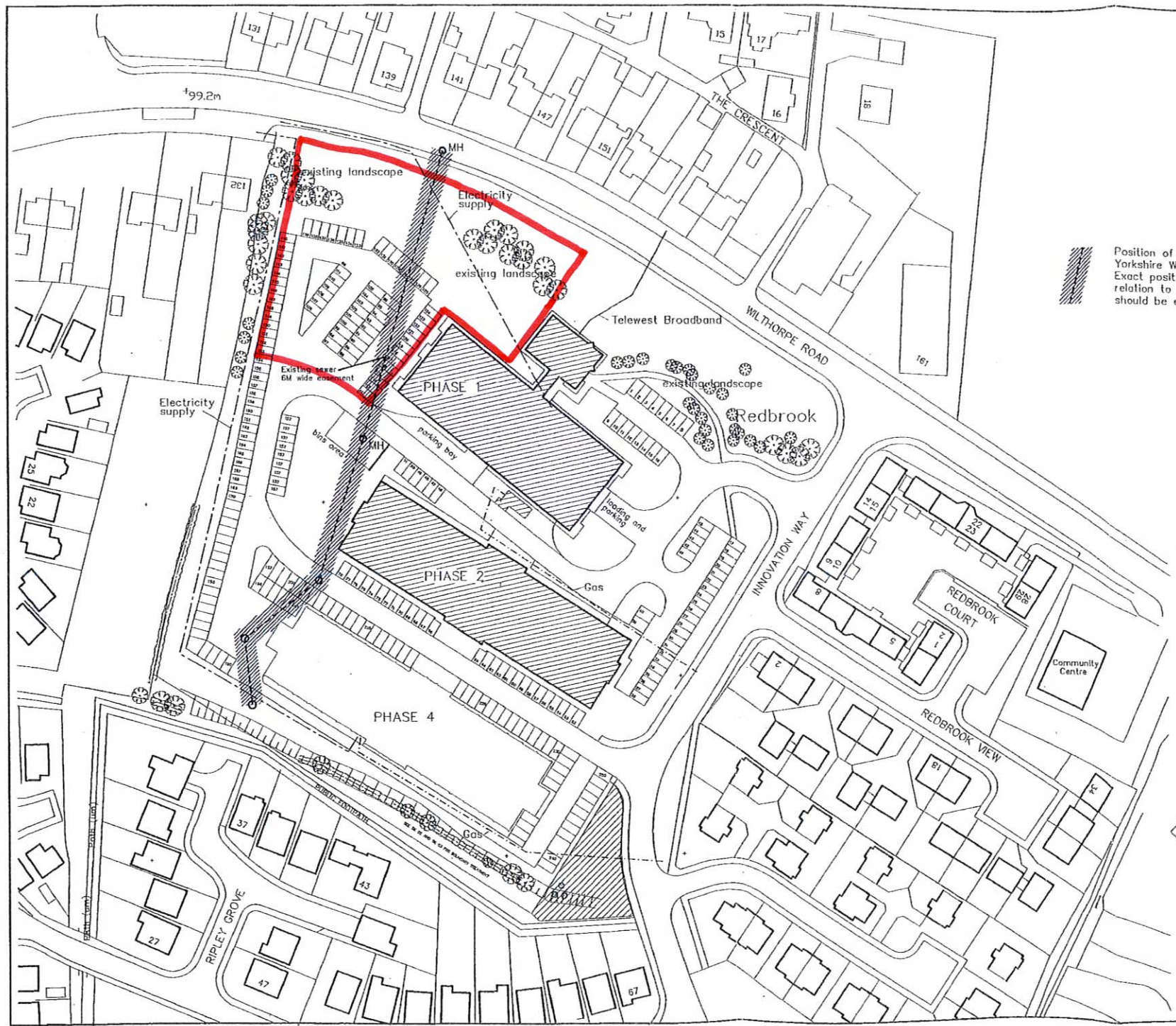
- Excavate trial pits to establish shallow ground conditions, assess external works construction and obtain samples for chemical analysis.
- Construct 3no. window sample boreholes to establish consistency of deeper strata and install with slotted pipe and gas valve to enable the ground gas condition to be established.

APPENDIX A
Location Plans




 Position of sewer as shown on Yorkshire Water record drawing. Exact position of this in relation to proposed building should be established by survey.

BARNESLEY BIC
PHASE 5
LOCATION PLAN



BARNESLEY Metropolitan Borough Council	
Property & Procurement Alan Widd Assistant Executive Director Springfield House, Springfield 21 Barnsley S70 6RS Tel: 01226 777770 Fax: 01226 771100	
PROJECT BRIC PHASE 5	
DRAWING SITE AS EXISTING	
Drawn IHW	Revision
Scale 1: 500	Date APRIL 06
Project Code	Drawing No. 1

APPENDIX B
Historical Mapping

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

Other Pits
 Gravel Pit, Sand Pit, Other Pits
Quarry
 Shingle, Orchard
Osiers
 Reeds, Marsh
Mixed Wood
 Deciduous, Brushwood
Fir
 Furze, Rough Pasture
Trigonometrical Station
 Arrow denotes flow of water
Site of Antiquities
 Pump, Guide Post, Signal Post
• 285 Surface Level
Sketched Contour
Instrumental Contour
Main Roads
 Fenced, Un-Fenced
Minor Roads
 Fenced, Un-Fenced
Sunken Road
Raised Road
Road over Railway
Railway over River
Railway over Road
Level Crossing
Road over River or Canal
Road over Stream
Road over Stream
County Boundary (Geographical)
County & Civil Parish Boundary
Administrative County & Civil Parish Boundary
County Borough Boundary (England)
County Borough Boundary (Scotland)
Rural District Boundary
Civil Parish Boundary

Ordnance Survey Plan 1:10,000

Chalk Pit, Clay Pit or Quarry
Gravel Pit
Sand Pit
Disused Pit or Quarry
Refuse or Slag Heap
Lake, Loch or Pond
Dunes
Boulders
Coniferous Trees
Non-Coniferous Trees
Orchard
Scrub
Coppice
Bracken
Heath
Rough Grassland
Marsh
Reeds
Saltings
Building
Glasshouse
Sloping Masonry
Pylon
Electricity Transmission Line
Pole
Cutting
Embankment
Standard Gauge Multiple Track
Standard Gauge Single Track
Siding, Tramway or Mineral Line
Narrow Gauge
Geographical County
Administrative County, County Borough or County of City
Municipal Borough, Urban or Rural District, Burgh or District Council
Borough, Burgh or County Constituency
Civil Parish
BP, BS Boundary Post or Stone
Ch Church
CH Club House
F E Sta Fire Engine Station
FB Foot Bridge
Fn Fountain
GP Guide Post
MP Mile Post
MS Mile Stone
Pol Sta Police Station
PO Post Office
PC Public Convenience
PH Public House
SB Signal Box
Spr Spring
TCB Telephone Call Box
TCP Telephone Call Post
W Well

