

**Coal Mining Risk Assessment**

**22 CROWLEES ROAD  
MIRFIELD**

for

**Mr. D. Hayman**

Report Number 4388

June 2024



**Michael D Joyce Associates LLP**

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## Coal Mining Risk Assessment

### 22 CROWLEES ROAD, MIRFIELD

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## **1 INTRODUCTION**

- 1.1 At the request of Orange Design Studio Limited, acting on behalf of Mr. D. Hayman, a Coal Mining Risk Assessment has been carried out of 22 Crowlees Road in Mirfield. It is proposed to demolish the existing bungalow and construct a two storey property in its place.
- 1.2 The purpose of the desk study was to review and assess information on the site including geological, mining and hydrogeological data, to review the past history of the site, and to determine if there are any previous mining related hazards that may impair its safe and economic development.
- 1.3 The study has not included checks on services on or adjacent to the site, and no structural or asbestos surveys have been carried out.

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## 2 THE SITE

2.1 The property is located at 22 Crowlees Road, approximately 1½km northeast of the centre of Mirfield. The Ordnance National Survey Grid Reference is E420605, N420215. Figure 1 shows the general site location, whilst figure 2 shows the site and development proposals in more detail.

2.2 At present, the site comprises a brick-built bungalow, and driveway leading to a single detached garage. There is a small lawned area to the front of the property. To the rear is a patio area and artificial pond.

2.3 The southern half of the site comprises a large lawned area with a number of mature and semi-mature trees along the boundaries, and within the site.



*View of front of property*



*View of front of property*



*View of rear of property and garden*



*View from rear of property and garden*



*View from rear of property*

### 3 SITE HISTORY

3.1 The following archival Ordnance Survey maps have been examined to trace the past development of the site. These are reproduced in Appendix 1 with the current site boundary superimposed on them. The apparent displacement on the older maps is due to a change in Ordnance Survey co-ordinates.

Scale and Year of Publication			
6" to 1 mile	1855	1:2500	1890 (1:500)
	1892		1893
	1905		1907
	1931		1922
	1938		1933
	1948		1958
	1956		
	1967		
1:10,000	1975	1:1250	1957
	1985		1968
	1993		1978
	2001		1986
	2010		1992
	2024		1993
			1995
	2003		

3.2 The earliest map to show the site in detail dates from 1890. It records the site to lie within parkland associated with Eastthorpe Villa, which originally lay to the

southeast. Crowlees Road first appears on the map of 1893, which also shows a footpath crossing the site.

3.3 By 1907, a railway line in a cutting is shown to run along the southern boundary of the site, and a "Memorial Hospital" had been constructed just to the north, on the opposite side of Crowlees Road.

3.4 The present property is first shown on the map of 1957, together with the other houses that run along the southern side of Crowlees Road. At this time, the southern boundary of the site ran approximately midway through the present site, with the footpath and railway beyond.

3.5 By 1967, the garden had been extended to the railway cutting, which by this time had been dismantled. The housing to the north of Crowlees Road had also been constructed.

3.6 The railway cutting had been infilled by 1992, and the land formed the garden areas to properties of Springfield Place. The hospital had also been demolished and replaced by housing on Crowlees Gardens.

## **4 GEOLOGY AND COAL MINING RISK ASSESSMENT**

### **4.1 Geology**

4.1.1 Maps of the British Geological Survey (BGS) record the site as being underlain by Undifferentiated mudstones, siltstones and sandstones of the Carboniferous Pennine Lower Coal Measures.

4.1.2 The site is shown to be unaffected by faulting, and no recent Drift deposits are recorded.

### **4.2 Coal Mining Risk Assessment**

4.2.1 The site lies within a "Development High Risk Area" as defined by the Coal Authority. A Consultant's Coal Mining Report has been obtained from the Coal Authority, and is reproduced in Appendix 2. It states that the Black Bed Coal seam has been worked at a depth of 126m below the site, with the last date of working being 1931. As such, any subsidence from this seam will have ceased by now.

4.2.2 The report does also state that unrecorded shallow workings are probable. The geological maps show the Blocking Bed Coal seam to outcrop to the southeast of the site (at No. 8 Crowlees Road). It dips in a northeasterly direction beneath the site. The Blocking Bed is underlain by the Top Lousey Coal seam.

4.2.3 The geological memoir for Huddersfield, published in 1930, states that the Blocking Bed Coal was of fair quality and extracted very widely by underground mining. At

Mirfield Moor, the memoir records the seam to comprise three leaves of coal as follows, although it is probable that only the upper leaf would have been extracted;

Coal	69cm
Seatearth	170cm
Coal	3cm
Black Shale	13cm
Coal	13cm

4.2.4 By contrast the underlying Top Lousey Coal seam was of variable quality and extent. It is not regarded by the Coal Authority of sufficient concern to be included within the Development High Risk Area, and as such is very unlikely to have been extracted from beneath the site.

4.2.5 Whilst no recorded shafts are recorded on the site itself, or within the vicinity, the possibility of an unrecorded shaft(s) being present cannot be entirely precluded.

4.2.6 The Coal Authority report found none of the following below or in the vicinity of the site.

- Spine roadways at shallow depth
- Geological faults, fissures or breaklines
- Opencast mines
- Coal Authority managed tips
- Site investigations
- Remediated sites

- Coal Mining subsidence
- Mine water treatment schemes
- Future underground mining
- Coal mining licensing
- Court Orders
- Section 46 Orders
- Withdrawal of support notices
- Payments to owners

### **Conclusions and Recommendations**

4.2.7 The Blocking Bed Coal is believed to outcrop close to the site, and to dip below it at shallow depth. This seam was previously of some value, and the Coal Authority consider it may have been worked. As such, it has designated the site to lie in a “Development High Risk Area”, as any subsidence could affect surface stability.

4.2.8 It is therefore recommended that rotary openhole drilling is carried out to confirm or preclude such workings. It is envisaged that one day of drilling should be sufficient at this stage. It is recommended that full time supervision of the drilling is carried out by a Chartered Geologist or a Fellow of the Geological Society. It should be noted that a licence will be required from the Coal Authority in the first instance.

A D Joyce

BSc MSc ARSM CEng CGeol CEnv MICE FGS SiLC SQP

June 2024

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### **Procedure Notes**

The desk study and/or ground investigation have been carried out using reasonable skill and care, primarily in accordance with the principles of BS5930: 2015 + A1: 2020: Code of Practice for Site Investigations and BS10175: 2011 + A1: 2017: Code of Practice for the Investigation of Potentially Contaminated Sites, and the terms of the client's brief. The report has been prepared for the specific purposes notified at the time of the initial enquiry.

By its very nature any ground investigation only encounters and samples a small percentage of the ground. Consequently changes in ground conditions, soil properties and contamination can occur between any two exploratory points, for example local features such as soft ground, pockets of contamination and faults. This is also true of the exploration of mineworkings and such features can extend beneath parts of the site not investigated. Unrecorded bell pits and shafts can also exist between exploratory points. The ground investigation is designed to minimize such risks with budgetary constraints.

Conclusions and recommendations are based on the information presented in this report, but unforeseen features may exist. No liability can be accepted for ground conditions not revealed by the exploratory holes or for contamination not sampled or tested for. Therefore, actual ground conditions should be noted during construction and further advice sought if they differ from those predicted. Michael D. Joyce Associates LLP reserves the right to amend the conclusions and recommendations in the light of further information. Actual methods of construction or alternative designs should be notified to Michael D. Joyce Associates LLP, such that the recommendations made can be reconsidered in the light of any changes.

Further investigation can be carried out to reduce uncertainty further and risk but ultimately these risks cannot be eliminated. Similarly a desk study normally only considers readily available information and further information could be held by other sources. In commissioning further research or investigation the cost/benefit of doing so must be considered.

It is assumed that groundlevels will not change significantly from those at present. The groundwater conditions are based on observations made at the time of the investigation, unless stated otherwise. It should be noted that the observations are subject to the method of the boring or excavation, and that groundwater levels will vary due to seasonal or other effects.

Where buildings are present on a site, structural and asbestos surveys of the buildings have not been carried out, unless specifically stated. An Unexploded Ordnance (UXO) Survey has not been carried out unless specifically stated. Furthermore, the positive identification of intrusive plants is beyond the expertise of this practice. In relevant situations it would be prudent to commission surveys in respect of UXO and invasive plants.

Where information has been obtained from Third Parties, no liability can be accepted for the accuracy or completeness of this information. Where anecdotal evidence or speculations are presented, they must be treated as such and cannot be relied upon.



**22 Crowlees Road, Mirfield**  
Site Location

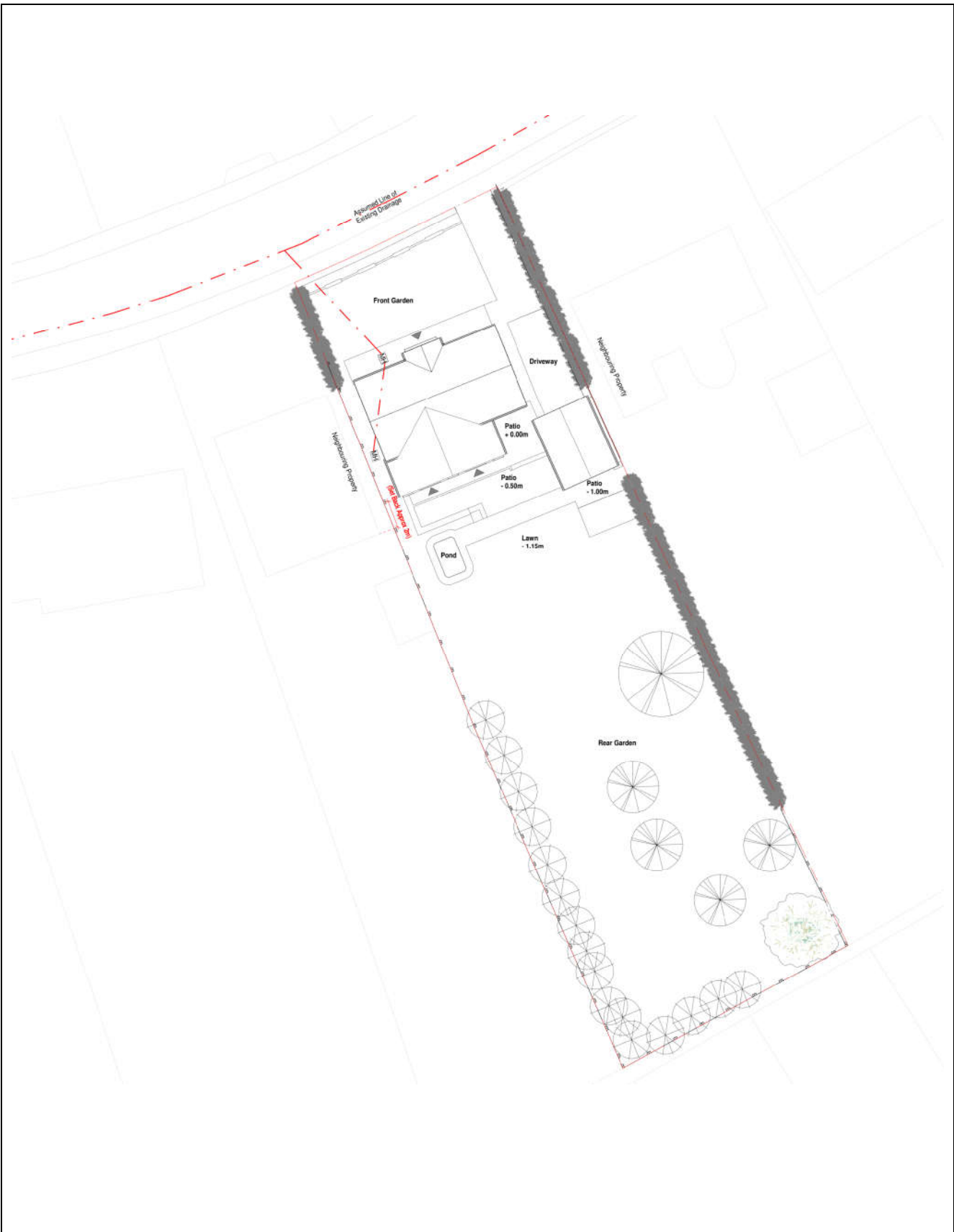
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Scale: NTS

Figure: 1



**22 Crowlees Road, Mirfield**  
Development Proposals

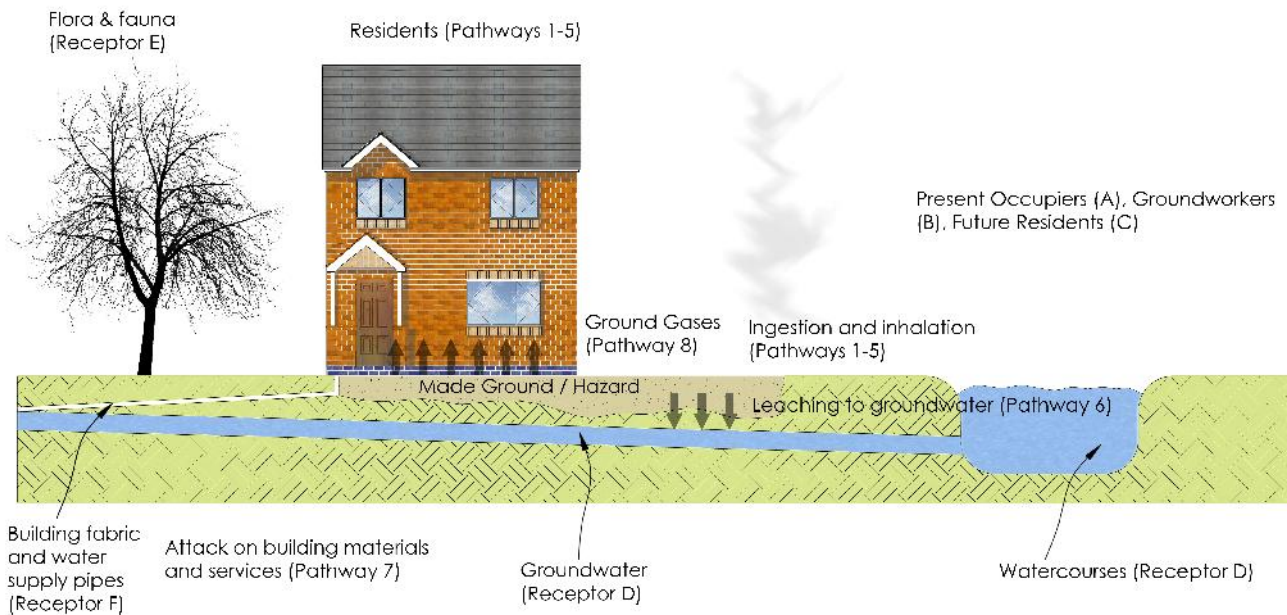
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Scale: NTS

Figure: 2



**Pathways**

1. Ingestion of contaminated soil/dust
2. Ingestion of contaminated food
3. Ingestion of contaminated water
4. Inhalation of contaminated vapours
5. Dermal contact with contaminated soil/dust or water
6. Pollution of controlled water and off site migration
7. Attack on building materials and services
8. Migration of landfill gases and radon

**Receptors**

- A. Present site occupiers
- B. Site development personnel
- C. Future residents
- D. Controlled waters
- E. Flora and fauna
- F. Building and services

Schematic Representation of Conceptual Site Model

**Schematic Representation of Conceptual Site Model**

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## **Appendix 1**

### Historical Maps

**Site Details:**

22 Crowlees Road, Mirfield

**Client Ref:** 22 Crowlees Road, Mirfield  
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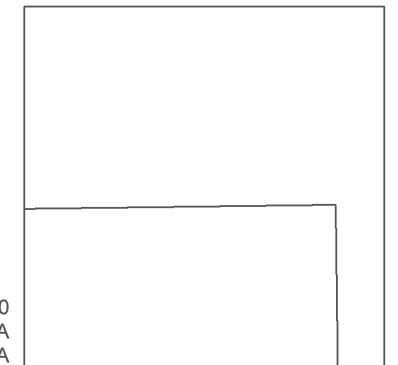
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 Edition N/A  
 Copyright N/A  
 Levelled N/A

