

Annex 7.1

AMEP: Phase 1  
Geoenvironmental Assessment

*(Able UK Ltd)*





**ABLE MARINE ENERGY PARK, KILLINGHOME**  
**PHASE 1 GEOENVIRONMENTAL ASSESSMENT**

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## **1 INTRODUCTION**

### **1.1 GENERAL**

1.1.1 This report has been compiled in accordance with Planning Policy Statement 23 (PPS23) Planning and Pollution Control, Section 24. The purpose of this Phase 1 Geoenvironmental assessment is to assess the current and historical land use of the proposed development and determine the potential for presence of contaminated land within the proposed site.

### **1.2 THE PROPOSED DEVELOPMENT**

1.2.1 Able Marine Energy Park comprises manufacturing facilities for the offshore wind energy industry and a quay facility that will enable turbine components to be loaded onto vessels for transport to the offshore wind farms. Vessel loading will be undertaken by a combination of mobile harbour cranes and Self-Propelled Mobile Transporters.

1.2.2 The quay will be of solid infill construction and provide berthing facilities for vessels up to 8.5m draft throughout its length with a short section providing berthing facilities for vessels up to 12.8m draft.

### **1.3 SITE LOCATION**

1.3.1 AMEP is situated in an area known as Killinghome Marshes on the southern bank of the River Humber approximately 2 kilometres from the village of North Killinghome and 3.3km from Immingham to the south. Humber Sea Terminal is immediately to the north of the development site and ABP Immingham Port lies to the south.

### **1.4 SITE FEATURES & DESCRIPTION**

1.4.1 The site lies adjacent to the southern shore of the Humber Estuary and comprises the following development areas:

- Existing terrestrial land - 247ha
- Existing intertidal area - 16.5ha
- Existing sub tidal area - 31.2ha

1.4.2 The existing terrestrial areas include 115ha of land that has the benefit of extant planning consents for port related storage. Development has commenced over all of this area. The balance of the terrestrial areas comprises agricultural land that is nevertheless allocated for industrial development in North Lincolnshire Council's Local Plan.

1.4.3 The western boundary of the development is defined by Rosper Road which provides direct access to the A160, part of the trunk road network. Beyond Rosper Road lies the Total Oil Refinery and Conoco Philips combined Heat and Power Plant. The eastern boundary of the site is marked by the existing flood defence wall beyond which lies the Humber Estuary.

1.4.4 Site features are summarised in Table 1.1, below.

**Table 1.1: Site Features**

FEATURE	REMARKS
<b>Current Access</b>	Rosper Road with direct access to A160 Able site entrance in northwest and Station Road access in centre of site.
<b>Topography</b>	Terrestrial: Predominately flat and low lying. Estuary: Wide, gently sloping mudflats at low tide.
<b>Approximate Areas</b>	Terrestrial land - 247ha Intertidal area - 16.5ha Sub tidal area - 31.2ha
<b>Nature of boundaries</b>	<b>North:</b> Haven Road and North Killinghome Haven <b>East:</b> Flood defence wall <b>South:</b> No definable boundary. <b>West:</b> Rosper Road
<b>Surrounding Land Use</b>	<b>North:</b> Humber Sea Terminal <b>East:</b> River Humber with north shore beyond. <b>South:</b> Killinghome Oil Jetty with ABP Immingham Port <b>West:</b> Total Oil Refinery with North Killinghome beyond.

## 2 **SITE HISTORY**

### 2.1 **HISTORICAL LAND USE**

2.1.1 In order to investigate the development history and previous land uses at the site and immediate surrounding land, site centred extracts from Ordnance Survey (OS) plans dating back to 1885 were examined. These plans are presented in Appendix 2.

2.1.2 Table 2.1 provides a summary of the history of the site with respect to the proposed end use.

**Table 2.1: Site History 1885 to Present**

DATE	ONSITE	OFFSITE
1885	Site shown as numerous open fields and estuary.	Open fields and Humber Estuary.
1886-1887	Site known as "Killinghome Marshes". Copse shown in centre of site (c. 230m x 90m).	Brick & Tile Works shown on river bank, adjacent to northern boundary. 3 No. fixed Lighthouses shown on river bank adjacent to southern boundary. Rosper Road is shown running parallel with western boundary. Fox Cover, Chasehill Wood and Burkenshaw's Covert shown on western side of Rosper Road.
1892	No change.	Jetties shown from Brick & Tile Works and Lighthouses. Area adjacent to northern boundary is shown as "North Killinghome Haven".

DATE	ONSITE	OFFSITE
1908	Flood defence embankment shown along river bank.	Brick & Tile Works shows increase in size.
1910	Foreshore of River Humber shown as mud.	Clay pit shown north of Brick Works.
1931-1932	<p><b>Railway:</b> Goxhill &amp; Immingham Line runs north/south through the centre of site.</p> <p>Killinghome station shown in the centre of site with access road leading west to Rosper Road and east to Killinghome North Lower Lighthouse.</p> <p>Road shown to run along river bank – possible flood defence wall.</p>	<p>Railway: Ulceby &amp; Immingham Line shown c. 600m south of boundary.</p> <p>Second Jetty shown at North Killinghome Haven. Jetty extends over mudflats.</p> <p>Brick &amp; Tile Works no longer shown.</p> <p>Road shown parallel to northern boundary.</p> <p>Fish Meal Works with deep channel jetty shown south east of lighthouses.</p>
1950	No change.	Killinghome North Lower Lighthouse shown as disused.
1965		Pond shown adjacent to northern boundary and on western boundary of Works.
1968	Several drains are shown crossing the site east/west and north/south.	<p>Former Brick &amp; Tile Works and clay pits shown as lakes/ponds with marsh area in the east.</p> <p>Works with chimneys and tanks shown adjacent to northern boundary.</p> <p>Large circular tanks and deep water channel jetty are shown in south east adjacent to lighthouses.</p>
1971	Flood defence wall shown along river bank.	No change.
1973	No change.	Gas works shown c. 250m north northwest of the site.
1974	Killinghome Station access road shown as Station Road.	<p>Tanks in southeast are shown as Oil Storage Depot.</p> <p>Oil Refinery is shown 400m west of the site.</p> <p>Access road along northern boundary shown as Haven Road.</p>
1985	<p>Sewage Works shown in west of site adjacent to Rosper Road.</p> <p><b>Access Road</b> shown from Rosper Road eastwards across site with bridge over railway.</p>	No change.
2000	No change.	Depot shown on western boundary.
2003 <sup>1</sup>	<i>Field along river bank in northern half shown as car storage area.</i>	No change to present.
2006	Pylons are shown crossing the northwest of site.	
2007 <sup>1</sup>	<i>Northern half of the site shown as car storage and redevelopment.</i>	
2010	No change to present.	

<sup>1</sup> Google Earth. All other data supplied by Envirocheck

## **2.2 REFERENCES**

- Envirocheck Report; June 2010 ([www.envirocheck.co.uk](http://www.envirocheck.co.uk))

## **3 ENVIRONMENTAL SETTING**

### **3.1 GEOLOGY – TERRESTRIAL**

#### ***SURFICIAL GEOLOGY***

- 3.1.1 Historically the site has been used for arable agricultural purposes and to that effect the top surface of the site is primary topsoil with some made ground surrounding the railway line (running north south). Data from boreholes provided by the British Geological Survey (BGS) (Appendix 3) and previous site investigation indicates that the topsoil and made ground is typically 0.4m thick.
- 3.1.2 BGS Solid & Drift Map, Sheet 81: Patrington (1:50,000) shows Marine & Estuarine deposits underlay the majority of the site except the western edge, of which is underlain by glacial till. A localised area of glacial sand & gravel is shown in the south of the site.
- 3.1.3 Borehole data shows that cohesive and granular alluvial deposits, laid down by the River Humber, are recorded underlying the entire site. A maximum recorded thickness of 4m bgl. The cohesive alluvial deposits comprise firm to stiff clays with occasional silt layers. Very little gravel is recorded within the clay. The granular deposits are recorded as very clayey and gravelly.
- 3.1.4 The alluvial deposits are underlain by stiff cohesive glacial deposits with occasional sand layers. BGS boreholes indicate that the glacial deposits are composed of marl clays, also known as boulder clay. Maximum recorded thickness for glacial deposits is 14.9m.
- 3.1.5 Granular deposits comprising glacial sand and gravel were recorded in the borehole in the centre south of the site. These granular deposits have a max thickness of 1m at c. 6.3m bgl.

#### ***MADE GROUND***

- 3.1.6 Made ground is shown, on the Geological map, east of the railway in the northeast of the terrestrial boundary. The made ground covers up to 20% of the total terrestrial site area.

#### ***SOLID GEOLOGY***

- 3.1.7 BGS Solid & Drift Map, Sheet 81: Patrington (1:50,000) shows rockhead to vary across the site. Approximately 90% of the terrestrial site area is underlain by the Burnham Chalk formation. The southeast of the terrestrial site and proposed quay area are underlain by Flamborough Chalk.
- 3.1.8 Borehole logs record rockhead at between 14.4m and 18m bgl across the site. All boreholes recorded a mix of weathered chalk and cohesive glacial deposits, of variable thickness across the site.
- 3.1.9 A diagrammatic interpretation of the geology below site is shown in Drawing No. KI-99002 B in Appendix 1.



### 3.2 ESTUARINE GEOLOGY

3.2.1 The Humber Estuary around the proposed site is dominated by two types of surficial deposits:

- Tidal Flat Deposits – on the river banks; and
- Seabed and Tidal River Bed Deposits – within the centre of the channel.

3.2.2 The Tidal Flat Deposits are shown as “mud” with pockets of gravel to the north and sand to the south. In the centre of the proposed quay there is an exposure of glacial till. Further into the channel the deposits change to Seabed and Tidal River Bed Deposits which are dominated by sand.

3.2.3 The surficial deposits are underlain by the Flamborough Chalk Formation.

### 3.3 QUARRYING

3.3.1 Historical OS plans show the Brick and Tile Works clay pit approximately 80m north of the northern site boundary. After the closure of the Brick and Tile Works and associated clay pit subsequently formed lakes and marsh land. This area, now known as North Killinghome Haven is designated Site of Special Scientific Interest (SSSI) and forms part of the Humber Estuary Special Protection Area (SPA), Special Area of Conservation (SAC) and Ramsar site.

### 3.4 HYDROGEOLOGY

3.4.1 Hydrogeological information provided in the Envirocheck Report are summarised in Table 3.1.

**Table 3.1: Hydrogeological Setting**

	REMARKS
<b>Source Protection Zone</b>	No Source Protection Zones on site. Zones 2 & 3 shown c. 700m south and Zone 1 1km south of site boundary.
<b>Nitrate Vulnerable Zone</b>	Western half of site classified as Nitrate Vulnerable Zone.
<b>Groundwater Abstraction</b>	Simon Storage Group holds a permit for groundwater abstraction. Boreholes are located at Grid References: 515900, 419795 and 515900, 419800 approx 300m north west of site.
<b>Pollution Incidents</b>	No pollution incidents relating to site.

#### **AQUIFERS**

3.4.2 As of April 2010 the Environment Agency introduced new assessment criteria for groundwater vulnerability (aquifer classification). The National Rivers Authorities (NRA) Groundwater Vulnerability Maps and classification are still valid.

3.4.3 For this report both systems are used. A detailed understanding of the hydrogeology below the site (Table 3.2).

**Table 3.2: Aquifer Classification**

GEOLOGY	CLASSIFICATION	REMARKS
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	<b>NRA*</b>	<b>EA*</b>	
<b>Alluvial Deposits</b>	Minor	Secondary Undifferentiated	NRA map shows low permeability, non-water bearing drift deposits across the entire site. EA classification states "where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type."
<b>Cohesive Glacial Deposits</b>	Non Aquifer		
<b>Granular Glacial Deposits</b>		Secondary A	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. These are generally aquifers formerly classified as minor aquifers
<b>Chalk</b>	Major	Principal	Layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale. In most cases, principal aquifers are aquifers previously designated as major aquifer.

\*NRA: National Rivers Authority Groundwater Vulnerability Map

EA: Environment Agency Aquifer Classification Map

### **SOIL LEACHABILITY**

- 3.4.4 Utilising the Groundwater Vulnerability map for the Humber Estuary the surficial deposits on site are classed as being of high leaching potential in the east and low leaching potential in the west.
- 3.4.5 Marine & Estuarine Alluvial deposits are considered to have the highest leachability potential i.e. provide a direct pathway for pollutants into underlying rock and/or groundwater.
- 3.4.6 Cohesive Glacial Deposits (Glacial Till) are shown as having a low leachability potential i.e. pollutants are unlikely to penetrate the soil layer.

### **3.5 HYDROLOGY**

- 3.5.1 Hydrological information provided in the Envirocheck Report is summarised in Table 3.3.

**Table 3.3: Hydrogeological Setting**

	REMARKS
<b>Nearest Watercourse</b>	River Humber – onsite North East Lindsey Drainage Board (NELDB) Ditch runs north-south through site.
<b>Pollution Incidents</b>	No pollution incidents relating to site.
<b>Abstractions</b>	No current abstraction licences relevant to the site.
<b>Discharge Consents.</b>	10 No. discharge consents shown within boundary. 3 of which are currently active: Anglican Water – Effective 01/01/2010 Able UK Area E – Effective 26/03/2009 Clive Davies – Effective 04/03/1992 11 No. discharge consents are shown within 250m of the site.

### 3.6 FLOOD RISK

3.6.1 Flood zone maps produced by Environment Agency (EA) show approximately 90% of the site is classified as Flood Zone 3. The western boundary and up to 300m east of the boundary is classified as Zone 1. Localised areas of the Zone 3 boundary are shown as Zone 2. Table 3.4 outlines the definitions of the flood zones.

3.6.2 The flood zone maps show that the river bank on and off site is protected by flood defences. It should be noted however, that the EA’s flood zones classification does not take into account the flood defences currently in place.

**Table 3.4: Environment Agency Flood Zones**

FLOOD ZONE	DETAILS
ZONE 3	Area could be affected by flooding from rivers or the sea if there are no flood defences. Area could be flooded by: <ul style="list-style-type: none"> <li>• Sea: 1:200 year event.</li> <li>• River: 1:100 year event.</li> </ul>
ZONE 2	Area could be affected by an extreme (i.e. less than 1 in 1000 year event) flood event from either river or tidal & coastal flooding.
ZONE 1	Area is of little or no flood risk. The probability of either river or tidal and coastal flooding is less than 1:1,000 years.

### 3.7 LANDFILLS

3.7.1 No landfills are recorded onsite. There are two known landfills within 250m of the site all of which are recorded as historical. Details on each of the landfills are presented in Table 3.5.

**Table 3.5: Landfills**

LOCATION	GRID REF.	REMARKS
Southwest corner, 148m from boundary.	516666, 417489	<b>Licence Holder:</b> Not supplied <b>Location:</b> Rosper Road <b>Name:</b> Lindsey Oil Refinery <b>Reference:</b> EAHLD01515 <b>First Input Date:</b> 31/12/1986 <b>Last Input Date:</b> Not supplied <b>Specified Waste:</b> Liquids & Sludge (Industrial waste water, sewage sludge, and chemical wastes mixed with municipal solid waste.).
161m north beyond North Killinghome Haven lakes.	516352, 419851	<b>Licence Holder:</b> Petrofina (Petrofina UK Ltd) <b>Location:</b> Clough Lane, Killinghome <b>Name:</b> Petrofina <b>Reference:</b> EAHLD01581 <b>First Input Date:</b> 31/12/1972 <b>Last Input Date:</b> 31/12/1989 <b>Specified Waste:</b> Construction & Demolition (Inert) Waste (waste which remains largely unaltered once buried e.g. glass, concrete, bricks, tiles, soils and stones.).

Sources: Envirocheck & www.environment-agency.gov.uk

3.7.2 Due to age and type of waste within the landfill Lindsey Oil Refinery landfill may be a possible source of landfill gas. As such proposed buildings within 250m of the landfill should undergo a gas risk assessment.

3.7.3 The Petrofina Landfill was licensed only for inert waste. As the site last received waste in 1989 and the nature of the fill, it is considered that production and subsequent migration of landfill gases is considered unlikely.

### 3.8 REFERENCES

- British Geological Survey; GeoRecords: Borehole Records (<http://shop.bgs.ac.uk/GeoRecords>)
- British Geological Survey; Solid & Drift Map, Sheet 81, Patrington (1:50,000)
- Envirocheck Report; June 2010 ([www.envirocheck.co.uk](http://www.envirocheck.co.uk))
- National Rivers Authority; Ground Water Vulnerability Map, Sheet 13, Humber Estuary (1:100,000)
- Environment Agency: Interactive Maps – Groundwater & Aquifer Maps: ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk))
- Environment Agency: Interactive Maps – Landfill: ([www.environment-agency.gov.uk](http://www.environment-agency.gov.uk))

## **4 PREVIOUS SITE INVESTIGATIONS**

### **4.1 INTRODUCTION**

4.1.1 In the 1970s the site was considered as a location for a new proposed power station. As such several site investigations (SI) have been undertaken on site. Section 4.2 to 4.4 review three investigations which were undertaken on site and offshore.

4.1.2 Section 4.5 and 4.6 reviews two SI's commission by Able UK Ltd during the development of Able Humber Ports Facility.

### **4.2 CENTRAL ELECTRICITY GENERATING BOARD: PROPOSED POWER STATION DESK STUDY.**

4.2.1 In July 1970 the Central Electricity Generating Board (CEGB) produced a desk study for a proposed power station to be constructed within northern section of Killinghome Marshes. The desk study covered past land use, geology etc along with a brief review of past and present site investigations for the site and surrounding land.

4.2.2 The review of a site investigation undertaken by George Wimpey Co. Ltd in 1965 comprised:

- Terrestrial investigation:
  - 26 No. cable percussive boreholes.
  - 21 No. hand auger holes (to prove depth of alluvial deposits).
- Estuary investigation:
  - 2 No. cable percussive boreholes on the foreshore.
  - 6 No. cable percussive boreholes within the channel.

4.2.3 The terrestrial investigation encountered topsoil over alluvial and glacial deposits. Both of the foreshore boreholes reflected the terrestrial stratigraphy. Some localised areas of made ground were encountered.

4.2.4 The offshore boreholes undertaken in the north of the site encountered little if any glacial deposits below the alluvial deposits. It was concluded that the chalk bedrock is likely to be exposed in this area.

### **4.3 ALLOTT ATKINS MOUCHEL: CEGB KILLINGHOME "A" POWER STATION PRE-APPLICATION STUDIES; PRELIMINARY REPORT, JULY 1987.**

4.3.1 This preliminary report is a desk study of the information available for the site. The report is for a proposed power station which was to be constructed in the centre of the proposed AMEP site. The report included a review of previously commissioned site investigations (SI) undertaken on the site between 1970 and 1974. Table 4.1 summaries the SI's are reviewed.

**Table 4.1: Summary of Reviewed Site Investigations (1970-1974)**

COMPANY	DATE	DETAILS
Dredging Investigations Ltd	1970	6 No. offshore cable percussive and rotary boreholes.

Soil Mechanics Ltd	1971	12 No. cable percussive and rotary boreholes to a maximum depth of 62m bgl.
Norwest Holst Soil Engineering	1973	Site Investigation for railway bridge and embankment.
Foundation Engineering Ltd	1974	47 No, cable percussive and rotary boreholes between 27.4m and 62.5m bgl.

4.3.2 All the reports reviewed as part of the Allott Atkins Mouchel (AAM) preliminary report encountered a similar stratigraphy Table 4.2 summaries the AAM geological interpretation.

**Table 4.2: Allott Atkins Mouchel Preliminary Report Geological Interpretation.**

DEPOSIT	COMMENTS
Made Ground	No detailed descriptions. Made ground identified as chalk fill.
Estuarine Alluvial Deposits	Variable thickness, from east to west not recorded in the far west of the site. Maximum recorded thickness of 9m. Typically recorded as having a firm desiccated top section becoming softer with depth. Natural organic material often encountered. Loose to medium dense granular material (sand and gravel) recorded near to base of deposits.
Glacial Till	Encountered across the entire site with varying thickness west to east. Erosion noted where alluvial deposits are encountered over laying the till. Typical thickness is recorded at between 12m and 19m.
Chalk	Medium strong bedrock typically encountered from -10 to -20 m OD with a thickness of c. 200m. An undulating surface is noted, trending northwest to east-south-east.

#### **4.4 EXPLORATION ASSOCIATES LTD: FACTUAL REPORT ON GROUND INVESTIGATION, APRIL 1989.**

4.4.1 This report was commissioned by CEGB in 1989. The investigation comprised 9 No. light cable percussion boreholes to between 15.2 and 23.3m bgl and 1 No. rotary core to 26.5m bgl across two sites, of which one was situated on Killinghome Marshes.

4.4.2 No exploratory hole location plan was provided however, OS co-ordinates on the logs show that 2 boreholes were drilled in the northeast and southeast of the site.

4.4.3 The logs show that the ground conditions in Killinghome Marshes comprised made ground over cohesive alluvium, glacial till and granular glacial deposits. Logs show made ground in Killinghome Marshes is between 2.6m and 3.45m thick and comprised reworked gravelly clay.

4.4.4 The alluvium varied between 4.9m and 5.4m in thickness. Strength of the alluvium was recorded as being firm to soft.

4.4.5 Glacial Till underlies the alluvium and has a thickness of at least 10m. The Till is recorded as being stiff and with little gravel present with exception to the weathered interface with the chalk bedrock.

**4.5 WEEKS CONSULTING LTD: REPORT ON OPTIONS FOR SOIL STABILISATION AT ABLE HUMBER PORT FACILITY, APRIL 2003.**

4.5.1 Weeks Consulting Ltd was commissioned by Able UK Ltd, in November 2002, to undertake a site investigation at Able Humber Port Facility. The investigation comprised 69 No. mechanically excavated trial pits across the 400 ha site, 39 of the trial pits were undertaken on what is now the AMEP site.

4.5.2 The ground conditions across the entire site showed little variation. Typically 0.3m of topsoil overlaying cohesive alluvial and cohesive glacial deposits. Alluvial deposits were encountered across the site with exception of the south west of site. Where alluvial deposits overlay the glacial deposits

**4.6 STRUCTURAL SOILS LTD: GROUND INVESTIGATION AT KILLINGHOME, JULY 2005; REPORT NO. 56601**

4.6.1 Able UK Ltd commissioned Structural Soils Ltd to undertake a ground investigation across several parcels of land at Killinghome, North Lincolnshire. The investigation consisted of 13 No. cable percussion boreholes and geotechnical investigation. Nine of the 13 boreholes were drilled in the northern half of the now proposed AMEP site.

4.6.2 The 9 No. boreholes drilled on the AMEP site encountered varying thicknesses of cohesive alluvial deposits over lying cohesive glacial deposits. The alluvial deposits were varied in depth across the site, thicker in the east and thinner to not recorded (BH1) in the west.

4.6.3 Made ground, comprising reworked clay and granular fill material, was recorded in the north-eastern corner of the site. Thickness of the made ground varied from 0.6m to 3.1m. The made ground is considered to have been laid down during the regrading of the site.

4.6.4 The alluvial deposits are recorded as being soft to firm, increasing in strength with depth. The glacial clays are recorded as stiff with rare sandy clay bands below 3m bgl.

4.6.5 The deepest boreholes extended to 15.45m bgl and none encountered rockhead.

**4.7 LANGDALE – SMITH AND CO. LTD: GROUND INVESTIGATION AT AREA C NORTH LINCOLNSHIRE, FEBRUARY 2007**

4.7.1 Able UK Ltd commissioned Langdale – Smith and Company Ltd in early 2007 to undertake a ground investigation on Area C of Able Humber Port Facility, Killinghome. The purpose of the investigation was to determine the ground conditions below a proposed warehouse, although the structure has never been built.

4.7.2 Three No. cable percussive boreholes to 20m bgl and several plate load (CBR) tests were undertaken. Insitu testing, in the boreholes were undertaken every metre. Table 4.3 summaries the ground conditions encountered.

**Table 4.3: Area C Ground Conditions**

DEPTH	GEOLOGY	COMMENTS
0 – 2m	Made Ground	Gravelly fill
2 – 3.5m	Cohesive Alluvial Deposits	Firm laminated CLAY
3.5 – 7m	Alluvium	Soft silty/Sandy CLAY
7 – 19m	Cohesive Glacial Deposits	Stiff slightly gravelly CLAY
19 – 20m	Granular Glacial Deposits	Dense SAND and GRAVEL

## 5 **PRELIMINARY CONCEPTUAL SITE MODEL**

### 5.1 **POTENTIAL ISSUES**

- 5.1.1 The historical plans show the site being occupied by farmland until approximately 2003. From 2003 the northern half of the site has seen progressive redevelopment into as port related storage for vehicles. The recent change in land use and the presence of the railway in the centre of the site is likely to represent the greatest, albeit slight, potential for contamination.
- 5.1.2 The main sources of pollutants are likely to rise from the railway (ash, hydrocarbons, etc) and the made ground and in the north east of the site. If hydrocarbons were encountered they would pose a threat to the controlled waters of the River Humber but leaching into the major chalk aquifer below the site would be less likely due to the thickness of cohesive glacial deposits overlying the chalk.
- 5.1.3 Previous offshore investigations have suggested that the river bed in the northeast of the site is not underlain by cohesive glacial deposits. It is considered likely that the chalk is exposed in the river bed or a thin veneer of alluvial deposits overlying the chalk bedrock. As the alluvial deposits are considered as minor aquifers it is likely that the saline estuarine waters are in contact with the major aquifer (chalk). Possible future dredging in this area may expose the major aquifer to increased amounts of saline ingress.
- 5.1.4 The potential pollutant linkages are shown in a preliminary Conceptual Site Model (CSM) which has been created using information presented in Sections 2 to 4. The preliminary CSM details potential sources of contamination, pathways and receptors based on current site usage.

**Table 5.1: Conceptual Site Model**

SOURCES		
	Made Ground	Reworked clay and granular made ground identified in previous investigations.
	Historical Activities	Agricultural land use. Northern port related storage development Railway running through the site.
	Landfill Gas	Lindsey Oil Refinery landfill 150m southwest.
	Transport Depot	Potential TPH and PAH source from fuels etc.
	Hard Standing/Car Storage	Surface water run-off from car storage areas.



<b>SOURCES</b>	Made Ground	Reworked clay and granular made ground identified in previous investigations.
	Dredging	Exposure of chalk in river bed.
<b>PATHWAYS</b>	Leaching: Migration (vertical/horizontal) of potential contaminants inc saline ingress.	
	Dust	
	Dermal Contact / Ingestion	
	Plant Uptake	
	Surface water run-off	
<b>RECEPTORS</b>	Human Health – Construction	
	Human Health – End Users	
	Vegetation	
	Controlled Waters – Principal Aquifer (Burnham and Flamborough Chalks)	
	Controlled Waters – River Humber	

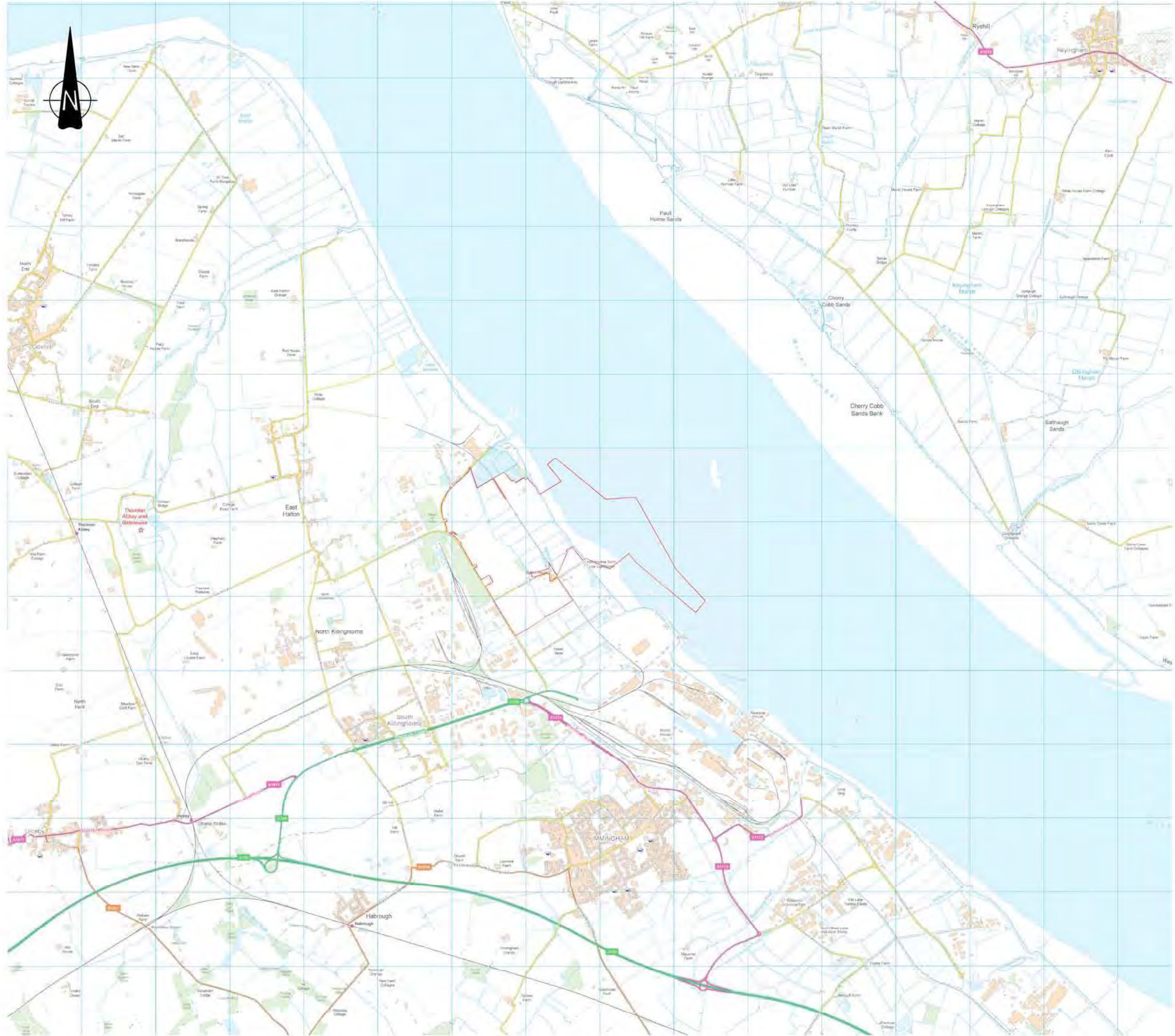


	<b>AMEP, KILLINGHOME GEOENVIRONMENTAL ASSESSMENT</b>	<b>JUNE 2010</b>
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**APPENDIX 1  
DRAWINGS**

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KEY

■ Site Boundary

A	21/09/10	Preliminary Issue	RK	JD	RC
Rev	Date	Description	By	Chk	App



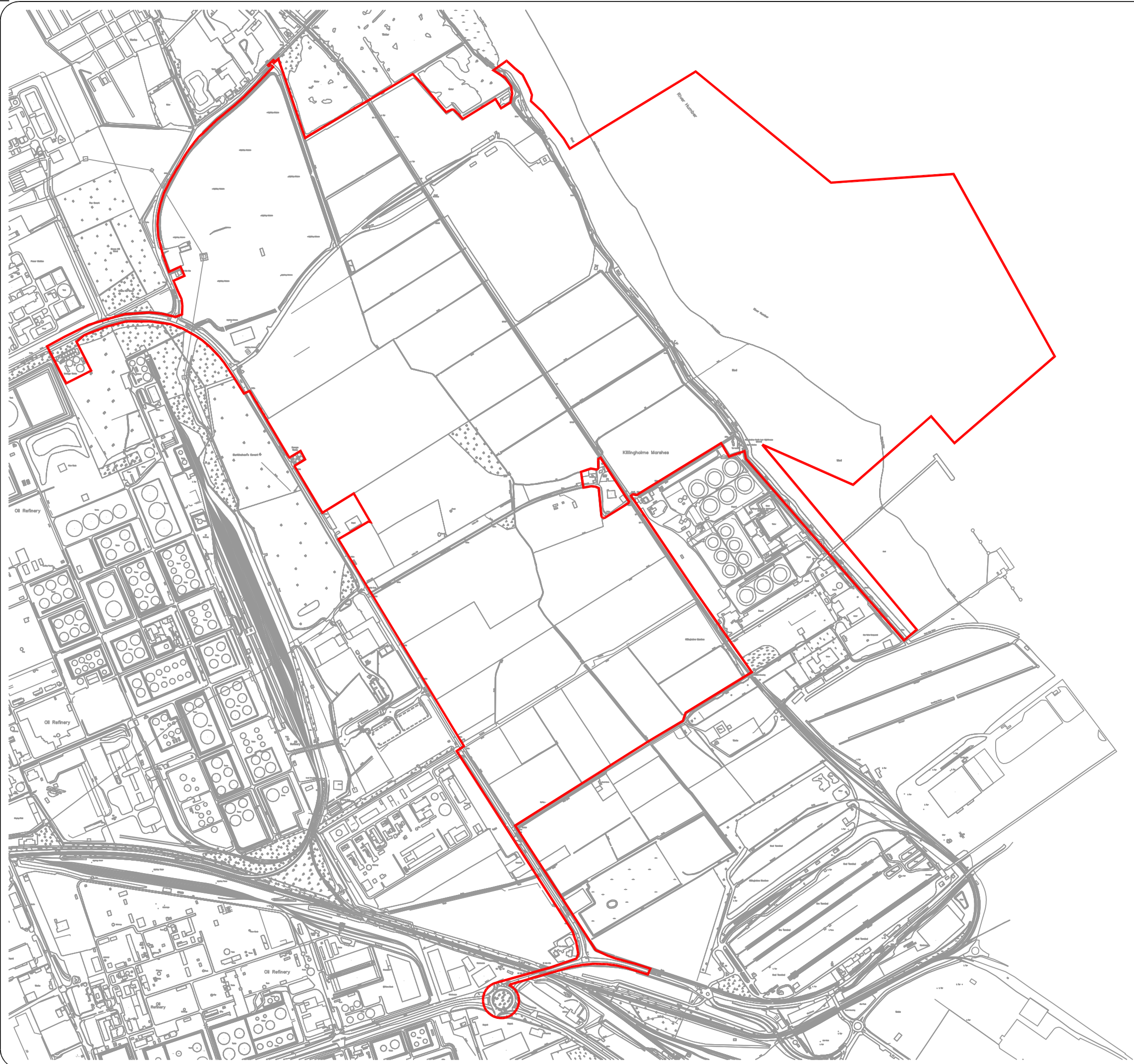
able UK Ltd  
Able House  
Billingham  
Teesside UK  
TS23 1PX

Tel: +44-(0)1642 806080  
Fax: +44-(0)1642 655655  
email: info@ableuk.com  
www.ableuk.com

Project:	ABLE Marine Energy Park
Client:	ABLE UK Ltd
Title:	Site Location Plan

**PRELIMINARY**

Scale:	1:50,000@A3	Drawn By:	R Keir	Checked By:	J Dawes	Approved By:	R Cram
Date:	21/09/2010	Date:	21/09/2010	Date:	21/09/2010		
Drawing No.	AME - 02001	Revision:	A				



KEY

Rev	Date	Comments	Drw	Chk	App
A	17/02/11	Preliminary Issue	JH	RC	RC



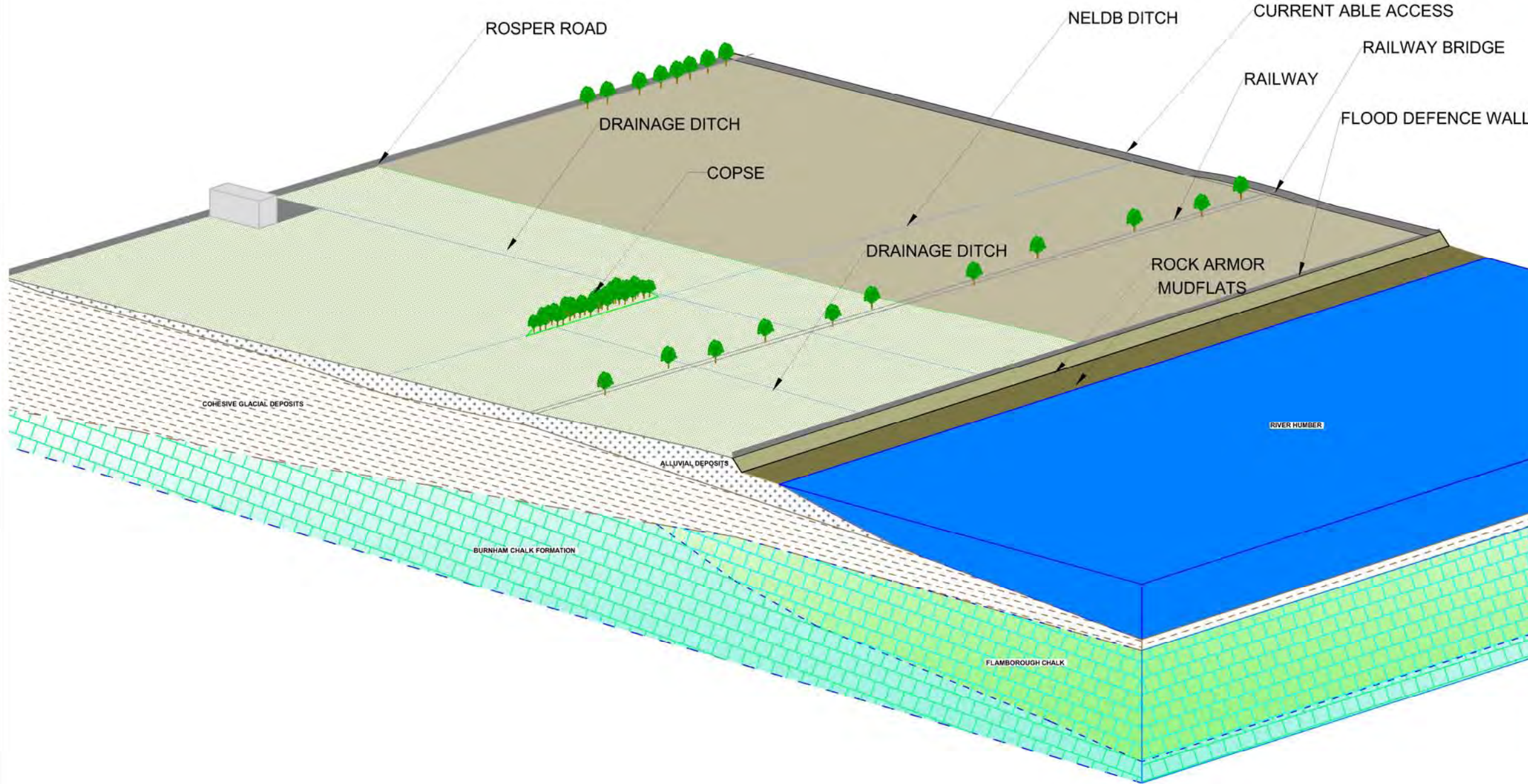
ABLE UK Ltd  
 ABLE House  
 Billingham,  
 Teesside,  
 TS23 1PX