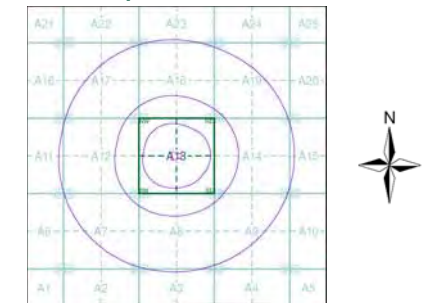
1:10,000 Raster Mapping

Gravel Pit
Refuse tip or slag heap
Rock
Rock (scattered)
Boulders
Boulders (scattered)
Shingle
Mud
Sand
Sand Pit
Slopes
Top of cliff
General detail
Underground detail
Overhead detail
Narrow gauge railway
Multi-track railway
Single track railway
County boundary (England only)
Civil, parish or community boundary
District, Unitary, Metropolitan, London Borough boundary
Constituency boundary
Area of wooded vegetation
Non-coniferous trees
Non-coniferous trees (scattered)
Coniferous trees
Positioned tree
Coniferous trees (scattered)
Coppice or Osiers
Orchard
Heath
Rough Grassland
Marsh, Salt Marsh or Reeds
Scrub
Water feature
Flow arrows
Mean high water (springs)
Mean low water (springs)
Telephone line (where shown)
Electricity transmission line (with poles)
Bench mark (where shown)
Triangulation station
Point feature (e.g. Guide Post or Mile Stone)
Pylon, flare stack or lighting tower
Site of (antiquity)
Glasshouse
General Building
Important Building

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:10,560	1855	2
Yorkshire	1:10,560	1894	3
Yorkshire	1:10,560	1907	4
Yorkshire	1:10,560	1932 - 1933	5
Yorkshire	1:10,560	1938	6
Yorkshire	1:10,560	1938 - 1948	7
Yorkshire	1:10,560	1948	8
Ordnance Survey Plan	1:10,000	1956	9
Ordnance Survey Plan	1:10,000	1966	10
Ordnance Survey Plan	1:10,000	1973	11
Ordnance Survey Plan	1:10,000	1983	12
Ordnance Survey Plan	1:10,000	1993	13
10K Raster Mapping	1:10,000	2000	14
10K Raster Mapping	1:10,000	2012	15

Historical Map - Slice A



Order Details

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 Search Buffer (m): 1000

Site Details

Barnsley BIC, Withthorpe Road, Barnsley, S75 1JQ

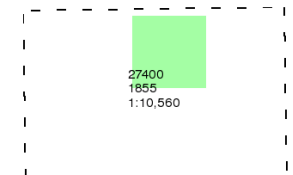
Yorkshire

Published 1855

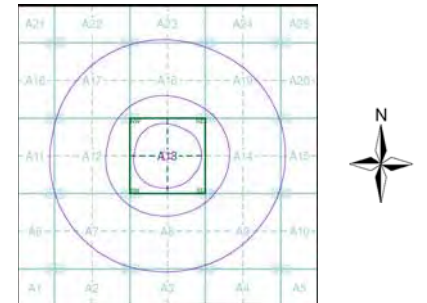
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore 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. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A

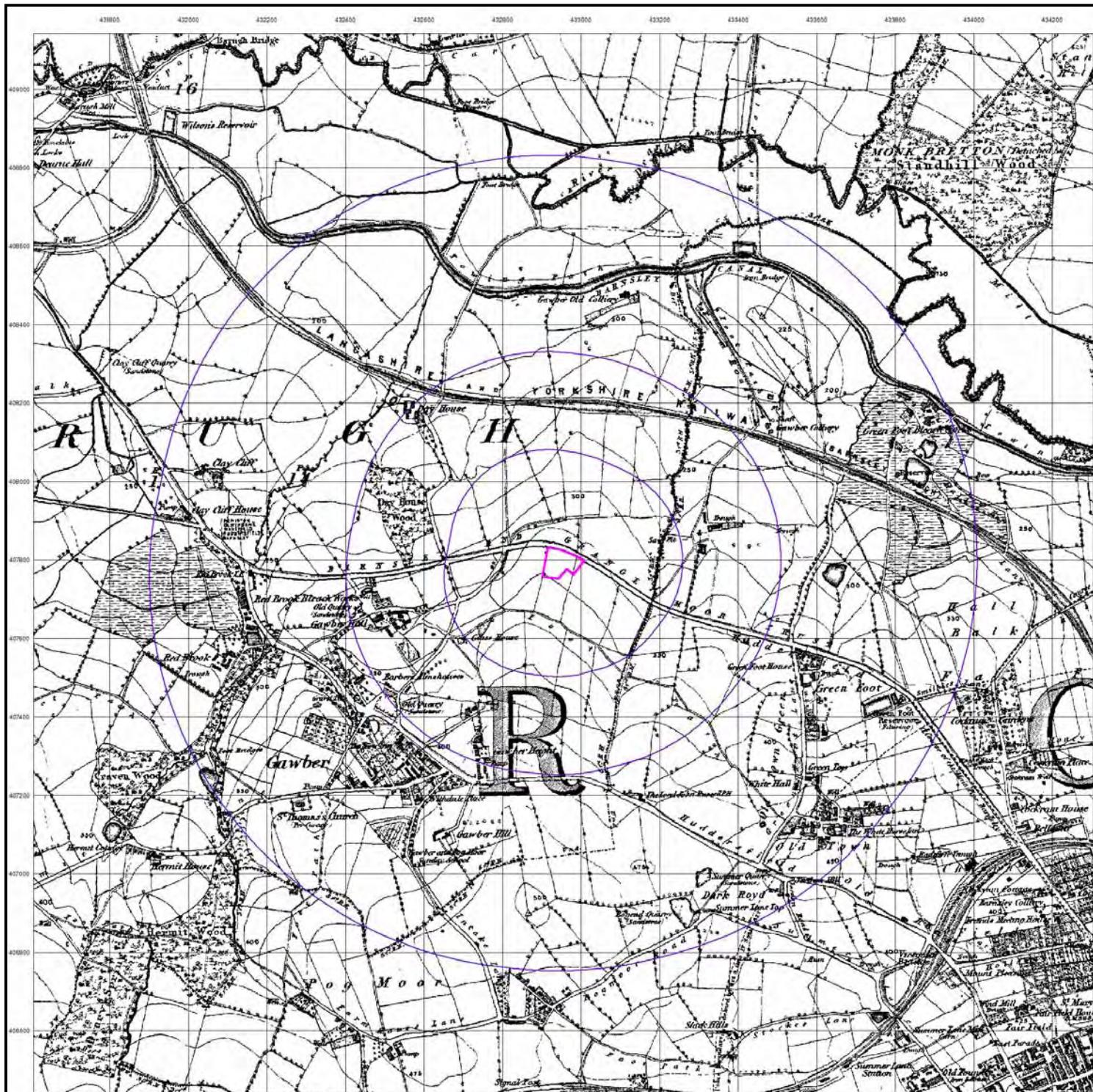


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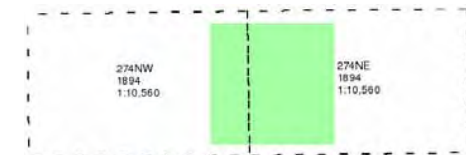
Yorkshire

