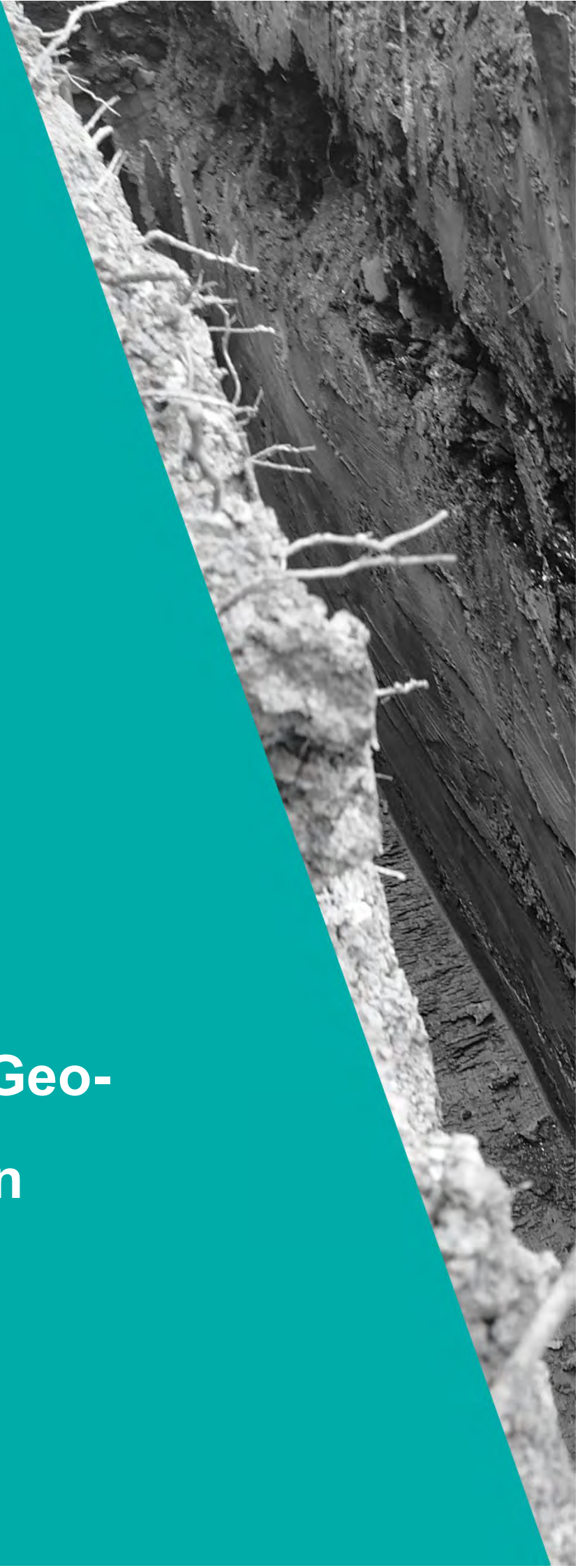


Geotechnical & Geo- environmental Site Investigation

Manor Farm, Great Houghton

Avant Homes

17 September 2024



**GEOTECHNICAL AND GEO-ENVIRONMENTAL
SITE INVESTIGATION**

MANOR FARM, GREAT HOUGHTON

FOR

AVANT HOMES

ISSUE 3



48417-ECE-XX-XX-RP-C-0002

17 September 2024

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Kate Edwards
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1.0 EXECUTIVE SUMMARY

1. The 3.6-hectare site is located to the east of High Street in Great Houghton, east of Barnsley. The majority of the site comprises two fields of roughly equal size, and a farm yard with old sheds and silos is located in the south west ~15% of the site. The site slopes gently down towards the north east with an average gradient of approximately 1 in 40.
2. Small infilled ponds/reservoirs are located in the north of the site. Apart from the farm buildings in the south of the site, no other historical development has taken place.
3. A sewer crosses the north of the site which will need to be taken into account as part of the proposed development.
4. A fault crosses the south of the site, trending roughly north west to south east. The solid geology south of the fault comprises the Newstead Rock (sandstone). The geology to the north comprises the Pennine Upper Coal Measures. No superficial deposits underlie the site.
5. Precautions due to shallow coal mining are not considered to be required.
6. The north east corner of the site is at risk from surface water flooding and the southern third of the site is shown to have a limited potential for groundwater flooding to occur. The solid geology is classified as a Secondary A Aquifer; the site is not within a Groundwater Source Protection Zone.
7. Topsoil between 0.2 and 0.35 m thick is present at the surface of the fields. Granular made ground between 0.25 and 0.5 m thick is present at the surface of the yard, whilst old concrete floor slabs are also locally present. Reworked natural clay overlying a brick base was encountered in the footprint of the infilled ponds in the north to 1.25 m bgl.
8. The natural ground to the north of the fault generally comprises stiff clay overlying siltstone from around 1.6 to 2.7 m bgl. The natural ground south of the fault comprises gravelly sand or sandy gravel of sandstone, overlying sandstone bedrock from around 1.1 to 1.5 m bgl. The sandstone became too difficult to excavate with a JCB 3CX at around 1.9 to 2.0 m bgl.
9. A coal seam typically between 0.7 and 1.35 m thick was encountered below the north east ~25% of the site, encountered at depths of between 0.95 and 1.7 m bgl. No evidence of shallow crop workings was encountered.

10. Groundwater was not encountered during the excavation of the trial pits. [Twelve rounds of groundwater monitoring have been completed for the wells installed in the north of the site; groundwater was recorded at depths of between 0.37 and 2.65 m bgl.](#)
11. Traditional strip or trench fill footings are considered to be suitable, constructed within the natural clay at a minimum depth of 900 mm (increasing to 1,000 mm in the vicinity of TP15 and TP18), or 600 mm within the natural sand. If different ground types are present at formation, the foundation will require reinforcement. Spread footings will need to be deepened where within influencing distance of trees, and heave precautions installed where appropriate.
12. If foundations are deepened due to trees and a very shallow water table is present during wetter times of the year, consideration should be given to using piled foundations.
13. Infiltration tests were carried out in three trial pits. Three infiltration tests drained in the granular soils in the south of the site, however the water failed to drain in tests excavated in the clays in the north. Soakaway drainage is not considered to be viable.
14. No radon or ground gas precautions are considered to be required.
15. No elevated concentrations were recorded in the topsoil or natural ground which can be considered suitable for re-use.
16. Two samples of made ground recorded elevated concentrations of PAHs and asbestos fibres were encountered historically within the yard area. A 600 mm thick clean capping layer is required where the made ground below the yard is to remain below gardens or landscaped areas.
17. A 1 m thick capping is required for gardens and soft landscaped areas where coal or coal-rich materials are present within the upper 1 m; if levels are to be raised slightly, this capping will not be required. Similarly, electricity cables should not be laid in coal or coal-rich soils.
18. DS-2 AC-3z sulphate precautions are required where sub-surface concrete is in contact with made ground, and DS-4 AC-4 for concrete in contact with coal. No sulphate precautions are required where concrete is in contact with the natural ground only.
19. The conclusions made in this report are subject to agreement by the approving bodies, such as the Local Authority, and your warranty provider.

2.0 INTRODUCTION

2.1 Terms of Reference

This report presents the findings of a Geotechnical and Geo-environmental Site Investigation carried out by Eastwood Consulting Engineers for, and on the instructions of, Avant Homes. Any other parties using the information in this report do so at their own risk and any duty of care is excluded.

2.2 Context

JNP Group previously completed a 'Phase II Geotechnical and Geoenvironmental Report' for the site in April 2021. However, Avant Homes do not have reliance on the report. Pertinent information from JNP's report has only been referred to in this report.

2.3 Aims and Objectives

The aims and objectives of this investigation were as follows:

- Assimilate Phase 1 data to derive an outline conceptual model identifying potential contaminants, pathways and receptors, as well as possible linkages between these;
- Obtain information enabling refinement and subsequent testing of the conceptual model;
- Carry out a tiered risk assessment to establish the likely risks to future receptors, involving the use of generic assessment criteria and where unacceptable risks are identified, site specific assessment criteria within a detailed quantitative risk assessment;
- Identify feasible remediation options if unacceptable risks are highlighted;
- Develop an appropriate remediation strategy where remediation is required; and
- Detail the ground conditions and their geotechnical properties enabling outline foundation proposals to be made.

2.4 Scope of Investigation

This document is split into two sections. These constitute the findings of the Phase 1 and Phase 2 investigations, consecutively.

2.4.1 Phase 1

The Phase 1 investigation involved a review of information extracted from published documentation as well as that obtained from a site reconnaissance. Information regarding the current and former

land uses both on and surrounding the site, as well as the environmental sensitivity of the site location as determined by factors including geology, hydrogeology and hydrology have been examined.

Information analysed in this section of the report has been obtained from a variety of sources and included the following:

- Landmark Envirocheck;
- Consultants Coal Mining Report;
- Geological Maps and Associated Geological Memoirs; and
- A site walkover.

2.4.2 Phase 2

This part of the investigation consisted of intrusive works and laboratory analysis. The findings were used to test the conceptual model and produce a final risk assessment. The intrusive works comprised trial pits and rotary boreholes which were undertaken to enable:

- Examination of the shallow ground conditions;
- In situ description of soils, enabling any localised lateral and vertical changes in soil conditions to be logged;
- Assessment of any contamination identified using visual and olfactory methods;
- Collection of soil samples for chemical and geotechnical testing;
- Infiltration tests to be undertaken; and
- Installation of groundwater monitoring wells.

2.5 Limitations of Investigation

This report is based on the assumption that the site will be developed with residential properties, each with private gardens and areas of hardstanding. The dwellings will be of conventional construction and will be three storeys or less in height, and it is assumed that existing ground levels will not alter significantly. If this is not the case, then the advice given in this report may not be appropriate.

Where assessments of site areas affected in particular ways are given, these are approximate. All information, comments and opinions given in this report are based on the ground conditions encountered during the site work, on the results of laboratory testing carried out as part of the investigation and information gained from a geological and historical desk study. However, there may be conditions at the site that have not been taken into account, such as unpredictable soil strata and water conditions between or below investigation points. It should be noted that groundwater levels vary due to seasonal or other effects, and may at times differ from those measured during the investigation.

This report considers the ground and groundwater and does not cover any buildings or their fabric or the constituents of any existing hardstanding materials. Generally, testing has only been carried out for contaminants identified as potentially present with no assessment made of biological contamination. Risks to ecological receptors, such as bats, have not been considered.

3.0 THE SITE

3.1 Description

The approximate 3.6 hectare site is located to the east of High Street (B6273) on the northern edge of Great Houghton, approximately 8 km east of Barnsley, in South Yorkshire. The site is roughly centred on National Grid Reference 442950, 407030 and is currently accessed via a gate which leads off High Street into the farm yard.

The majority of the site comprises two fields of roughly equal size; at the time of the investigation in August 2023 the eastern field comprised agricultural grassland, whilst the western field was largely overgrown (comprising rough grassland and brambles). Hedgerows are present along most boundaries. Occasional mature trees are located along the western boundary.

A derelict farm yard is located in the south west ~15% of the site. Two old sheds are located in the east of the farm yard. The roofs of these structures are expected to comprise cement-bound asbestos sheeting. Three old silos are present in the south west, and old concrete floor slabs are present in the south east.

The site gently slopes from around 63 m AOD in the south-west to 55.5 m AOD in the north-east. The average gradient is approximately 1 in 40.

In the surrounding area, agricultural fields are located to the north and east of the site, and farm buildings are located adjacent to the south; the yard to the south east comprises a livestock farm. Residential development is located opposite High Street to the west of the site, and also beyond the farm yard and fields to the south and east. is currently active. Residential development is located within 250 m of the site to the north-west and south-east.

Photographs from the site walkover are included in the Appendix.

3.2 History

Historical Ordnance Survey maps obtained as part of the Envirocheck have been studied to assess the previous use of the site. The maps, together with the Envirocheck, can be found in the Appendix.

3.2.1 The Site

The earliest historical map, dated 1854, shows the site consisted of multiple agricultural fields. Occasional trees are shown along the field boundaries. The extreme south west corner of the site may have extended into an orchard.

On the 1892 map, a small roughly circular pond and two small roughly rectangular ponds are indicated close to the northern boundary in the western field. The map also shows a track in the south west of the site. By 1906, the two small rectangular ponds and the trees along the field boundaries are no longer shown.

The track is no longer shown by 1930, and the orchard in the south west is no longer shown by 1962.

A structure (presumed to comprise a farm shed) is indicated in the south of the site on the 1979 map, along with three silos. A further structure is added by 1985.

The remaining circular pond is indicated on the larger-scale historical maps until (and including) 1993, and appears to either be dry or to have been infilled on the 1999 historical aerial imagery. This imagery indicates two further farm buildings to be present in the south of the site.

No further significant changes are shown on the site to the present day. The historical Google Earth imagery indicates the southern-most of the farm structures to have been demolished between April 2021 and May 2022.

3.2.2 The Surrounding Area

The earliest historical map indicates the village of Great Houghton to lie to the south east of site. A road (High Street) forms the western site boundary, and residential development is located along the road to the west and south of the site - a large pond is also indicated immediately west of the road, around 30 m from the site (to the south of 'Lister's Buildings'). Agricultural fields are located adjacent to the north and east of the site. A sandstone quarry is located approximately 130 m to the north.

The sandstone quarry is not shown on the 1892 map. By 1906, another two ponds are indicated around 40 m and 100 m to the north of the site. Residential development is indicated around 100 m to the south east, with more development also indicated by 1930. The pond to the south of Lister's Buildings is no longer shown on the 1930 map, and allotment gardens are labelled around 60 m to the south east of the site.

By 1962, a number of buildings located adjacent to the north west corner of the site are no longer shown, and the pond at this location has been infilled. A garage is labelled in their place.

By 1979, multiple farm buildings are indicated adjacent to the south east boundary of the site (Hawthorne House Farm), and a playing field is located adjacent to the south east corner. Extensive residential development is also shown to the west of the site opposite High Street.

The garage adjacent to the north west corner appears to have been demolished on the 1999 historical aerial imagery. Further residential development is indicated around 100 m to the east. In addition, there is no evidence of the pond around 100 m to the north of the site.

No further significant developments are shown to the present day.

3.3 Geology

The geological map SE40 NW (1:10,000) and the British Geological Survey (BGS) Online Viewer have been reviewed.

A fault is indicated to cross the south of the site, trending roughly north west to south east, with the geology downthrown to the north east. The solid geology to the south of the fault (around one third of the site) is shown to comprise the Newstead Rock (sandstone). The geology to the north of the fault (around two thirds of the site) comprises interbedded mudstones, siltstones and sandstones of the Pennine Upper Coal Measures formation.

The solid geology dips down towards the north-east at around 4 degrees.

No superficial deposits are shown to cover the site.

3.4 Hydrogeology

3.4.1 Groundwater Vulnerability

The underlying bedrock is classified as a Secondary A Aquifer. This is defined as permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

3.4.2 Groundwater Abstractions

There are no water abstractions within 1 km of the site reported within the Envirocheck.

3.5 Hydrology

The Envirocheck records that the nearest surface water feature is 178 m east of the site, and comprises an unnamed stream.

Information within the Envirocheck states that the site does not lie within a Groundwater Source Protection Zone.