Tel: +44(0)1642 806080  
 Fax: +44(0)1642 655655  
 email: info@ableuk.com  
 www.ableuk.com

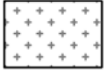



Project:	ABLE Marine Energy Park
Client:	ABLE UK Ltd
Title:	Site Location Plan - OS

**PRELIMINARY**

Scale:	Drawn	Checked	Approved
1:25,000@A3	J Harris	R Cram	R Cram
Date	17/02/2011	17/02/2011	17/02/2011
Drawing No.	AME - 02034		Revision: A



KEY

-  ALLUVIAL DEPOSITS  
(predominately clay with occasional thin layers of sand and silt)
-  COHESIVE GLACIAL DEPOSITS  
(with rare sand & gravel layers)
-  FLAMBOROUGH CHALK  
(Rockhead between 14.4m and 18m bgl)
-  BURNHAM CHALK  
(Rockhead between 14.4m and 18m bgl)

D	10-08-11	Chalk boundary amended	JD	RC	RC
C	08-04-11	Update following new data	JD	RC	RC
B	21-06-10	Minor Amendments	JD	RC	RC
A	13-04-10	Preliminary Issue	JD	GD	GD
Rev	Date	Description	By	Chk	App



Able UK Ltd  
 Able House  
 Billingham  
 Teesside UK  
 TS23 1PX  
 Tel: +44-(0)1642 806080  
 Fax: +44-(0)1642 655655  
 email: info@ableuk.com  
 www.ableuk.com

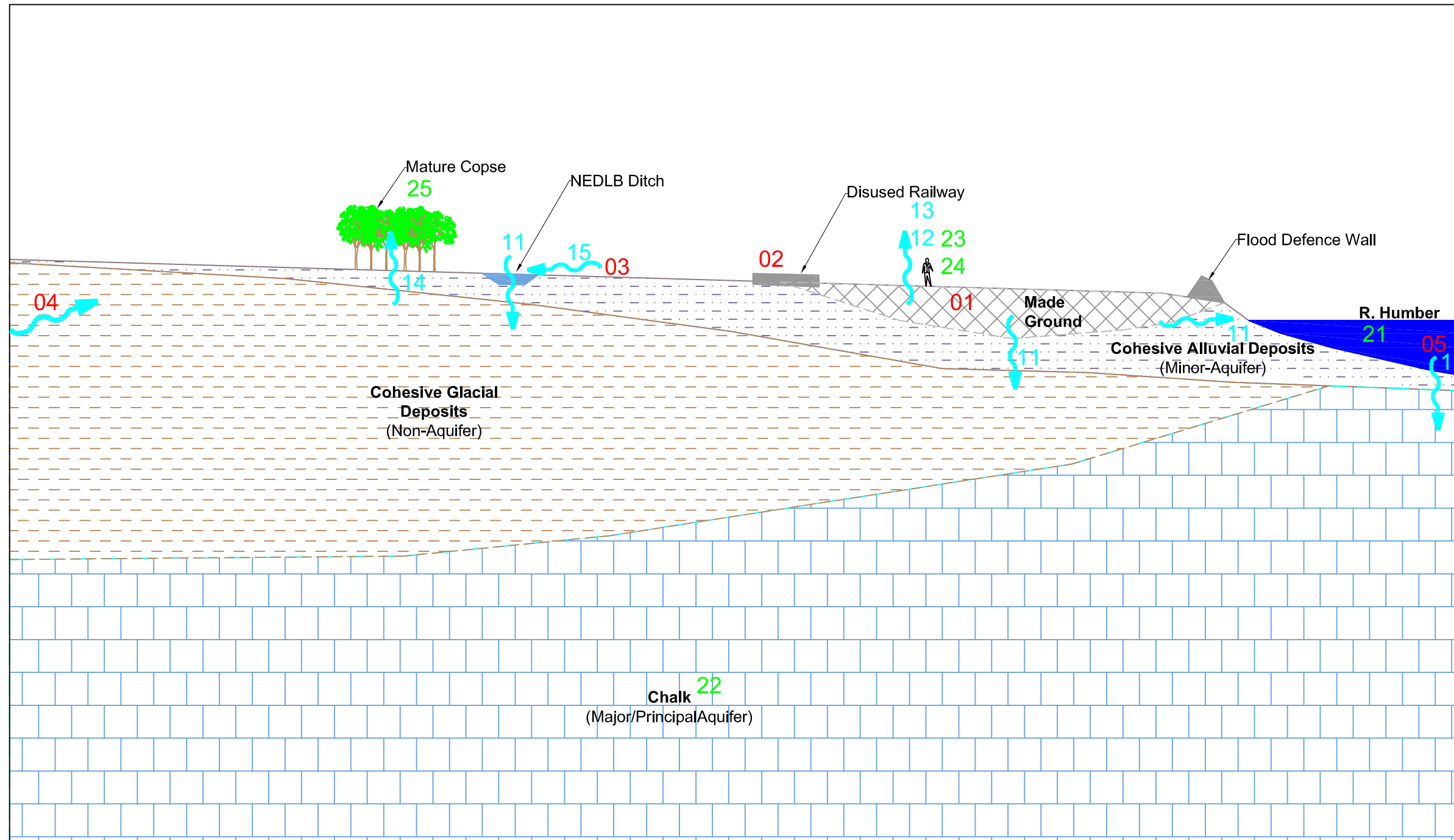
Project:	ABLE MARINE ENERGY PARK
Client:	ABLE UK Ltd
Title:	GEOLOGICAL CROSS-SECTION

**PRELIMINARY**

Scale:	Drawn By	Checked By	Approved By
NTS@A3	J. DAWES	GD	GD
Date:	13-04-10	13-4-10	13-04-10
Drawing No.	KI - 99002		Revision: D

WEST

EAST



**Potential Sources of Contamination**

- 01 - Made Ground (fill material)
- 02 - Historical Landuse (Railway)
- 03 - Hardstanding Run-off
- 04 - Migration of Offsite Landfill Gas
- 05 - Saline Ingress from Proposed Dredging

**Pathways**

- 11 - Leaching
- 12 - Dust
- 13 - Dermal Contact & Ingestion
- 14 - Plant Uptake
- 15 - Surface water

**Receptors**

- 21 - Controlled Waters (River Humber)
- 22 - Controlled Waters (Major Aquifer)
- 23 - Human Health - Construction
- 24 - Human Health - End Users
- 25 - Vegetation

KEY

Rev	Date	Description	By	Chk	App
A	23-06-10	Preliminary Issue	JD	RC	RC



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 Fax: +44-(0)1642 655655  
 email: info@ableuk.com  
 www.ableuk.com

Project:	Able Marine Energy Park
Client:	ABLE UK Ltd
Title:	Preliminary Conceptual Site Model

**PRELIMINARY**

Scale:	Drawn By	Checked By	Approved By
NTS	J. Dawes	RC	RC
Date:	23-06-10	23-06-10	23-06-10
Drawing No.	Revision:		
AME - 09000	A		



 <p>ableuk www.ableuk.com</p>	<p><b>AMEP, KILLINGHOME GEOENVIRONMENTAL ASSESSMENT</b></p>	<p><b>JUNE 2010</b></p>
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**APPENDIX 2  
HISTORICAL OS PLANS**

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# 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** (Fenced, Un-Fenced), **Minor Roads** (Fenced, Un-Fenced)  
**Sunken Road**, **Raised Road**  
**Road over Railway**, **Railway over River**  
**Railway over Road**, **Level Crossing**  
**Road over River or Canal**, **Road over Stream**  
**Road over Stream**  
**County Boundary (Geographical)**  
**County & Civil Parish Boundary**  
**Administrative County & Civil Parish Boundary**  
**County Borough Boundary (England)**  
**Co. Boro. Bdy.**  
**County Burgh Boundary (Scotland)**  
**Ca. Burgh Bdy.**  
**Rural District Boundary**  
**R.D. Bdy.**  
**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**, **Direction of Flow of Water**, **Shingle**, **Sand**  
**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

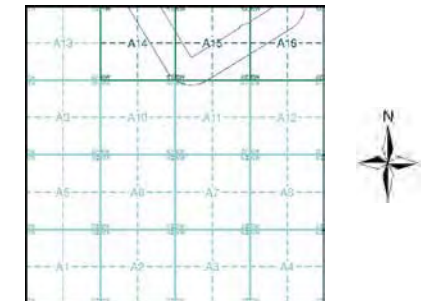
**Gravel Pit**, **Refuse tip or slag heap**  
**Rock**, **Rock (scattered)**  
**Boulders**, **Boulders (scattered)**  
**Shingle**, **Mud**  
**Sand**, **Sand Pit**  
**Slopes**, **Top of cliff**  
**General detail**, **Underground detail**  
**Overhead detail**, **Narrow gauge railway**  
**Multi-track 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/SI: Mean high water (springs)**, **MLWSI: Mean low water (springs)**  
**Telephone line (where shown)**, **Electricity transmission line (with poles)**  
**Bench mark (where shown)**, **Triangulation station**  
**Point feature (e.g. Guide Post or Mile Stone)**, **Pylon, flare stack or lighting tower**  
**Site of (antiquity)**, **Glasshouse**  
**General Building**, **Important Building**



## Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:10,560	1855	2
Lincolnshire	1:10,560	1887	3
Yorkshire	1:10,560	1892	4
Lincolnshire	1:10,560	1908 - 1910	5
Yorkshire	1:10,560	1910	6
Lincolnshire	1:10,560	1932	7
Lincolnshire	1:10,560	1938 - 1951	8
Yorkshire	1:10,560	1950	9
Lincolnshire	1:10,560	1951	10
Ordnance Survey Plan	1:10,000	1956	11
Ordnance Survey Plan	1:10,000	1966	12
Ordnance Survey Plan	1:10,000	1968	13
Ordnance Survey Plan	1:10,000	1974	14
Ordnance Survey Plan	1:10,000	1985	15
10K Raster Mapping	1:10,000	2000	16
10K Raster Mapping	1:10,000	2006	17
10K Raster Mapping	1:10,000	2010	18

## Historical Map - Slice A



## Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

## Site Details

Site at 516900, 418600



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

**Lincolnshire**  
**Published 1887**

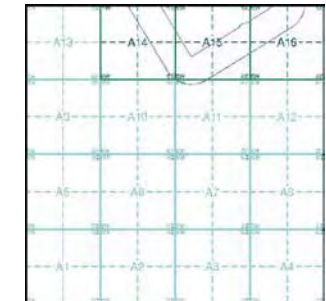
**Source map scale - 1:10,560**

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)**

013NW 1887 1:10,560	013NE 1887 1:10,560
013SW 1887 1:10,560	013SE 1887 1:10,560

**Historical Map - Slice A**

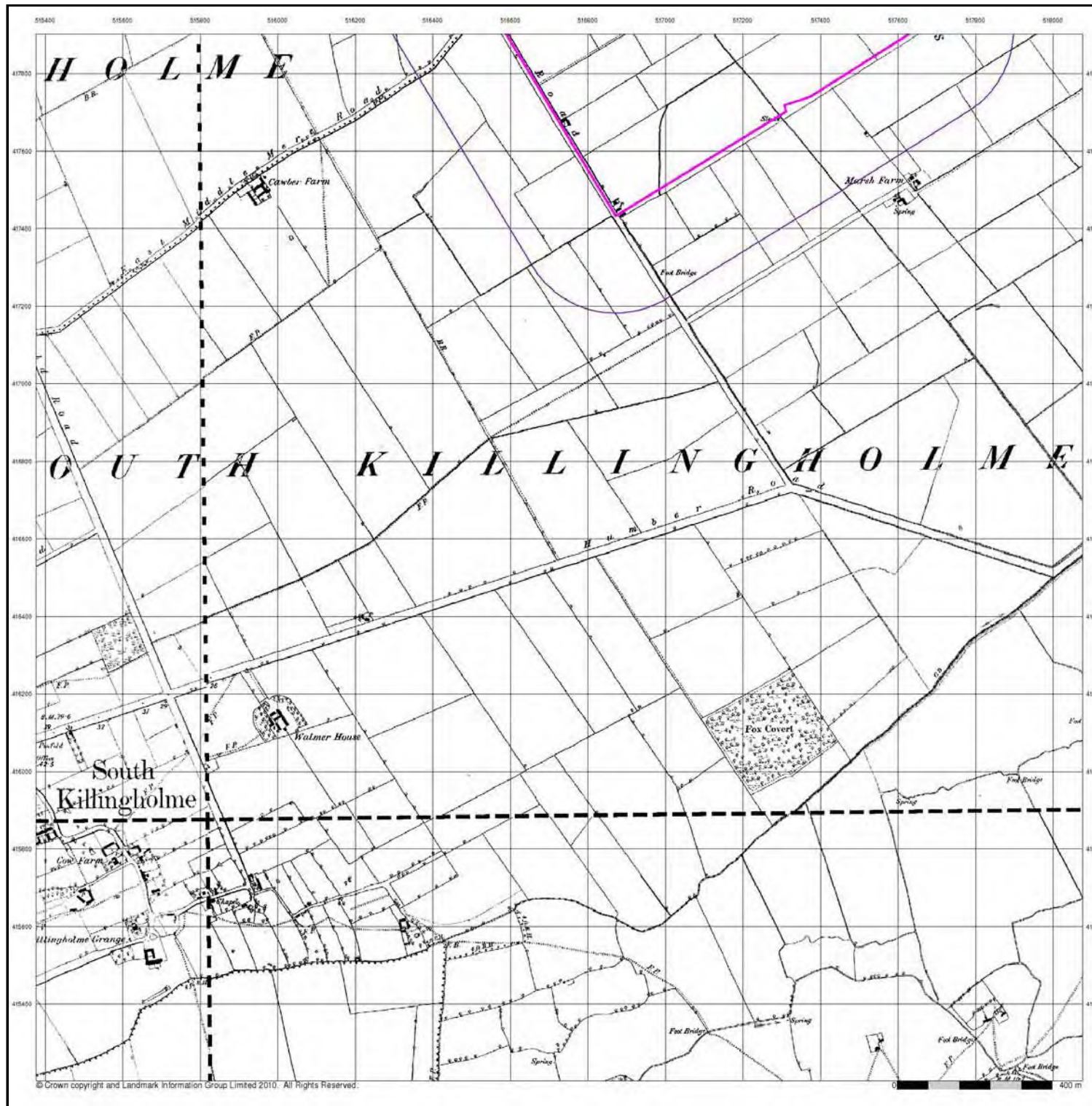


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



Lincolnshire

Published 1908 - 1910

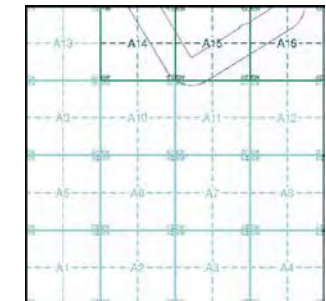
Source map scale - 1:10,560

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)

013NW 1908 1:10,560	013NE 1910 1:10,560
013SW 1908 1:10,560	013SE 1908 1:10,560

Historical Map - Slice A

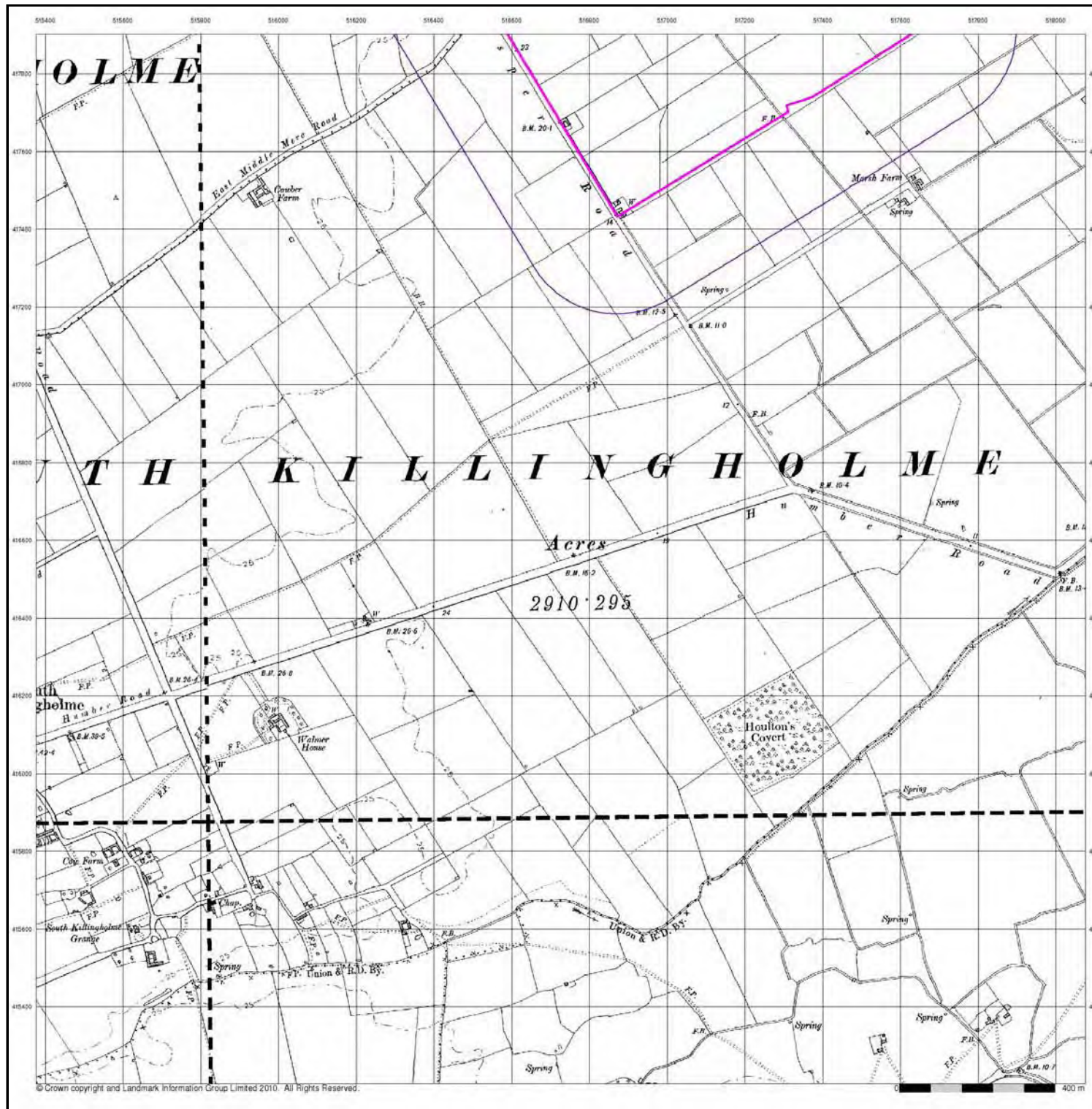


Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

Site Details

Site at 516900, 418600



Lincolnshire  
Published 1932

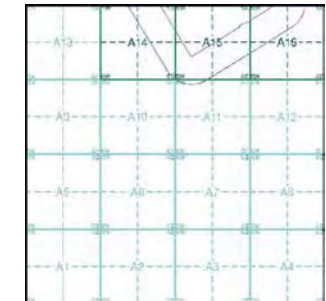
Source map scale - 1:10,560

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)

013NW 1932 1:10,560	013NE 1932 1:10,560
013SW 1932 1:10,560	013SE 1932 1:10,560

Historical Map - Slice A

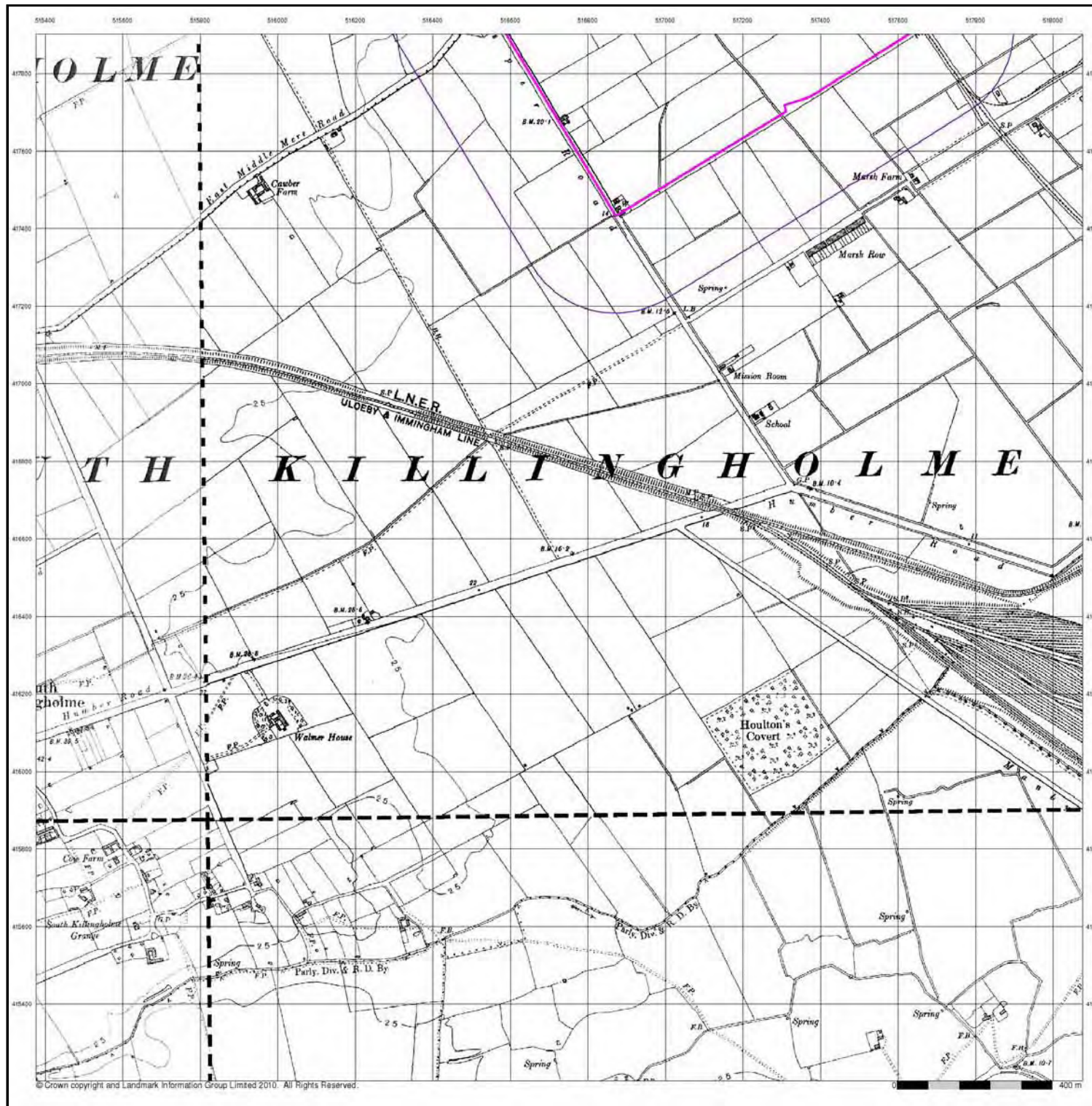


Order Details

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Customer Ref: 68493  
National Grid Reference: 517050, 417630  
Slice: A  
Site Area (Ha): 314.12  
Search Buffer (m): 250

Site Details

Site at 516900, 418600



Lincolnshire

Published 1938 - 1951

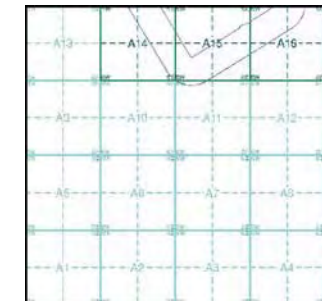
Source map scale - 1:10,560

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)

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013SW 1946 1:10,560	013SE 1938 1:10,560

Historical Map - Slice A

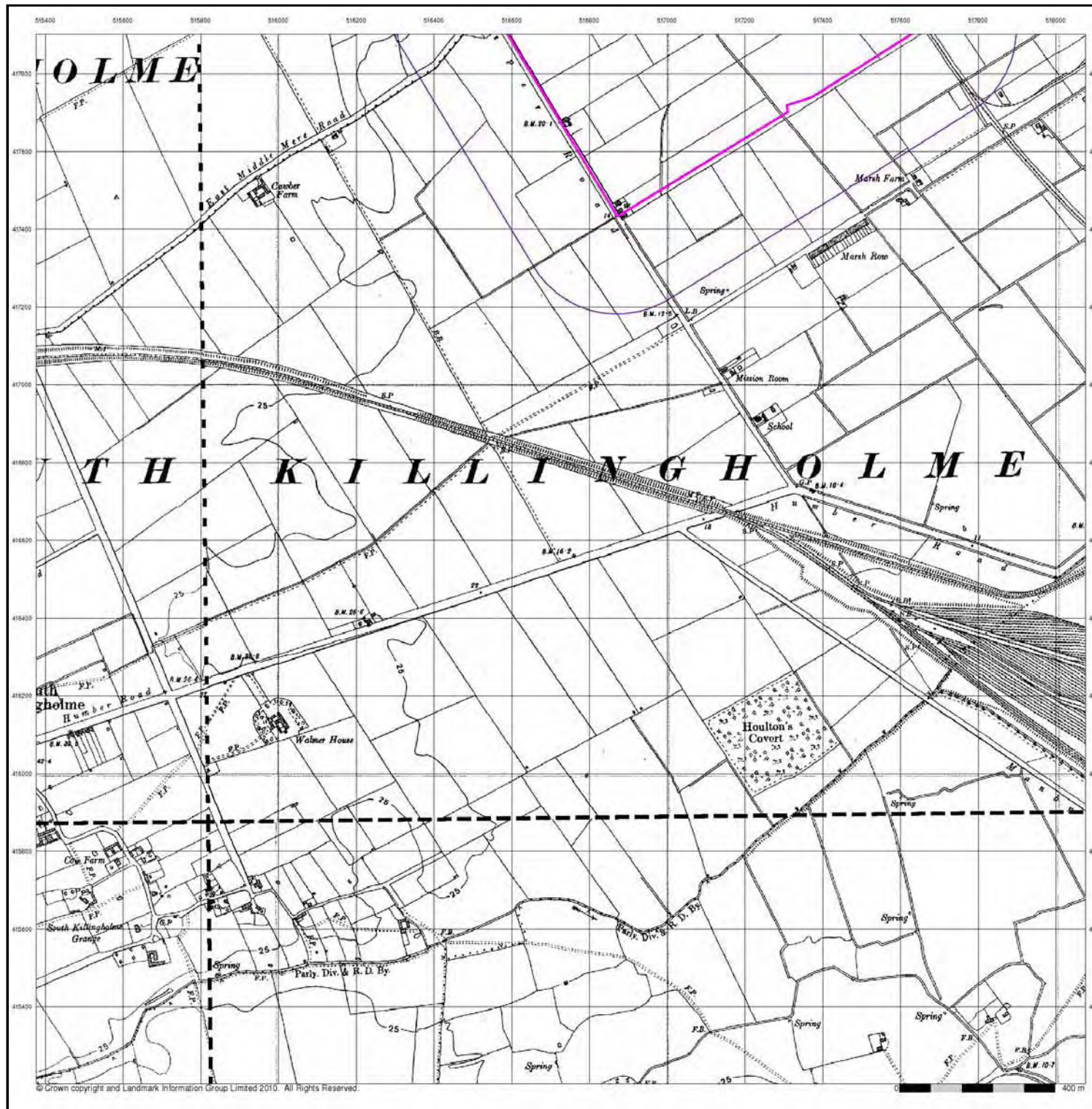


Order Details

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 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

Site Details

Site at 516900, 418600



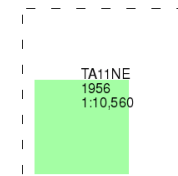
## Ordnance Survey Plan

Published 1956

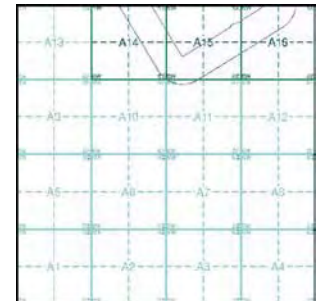
Source map scale - 1:10,000

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

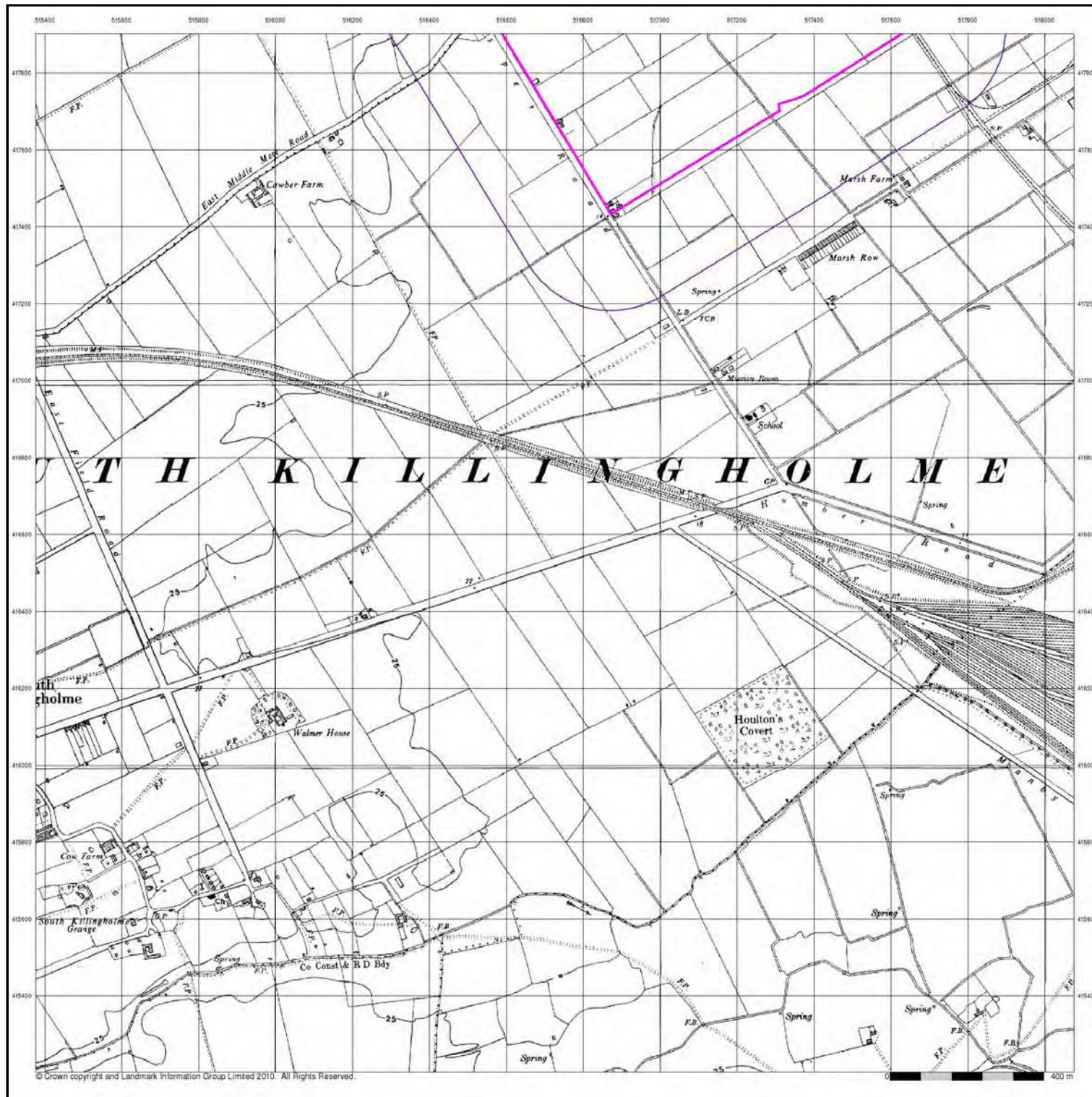


### Order Details

Order Number: 31479075\_1\_1  
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 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600





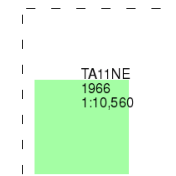
## Ordnance Survey Plan

Published 1966

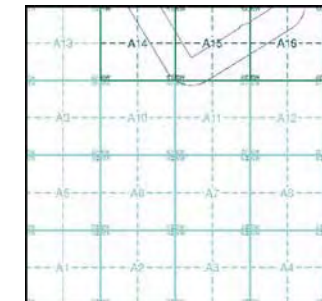
Source map scale - 1:10,000

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

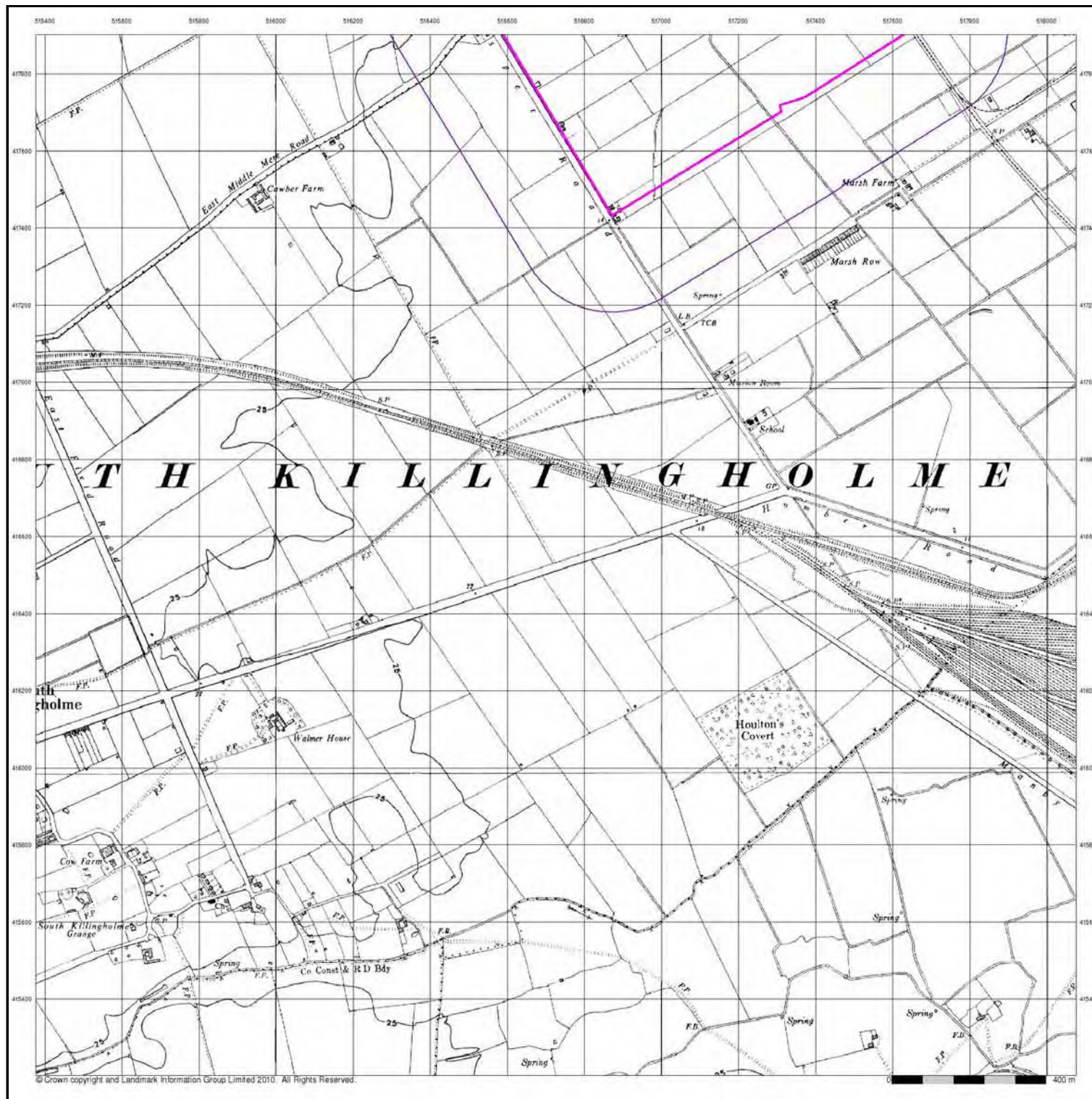


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
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 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



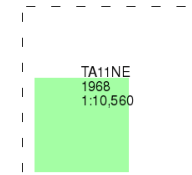
### Ordnance Survey Plan

Published 1968

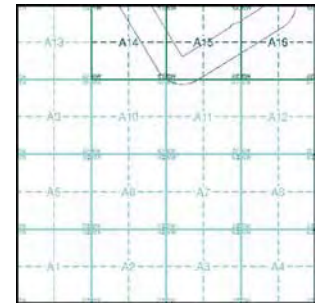
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### Map Name(s) and Date(s)