Published 1894

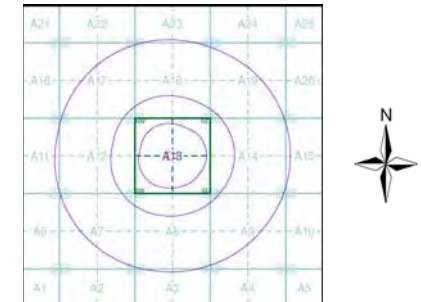
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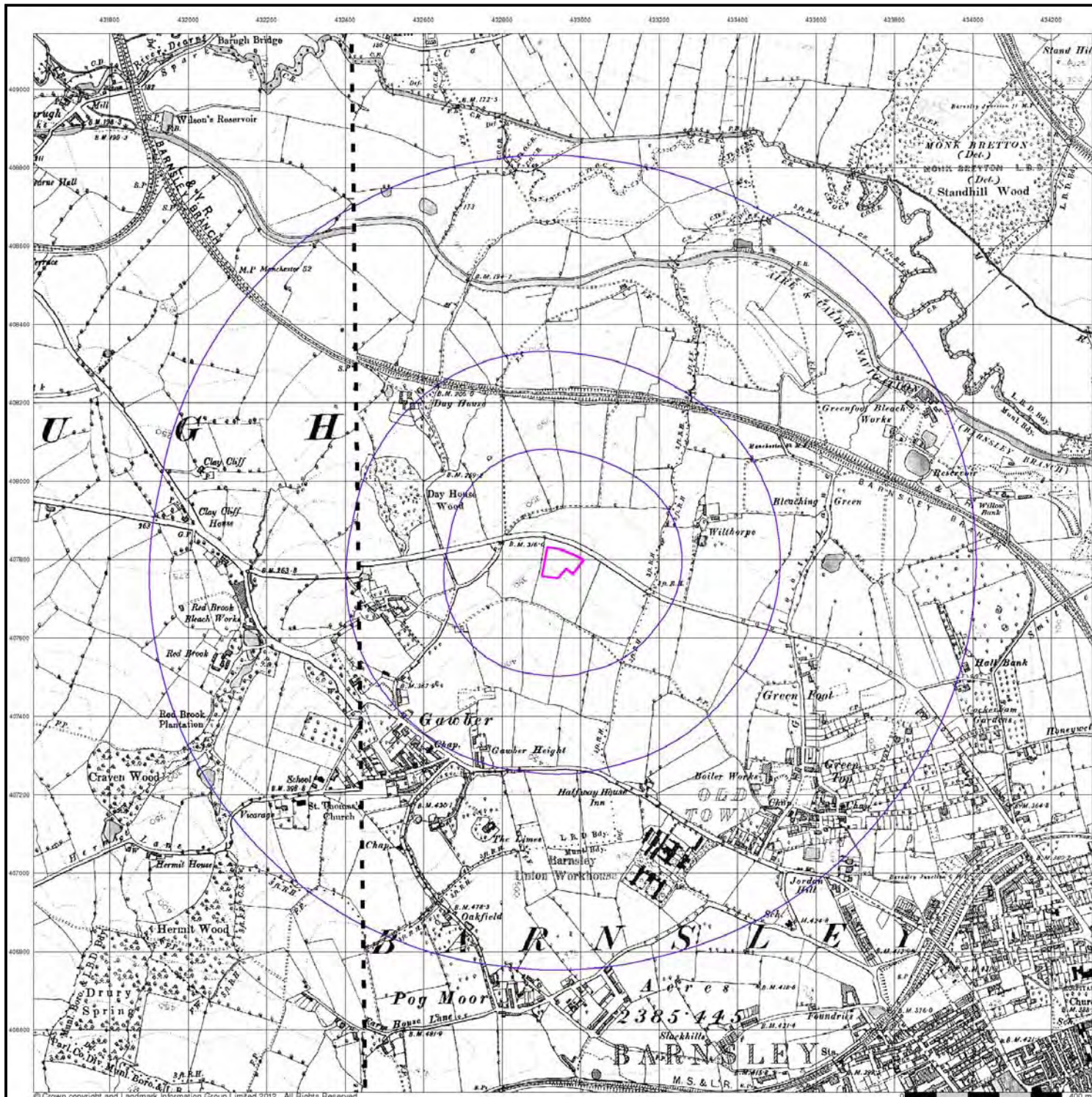


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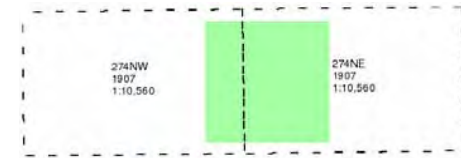
Yorkshire

Published 1907

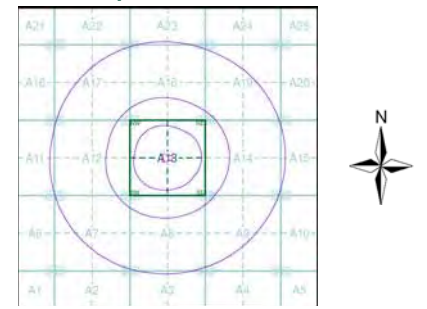
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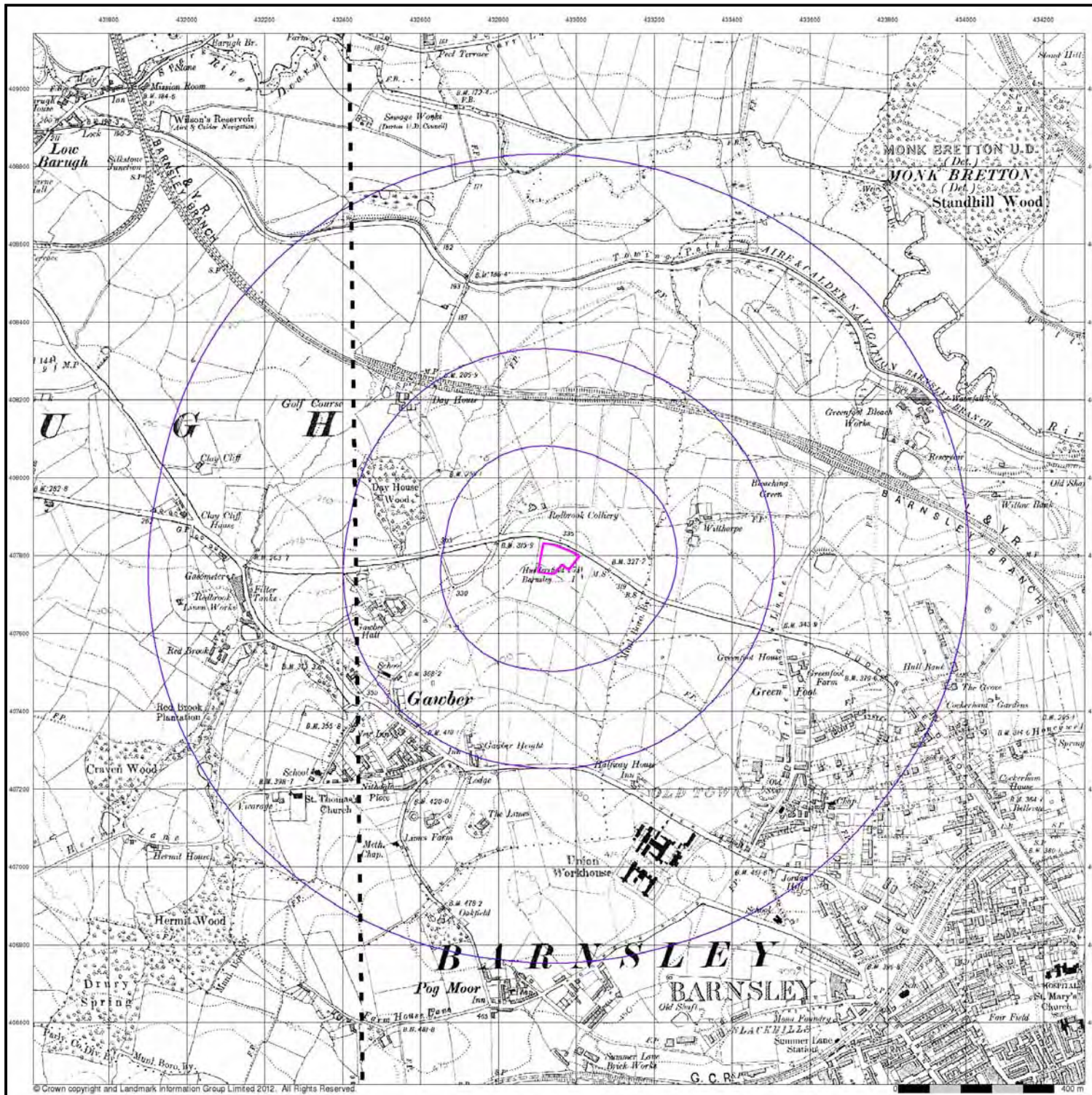