3.6 Extractive Industries

3.6.1 Coal Mining

Geological Review

The geological map SE40 NW conjectures a short section of a coal seam, possibly the Brierley coal, to outcrop across Moor Lane (a continuation of High Street) approximately 150 m to the north of the site. The solid geology is anticipated to dip towards the north east, therefore the seam is not expected to underlie the site.

However, during the ground investigation by JPN Group a coal seam between 0.2 and 1.1 m thick was encountered in a number of exploratory holes located in the north east of the site at depths of between 0.95 and 1.6 m; this seam could represent the Brierley coal. No evidence of any shallow crop workings was encountered during their ground investigation.

The geological memoirs for Barnsley state that the Brierley coal is a persistent seam up to 1.2 m thick in the vicinity of Brierley (approximately 4 km to the north of the site), but is noted to be an inferior coal. The seam is not expected to have been extensively worked.

The next shallowest named seam below the site is expected to be the Shafton coal, which outcrops around 1.35 km to the south west. The geological memoirs note the seam to lie around ~160 m below the Brierley coal.

Consultants Coal Mining Report

The site is recorded to be within a coal mining affected area; a Coal Authority Consultant Coal Mining Report has been obtained. This indicates that the site is directly underlain by underground mine workings in eleven coal seams which are summarised in the following table.

Seam	Depth (m)	Extraction Thickness (m)	Year Last Mined
Shafton	137 to 182	1.52 to 1.75	1945
Meltonfield	423 to 449	1.25 to 1.32	1960
Beamshaw Top	494	1.16	1969
Beamshaw Low	500 to 502	0.94 to 1.14	1955
Barnsley	593	2.17	1890
Dunsil	589 to 613	1.41 to 1.48	1985
Top Hard Barnsley	599 to 641	1.99	1930
Parkgate	784 to 909	0.4 to 2.34	1982

Seam	Depth (m)	Extraction Thickness (m)	Year Last Mined
Fenton	786 to 814	0.41 to 2.04	1992
Middleton Main	835 to 848	1.90	1976
Silkstone	870 to 886	1.02 to 1.14	1989

The Coal Authority report states that there are no probable unrecorded shallow workings or spine roadways recorded at shallow depth.

No mine entries are recorded withing 100 m of the site.

An extensive area of opencast coal workings is indicated from around 400 m to the south west of the site. It is anticipated this relates to the Shafton coal.

According to the Coal Authority report there are 14 claims of coal mining subsidence within 50 m of the site boundary which relate to properties located along High Street to the west of the site. No further details related to these claims are provided. No notices have been given under section 46 of the Coal Mining Subsidence Act 1991 stating that the land is at risk of subsidence.

There are no remediation sites recorded within 50 m of the site boundary by the Coal Authority report.

No mine gas and no mine water treatment schemes are recorded within 500 m of the site boundary.

Conclusion

A coal seam, anticipated to be the Brierley coal, underlies the north east of the site at shallow depth (within the upper 1.0 to 2.0 m), although is not expected to have been worked. The next shallowest coal seam below the site is expected to be the Shafton coal at a depth of around 140 m.

Precautions due to shallow coal mining are therefore not considered to be required.

3.6.2 Sandstone Quarrying

Historical maps indicate a quarry was present around 130 m north of the site, infilled by 1892. The Envirocheck notes sandstone was extracted. No evidence of quarrying can be seen on maps or on the walkover of the site itself.

3.7 Ground Gas

According to the Envirocheck the site is within an intermediate probability radon area, where 1 to 3% of homes are estimated to be at or above the action level. No radon protective measures are therefore necessary in the construction of new dwellings or extensions.

A small infilled pond is expected be present in the north of the site. The pond is expected to be present below a combined sewer which is indicated to cross the site; due to its proximity to the sewer, no exploratory holes were undertaken during the investigation to target this feature. This feature should be investigated prior to or during development of the site, although due to its small size it is not expected to present a significant risk of ground gas.

Two small infilled ponds are expected adjacent to the northern site boundary (these are shown as one larger infilled pond on our appended Exploratory Hole Location Plan). Due to the small size of these features and the length of time since they were infilled, they are also not expected to present a significant risk of ground gas.

According to the Envirocheck there are five potentially infilled features located within 250 m of the site. Four of these relate to infilled ponds located between 35 m and 138 m to the north west and north of the site. The historical maps indicate all of these ponds to have been infilled by 1962. The remaining infilled feature relates to an infilled sandstone quarry located 130 m to the north of the site which was infilled by 1892. Due to the age of these features they are not considered to present a significant risk of ground gas to the site.

According to the Envirocheck, there are no active or historical landfills located within 500 m of the site.

3.8 Pollution Incidents to Controlled Waters

There are no recorded pollution incidents to controlled waters within 500 m of the site.

3.9 Local Authority Pollution Prevention and Controls

According to the Envirocheck there are no active Local Authority Pollution Prevention Control within 500 m of the site.

3.10 Discharge Consents

The Envirocheck does not record any discharge consents within 1 km of the site.

3.11 Flooding

The site is not at risk of flooding from rivers or the sea.

The north east corner of the site is recorded to be at low to high risk (1000 to 30-year return) of surface water flooding.

The southern third of the site is shown to have a limited potential for groundwater flooding to occur. The northern two thirds are not at risk from groundwater flooding.

3.12 Soil Geochemistry

The Envirocheck estimates the following concentrations of arsenic, cadmium, chromium, nickel and lead to be present in the natural soil at the site. These have been compared to the appropriate assessment value protective of residential human health receptors with homegrown produce.

Contaminant	Estimated Concentration (mg/kg)	Assessment Value (mg/kg)
Arsenic	<15 to 25	37
Cadmium	<1.8	11
Chromium	40 to 120	910
Lead	<100	200
Nickel	15 to 30	180

The concentrations of these contaminants are not therefore expected to be elevated within natural ground.

3.13 Contemporary Trade Directory Entries and Fuel Station Entries

According to the Envirocheck, the closest contemporary trade directory entry is located 90 m to the north west of the site; the entry relates to a pest and vermin control business and is listed as inactive. The closest active entry is recorded 254 m to the south of the site and relates to road haulage services.

There are no fuel station entries within 250 m of site.

4.0 OUTLINE CONCEPTUAL MODEL

4.1 Potential Sources of Contamination

A limited thickness of made ground is expected to be present below the farm yard in the south west of the site, and infilled ponds are expected in the north of the site.

During the previous investigation by JPN Group, elevated concentrations of beryllium, PAHs and asbestos fibres were identified in the made ground which underlies the yard the in the south west of the site.

Any made ground may contain elevated concentrations of heavy metals, PAHs, asbestos fragments/fibres and sulphates.

4.2 Ground Gas

Infilled ponds are anticipated in the north of the site, although due to their small size they are not expected to present a significant risk of ground gas to the proposed development. The southern of these ponds is expected to underlie a combined sewer and therefore has not been targeted as part of this investigation – this feature should be investigated prior to or during construction to confirm this.

Further infilled ponds and an infilled quarry are located between 38 and 135 m to the north west and north of the site. Due to the length of time since these features were infilled (at least 60 years) the risk of ground gas posed by these features to the development is considered to be negligible.

No ground gas precautions are therefore expected to be necessary for the site.

4.3 Potential Pollutant Linkages

The following table details the possible sources and associated contaminants of concern, pathways and receptors, highlighted by the Phase 1 as potentially present.

Source	Potential Contaminants	Potential Pathways	Potential Receptors
Made ground	Heavy metals/metalloids PAHs Asbestos	Ingestion Inhalation Direct contact Biological uptake Migration through ground	Site residents and visitors to the site Site construction workers Secondary A Aquifer Plants Water supply pipes
Made or natural ground	Sulphates Low pH	Direct contact	Below ground concrete

5.0 GROUND INVESTIGATION

5.1 Site Works

We visited site on 30 and 31 August 2023 and excavated twenty-four trial pits, referenced TP01 to TP24, in order to determine the underlying ground conditions. These reached depths of between 1.0 and 2.9 m below ground level (bgl). Infiltration tests were undertaken in three trial pits.

Three rotary boreholes, referenced BH1 to BH3, were drilled on 31 August 2023 to install groundwater monitoring wells to 6.0 m bgl within the footprint of the proposed attenuation basin in the north of the site. Each well comprises a raised cover, plain pipe extending to 1.0 m bgl and 5 m of slotted pipe.

Copies of the exploratory hole logs are presented in Appendix 3, and their locations are plotted on the Exploratory Hole Location Plan, drawing number 48417-ECE-XX-XX-DR-C-0001 in Appendix 1.

[Twelve rounds of groundwater monitoring have been undertaken at monthly intervals between September 2023 and September 2024. The results are discussed in Section 6.5.](#)

5.2 Laboratory Testing

Nine samples of natural ground were sent to Professional Soils Laboratory for geotechnical testing. The geotechnical test results are presented in Appendix 4 and discussed further in Section 7.

Seventeen samples of topsoil, five of made ground and nine of natural ground were despatched for chemical testing. Soil samples were taken in 1 kg plastic tubs and 250 ml amber glass jars and analysed at i2 Analytical Laboratories, using MCERTs accredited methodologies where available. The chemical test results are presented in Appendix 5 and discussed further in Sections 8 and 9.

6.0 GROUND CONDITIONS

6.1 Surface Covering

Topsoil was encountered at the surface of the fields with a thickness of between 0.2 and 0.35 m, and typically 0.25 to 0.3 m. The topsoil typically comprises a clayey or silty sand or sandy clay, with occasional gravel of sandstone, and rare brick, coal and pot fragments. Cobbles of brick were encountered in the topsoil in TP03, which was excavated on the edge of the yard in the south of the site.

Granular made ground was encountered at the surface of the three trial pits (TP01, TP02 and TP24) excavated within the yard in the south with a thickness of between 0.25 and 0.5 m. The made ground in these pits is variable in consistency, comprising proportions of sand, gravel and cobbles. The gravel and cobbles largely comprise concrete, brick fragments and sandstone; clinker, coal and glass were also noted in the made ground in TP01.

Concrete hardstanding is locally present at the surface in the south east of the yard.

6.2 Made Ground

Made ground was encountered in the yard in the south west of the site to depths of between 0.25 and 0.5 m, as discussed in Section 6.1.

Elsewhere, made ground was only encountered in TP11, excavated within the footprint of the infilled ponds adjacent to the northern boundary. Reworked natural clay with gravel and cobbles of sandstone was encountered below the topsoil surface covering to a depth of 1.15 m bgl. A layer of bricks, considered to comprise the base of the ponds, was encountered at the base of the reworked clay to 1.25 m bgl.

6.3 Natural Ground

Northern Fault Block

Below the topsoil and made ground where present, the underlying natural ground below the northern two thirds of the site typically comprises stiff clay to depths of between 0.95 m (TP14) up to 2.1 m (TP09 and TP18), and generally at least 1.5 m bgl. The clay was noted to be firm in TP12, whilst firm bands between 0.25 and 0.35 m thick were noted in TP07, TP08 and TP10.

Stiff clay was encountered below natural sand in TP17 at a depth of 1.15 m bgl; it is considered that this horizon between the sand and clay is indicative of the fault line.

Coal was encountered at the base of the clay in the north / north east of the site at depths of between 0.95 and 1.7 m. Further information on the coal is provided in Section 6.4.

The bedrock beneath the clay (and coal where present) typically comprises siltstone, and was encountered at depths of between 1.6 and 2.7 m. Sandstone was recorded below the clay in TP16, and clayey gravel (considered to be completely weathered siltstone) was encountered in TP10.

Southern Fault Block

The natural ground below the southern third of the site comprises gravelly sand or sandy gravel of sandstone. Silty sand was occasionally encountered directly below the surface covering up to 0.7 m bgl.

Sandstone bedrock was encountered below the shallow granular soils at depths of between 1.1 and 1.5 m bgl, and typically became too difficult to dig with a JCB excavator at around 1.9 to 2.0 m bgl.

6.4 Coal

Coal was encountered at the base of the clay in six trial pits (TP10 to TP15) and the three rotary boreholes in the north / north east of the site at depths of between 0.95 and 1.7 m, and underlying roughly 25% of the site.

The seam typically comprises three individual leaves of coal which range in thickness between 0.15 and 0.45 m (the upper leaf of which is the thickest) separated by partings of clay and siltstone. The total thickness of the coal seam typically ranged between 1.1 and 1.35 m; only a 0.15 m band of coal was encountered in TP10, and the upper leaf of coal had weathered to a stiff clay in TP14.

The coal seam was also recorded in each of the rotary boreholes in the north of the site as a single seam between 0.7 and 0.8 m thick.

No evidence of shallow crop workings in the seam was encountered.

6.5 Groundwater

Groundwater was not encountered in any of the trial pits during the investigation.

Groundwater monitoring wells were installed in BH1 to BH3 within the footprint of the proposed attenuation basin in the north of the site. [Twelve rounds of monitoring have been completed between September 2023 and September 2024; groundwater was recorded as deep as 2.65 m \(October 2023\) and as shallow as 0.37 m \(December 2023\). Both measurements were taken in BH03, located to the north east of the site.](#)

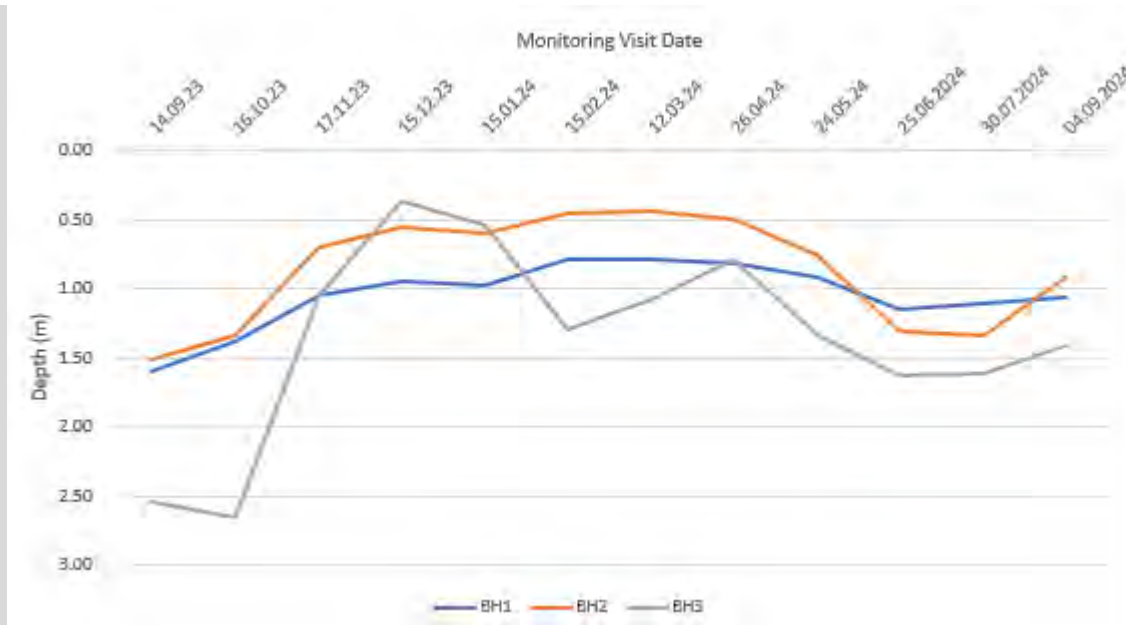
BH02 recorded water within the upper 1.0 m during the November to April rounds. BH01 and BH03 has recorded water less than 1.0 m bgl from December onwards up to May (BH01) and April (BH03).