### Historical Map - Slice A

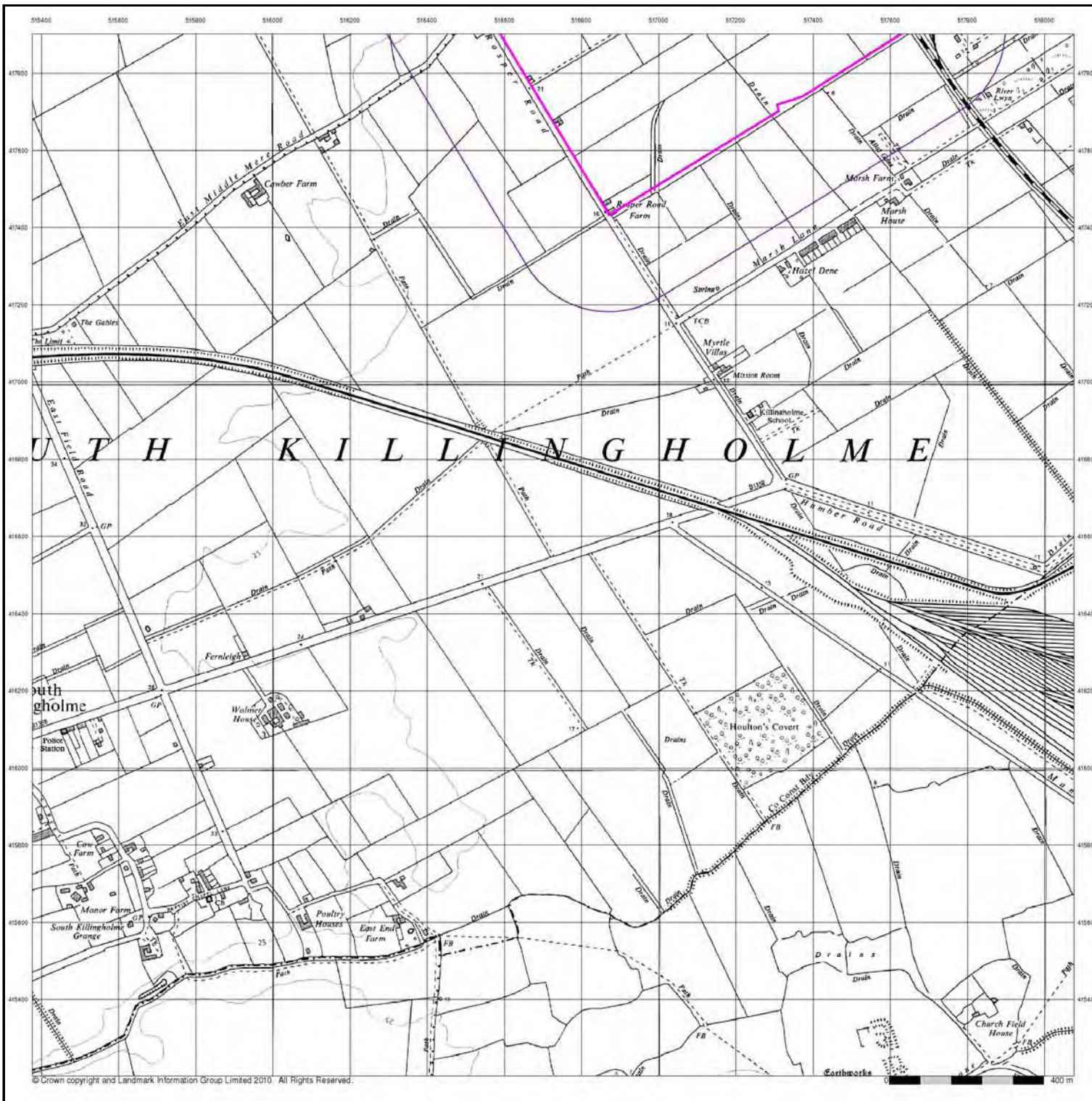


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



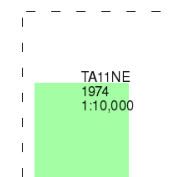
## Ordnance Survey Plan

Published 1974

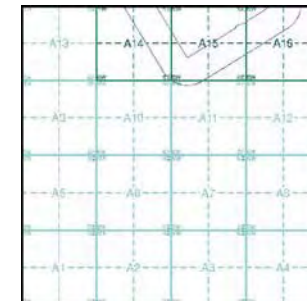
Source map scale - 1:10,000

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

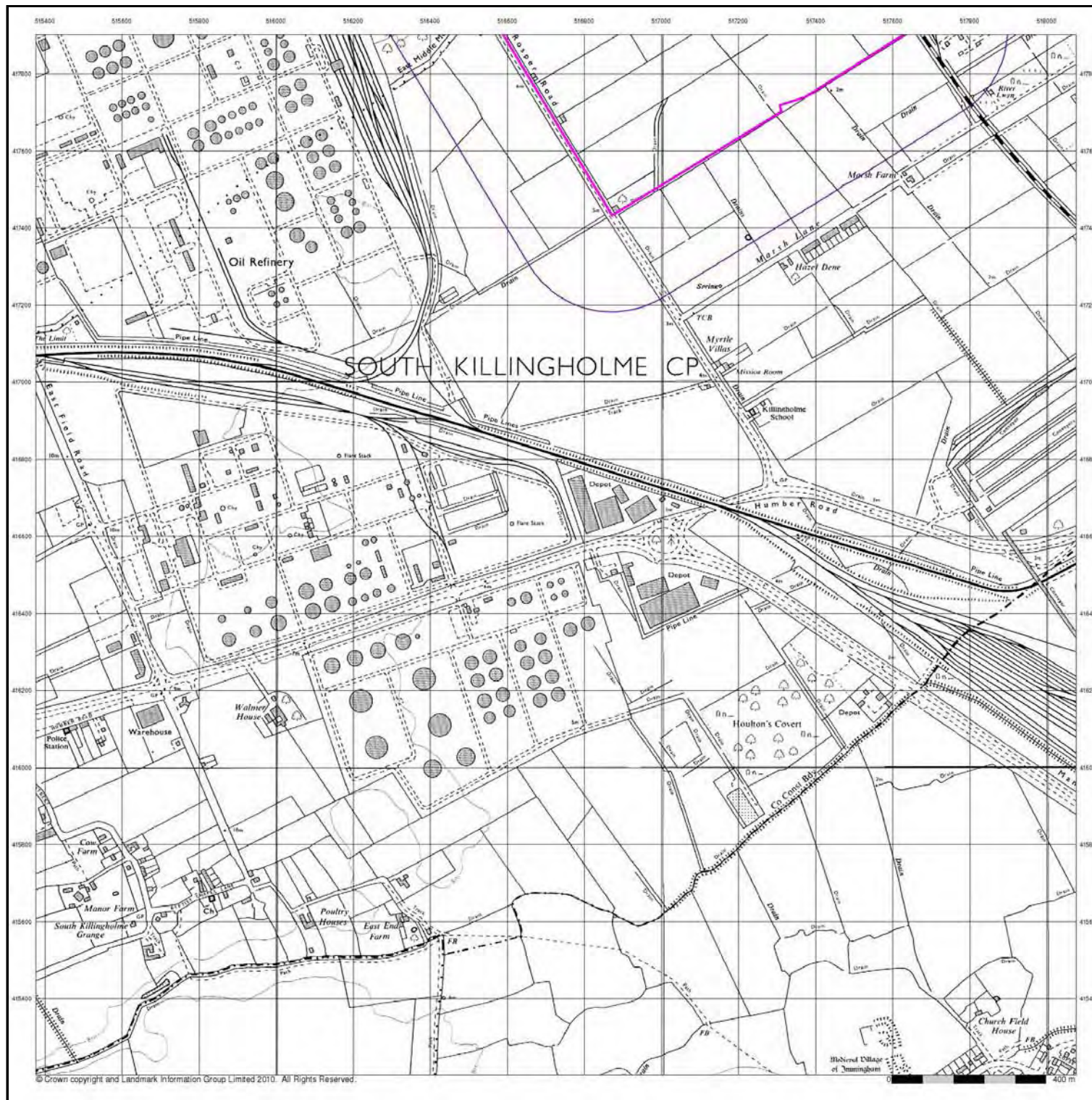


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



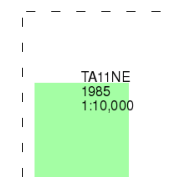
## Ordnance Survey Plan

Published 1985

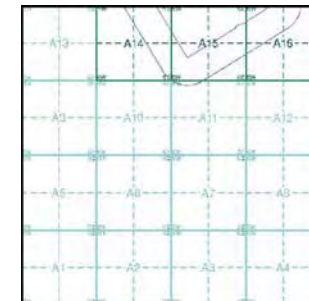
Source map scale - 1:10,000

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

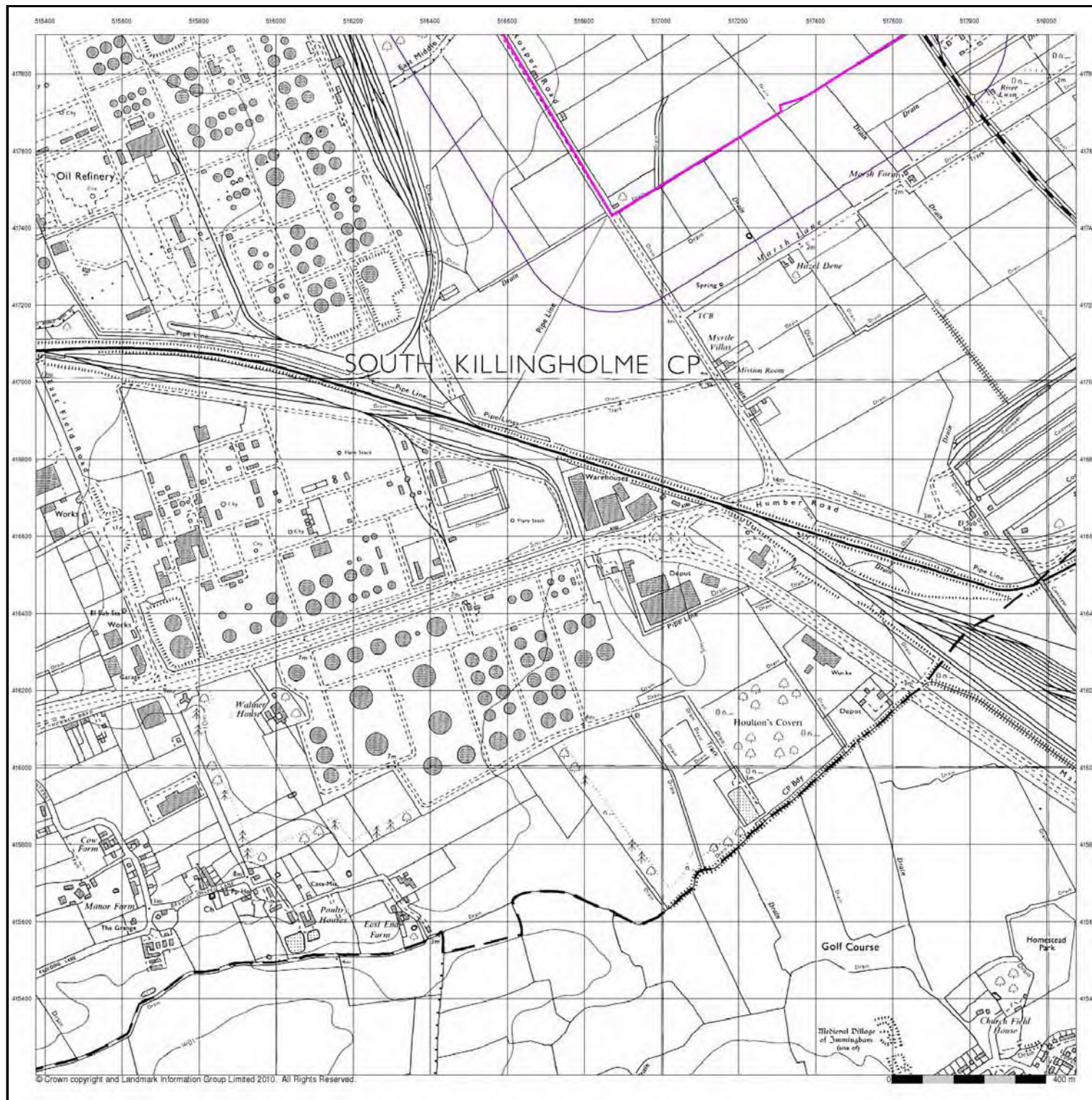


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



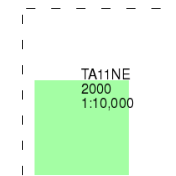
### 10k Raster Mapping

Published 2000

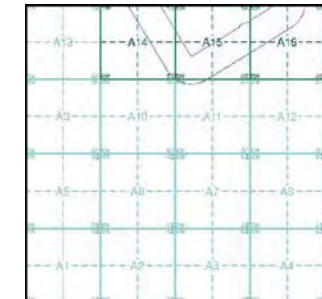
Source map scale - 1:10,000

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

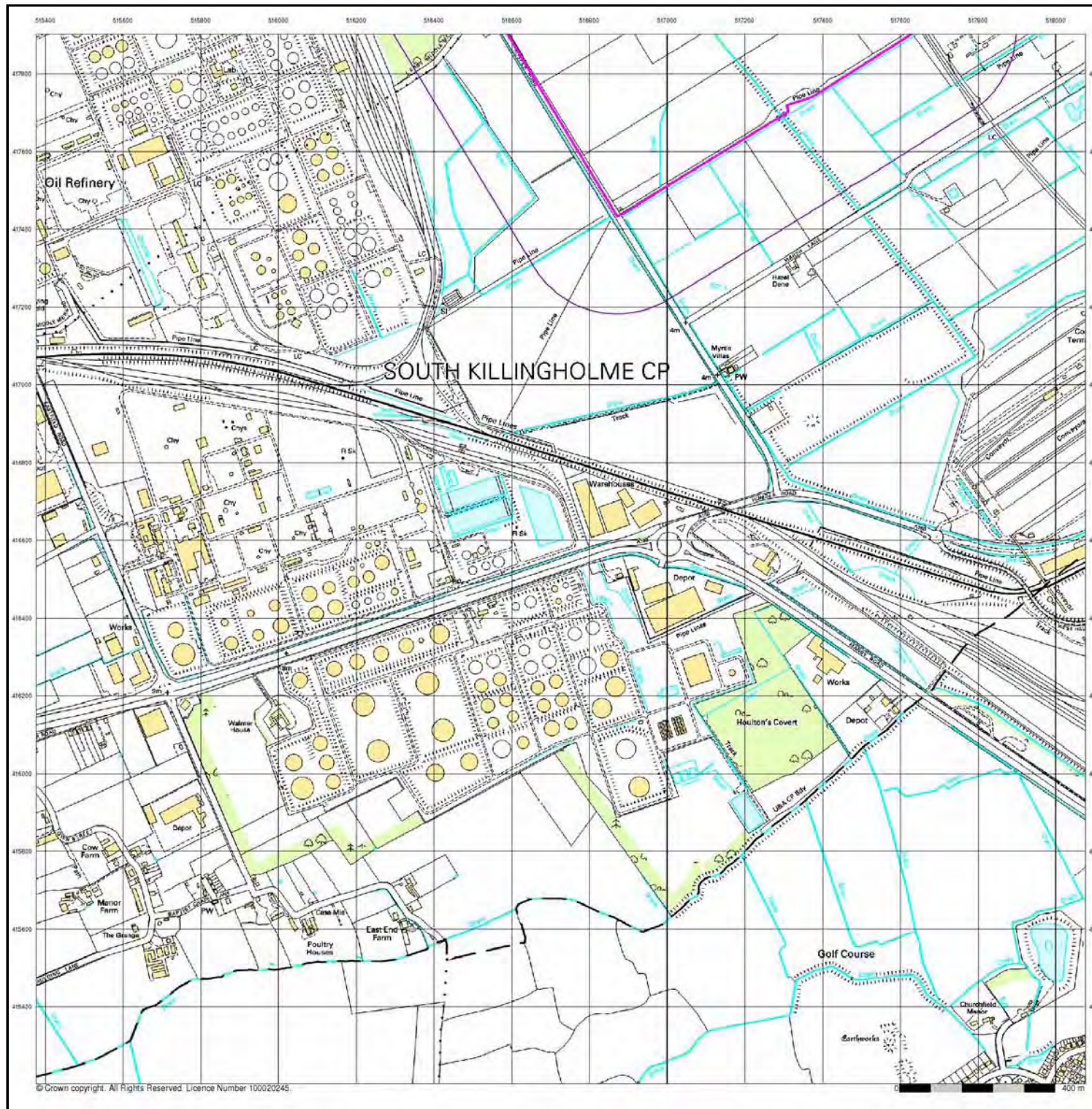


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



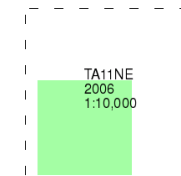
## 10k Raster Mapping

Published 2006

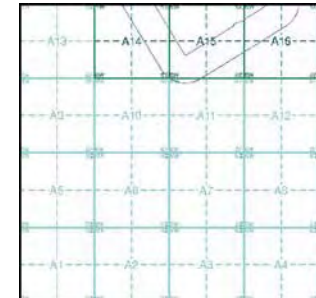
Source map scale - 1:10,000

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

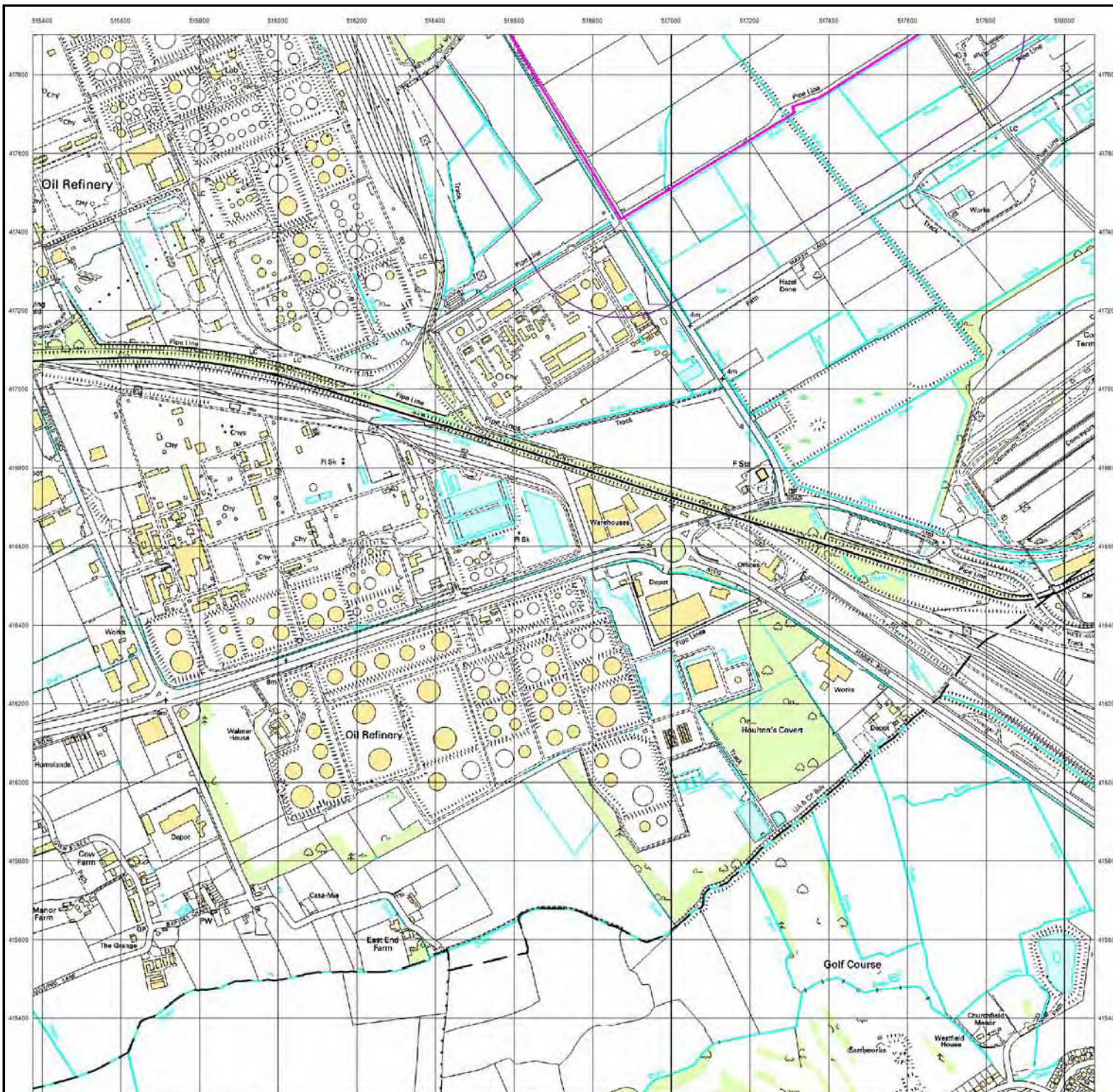


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



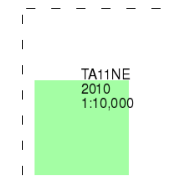
## 10k Raster Mapping

Published 2010

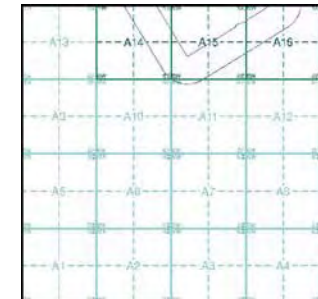
### Source map scale - 1:10,000

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

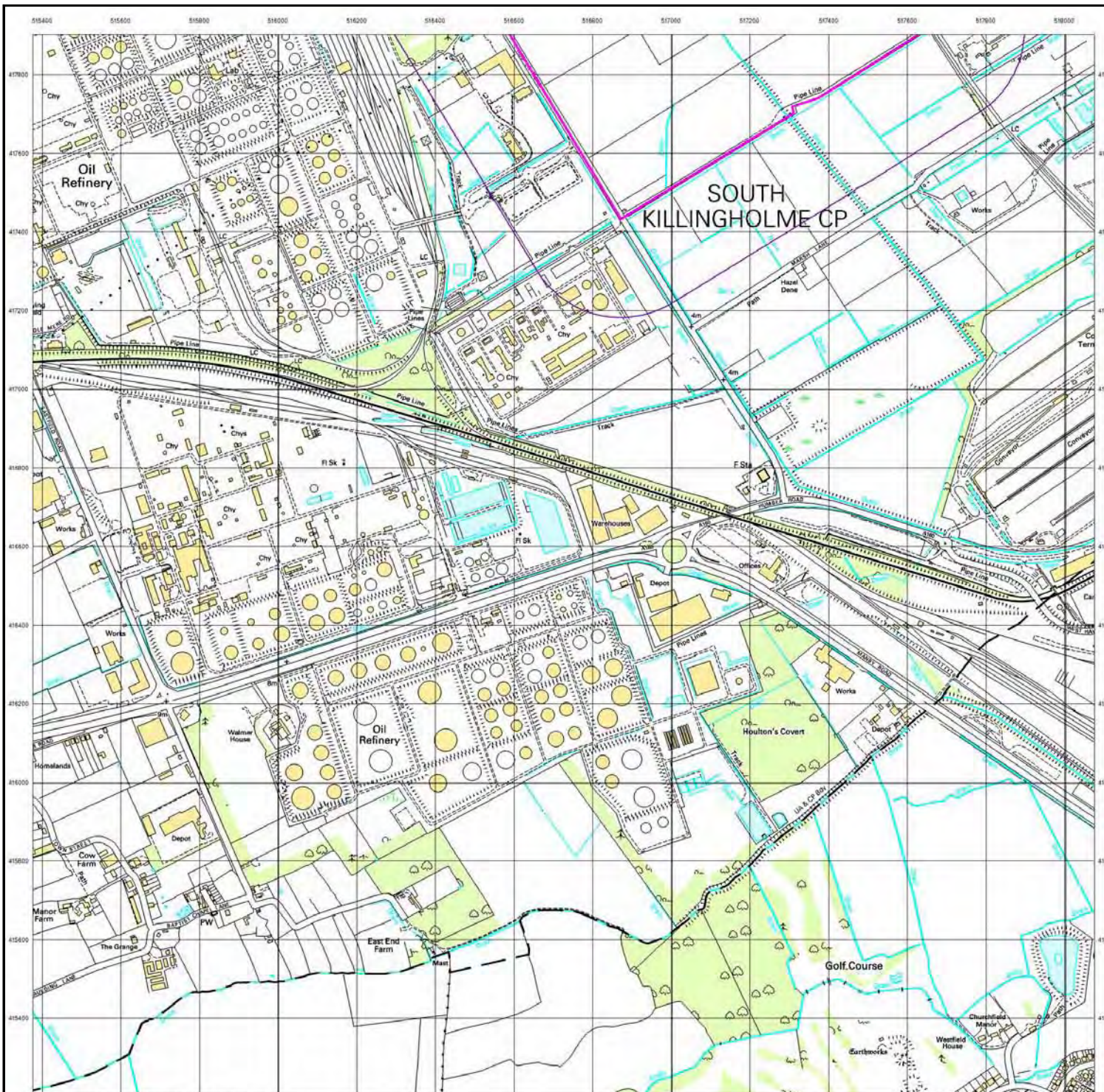


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 517050, 417630  
 Slice: A  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



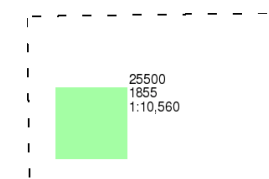
Yorkshire

Published 1855

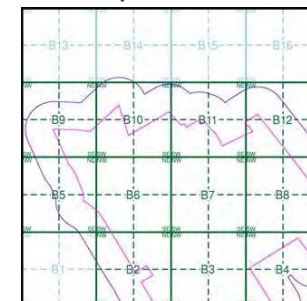
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

#### Map Name(s) and Date(s)



#### Historical Map - Slice B

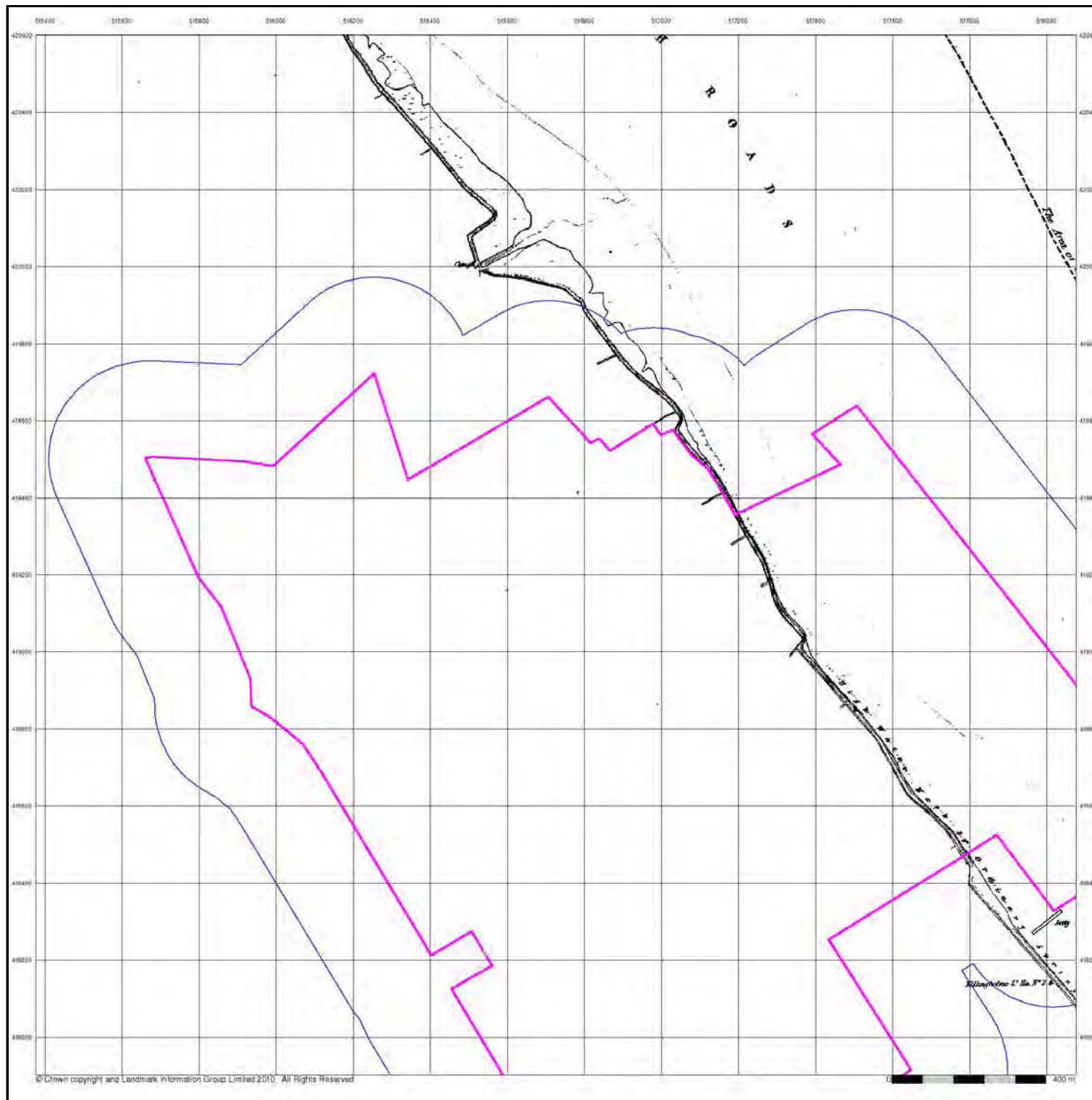


#### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

#### Site Details

Site at 516900, 418600





## Lincolnshire

Published 1886 - 1887

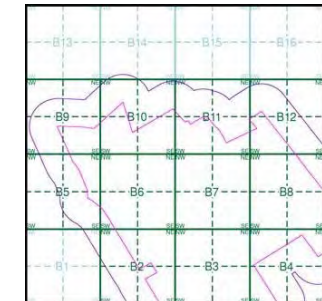
Source map scale - 1:10,560

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)

008SW 1886 1:10,560	008SE 1886 1:10,560
013NW 1887 1:10,560	013NE 1887 1:10,560

### Historical Map - Slice B

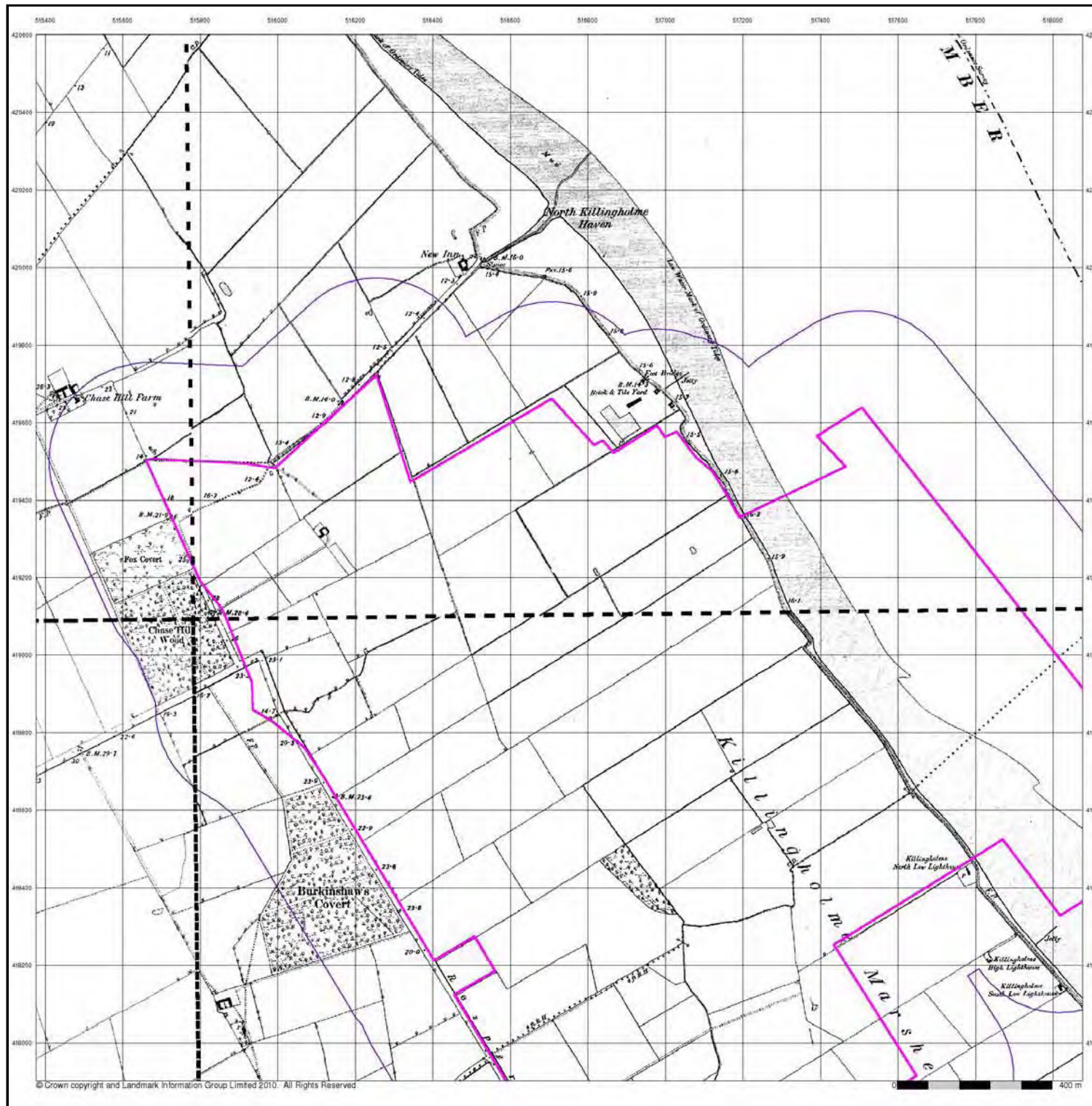


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



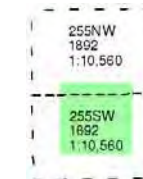
## Yorkshire

Published 1892

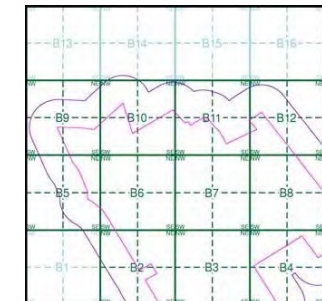
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

### Map Name(s) and Date(s)



### Historical Map - Slice B

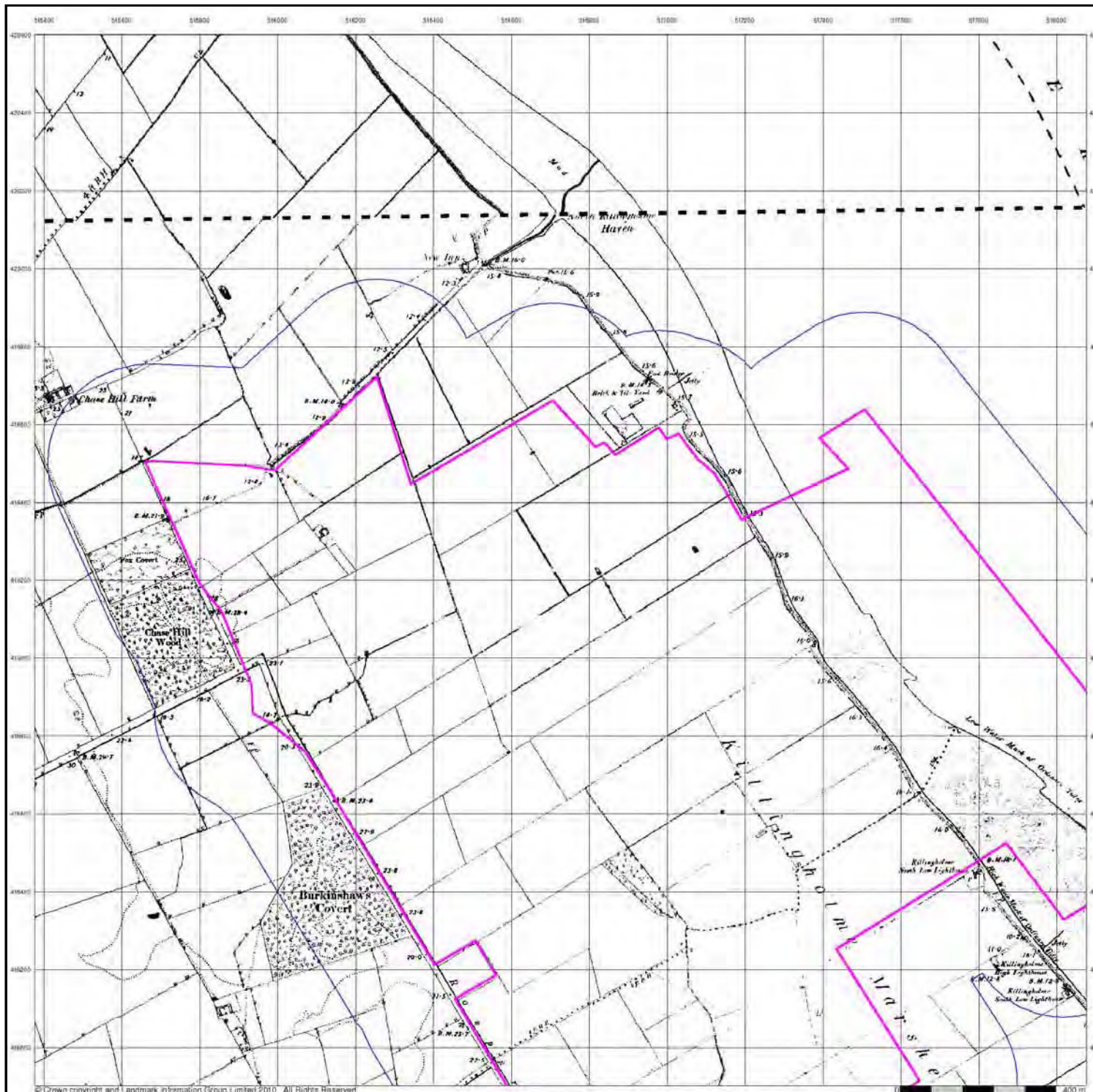


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



Lincolnshire

Published 1908 - 1910

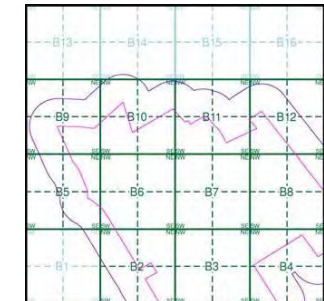
Source map scale - 1:10,560

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)