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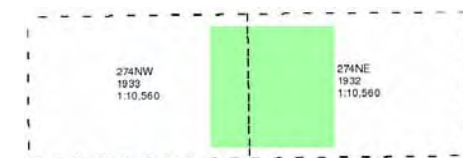
Yorkshire

Published 1932 - 1933

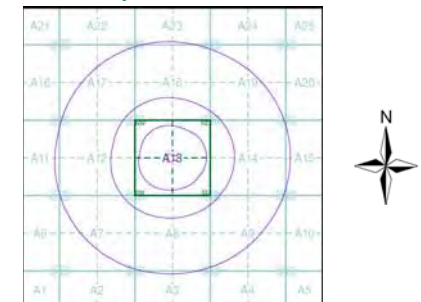
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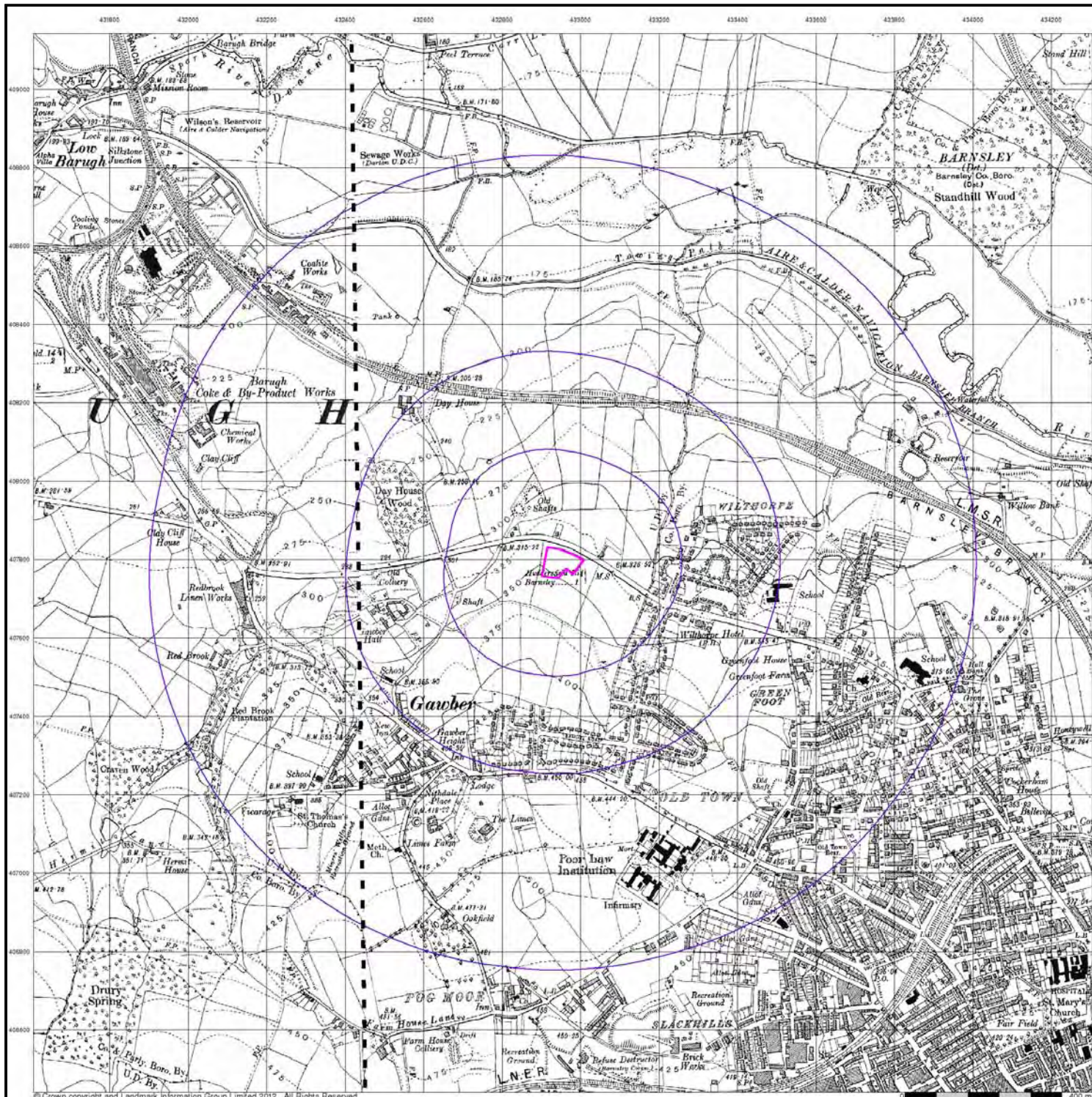


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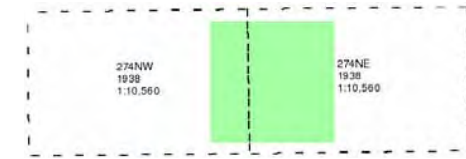
Yorkshire

Published 1938

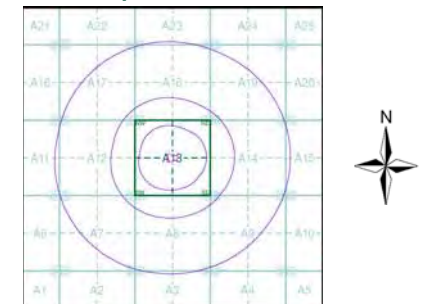
Source map scale - 1:10,560

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; these maps were used to update the 1:10,560 maps. The published date given therefore 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. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A