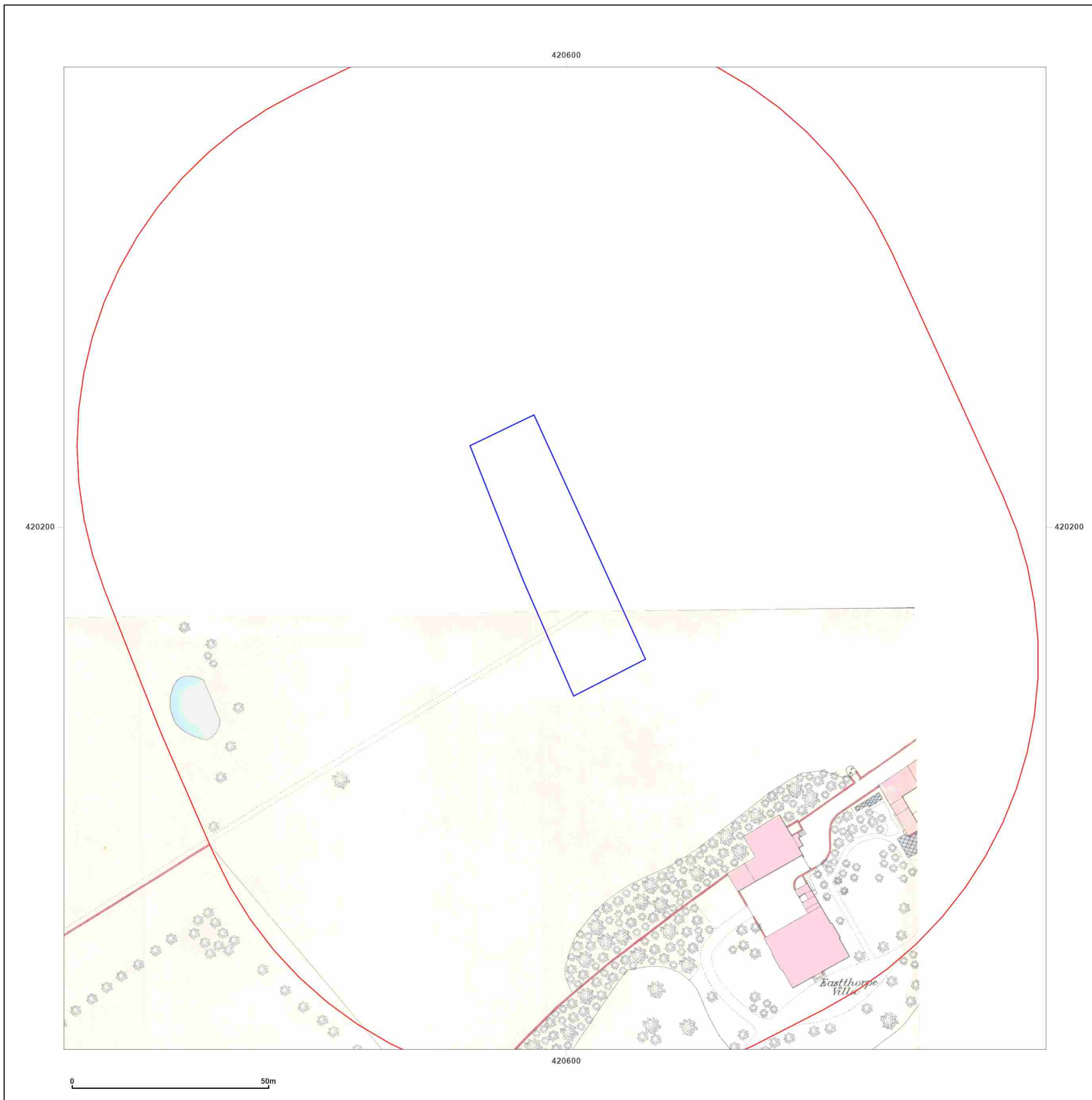


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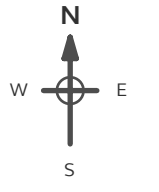
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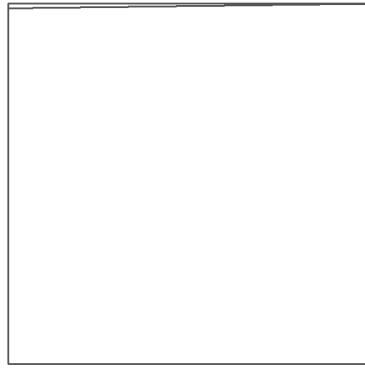
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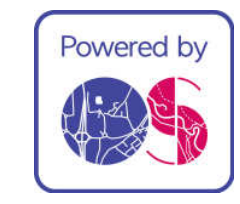
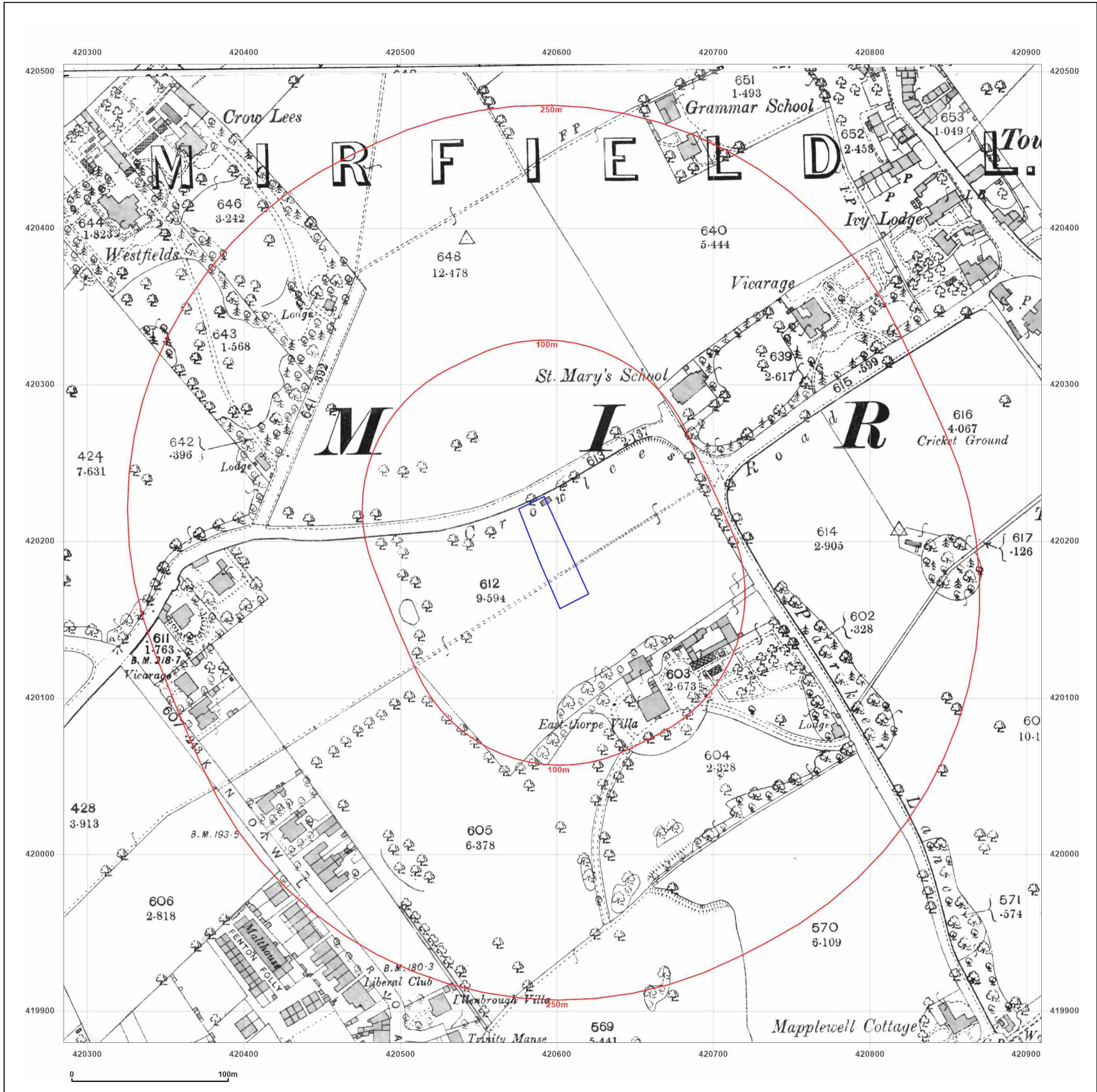
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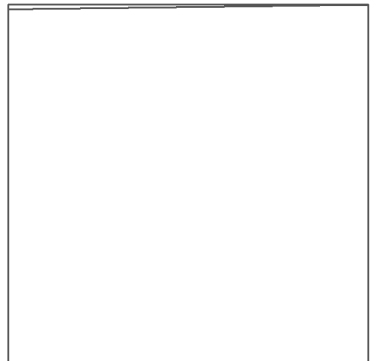
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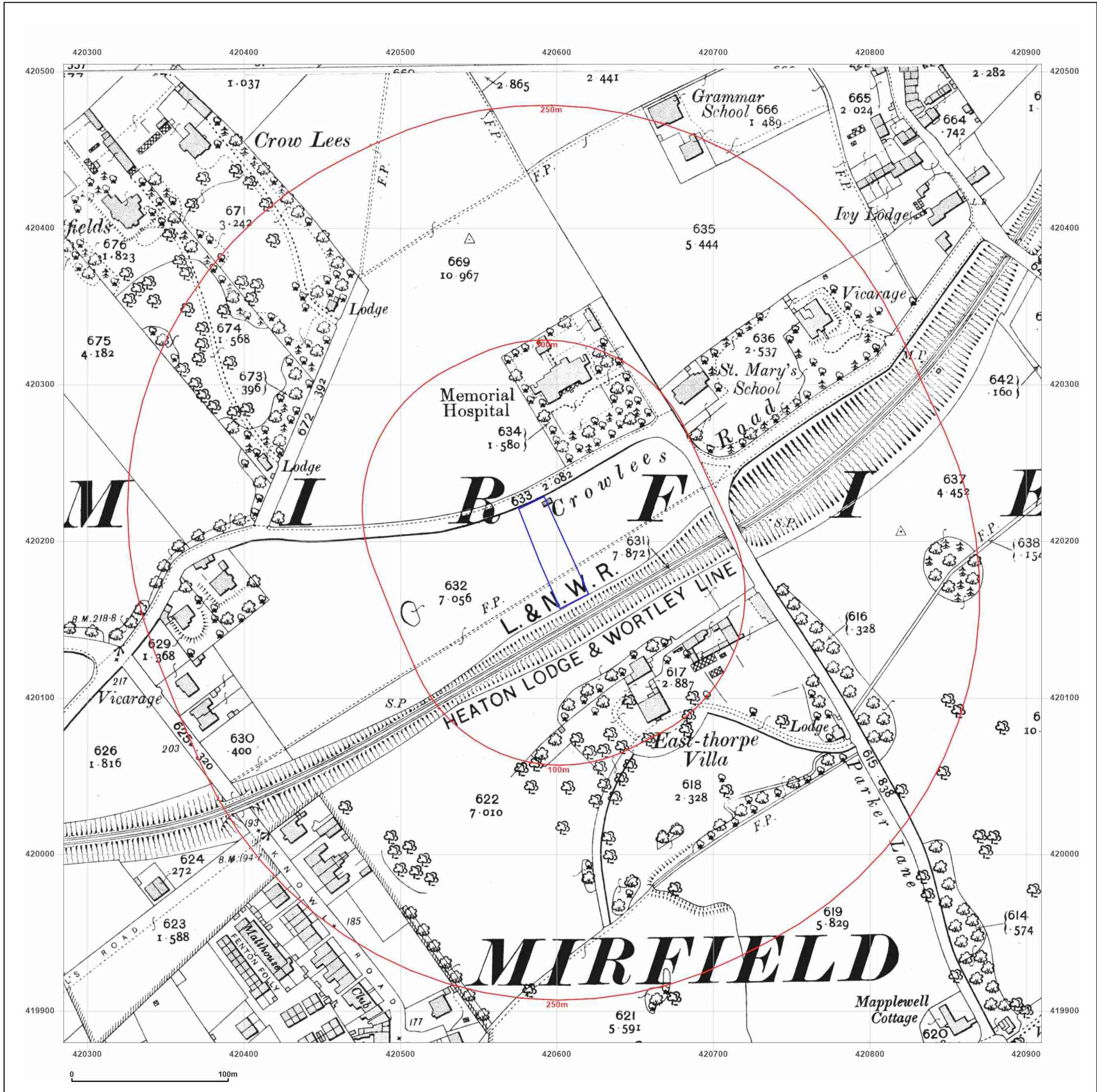


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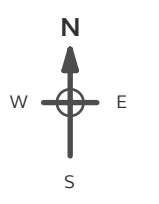
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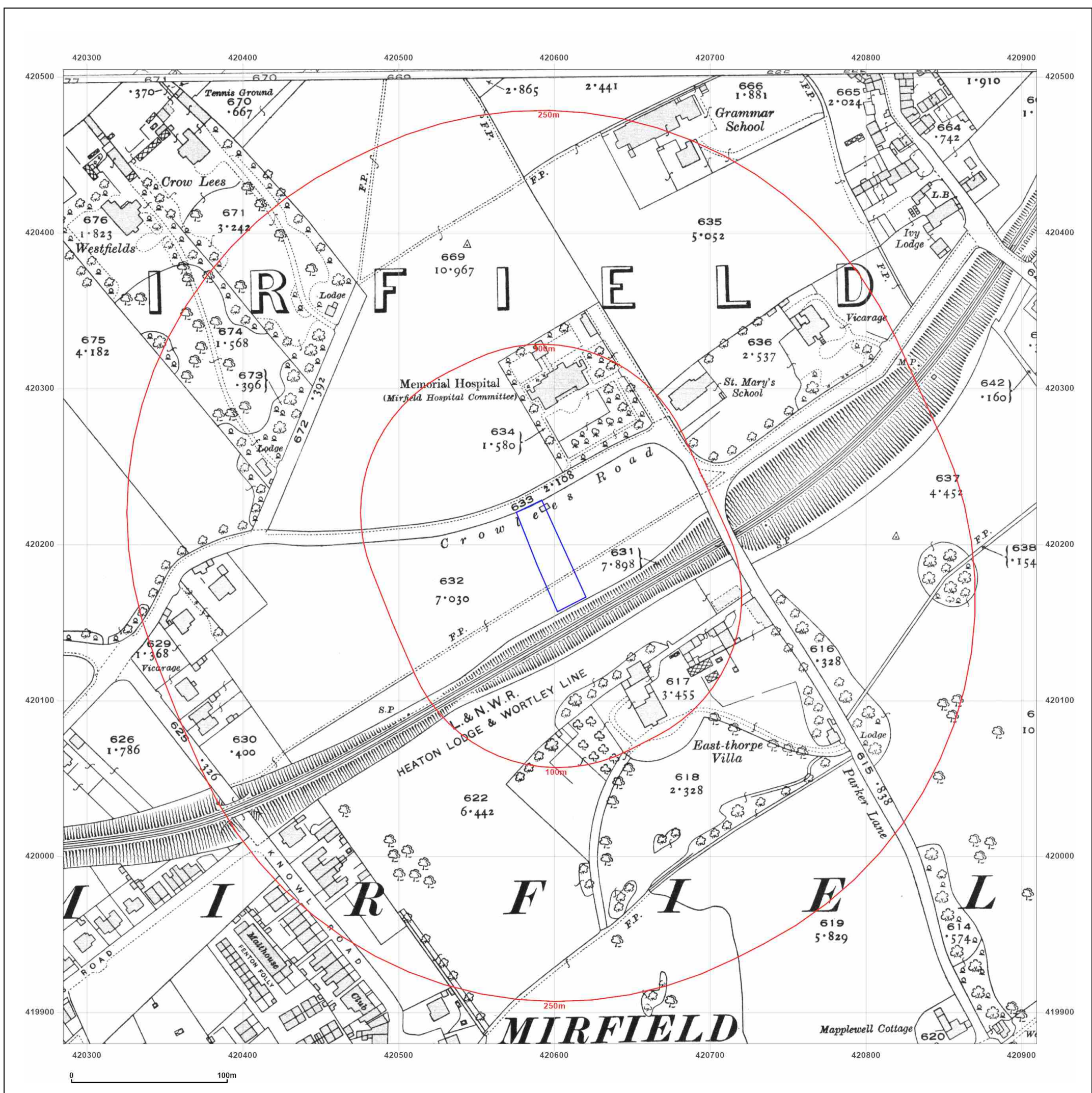


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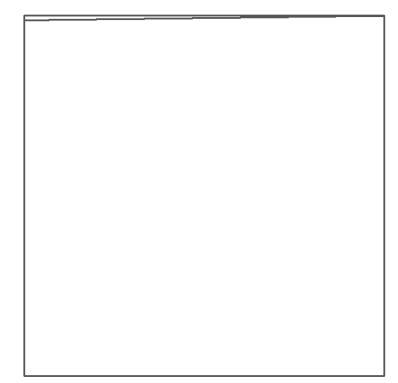
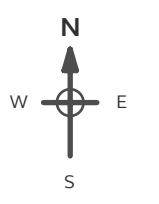
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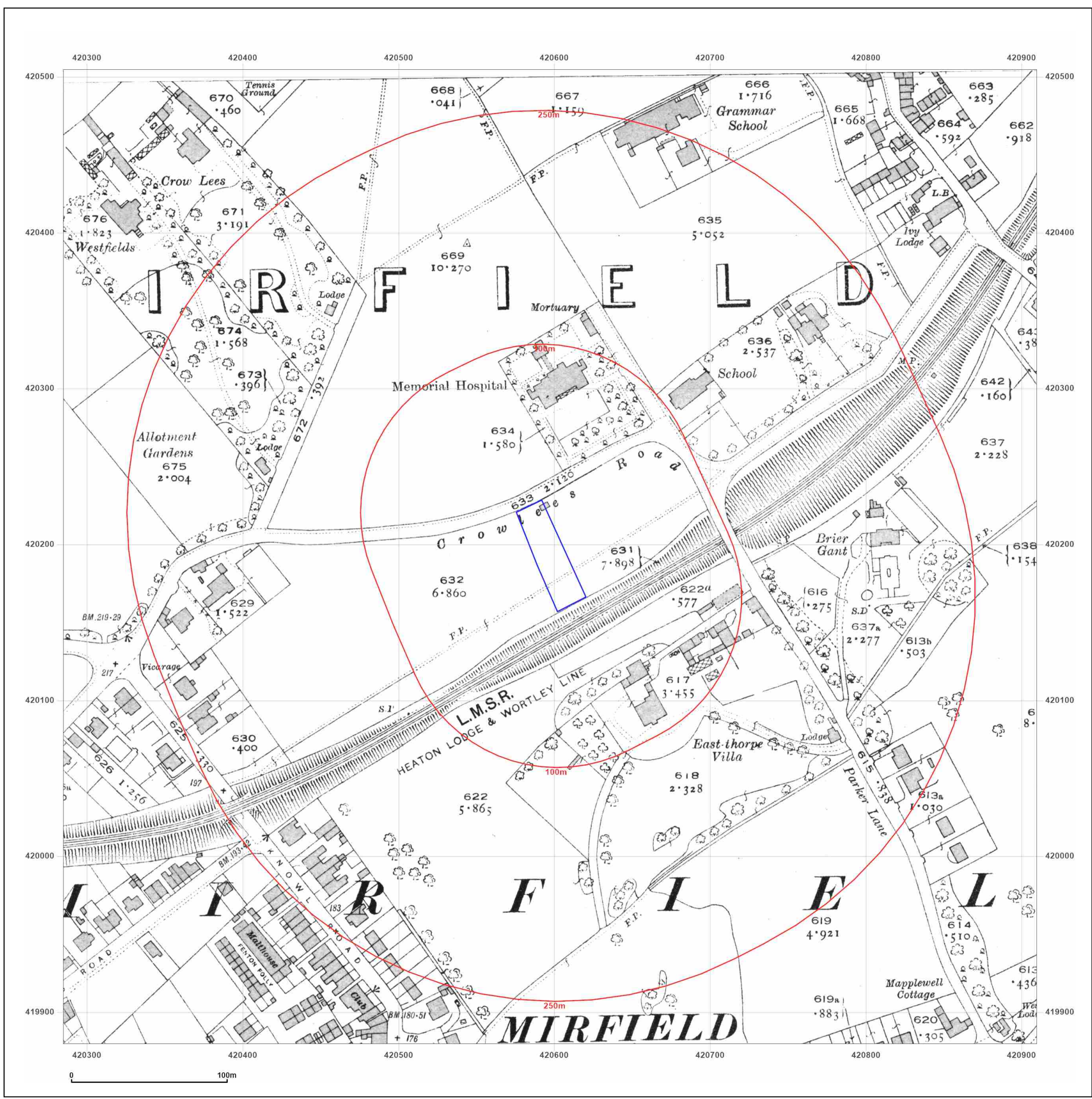


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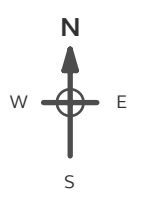
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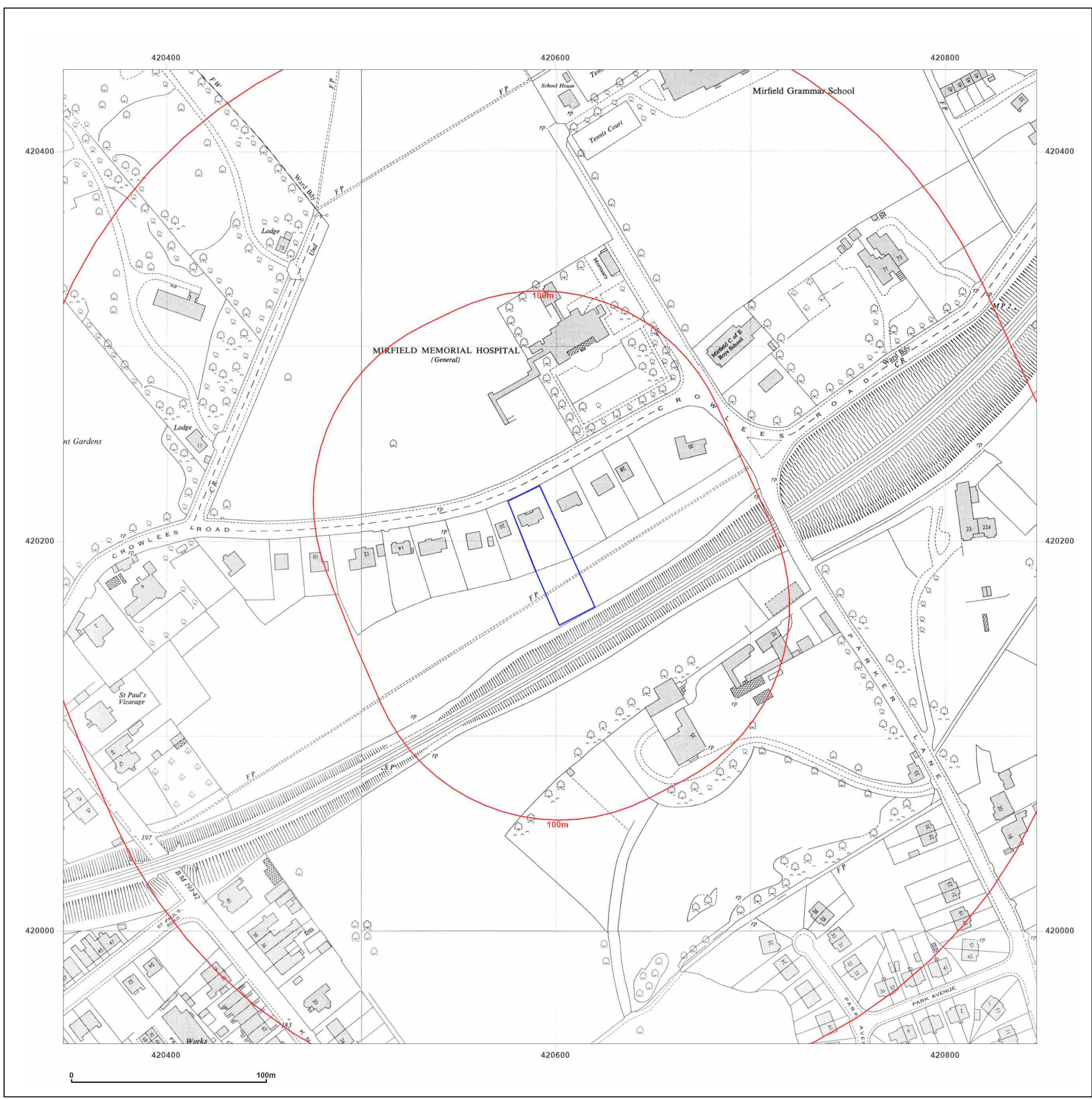