008SW 1908 1:10,560	008SE 1910 1:10,560
013NW 1908 1:10,560	013NE 1910 1:10,560

Historical Map - Slice B

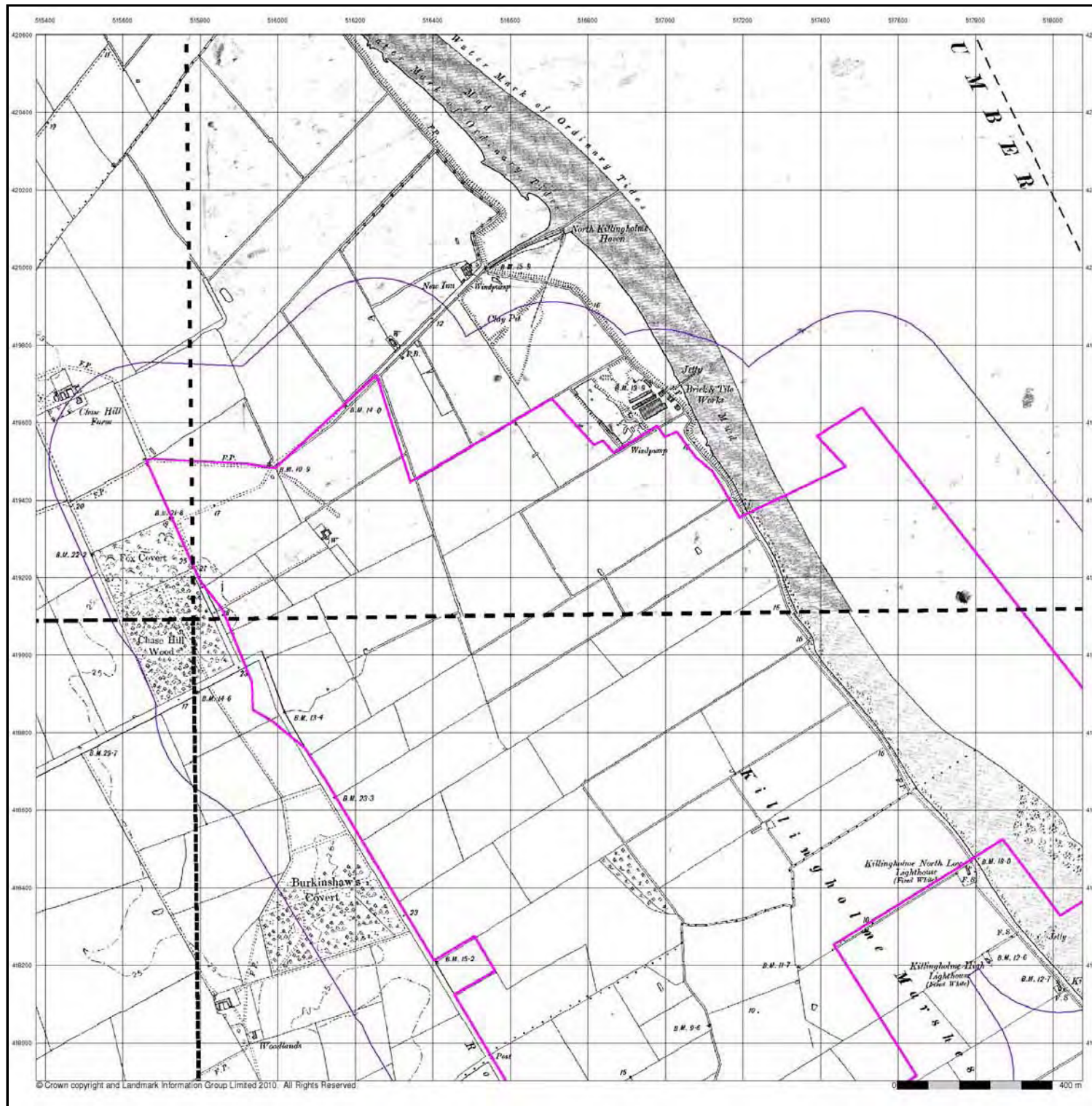


Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

Site Details

Site at 516900, 418600



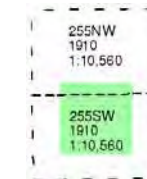
Yorkshire

Published 1910

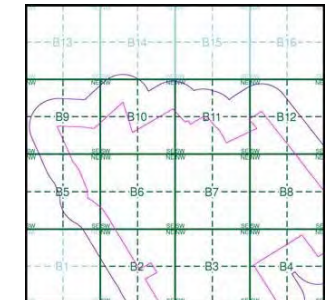
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

Map Name(s) and Date(s)



Historical Map - Slice B

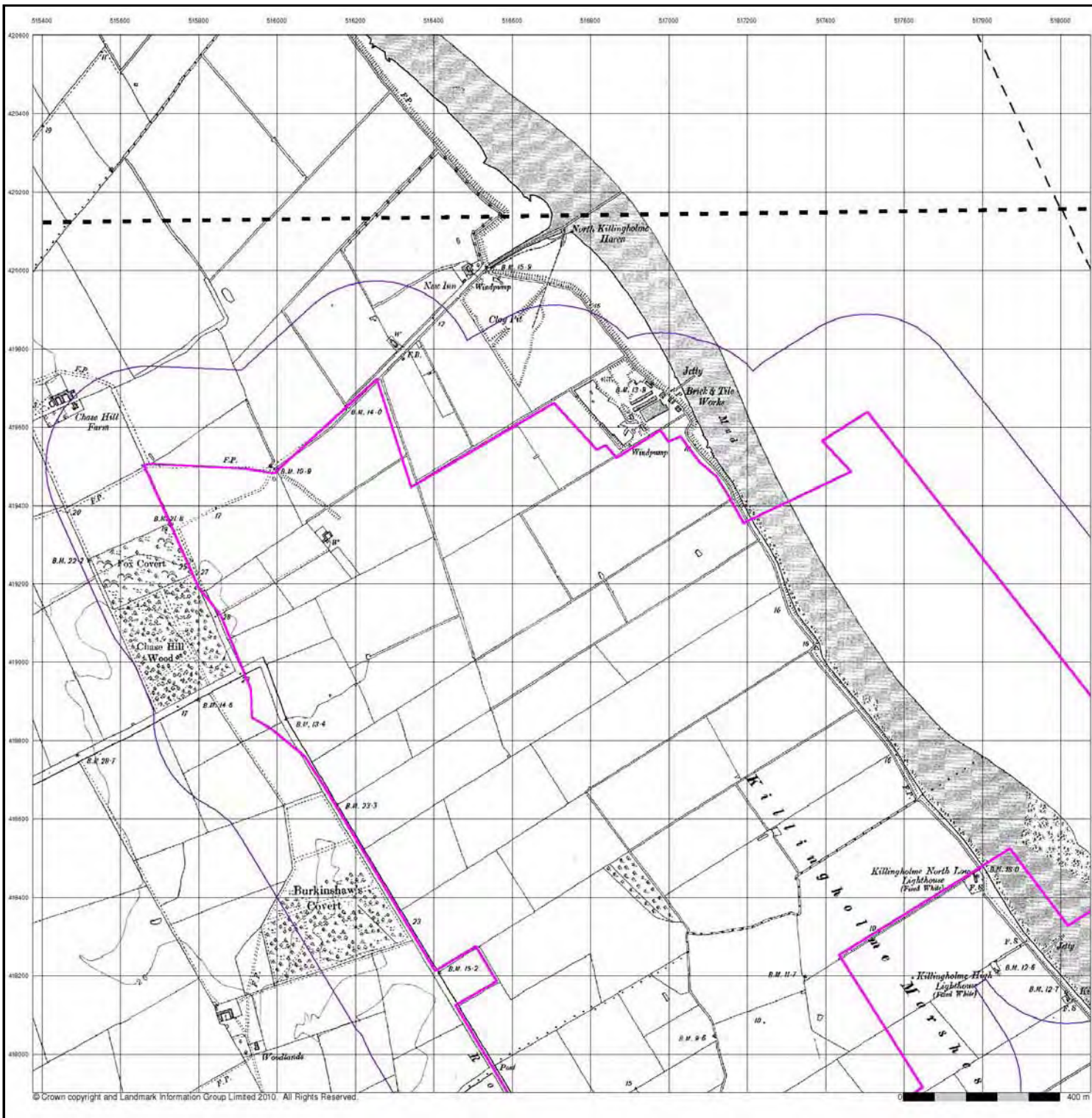


Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

Site Details

Site at 516900, 418600



**Lincolnshire**  
**Published 1932**

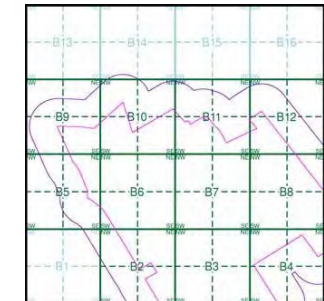
**Source map scale - 1:10,560**

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)**

008SW 1932 1:10,560	008SE 1932 1:10,560
013NW 1932 1:10,560	013NE 1932 1:10,560

**Historical Map - Slice B**

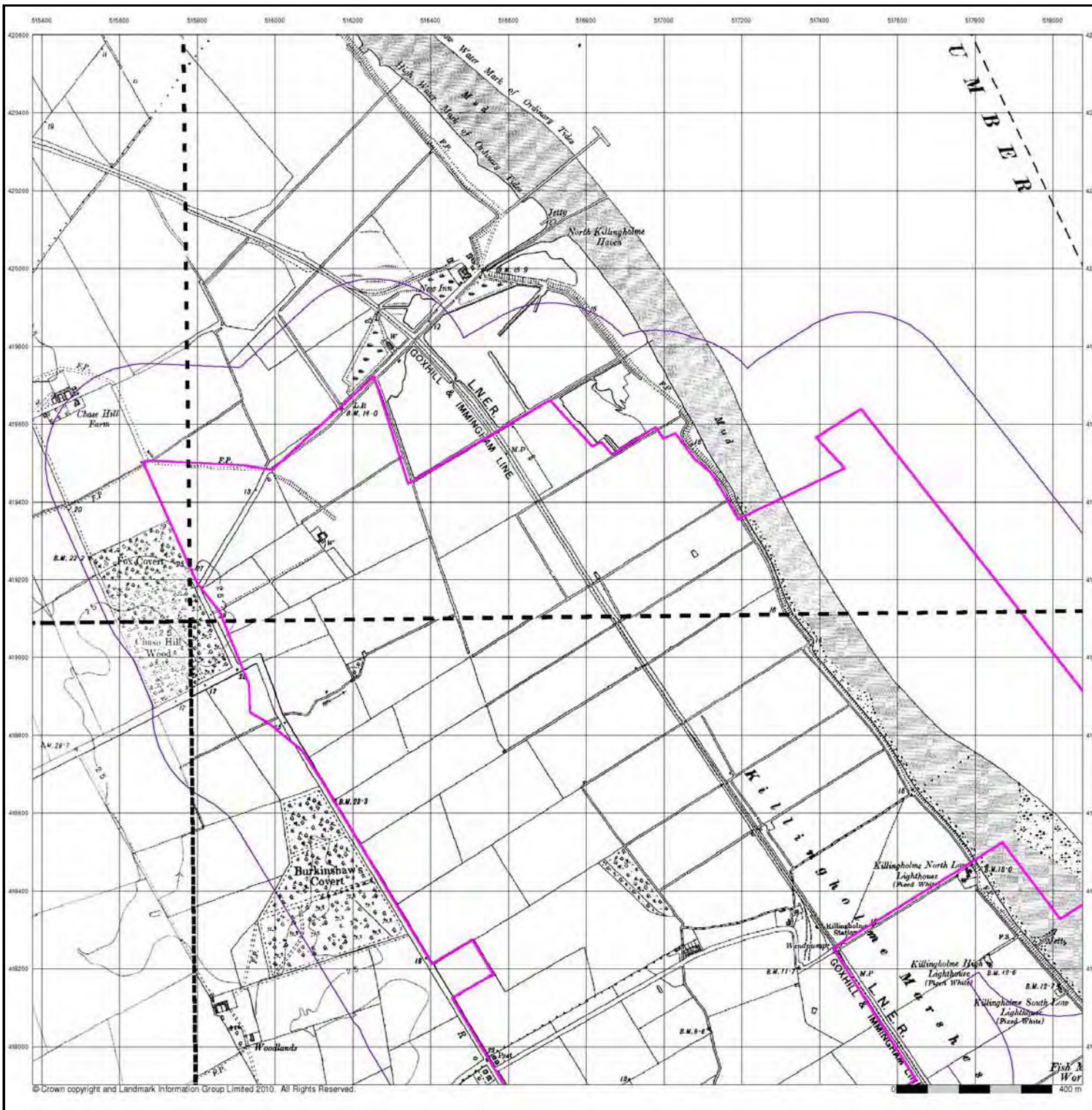


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



## Lincolnshire

Published 1947 - 1951

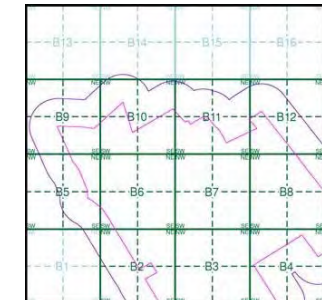
Source map scale - 1:10,560

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)

008SW 1960 1:10,560	008SE 1951 1:10,560
013NW 1947 1:10,560	013NE 1951 1:10,560

### Historical Map - Slice B

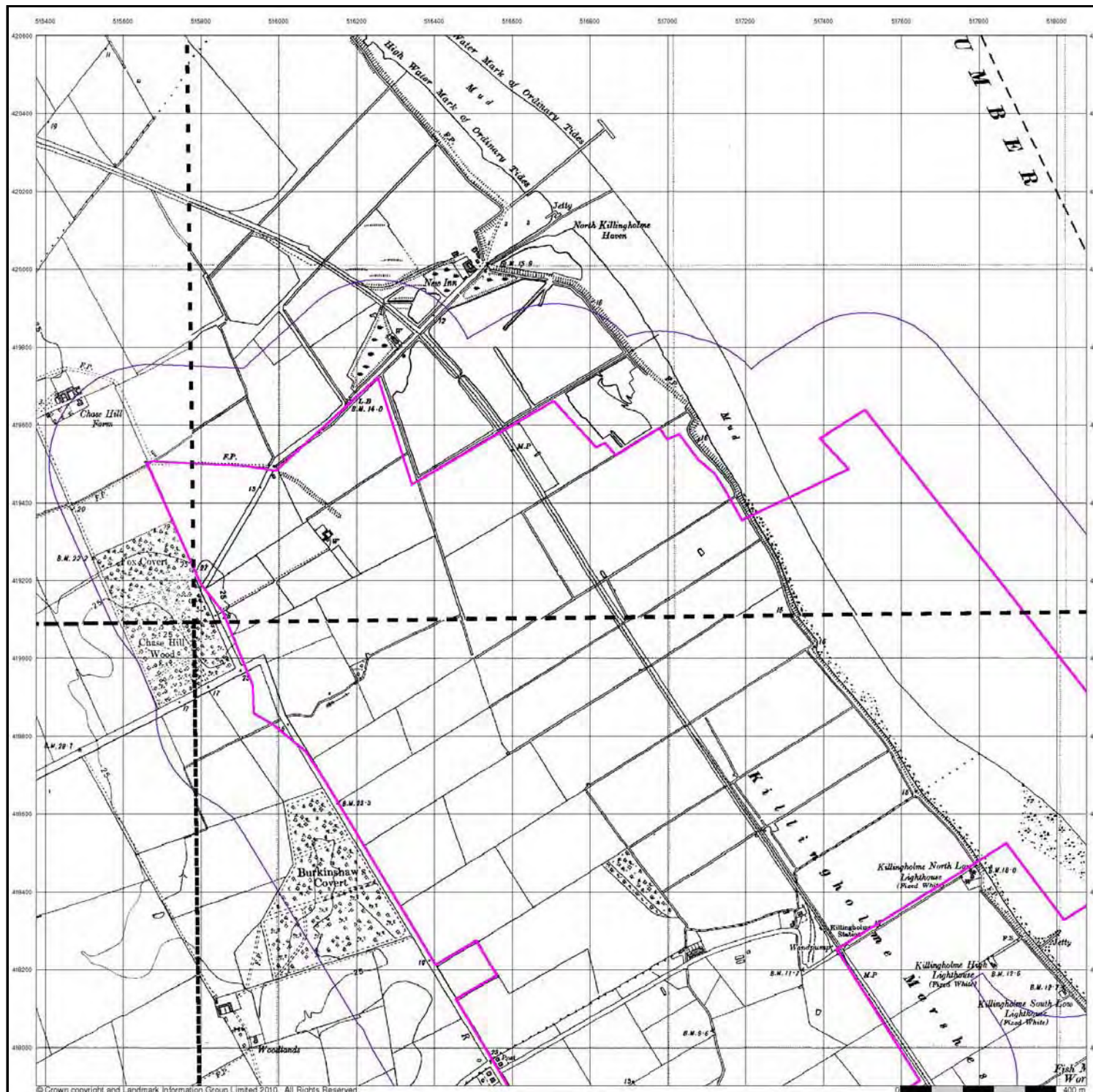


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



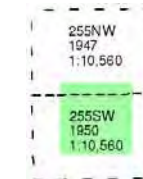
## Yorkshire

Published 1947 - 1950

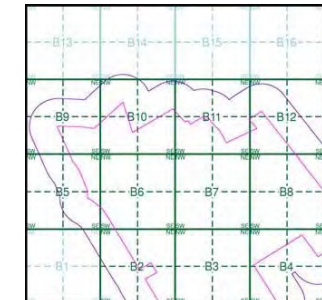
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

### Map Name(s) and Date(s)



### Historical Map - Slice B

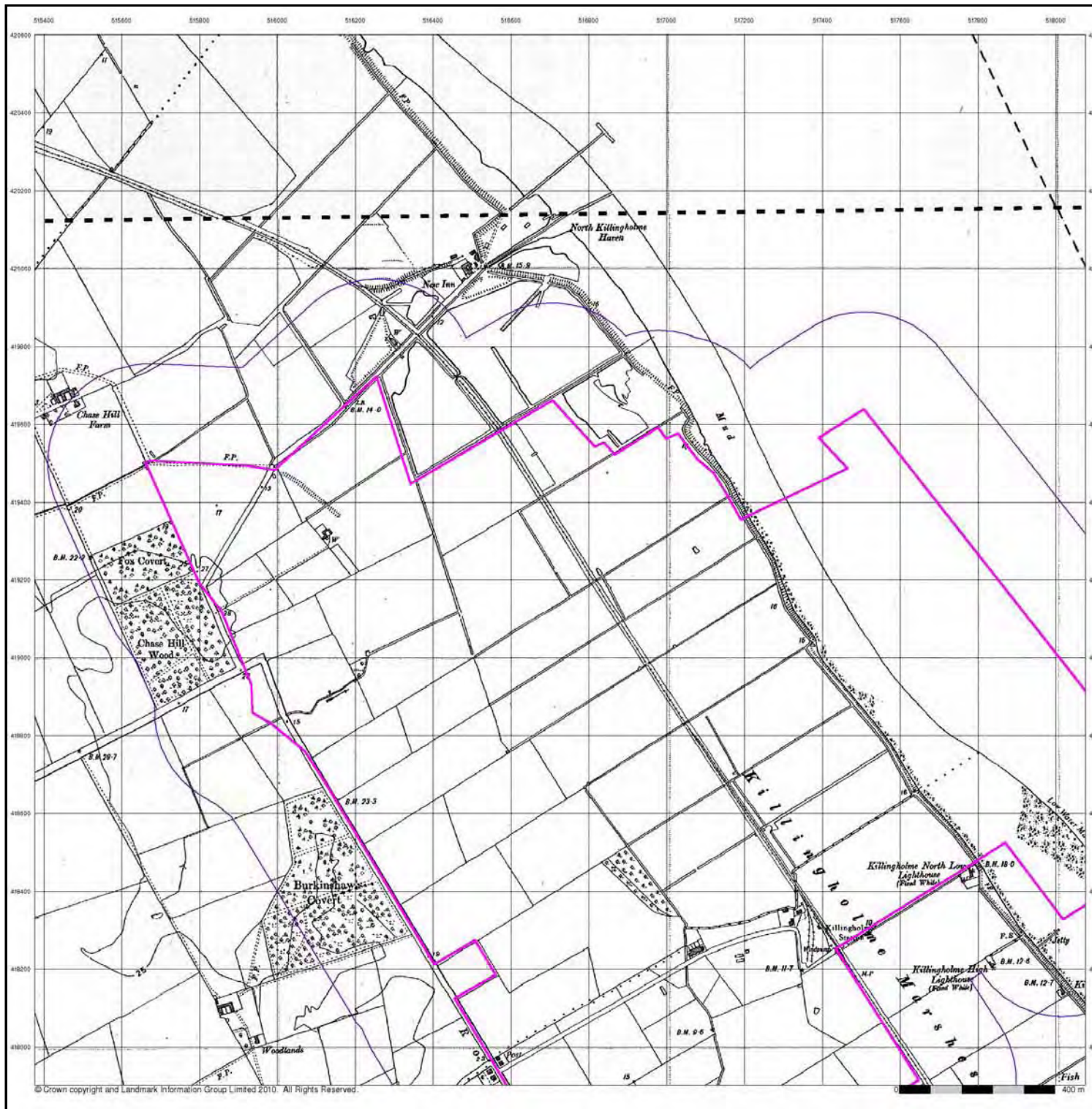


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



## Ordnance Survey Plan

Published 1956

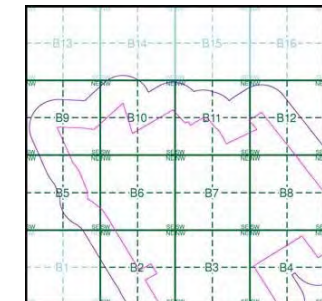
Source map scale - 1:10,000

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)

TA12SE	1956	1:10,560
TA11NE	1956	1:10,560

### Historical Map - Slice B

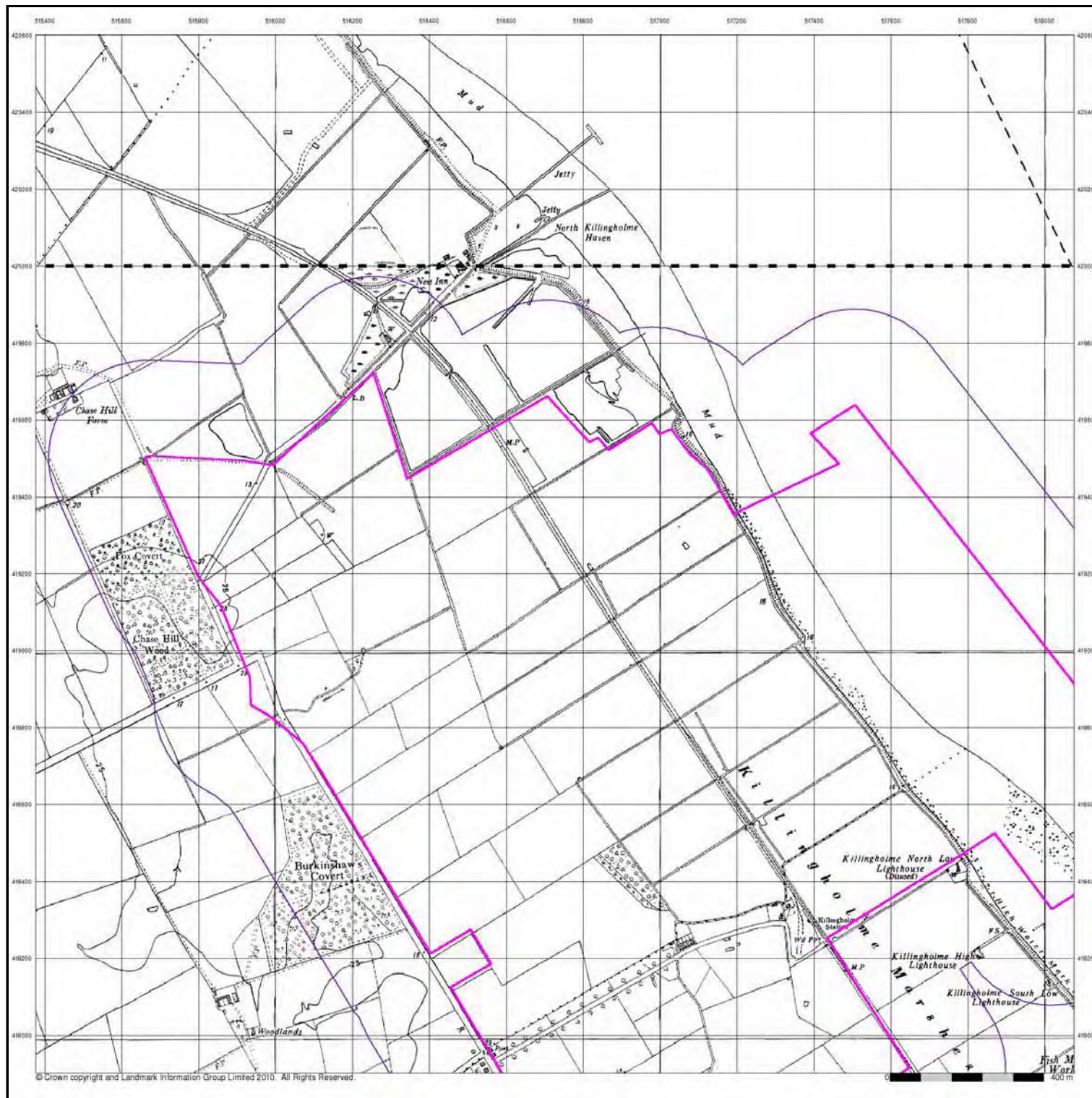


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600





### Ordnance Survey Plan

Published 1965 - 1966

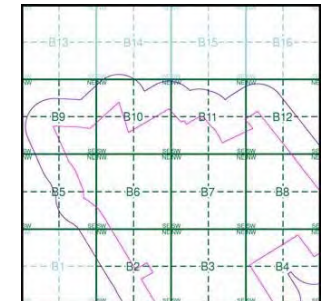
Source map scale - 1:10,000

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)

TA12SE	1965	1:10,560
TA11NE	1966	1:10,560

### Historical Map - Slice B

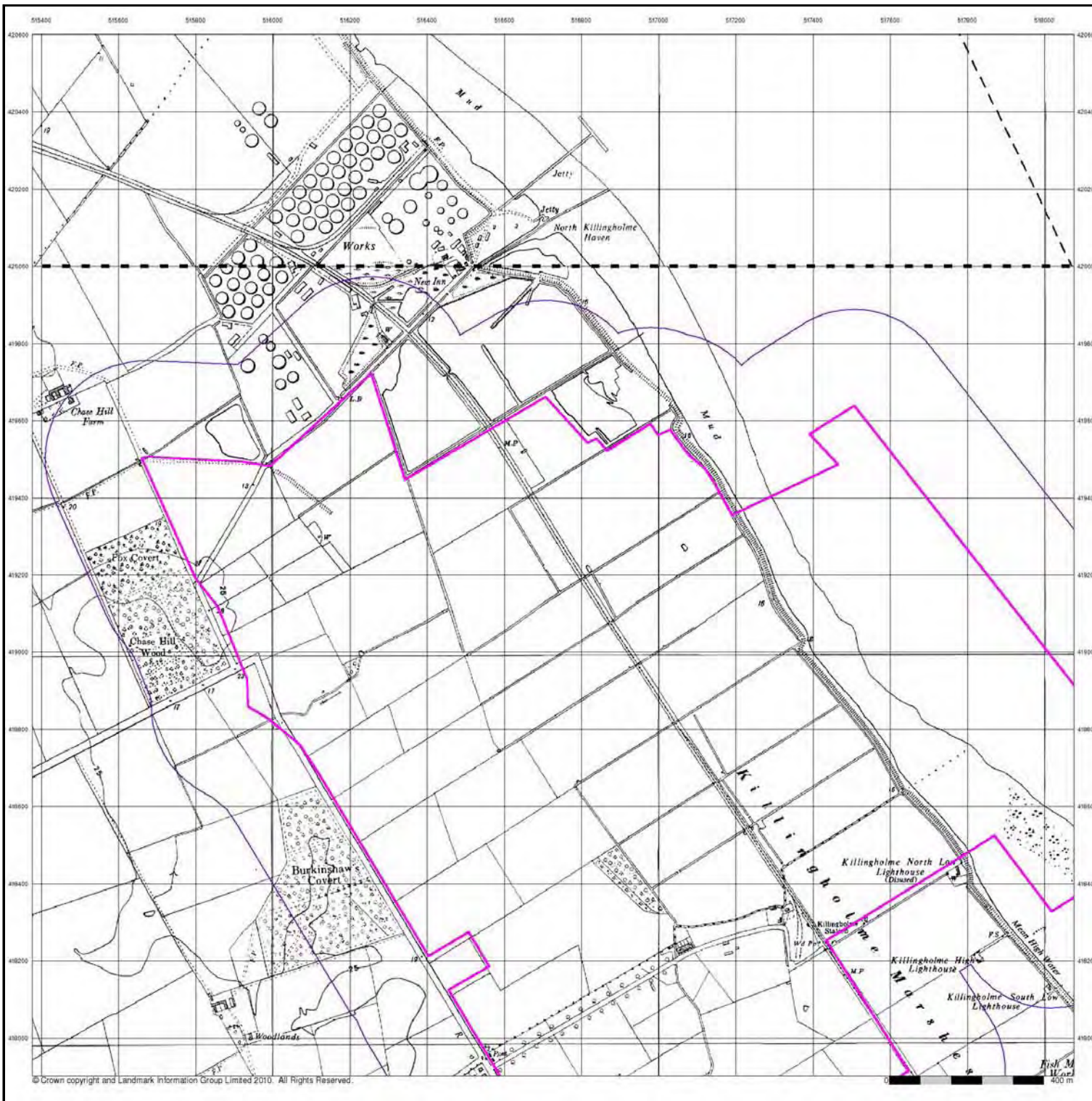


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



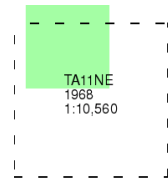
## Ordnance Survey Plan

Published 1968

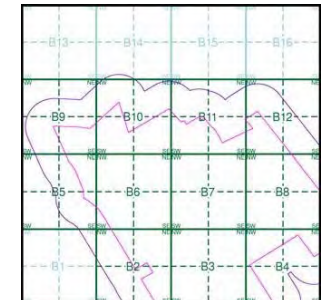
Source map scale - 1:10,000

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 B

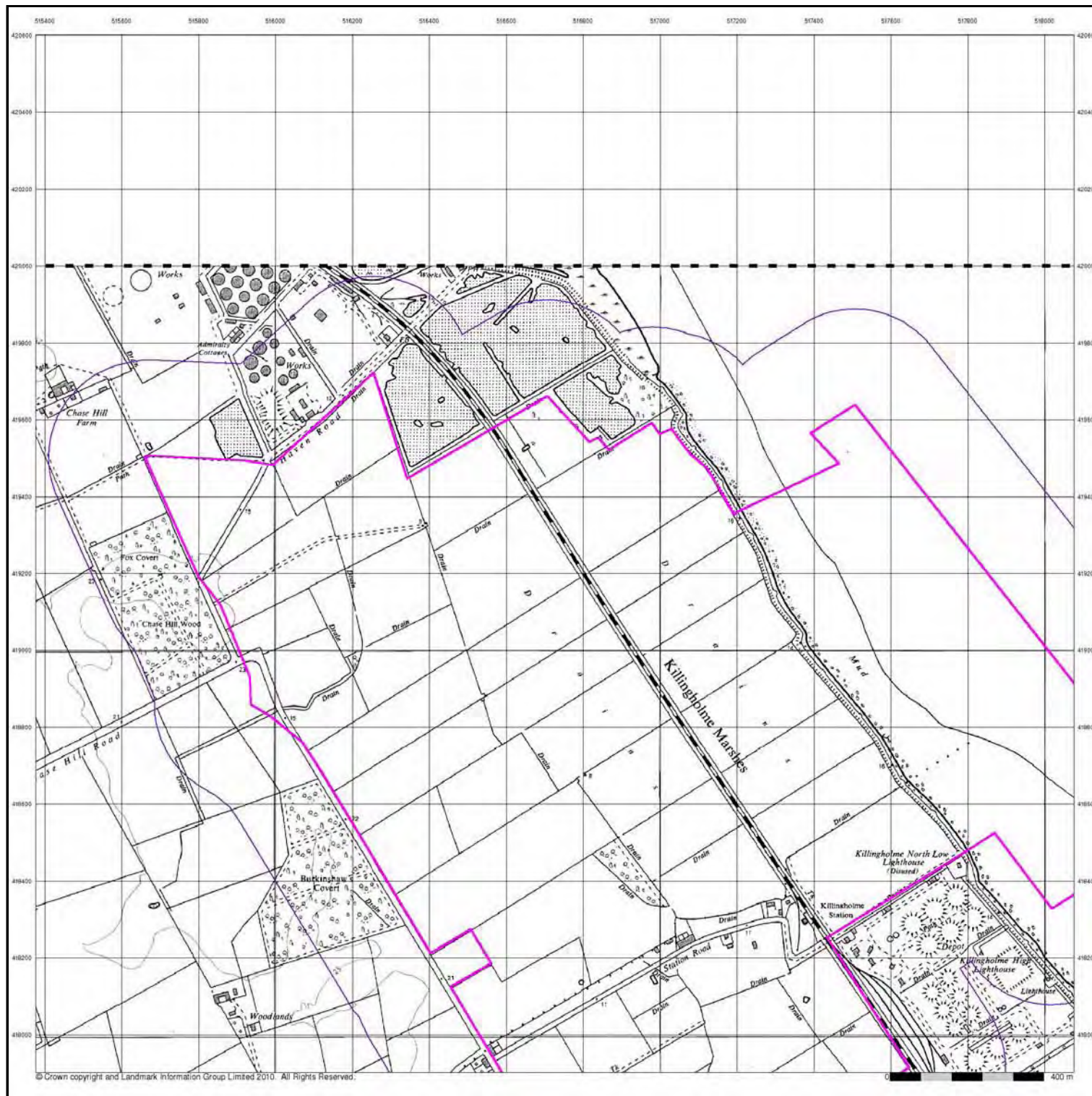


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600





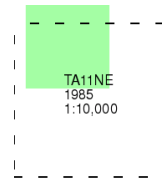
## Ordnance Survey Plan

Published 1985

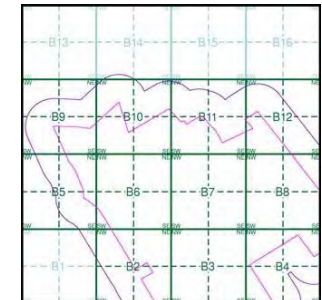
Source map scale - 1:10,000

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 B

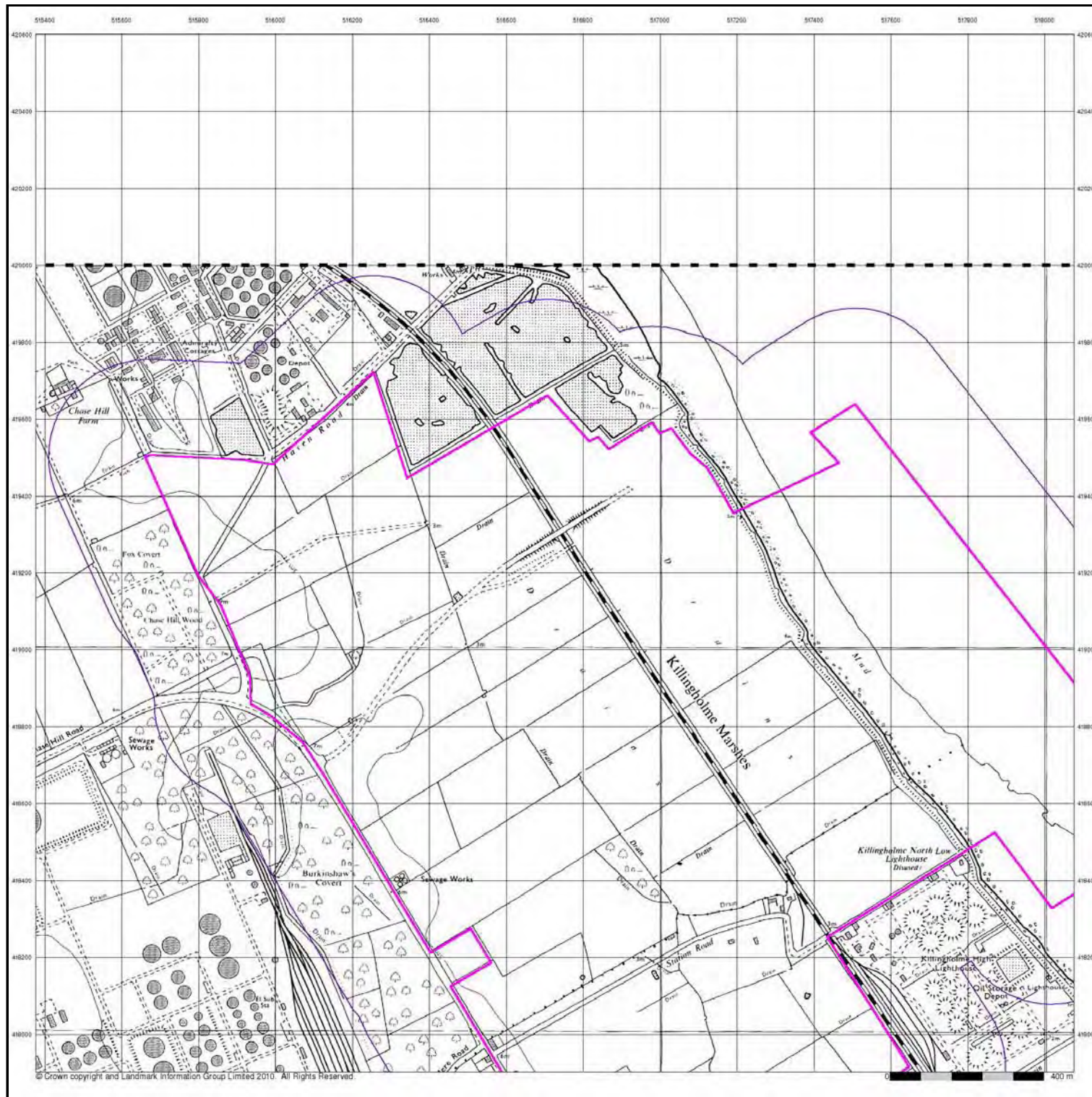


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



### 10k Raster Mapping

Published 1999 - 2000

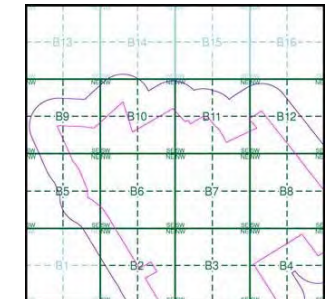
Source map scale - 1:10,000

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)