The water level has been lowered by bailing on each monitoring visit, except BH03 on the second visit (October 2023); this is due to the depth of water being too deep to reach with a bailer on this occasion. The quickest recharge rate was recorded on the sixth visit (February 2024) in BH03 which recharged in 6 minutes. The slowest recharge rate was recorded in BH01 during the second round of groundwater monitoring (October 2024) taking 102 minutes to recharge.

The results of the groundwater monitoring visits are summarized in the table below:

Monitoring Visit	Borehole	Initial Water Depth (m bgl)	Base of Pipe (m bgl)	Water Depth After Bailing (m bgl)	Monitored Recharge Time (mins)	Recharged Water Depth (m bgl)
September 2023	BH1	1.59	6.00	1.66	20	1.64
	BH2	1.51	6.00	1.67	20	1.58
	BH3	2.54	6.00	2.58	20	2.57
October 2023	BH1	1.38	5.60	2.30	102	1.52
	BH2	1.33	6.00	2.25	68	1.34
	BH3	2.65	5.92	-	-	-
November 2023	BH1	1.05	5.60	2.03	53	1.05
	BH2	0.70	6.00	1.91	55	0.73
	BH3	1.05	5.92	2.10	14	1.05
December 2023	BH1	0.95	5.57	2.07	12	0.96
	BH2	0.55	5.95	2.65	45	0.60
	BH3	0.37	5.85	2.02	27	0.50
January 2024	BH1	0.97	5.48	2.23	20	0.97
	BH2	0.60	5.93	2.35	35	0.75
	BH3	0.54	5.84	2.29	20	0.85
February 2024	BH1	0.79	5.50	2.76	60	0.80
	BH2	0.45	5.91	2.71	42	0.49
	BH3	1.29	5.76	2.76	6	1.29
March 2024	BH1	0.79	5.40	2.46	14	0.80
	BH2	0.44	5.93	2.50	46	0.44
	BH3	1.07	5.81	2.64	12	1.08
April 2024	BH1	0.82	5.36	2.27	74	0.87
	BH2	0.50	5.88	2.30	48	0.57
	BH3	0.78	5.84	2.88	39	1.06
May 2024	BH1	0.92	5.61	2.59	49	0.92
	BH2	0.75	5.83	2.20	43	0.75
	BH3	1.33	5.79	3.18	37	1.33
June 2024	BH1	1.14	5.35	2.47	60	1.14
	BH2	1.30	5.78	2.44	20	1.30
	BH3	1.62	5.80	3.27	30	1.62
July 2024	BH1	1.11	5.61	3.08	120	1.13
	BH2	1.34	5.83	2.55	30	1.35
	BH3	1.61	5.79	2.65	30	1.62
September 2024	BH1	1.06	5.61	2.45	90	1.15
	BH2	0.92	5.83	2.63	90	1.24
	BH3	1.41	5.79	2.81	60	1.46

A fluctuating water table is evident:



7.0 GEOTECHNICAL APPRAISAL

The proposed development is to comprise low rise housing of conventional construction with associated private gardens and hardstanding areas.

Ground Conditions

Topsoil between 0.2 and 0.35 m thick is present at the surface of the fields, and granular made ground between 0.25 and 0.5 m thick is present at the surface of the yard in the south west. Reworked natural clay overlying a brick base was encountered in the footprint of the infilled ponds in the north to 1.25 m bgl.

To the north of the fault, the natural ground generally comprises stiff clay overlying siltstone bedrock from around 1.6 to 2.7 m bgl. A coal seam typically between 0.7 and 1.35 m thick was encountered below the north east ~25% of the site, encountered at depths of between 0.95 and 1.7 m bgl.

The natural ground to the south of the fault comprises gravelly sand or sandy gravel of sandstone, overlying sandstone bedrock from around 1.1 to 1.5 m bgl.

Groundwater was not encountered during the excavation of the trial pits. Twelve rounds of groundwater monitoring have been completed for the wells installed in the north of the site; groundwater was recorded at depths of between 0.37 and 2.65 m bgl.

Geotechnical Testing

Hand Vanes

Hand shear vane tests were carried out within the natural clay in fourteen of the trial pits at depths of between 0.7 and 2.0 m.

The lowest average hand shear vane readings were recorded in TP07 at 0.8 m (60 kN/m²) and also TP12 at 1.0 m (68 kN/m²), which equates to either firm (40 to 75 kN/m²) strata. The remaining pits recorded average readings ranging between 81 and 150 kN/m², which equates to stiff strata (75 to 150 kN/m²).

Atterberg Testing

Geotechnical testing was carried out on nine samples of natural clay, including one sample comprising a weathered coal seam (TP15 1.0 m).

The sample of completely weathered coal collected from TP15 recorded a modified plasticity index (MPI) of 60%, which equates to high volume change potential (>40%) in accordance with NHBC Standards.

One sample of natural clay (TP18 0.9 m) recorded a MPI of 53%, whilst the remaining seven samples recorded MPIs ranging between 22 and 37%, which equates to medium (20 to 40%) volume change potential. The result for sample TP18 0.9 m appears to be anomalously high – when queried with the laboratory, no reason for this high reading could be determined.

It is considered that the natural clay across the majority of the site could be considered to be of medium volume change potential. At this stage, the natural clay in the vicinity of TP15 and TP18 should be assumed to be of high volume change potential.

7.1 Foundations

A minimum bearing capacity of 150 kN/m² is considered to be appropriate for the residual shallow strata (i.e. clay or sand), increasing significantly for the underlying bedrock. A lower bearing capacity of 125 kN/m² should be assumed where firm clay is encountered (e.g. TP12).

Traditional strip or trench fill footings are considered to be suitable for all plots. Footings should be taken through any made ground into the underlying natural strata to a minimum depth of 900 mm in clay (increasing to 1000 mm in the vicinity of TP15 and TP18) or 600 mm in sand. The minimum depth for clay should be taken from the lowest of existing or finished ground level.

The monitoring wells installed in the lowest point of the site recorded water at between 0.37 and 2.65 m bgl. No evidence of a strike was noted within the exploratory holes, indicating that the groundwater is held within the clay, potentially slow to ingress into excavations. For foundations within the northern part of the site, excavations should not be left open for a significant period of time in case groundwater ingress occurs. If foundations are deepened due to trees and a very shallow water table is present during wetter times of the year, consideration should be given to using piled foundations.

Where foundations span across different ground types, e.g. clay and sand, they should be taken down to found on the same material, or thickened and reinforced to minimise the effects of differential settlement.

Where foundations are in clay and within influencing distance of past, present or proposed trees, the footing depth will need to be increased in accordance with the NHBC Standards Chapter 4.2.

Precautions against soil heave due to the influence of past or present trees are likely to be required wherever the footing depth is increased to greater than 1500 mm.

Future movement of the faults is not expected; no additional precautions due to faulting (i.e. reinforced foundations or movement joints) are considered to be necessary.

7.2 Ground Floors

Where less than 600 mm of made ground is present, ground bearing slabs will be appropriate.

Where greater than 600 mm of made ground is encountered (including where ground levels are raised), reinforced suspended slabs or precast concrete floors with a minimum 150 mm high ventilated void should be used (increasing to 250 or 300 mm for plots where heave precautions are required).

7.3 Superstructure Precautions

No additional superstructure precautions will be required due to the ground conditions encountered.

7.4 Excavation Problems and Obstructions

A combined sewer is located below the north of the site and will need to be taken into account as part of the proposed development.

A layer of bricks was encountered in TP11, excavated in the footprint of the infilled ponds/reservoirs in the north of the site, at a depth of 1.15 m. This will need to be excavated where it presents an obstruction to the proposed development (i.e. the attenuation pond).

Sandstone bedrock was encountered below the southern third of the site at depths of between 1.1 and 1.5 m bgl. Trial pits which encountered sandstone were terminated at depths of around 1.9 to 2.0 m due to the strength of the bedrock; the pits were excavated using a JCB 3CX.

A shallow water table is expected in the north of the site.

Support will therefore be required in accordance with current Health & Safety Regulations wherever access is required to trenches deeper than 1.2 m or less where there is risk of collapse.

7.5 Roads

A CBR value of at least 2% is likely to be appropriate for road design. The ground should be assumed to be frost susceptible and a minimum construction thickness of 450 mm will therefore

apply. It is recommended that CBR tests are undertaken along any proposed roads prior to construction so that more accurate CBR values can be obtained.

7.6 Surface Water Drainage

Soakaway tests were completed in three trial pits, referenced SA1/TP08, SA2/TP14 and SA3/TP20.

The infiltration tests completed in SA1 and SA2 failed to drain; these pits were excavated in the impermeable cohesive strata in the north of the site.

Three tests were completed in SA3, which was excavated in the sandstone bedrock in the south of the site. The water took roughly 30 to 70 minutes to drain during each of the tests, and the calculated infiltration rates are present in the table below.

Test No.	Average Infiltration Rate ($\times 10^{-6}$ m/s)	BRE365 Infiltration Rate ($\times 10^{-6}$ m/s)
1	57	120
2	79	100
3	58	76

Since the northern two thirds of the site are underlain by impermeable clays and a shallow water table is expected to be present below the north of the site, soakaway drainage is not considered to be viable for the site.

8.0 REFINEMENT OF OUTLINE CONCEPTUAL MODEL

8.1 Source Characterisation

An outline conceptual model, detailing the possible sources and associated contaminants of concern, potential pathways and receptors identified in the Phase 1 was detailed in Section 4.0.

This section of the report documents the works undertaken to obtain information to test and refine this model enabling a risk assessment to be produced and, where significant risks are expected, remediation recommendations.

8.2 Investigation of Potential Contamination Sources

The investigation works undertaken to cover each of the sources of potential contamination outlined in Section 4, are detailed in the table below:

Source	Potential Contaminants	Targeted Exploratory Holes
Topsoil	Heavy metals/metalloids PAHs Asbestos	Topsoil was encountered in 24 of the exploratory holes
Made ground	Heavy metals/metalloids PAHs Asbestos	Made ground was encountered in 4 of the exploratory holes
Sulphates and low pH in made ground or natural ground	Sulphates Low pH	Natural ground was encountered in all exploratory holes

8.3 Gas Precautions

No radon precautions are required.

Reworked natural clay was encountered in TP11, excavated in the footprint of the infilled ponds located adjacent to the northern site boundary, to a depth of 1.15 m. Significant organic material which could potentially pose a risk of ground gas was not present within the pond backfill.

Another infilled pond is located in the north of the site, but was not targeted as part of this investigation due to the proximity of the sewer which crosses below this section of the site. This feature should be investigated prior to or during development of the site, although due to its small size it is not expected to present a significant risk of ground gas.

At this stage, no ground gas precautions are considered to be required for the site.

8.4 Unexpected Contamination

No visual or olfactory observations of unexpected contamination were noted.

8.5 Chemical Testing

Seventeen samples of topsoil, five samples of made ground (including one sample of topsoil/made ground) and nine samples of natural ground were sent for chemical testing. Each of the samples was analysed for the suite of contaminants listed overleaf.

Contaminant Type	Actual Contaminants
Metals/Metalloids	Arsenic, cadmium, chromium, lead, mercury, nickel, selenium, copper and zinc
pH	pH
PAHs	Speciated PAH
Sulphates*	Water soluble sulphate, acid soluble sulphate, total sulphur
Asbestos**	Fibres
TOC	Total organic carbon content

*Made and natural ground samples only

**Topsoil and made ground samples only

Selected samples of topsoil and made ground were tested for total organic carbon (TOC).

One sample of the natural ground (TP12 1.6 m) which comprised a sample of coal was tested for a sulphate suite only.

Testing was undertaken by at i2 Analytical Laboratories, using MCERTs accredited methodologies where available.

8.6 Assessment Criteria

The proposed development of the site is to be residential with associated gardens. Therefore, the assessment criteria relating to a residential end use with homegrown produce have been used. Tables detailing the relevant assessment concentrations used are included in Appendix 5.

8.7 Chemical Test Results

Some preliminary risk assessment is undertaken in this section of the report where determinants can be readily discounted.

8.7.1 Topsoil

The samples recorded an average total organic carbon of 2.15%, which equates to 3.7% soil organic matter (SOM). Assessment criteria derived for 2.5% SOM have therefore been used in this assessment.

The concentrations of the contaminants tested did not exceed the assessment values.

Asbestos was not detected in any of the tested samples.

None of the samples of the topsoil was recorded elevated concentrations above their respective phytotoxic assessment values

8.7.2 Made Ground

The samples recorded an average total organic carbon of 1.77%, which equates to 5.31% soil organic matter (SOM). Assessment criteria derived for 2.5% SOM have therefore been used in this assessment.

Elevated concentrations of up to five PAHs were recorded in two samples of made ground (TP02 0.1 m and TP24 0.1 m) collected from below the yard in the south. The elevated concentrations are summarised in the table below.

PAH	Assessment Value (mg/kg)	Elevated Concentration (mg/kg)	
		TP02 0.1 m	TP24 0.1 m
Benzo(a)anthracene	11	-	27
Chrysene	22	-	25
Benzo(b)fluoranthene	3.3	7.2	37
Benzo(a)pyrene	2.7	6.5	29
Dibenz(a,h)anthracene	0.28	0.83	4.9

No other elevated concentrations of contaminants were recorded.

Asbestos was not detected in any of the tested samples.

None of the samples of made ground recorded elevated concentrations above their respective phytotoxic assessment values.

8.7.3 Natural Ground

Assessment criteria derived for 1% SOM have been used in this assessment.

None of the samples recorded elevated concentrations of any of the determinants when compared to their human health or phytotoxicity assessment values.

8.7.4 Sulphates

In accordance with BRE Special Digest 1, the site comes under the classification of 'Brownfield' and groundwater is expected to be mobile.

The following table displays the results of the made ground and natural ground samples tested:

Made Ground	Range of Results	Characteristic Value
Water Soluble Sulphate (mg/l)	14.9 to 89	89
Total Sulphur (%)	0.033 to 0.148	0.148
Total Potential Sulphate (%)	0.099 to 0.444	0.444
pH	6.4 to 9.2	6.4
Natural Ground (Clay/Sand)	Range of Results	Characteristic Value
Water Soluble Sulphate (mg/l)	2.4 to 79.7	75
Total Sulphur (%)	0.005 to 0.025	0.022
Total Potential Sulphate (%)	0.015 to 0.075	0.066
pH	6.7 to 7.9	6.85
Natural Ground (Coal, TP12 1.6 m)	Results	Characteristic Value
Water Soluble Sulphate (mg/l)	97.9	97.9
Total Sulphur (%)	2.3	2.3
Total Potential Sulphate (%)	6.9	6.9
pH	4.4	4.4

8.8 Significant Pollutant Linkages

The significant pollutant linkages consequently identified are thus documented in the following table.

Source	Pathway	Receptor
Elevated PAHs, asbestos fibres in made ground	Ingestion, inhalation, direct contact	Future residents & visitors to the site Site construction workers Secondary A Aquifer
Low pH in made ground High sulphates in coal	Direct contact	Below ground concrete

9.0 RISK ASSESSMENT

9.1 Human Health: Future Site Users

Topsoil

No elevated concentrations of contaminants were recorded in the topsoil, which can be considered to be suitable for re-use.