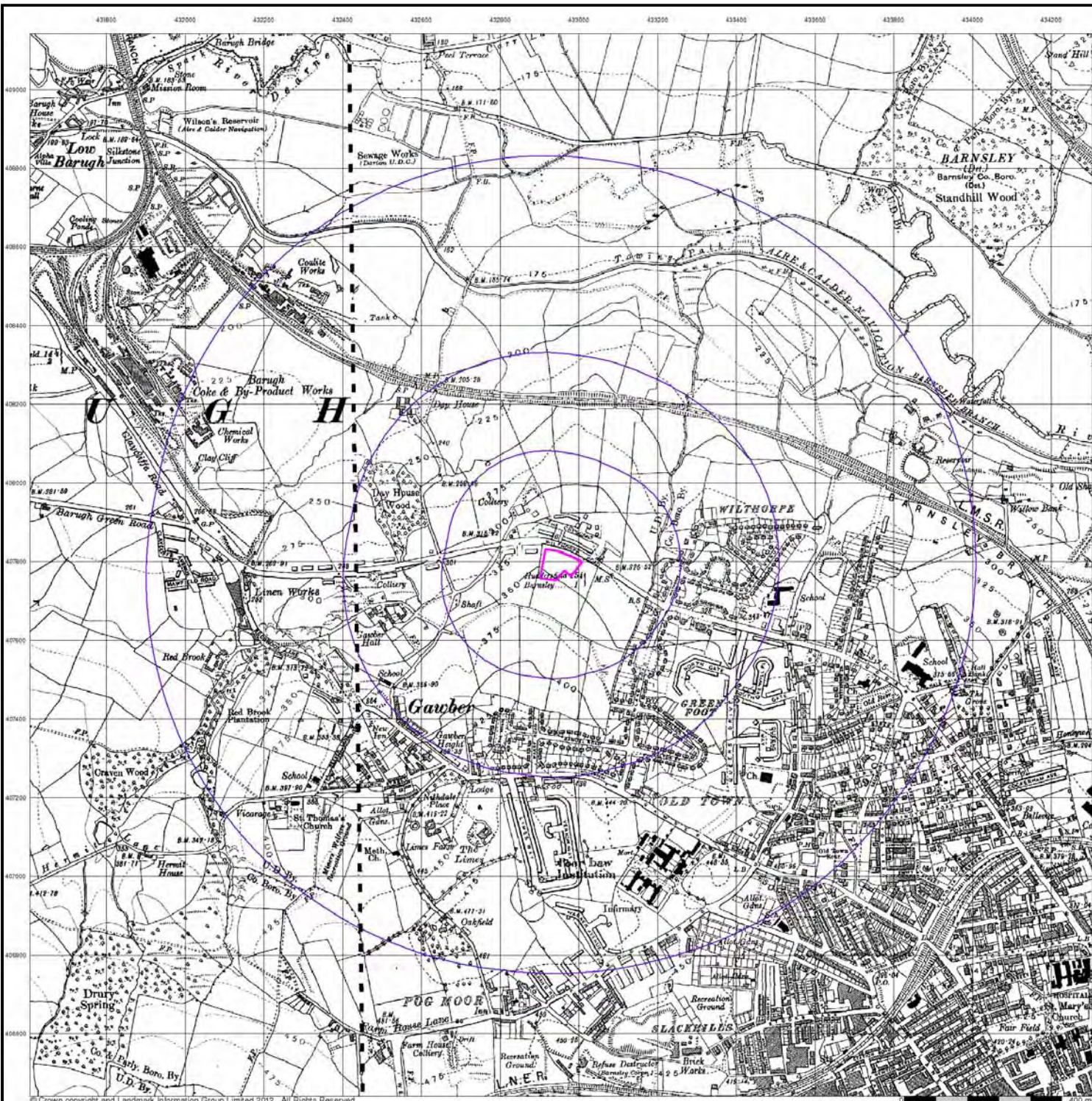


Order Details

Order Number: 42644402_1_1
 Customer Ref: 10717/8.2
 National Grid Reference: 432950, 407790
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Site Details

Barnsley BIC, Wilthorpe Road, Barnsley, S75 1JQ



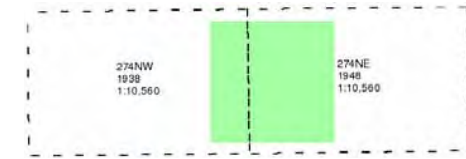
Yorkshire

Published 1938 - 1948

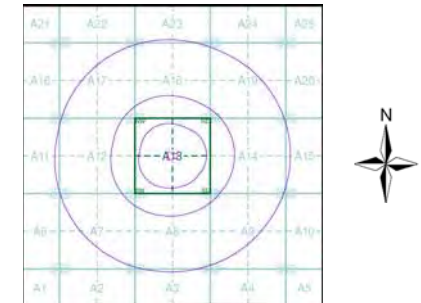
Source map scale - 1:10,560

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; these maps were used to update the 1:10,560 maps. The published date given therefore 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. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice A



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Site Details

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Yorkshire

Published 1948

Source map scale - 1:10,560

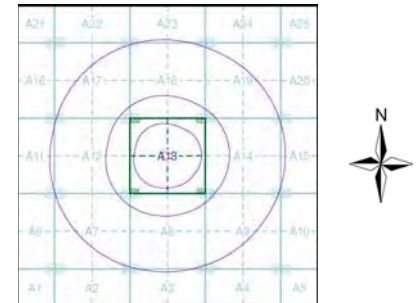
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some 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. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)