TA12SE	1999	1:10,000
TA11NE	2000	1:10,000

### Historical Map - Slice B

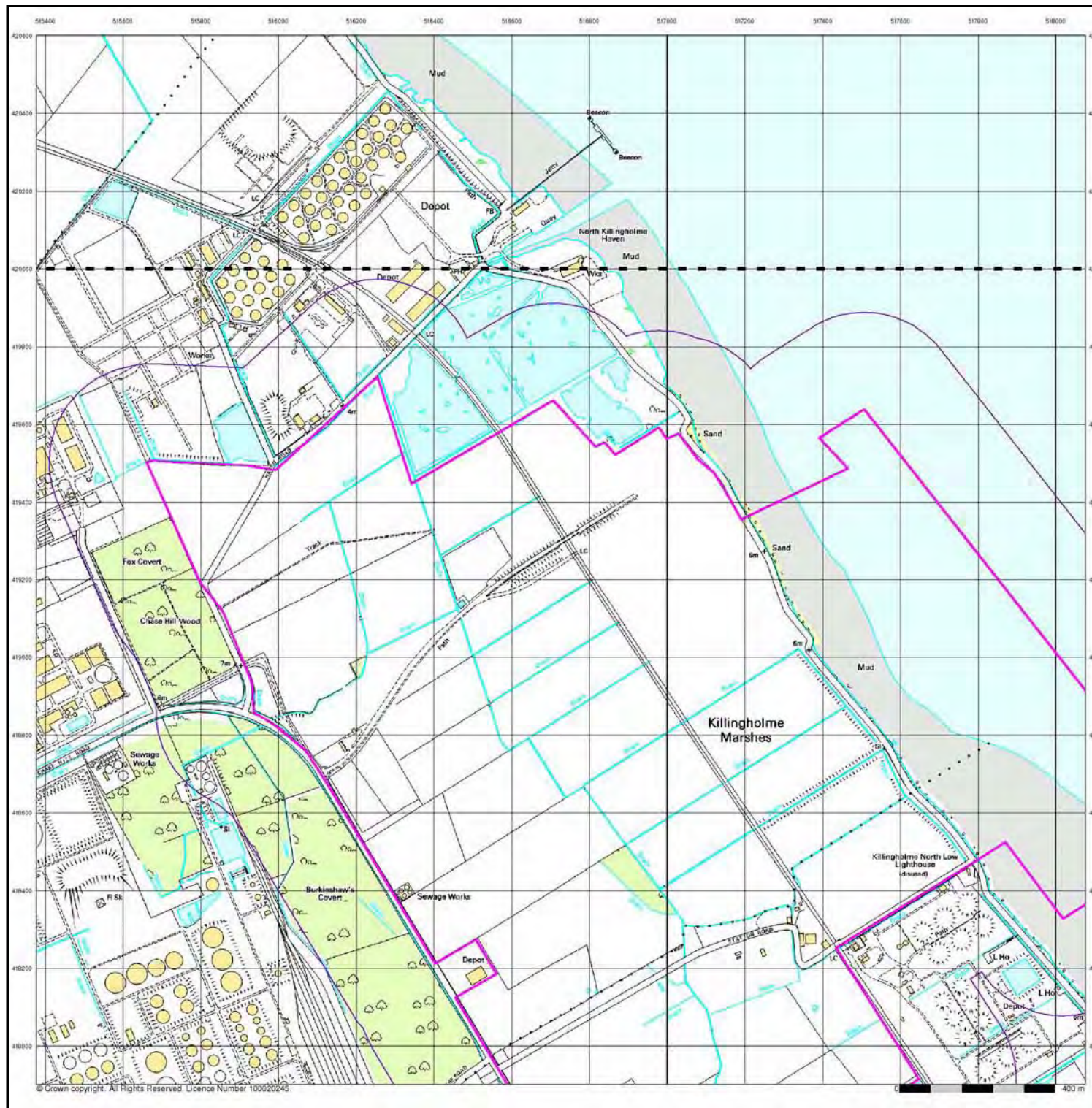


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



### 10k Raster Mapping

Published 2006

Source map scale - 1:10,000

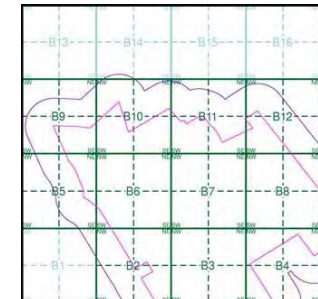
The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks 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)

TA12SE  
2006  
1:10,000

TA11NE  
2006  
1:10,000

#### Historical Map - Slice B

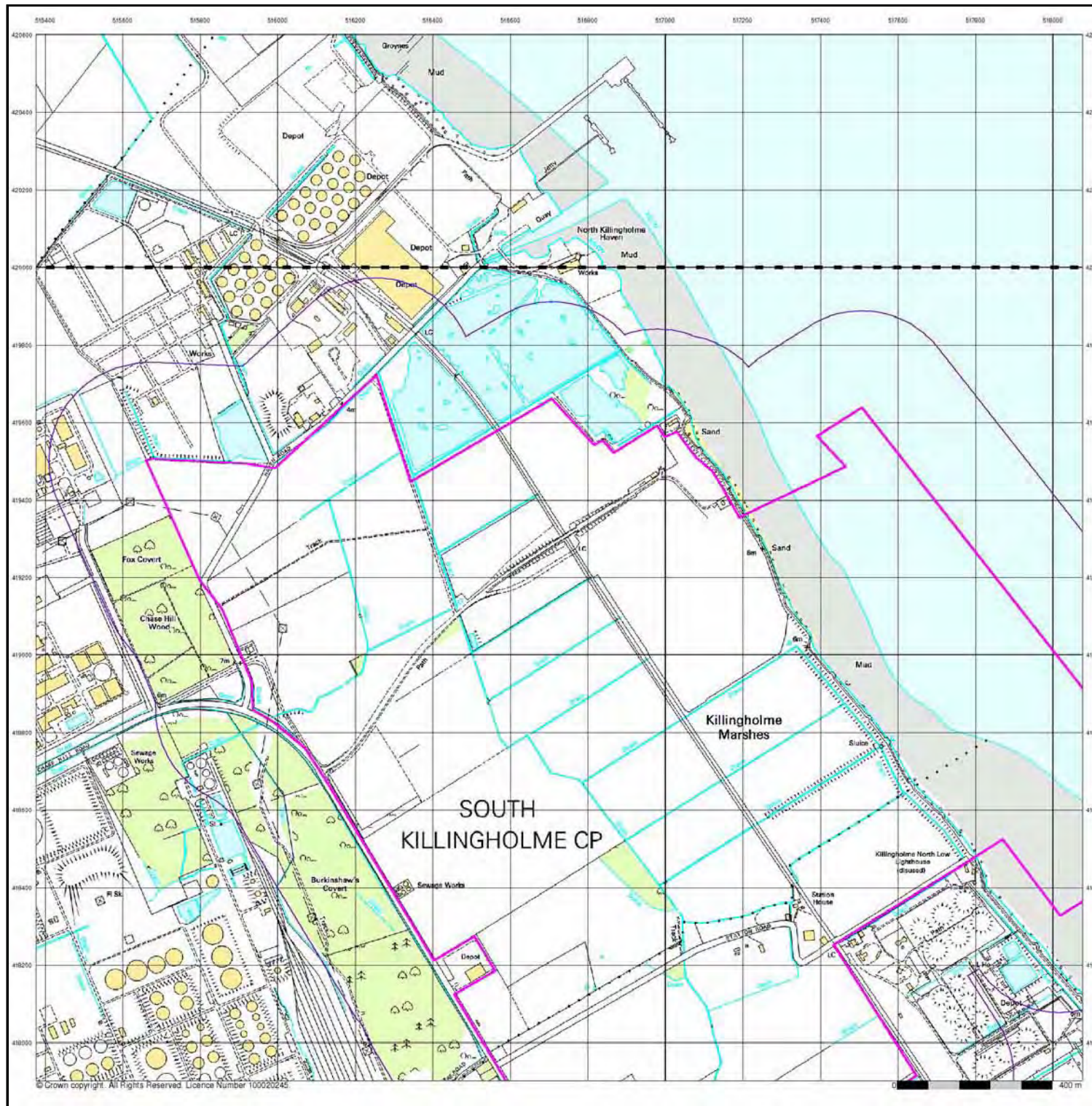


#### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

#### Site Details

Site at 516900, 418600



### 10k Raster Mapping

Published 2010

Source map scale - 1:10,000

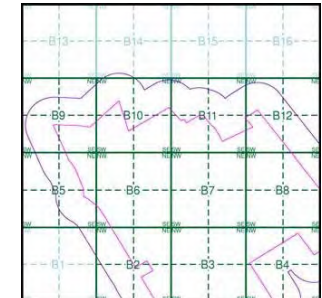
The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks 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)

TA12SE  
2010  
1:10,000

TA11NE  
2010  
1:10,000

### Historical Map - Slice B

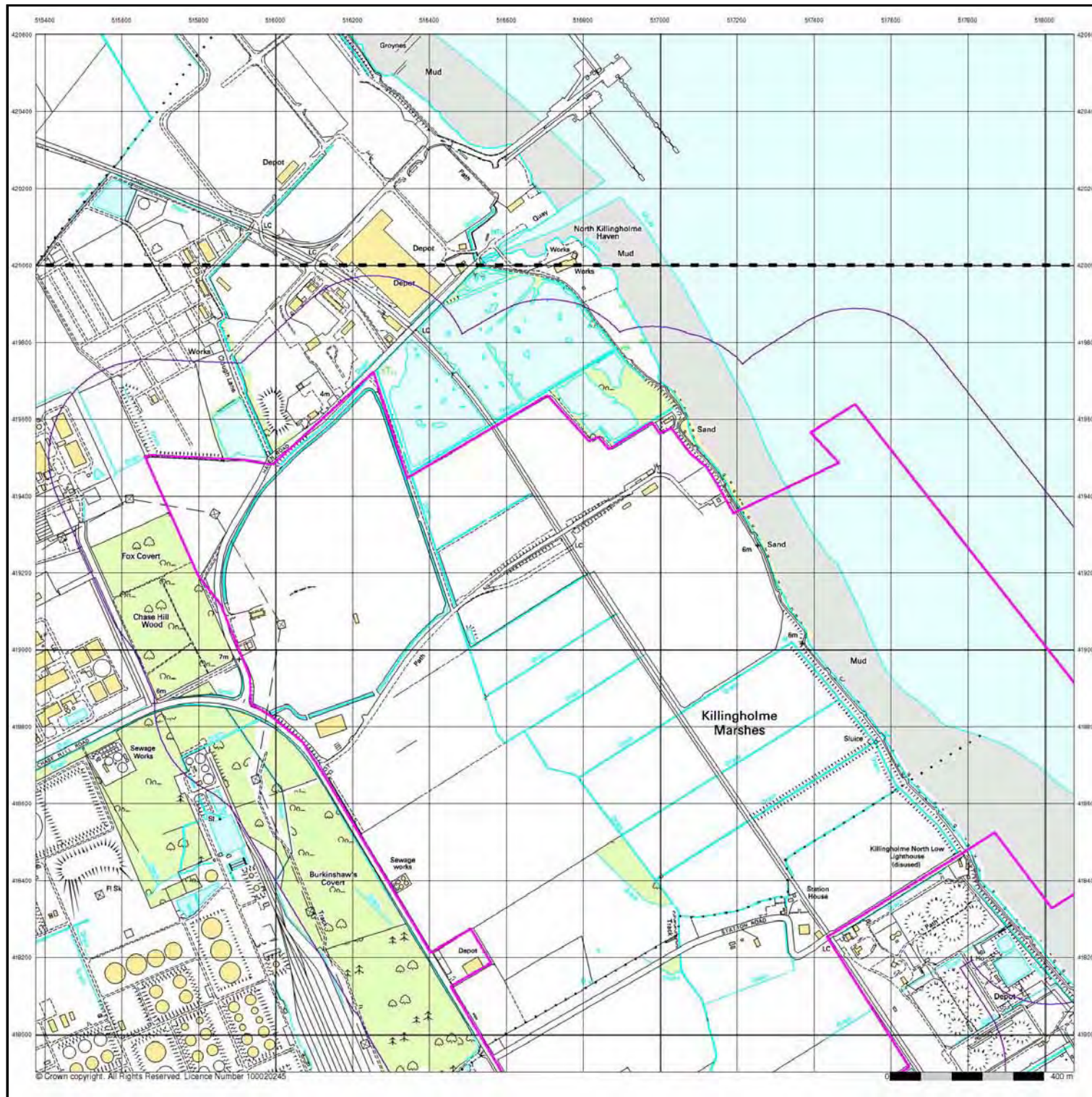


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 516870, 418930  
 Slice: B  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600

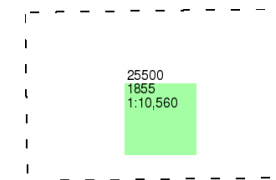


**Yorkshire**  
**Published 1855**

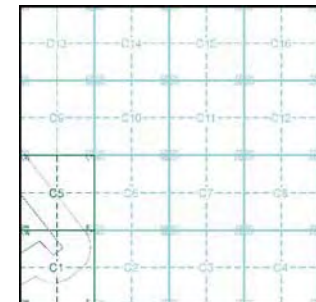
**Source map scale - 1:10,560**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**



**Historical Map - Slice C**

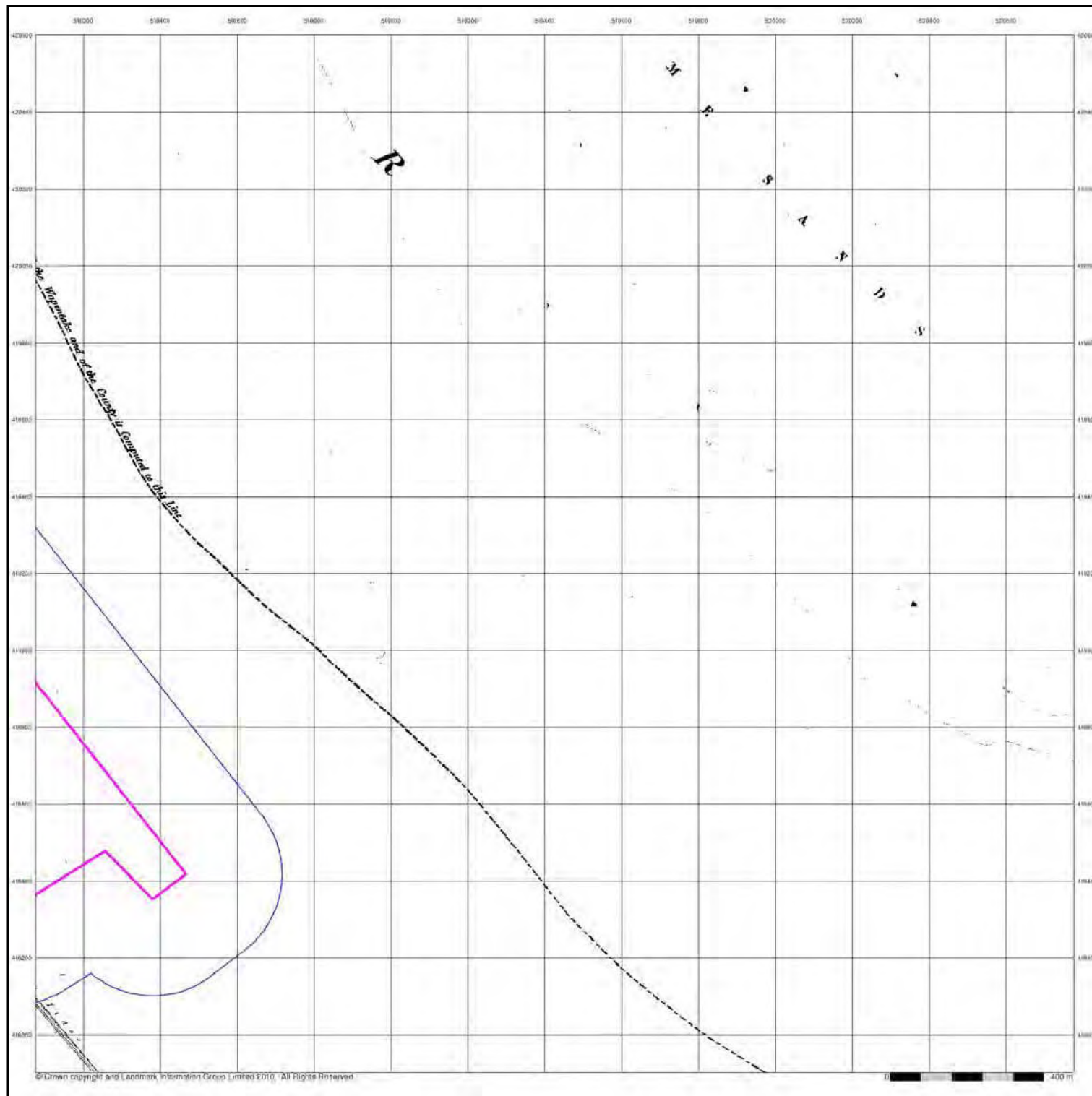


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600





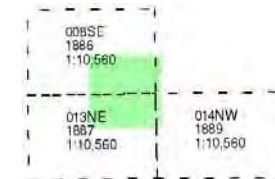
## Lincolnshire

Published 1886 - 1889

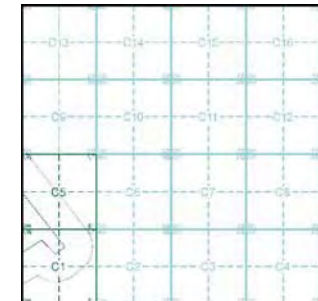
Source map scale - 1:10,560

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

### Map Name(s) and Date(s)



### Historical Map - Slice C

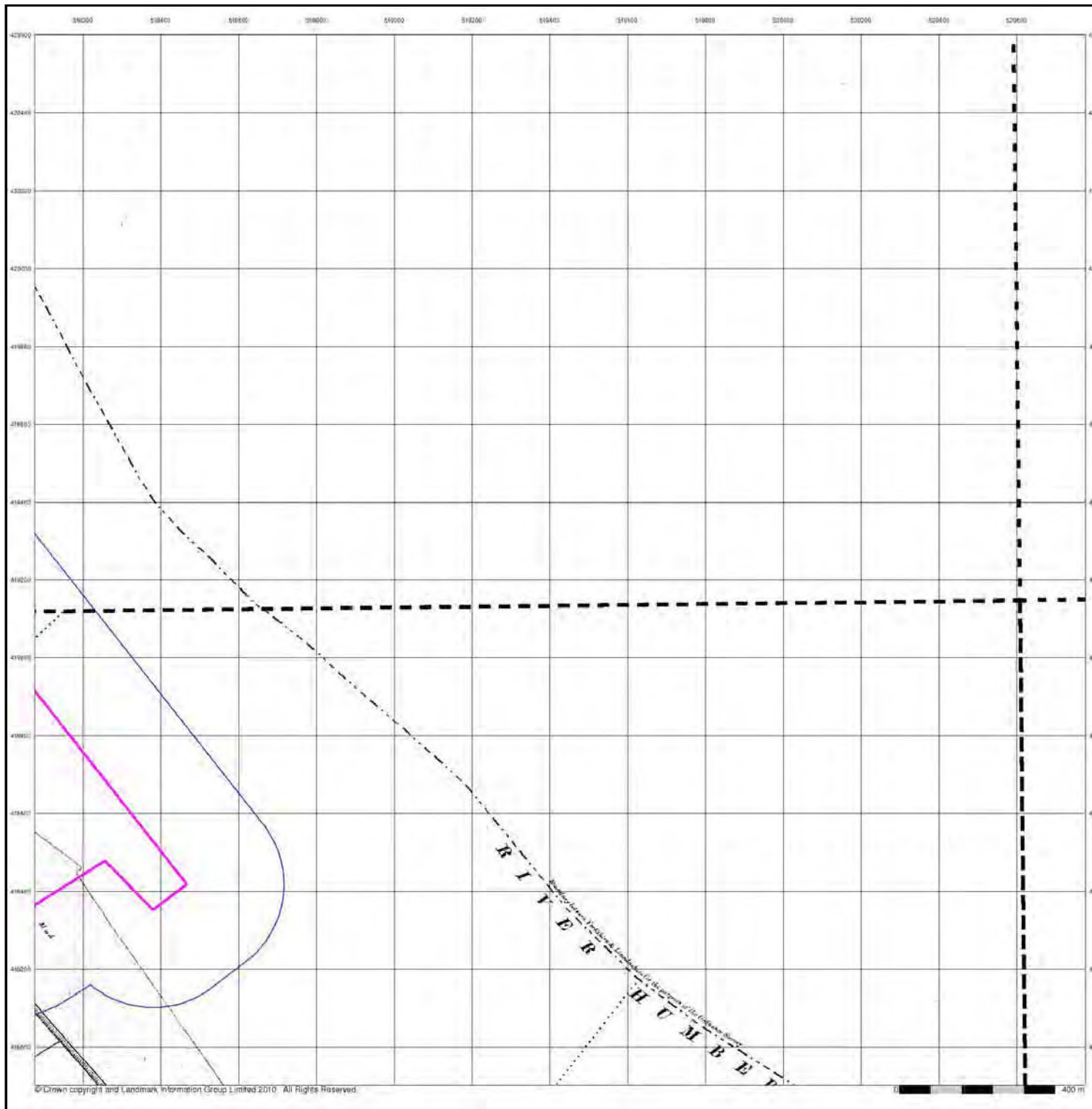


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



**Yorkshire**  
**Published 1892**

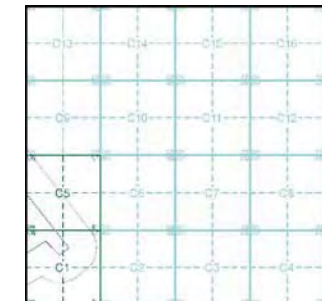
**Source map show scale - 1:10,560**

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)**

255NW 1892 1:10,560	255NE 1892 1:10,560
255SW 1892 1:10,560	255SE 1892 1:10,560

**Historical Map - Slice C**

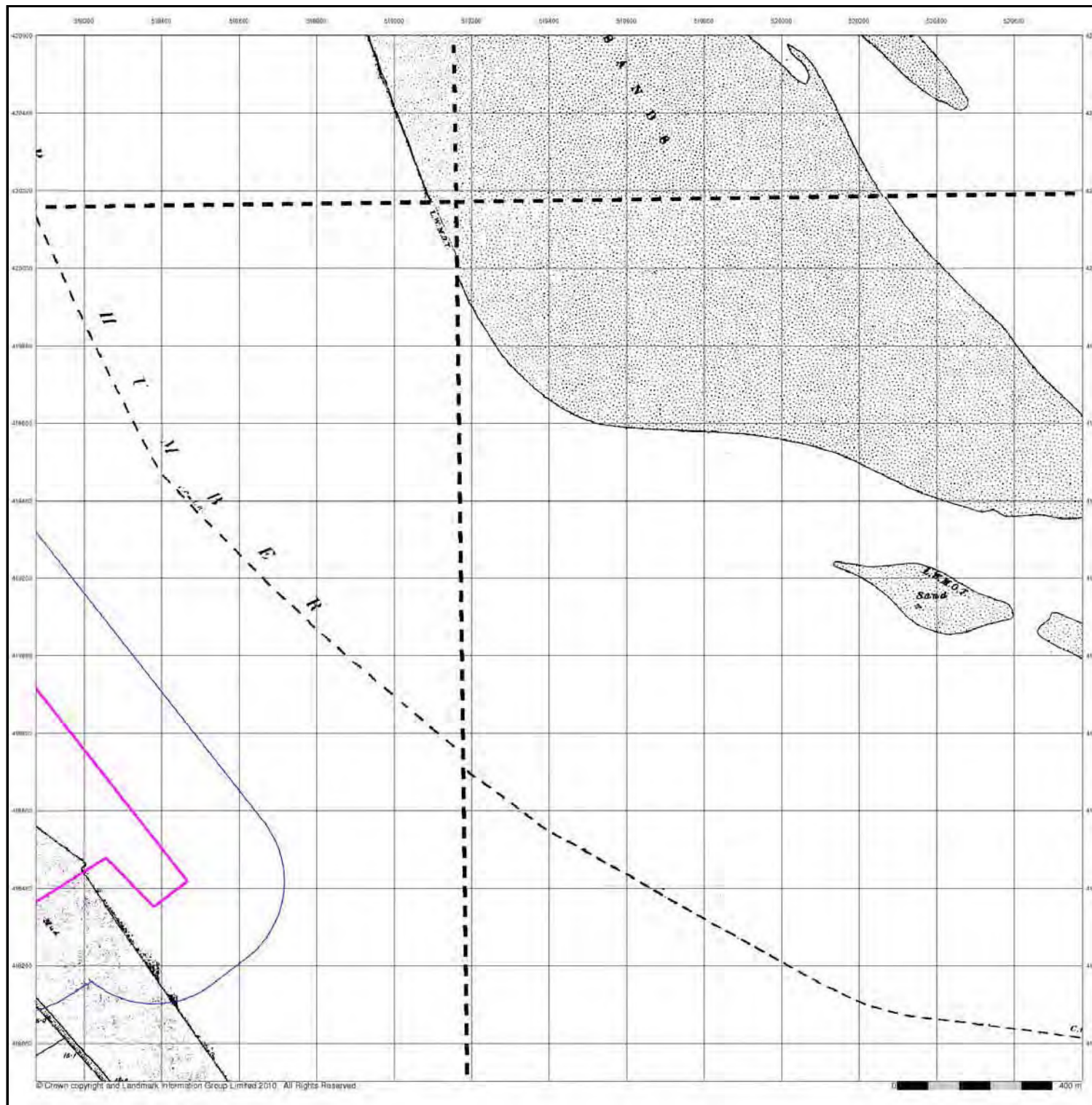


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600

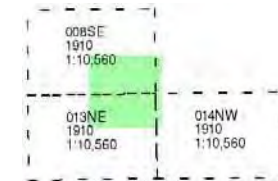


**Lincolnshire**  
**Published 1910**

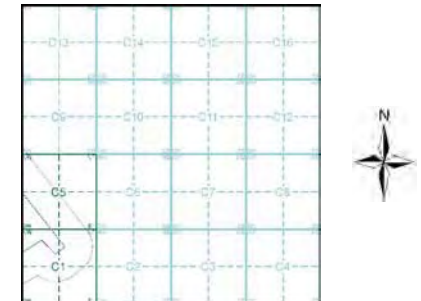
**Source map scale - 1:10,560**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**



**Historical Map - Slice C**

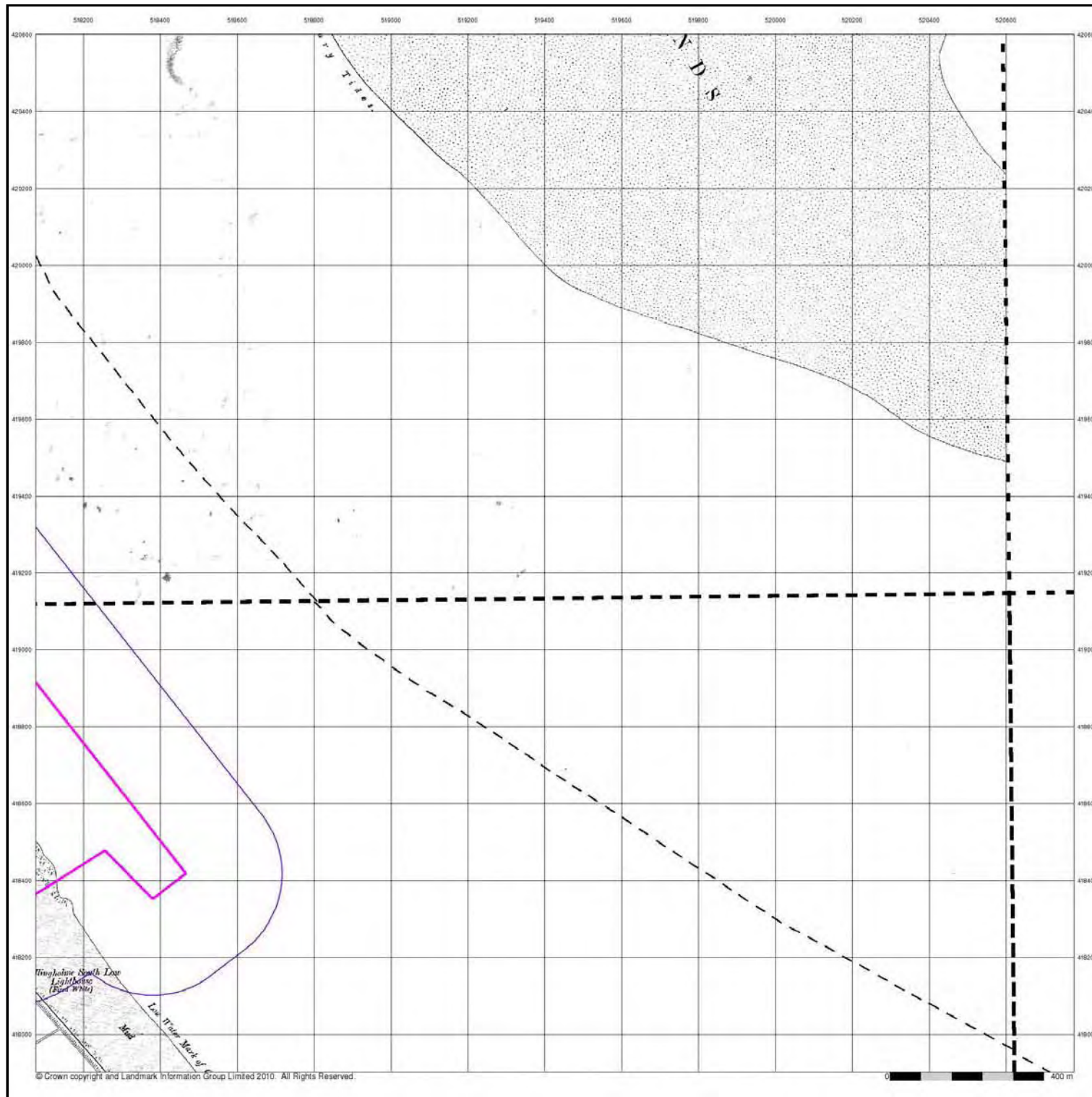


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



**Yorkshire**  
**Published 1910**

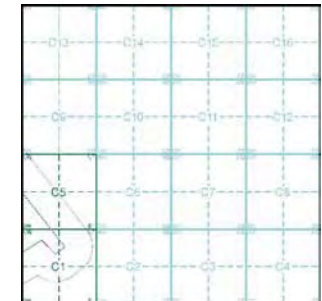
**Source map shown scale - 1:10,560**

The historical maps shown are 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)**