Made Ground

Two samples of made ground tested from below the yard in the south west of the site recorded elevated concentrations of up to five PAHs (including benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene and dibenz(a,h)anthracene). In addition, asbestos fibres were identified in the made ground during the previous ground investigation by JPN Group, although quantification testing recorded the percentage of fibres to be <0.001%.

Where the made ground below the yard is to remain below gardens and landscaped areas, it is considered that a minimum 600 mm thick clean capping layer, including a minimum 100 mm topsoil, will need to be provided. Alternatively, the made ground may be excavated and placed below plots or hardstanding areas to cut off the pathway between site end users and the material.

No remedial measures are considered to be required for the made ground encountered in the infilled ponds in the north.

Natural Ground

No elevated concentrations of contaminants were recorded in the natural ground, which can be considered to be suitable for re-use.

Where coal seams or coal-rich strata lie less than 1 m below the surface of gardens or soft landscaped areas, a minimum 1 m thick capping will be required to reduce the potential for combustion. However, only one trial pit recorded coal at less than 1 m below current ground level, and levels are likely to be raised slightly meaning a 1 m cap will already be provided. This will need to be confirmed when proposed levels are known.

Similarly, coal or coal-rich strata surrounding electricity cables should be removed to a distance of 1 m from the service in all directions and replaced with appropriate, non-combustible, fill.

Asbestos

The structures in the farm yard were noted to have cement-bound asbestos sheet roofs. Any asbestos containing materials (ACMs) identified on the site will need to be removed by a specialist contractor.

9.2 Human Health: During Construction

Groundworkers employed during the construction phase of the development are most at risk of harm due to them having direct contact with the affected soils. However, the contact is generally of short duration, and all competent ground workers will be aware of the potential risks associated with the made ground soils. Therefore, the overall risk to the health of construction workers is considered to be low.

Normal site procedures, such as the wearing of gloves when handling soils and the washing of hands prior to eating, should be implemented at all times.

9.3 Plants

None of the samples of made or natural ground recorded elevated concentrations of metals/metalloids above the respective phytotoxicity assessment values. The risk to plant growth is therefore considered to be negligible from site won materials.

A capping layer is proposed for the made ground in the south west of the site which recorded significantly elevated PAH concentrations where this remains below gardens and landscaped areas.

9.4 Ground Gas

No radon or ground gas precautions are considered to be necessary for the site.

9.5 Construction Materials

The chemical results indicate DS-2 AC-3z sulphate precautions are required where sub-surface concrete is in contact with made ground.

The results of the sample of coal tested indicated DS-5 AC-5 sulphate precautions are required for concrete in contact with coal. In accordance with BRE Special Digest 1, a limiting factor can be applied as the water soluble sulphate concentration is equivalent to DS-3 or less. Concrete in contact with coal should therefore contain DS-4 AC-4 sulphate precautions.

Where concrete is in contact with the natural ground only (excluding coal-bearing strata), DS-1 AC-1 sulphate precautions are considered to be appropriate.

The chemical test results will need to be submitted to the water supplier for review so that appropriate water supply pipes can be selected.

9.6 Controlled Waters

The site is located over a Secondary A Aquifer and the site is not within a Groundwater Source Protection Zone.

Although elevated concentrations of contaminants were recorded in the made ground (where present), no evidence of the downwards migration of contaminants was noted with no elevated contaminants recorded in the natural ground. The risk to controlled waters is therefore considered to be low.

Standard good site practice during the construction phase of the development must still be adhered to in terms of surface water run-off control measures, to ensure there is no risk to controlled waters.

9.7 Unexpected Contamination

Should any unusual, brightly coloured, ashy, fibrous or odorous material or material suspected of containing asbestos be encountered during construction this should be brought to the attention of the site staff and investigated.

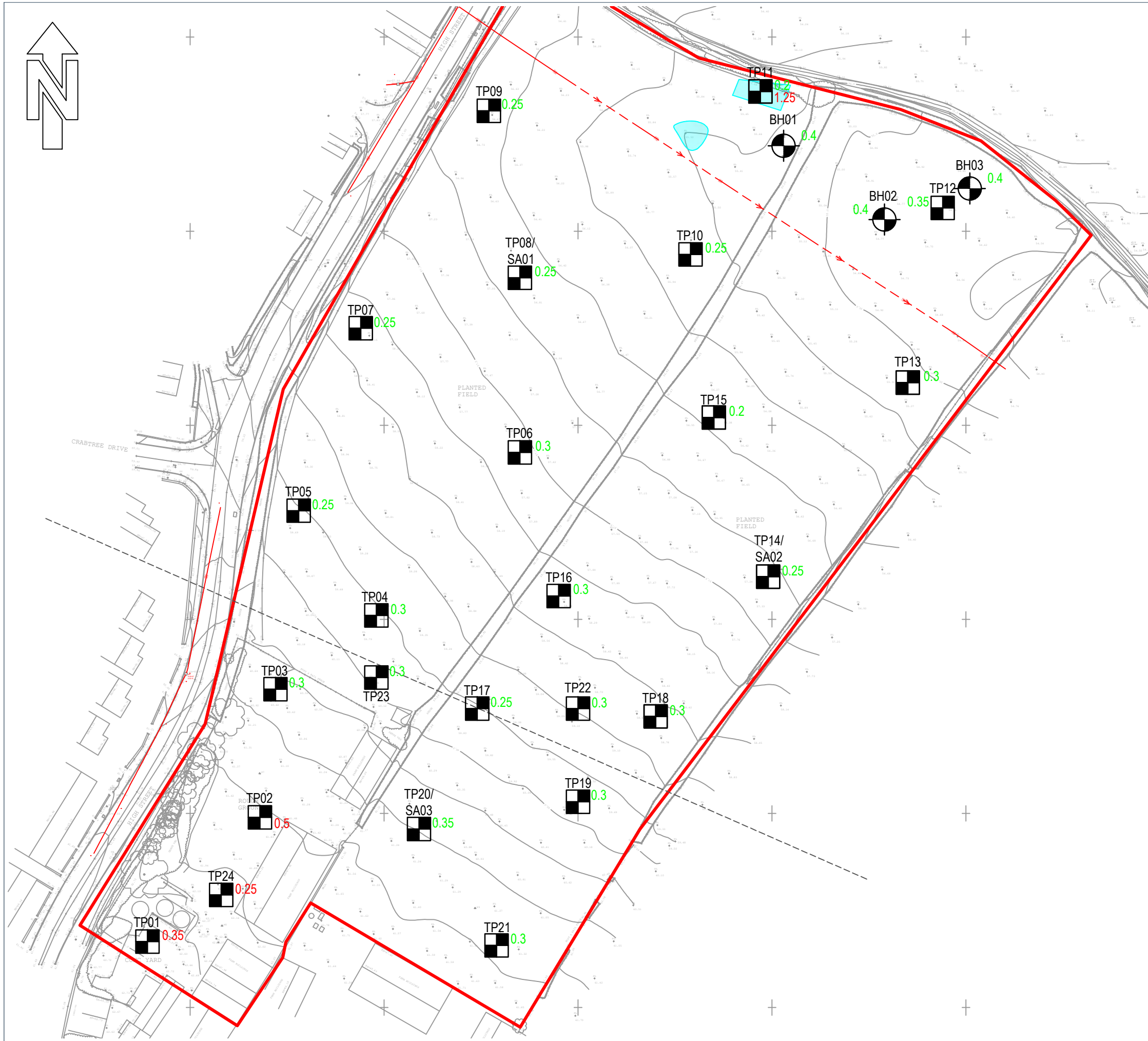
9.8 Disposal of Material

If material needs to be removed, it should to be taken to a suitably licensed landfill or waste treatment facility. The costs of disposal and landfill tax can be substantial. The disposal of material should therefore be seen as a last resort with options such as treatment and reuse either on-site or off-site considered where possible.

The category of landfill which can accept the waste (inert, non-hazardous or hazardous) would need to be determined and will also have a significant effect on the costs. Additional testing may be required by the landfill operator and the acceptance of material is generally at their discretion.

Appendix 1

Exploratory Hole Location Plan, 48417-ECE-XX-XX-DR-C-0001 P01



- Existing combined sewer
- Approximate location of trial pit excavated by ECE on 30-31.08.2023.
- Approximate location of monitoring well installed by ECE on 31.08.2023.
- Approximate extent of infilled ponds taken from 1892 & 1993 historical maps.
- 0.3 Depth to base of topsoil (m)
- 0.5 Depth to base of made ground (m)
- - - Approximate location of fault (inferred from ground conditions).

P01	First Issue.	JL	DN	29.09.2023
REV	DESCRIPTION	SIG	CHK	DATE

AVANT HOMES

MANOR FARM, GREAT HOUGHTON

EXPLORATORY HOLE LOCATION PLAN

Eastwood
CONSULTING ENGINEERS

St Andrew's House
23 Kingfield Road
Sheffield, S11 9AS

T: 0114 255 4554
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ECE PROJECT No	SCALE AT A3	STATUS	SUITABLE FOR
48417	1:1000	S0	Initial
DRAWING NUMBER			REV
48417 - ECE - XX - XX - DR - C - 0001			P01
Project	Originator	Zone	Level Type Role Number

Appendix 2

Envirocheck

Consultants Coal Mining Report

Historical Mapping Legends

Ordnance Survey County Series 1:10,560

	Gravel Pit		Sand Pit		Other Pits
	Quarry		Shingle		Orchard
	Osiers		Reeds		Marsh
	Mixed Wood		Deciduous		Brushwood
	Fir		Furze		Rough Pasture
	Arrow denotes flow of water		Trigonometrical Station		
	Site of Antiquities		Bench Mark		
	Pump, Guide Post, Signal Post		Well, Spring, Boundary Post		
	-285 Surface Level				
	Sketched Contour		Instrumental Contour		
	Main Roads		Minor Roads		
	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 Burgh 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 Shown only when not coincident with other boundaries		
	Civil Parish Shown alternately when coincidence of boundaries occurs		
	BP, BS Boundary Post or Stone		Pol Sta Police Station
	Ch Church		PO Post Office
	CH Club House		PC Public Convenience
	F E Sta Fire Engine Station		PH Public House
	FB Foot Bridge		SB Signal Box
	Fn Fountain		Spr Spring
	GP Guide Post		TCB Telephone Call Box
	MP Mile Post		TCP Telephone Call Post
	MS Mile Stone		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
	Coniferous trees (scattered)		Positioned tree
	Orchard		Coppice or Osiers
	Rough Grassland		Heath
	Scrub		Marsh, Salt Marsh or Reeds
	Water feature		Flow arrows
	MHW(S) Mean high water (springs)		MLW(S) 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

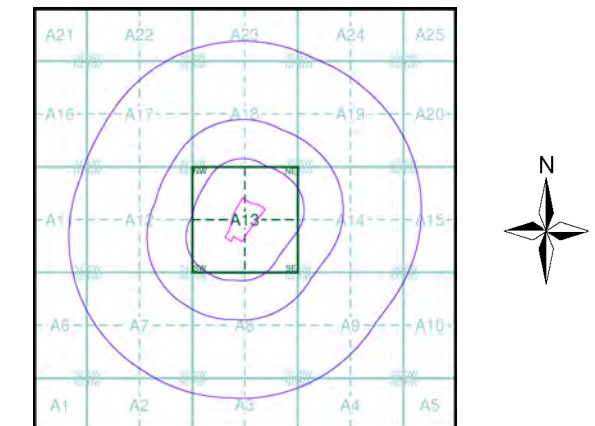
Envirocheck

LANDMARK INFORMATION GROUP

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:10,560	1854	2
Yorkshire	1:10,560	1894	3
Yorkshire	1:10,560	1906 - 1907	4
Yorkshire	1:10,560	1931 - 1932	5
Yorkshire	1:10,560	1938 - 1948	6
Yorkshire	1:10,560	1938 - 1948	7
Yorkshire	1:10,560	1948	8
Ordnance Survey Plan	1:10,000	1955	9
Ordnance Survey Plan	1:10,000	1967	10
Ordnance Survey Plan	1:10,000	1983	11
Ordnance Survey Plan	1:10,000	1989	12
10K Raster Mapping	1:10,000	2000	13
10K Raster Mapping	1:10,000	2006	14
VectorMap Local	1:10,000	2023	15

Historical Map - Slice A



Order Details

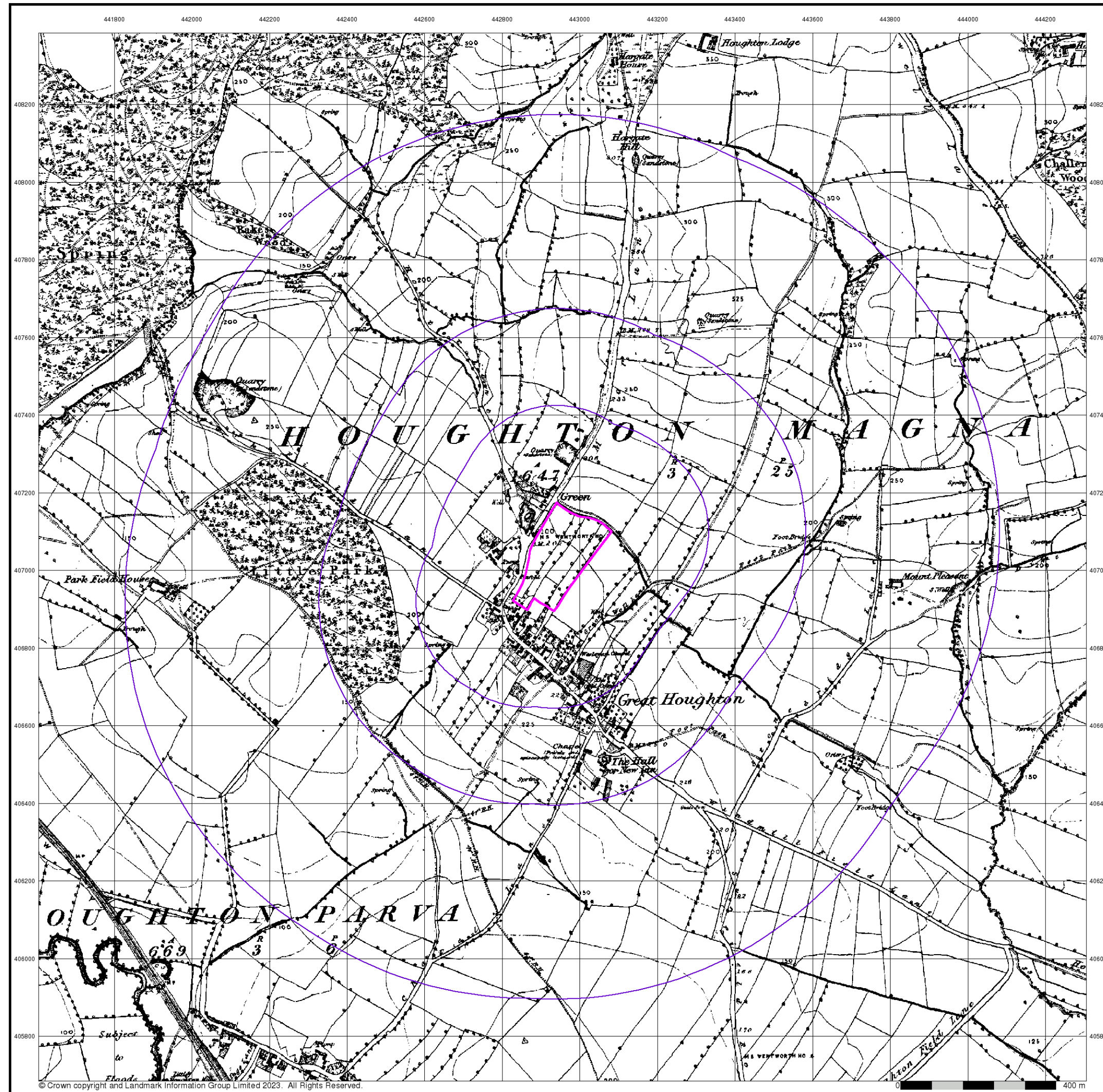
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Site Details