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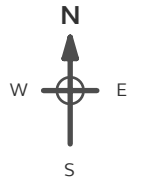
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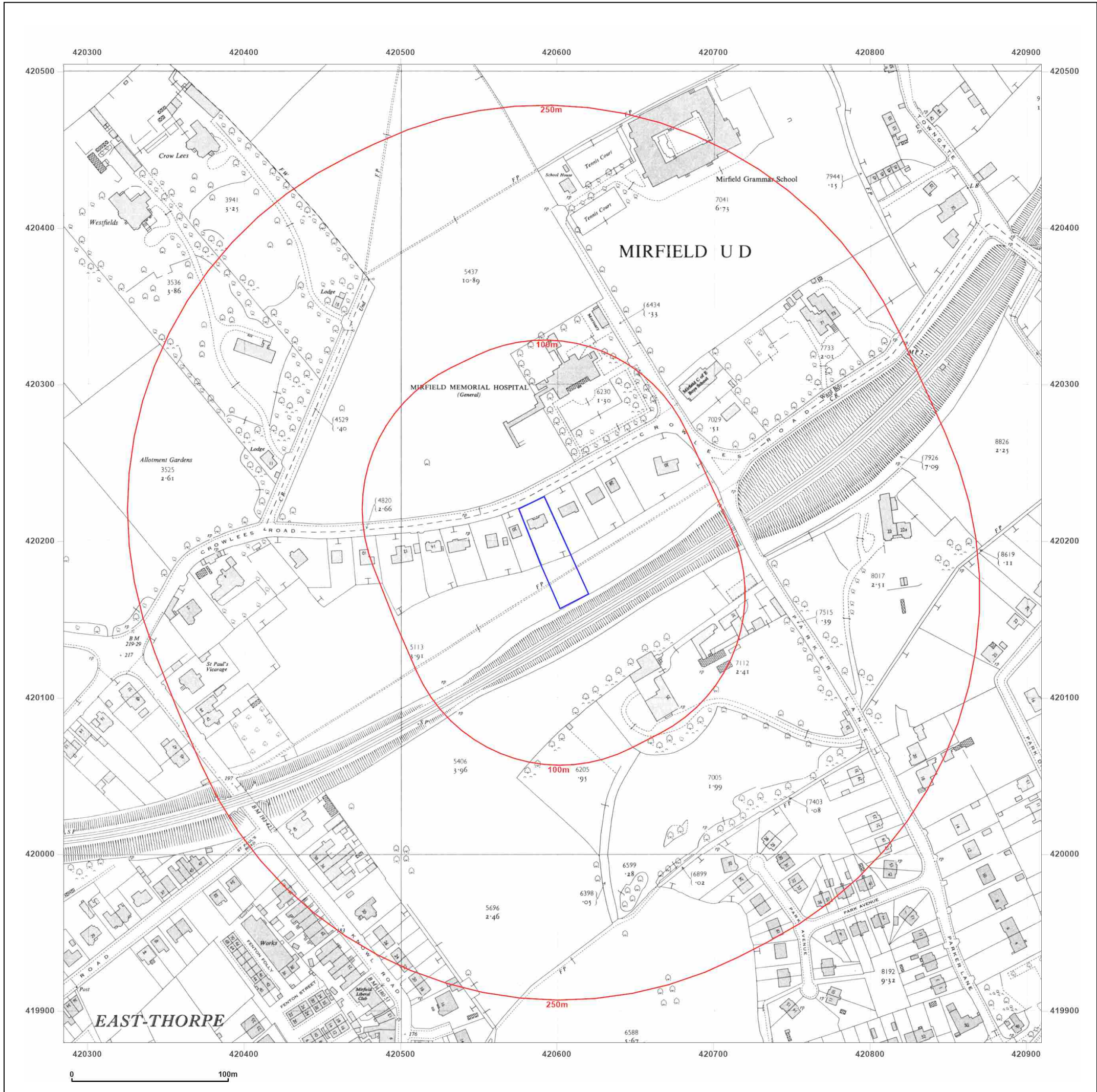
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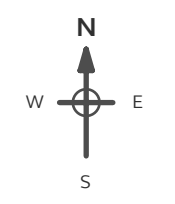
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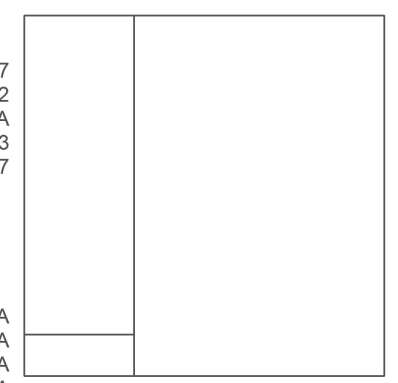
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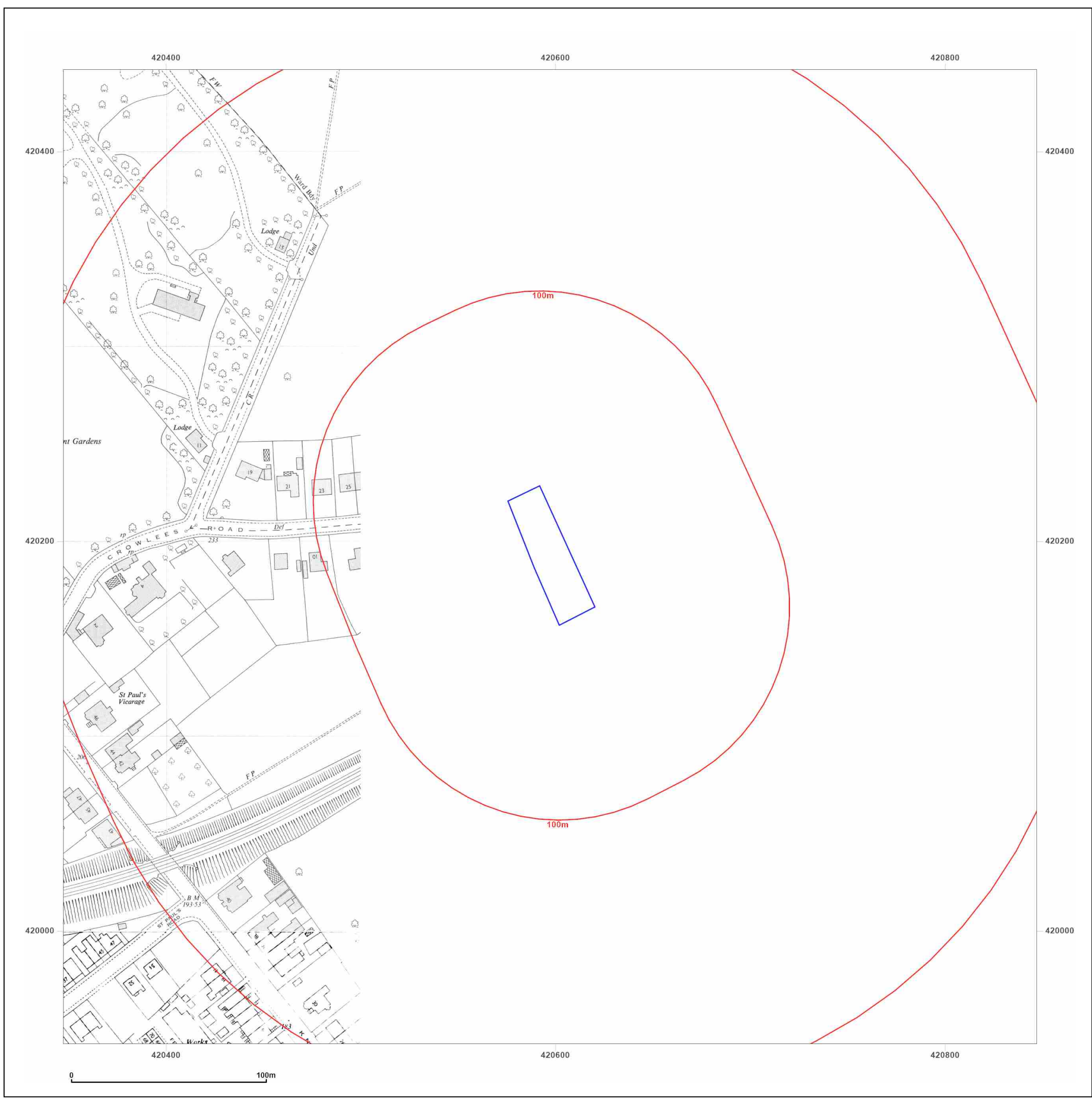


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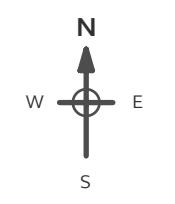
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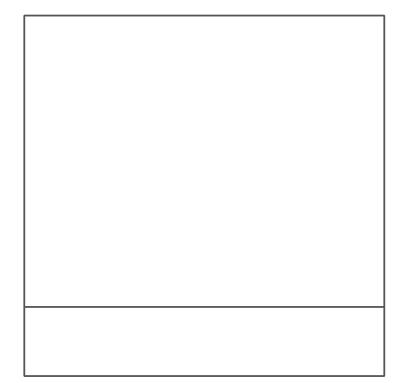
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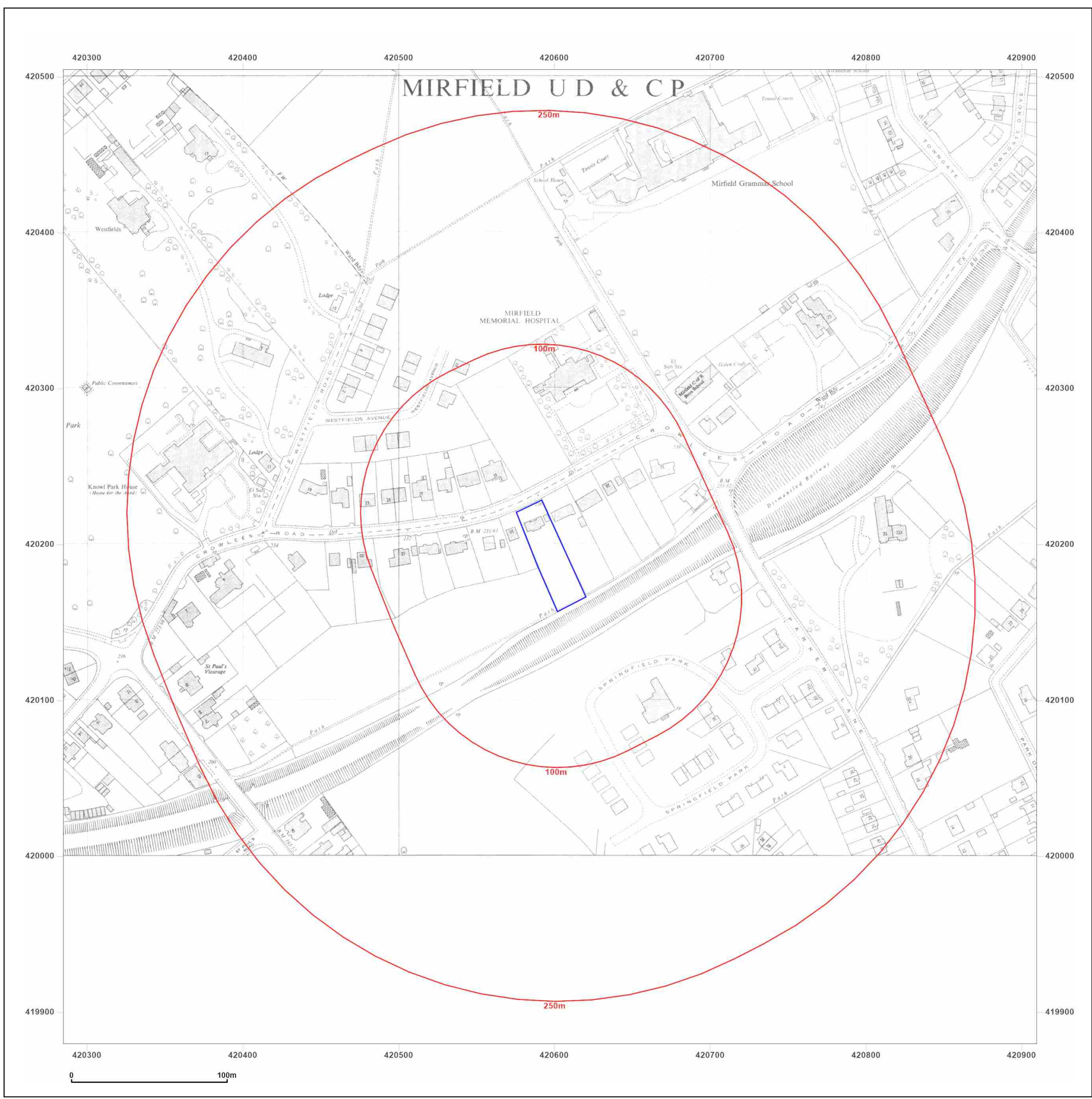


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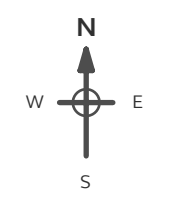
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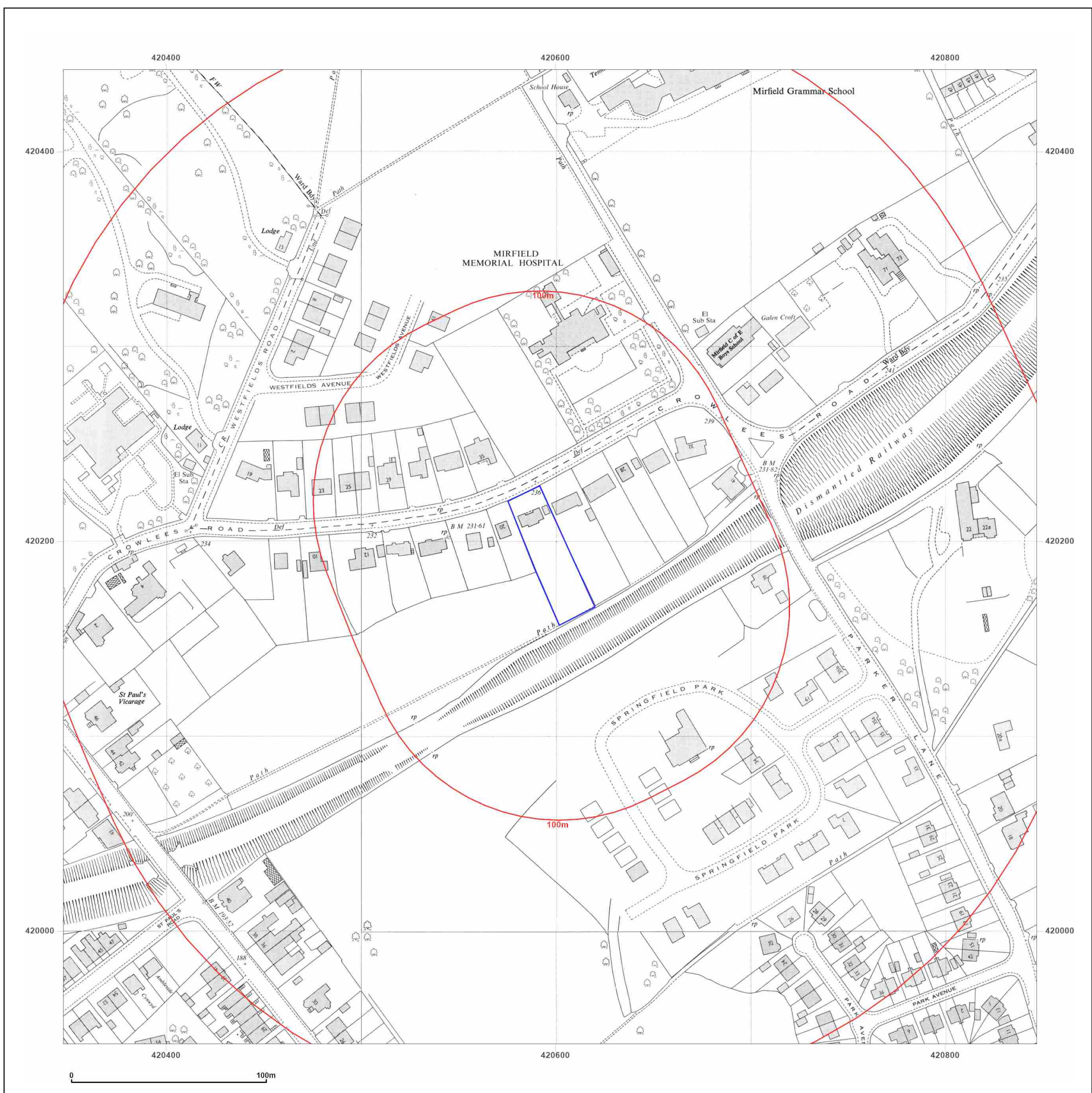


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**Site Details:**

22 Crowlees Road, Mirfield

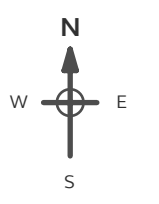
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**Map Name:** National Grid

**Map date:** 1973-1978

**Scale:** 1:1,250

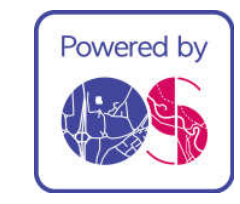
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Surveyed 1957  
 Revised 1972  
 Edition N/A  
 Copyright 1973  
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 Copyright N/A  
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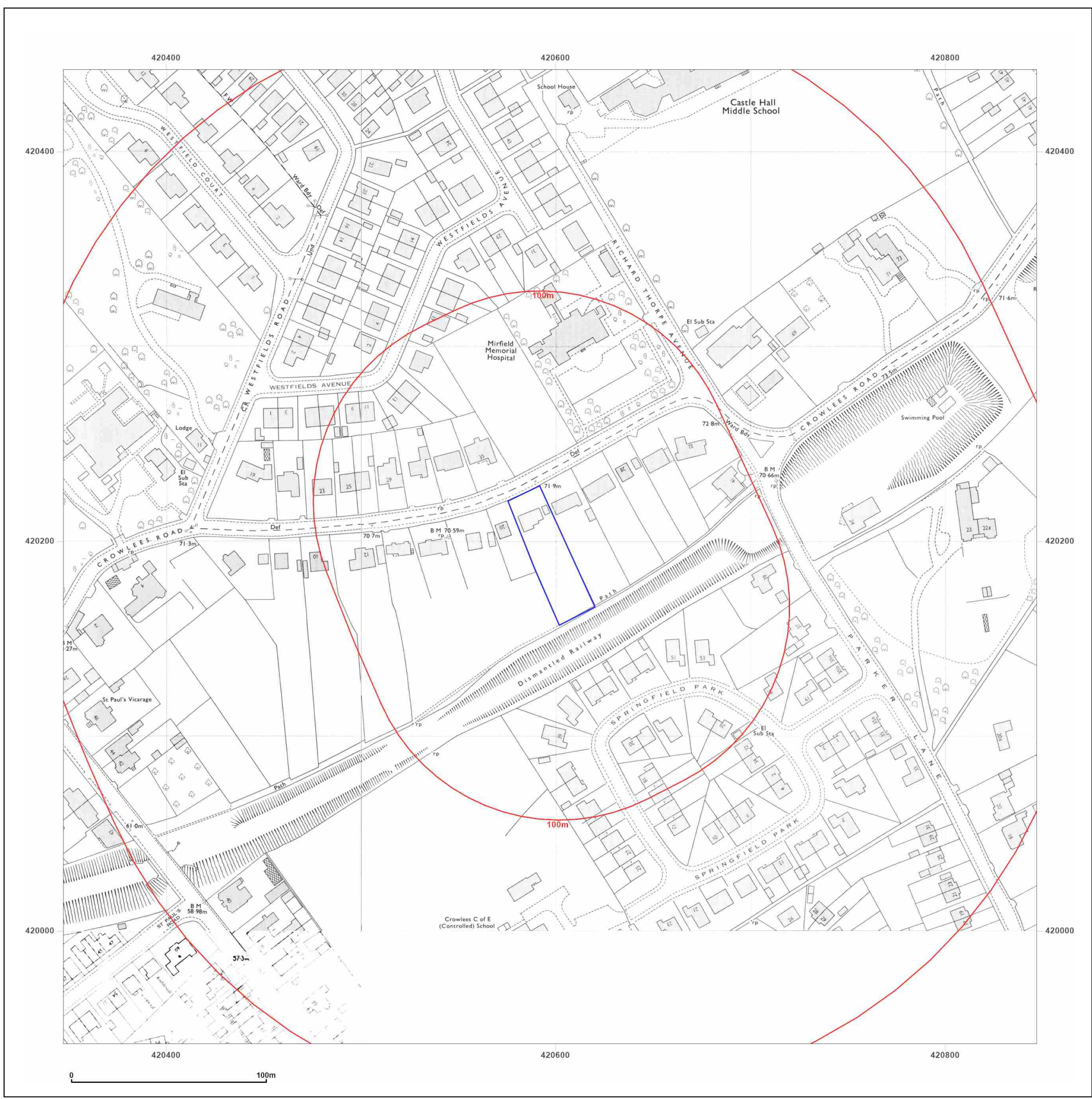