255NW 1910 1:10,560	255NE 1910 1:10,560
255SW 1910 1:10,560	255SE 1910 1:10,560

**Historical Map - Slice C**

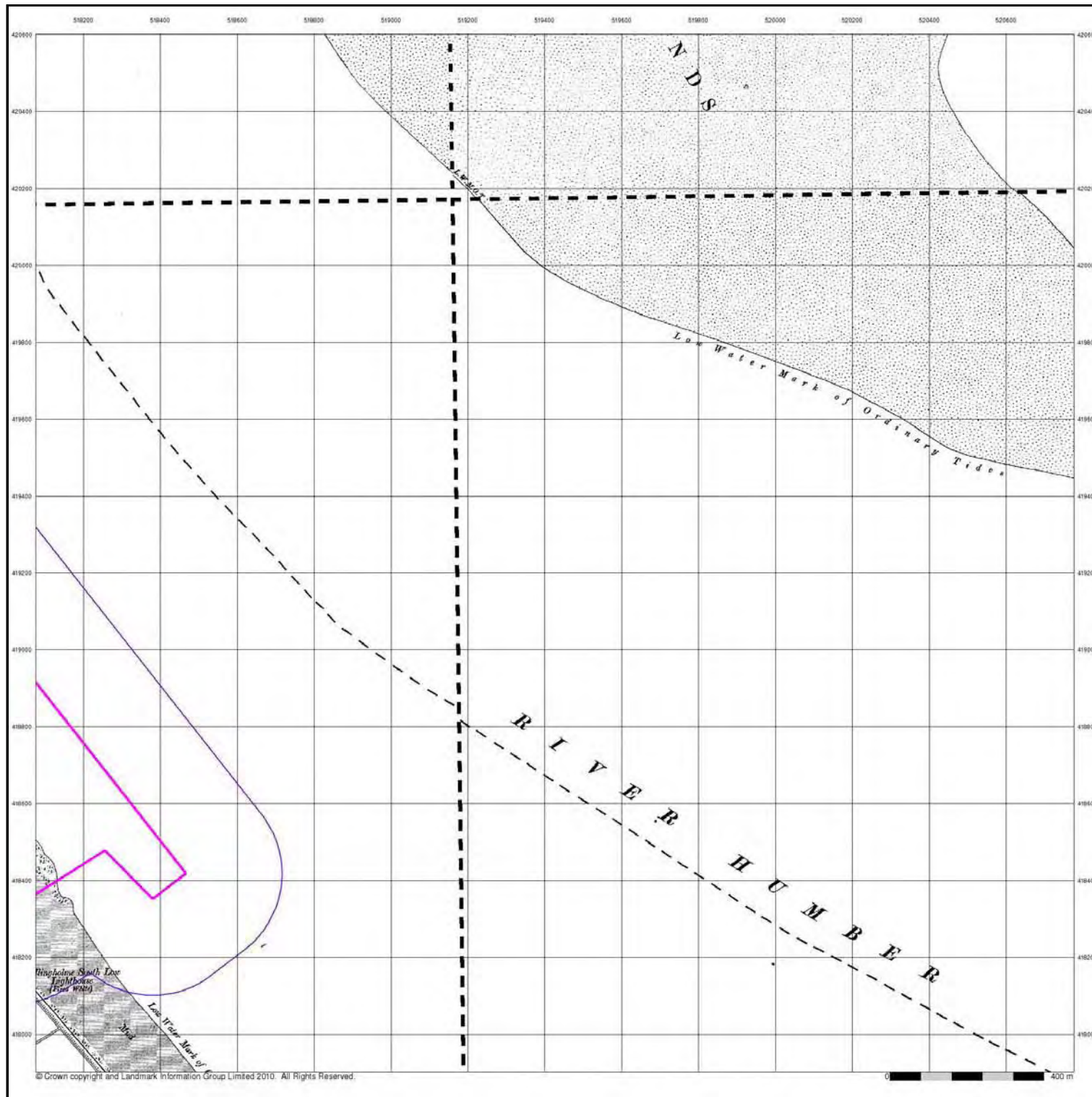


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



**Lincolnshire**  
**Published 1932**

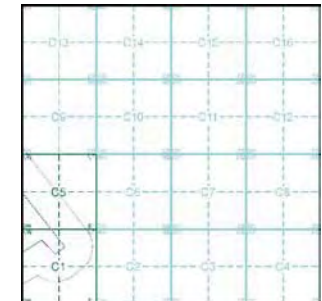
**Source map shown scale - 1:10,560**

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)**

008SE	1932	1:10,560
013NE	1932	1:10,560

**Historical Map - Slice C**

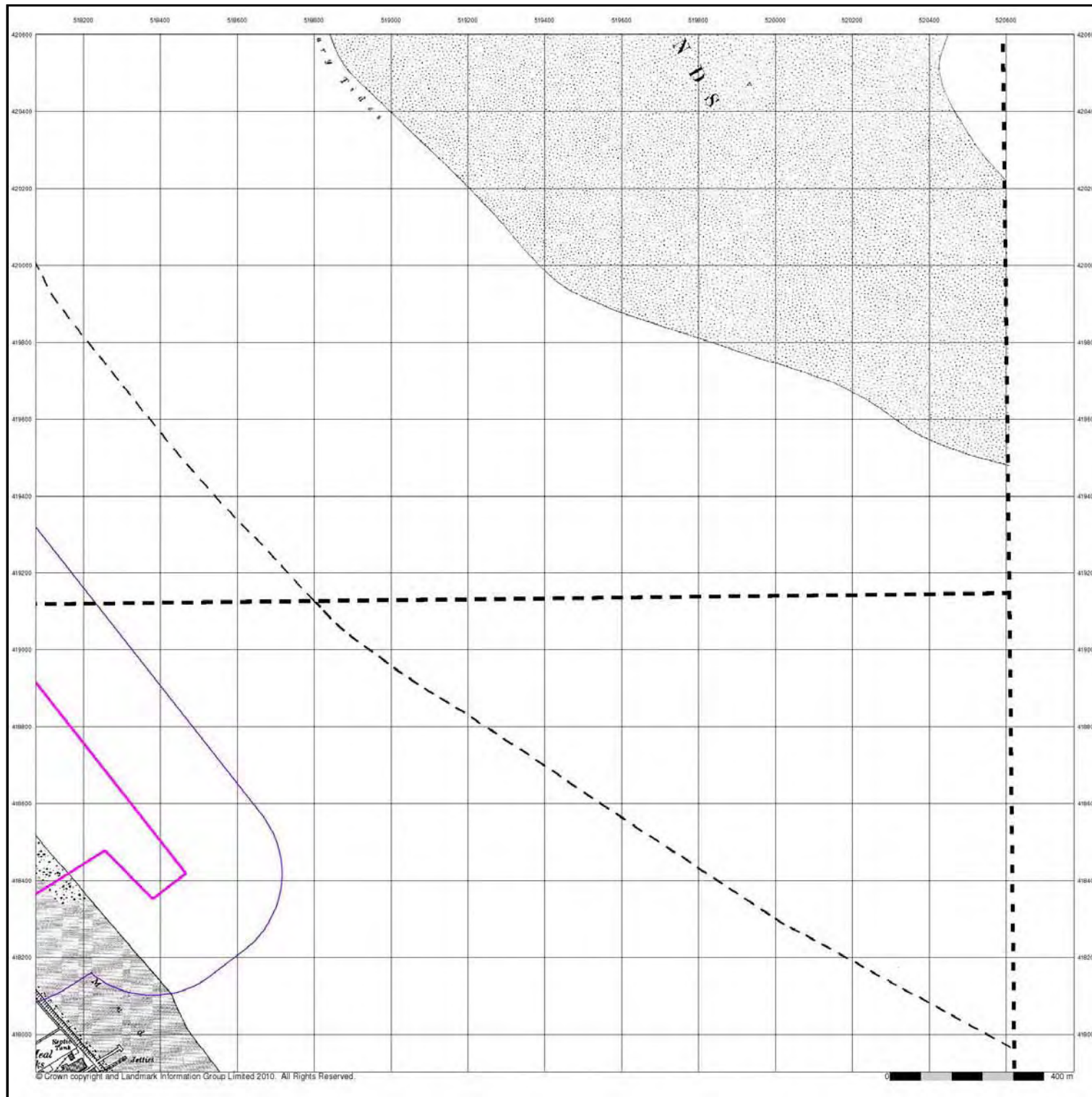


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



**Yorkshire**

**Published 1947 - 1951**

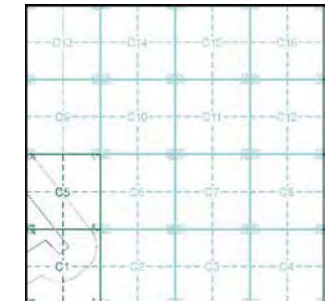
**Source map scale - 1:10,560**

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)**

255NW 1947 1:10,560	255NE 1951 1:10,560
255SW 1950 1:10,560	255SE 1951 1:10,560

**Historical Map - Slice C**

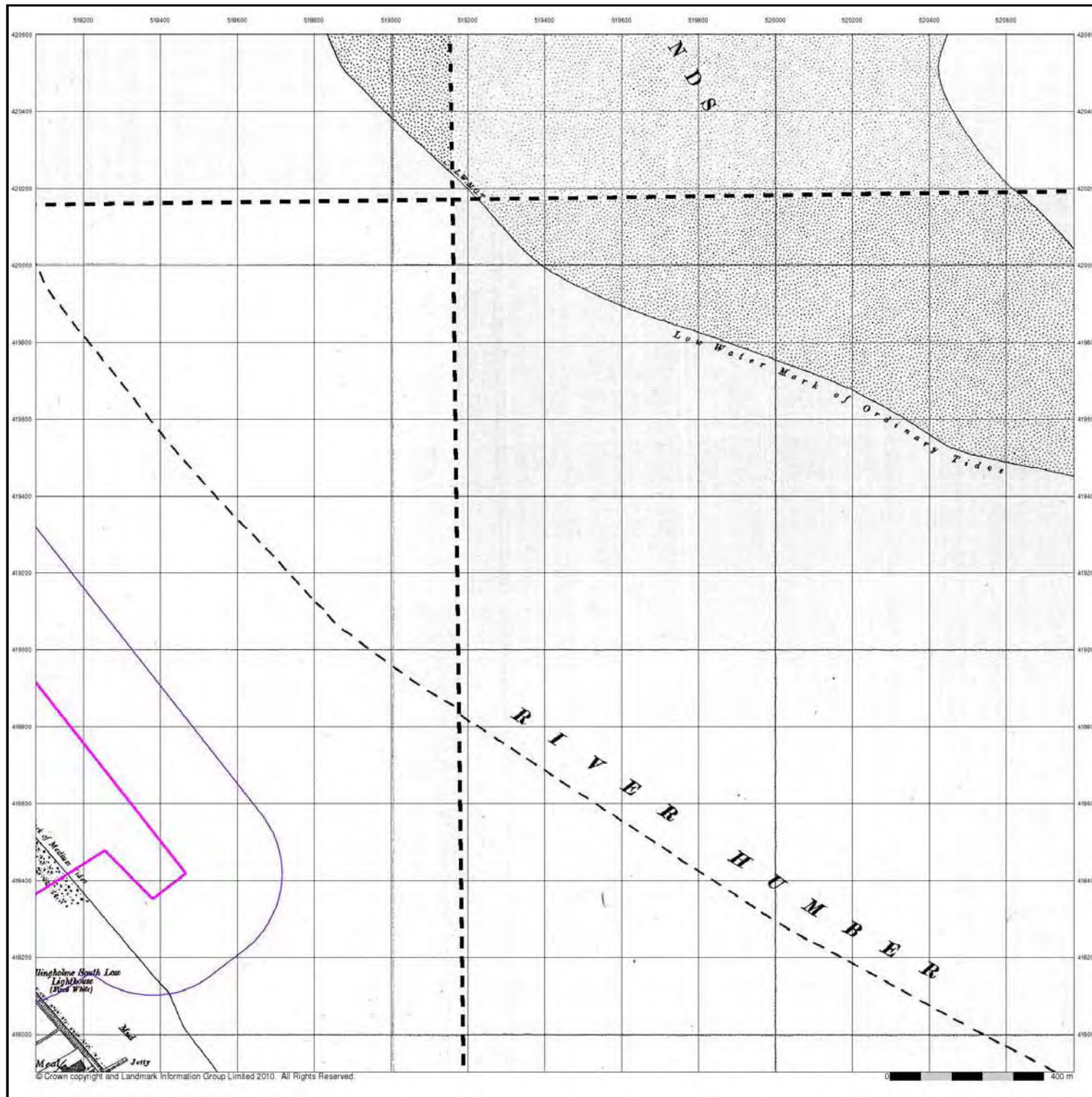


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600

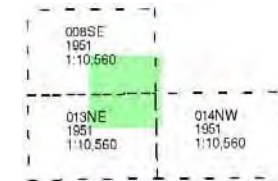


**Lincolnshire**  
**Published 1951**

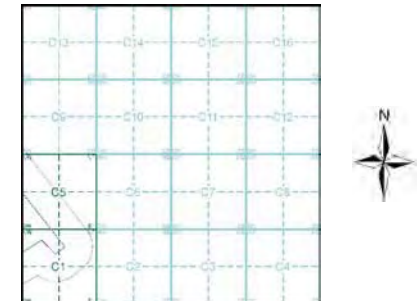
**Source map scale - 1:10,560**

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas. In the late 1940's, a Provisional Edition was produced, which updated the 1:10,560 mapping from a number of sources. The maps appear unfinished - with all military camps and other strategic sites removed. These maps were initially overprinted with the National Grid. In 1970, the first 1:10,000 maps were produced using the Transverse Mercator Projection. The revision process continued until recently, with new editions appearing every 10 years or so for urban areas.

**Map Name(s) and Date(s)**



**Historical Map - Slice C**

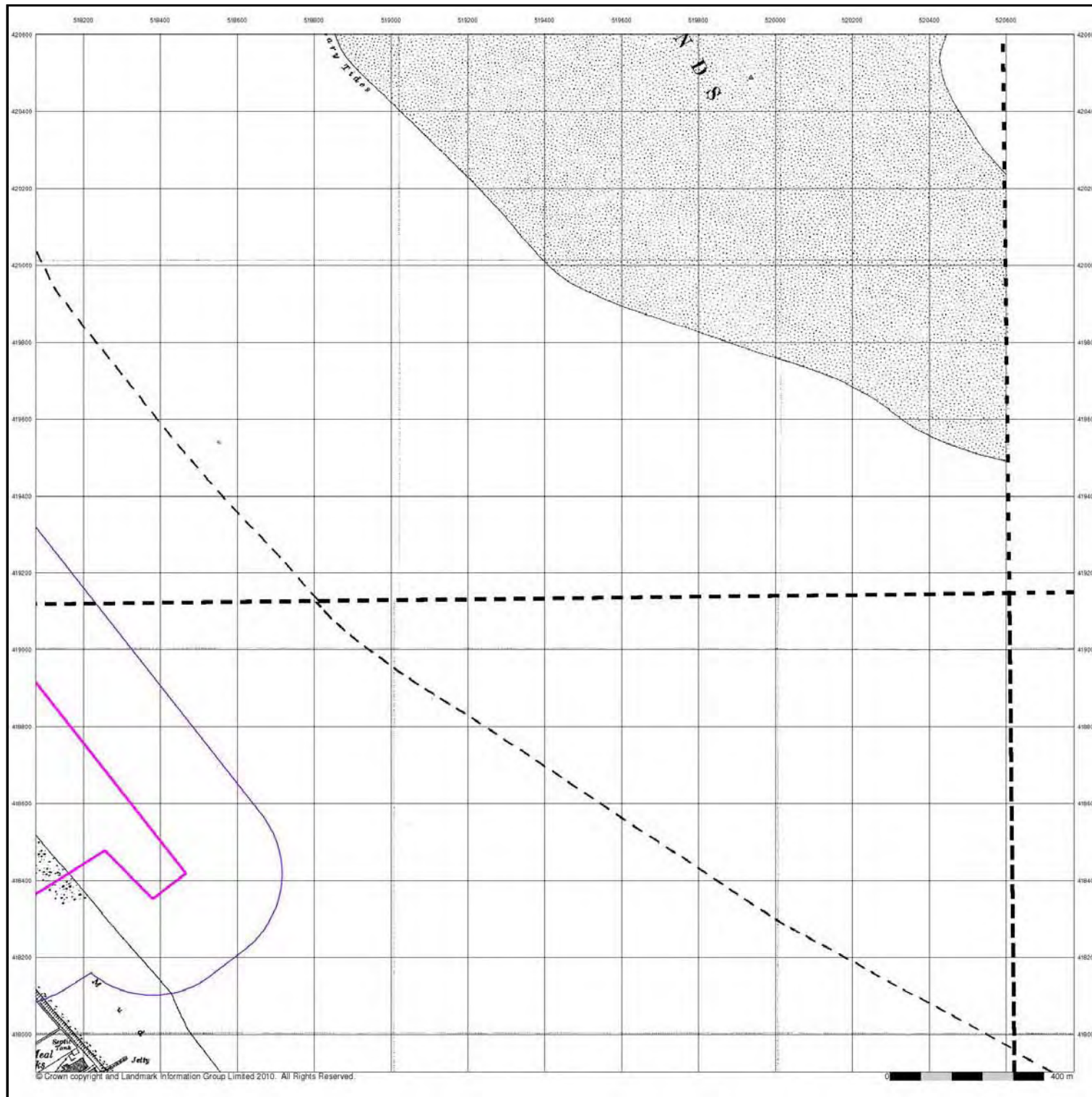


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



## Ordnance Survey Plan

Published 1956

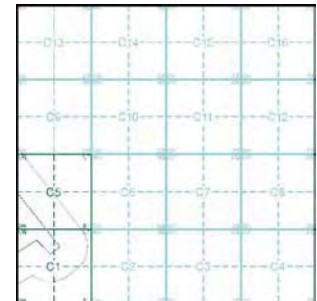
Source map scale - 1:10,000

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)

TA12SE	TA22SW
1956	1956
1:10,560	1:10,560
TA11NE	TA21NW
1956	1956
1:10,560	1:10,560

### Historical Map - Slice C

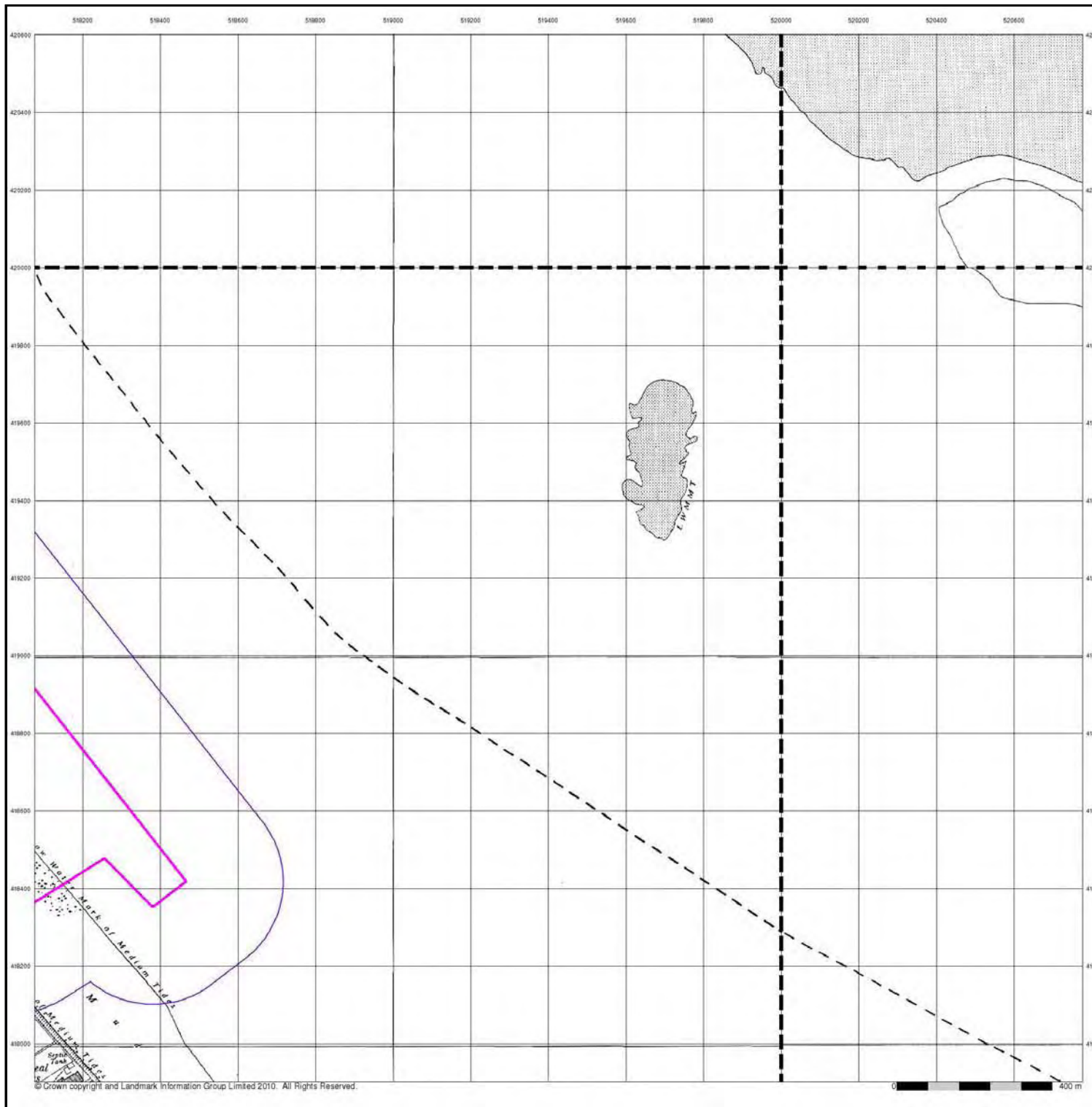


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600





## Ordnance Survey Plan

Published 1965 - 1966

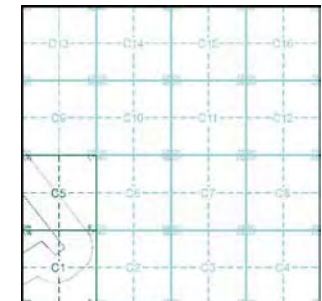
Source map scale - 1:10,000

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)

TA12SE
1965
1:10,560
TA11NE
1966
1:10,560

### Historical Map - Slice C

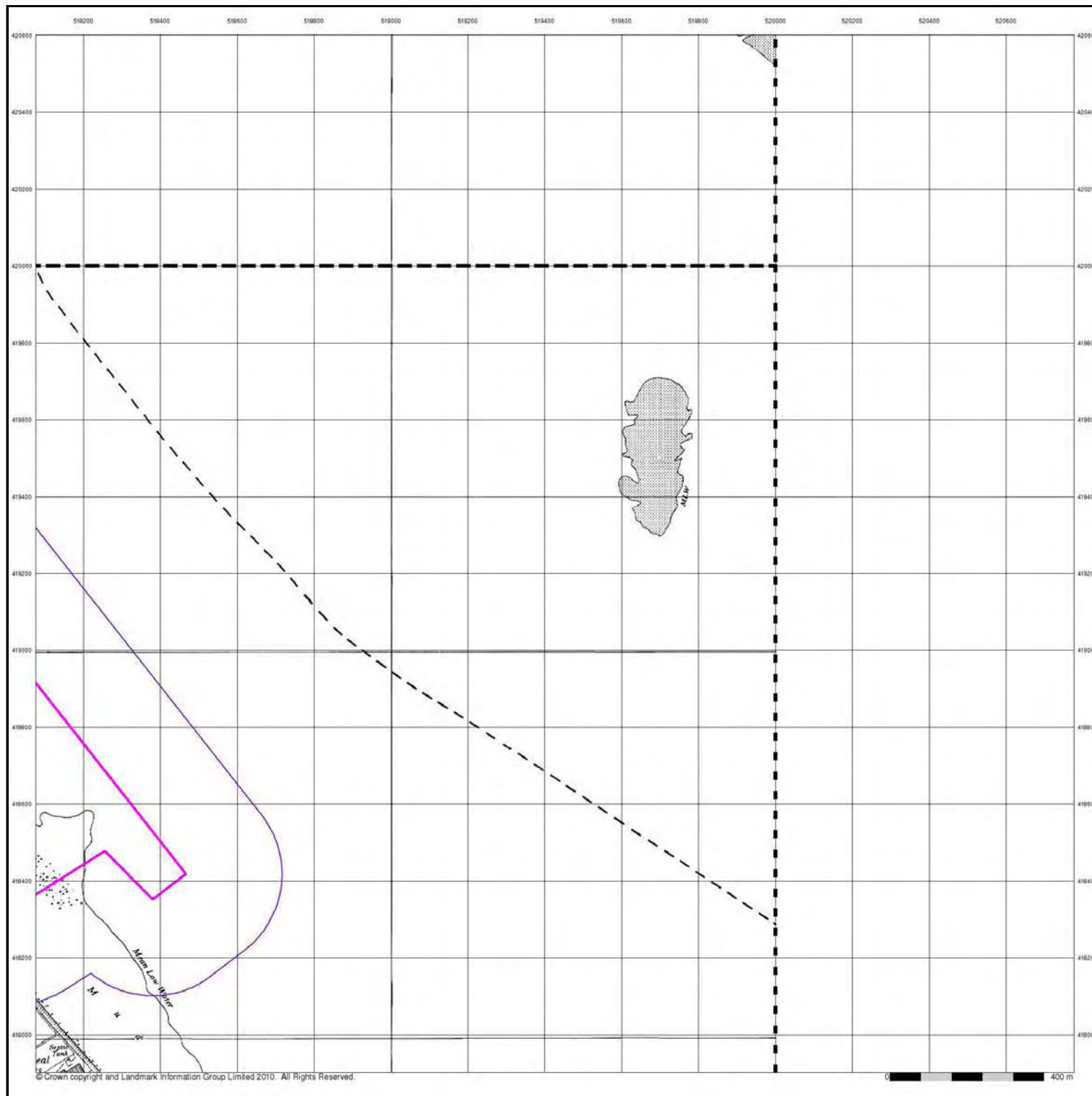


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



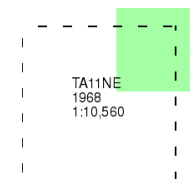
## Ordnance Survey Plan

Published 1968

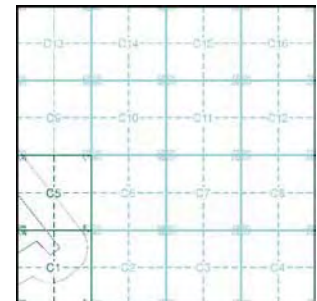
### Source map scale - 1:10,000

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 C

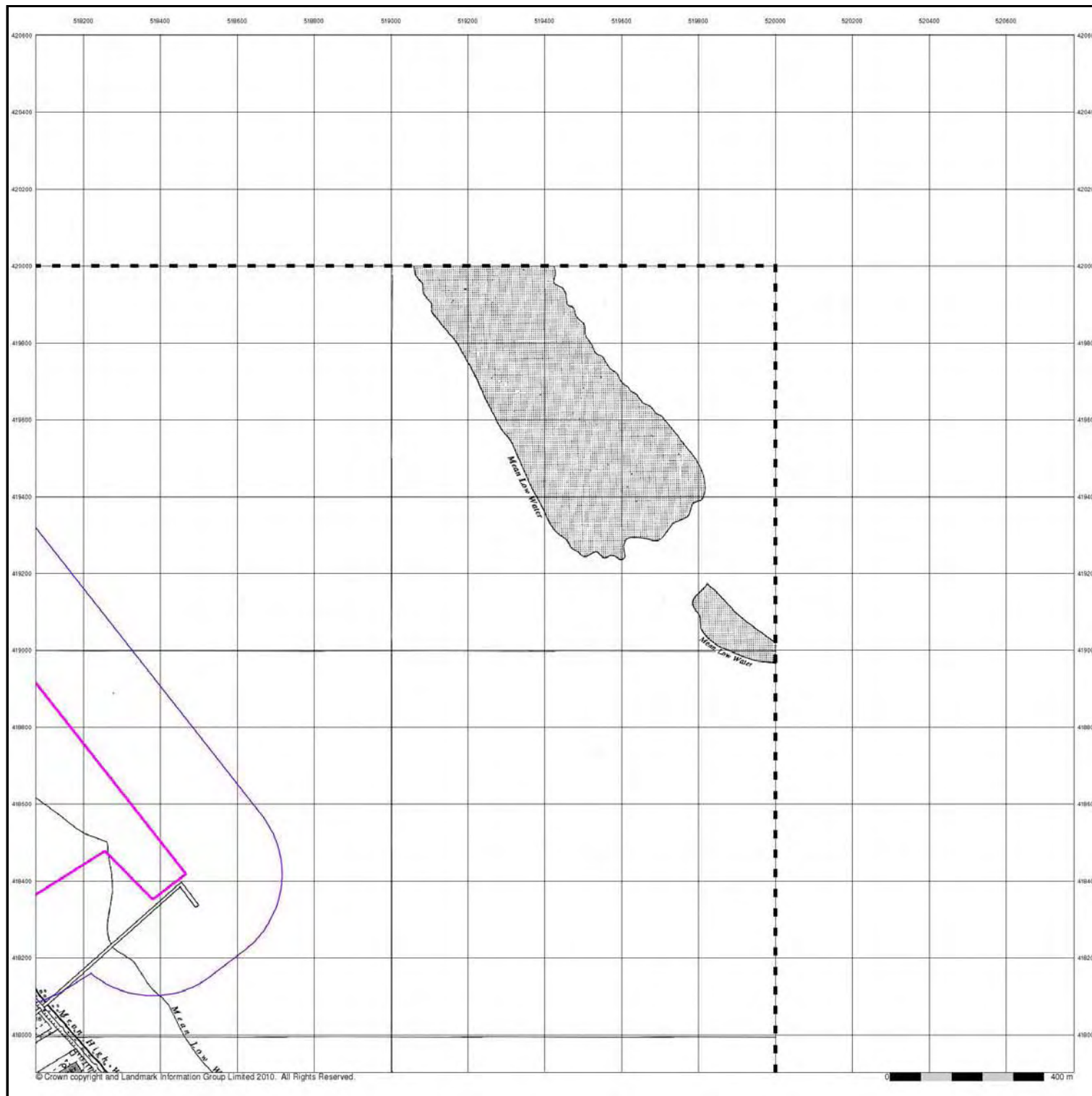


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



## Ordnance Survey Plan

Published 1970 - 1975

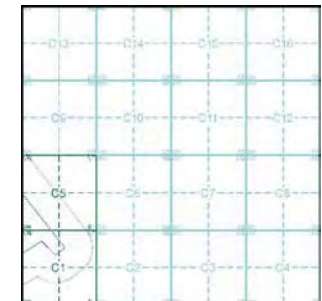
Source map scale - 1:10,000

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)

TA12SE 1970 1:10,000	TA22SW 1975 1:10,000
TA11NE 1974 1:10,000	TA21NW 1972 1:10,000

### Historical Map - Slice C

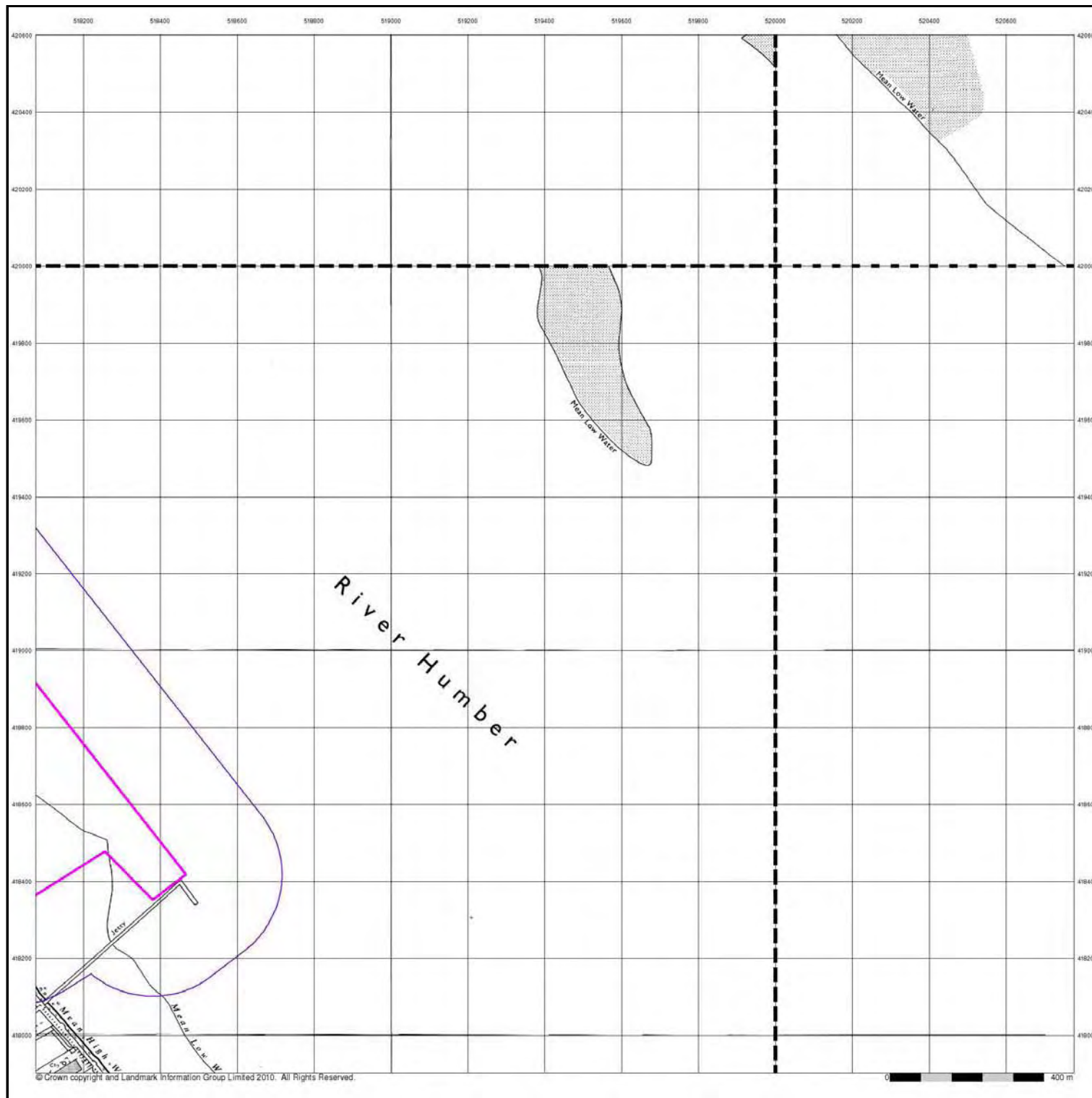


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



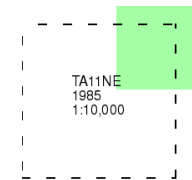
### Ordnance Survey Plan

Published 1985

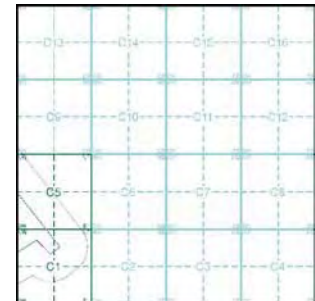
Source map scale - 1:10,000

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 of 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 C

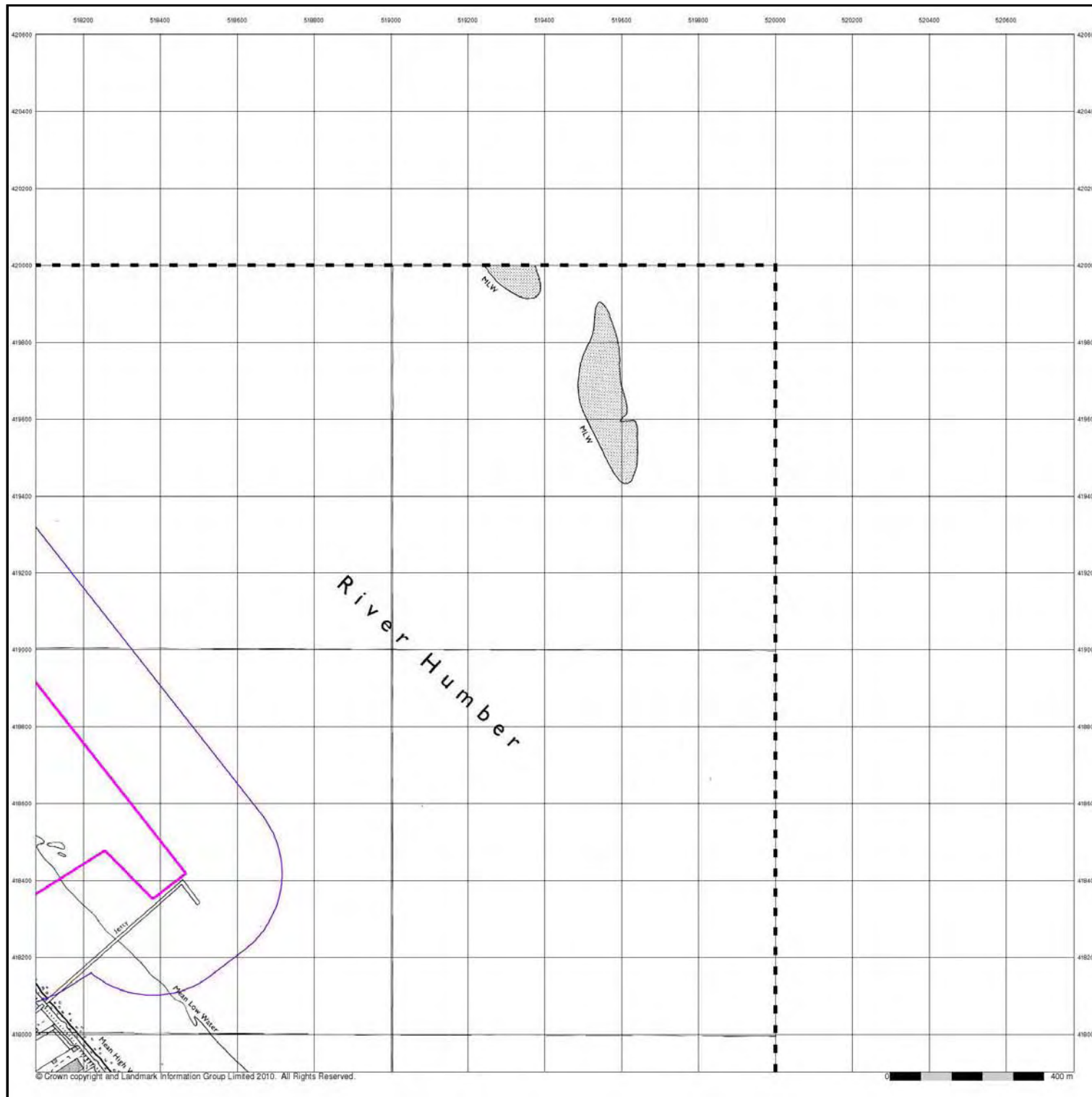


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



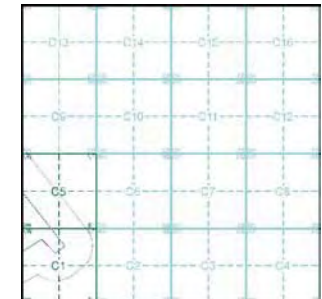
**10k Raster Mapping**  
**Published 1999 - 2000**  
**Source map scale - 1:10,000**

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)**

TA12SE 1999 1:10,000	TA22SW 1999 1:10,000
TA11NE 2000 1:10,000	TA21NW 1999 1:10,000

**Historical Map - Slice C**

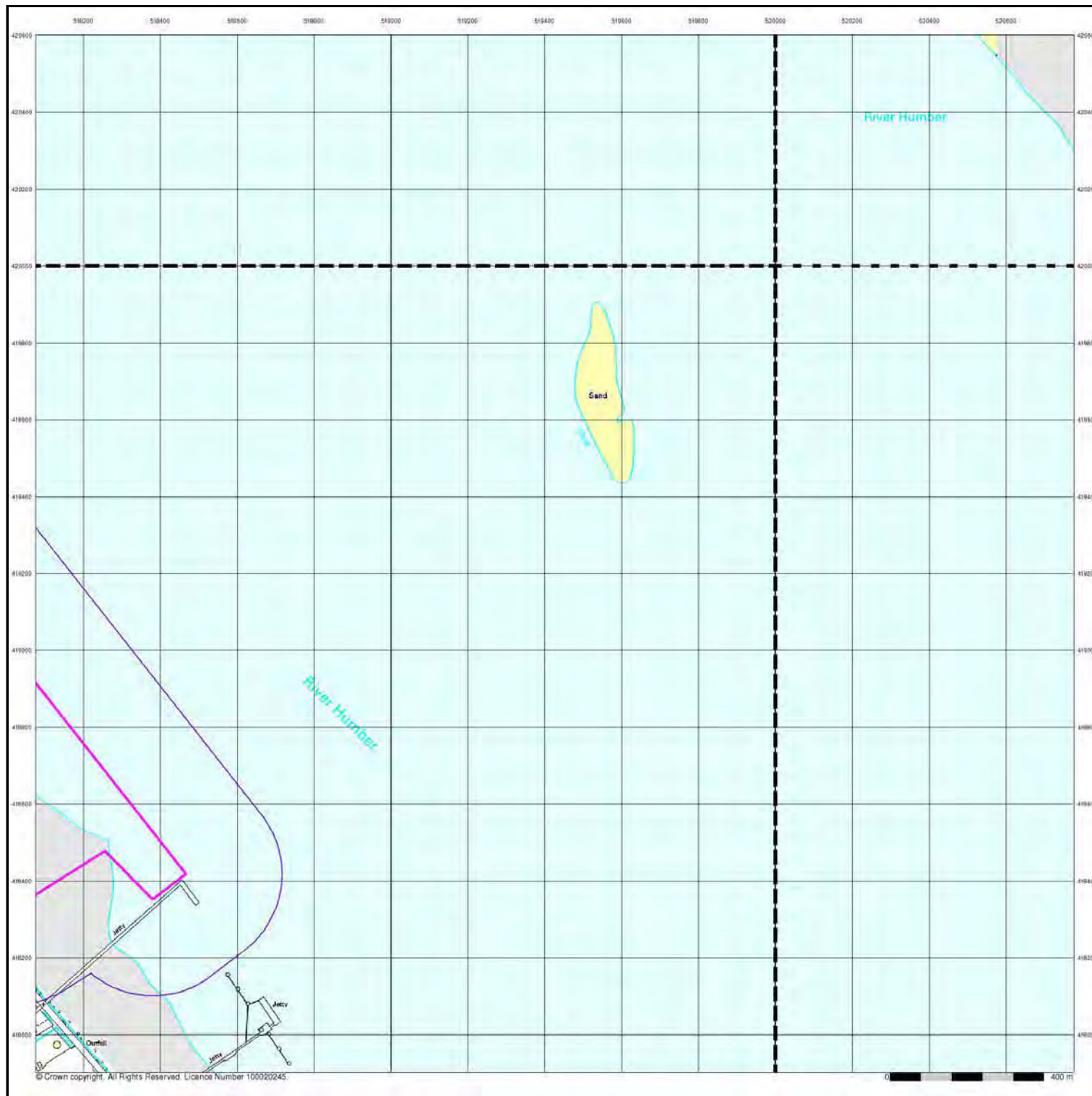


**Order Details**

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

**Site Details**

Site at 516900, 418600



### 10k Raster Mapping

Published 2006

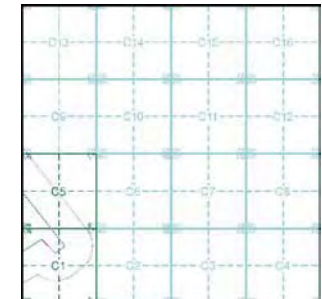
### Source map scale - 1:10,000

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)