Site at 442960, 407060

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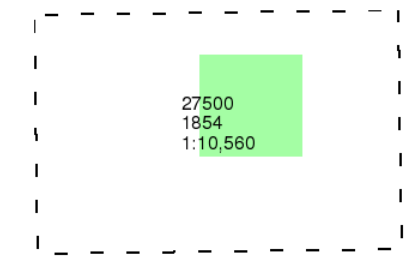
Tel: 0844 844 9952
 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



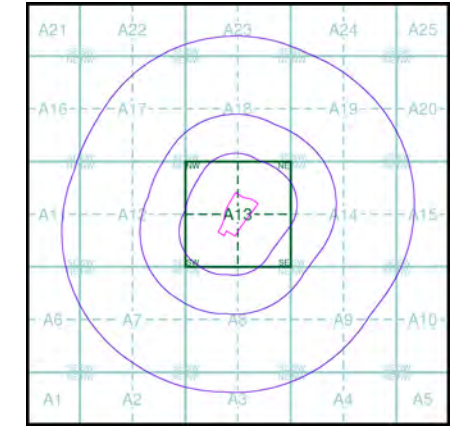
Yorkshire
Published 1854
Source map scale - 1:10,560

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Map Name(s) and Date(s)

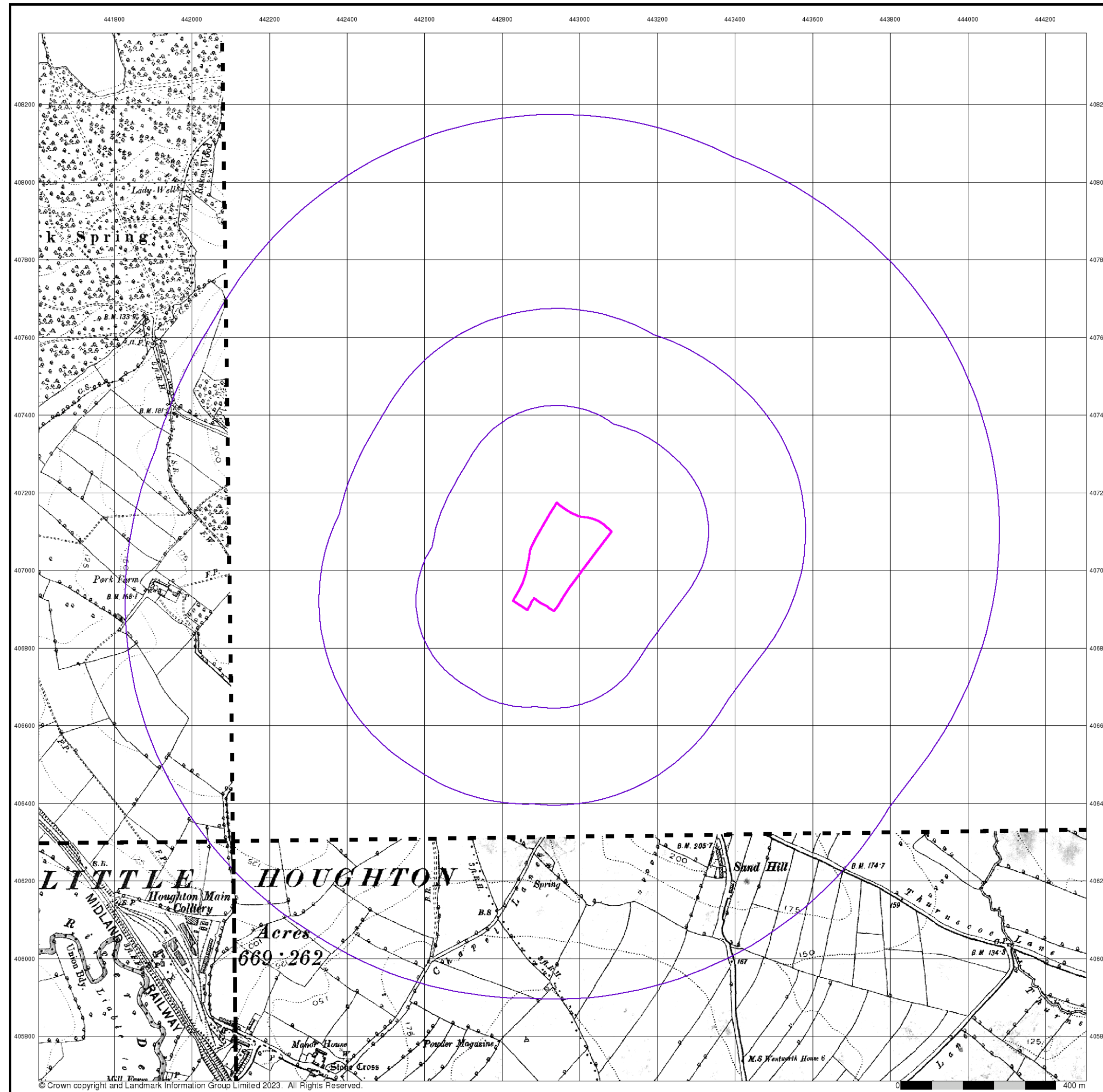


Historical Map - Slice A



Order Details
Order Number: 315590317_1_1
Customer Ref: 48417
National Grid Reference: 442950, 407030
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Search Buffer (m): 1000

Site Details
Site at 442960, 407060



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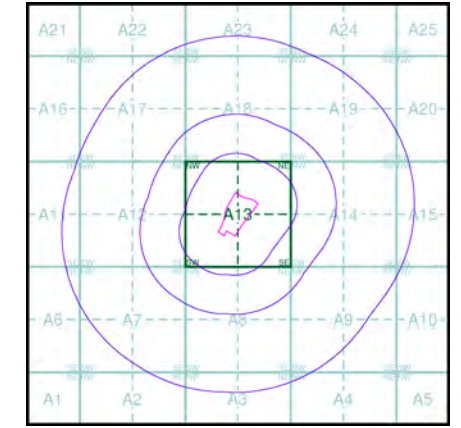
Yorkshire
Published 1894
Source map scale - 1:10,560

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)

275NW 1894 1:10,560		275SE 1894 1:10,560
275SW 1894 1:10,560		275E 1894 1:10,560

Historical Map - Slice A

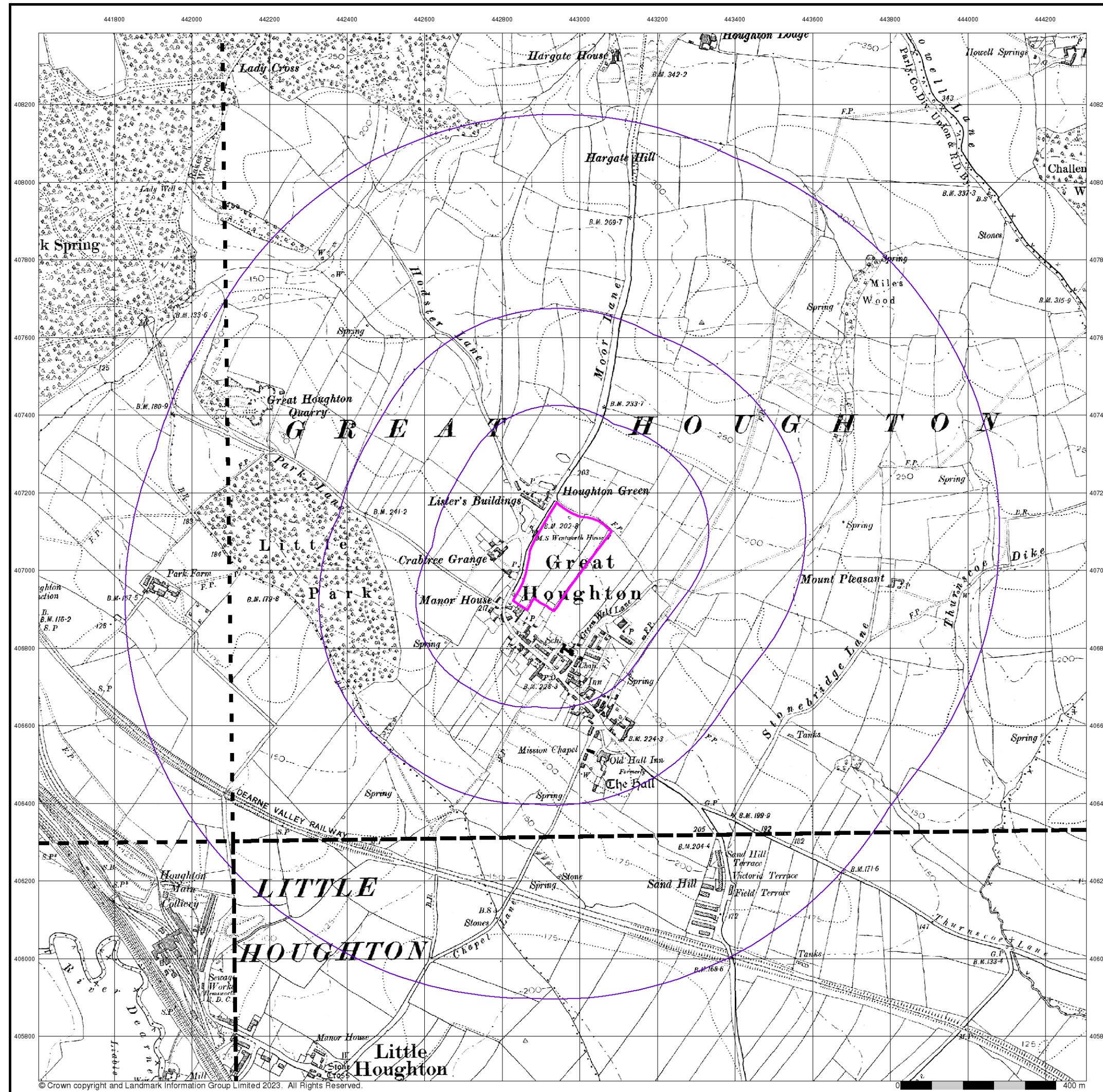


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Site Details

Site at 442960, 407060



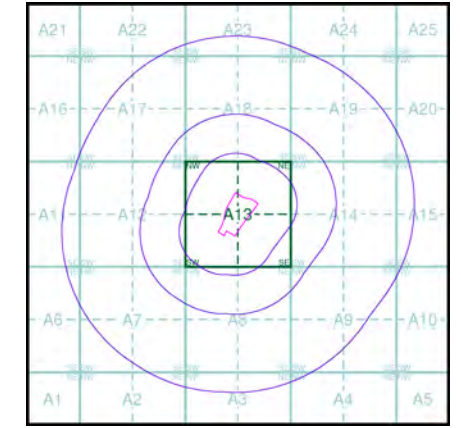
Yorkshire
Published 1906 - 1907
Source map scale - 1:10,560

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)

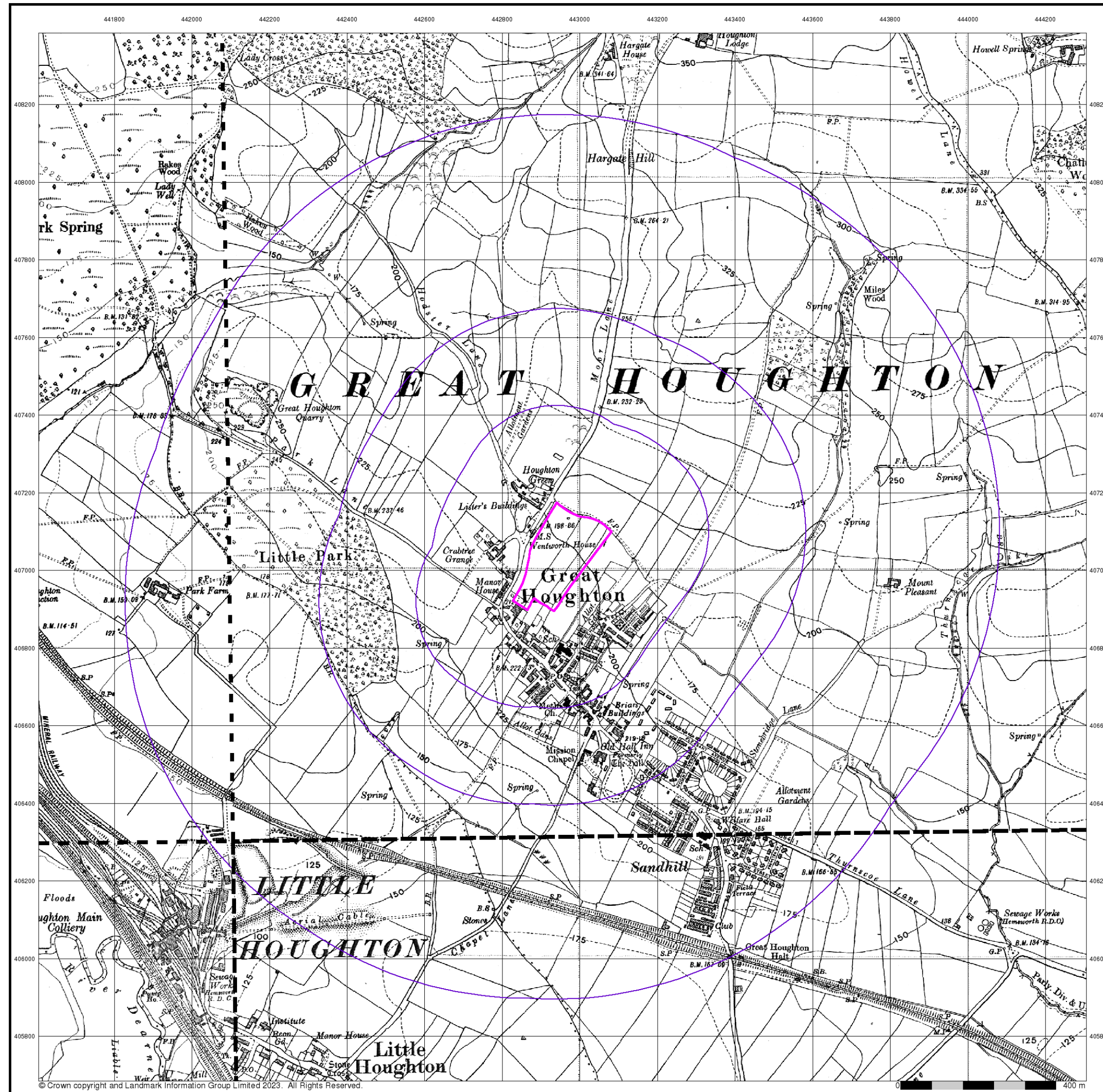
275NW 1906 1:10,560	275NE 1907 1:10,560
275SW 1907 1:10,560	275SE 1906 1:10,560