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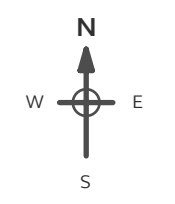
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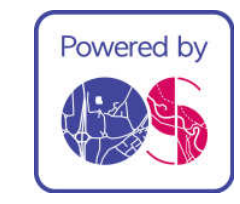
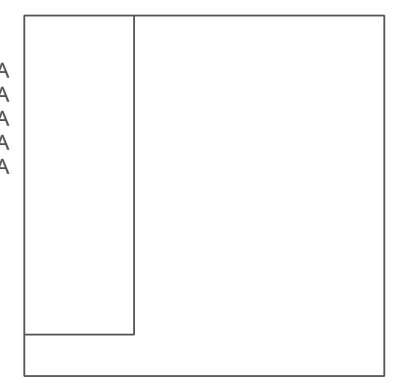
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**Printed at:** 1:2,000



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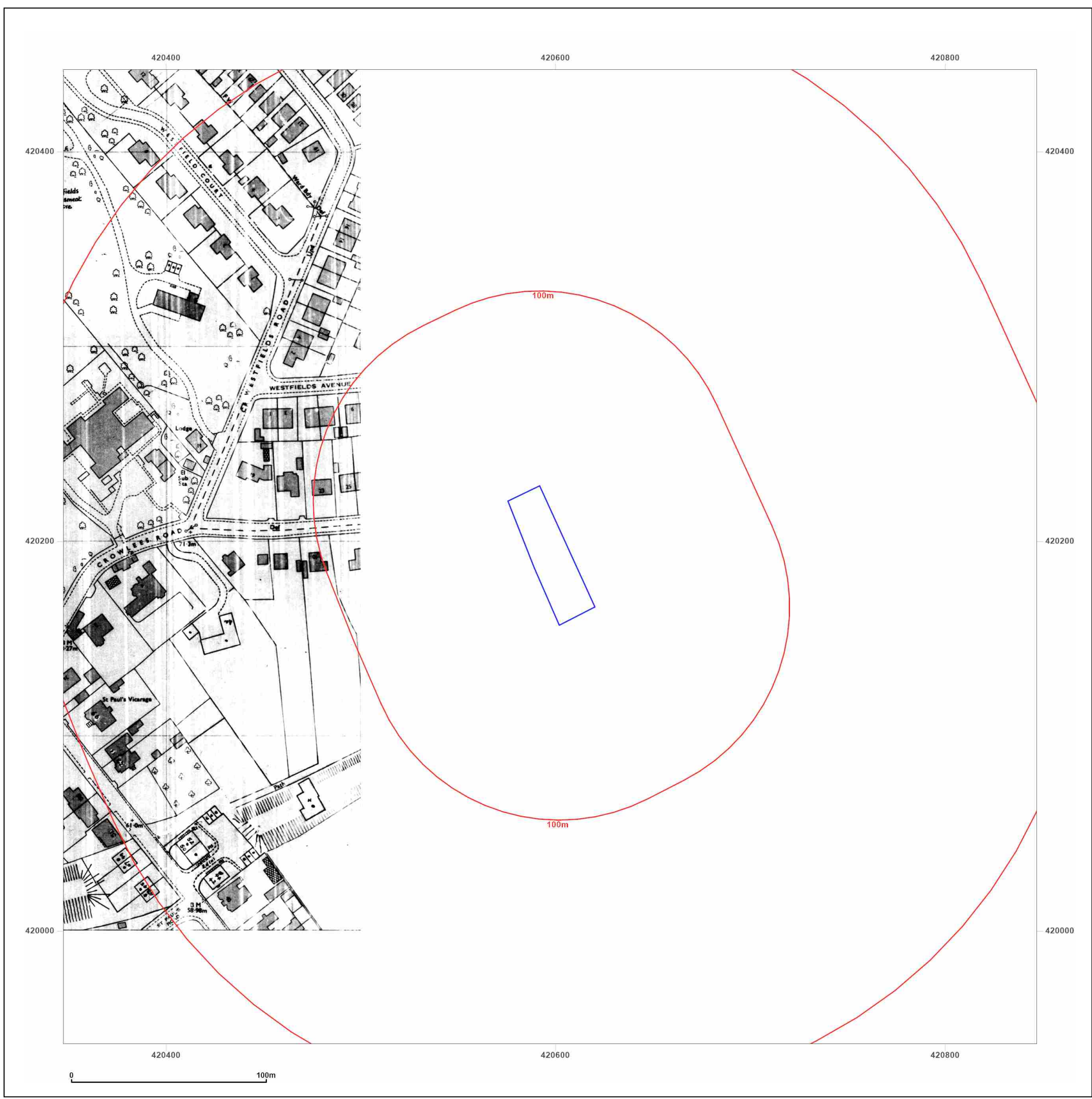


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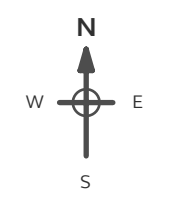
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**Map Name:** National Grid

**Map date:** 1984-1986

**Scale:** 1:1,250

**Printed at:** 1:2,000



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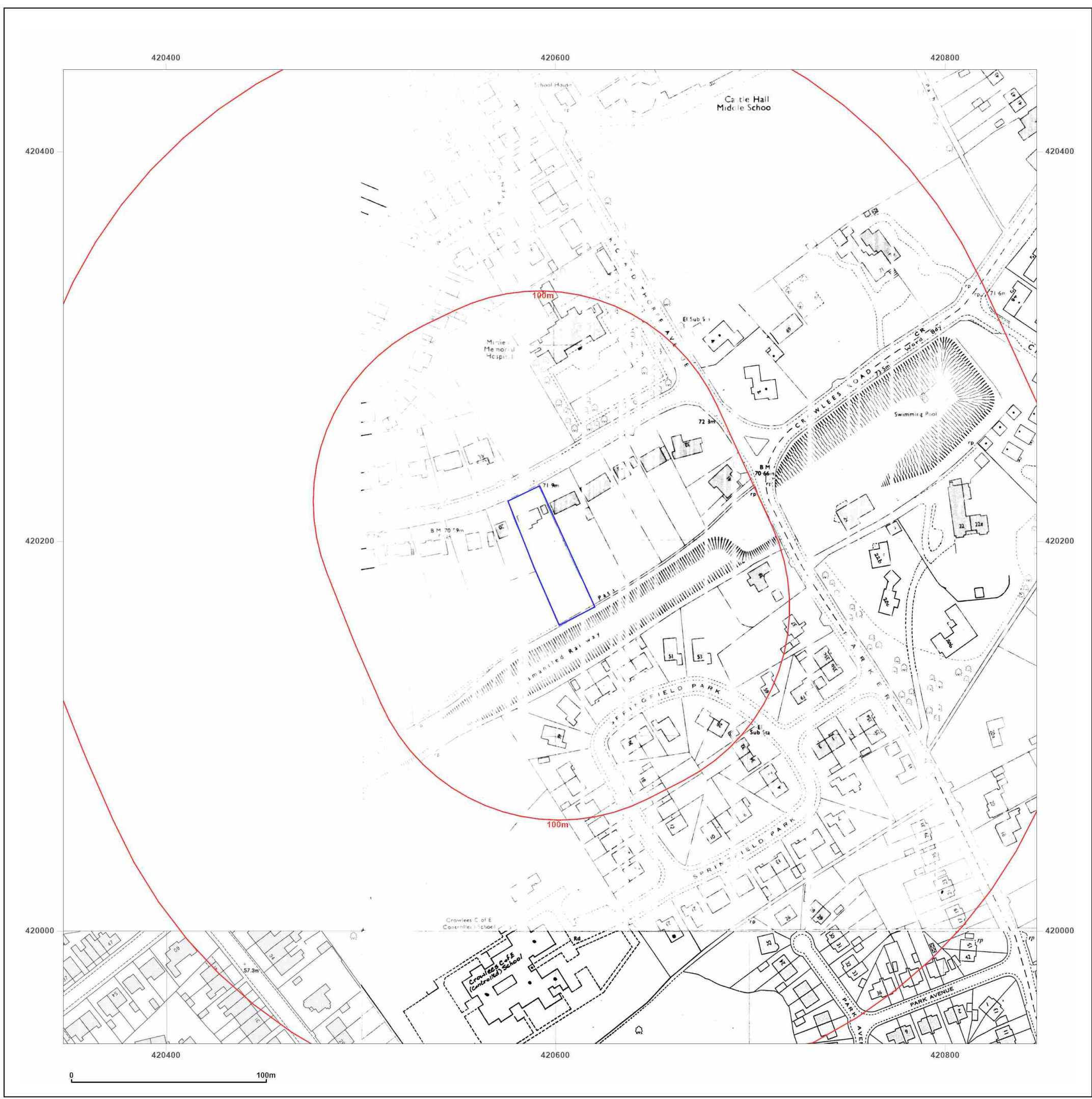


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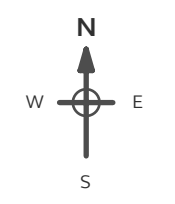
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**Map Name:** National Grid

**Map date:** 1989-1992

**Scale:** 1:1,250

**Printed at:** 1:2,000



Surveved N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A	Surveved N/A Revised N/A Edition N/A Copyright 1992 Levelled N/A
Surveved 1957 Revised 1985 Edition N/A Copyright 1989 Levelled 1963	Surveved 1962 Revised 1989 Edition N/A Copyright 1989 Levelled 1962



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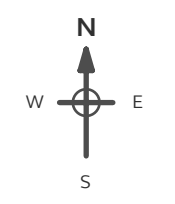
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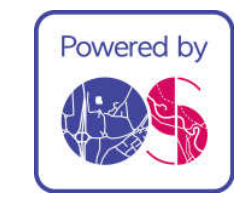
**Map date:** 1992-1993

**Scale:** 1:1,250

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Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A	Surveyed 1962 Revised 1992 Edition N/A Copyright 1992 Levelled 1962	Surveyed N/A Revised N/A Edition N/A Copyright 1993 Levelled N/A
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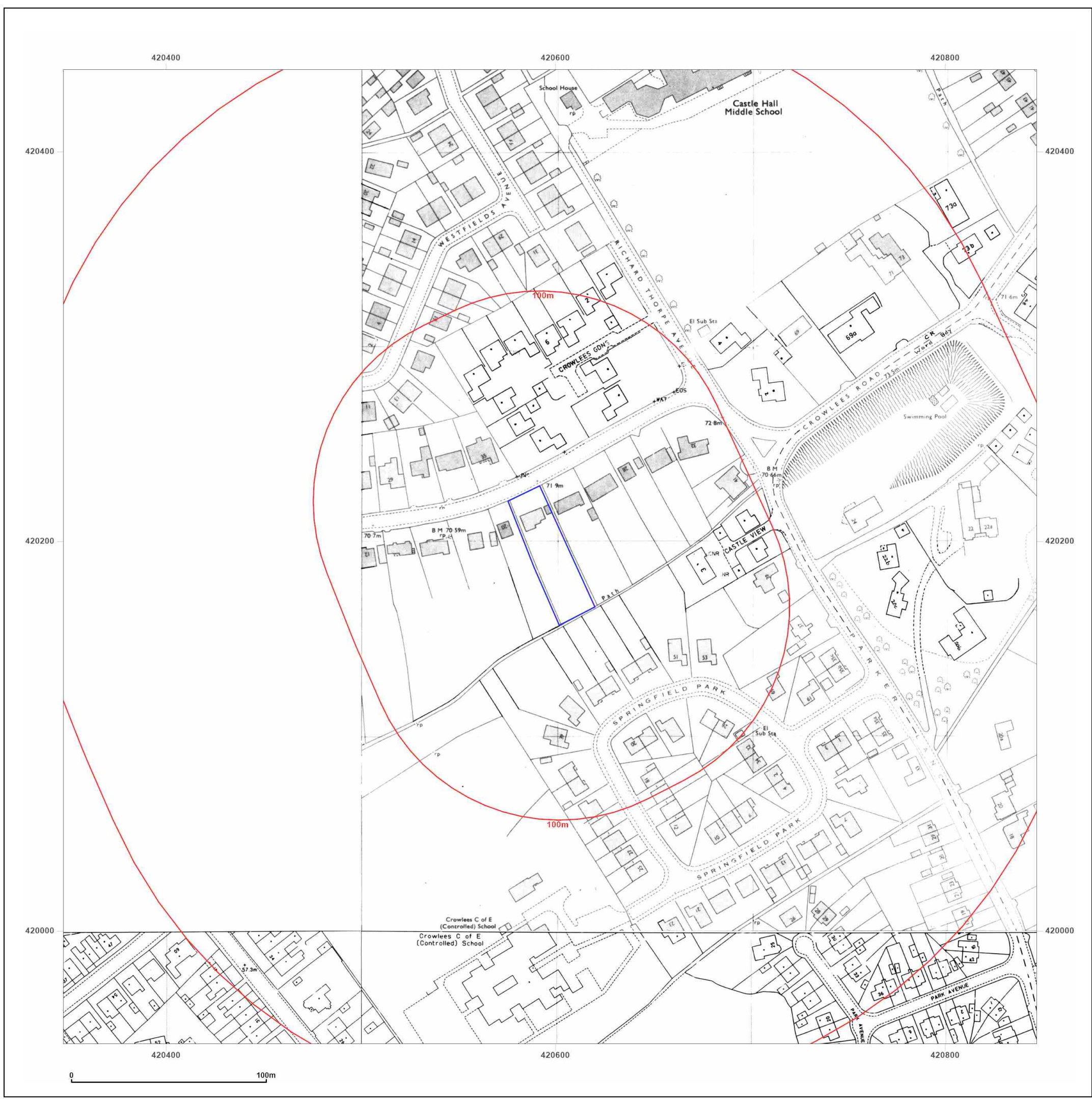


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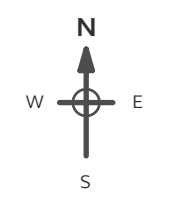
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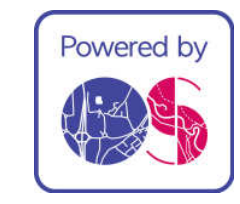
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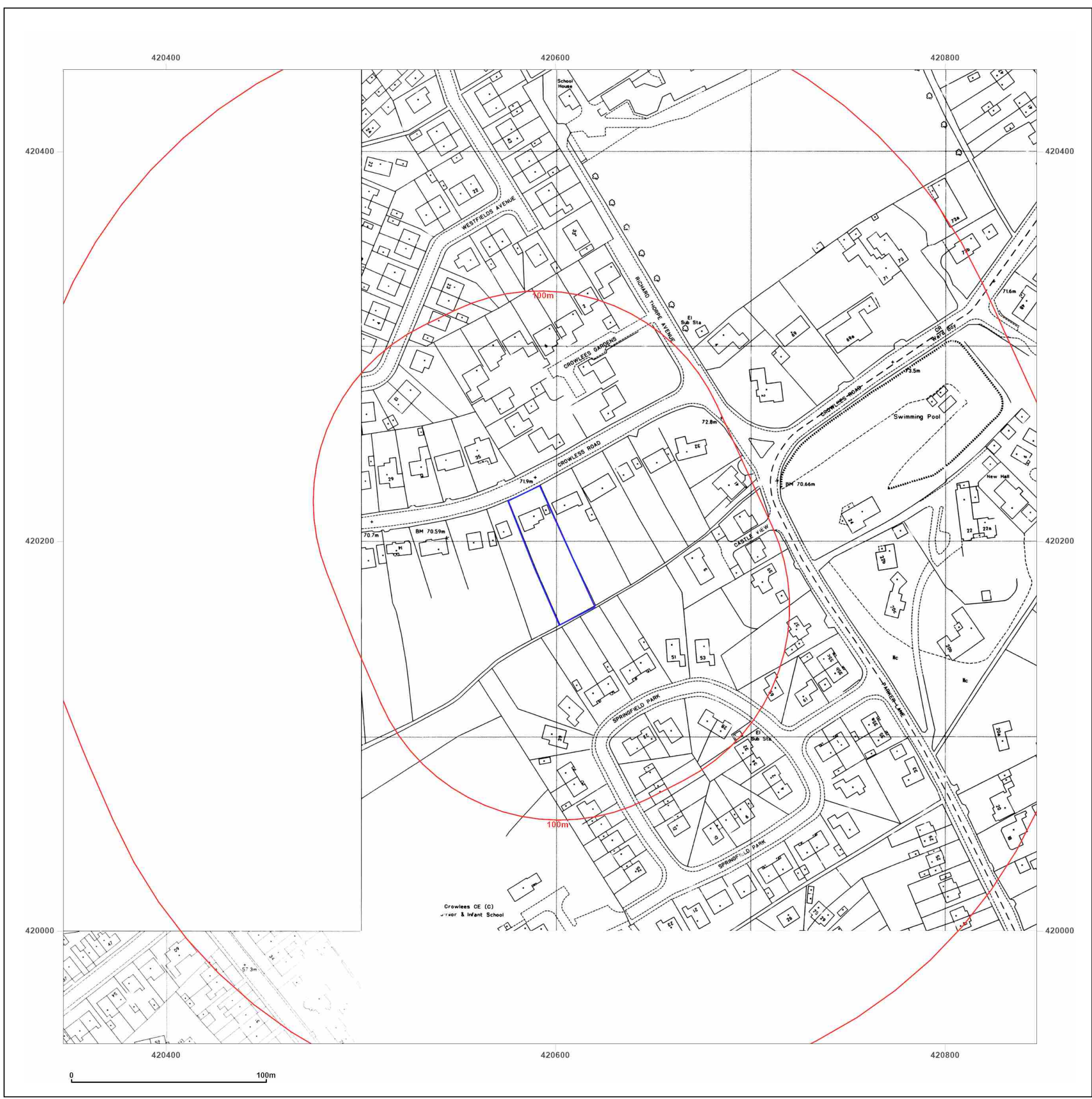