274NW
1948
1:10,560



Historical Map - Slice A

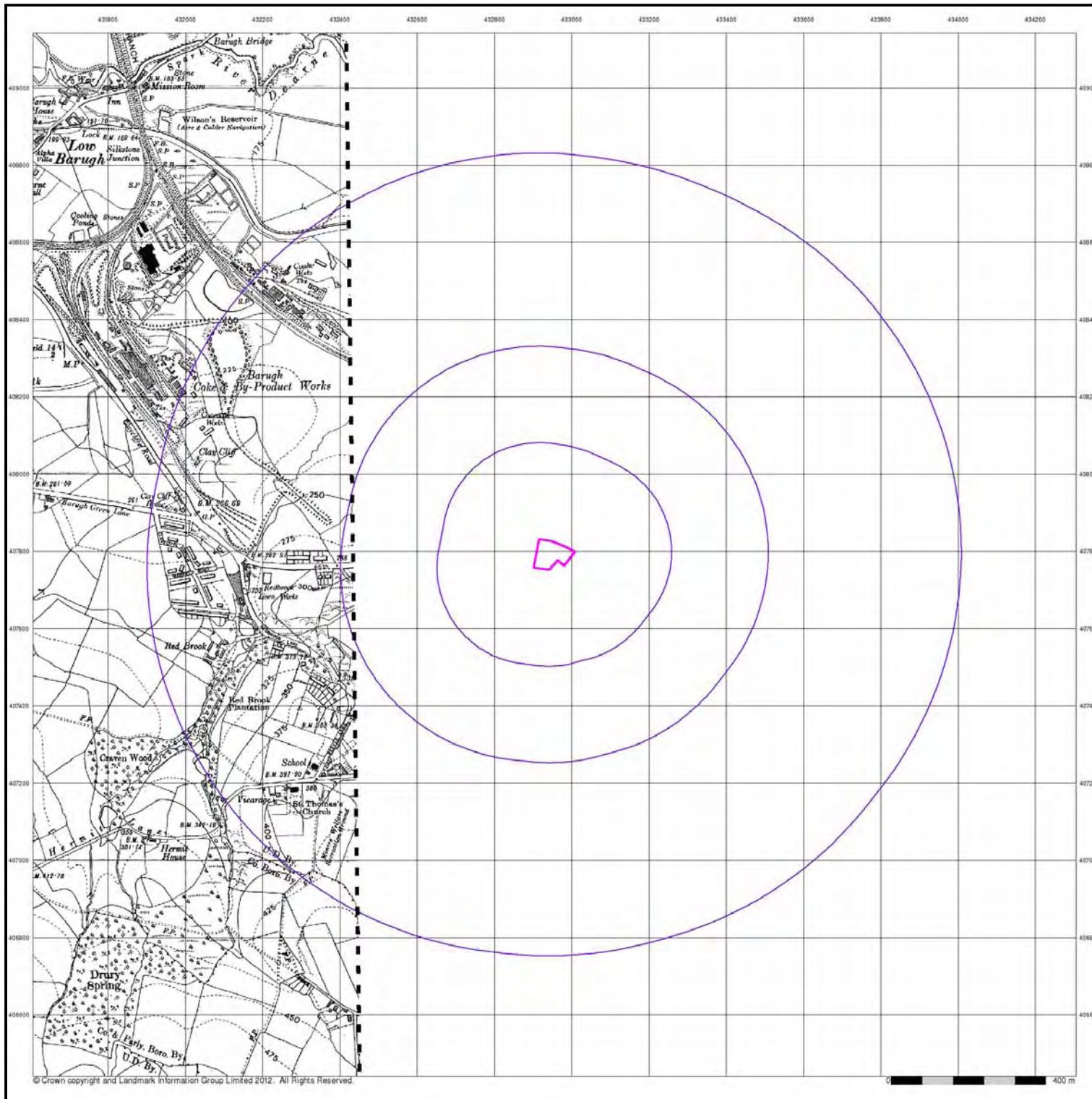


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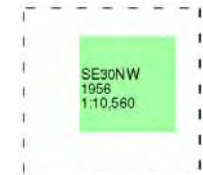
Ordnance Survey Plan

Published 1956

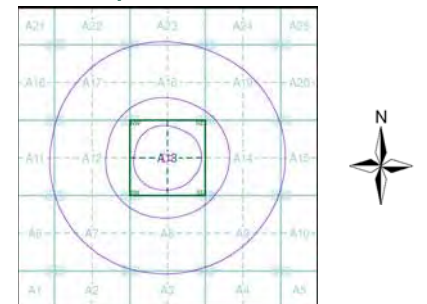
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A

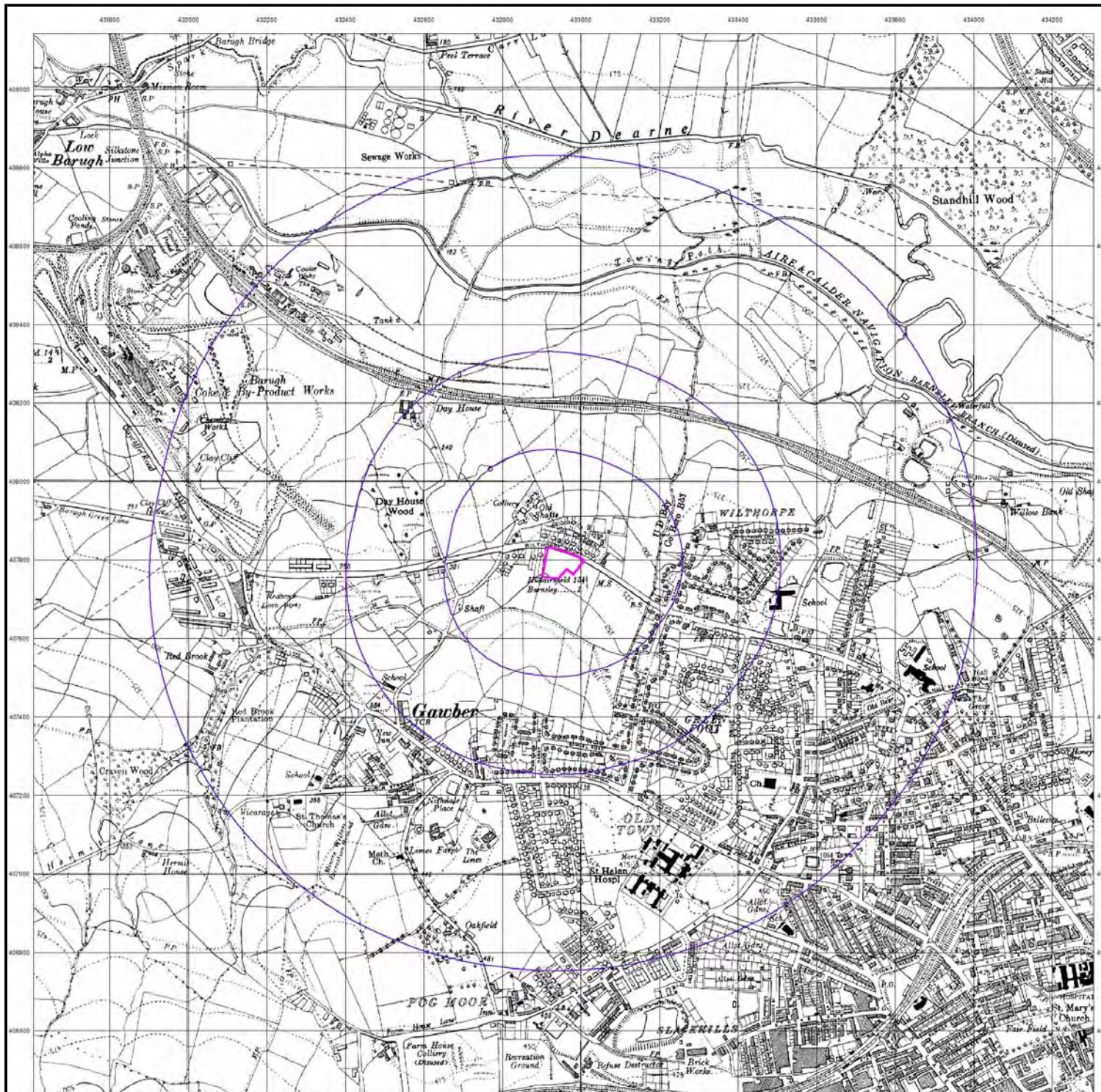


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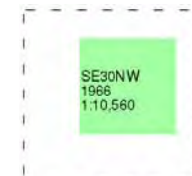
Ordnance Survey Plan

Published 1966

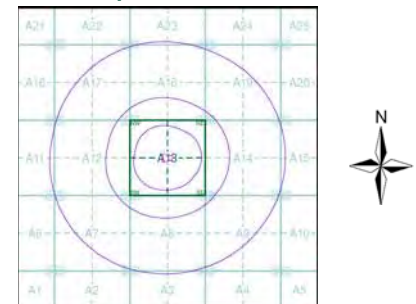
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Historical Map - Slice A