Historical Map - Slice A



Order Details
 Order Number: 315590317_1_1
 Customer Ref: 48417
 National Grid Reference: 442950, 407030
 Slice: A
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Site Details
 Site at 442960, 407060



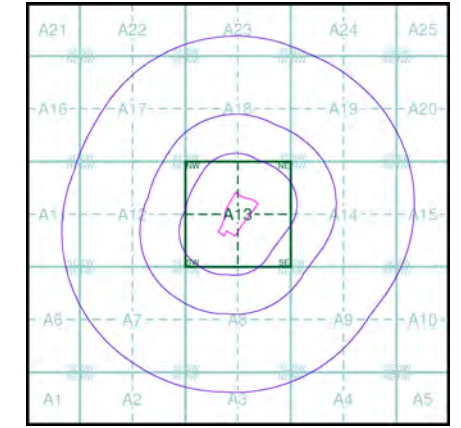
Yorkshire
Published 1938 - 1948
Source map scale - 1:10,560

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)

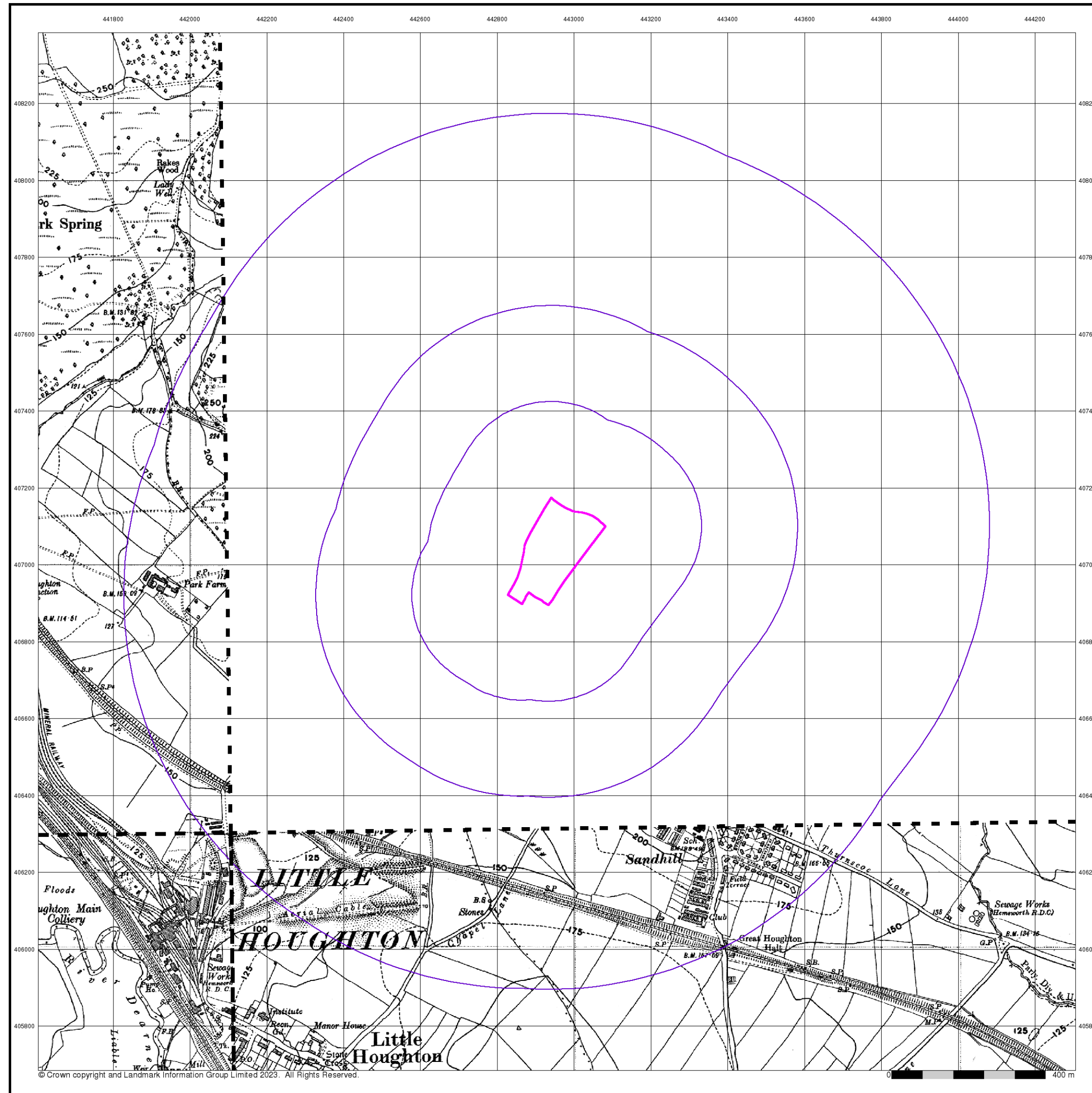
275NW 1938 1:10,560	275NE 1948 1:10,560
275SW 1938 1:10,560	275SE 1938 1:10,560

Historical Map - Slice A



Order Details
 Order Number: 315590317_1_1
 Customer Ref: 48417
 National Grid Reference: 442950, 407030
 Slice: A
 Site Area (Ha): 3.56
 Search Buffer (m): 1000

Site Details
 Site at 442960, 407060



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Yorkshire

Published 1938 - 1948

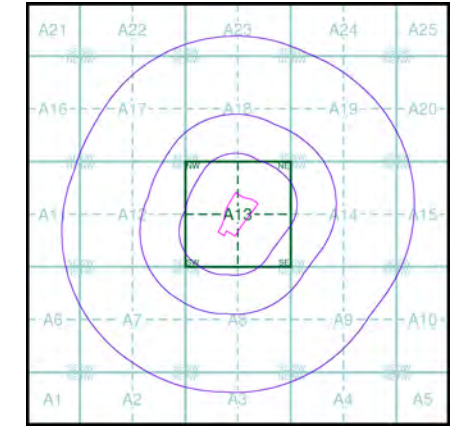
Source map scale - 1:10,560

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)

275NW 1938 1:10,560		
275SW 1938 1:10,560		275SE 1948 1:10,560

Historical Map - Slice A

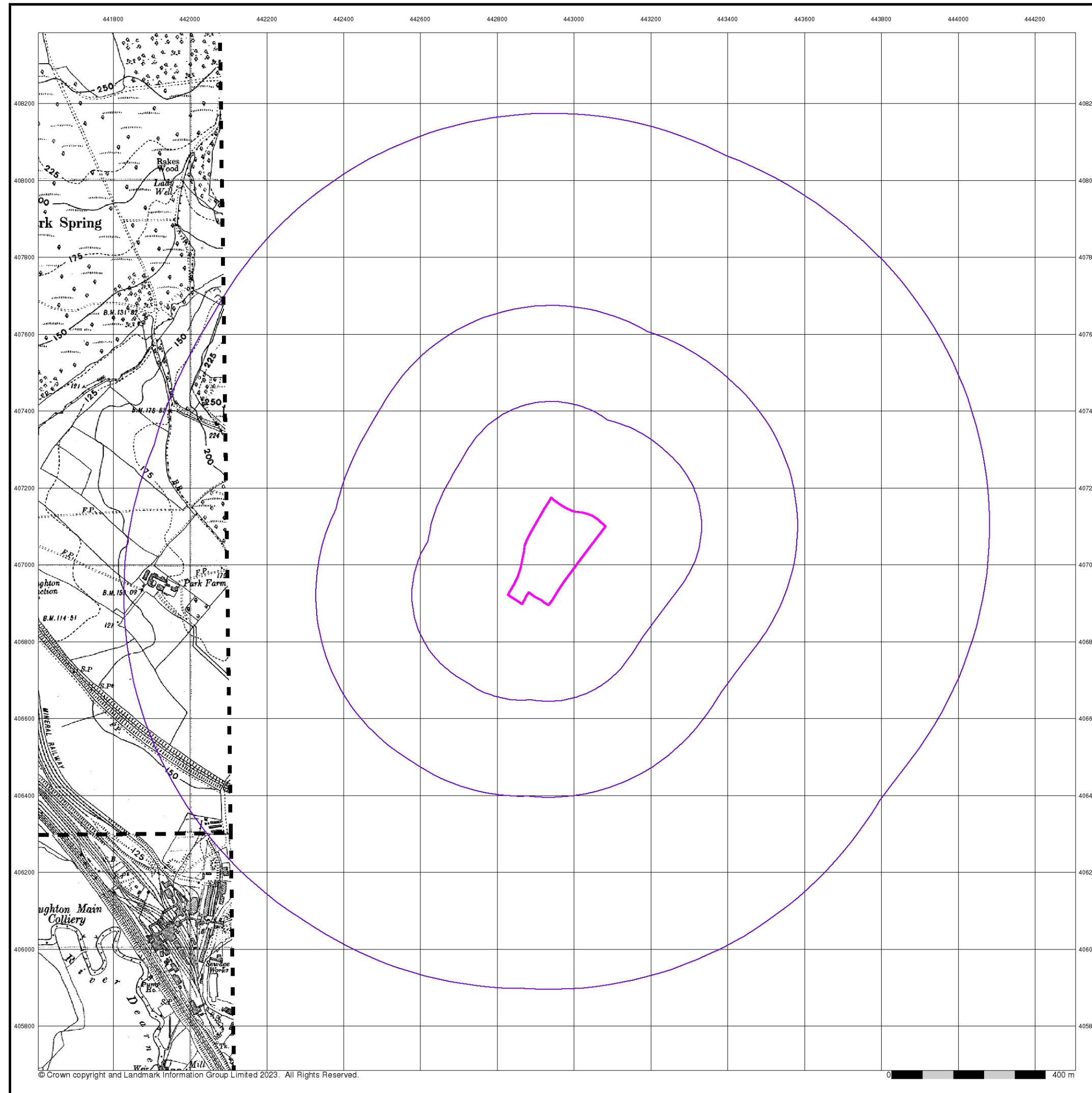


Order Details

Order Number: 315590317_1_1
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 National Grid Reference: 442950, 407030
 Slice: A
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Site Details

Site at 442960, 407060



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Yorkshire

Published 1948

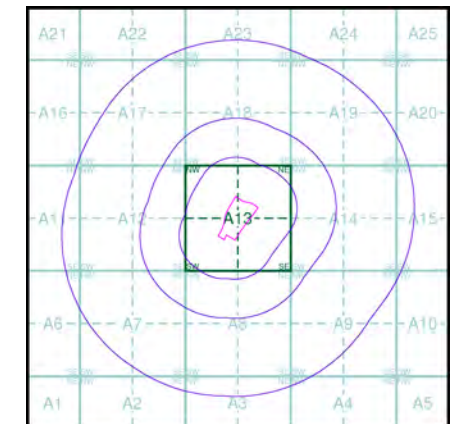
Source map scale - 1:10,560

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Map Name(s) and Date(s)

275NW	1948	1:10,560
275SW	1948	1:10,560

Historical Map - Slice A

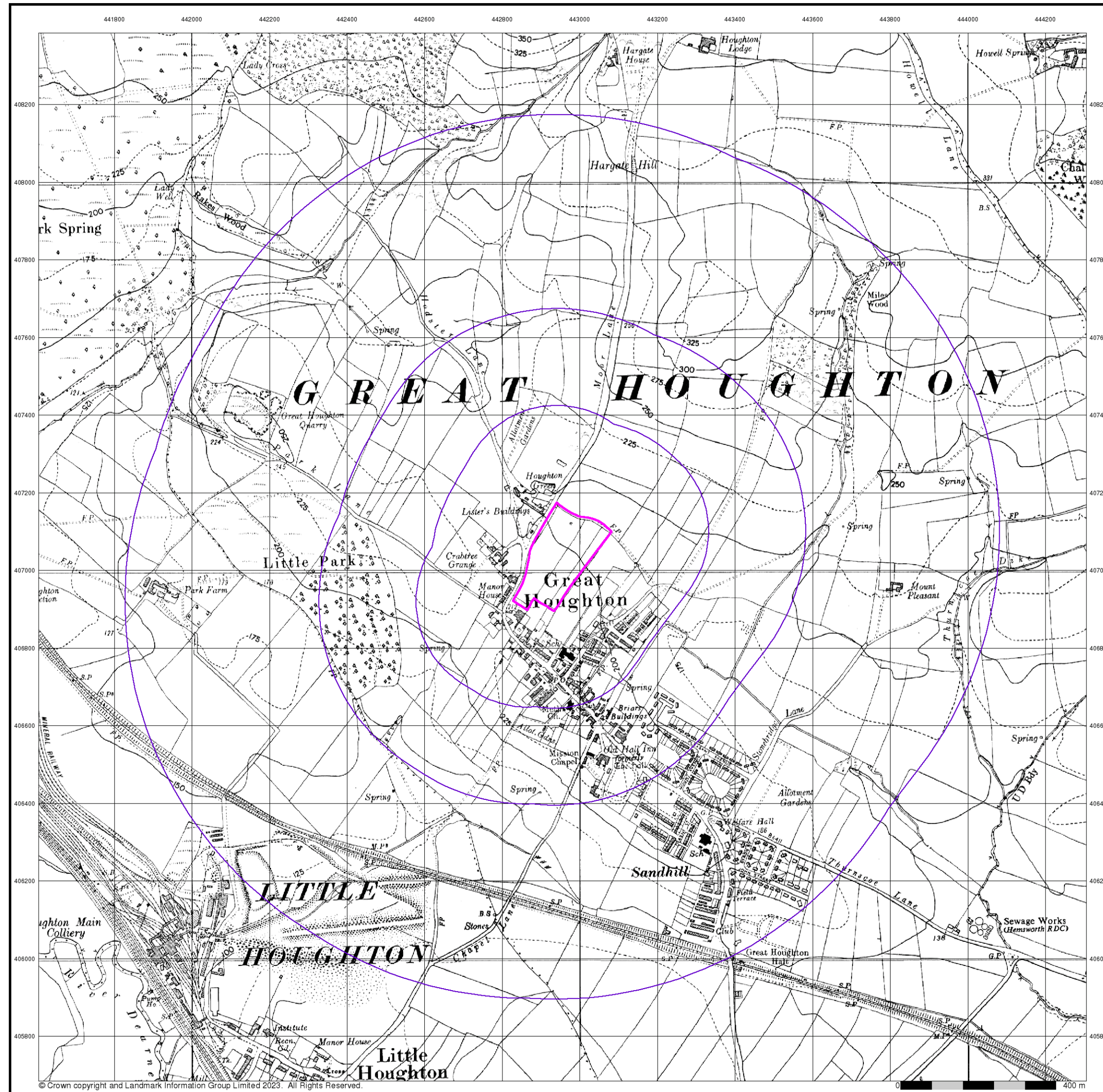


Order Details

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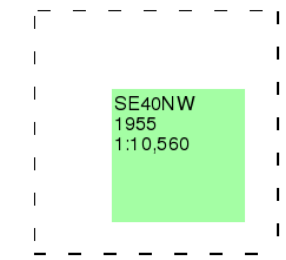
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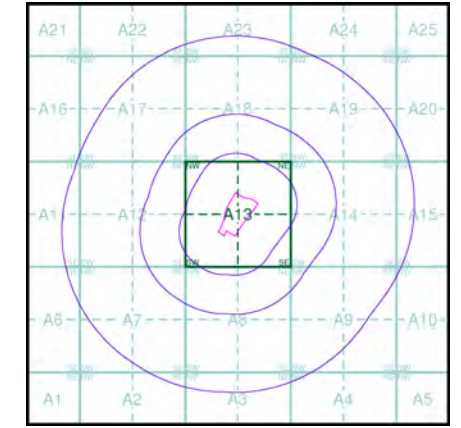
Ordnance Survey Plan Published 1955 Source map scale - 1:10,000