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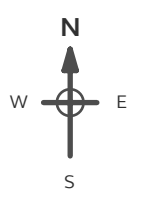
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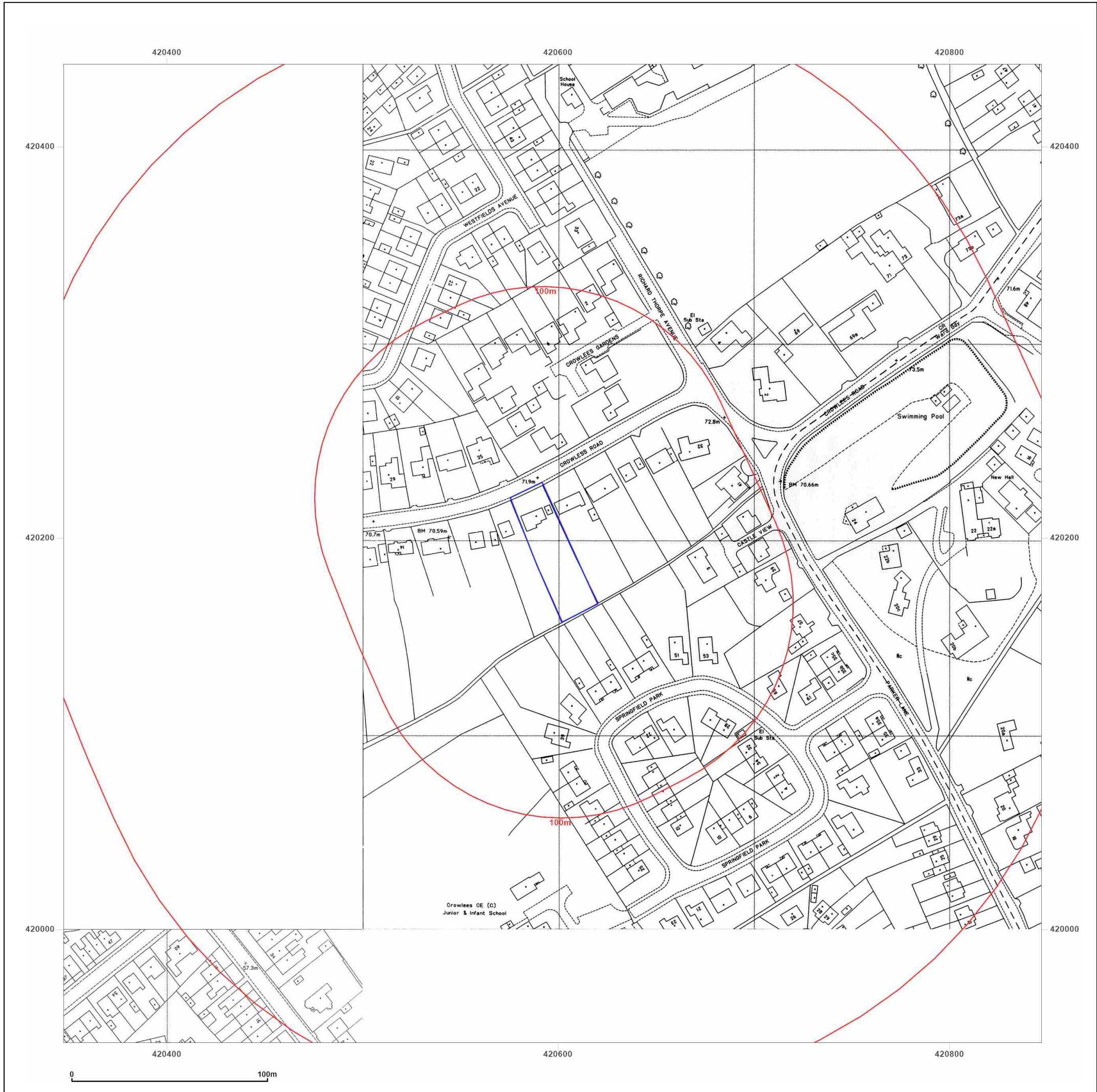


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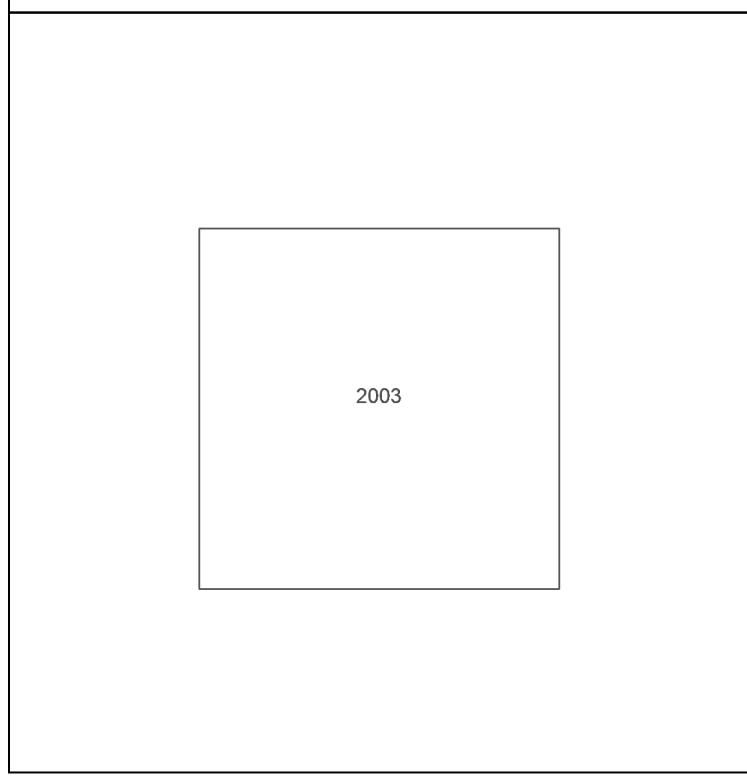
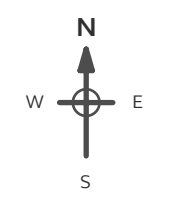
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**Grid Ref:** 420597, 420192

**Map Name:** LandLine

**Map date:** 2003

**Scale:** 1:1,250

**Printed at:** 1:1,250



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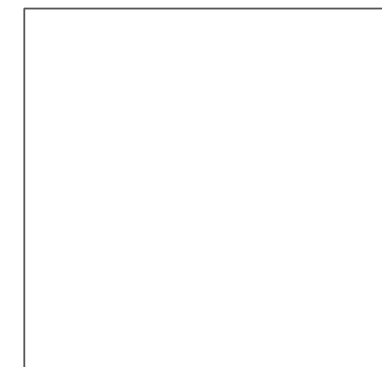
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**Map Name:** County Series

**Map date:** 1855

**Scale:** 1:10,560

**Printed at:** 1:10,560



Surveyed 1851  
 Revised N/A  
 Edition 1855  
 Copyright N/A  
 Levelled N/A

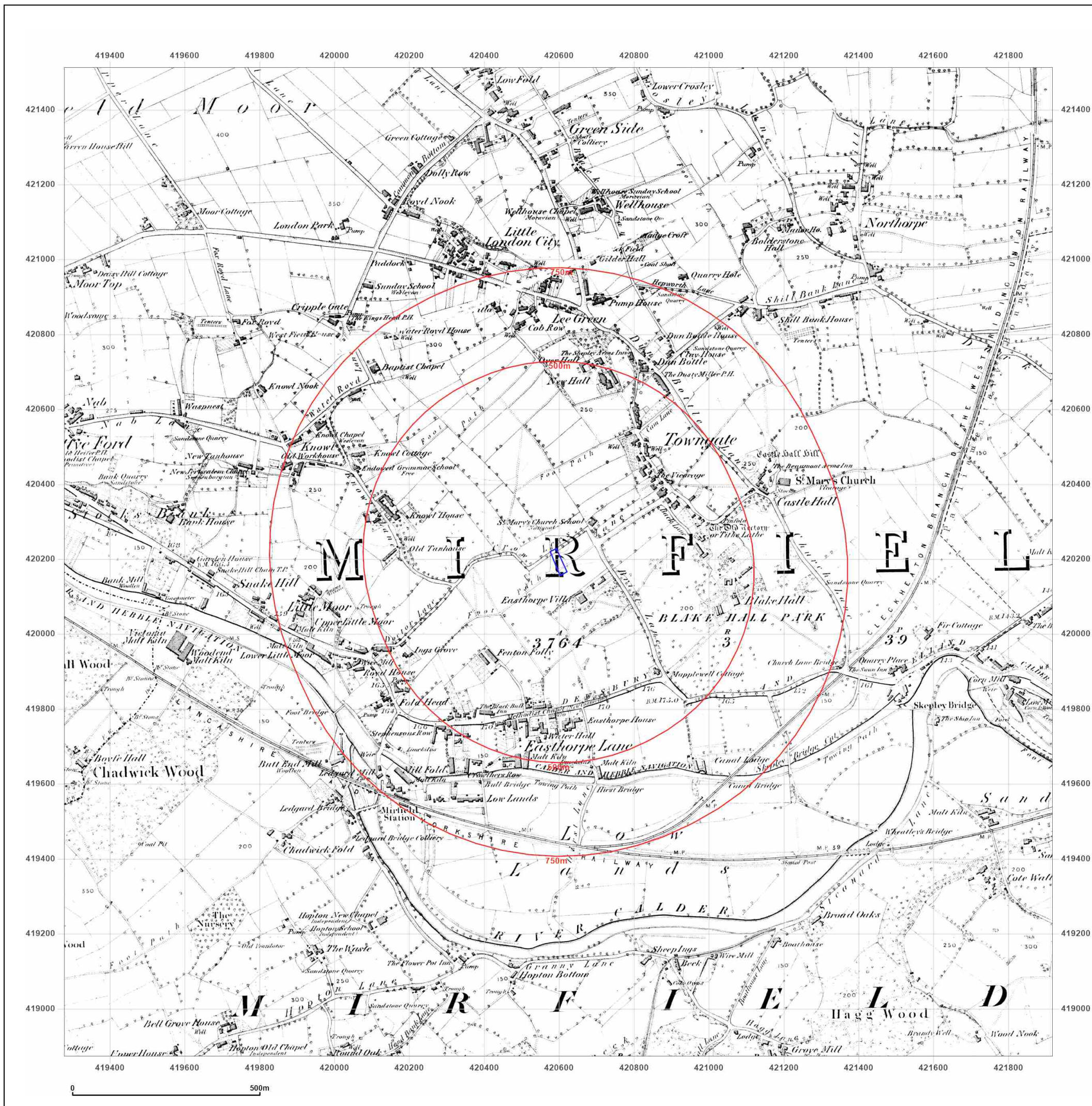


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**Site Details:**

22 Crowlees Road, Mirfield

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**Grid Ref:** 420597, 420192

**Map Name:** County Series

**Map date:** 1892

**Scale:** 1:10,560

**Printed at:** 1:10,560



Surveyed 1892  
 Revised 1892  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

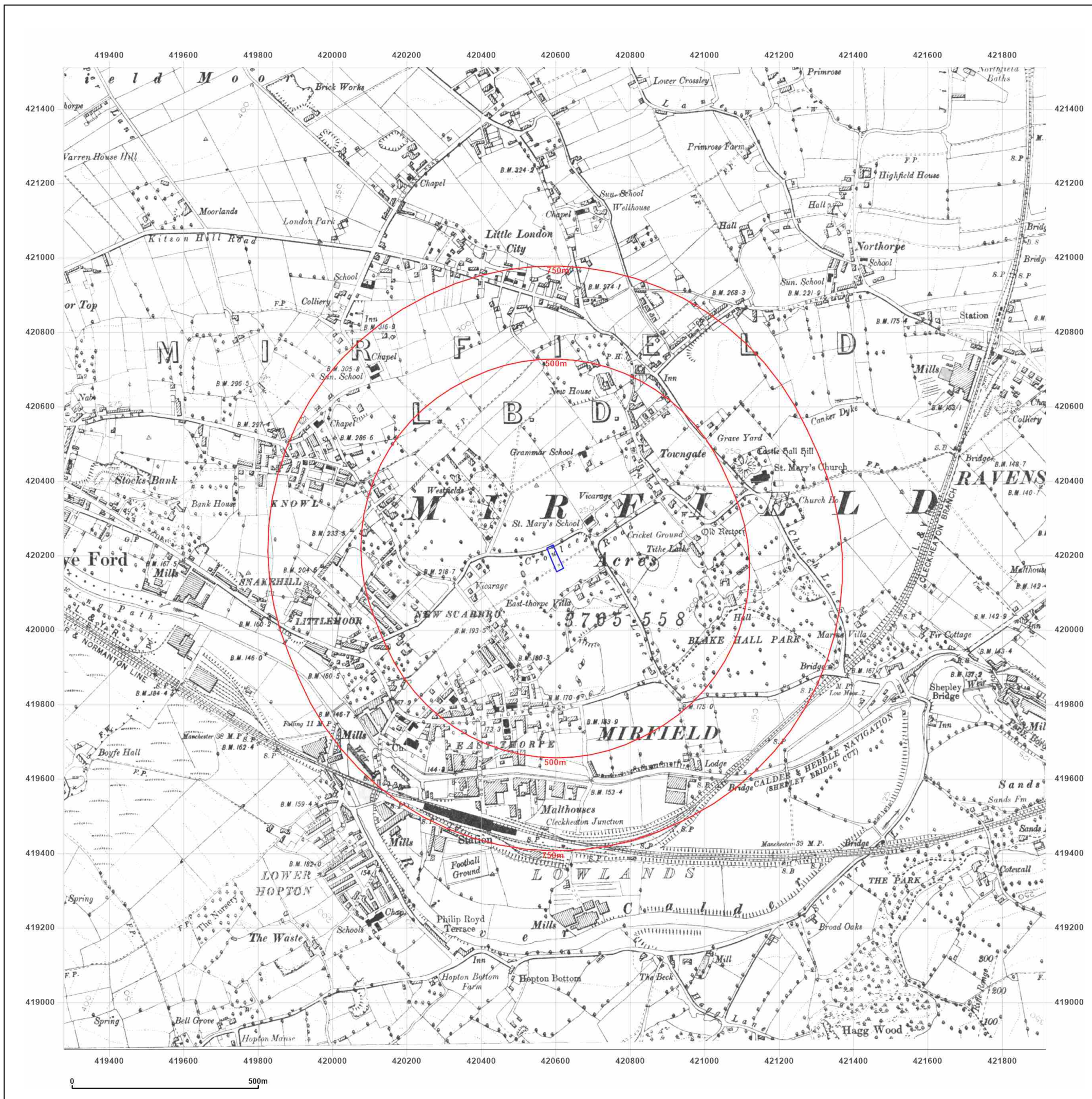


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**Grid Ref:** 420597, 420192

**Map Name:** County Series

**Map date:** 1904-1905

**Scale:** 1:10,560

**Printed at:** 1:10,560



Surveyed 1892  
 Revised 1905  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

Surveyed 1888  
 Revised 1904  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

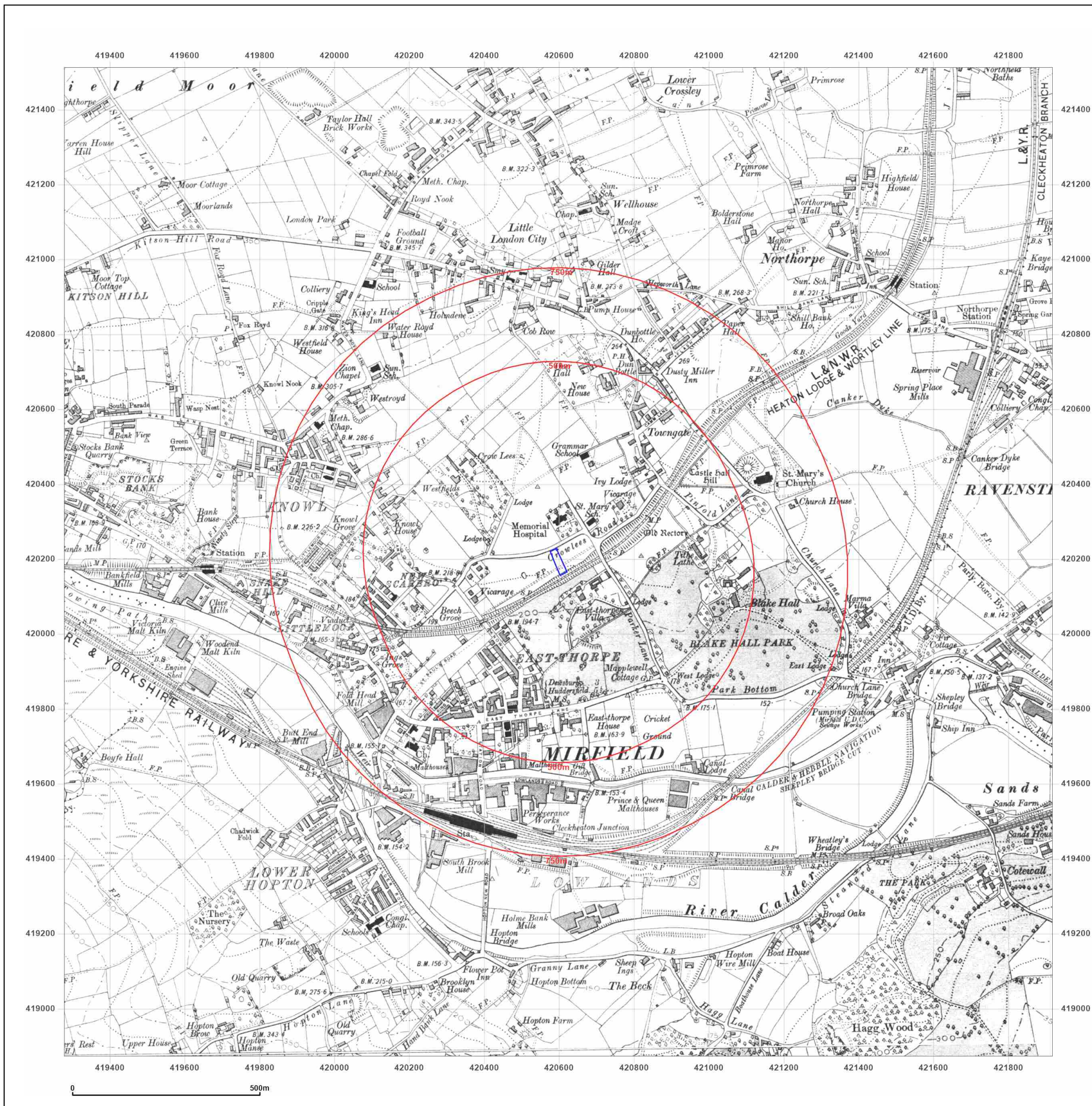


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**Map Name:** County Series

**Map date:** 1930-1931

**Scale:** 1:10,560

**Printed at:** 1:10,560



Surveyed 1851  
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 Edition N/A  
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 Levelled N/A

Surveyed 1851  
 Revised 1930  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

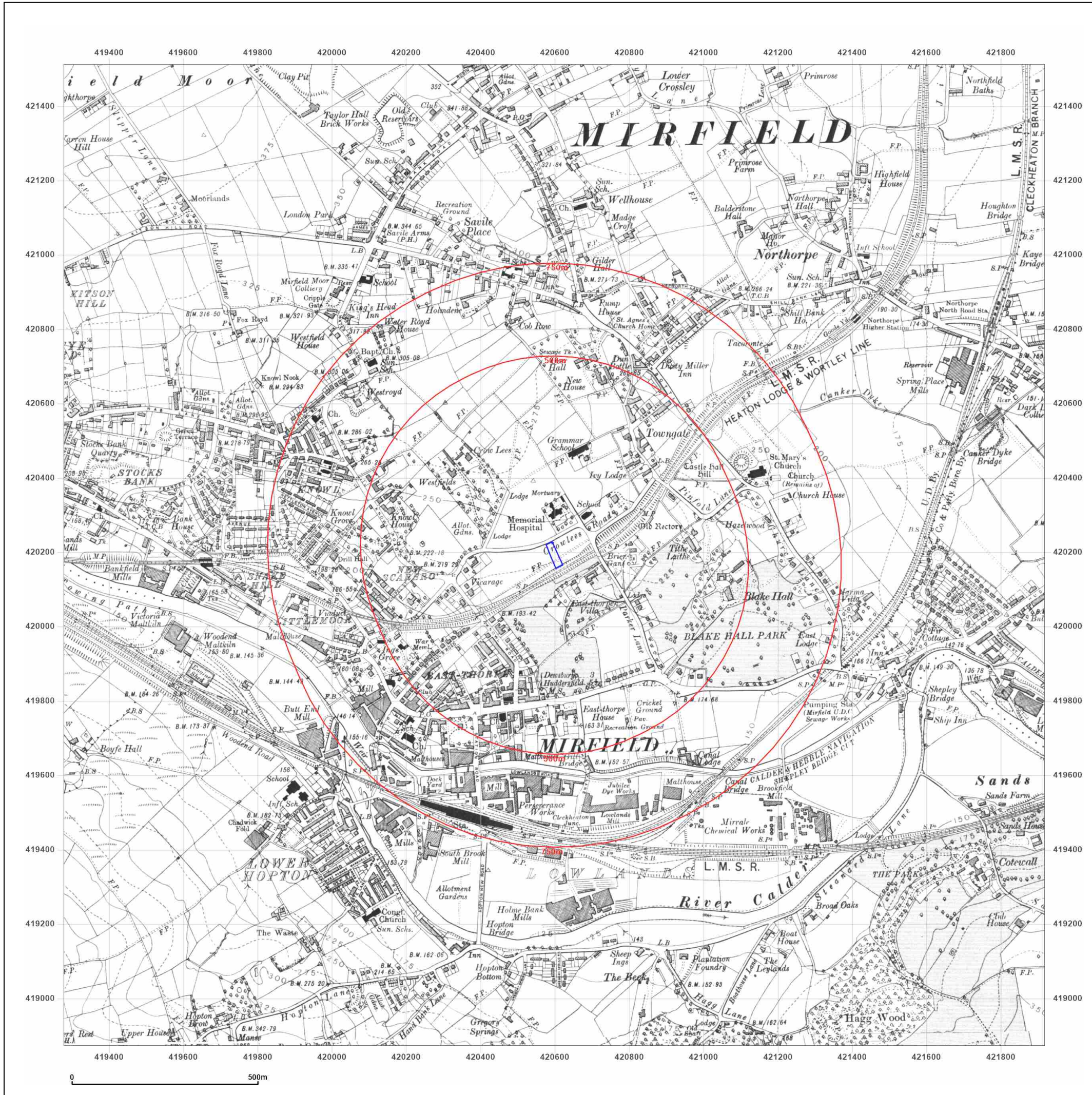


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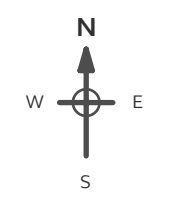
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**Printed at:** 1:10,560