TA12SE 2006 1:10,000	TA22SW 2006 1:10,000
TA11NE 2006 1:10,000	TA21NW 2006 1:10,000

### Historical Map - Slice C

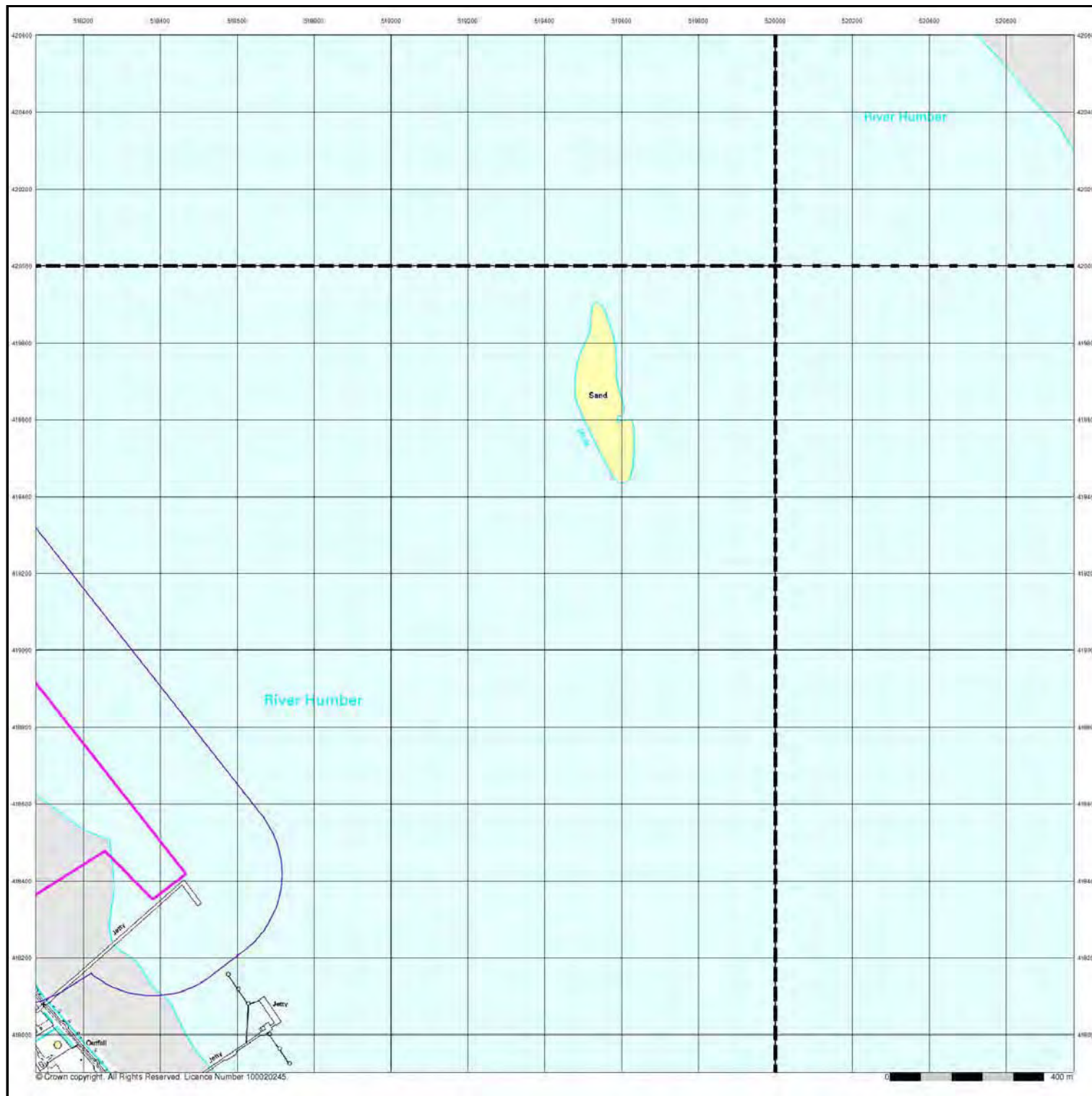


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600



## 10k Raster Mapping

Published 2010

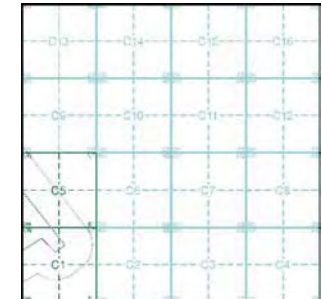
Source map scale - 1:10,000

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)

TA12SE 2010 1:10,000	TA22SW 2010 1:10,000
TA11NE 2010 1:10,000	TA21NW 2010 1:10,000

### Historical Map - Slice C

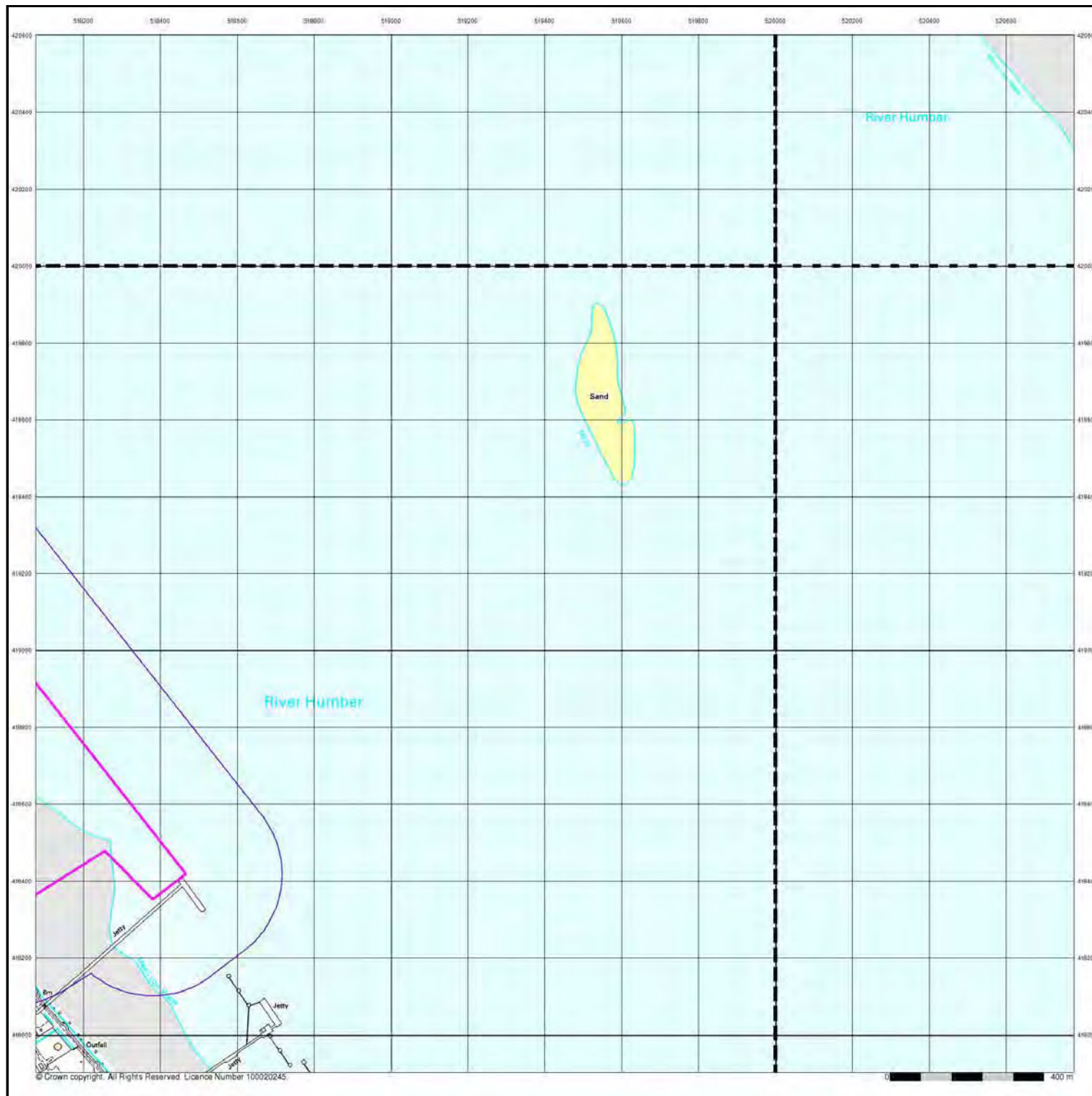


### Order Details

Order Number: 31479075\_1\_1  
 Customer Ref: 68493  
 National Grid Reference: 518330, 418570  
 Slice: C  
 Site Area (Ha): 314.12  
 Search Buffer (m): 250

### Site Details

Site at 516900, 418600







	<b>AMEP, KILLINGHOME GEOENVIRONMENTAL ASSESSMENT</b>	<b>JUNE 2010</b>
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**APPENDIX 3  
BGS BOREHOLE LOGS**

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- Estates Boundary
- Proposed GE Site Boundary (5ha)
- Boreholes (BGS)
- Boreholes (SS)

Rev	Date	Description	By	Chk	App
A	09/04/10	Preliminary Issue	RK	RC	RC

Able UK Ltd  
 Able House  
 Billingham  
 Teesside UK  
 TS23 1PX  
[www.ableuk.com](http://www.ableuk.com)

Tel: +44-(0)1642 806080  
 Fax: +44-(0)1642 656555  
 email: [info@ableuk.com](mailto:info@ableuk.com)  
[www.ableuk.com](http://www.ableuk.com)

Project:	ABLE Humber Port Facility
Client:	ABLE UK Ltd
Title:	Phase 3 W3 Site Information

PRELIMINARY

Scale: 1:10,000@A3	Drawn By R Keirl	Checked By R Cram	Approved By R Cram
Date:	09/04/2010	09/04/2010	09/04/2010
Drawing No. KI - 98004	Revision: A		

RECORD OF WELL (SHAFT OR BORE)

81

1" N.S. 81/162  
1" O.S. TA 11/83  
Grid Ref. 162

At Cottage, Station Road, S. Kellingholme  
Town or Village \_\_\_\_\_ County \_\_\_\_\_ Six-inch quarter sheet 13 NE/W  
Exact site GR: 1704 1826 TA 11 NE/79  
in parish of \_\_\_\_\_

Level of ground surface above sea-level (O.D.) \_\_\_\_\_ ft. If well starts below ground surface, state how far \_\_\_\_\_ ft.  
Shaft \_\_\_\_\_ ft., diameter \_\_\_\_\_ ft. Bore \_\_\_\_\_ ft. Diameter of bore: at top \_\_\_\_\_ ins.; at bottom \_\_\_\_\_ ins.

Details of permanent lining tubes (internal diameters preferred) 25' x 2 1/2"; 30' x 2"  
2 1/2" Jack Pumps with 14' x 1 1/4" galv'd section.

Water struck at depths of (feet) \_\_\_\_\_  
Rest-level of water below top of well 5 feet. Suction at \_\_\_\_\_ feet. Yield on \_\_\_\_\_ hours' test days' \_\_\_\_\_ gallons per \_\_\_\_\_ (with pump of capacity \_\_\_\_\_ g.p.h.); depressing water level to \_\_\_\_\_ feet below top. Time of recovery \_\_\_\_\_ hrs. Amount normally pumped daily \_\_\_\_\_ g.p.h. for \_\_\_\_\_ hours.  
Quality (attach copy of analysis if available) \_\_\_\_\_

Sunk by F. Smith & Son, Grimsby for Mr. C. M. Goudle Date of well Sept. 1937  
Information from D. D. Evans for Messrs. Reaction Co., Town Hall St., Grimsby

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS		DEPTH	
		Feet.	Inches	Feet.	Inches.
	Mud ground	1		1	-
	Silty clay	4		5	-
	Sand & gravel	3		8	-
	Dark hard clay	12		20	-
	Sand & gravel	1		21	-
	hard clay	24		45	-
	Chalk. pebbles	2		47	-
	Chalk	38		85	- ✓

Existing borehole sealed with liquid cement.

In use. Hand pump behind centre of row  
of stages OD 10  
Visited and sited on 6" lens 13 NE/W  
S. P. B. 10.47

in use for 8 stages Hand pump Say 250 gpd = 1 Mgpd  
2/12 9/1/47

Visited. Still in use.  
Flood water came into fields in front of houses.  
Conductivity 550 at 10°C. Chloride c. 40 ppm Cl.  
23.53 REA.

GEOLOGICAL SURVEY AND MUSEUM.  
SOUTH KENSINGTON.  
LONDON, S.W.7.

For Survey use only		
Date received 11.12.47	G.S.M. Office File No.	Site marked on 1" map (use symbol)

(\*11815) Wt. 29051/0.369 10,000 9/39  
A. & E.W. Ltd. Gp. 686





**TA 11 NE 179**  
**81**  
 Cottage, Station Road, S. Hellingholme

1" N.S. **81/162**  
 1" O.S.  
 Grid  
 Sheet **13 NE/W**

At **Station Road**  
 Town or Village **S. Hellingholme** County **Leeds** Six-inch quarter sheet  
 Exact site \_\_\_\_\_ in parish of **TA 11 NE 179** } (A rough sketch-map or a tracing from a map is very desirable)

Level of ground surface above sea-level (O.D.) \_\_\_\_\_ ft. If well starts below ground surface, state how far \_\_\_\_\_ ft.  
 Shaft \_\_\_\_\_ ft., diameter \_\_\_\_\_ ft. Bore \_\_\_\_\_ ft. Diameter of bore: at top \_\_\_\_\_ ins.; at bottom \_\_\_\_\_ ins.  
 Details of permanent lining tubes (internal diameters preferred) **2 1/2" x 2 1/4"; 30" x 2"**  
**2 1/2" Jack Pump with 14" x 1 1/4" galv'd section.**  
 Water struck at depths of (feet) \_\_\_\_\_  
 Rest-level of water <sup>below</sup>/<sub>above</sub> top of well **5'** feet. Suction at \_\_\_\_\_ feet. Yield on \_\_\_\_\_ hours' test  
 \_\_\_\_\_ gallons per \_\_\_\_\_ (with pump of capacity \_\_\_\_\_ g.p.h.); depressing water level to \_\_\_\_\_ feet  
 below top. Time of recovery \_\_\_\_\_ hrs. Amount normally pumped daily \_\_\_\_\_ g.p.h. for \_\_\_\_\_ hours.  
 Quality (attach copy of analysis if available) \_\_\_\_\_

Sunk by **F. Smith & Son, Grimsby** for Mr. **C. H. Goudle** Date of well **Sept. 1927**  
 Information from **W. D. Evans for house** **Academy, Town Hall St, Grimsby**

(For Survey use only). GEOLOGICAL CLASSIFICATION.	NATURE OF STRATA (and any additional remarks).	THICKNESS		DEPTH	
		Feet.	Inches.	Feet.	Inches.
	Waste ground	0	30	0	30
	Salty clay	4	1 22	5	1 52
	Sand & gravel	3	0 91	8	2 44
	Dark hard clay	12	3 66	20	6 10
	Sand & gravel	1	0 30	21	6 40
	hard clay	24	7 32	45	13 72
	Chalk. blenny	2	0 61	47	14 33
	Chalk	38	1 58	85	25 91
	Existing borehole sealed with liquid cement.				
	In use. Hand pump behind centre of row of cottages O.D. 10 3 05 Visited and sited on 6" line 13 NE/W S. Buchanan 1. 10. 47				
	In use for 8 cottages. Hand pump say 250 ypd = 1 Magdgy. 200. 2/1/12				
	Visited. Still in use. Flood water came into fields in front of houses. Conductivity 550 at 10°C. Chloride c 40 ppm Cl. 2.3.53 REA.				

GEOLOGICAL SURVEY AND MUSEUM,  
 SOUTH KENSINGTON,  
 LONDON, S.W.7.

For Survey use only

Date received Viii - ix, 1948	G.S.M. Office File No.	Site marked on 1" map (use symbol)
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(\*11815) Wt. 29051/0.38 10,000 2/89  
 A. & E.W. Ltd. Gp.



British Geological Survey  
 NATURAL ENVIRONMENT RESEARCH COUNCIL

**RECORD OF WELL (SHAFT OR BORE)**

For Survey use only

TA11NE/65

TA11/84 N.  
81/289  
Licence No.

EXACT SITE OF WELL

At Next door to Station House 1730 1830  
Killingholme Station GR: ~~225 285~~  
 Town or Village Killingholme TA11 NE-W  
 County Lincolnshire Six-inch quarter sheet Lines 13 NE-W  
 For \_\_\_\_\_ State whether owner, tenant, builder, contractor, consultant, etc.:-

Address (if different from above) \_\_\_\_\_  
 Level of ground surface above sea-level (O.D.) c 12 ft. If well-top is not at ground level, state how far { above: \_\_\_\_\_ ft. below: \_\_\_\_\_ ft.

SHAFT \_\_\_\_\_ ft.; diameter \_\_\_\_\_ ft.; Full details of headings (dimensions and directions) \_\_\_\_\_

BORE 120 ft.; diameter of bore: at top \_\_\_\_\_ ins.; at bottom \_\_\_\_\_ ins.

Full details of permanent lining tubes (position, length, diameter, plain, slotted etc.) \_\_\_\_\_

Water struck at depths of \_\_\_\_\_ ft. below well-top.

TEST CONDITIONS

Rest level of water \_\_\_\_\_ ft. above/below well-top. Suction at \_\_\_\_\_ ft. Yield on \_\_\_\_\_ hours' test days' pumping at \_\_\_\_\_ galls. per \_\_\_\_\_ with depression to \_\_\_\_\_ ft. below well-top.  
 Recovery to rest-level in \_\_\_\_\_ mins./hours Capacity of pump \_\_\_\_\_ g.p.h. Date of measurements \_\_\_\_\_

NORMAL CONDITIONS

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:  
 Make and/or type \_\_\_\_\_ Motive power \_\_\_\_\_  
 Capacity \_\_\_\_\_ gallons per hour. Suction at \_\_\_\_\_ ft.  
 Amount pumped \_\_\_\_\_ galls. per day. Estimated consumption \_\_\_\_\_ galls. per week.  
 Well made by \_\_\_\_\_ Date of well 1914

Information from Occupier via JHP

ADDITIONAL NOTES

ANALYSIS (please attach copy if available)

Borehole 120 ft deep into chalks. Put down about 1914 and originally unglazed. Now handpump in the back kitchen. Mains water along the road but not laid on. Handpump at station (81/237) disused & broken JHP. July 56.

LOG OF STRATA OVERLEAF.

(1527) Dd574/W437585 12,000 8/54 JC&S Cp069

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Section 6.	Date Received	1" O.S. Map No.	Site marked on 1" Map	(use symbol) on 8" Map
			○	○	○



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL



## RECORD OF WELL (SHAFT OR BORE)

TA  
54 / 17311833

138 N. ....

# 81 / 289

①

EXACT SITE OF WELL

At Next door to Station House,  
Killingholme Station

Licence No. ....

Town or Village Killingholme

County Lincolnshire

Six-inch quarter sheet Lines 13 NE.W.

For ..... State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above) .....

Level of ground surface 3.66 If well-top is not at ground level, state how far { above: ..... ft.  
above sea-level (O.D.) 5.12 ft. .. { below; ..... ft.

SHAFT ..... ft.; diameter ..... ft.; Full details of headings (dimensions and directions) .....

BORE 120 <sup>36.58m</sup> ft.; diameter of bore: at top ..... ins.; at bottom ..... ins.

Full details of permanent lining tubes (position, length, diameter, plain, slotted etc.) .....

Water struck at depths of ..... ft. below well-top.

TEST CONDITIONS

Rest level of water ..... ft. above well-top. Suction at ..... ft. Yield on ..... hours' test days' test

pumping at ..... galls. per ..... with depression to ..... ft. below well-top.

Recovery to rest-level in ..... mins. Capacity of pump ..... g.p.h. Date of measurements .....

NORMAL CONDITIONS

DESCRIPTION OF PERMANENT PUMPING EQUIPMENT:

Make and/or type ..... Motive power .....

Capacity ..... gallons per hour. Suction at ..... ft.

Amount pumped ..... galls. per day. Estimated consumption ..... galls. per week.

Well made by ..... Date of well 1914

Information from Occupier via JHR

ADDITIONAL NOTES

ANALYSIS (please attach copy if available)

*Borehole 120 ft deep into chalk. Put down about 1914 and originally unglazed. Now handpump in the back kitchen. Mains water along the road but not laid on. Windpump at station (81/237) disused & broken JHR. July 56.*

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Section 6.	Date Received	1" O.S. Map No.	Site marked on 1" Map	(use symbol on 6" Map)
			○	○	○

(1527) D6574/W437583 12,000 8/54 J.C.K.S. Gp669







# RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

For Survey use only

8/TA11/85  
235  
6/235

EXACT SITE OF WELL

At Killingholme Marshes GR: 1699 1845

Town or Village N. Killingholme

County Lincoln

Six-inch quarter sheet 13 NE-W

For Mr. Barton & Birmingham Light Rly. State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above) Shillite's No: 300 (1)

Level of ground surface above sea-level (O.D.) nr 12 ft. If well-top is not at ground level, state how far (above; below; ) ft.

SHAFT ft.; diameter ft.; Details of headings

BORE 70 ft.; diameter of bore: at top ins.; at bottom ins.

Details of permanent lining tubes 49 ft of 2 1/2" tubes

Water struck at depths of ft. below well-top.

TEST CONDITIONS

Rest-level of water ft. above below well-top. Suction at ft. Yield on hours' test days' pumping at galls. per with depression to ft. below well-top.

Recovery to rest-level in mins. hours Capacity of pump g.p.h. Date of measurements

Description of permanent pumping equipment:

NORMAL CONDITIONS

Make and/or type Motive power

Capacity gallons per hour. Suction at ft.

Amount pumped galls. per day. Estimated consumption galls. per week.

Well made by F. Smith & Son Date of well Oct 1910

Information from C.F.B. Shillite per D.M. July 51

## ADDITIONAL NOTES

Strata log over.

Station master has no knowledge of this borehole.  
Fields all supplied by mains from Admiralty.  
Probably a trial bore as railway built 1910-1912.  
2.3.53. R.E.A.

## LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,  
SOUTH KENSINGTON,  
LONDON, S.W.7.

Date Received

1" O.S. Map No.

Site marked (use symbol) on 1" Map on 6" Map

①

\*25243) Wt. 4473/10424 12,000 3/16 A. & E.W.Ltd. Cp. 685



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL



# RECORD OF WELL (SHAFT OR BORE)

(attach copy of analysis if available)

For Survey use only

N. \_\_\_\_\_

EXACT SITE OF WELL

At Kilnighshane Marshes

**TAIINE/53**

**235**

TA 54 / 16981843

Town or Village N. Kilnighshane

61/235

County Lincol.

Six-inch quarter sheet 13 NE-W

For Mr. Barton & Cunningham Light. Eng.

State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above) \_\_\_\_\_

Shillito's No: 340 (1)

Level of ground surface above sea-level (O.D.) 3.66 or 12 ft.

If well-top is not at ground level, state how far (above; below; ) ft.

SHAFT \_\_\_\_\_ ft.; diameter \_\_\_\_\_ ft.; Details of headings \_\_\_\_\_

BORE 70 ft.; diameter of bore: at top \_\_\_\_\_ ins.; at bottom \_\_\_\_\_ ins.

Details of permanent lining tubes 49 ft of 2 1/2" tubes.

Water struck at depths of \_\_\_\_\_ ft. below well-top.

TEST CONDITIONS

Rest-level of water \_\_\_\_\_ ft. above well-top. Suction at \_\_\_\_\_ ft. Yield on \_\_\_\_\_ hours' test days' pumping at \_\_\_\_\_ galls. per \_\_\_\_\_ with depression to \_\_\_\_\_ ft. below well-top.

Recovery to rest-level in \_\_\_\_\_ mins. Capacity of pump \_\_\_\_\_ g.p.h. Date of measurements \_\_\_\_\_ hours

Description of permanent pumping equipment:

NORMAL CONDITIONS

Make and/or type \_\_\_\_\_ Motive power \_\_\_\_\_

Capacity \_\_\_\_\_ gallons per hour. Suction at \_\_\_\_\_ ft.

Amount pumped \_\_\_\_\_ galls. per day. Estimated consumption \_\_\_\_\_ galls. per week.

Well made by F. Smith & Son Date of well Oct 1910

Information from C.F.B. Shillito per B.M. July 51

## ADDITIONAL NOTES

Strata log over.

Station master has no knowledge of this borehole.  
Fields all supplied by mains from Admiralty.  
Probably a trial bore as railway built 1910-1912.

2-3-53. R.E.A.

## LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,  
SOUTH KENSINGTON,  
LONDON, S.W.7.

Date Received

1" O.S. Map No.

Site marked (use symbol) on 1" Map on 6" Map

(\*58243) Wt. 44731/0424 12,000 3/48 A. & E.W. Ltd. Gp. 685



British Geological Survey

NATURAL ENVIRONMENT RESEARCH COUNCIL

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[TA11NE BJ 53.]

(For Survey use only)  
GEOLOGICAL  
CLASSIFICATION

NATURE OF STRATA

12

If measurements start below  
ground surface, state how far ...

THICKNESS

DEPTH

Feet Inches  
... ..

Feet Inches

2

Clay & stones

2

0.61

2

0.61

Mud Clay

6

1.83

8

2.44

Sand

5

1.52

17

3.96

Mud Clay

19

5.79

32

9.75

Beavings

26

7.92

58

17.68

-147 ft.

Chalk

12

3.66

70

21.34



**RECORD OF WELL (SHAFT OR BORE)**

(attach copy of analysis if available)

For Survey use only

①

At Killnashstone Marshes GR: 1675 1867  
TA 11 NE/52

8/TA11/87  
 234  
 81/234

EXACT SITE OF WELL

Town or Village N. Killnashstone.

County Lincoln.

Six-inch quarter sheet 12 NE/14.

For Mr. Barton & Immingham Light Rly.

State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above)

Sheet No. 340 (2)

Level of ground surface above sea-level (O.D.) no 12. ft.

If well-top is not at ground level, state how far (above; below) ft.

SHAFT ..... ft.; diameter ..... ft.; Details of headings.....

BORE 70. ft.; diameter of bore: at top ..... ins.; at bottom ..... ins.

Details of permanent lining tubes.....

Water struck at depths of ..... ft. below well-top.

TEST CONDITIONS

Rest-level of water ..... ft. above well-top. Suction at ..... ft. Yield on ..... hours' test days' pumping at ..... galls. per ..... with depression to ..... ft. below well-top.

Recovery to rest-level in ..... mins. Capacity of pump ..... g.p.h. Date of measurements.....

Description of permanent pumping equipment:

NORMAL CONDITIONS

Make and/or type ..... Motive power .....

Capacity ..... gallons per hour. Suction at ..... ft.

Amount pumped ..... galls. per day. Estimated consumption ..... galls. per week.

Well made by F. Smith. Date of well Oct 1910.

Information from C.F. Phillips per P.M. July 51.

ADDITIONAL NOTES

Chalk at -47 ft OD. No further operation.  
Station master has no knowledge of this borehole.  
Fields all supplied by main water from Admiralty.  
Probably a trial bore as railway built 1910-1912.  
 2.3.53. R.E.A.

LOG OF STRATA OVERLEAF.

GEOLOGICAL SURVEY AND MUSEUM,  
 SOUTH KENSINGTON,  
 LONDON, S.W.7.

Date Received 1" O.S. Map No. Site marked (use symbol) on 1" Map on 6" Map

(\*)35243) W.L.47731/0254 12,000 3/48 A.&E.W.Ltd. GP.685





RECORD OF WELL (SHAFT OR BORE) **TA11NE 52** For Survey use only  
 (attach copy of analysis if available)

EXACT SITE OF WELL

At Kilnashogue Marshes

TA 54 / 16761866

81 / 234  
 9  
 81 / 234

Town or Village N. Killnashogue.

County Leics.

Six-inch quarter sheet 13 NE / W.

For Mr. Barton & Birmingham Light Rly.

State whether owner, tenant, builder, contractor, consultant, etc. :-

Address (if different from above) Shillito's No. 340 (2)

Level of ground surface above sea-level (O.D.) nr 12. 3.66 ft.

If well-top is not at ground level, state how far above; below; ft.

SHAFT \_\_\_\_\_ ft.; diameter \_\_\_\_\_ ft.; Details of headings \_\_\_\_\_

BORE 70. 21.34m ft.; diameter of bore: at top \_\_\_\_\_ ins.; at bottom \_\_\_\_\_ ins.

Details of permanent lining tubes \_\_\_\_\_

Water struck at depths of \_\_\_\_\_ ft. below well-top.

TEST CONDITIONS

Rest-level of water \_\_\_\_\_ ft. above well-top. Suction at \_\_\_\_\_ ft. Yield on \_\_\_\_\_ hours' test \_\_\_\_\_ days' pumping at \_\_\_\_\_ galls. per \_\_\_\_\_ with depression to \_\_\_\_\_ ft. below well-top.

Recovery to rest-level in \_\_\_\_\_ mins. Capacity of pump \_\_\_\_\_ g.p.h. Date of measurements \_\_\_\_\_ hours

Description of permanent pumping equipment:

NORMAL CONDITIONS

Make and/or type \_\_\_\_\_ Motive power \_\_\_\_\_

Capacity \_\_\_\_\_ gallons per hour. Suction at \_\_\_\_\_ ft.

Amount pumped \_\_\_\_\_ galls. per day. Estimated consumption \_\_\_\_\_ galls. per week.

Well made by F. Smith. Date of well Oct 1910

Information from CPD. Shillito per DM July 51.

ADDITIONAL NOTES

Chalk at -47ft OD. No further penetration.  
Station master has no knowledge of this borehole.  
Fields all supplied by main water from Admiralty.  
Probably a trial bore as railway built 1910-1912.  
2.3.53. REA.

LOG OF STRATA OVERLEAF.

1038243) Wt. 44731.0424 12,000 3/48 A. & E. W. Ltd. Cp. 685

GEOLOGICAL SURVEY AND MUSEUM, SOUTH KENSINGTON, LONDON, S.W.7.	Date Received	1" O.S. Map No.	Site marked (use symbol) on 1" Map	on 6" Map





2

10

(For Survey use only)  
GEOLOGICAL  
CLASSIFICATION

NATURE OF STRATA

If measurements start below  
ground surface, state how far ...

THICKNESS

DEPTH

Feet Inches  
... ..

Feet Inches  
... ..

Soil

1

0.30

1

0.30

Silt

2

0.61

3

0.91

Brack Clay

5

1.52

8

2.44

Sand

2

0.61

10

3.05

Marl Clay

23

7.01

33

10.06

Bearings

26

7.92

59

17.98

Chalk

11

3.35

70

21.34

# RECORD OF WELL or BORING

81

Survey No. 11  
 1" N.S. \_\_\_\_\_  
 1" O.S. \_\_\_\_\_  
 Six-inch map: XIII N.E.  
 Popular Edition (Sheet) \_\_\_\_\_  
 of \_\_\_\_\_  
 one-inch map: 196 Square \_\_\_\_\_

at (house or farm) Two Bungalows between 10 Station Road  
 Town, Village, &c. Stodd Hill, Billingham County Lincolnshire

Exact site (unless a tracing from a map is supplied, give distance and direction from parish church, cross-roads, or other object shown on maps).  
about 1/2 mile from road N.E.

Surface level of ground 22.0 ft. above Ordnance Datum. Well or Bore commenced at \_\_\_\_\_ ft. below surface level of ground.  
 Sunk \_\_\_\_\_ ft., diameter \_\_\_\_\_ ft. Bored 82 ft.; diameter of boring: at top \_\_\_\_\_ in., at bottom \_\_\_\_\_ in.

Details of lining tubes (internal diameters preferred) TH 54 / 16581798

Water struck at depths of (feet) \_\_\_\_\_  
 Rest-level of water <sup>below</sup> ~~above~~ top of well or bore \_\_\_\_\_ ft. Pumping level \_\_\_\_\_ ft. Time of recovery \_\_\_\_\_ hours.

Suction at \_\_\_\_\_ ft. depth. Yield: (i) on test \_\_\_\_\_ galls. per \_\_\_\_\_, (ii) normal \_\_\_\_\_ galls. per \_\_\_\_\_

Quality (attach copy of analysis if available) \_\_\_\_\_  
 Made by H. W. Jackson & Son, Grimsby for Mr. \_\_\_\_\_ Date of boring \_\_\_\_\_  
 Information from to S. R. Ballin, Lincolnshire

(For Survey use only).  
 GEOLOGICAL CLASSIFICATION.

NATURE OF STRATA.  
 (and any additional remarks)

THICKNESS.		DEPTH.	
Feet.	Inches.	Feet.	Inches.
50	5.24	50	15.24
32	9.75	32	24.99
	5.49		30.48
18		100	

Marl clay.  
 Chalk (soft)

Deepened since (gas water was milky)

"S' Painter" & "Chetwynd"  
 Bore in quads of "Chetwynd" between 2 houses  
 C to 1.10.47  
 Out at one point. 1st depth still in use. Say 50 gpd = 18000 gpm.  
 002 9/1/17.

On main. Discused. J.H.B. 5.7.36

GEOLOGICAL SURVEY AND MUSEUM,  
 SOUTH KENSINGTON,  
 LONDON, S.W. 7.

(For Survey use only.)