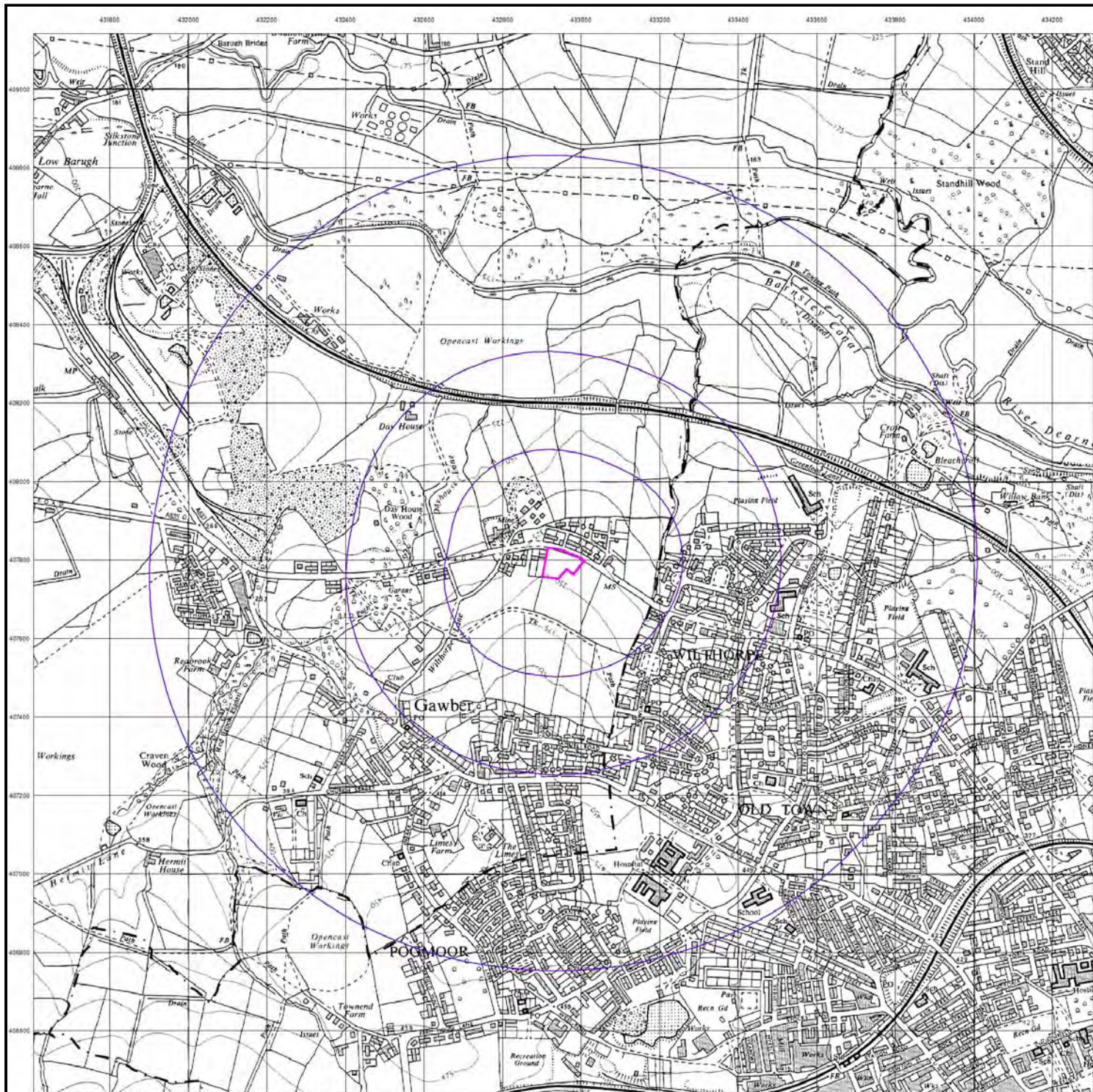


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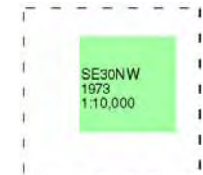
Ordnance Survey Plan

Published 1973

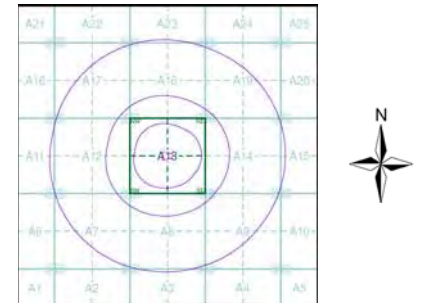
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore 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. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

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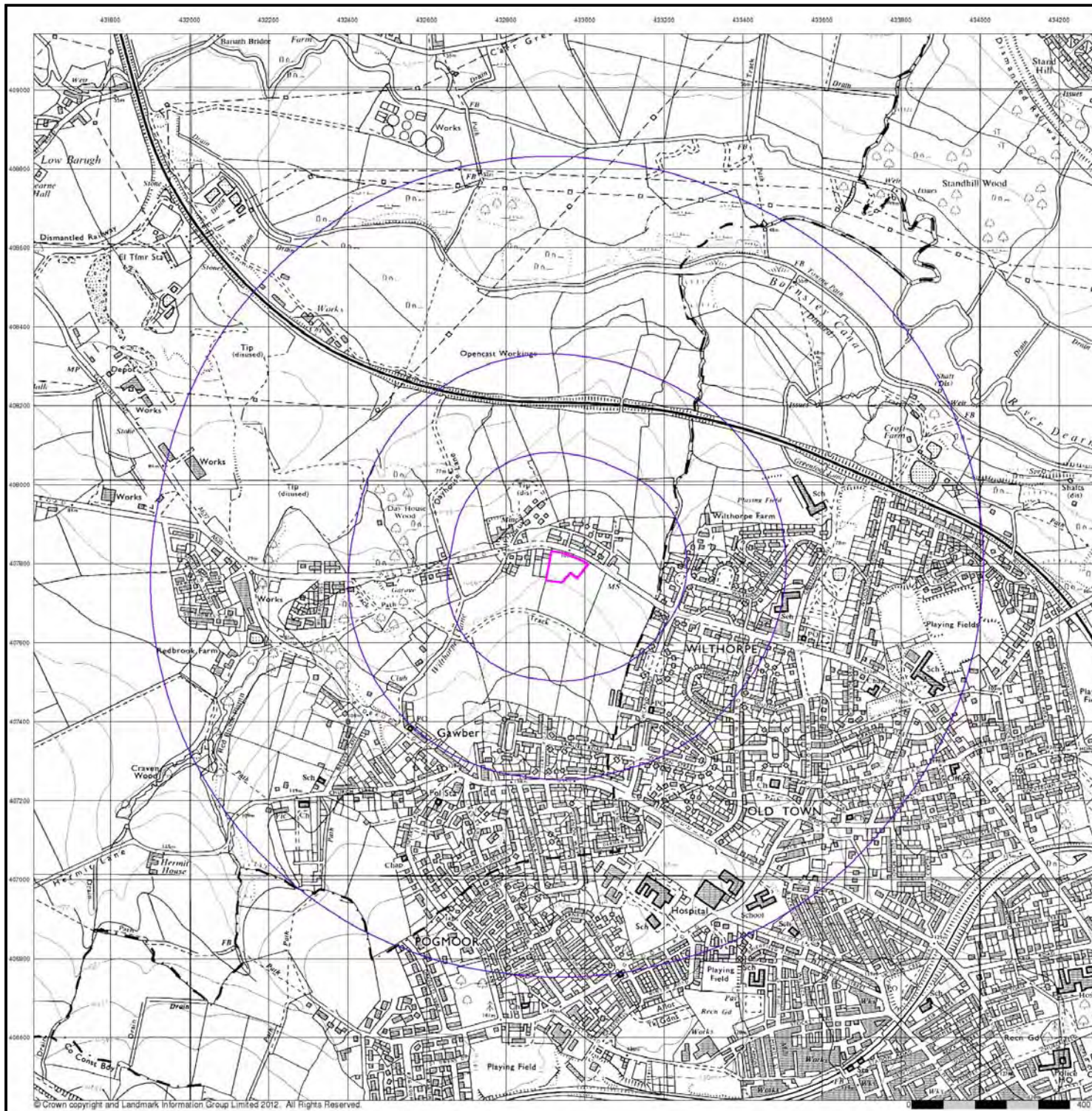