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 Edition 1938  
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**Grid Ref:** 420597, 420192

**Map Name:** County Series

**Map date:** 1948

**Scale:** 1:10,560

**Printed at:** 1:10,560



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 Edition N/A  
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 Revised 1948  
 Edition N/A  
 Copyright N/A  
 Levelled N/A



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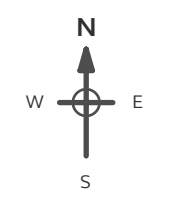
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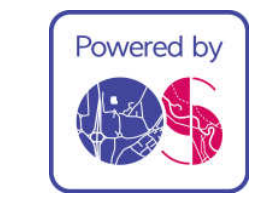
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Surveyed 1851  
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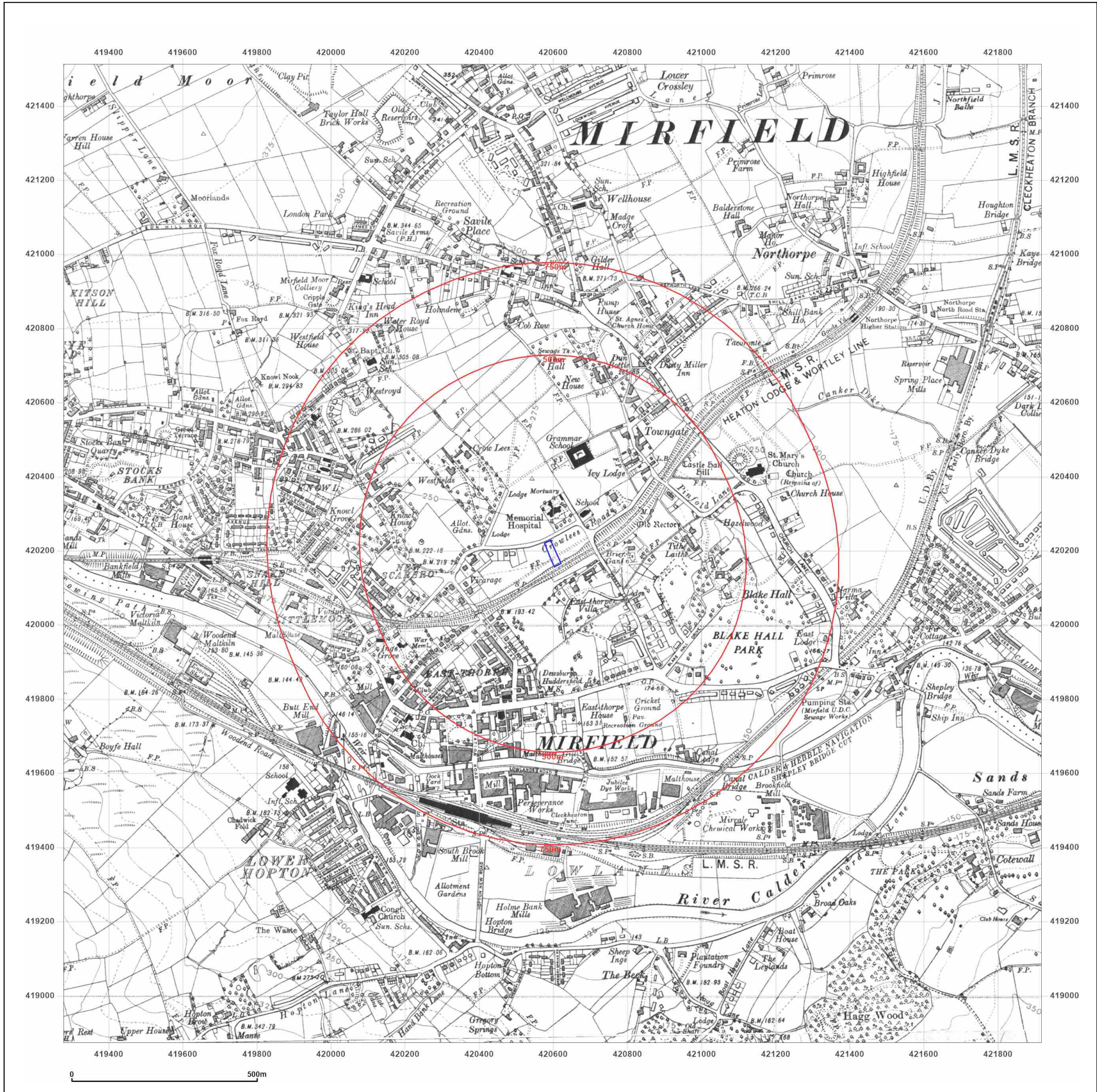


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**Map Name:** Provisional

**Map date:** 1951-1956

**Scale:** 1:10,560

**Printed at:** 1:10,560



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 Revised 1951  
 Edition N/A  
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Surveyed 1951  
 Revised 1955  
 Edition N/A  
 Copyright N/A  
 Levelled N/A

Surveyed 1951  
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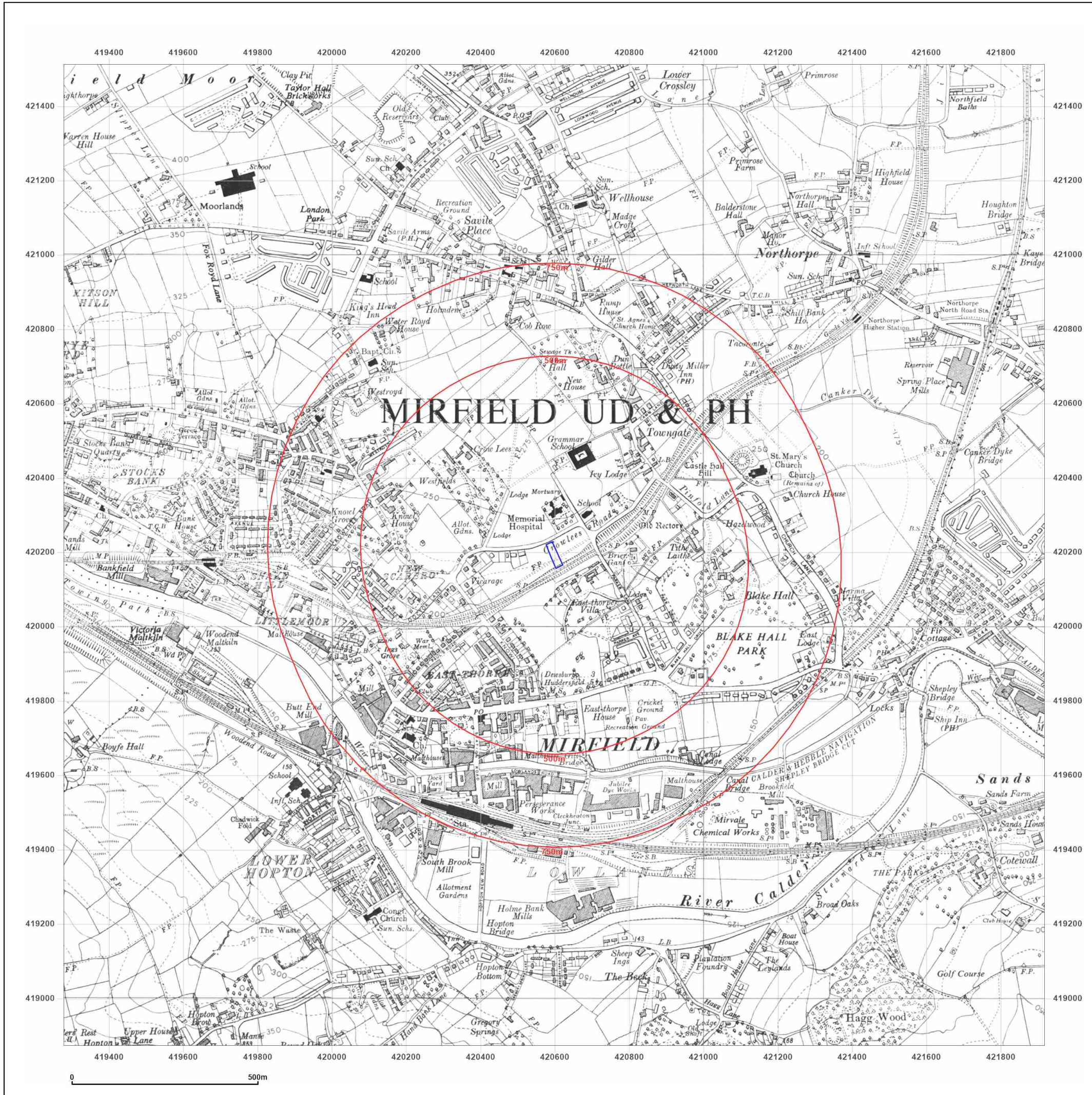


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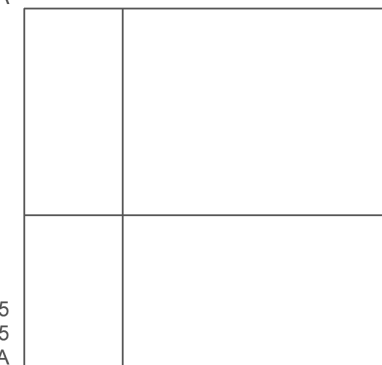
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 Levelled N/A

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 Revised 1967  
 Edition N/A  
 Copyright N/A  
 Levelled N/A



Surveyed 1965  
 Revised 1965  
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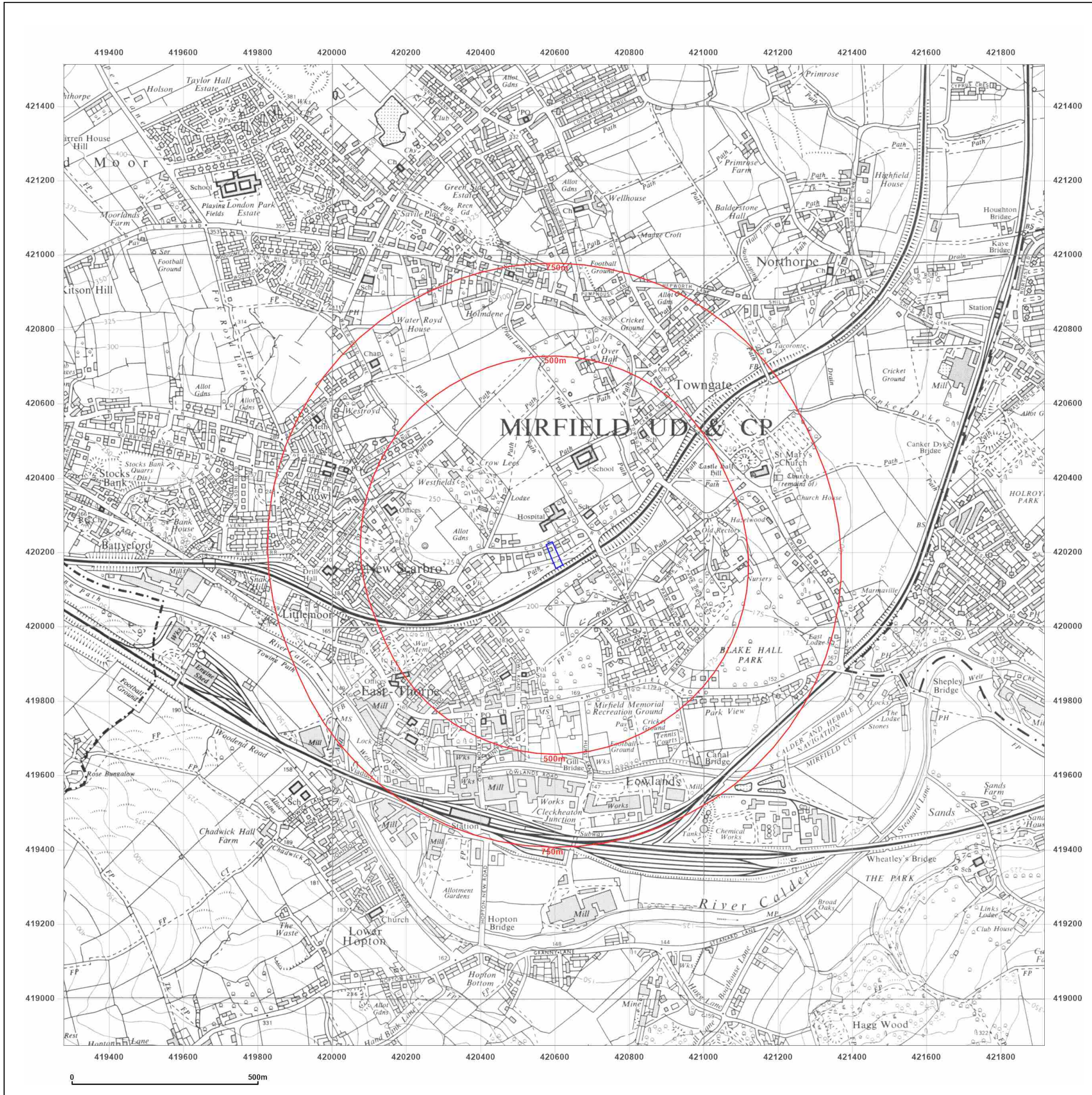


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**Site Details:**

22 Crowlees Road, Mirfield

**Client Ref:** 22 Crowlees Road, Mirfield  
**Report Ref:** GS-6PB-9MK-3XE-ZOC  
**Grid Ref:** 420597, 420192

**Map Name:** National Grid

**Map date:** 1974-1975

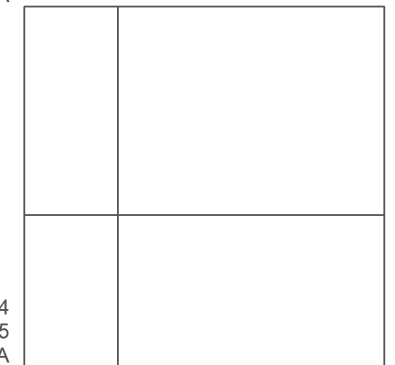
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 Edition N/A  
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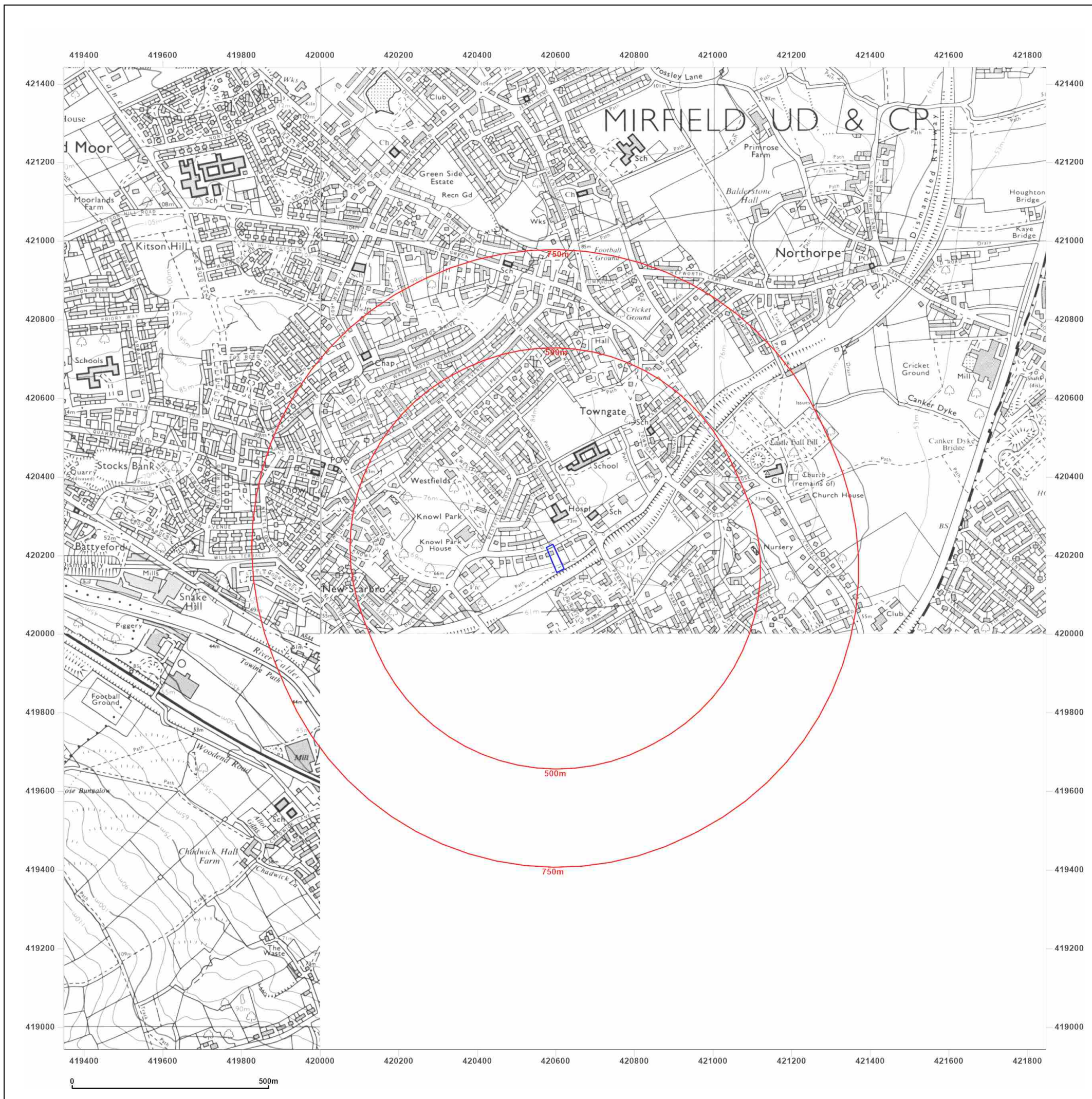