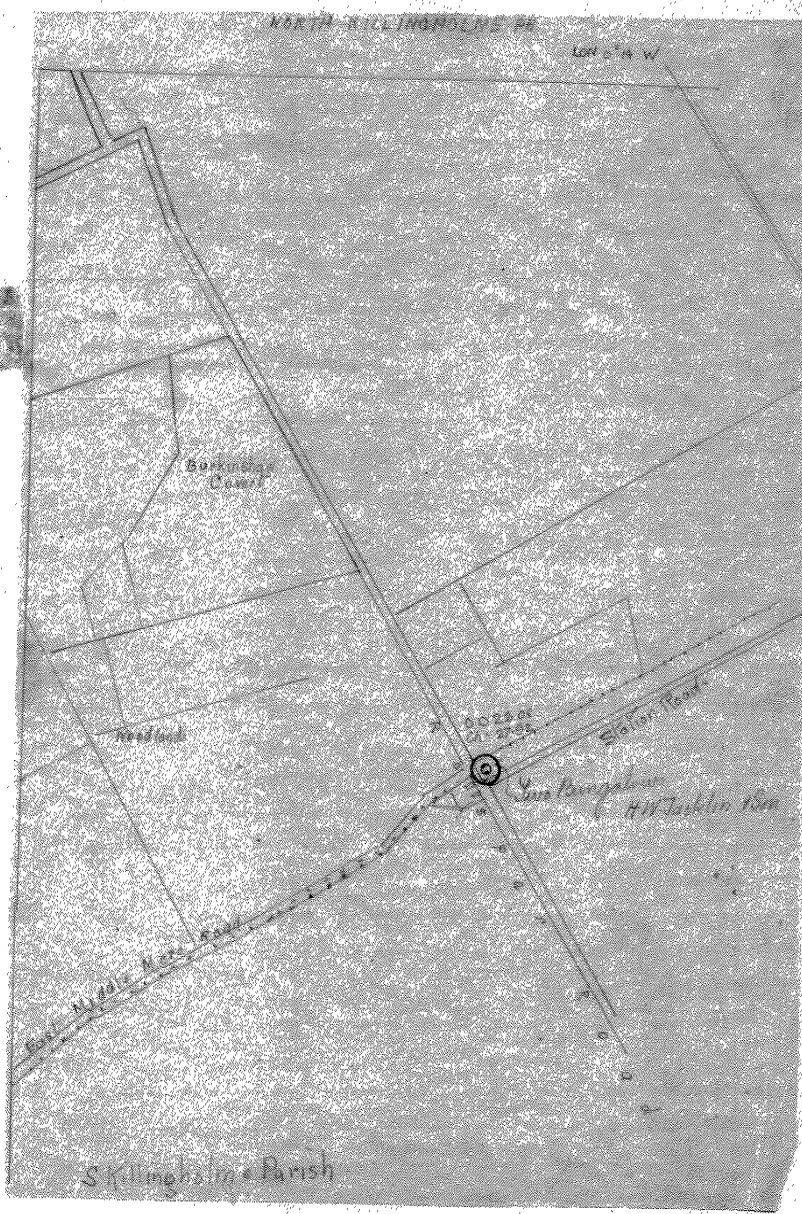
Date received.	G.S.M.	M. of H. notified.	Site marked on 1" map.
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(24735C) Wt 26030/205 5,600 11/86  
 H, J, R & Co, Ltd Gp 616



British Geological Survey  
 NATURAL ENVIRONMENT RESEARCH COUNCIL

2



C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF. 80.440.0		GROUND LEVEL +6.46		MOD		EXPLORATORY HOLE No.	
LOG PREPARED BY : HOWARD HUMPHREYS & PARTNERS		CABLE PERCUSSION BORING LOG		BORING DIA.(mm)	250 to 14.70m 200 from 14.70 to 21.00m	COORDINATES 516299.78 E 418417.33 N		KHN/ OW 19		SHEET 1 OF 15	
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT PILCON WAYFARER		CASING DIA.(mm)	250 to 14.70m 200 from 14.70 to 21.00m	DATES BORED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 1 OF 15			

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING		IN-SITU TESTING		INDEX RESULTS		LABORATORY TESTS	
				PRIMARY	SECONDARY	Red. Level (MOD)	Legend	Depth (m)	Depth (m)	Type	Depth (m)	Type	Result	% W		% PL
07.00 13.3.87																NONE
	0.00				Soft to firm mottled dark grey (10YR 4/1) greyish brown (10YR5/2) and dark yellowish brown (10YR4/4) slightly silty slightly sandy CLAY with rare to occasional gravel. Sand is fine to medium. Gravel is subangular to subrounded fine occasionally medium predominantly chalk.			+6.46		0.00						
					Firm to stiff darkish brown (7.5YR 4/6), very closely to closely fissured slightly gravelly silty sandy CLAY. Gravel is subangular to subrounded fine to coarse coal, chalk and sandstone. Sand fine to coarse.	1.68 to 1.77 fissure, subvertical, dry, open to 1mm, gleyed light olive grey (5Y 6/2).										
					Darkish brown (7.5YR 5/6) slightly silty gravelly very clayey medium to coarse SAND. Gravel is subangular to subrounded fine to medium coal chalk and sandstone.	1.79 discontinuity inclined to 45°, damp, planar, closed.										
					GLACIAL TILL			+4.96		1.50						
					Stiff yellowish brown (10YR 5/6) silty sandy gravelly to very gravelly CLAY. Sand is fine to coarse. Gravel is subangular to subrounded fine to coarse mainly fine to medium chalk, coal and sandstone.			+4.81		1.65						
								+4.67		1.79						
					2.23 becoming very closely to closely fissured and slightly gravelly. Fissures gleyed grey (2.5YR 5/6) are subvertical threadlike and rarely associated with rootlets.			+4.36		2.10						
					GLACIAL TILL			+4.06		2.40						
					Stiff to very stiff dark greyish brown (10YR 3/2) very closely to closely fissured silty sandy CLAY with occasional gravel. Fissures are subvertical, threadlike, gleyed grey and rarely associated with rootlets. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium chalk, coal and sandstone.	Subhorizontal fabric.				2.50						
										2.55						
										2.70						
										3.07						
						2.90 discontinuity dipping 30° irregular and dry.				3.15						
										3.15						
										3.30						
						3.45 horizontal discontinuity irregular, closed with silty clay on surfaces dry.										
					GLACIAL TILL											
					Stiff very dark greyish brown (10YR 3/2) very thinly laminated very closely to closely fissured silty CLAY with occasional sand and gravel. Laminations are horizontal. Sand is coarse predominantly chalk. Gravel subangular to subrounded fine chalk and sandstone.					3.67						
						4.50 and 4.60 two threadlike subvertical fissures gleyed grey (N5/0) 20mm in length.				3.65						
										3.75						
										3.90						
					GLACIAL TILL											
					Stiff very dark greyish brown (10YR 3/2) silty sandy CLAY with occasional gravel. Gravel is subangular to subrounded fine to coarse chalk, sandstone, chert, coal and igneous exotics.					4.30						
										4.35						
										4.35						
										4.50						
										4.50						
						4.85 discontinuity inclined to 10° irregular open to 5mm infilled with a pocket 50x5x5mm of yellowish brown (10YR 5/4) fine sand. Dry.				4.80						
										4.90						
										4.95						
					GLACIAL TILL											

NOTES: 1. Inspection pit dug to 1.50m, no obstructions or services encountered. 2. For definition of fissure see logging manual. 3. Curvilinear, subhorizontal fabric (possible foliation) seen upon splitting of the core. 4. Water strike at 0.60m. 1 groundwater sample taken (no drillers sheet giving recovery found).	LOGGED BY		A.E.F.	2.2.87	SHEET 1 OF 15	EXPLORATORY HOLE No. KHN/ OW 19	
	Rev No.	Rev. Date	CHECKED BY	P.A.N.			2.11.87
	Document I.D.No.		E.R. APPROVAL	P.D.B.			11.11.87
			SIGNATURE				DATE

TA11NE 197





C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF. 60.440.0		GROUND LEVEL +6.46		MOD EXPLOHATORY HOLE No.										
LOG PREPARED BY : HOWARD HUMPHREYS & PARTNERS		CABLE PERCUSSION BORING LOG		BORING DIA.(mm) 250 to 14.70m 200 from 14.70 to 21.00m		COORDINATES 516299.78 E 418417.33 N		KHN/ OW 19										
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT PILCON WAYFARER		CASING DIA.(mm) 250 to 14.70m 200 from 14.70 to 21.00m		DATES BORED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 3 OF 15										
Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	P.I.S.O.	DESCRIPTION OF STRATA		STRATA			SAMPLING		IN-SITU TESTING		INDEX RESULTS				LABORATORY TESTS	
				PRIMARY	SECONDARY	Red. Level (mOD)	Legend	Depth (m)	Depth (m)	Type	Depth (m)	Type	Result	Sum %	W %	PL %		LL %
				As before.														NONE
				10.75 becoming firm.														
				11.10 becoming stiff.														
				11.40 gravel becoming rare.	11.34 cobble of subangular coarse sandstone, 90x55x60mm.													
				GLACIAL TILL														
				Stiff very dark greyish brown (10YR 3/2), very thinly to thinly laminated slightly silty sandy CLAY with rare gravel. Laminations are subhorizontal with rare silt coatings on lamination surfaces. Sand is fine to coarse. Gravel is subangular to subrounded fine to medium chalk, chert, shale, sandstone and limestone.	11.80 boundary very gradational.													
					12.30-12.41 laminations inclined up to 60°.	-5.34		11.80										
				13.23, gravel becoming occasional.														
				13.50, laminations inclined at 20°	13.70-13.80 horizontal band of dark reddish grey (5YR 4/2) thinly to thickly laminated very silty clay.													
					13.76 discontinuity subhorizontal, curved, closed and dry.													
				GLACIAL TILL														
				Firm to stiff olive grey (5Y 4/2) mottled very dark greyish brown (10YR 4/2) silty gravelly very sandy CLAY. Gravel is subangular to angular fine to coarse chalk. Sand fine to coarse chalk.	13.99 sharp subhorizontal irregular boundary.													
				14.22 becoming olive (5Y 4/4)														
				14.35 becoming olive (5Y 5/6)														
				14.50 becoming mottled light olive brown (2.5Y 5/4) and olive yellow (2.5Y 6/6).														
					14.29-14.35 grey careous flint recovered as angular fine to coarse gravel due to drilling disturbance.													
					14.43-14.50 moss green horizontal very silty clay band.													
				TRANSITION ZONE														
13.3.87 19.00	4.67																	
07.00																		
14.3.87																		

NOTES: 1. Water strike at 14.70m at 18.50 hrs on 13/3/87. Water rose to 5.08m in 20 minutes and to 4.82m at 0700hrs 14/3/87. 1 groundwater sample taken.

Rev No.	Rev. Date	LOGGED BY	SIGNATURE	DATE
			A.R.T.	2.2.87
Document I.D.No.		CHECKED BY	P.A.N.	Sept 87
		E.R. APPROVAL	P.J.B.	11.11.87

TA 11 NE 197



C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF. 80.440.0		GROUND LEVEL +6.46 MOD		EXPLORATORY HOLE No.												
LOG PREPARED BY : HOWARD HUMPHREYS & PARTNERS		CABLE PERCUSSION BORING LOG		BORING DIA.(mm) 250 to 14.70 m 200 from 14.70 to 21.00 m		COORDINATES 516299.78E 418417.33 N		KHN/ OW 19												
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT PILCON WAYFARER		CASING DIA.(mm) 250 to 14.70 m 200 from 14.70 to 21.00 m		DATES BORED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87		SHEET 4 OF 15												
Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING		IN-SITU TESTING		INDEX RESULTS				LABORATORY TESTS			
						Red. Level (mOD)	Legend	Depth (m)	Depth (m)	Type	Depth (m)	Type	Result	Sum %	W %	PL %		LL %		
14.3.87	4.67	▼ ②		As before.													NONE			
				TRANSITION ZONE																
				Structureless, completely weathered CHALK composed of white subrounded to subangular, fine to coarse gravel sized, slightly weathered, moderately weak fragments in a white silty sandy clay matrix (25:75).	15.53 boundary sharp subhorizontal and irregular.	-9.07	15.53													
				CHALK Grade VI/WVI																
				End of logging 16.15m <sup>ⓐ</sup>																

TA11NE 197

TA11NE 197

NOTES :  
 1. Logging not continued deeper than 16.15m as the bulk samples could not be located in the sample store.  
 2. Water strike at 17.00m one groundwater sample taken (No drillers sheet giving recovery found).

LOGGED BY		SIGNATURE		DATE	
A.R.T.		P.A.S.		2.2.88	
Rev. No.	Rev. Date	CHECKED BY	E.R. APPROVAL		
		P.D.B.	4.11.87		
Document I.D.No.					

EXPLORATORY HOLE No. KHN/ OW 19 SHEET 4 OF 15

C.E.G.B. CONTRACT REF. NO. KHN/C/200			KILLINGHOLME SITE INVESTIGATION			REF. 80.440.0			GROUND LEVEL +6.46 MOD			EXPLORATORY HOLE No.				
LOG PREPARED BY : HOWARD HUMPHREYS & PARTNERS			CABLE PERCUSSION BORING LOG			BORING DIA.(mm) 250 to 14.70 m 200 from 14.70 to 21.00 m			COORDINATES 516299.78 E 418417.33 N			KHN/ OW 19				
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES			EQUIPMENT PILCON WAYFARER			CASING DIA.(mm) 250 to 14.70 m 200 from 14.70 to 21.00 m			DATES BORED 13.3.87 - 14.3.87			SHEET 5 OF 15				
Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING		IN-SITU TESTING			INDEX RESULTS		LABORATORY TESTS
				PRIMARY	SECONDARY	Red. Level (MOD)	Legend	Depth (m)	Depth (m)	Type	Depth (m)	Type	Result	2m %	W %	
14.3.87	4.67								20.00	W ①						NONE
									20.00 - 20.50	B						
14.3.87 19.00									20.60 - 21.00	B						
									-14.54							
					END OF CABLE PERCUSSION DRILLING 21.00 m											

TA 11 NE 197

NOTES: 1. Water strike at 20.00m, 1 sample taken (No drillers sheet giving recovery found.) 2. Piezometer installed 14/3/87. 21.00 to 20.50m cement plug. 20.50m rubber packer. 20.50 to 16.50 gravel. 20.00 to 17.00m hydrotech wrap screen 16.50 to 16.00m, medium sand. 16.00 to 14.00 bentonite pellets. 14.00 to GL cement/bentonite or bentonite grout.	SIGNATURE		DATE	5 OF 15 SHEET	EXPLORATORY HOLE No. KHN/ OW 19
	LOGGED BY	A.D.T	2.2.88		
	CHECKED BY	P.A.N.	9.4.88		
Rev. No.	Rev. Date	E.R. APPROVAL	P.J.B	11.11.88	
Document I.D.No.					



C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	MOD	EXPLORATORY HOLE No.
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS		ROTARY DRILLING LOG	CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N		KHN/ OW 19
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT: BBS 25	DRILL BIT T/W TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87	SHEET 6 OF 15		

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA		SAMPLING AND IN-SITU TESTING		CORE RECOVERY				Fracture Log	LABORATORY TESTS		
				PRIMARY	SECONDARY	Red. Level (MOD)	Leg.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)			TCR %	SCR %
23.4.87 14.35 20.50	20.48	23.4.87 14.35 6.28															
						-14.14		20.60				100	3	0	0	Hf	Hf
						-15.54		22.00				100	27	5	0	Hf	Hf
						-16.29		22.75				100	27	11	0	Hf	Hf
						-17.04		23.50				100	16	11	0	Hf	
						-17.79		24.25				100	NIL	NIL	N/A	N/A	NR

NOTES: 1. Description in situ based on description of material recovered. 2. Base of 114mm O.D. Base of Well screen @ 20.50m. 3. Flush returns are drillers estimate. 4. In situ description of recovered material not possible, no structural evidence.	LOGGED BY		A.R.T.	DATE	2.7.87
	Rev. No.	Rev. Date	CHECKED BY	P.A.N.	Sept. 87
	Document I.D. No.		E.R. APPROVAL	P.J.B.	11.11.87
			SIGNATURE		DATE

TA 11NE 197

EXPLORATORY HOLE No. KHN/ OW19

C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0		GROUND LEVEL +6.46 mOD		EXPLORATORY HOLE No.		
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS			ROTARY DRILLING LOG		CORE DIA. (mm) 54 NX		FLUSH WATER		COORDINATES 516299.78 E 418417.33 N	
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES			EQUIPMENT: BBS 25		DRILL BIT TUNGWSTEN CARBIDE BIT		DATES DRILLED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87		SHEET 7 OF 15	

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					Fracture Log	LABORATORY TESTS		
				PRIMARY	SECONDARY	Red. Level (mOD)	Log.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %			RQD %	I <sub>f</sub> (mm)
23.4.87 1900	20.48	4.70	[Piezo. Scale]	White (5Y 8/1) to yellow (10YR 7/8) Very thinly bedded, extremely closely jointed, slightly to moderately weathered CHALK. Moderately strong to strong. Joints dominantly 90° to bedding, extensive Iron staining.	Material recovered as fine to coarse sand and angular, elongate fine to coarse, gravel sized chalk, also fine to coarse angular flint gravel. Flint is dark greyish brown (2.5Y 5/2) smooth skinned 1mm thick, slightly careous. (Drilling disturbed).	-18.54	f	25.00											
07.00 24.4.87		4.57				-18.69	f	25.15				100	25.00	80	38	0	Hf	Hf	
				CHALK Grade IIII/IV/VI/IIII		-19.41	f	25.87											
				NO RECOVERY															
				White (5YB/1) very thinly bedded, very closely jointed, slightly to moderately weathered CHALK. Moderately strong to strong with low amplitude, complex stylolites. Bedding planes are horizontal planar, rough, discoloured with silt sized olive brown (2.5Y 4/4) developments, and manganese dendrite speckles. Joints subvertical, iron-stained.	Top 100mm of material recovered as fine to coarse chalk gravel. (Drilling disturbed).	-20.34	f	26.80											
				CHALK Grade IIII/II/VI/IIII				26.90	SP										
				White (5Y 8/1) thickly laminated to very thinly bedded, closely to very closely jointed, slightly weathered CHALK. Strong with stylolites. Bedding planes have a silty coating light grey (5Y 7/1). Joints vertical with minor iron-staining and Manganese dendrite development. Stylolites closely spaced up to 30° inclination from horizontal, simple.	Up to 40mm thick, tabular, non careous, smooth, strong, grey (2.5Y N6) flint identified. (Drilling disturbed). Olive grey (5Y 5/2) silty marl up to 3mm thick on open fracture in core.	-21.97 -22.09 -22.13	f	28.43 28.55 28.59											
				In run from 29.40 with bioturbation and rare trace fossils of thalassinoides up to 60mm long.				28.43 28.55 28.59											
						-23.36	m	29.82											
								29.90											

NOTES:	1. Description in situ based upon description of recovered material.	LOGGED BY A. R. F.	DATE 2.7.87	7 OF 15	HOLE No. KHN/OW19
	2. Flint depth determined on basis of Microresistivity log.				
	3. Marl depth determined on basis of resistivity logs.				
4. Flint and marl bands not detected above 25.00m - no microresistivity log performed above 25.00m.		CHECKED BY P. A. N.	DATE Sep 87		
		E.R. APPROVAL P. J. B.	DATE 16.11.87		

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C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION			REF.80.440.0		GROUND LEVEL +6.46		MOD		EXPLORATORY HOLE No. TA11NE/							
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS			ROTARY DRILLING LOG		CORE DIA. (mm) 54 NX		FLUSH WATER		COORDINATES 516299.78 E 418417.33 N			KHN/ OW 19 197						
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES			EQUIPMENT: BBS 25		DRILL BIT TUNGSTEN CARBIDE BIT		DATES DRILLED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 8 OF 15									
Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo	DESCRIPTION OF STRATA			STRATA		SAMPLING AND IN-SITU TESTING		CORE RECOVERY				Fracture Log	LABORATORY TESTS		
				PRIMARY	SECONDARY	Red. Level (MOD)	Log.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %			SCR %	ROD %
24.4.87 11.30 30.40	25.27	24.4.87 11.30 4.68		CHALK Grade III/III	40mm thick, tabular, careous, grey (N6/0), very strong, irregular FLINT.	-23.81 -23.85	30.27 30.31	30.40			100	30.40	57	35	0	5 20 50	Hf	
					Up to 40mm thick, extremely careous, irregular grey (10YR 5/1) lobed, moderately strong flint gravel. (Drilling disturbed).	-24.35 -24.39	30.81 30.85				100	31.15	65	25	0	5 20 30	Hf	
				White (5Y 8/1) very thinly bedded to thickly laminated very closely to closely jointed, slightly weathered CHALK. Moderately strong Bedding planes are horizontal, stepped, often discoloured light grey (10YR 7/1), silty.	390mm recovered as angular, fine to coarse gravel sized chalk. (Drilling disturbed).							31.15						
				As before.	50mm thick, careous, lobate, strong, grey flint recovered in core.	-24.99	31.45		SP ①			31.15	73	40	0	10 30 50	Hf	
					31.15-31.22 low amplitude, very closely spaced, simple stylolites developed with very dark greyish brown (2.5Y 3/2) discontinuous Marl bands along rough irregular stylolites.	-25.26 -25.37	31.72 31.83				100	32.15						
					31.15-31.52 abundant trace fossils of thelassinoides, zoophycos and planolites and occasional fossil fragments.	-25.69	32.15					32.15						
					31.45 up to 2mm thick, olive brown marl in core. (Drilling disturbed).	-26.34	32.70				100	32.90	65	42	38	15 25 80	Hf	
					31.66-31.81 150mm of coarse gravel to cobble sized irregular, extremely careous dark grey (2.5Y N/4) flint. (Drilling disturbed).			32.90				33.40						
				White, very thinly bedded, closely jointed, slightly weathered CHALK. Moderately strong with stylolites. Joints, planar, smooth, vertical, closed, open, stylolites often complex, highly sutured with marly pockets on stylolites planes.	270mm recovered as angular to subangular fine to coarse sand and fine to coarse gravel sized chalk and coarse gravel sized flint. Occasional trace fossils of planolites and Trechichnus present in core.			33.40			100	34.26	77	60	0	10 30 50	Hf	
				As above.	270mm recovered as angular fine to coarse gravel sized material in a silty, clayey chalk matrix. 1mm thick dark greyish brown (2.5Y 4/2) silty marl identified. (Drilling disturbed).	-27.80	34.26		SP ②			34.26						
				Joints vertical to 75° from horizontal, occasional slickensides on joints.		-28.34	34.80				100		63	39	10	10 25 60		

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NOTES:

- No flow recorded on packer test from 29.90 to 33.40m.
- No flow recorded on packer test from 32.90 to 36.40m.
- Flint depths based on microresistivity log.
- Marl identified on microresistivity log @ 32.70m.

LOGGED BY		A.R.S.		DATE		2.7.87	
Rev. No.	Rev. Date	CHECKED BY	P.A.W.		11.11.87		
Document I.D. No.		E.R. APPROVAL	P.J.B.		11.11.87		

8 OF 15

EXPLORATORY HOLE No. KHN/OW19



C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	MOD	EXPLORATORY HOLE No.
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS		ROTARY DRILLING LOG		CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N KHN/ OW 19	
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT: BBS 25		DRILL BIT TNW TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87		SHEET 9 OF 15

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY				Fracture Log	LABORATORY TESTS		
				PRIMARY	SECONDARY	Red. Level (MOD)	Leg.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %			SCR %	RQD %
24.4.87 19.00	25.27	4.59		White to pale yellow (2.5Y 8/4), very thinly bedded, closely jointed, slightly to moderately weathered CHALK. Strong with stylolites.	360mm recovered as fine to coarse sand and angular, fine to coarse gravel sized chalk in a silty matrix. (Drilling disturbed). Up to 3mm thick, dark, olive grey (5Y 3/2) Marl identified in core on fractured stylolite plane.	-28.64		35.10										
35.28 07.00	25.27	4.55 07.00				CHALK Grade II/III/III/III		-29.36		35.82				100	64	28	0	10/15
25.4.87	25.4.87	25.4.87		White, very thinly bedded to thickly laminated, closely jointed, slightly weathered CHALK. Moderately strong to strong with moderately widely spaced complex, high amplitude stylolites. Stylolites up to 20mm in amplitude, often having discontinuous olive grey (5Y 4/2) marl pockets on irregular surfaces.	30mm thick tabular grey (2.5Y R/5) moderately strong smooth white skinned 1mm thick flint recovered. Rare trace fossils of zoophycos and thalassinoides present. 30mm thick, slightly careous dark grey (5Y 4/1) smooth strong flint. (Drilling disturbed).	-29.39		35.85										
						CHALK Grade II/III		-29.94		36.40				100	57	27	0	5/30
				White, very thinly bedded to thickly laminated closely jointed, slightly weathered CHALK. Strong to very strong with very closely spaced stylolites. Joints are vertical, planar, smooth, closed discoloured light grey (10YR 7/1) with discontinuous iron-staining (10YR 8/4). Stylolites up to 45° inclination high amplitude, complex, very closely spaced.	300mm recovered as fine to coarse, subangular to angular chalk gravel. (Drilling disturbed).	-30.54		37.10										
						CHALK Grade II/III		-30.94		37.40		SP	k = 2.8 x 10 <sup>-7</sup> m sec <sup>-1</sup>					
				600mm recovered as silt, fine to coarse sand and angular to subangular fine to coarse gravel sized chalk. (Drilling disturbed).	37.92-38.02 flaser type stylolite structure.													
								-31.74	m	38.20				100	87	27	0	
				38.68-38.70 material recovered as fine to coarse sand, angular fine to coarse gravel sized chalk and flint. Flint gravel nodular grey (N5/D) white skinned, careous, up to 20mm thick. (Drilling disturbed).	38.96m flaser type stylolite structure with marly coatings on fracture plane.													
								-32.22		38.68								
				38.95 becoming with well developed, extremely closely spaced stylolites with significant marl developments along stylolite surfaces.	38.96m flaser type stylolite structure with marly coatings on fracture plane.	-32.24		38.70					100	90	47	0	10/15	70
25.4.87 12.05	25.4.87 12.05	4.81				CHALK Grade II/III/III												
39.40	39.40			As before with no stylolites		-32.99	m	39.45										
						-33.19	m	39.65					100					
						-33.44	f	39.90										

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NOTES:		SIGNATURE		DATE	
1. No flow recorded on packer test from 38.90 to 42.40m.		A. R. V.		2.7.87	
2. Depth of flint changed on basis of microresistivity log from 35.28m to 35.10m.		P. A. N.		Sept 87	
3. Marls identified on microresistivity log @ 39.45, 39.65m, 38.20m.		P. J. B.		1.11.87	
4. Depth of flint determined on basis of microresistivity log.		E. R. APPROVAL			
		Rev. No.	Rev. Date	CHECKED BY	
		Document I.D. No.		E. R. APPROVAL	

HOLE No. KHN/ OW 19  
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C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	MOD	EXPLORATORY HOLE NO.
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS			ROTARY DRILLING LOG	CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N	
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES			EQUIPMENT: BBS 25	DRILL BIT TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 11 OF 15

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Plexo.	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					LABORATORY TESTS	
				PRIMARY	SECONDARY	Red. Level (mOD)	Leg.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %		RQD %
				As before.													
				NO RECOVERY													
				White, very thinly bedded, closely jointed fresh to slightly weathered CHALK. Strong. Bedding planar, smooth subhorizontal.	46.30 angular, slightly careous dark olive grey (5Y 4/2) to light brownish grey (2.5Y 6/2) mottled, smooth white skinned medium flint gravel. (Drilling disturbed).	-38.94	f	45.17									
				46.15-46.43 with very closely spaced low amplitude, simple stylolites.	46.43 angular, slightly careous mottled dark grey (5Y 4/1) to olive grey (5Y 4/2) moderately strong to strong, fine to coarse gravel sized flint. (Drilling disturbed).	-39.69	f	45.65									
				CHALK Grade II/M11/I													
				46.54-46.90													
				White, thickly laminated closely jointed, fresh to slightly weathered CHALK. Moderately weak to weak.													
				46.63 soft, olive grey (5Y 4/2) silty marl coating up to 2mm thick along discontinuity.													
				46.85 Marly plexus developed, containing firm olive grey (5Y 4/2) silty marls.													
				CHALK Grade II/III/M11/I													
				White, very thinly bedded, closely jointed slightly weathered CHALK. Strong with very closely to extremely closely spaced stylolites. Bedding planes commonly have a light grey (5Y 7/1) silty discoloration and minor iron-staining. Occasional trace fossils of chondrites and thalassinoides identified, and rare platy fossils.	290mm recovered as angular and subangular fine to coarse gravel sized chalk and flint.												
27.4.87 13.45 48.40	25.27	27.4.87 13.45 5.10		Flint gravel is dark grey (N4/0) irregular, strong, extremely careous, lenticular. (Drilling disturbed).													
				Further flint is extremely careous, dark grey (N4/0), irregular burrowform. (Drilling disturbed).													
				CHALK Grade II/M11													
				White very thinly bedded to thickly laminated closely jointed, fresh to slightly weathered CHALK. Moderately strong with extremely closely spaced stylolites.	50mm recovered as rounded to subangular fine to coarse gravel sized chalk. (Drilling disturbed).												
					280mm recovered as fine to coarse sand and angular, fine to coarse gravel sized chalk. (Drilling disturbed).												
				CHALK Grade II/M11/I													

NOTES:		SIGNATURE		DATE		11 OF 15	HOLE NO. KHN/OW 19
1. No flow recorded on packer test from 44.90 to 48.40m.		LOGGED BY A.R.G.		27.8			
2. No flow recorded on packer test from 47.90 to 51.40m.		CHECKED BY P.A.N.		27.8			
3. Flints @ 48.70, 49.40m according to microresistivity log.		E.R. APPROVAL P.J.B.		11.11.87			
4. Flints @ 45.65m may correspond to logged flints @ 46.30 and 46.43m b.g.l.		Rev. No.		Rev. Date			
5. East Halton Marl identified @ 45.17m on microresistivity log.		Document I.D. No.					

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C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	mOD	EXPLORATORY HOLE No.	
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS		ROTARY DRILLING LOG		CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N		KHN/ OW 19
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT: BBS 25		DRILL BIT TNW TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87		SHEET 12 OF 15	

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					Fracture Log	LABORATORY TESTS		
				PRIMARY	SECONDARY	Red. Level (mOD)	Log.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %			RQD %	I <sub>f</sub> (mm)
27.4.87 19.00 52.56	25.27	27.4.87 19.00 4.61		White, very thinly bedded to thickly laminated closely jointed slightly weathered CHALK. Strong with very closely spaced, low amplitude complex stylolites and abundant trace fossils of chondrites, thalassinoids.	Firm, olive grey (5Y 5/2) marl up to 1mm thick identified in core. (Drilling disturbed).							100	53	26	12	10 20 60	NI		
					400mm recovered as fine to coarse sand, angular fine to coarse gravel sized chalk.														
52.56 07.00 26.4.87	25.27	4.59 07.00 28.4.87		Light grey (2.5Y 7/1) to dark grey (N4/0) smooth skinned, angular coarse gravel sized flint up to 40mm thick, recovered amongst 70mm of angular, fine to coarse gravel sized chalk. (Drilling disturbed).		-44.94		51.40	51.40				100	44	31	0	15 40 90	NI	
					Further 80mm recovered as fine to coarse sand, angular fine to coarse gravel sized chalk and flint. Flint is careous grey (2.5Y N/5) up to 40mm thick, strong, irregular. (Drilling disturbed).	-45.09		51.55	51.59										
				White (5Y 8/1) thickly laminated, closely to very closely jointed, slightly weathered CHALK. Strong. Bedding planes are horizontal, frequently with a silty, light grey (5Y 7/1) discoloration.	340mm recovered as fine to coarse sand and angular, fine to coarse gravel sized chalk. (Drilling disturbed). Stylolite development identified in drilling disturbed material.	-45.89		52.35	52.39				100	64	27	0	15 20 30	NI	
					5mm thick, discontinuous light grey (5Y N7) careous flint recovered. Flaser type stylolite structure identified in core.	-45.93		52.56											
				White, thinly bedded, closely to moderately widely jointed, fresh to slightly weathered CHALK. Strong to very strong with extremely closely spaced stylolites.		-46.10		52.56										NI	
					40mm thick, white skinned, curvilinear, non careous lenticular, grey (2.5Y N5) white skinned 1mm thick flint recover red.														
				50mm thick, grey (N6/0) moderately strong to moderately weak, extremely careous burrowform flint.	110mm recovered as angular fine sand to coarse gravel sized chalk.	-47.00		53.46					100	66	54	38	100 120 140	NI	
					CHALK Grade II/III/MI	-47.54		54.00											
					490mm recovered as angular coarse gravel sized chalk.	-47.59		54.05										NI	
						-47.94		54.40											
						-48.49		54.95										NI	
						-48.53		54.99											

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NOTES:				SIGNATURE		DATE		12 OF 15	HOLE No. KHN/OW 19
1. No flow recorded on packer test from 50.90 to 54.40m.				A. R. F.		27.91			
2. Flint depths are determined from the microresistivity log.				P. A. N.		Sept 87			
				P. J. B.		11.11.87			
Rev. No.	Rev. Date	CHECKED BY	E.R. APPROVAL						
Document I.D. No.									

C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	MOD	EXPLORATORY HOLE No.
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS			ROTARY DRILLING LOG	CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N KHN/ OW 19	
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT: BBS 25	DRILL BIT TUNGSTEN CARBIDE BIT	THW	DATES DRILLED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 13 OF 15

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					Fracture Log	LABORATORY TESTS					
				PRIMARY	SECONDARY	Red. Level (MOD)	Log.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %			RQD %	I <sub>f</sub> (mm)			
28.4.87 14.30 57.40	25.27	28.4.87 14.30 4.63		White very thinly bedded to thickly laminated closely to moderately widely jointed CHALK. Strong with abundant trace fossils of chondrites and rare fossil fragments of platyseramus.	Up to 40mm thick grey (2.5N5) (2.5Y N5) slightly careous, smooth upper skinned, angular, coarse gravel sized flint. (Drilling disturbed).							100	64	26	11	10 20 60						
					Up to 30mm thick grey (2.5Y N5) slightly careous smooth skinned medium to coarse angular gravel sized flint. (Drilling disturbed).										100	38	37	30	10 20 60			
				Basal 300mm of recovered material white, moderately weak, fresh to slightly weathered chalk. (Drilling disturbed).												100	91	72	16	20 40 90		
				CHALK Grade II/WI/I																		
				White, thickly laminated, closely jointed, fresh to slightly weathered CHALK. Moderately strong to strong. Bedding planes horizontal minor iron-staining, joints vertical to 75° from horizontal.																		
				CHALK Grade II/I/I/WI/I																		
				White, very thinly bedded, closely jointed fresh to slightly weathered CHALK. Strong with closely spaced stylolites and abundant trace fossils.	56.80 12mm long, light pinkish grey fibrous fossil fragments identified.																	
				57.00-57.07 70mm thick, tabular, non careous lobed, mottled grey (2.5Y N/6) to (5Y 6/1) FLINT, very strong.	270mm recovered as angular, medium to coarse gravel chalk containing dark grey fibrous shell fragments. Coarse flint gravel recovered, slightly careous, smooth white skinned grey (N5/0) moderately strong up to 20mm thick.																	
				57.28-57.33 50mm thick, tabular, careous smooth, grey (2.5Y N/6) white skinned 1mm FLINT, very strong.																		
				CHALK Grade II/WI/II																		
				80mm recovered as rounded fine to coarse gravel chalk.																		
				As 56.61-58.90	59.65-59.81 material recovered as rounded and angular fine to coarse gravel sized chalk and minor angular medium sized flint gravel. Flint gravel is dark grey (2.5Y 4/2) to grey (2.5Y 6/1), non careous nodular, white skinned 1mm thick.																	
				59.81 becoming thin to very thinly bedded.																		
				CHALK Grade II/WI/II																		

NOTES:		LOGGED BY		SIGNATURE		DATE		13 OF 15	HOLE NO. KHN/OW 19
1. No flow recorded on packer test from 53.90 to 57.40m.		A.R.F.		A.R.F.		27.87			
2. No flow recorded on packer test from 56.90 to 60.40m.		P.A.N.		P.A.N.		Sept 87			
3. 0.63m recovered from 0.75m run; 0.08m recovered from previous run.		E.R. APPROVAL		P.J.B.		11.11.87			

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C.E.G.B. CONTRACT REF. NO. KHN/C/200		KILLINGHOLME SITE INVESTIGATION		REF.80.440.0	GROUND LEVEL +6.46	MOD	EXPLORATORY HOLE No. TA11NE/OW19 197
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS		ROTARY DRILLING LOG	CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78E 418417.33N		KHN/ OW19 197
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES		EQUIPMENT: BBS 25	DRILL BIT TNW TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87-14.3.87 and 23.4.87-29.4.87		SHEET 14 OF 15	

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					Fracture Log	LABORATORY TESTS	
				PRIMARY	SECONDARY	Red. Level (mOD)	Leg.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %			RQD %
28.4.87 19.00 60.40	25.27	28.4.87 19.00 4.56	[Piezo Diagram]	60.05 firm 3mm thick olive (SY 4/4) silty marl developed on fracture in core. (Drilling disturbed).	-54.59	m	60.05	60.40	SP		100							
60.40 07.00 29.4.87		4.55 07.00 29.4.87			-53.94	m	60.40				60.40	100	NIL	NIL	N/A	N/A	NR	
				White, to very white, very thinly bedded, moderately widely jointed, fresh to slightly weathered CHALK, strong with very closely spaced stylolites. Bedding planes horizontal smooth and irregular. Stylolites simple, poorly developed variable amplitude (5-20mm).  CHALK Grade 11/M11/1  NO RECOVERY	-54.24		60.70				100	NIL	NIL	N/A	N/A	NR		
					-54.99		61.45					100	NIL	NIL	N/A	N/A	NR	
					-55.74		62.20				100	NIL	NIL	N/A	N/A	NR		
					-56.49		62.95				100	NIL	NIL	N/A	N/A	NR		
					-57.26		63.72				100	NIL	NIL	N/A	N/A	NR		
					-58.01		64.47				100	NIL	NIL	N/A	N/A	NR		

NOTES:		1. No water level recorded @ 11.40hrs on 29/04/87.		LOGGED BY A.R.F. 27.87		14 OF 15	TA11NE 197	HOLE No. KHN/OW19
Rev. No.	Rev. Date	CHECKED BY P.A.N. [Signature]	E.R. APPROVAL P.J.B. 11.11.87					
Document I.D. No.								

TA11NE 197

C.E.G.B. CONTRACT REF. NO. KHN/C/200	KILLINGHOLME SITE INVESTIGATION	REF.80.440.0	GROUND LEVEL +6.46	mOD	EXPLORARY HOLE No. 1
LOG PREPARED BY: HOWARD HUMPHREYS & PARTNERS	ROTARY DRILLING LOG	CORE DIA. (mm) 54 NX	FLUSH WATER	COORDINATES 516299.78 E 418417.33 N	KHN/ OW 19 197
CONTRACTOR: FOUNDATION & EXPLORATION SERVICES	EQUIPMENT: BBS 25	DRILL BIT TNW TUNGSTEN CARBIDE BIT	DATES DRILLED 13.3.87 - 14.3.87 and 23.4.87 - 29.4.87	SHEET 15	OF 15

Hole Depth (Date/Time)	Depth of Casing (m)	Water Level	Piezo.	DESCRIPTION OF STRATA		STRATA			SAMPLING AND IN-SITU TESTING		CORE RECOVERY					Fracture LOG	LABORATORY TESTS					
				PRIMARY	SECONDARY	Red. Level (mOD)	Leg.	Depth (m)	Depth (m)	Type	Result	Flush Ret. %	Depth (m)	TCR %	SCR %			ROD %	I <sub>1</sub> (mm)			
					NO RECOVERY																	
					White, very thinly bedded, very closely jointed, slightly weathered CHALK. Strong with very closely spaced stylolites. Joints are vertical, planar rough. Stylolites developed along bedding planes, complex anastomosing stepped, with discontinuous marly infillings up to 2mm thick.	65.80-65.98, 66.15-66.17, 66.24-66.33, 66.41-66.46m material recovered as fine sand, angular fine to coarse angular flint gravel. Gravel sized chalk and sand. (Drilling disturbed).	-59.34		65.80													
					Flint gravel in material recovered from 65.90 to 66.08 is non-careous grey (NS/O) irregular. (Drilling disturbed).		-59.37	65.83														
					65.70-65.82 rare trace fossils of thalassinoides.																	
					65.82-65.90 with abundant trace fossils of zoophycos, thalassinoides and chondrites. Major thalassinoides trace fossils show very stiff, dark olive grey (SY 4/2) silty marl infill.																	
					CHALK Grade 11/111/W11																	
					White very thinly bedded, closely jointed fresh to slightly weathered CHALK. Strong to very strong with very closely spaced to closely spaced stylolites.	200mm recovered as clay, silt fine to coarse sand and angular fine to coarse gravel sized chalk. (Drilling disturbed). 10mm thick mottled light grey (2.5Y N/7) to dark grey (2.5Y N/4) flint nodule recovered.																
					68.02 up to 30mm thick, light grey (2.5Y N/7) to grey (2.5Y N/6), extremely careous, irregular, burrowform flint, strong.	68.02-68.15 material recovered as angular to rounded, coarse sand and fine to coarse gravel chalk. (Drilling disturbed).																
29.4.87 19.00 68.50	25.27	29.4.87 19.00 4.81			68.15 firm, 1mm thick discontinuous olive grey (SY 4/2) marl coating on core discontinuity. (Drilling disturbed).																	
68.50 07.00 1.5.87		4.52 07.00 1.5.87			With rare trace fossils of thalassinoides.	68.19-68.25 material recovered as grey (2.5Y N/6) lensoid, up to 20mm thick fine to coarse gravel sized, non careous, smooth white skinned flint. (Drilling disturbed). 68.34-68.37 material recovered as angular dark grey (SY 4/1) fine flint gravel. (Drilling disturbed).																
					END OF HOLE @ 68.50m.																	

NOTES: 1. Hole geophysically logged. 2. 0.76m recovered from 0.66m; 0.10m recovered from previous run. 3. 48.01m of 70mm O.D. stainless steel well screen inserted on 1/5/87 from 66.48 to 20.47 below ground level.	LOGGED BY A. R. F.		SIGNATURE A. R. F.	DATE 2.7.87	15 of 15	EARTHQUAKE HOLE NO. KHN/OW19
	Rev. No.	Rev. Date	CHECKED BY P. A. N.	DATE Sept 87		
	Document I.D. No.		E.R. APPROVAL P. J. B.	DATE 11.11.87		

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