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)

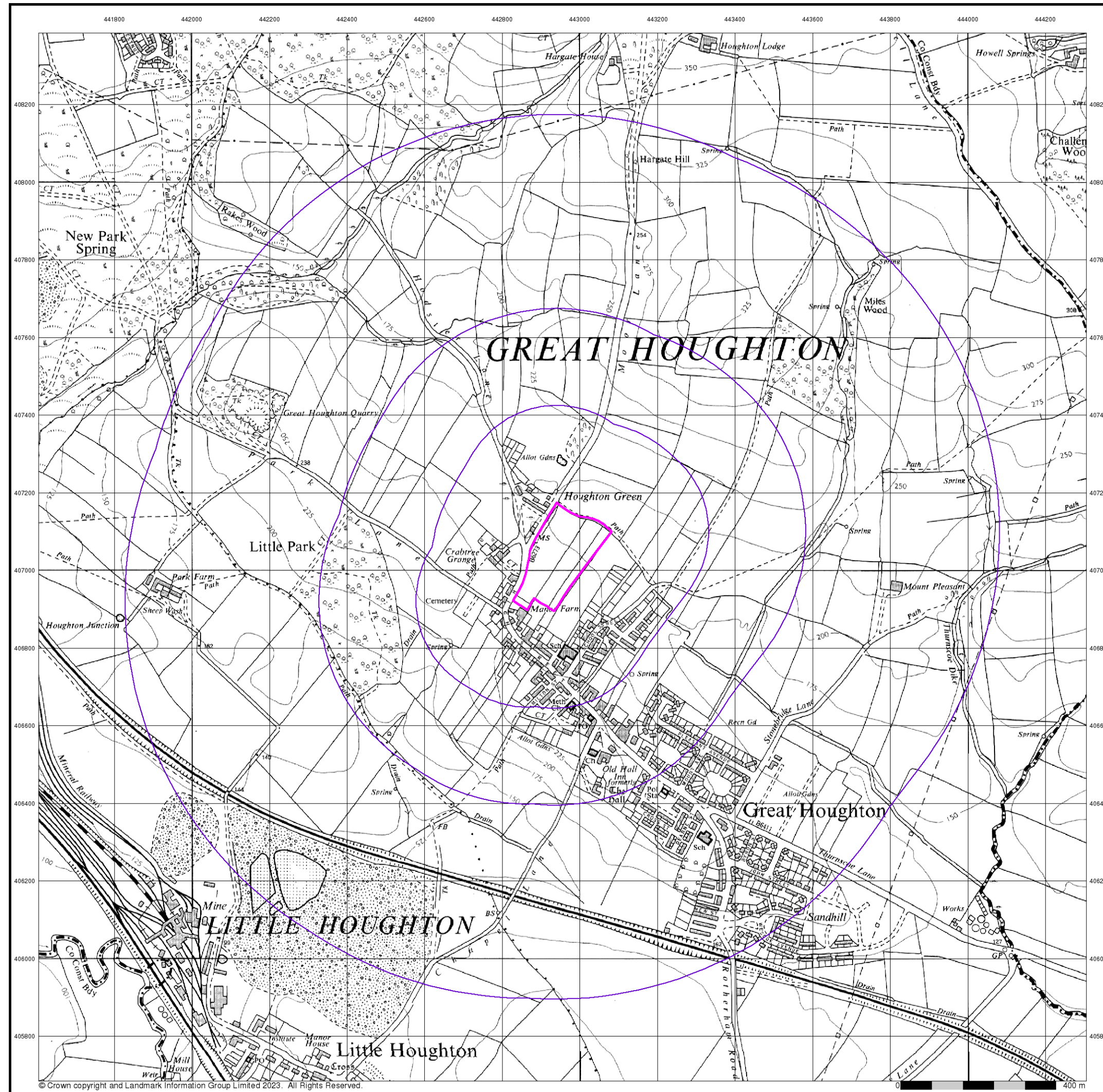


Historical Map - Slice A



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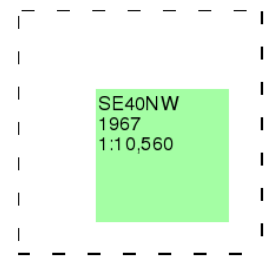
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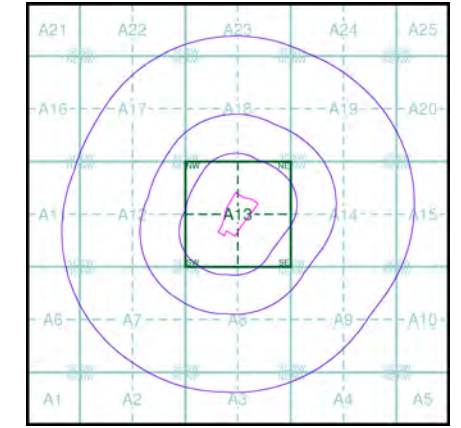
Ordnance Survey Plan Published 1967 Source map scale - 1:10,000

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

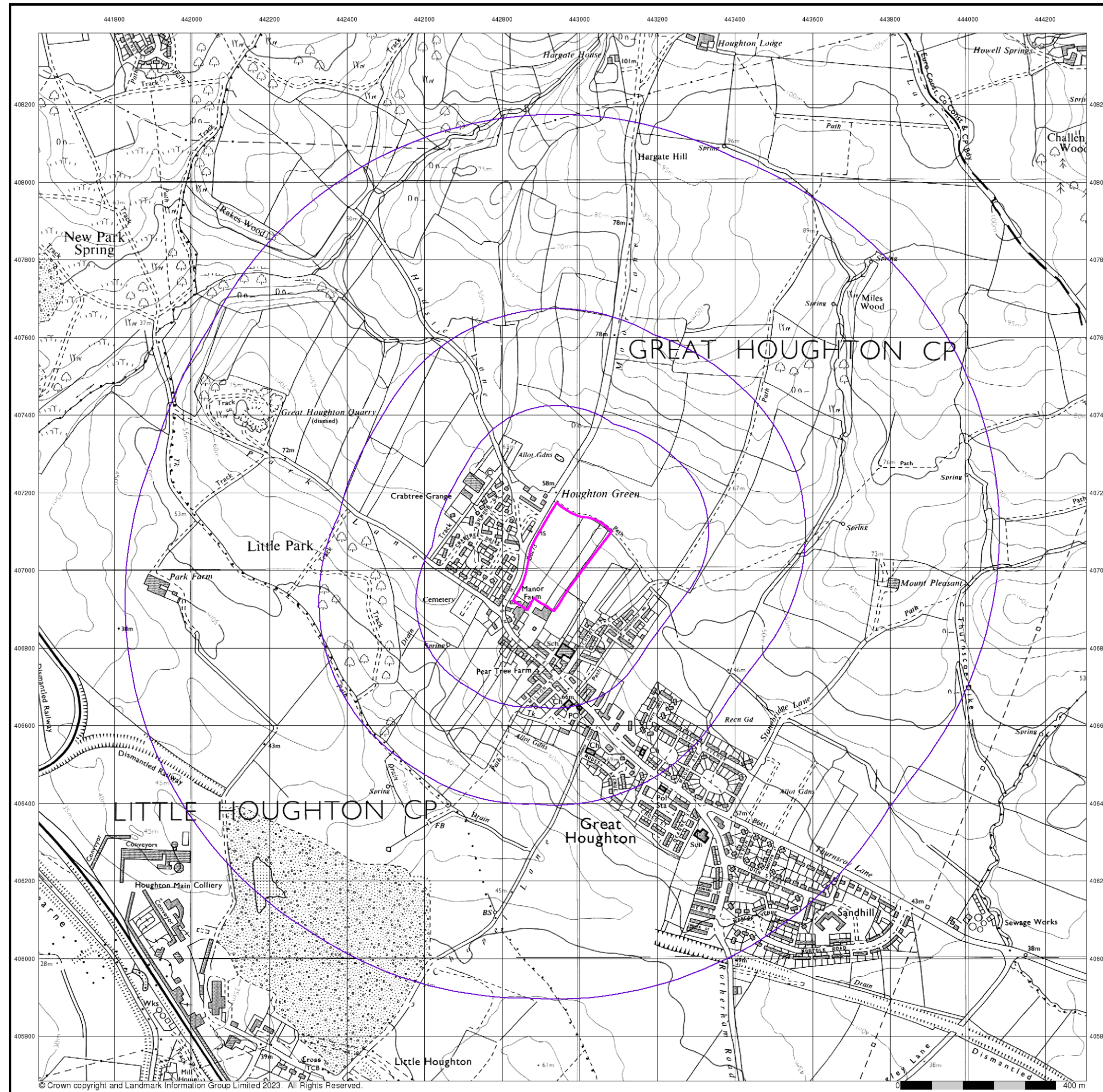


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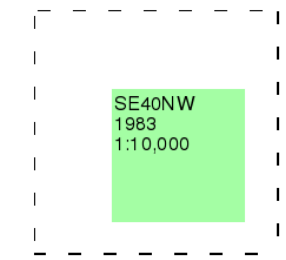
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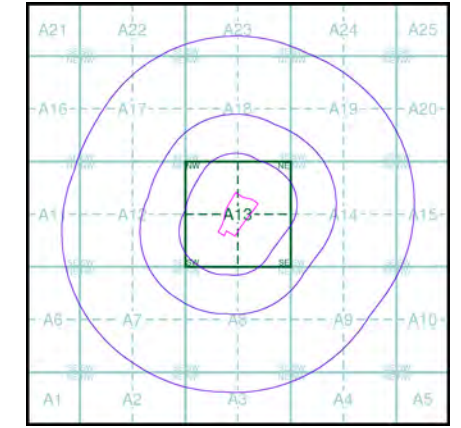
Ordnance Survey Plan Published 1983 Source map scale - 1:10,000

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)

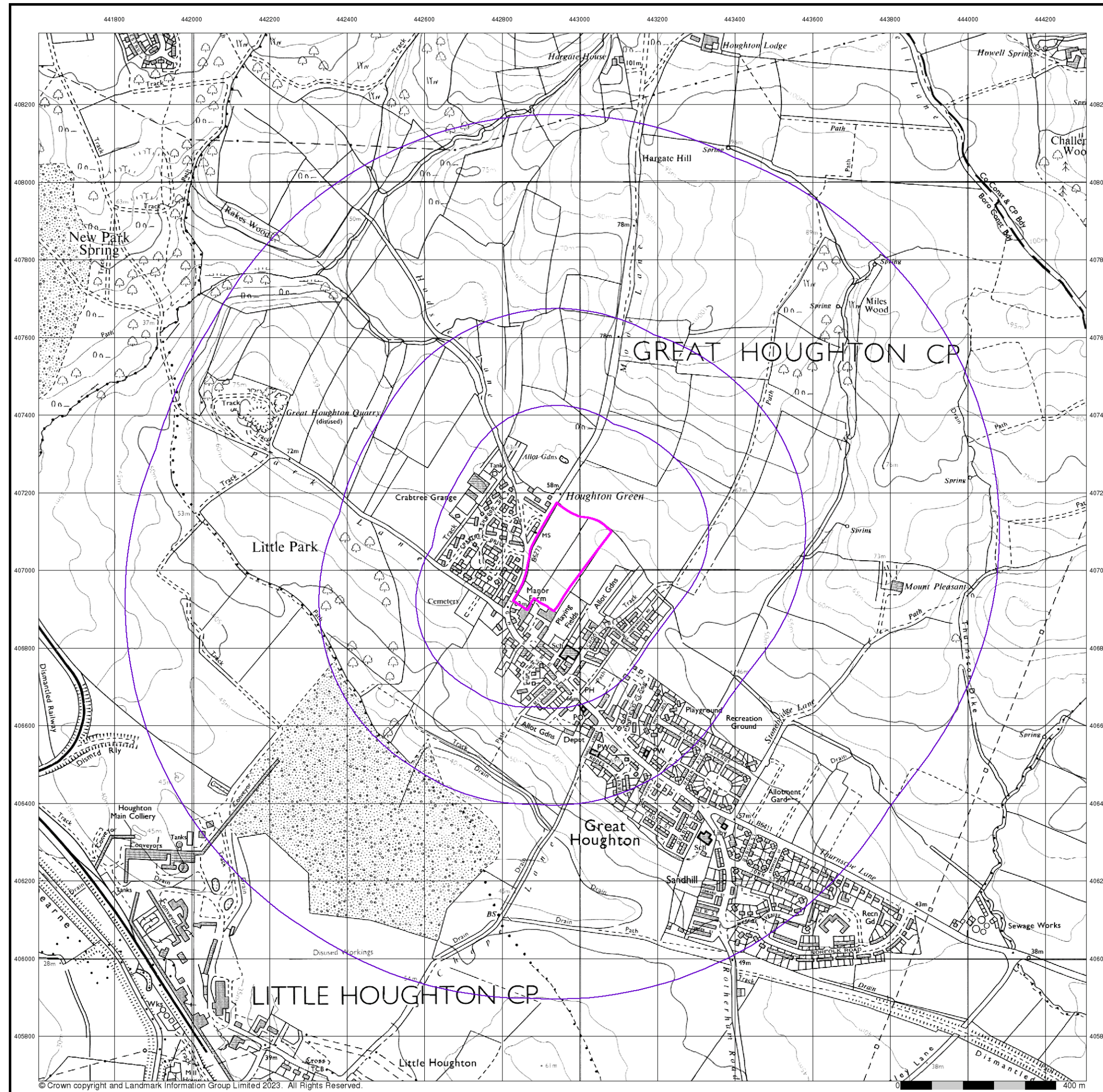


Historical Map - Slice A



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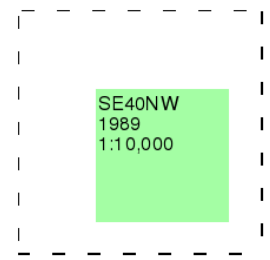
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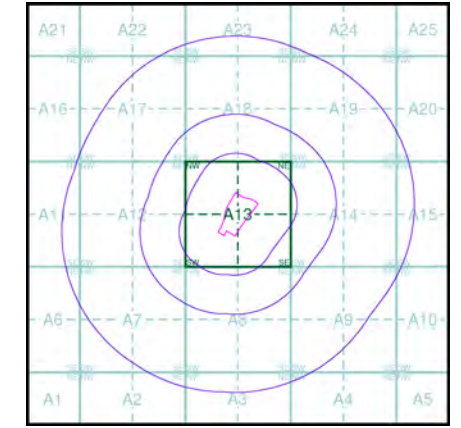
Ordnance Survey Plan Published 1989 Source map scale - 1:10,000