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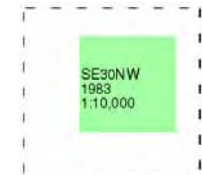
Ordnance Survey Plan

Published 1983

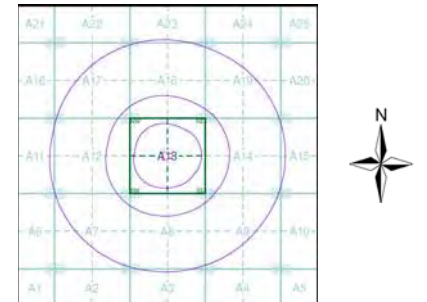
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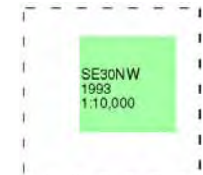
Ordnance Survey Plan

Published 1993

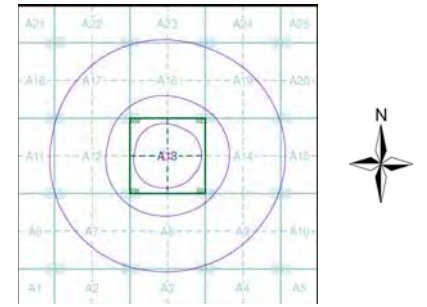
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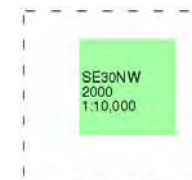
10k Raster Mapping

Published 2000

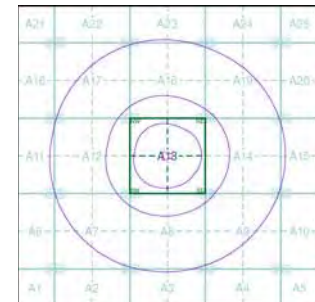
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A

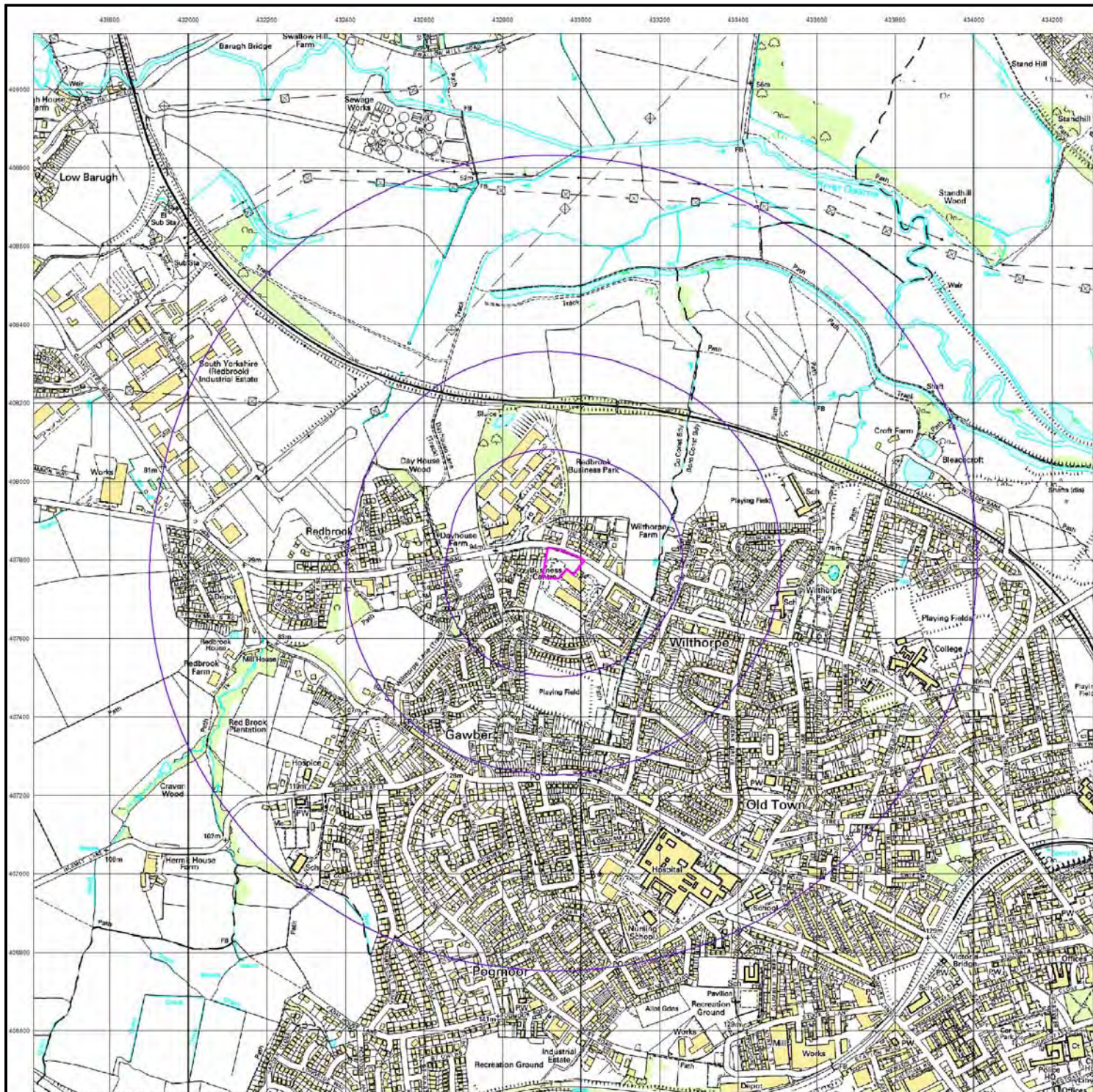


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Site Details

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10k Raster Mapping

Published 2012

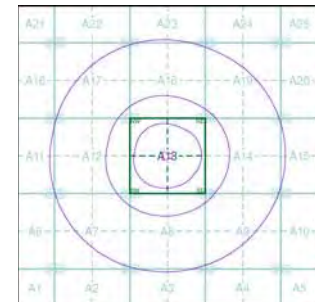
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