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**Site Details:**

22 Crowlees Road, Mirfield

**Client Ref:** 22 Crowlees Road, Mirfield  
**Report Ref:** GS-6PB-9MK-3XE-ZOC  
**Grid Ref:** 420597, 420192

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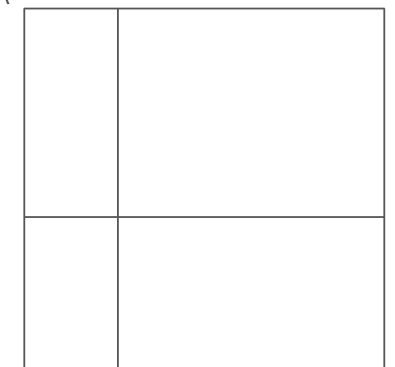
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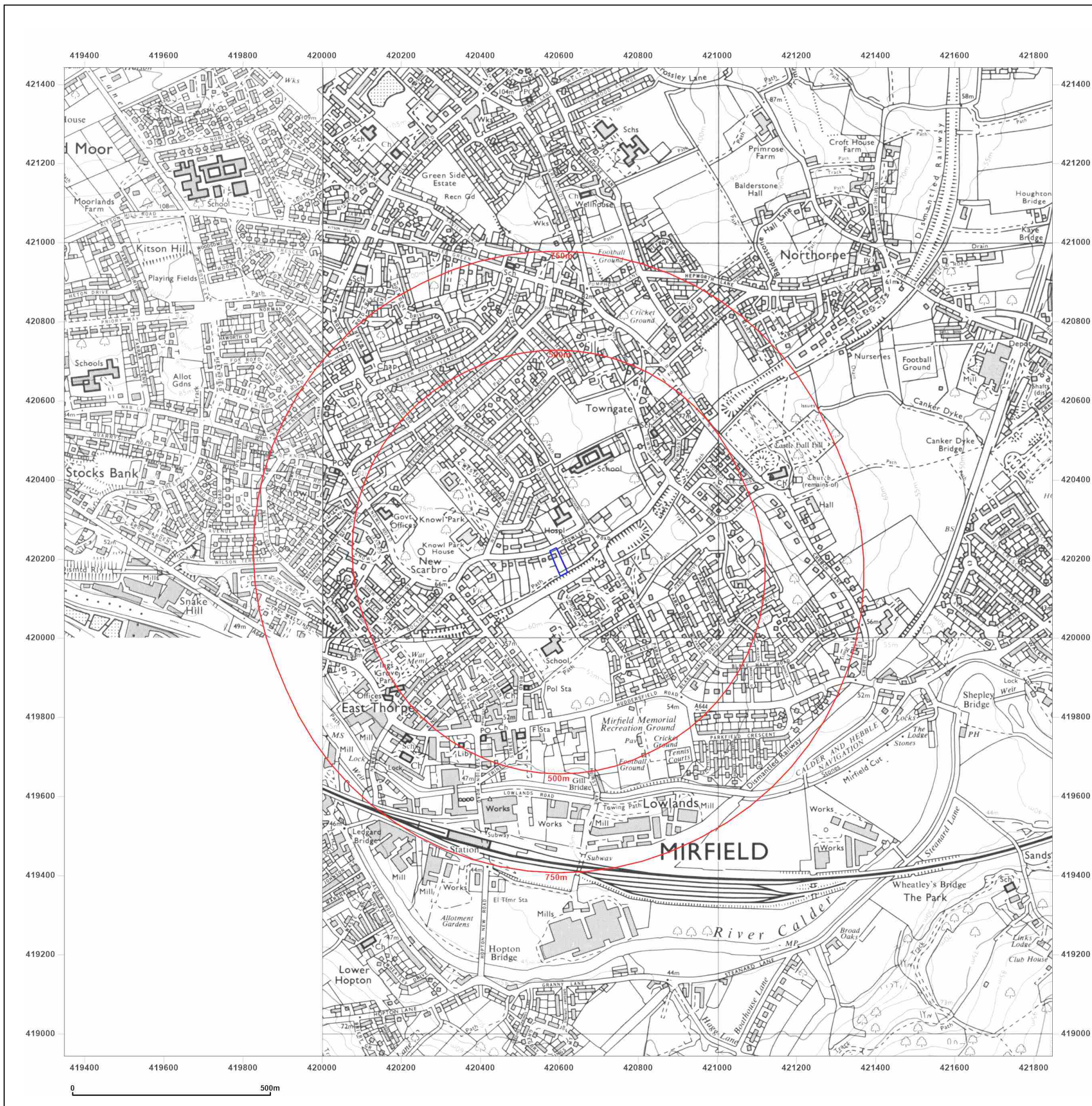


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**Site Details:**

22 Crowlees Road, Mirfield

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**Report Ref:** GS-6PB-9MK-3XE-ZOC  
**Grid Ref:** 420597, 420192

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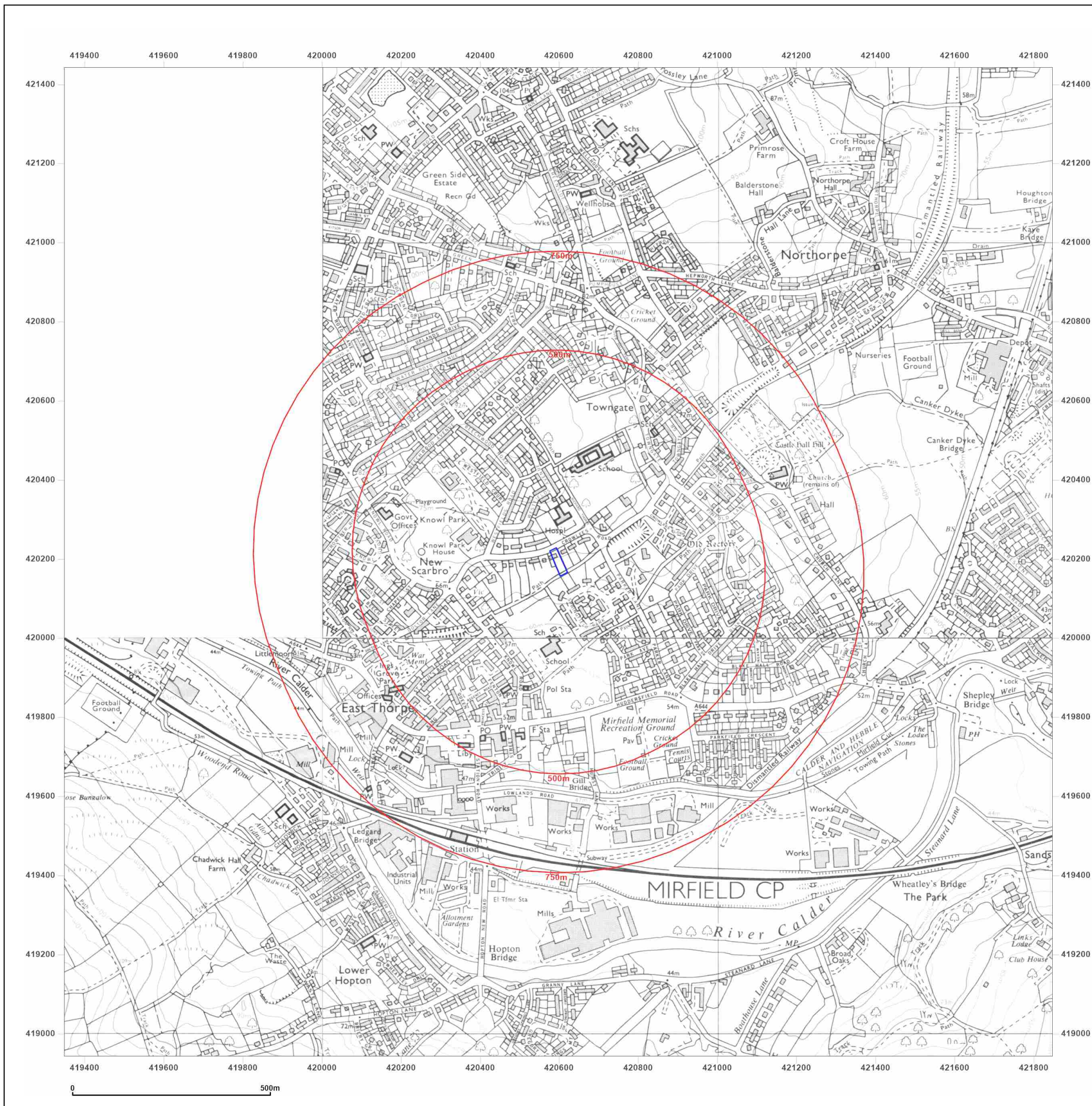


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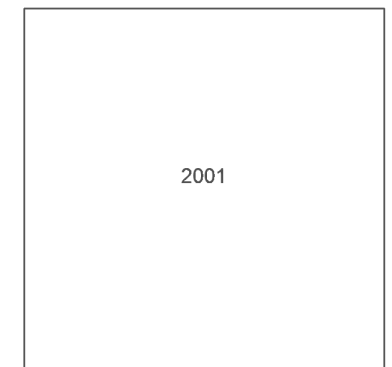
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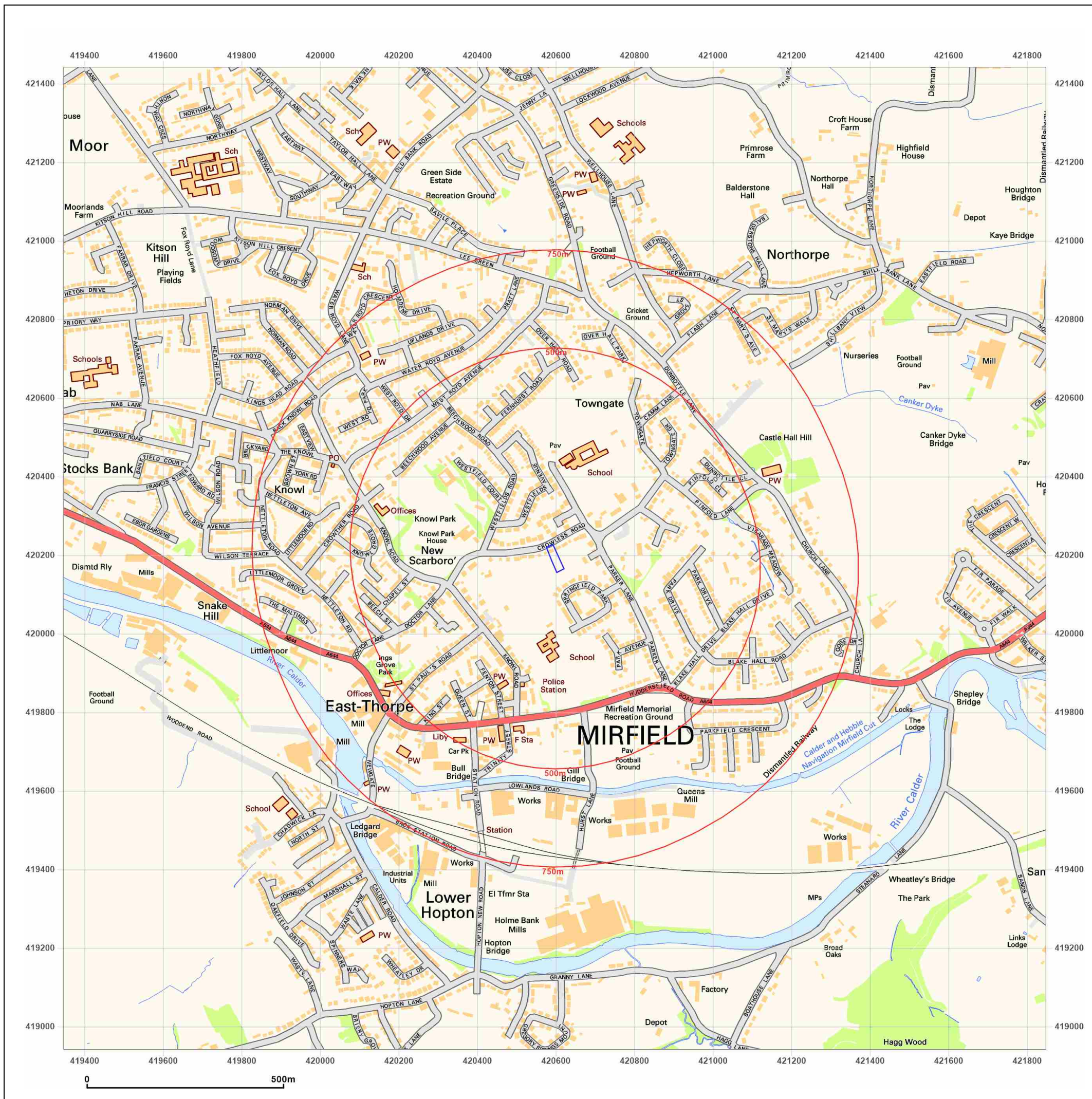


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**Site Details:**

22 Crowlees Road, Mirfield

**Client Ref:** 22 Crowlees Road, Mirfield  
**Report Ref:** GS-6PB-9MK-3XE-ZOC  
**Grid Ref:** 420597, 420192

**Map Name:** National Grid

**Map date:** 2010

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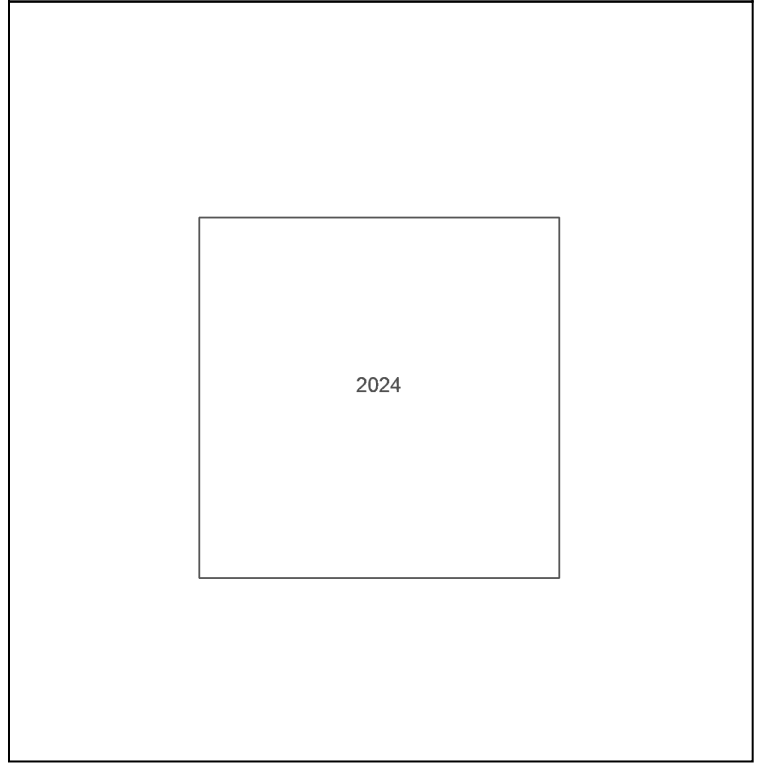
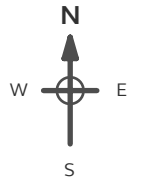
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**Site Details:**  
22 Crowlees Road, Mirfield

**Client Ref:** 22 Crowlees Road, Mirfield  
**Report Ref:** GS-6PB-9MK-3XE-ZOC  
**Grid Ref:** 420597, 420192

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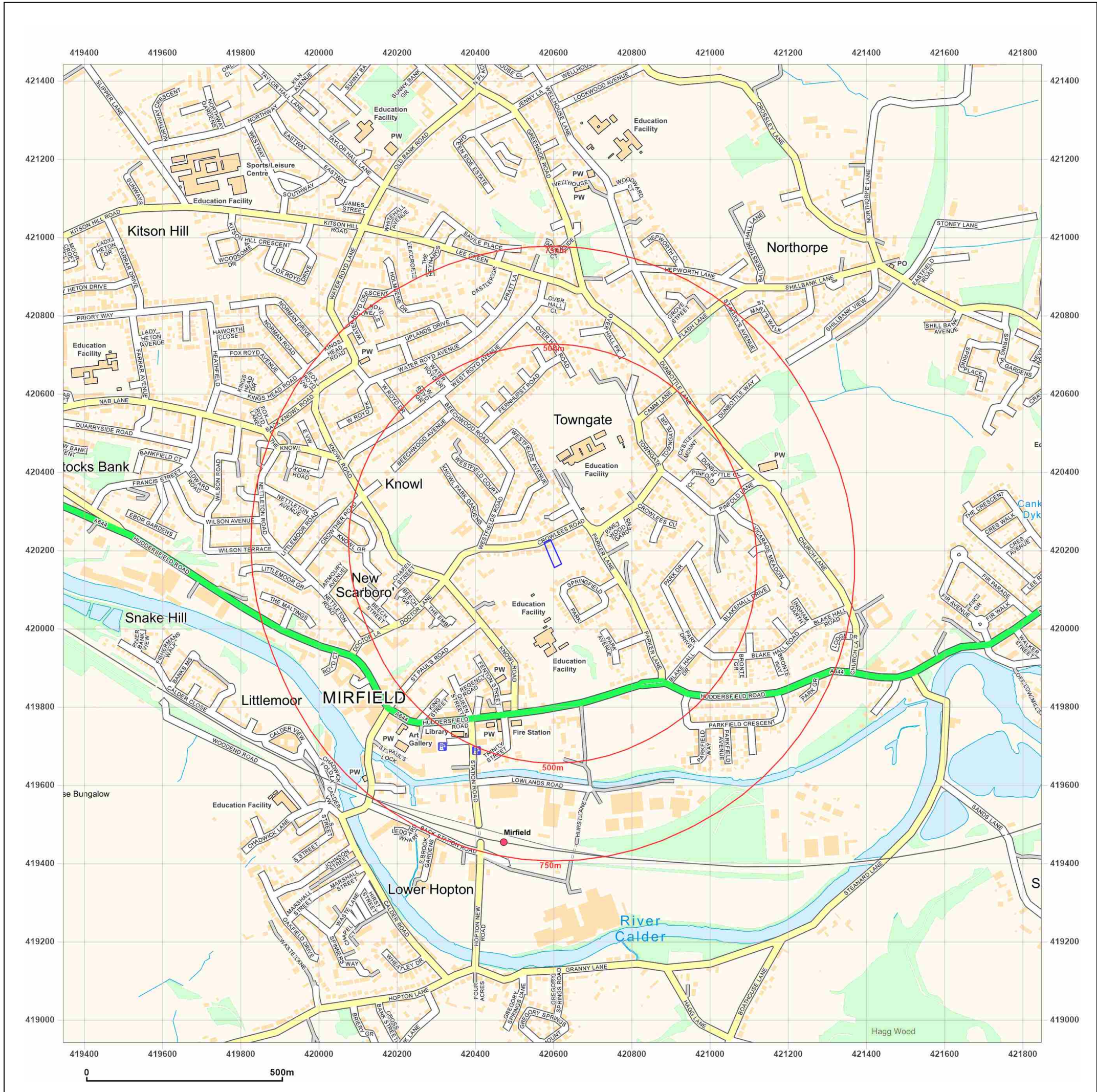


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## **Appendix 2**

Coal Authority Mining Report



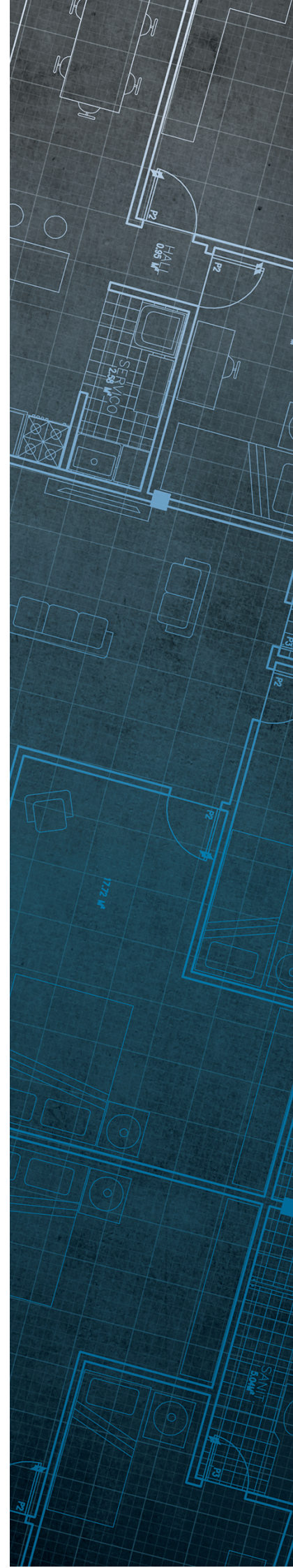
The Coal  
Authority

# Consultants Coal Mining Report

22 Crowlees Road, Mirfield  
West Yorkshire

Date of enquiry: 24 May 2024  
Date enquiry received: 24 May 2024  
Issue date: 24 May 2024

Our reference: 51003426993001  
Your reference: GS-TAH-2AR-8GB-7WD



# Consultants Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

## Client name

GROUNDSURE LIMITED

## Enquiry address

22 Crowlees Road, Mirfield  
West Yorkshire

## How to contact us

0345 762 6848 (UK)  
+44 (0)1623 637 000 (International)

200 Lichfield Lane  
Mansfield  
Nottinghamshire  
NG18 4RG

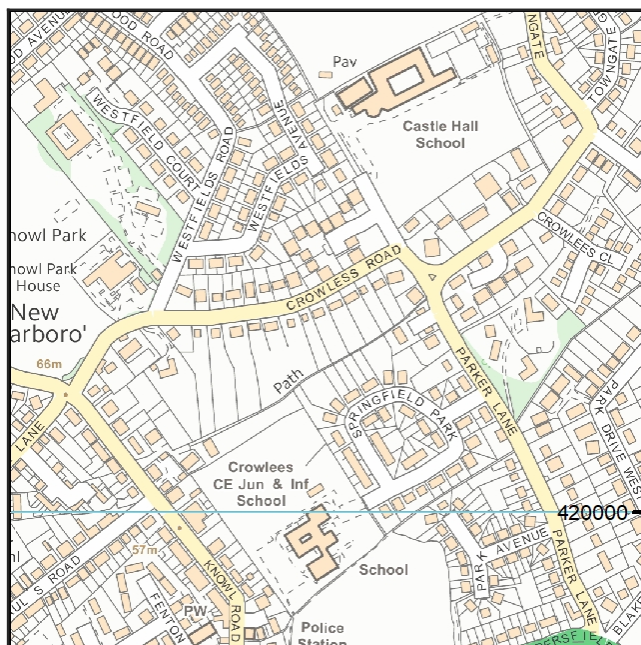
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Approximate position of property



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# Section 1 – Mining activity and geology

## Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	BLACK BED	Coal	6HBO	126	Beneath Property	2.7	East	76	1931
unnamed	BLACK BED	Coal	6HBN	126	Beneath Property	2.7	East	76	1925

## Probable unrecorded shallow workings

Yes.

## Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

## Mine entries

None recorded within 100 metres of the enquiry boundary.

## Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

10527	GCR54	GCR57
-------	-------	-------

**Please contact us on 0345 762 6848** to determine the exact abandoned mine plans you require based on your needs.

## Outcrops

No outcrops recorded.

## Geological faults, fissures and breaklines

No faults, fissures or breaklines recorded.

## Opencast mines

None recorded within 500 metres of the enquiry boundary.

## Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

## Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

### Site investigations

None recorded within 50 metres of the enquiry boundary.

### Remediated sites

None recorded within 50 metres of the enquiry boundary.

### Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

### Mine gas

None recorded within 500 metres of the enquiry boundary.

### Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

## Section 3 – Licensing and future mining activity

### Future underground mining

None recorded.

### Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

### Court orders

None recorded.

### Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

### Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

The property is not in an area where a notice has been given under section 41 of the Coal Industry Act 1994, cancelling the entitlement to withdraw support.

### Payments to owners of former copyhold land

The property is not in an area where a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

## Section 4 – Further information

The following potential risks have been identified and as part of your risk assessment should be investigated further.

### Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

**MINE GAS:** Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

### Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

**For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at [groundstability@coal.gov.uk](mailto:groundstability@coal.gov.uk).**

## Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at [groundstability@coal.gov.uk](mailto:groundstability@coal.gov.uk)**.

### Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

### Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

### Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

### Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

### Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

### Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

### Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

### **Opencast mines**

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

### **Coal Authority managed tips**

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

### **Site investigations**

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

### **Remediated sites**

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

### **Coal mining subsidence**

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

### **Mine gas**

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

### **Mine water treatment schemes**

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

### **Future underground mining**

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

### **Coal mining licensing**

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

### **Court orders**

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

### **Section 46 notices**

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

### **Withdrawal of support notices**


Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

### **Payment to owners of former copyhold land**

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

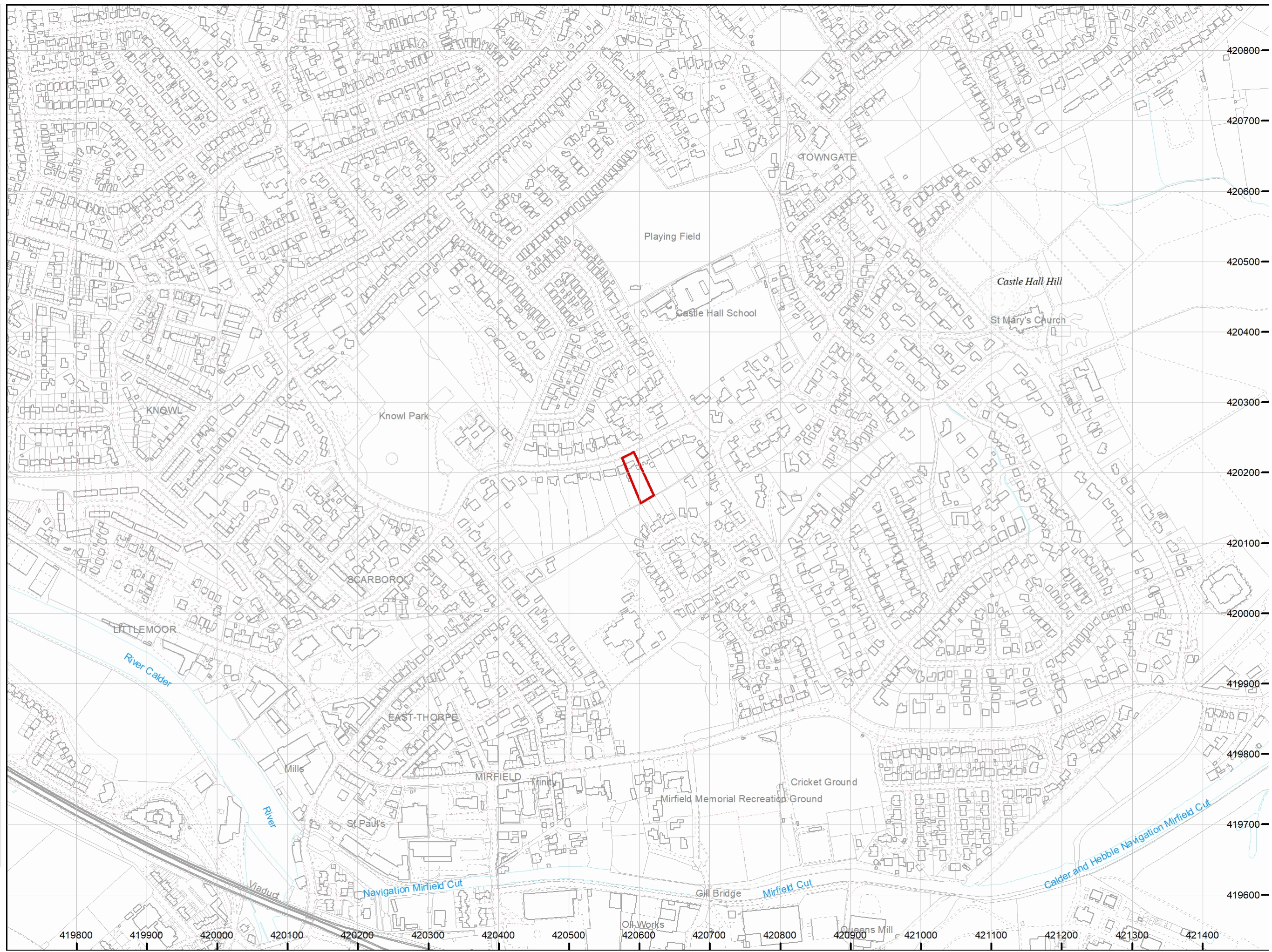
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

**Key**

Approximate position of the enquiry boundary shown 

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+44 (0)1623 637 000 (International)  
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**Standard Appendices**

**A and B**

NOTES ON SITE INVESTIGATION PROCEDURE (Dec 2023)

1. **GENERAL.** The ground investigation has been carried out in accordance with the requirements of BS5930: 2015 and A1: 2020 and BS10175: 2011+A1: 2017. By its very nature, any ground investigation only samples a small percentage of the ground. Consequently, changes in ground conditions and soil properties can occur between any two exploratory points, for example local features such as soft ground, pockets of contamination and faults. This is also true of the exploration of mineworkings and such features can extend beneath parts of the site not investigated. Unrecorded bell pits and shafts can also exist between exploratory points. The ground investigation is designed to minimise such risks but they cannot be eliminated.

2. **GROUND INVESTIGATION.**

- 2.1 **BOREHOLE AND TRIAL PIT RECORDS.** These illustrate the ground conditions only at the location of the particular borehole or trial pit. Correlation between boreholes is for guidance only and its accuracy cannot be guaranteed.
- 2.2 **SHELL AND AUGER BORING.** This technique uses a tripod winch and an essentially percussive action using a variety of tools. Disturbed and undisturbed samples can be taken. This is the most suitable method for soft ground investigation, enabling the maximum amount of information to be obtained. However, minor changes in lithology may be overlooked unless continuous undisturbed sampling is used.
- 2.3 **GROUNDWATER.** Groundwater levels vary seasonally and the details given on the borehole logs relate only to the dates and the conditions described in the borehole records. The rate of boring may not have allowed an equilibrium water level to be established and the use of casing may seal off certain seepages.
- 2.4 **SAMPLING.** Disturbed samples of soils are taken for identification and classification purposes. In cohesive soils 'undisturbed' samples 100mm in diameter are taken by open drive sampler for laboratory testing of strength, permeability and consolidation characteristics.
- 2.5 **STANDARD PENETRATION TESTS.** S.P.T tests are used in granular and cohesive materials and in soft or weathered rocks. Difficulties in obtaining true 'N' values mean they must only be used as a guide and not as an absolute value in foundation design.
- 2.6 **ROTARY DRILLING.** Two main types of rotary drilling are carried out in rock. Rock coring using diamond or tungsten carbide tipped core bits provides samples and information on rock types, fissuring and weathering. Openhole drilling only produces small particles for identification purposes and the information gained is therefore limited. The latter is, however, useful as a quick method for detecting major strata changes and for the location of coal seams and old workings. Water, air, foam or drilling muds may be used as the flushing medium in either case.
- 2.7 **PERMEABILITY TESTS.** These can be carried out in boreholes or trial pits and gives a good indication of in-situ permeability.
- 2.8 **TRIAL PITTING.** This enables soil conditions to be closely examined at any specific point and samples taken. It also gives useful information on the stability of excavations and ingress of water.
- 2.9 **WINDOW SAMPLING.** Window sampling consists of driving a series of 1m-long tubes into the ground using a dropping weight. On completion of each 1m run, the tube is withdrawn. The next tube is then inserted and the process repeated to provide a continuous profile of the ground. On each run the tube diameter is reduced in order to assist in its recovery.
- 2.10 **GAS MONITORING.** This is routinely carried out in trial pits or probe holes to check for elevated levels of methane and carbon dioxide or oxygen deficiency, particularly since risks can exist from natural gases, landfill sites and rising groundwater levels in mine workings below ground. Longer term monitoring is carried out with gas monitoring standpipes.

3. **SOIL DESCRIPTION.** Samples from borings or trial pits are described as specified in the standard procedure outlined in the British Standards. The description includes colour, consistency, structure, weathering, lithological type, inclusions and origin. All descriptions are based on visual and manual identification.

**Fire Soils (Cohesive Soils)**

The following field terms are used:

Soil Type	Description
Very soft	Exudes between fingers
Soft	Moulded by light finger pressure
Firm	Cannot be moulded by the fingers but can be rolled in hand to 3mm threads.
Stiff	Crumbles and breaks when rolled to 3mm threads but can be remoulded to a lump.
Very stiff	No longer moulded but crumbles under pressure. Can be indented with thumbs.

The following terms are used in accordance with the results of laboratory and field tests.

Description	Undrained Shear Strength $C_u$ (kPa)
Extremely Low	<10
Very Low	10 - 20
Low	20 - 40
Medium	40 - 75
High	75 - 150
Very High	150 - 300

Fine soils can also be classified according to their sensitivity, which is the ratio between undisturbed and remoulded undrained shear strength.

Sensitivity	Ratio
Low	8
Medium	8 - 30
High	>30
Quick	>50

#### Granular Soils (Non-Cohesive)

The following descriptions are used for granular soils.

Description	Normalised Blow Count ( $N_1$ ) 60
Very Loose	0 - 4
Loose	4 - 10
Medium	10 - 30
Dense	30 - 50
Very Dense	>50

- NATURAL OR IN-SITU MOISTURE CONTENT.** The natural or in-situ moisture content of a soil is defined as the weight of water contained in the pore space, expressed as a percentage of the dry weight of solid matter present in the soil. Soil properties are greatly affected by the moisture content and the test can help to give an indication of likely engineering behaviour.
- LIQUID AND PLASTIC LIMITS.** Two simple classification tests are known as the liquid and plastic limits. If a cohesive soil is remoulded with increasing amounts of water, a point will be reached at which it ceases to behave as a plastic material and becomes essentially a viscous fluid. The moisture content corresponding to this change is arbitrarily determined by the liquid limit test. 'Fat' clays, which have high contents of colloidal particles, have high liquid limits; 'lean' clays, having low colloidal particle contents have correspondingly low liquid limits. An increase in the organic content of a clay is reflected by an increase in the liquid and plastic limits.

If a cohesive soil is allowed to dry progressively, a point is reached at which it ceases to behave as a plastic material, which can be moulded in the fingers, and it becomes friable. The moisture content of the soil at this point is known as the 'plastic limit' of the soil.

The range of water content over which a cohesive soil behaves plastically, i.e. the range lying between the liquid and plastic limits, is defined as the plasticity index.

A cohesive soil with a natural water content towards its liquid limit will, in general, be an extremely soft material whereas a cohesive soil with a natural water content below its plastic limit will tend to be a stiff material.

- PARTICLE-SIZE DISTRIBUTION.** A knowledge of particle-size distribution is used to classify soils and to indicate likely engineering behaviour. British Standards define soils in relation to their particle-size as shown below:-

Boulders	>200mm	Coarse Sand	2.0	to	0.63mm
Cobbles	200 to 63mm	Medium Sand	0.63	to	0.2mm
		Fine Sand	0.2	to	0.063mm
Coarse Gravel	63 to 20mm	Coarse Silt	0.063	to	0.02mm
Medium Gravel	20 to 6.3mm	Medium Silt	0.02	to	0.0063mm
Fine Gravel	6.3 to 2mm	Fine Silt	0.0063	to	0.002mm
		Clay	<0.002mm		

- BULK DENSITY.** The bulk density of a material is the weight of that material per unit volume and includes the effects of voids whether filled with air or water. The 'dry density' of a soil is defined as the weight of solids contained in a unit volume of the soil.

8. **PERMEABILITY.** The permeability of a material is defined as the rate at which water flows through it per unit area of soil under unit hydraulic gradient.
9. **CONSOLIDATION CHARACTERISTICS.** When subjected to pressure, a soil tends to consolidate as the air or water in the pore space is forced out and the grains assume a denser state of packing. The decrease in volume per unit of pressure is defined as the 'compressibility' of the soil, and a measure of the rate at which consolidation proceeds is given by the 'coefficient of consolidation' of the soil. These two characteristics  $M_v$  and  $C_v$  are determined in the consolidation test and the results are used to determine settlement of structures or earthworks.
10. **STRENGTH CHARACTERISTICS.** The strength of geological materials is generally expressed as the maximum resistance that they offer to deformation or fracture by applied shear or compressive stress. The strength characteristics of geological materials depend to an important degree on their previous history and on the conditions under which they will be stressed in practice. Consequently, it is necessary to simulate in the laboratory tests the conditions under which the material will be stressed in the field.

In general, the only test carried out on hard rocks is the determination of their compressive strength but consideration must be given to fissuring, jointing and bedding planes.

The tests at present in use for soils and soft rocks fall into two main categories. Firstly, those in which the material is stressed under conditions of no moisture content change, and secondly those in which full opportunity is permitted for moisture content changes under the applied stresses. Tests in the first category are known as undrained (immediate or quick) tests, while those in the second category are known as drained (slow or equilibrium) tests. The tests are normally carried out in the triaxial compression apparatus but granular materials may be tested in the shear box apparatus.

The undrained triaxial test gives the apparent cohesion  $C_u$  and the angle of shearing resistance  $\phi_u$ . In dry sands,  $C_u = 0$  and  $\phi_u$  is equal to the angle of internal friction whereas with saturated non-fissured clays  $\phi_u$  tends to 0 and the apparent cohesion  $C_u$  is equal to one-half the unconfined compression strength  $q_u$ . On site the vane test gives an approximate measure of shear strength.

For some stability problems use is made of a variant of the undrained triaxial test in which the specimen is allowed to consolidate fully under the hydrostatic pressure and is then tested to failure under conditions of no moisture content change. This is known as the consolidated undrained triaxial test. Pore water pressures may be measured during this test or a fully drained test may be carried out. In either case the effective shear strength parameters  $C'$  and  $\phi'$  can be obtained which can be used to calculate shear strength at any given pore water pressure.

11. **COMPACTION.** The density at which any soil can be placed in an earth dam, embankment or road depends on its moisture content and on the amount of work which is used in compaction. The influence of these two factors can be studied in compaction tests, which can determine the maximum dry density (MDD) achievable at a certain optimum moisture content (OMC).
12. **CALIFORNIA BEARING RATIO TEST.** In flexible pavement design a knowledge of the bearing capacity of the subgrade is necessary to enable the thickness of pavement for any particular combination of traffic and site conditions to be determined. The quality of the subgrade can be assessed by means of the California Bearing Ratio Test or approximately by the MEXE cone penetrometer.
13. **ROCK DESCRIPTION.** This is based on;
- (i) Strength

Term	Field Identification	Unconfined Compressive Strength (MPa)
Extremely Weak <sup>a</sup>	Indented by thumbnail.	Less than 1
Very Weak	Crumbles under firm blows with point of geological hammer, can be peeled by a pocket knife.	1 to 5
Weak	Can be peeled by a pocket knife with difficulty, shallow indentations made by firm blow with point of geological hammer.	5 to 25
Medium Strong	Cannot be scraped or peeled with a pocket knife, specimen can be fractured with single firm blow of geological hammer.	25 to 50
Strong	Specimen required more than one blow of geological hammer to fracture it.	50 to 100
Very Strong	Specimen requires many blows of geological hammer to fracture it.	100 to 250
Extremely Strong	Specimen can only be chipped with geological hammer.	Greater than 250

<sup>a</sup> Some extremely weak rocks will behave as soils and should be described as soils.

- (ii) Structure

Thickness Term	Spacing Term	Thickness or spacing
Very thickly	Extremely wide	>6m
Very thickly	Very wide	2m – 6m
Thickly	Wide	600mm – 2m
Medium	Medium	200mm – 600mm
Thinly	Close	60mm – 200mm
Very thinly	Very close	20mm – 60mm
Thickly laminated (Sedimentary)		
Narrowly (Metamorphic and Igneous)	Extremely close	6mm – 20mm
Thinly laminated (Sedimentary)		
Very narrowly (Metamorphic and Igneous)	Extremely close	<6mm

- (iii) Colour
- (iv) Texture
- (v) Grain size

Description	Predominate Grain Size (mm)
Conglomerate	>2
Coarse - grained	2 - 0.63
Medium - grained	0.63 - 0.20
Fine - grained	0.20 - 0.063
Siltstone	0.063 - 0.002
Mudstone	<0.002

- (vi) Rock Name
- (vii) Stability
- (viii) Weathering

Term	Description	Grades
Fresh/unweathered	No visible sign of rock material weathering; perhaps slight discolouration on major discontinuity surfaces.	0
Slightly weathered	Slight discolouration indicates weathering of rock material and discontinuity surfaces.	1
Moderately weathered/Distinctly weathered	Less than half of the rock material is decomposed or disintegrated. Fresh or discoloured rock is present either as a continuous framework or as core stones.	2
Highly weathered/ Destroyed	More than half of the rock material is decomposed or disintegrated. Fresh or discoloured rock is present either as a continuous framework or as core stones.	3
Completely weathered	All rock material is decomposed and/or disintegrated to soil. The original mass structure is still apparent.	4
Residual soil	All rock material is converted to soil. The mass structure and material fabric are destroyed. There is a large change in volume, but the soils has not been significantly transported.	5

- (ix) Discontinuities
- (x) Weathered of Rock Mass

14. **CHEMICAL TESTS.** A knowledge of water soluble sulphate content and pH of soils and groundwater is important in determining the protection required for concrete or steel in contact with the ground. Other specialist tests may be carried out on sites suspected of being contaminated (see standard appendix B).

15. **REFERENCES**

BS5930: 2015+A1:2020 British Standard Code of Practice for Site Investigations  
 BS10175: 2011+A1:2017 British Standard Code of Practice for the Investigation of Potentially Contaminated Sites  
 BS EN ISO 14688-1: 2018 Geotechnical Investigation and Testing: Identification and Classification of Soil  
 BS EN ISO 14688-2: 2018 Geotechnical Investigation and Testing: Identification and Classification of Soil



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