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)

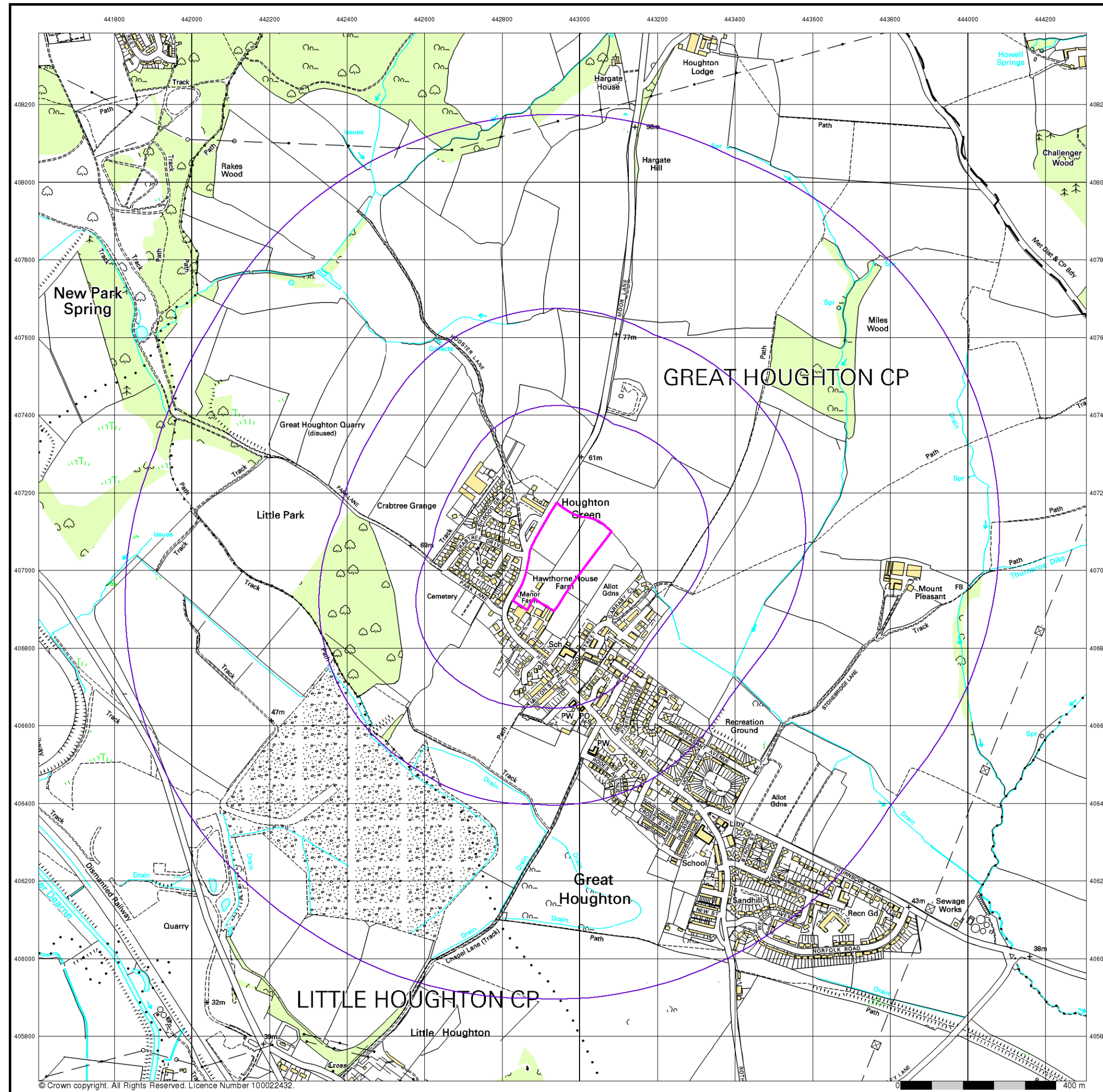


Historical Map - Slice A



Order Details
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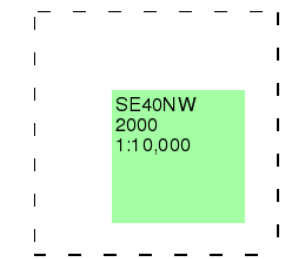
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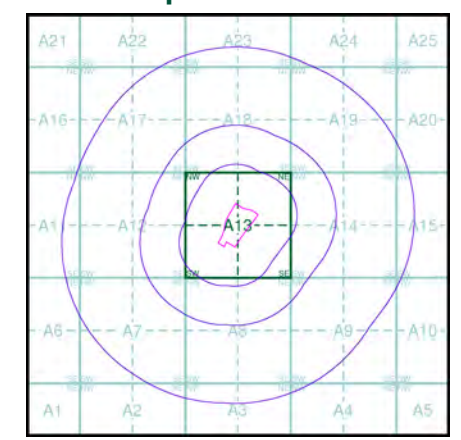
10k Raster Mapping
Published 2000
Source map scale - 1:10,000

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)

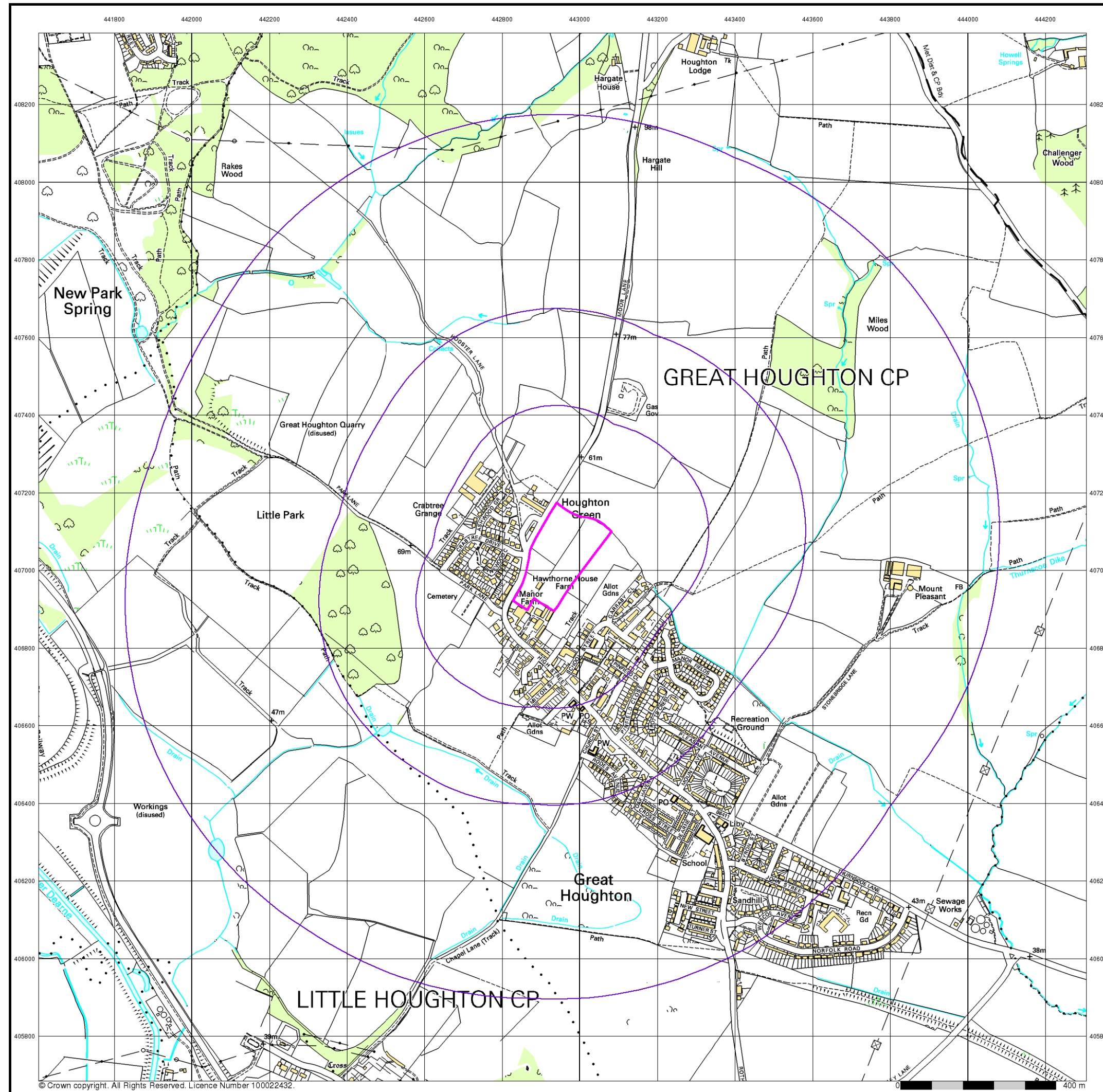


Historical Map - Slice A



Order Details
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 Customer Ref: 48417
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 Site Area (Ha): 3.56
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Site Details
 Site at 442960, 407060



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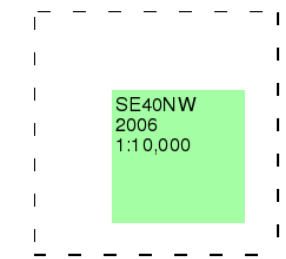
10k Raster Mapping

Published 2006

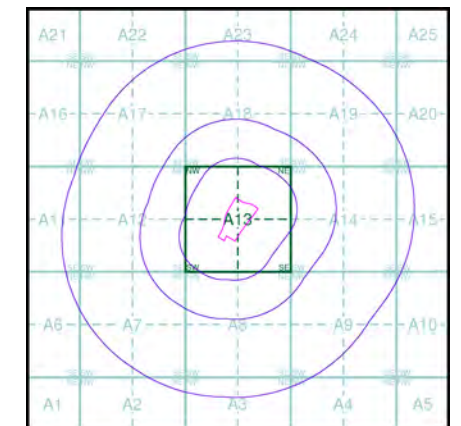
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The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, 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



Order Details

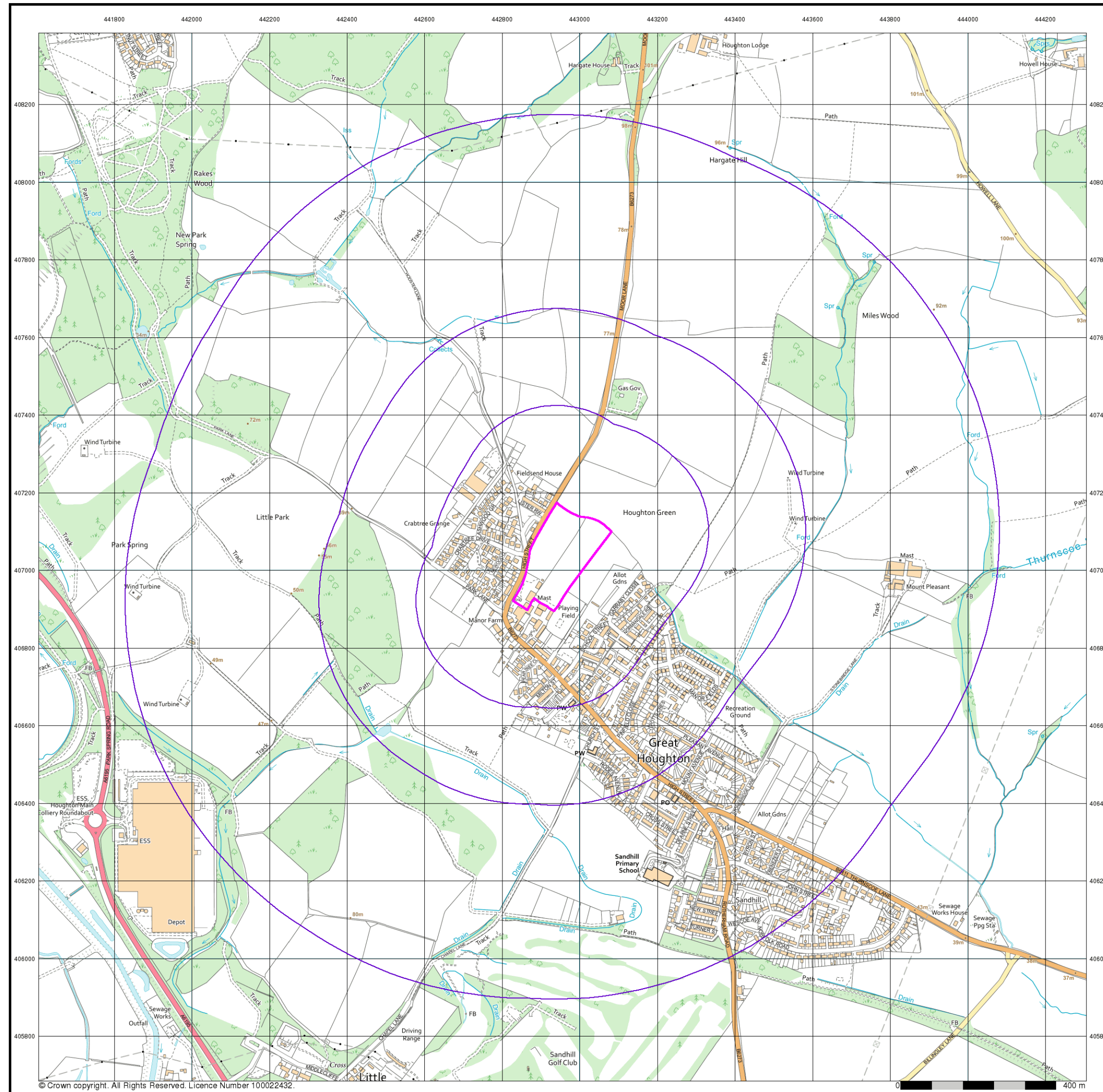
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Site Details

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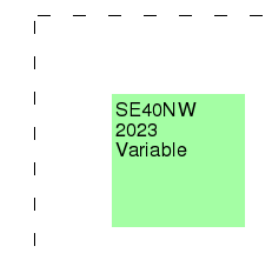
VectorMap Local

Published 2023

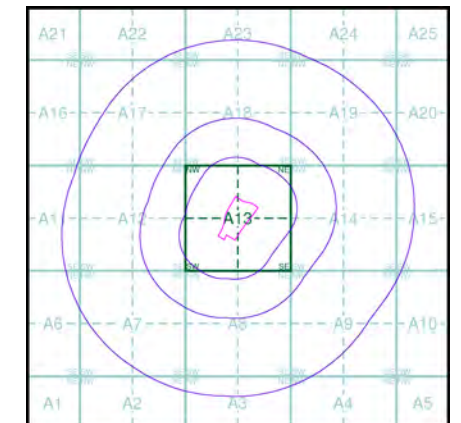
Source map scale - 1:10,000

VectorMap Local (Raster) is Ordnance Survey's highest detailed 'backdrop' mapping product. These maps are produced from OS's VectorMap Local, a simple vector dataset at a nominal scale of 1:10,000, covering the whole of Great Britain, that has been designed for creating graphical mapping. OS VectorMap Local is derived from large-scale information surveyed at 1:1250 scale (covering major towns and cities), 1:2500 scale (smaller towns, villages and developed rural areas), and 1:10 000 scale (mountain, moorland and river estuary areas).

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 315590317_1_1
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