Phase I Geo-Environmental Desk Study

Land adjacent to 1 Hall Lane
Moulton Seas End
Spalding
PE12 6LB

Prepared for:

Wilf Hammond Homes Ltd.
Red House Farm
Dawsmere Road
Gedney Marsh
Lincolnshire
PE12 9NG

EPS Project Reference:	UK19.4517
Date Issued:	5th July 2019
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LAND ADJACENT TO 1 HALL LANE, MOULTON SEAS END

NON TECHNICAL SUMMARY

This report presents the findings of a Phase I Geo-Environmental Desk Study which was carried out to identify potential contamination from previous or current uses of the site and surrounding area and to provide an initial assessment of geological and geotechnical aspects of the site and how the proposed development or surrounding environment might be affected.

- The site is currently an undeveloped, overgrown fallow field situated south of Hall Lane and west of Seas End Road in the village of Moulton Seas End. Vegetation throughout the site consists of weeds, grass and wildflowers with some semi-mature and mature trees located on the western boundary.
- Ground conditions are anticipated to comprise superficial Tidal Flat Deposits (clay & silt) over the West Walton Formation (mudstone, sandstone and limestone bedrock), and groundwater within these units is not protected or abstracted in the local area. Although a detailed fen drainage network has been identified nearby, the site is considered to have low environmental sensitivity.
- Historical mapping has shown the site to have remained undeveloped throughout the historical time period examined (1887-2019) and the surrounding land does not appear to have had significant industrial / commercial use.
- However, the EA public database lists a single historic landfill approximately 15m southwest of the site. Although limited evidence of any infilling in this area is present, risks associated with the on-site migration of landfill gas to indoor and outdoor air cannot be discounted at this stage and it has therefore been recommended that some intrusive investigation including gas monitoring be undertaken at the site.
- A copy of this report should be forwarded to South Holland District Council for inclusion into their land quality records and to support the current planning application.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report, or alternatively give us a call and we'll talk you through it.

Project Reference:	UK19.4517
Title:	Phase I Geo–Environmental Desk Study Land adjacent to 1 Hall Lane, Moulton Seas End
Client:	Wilf Hammond Homes Ltd.
Date:	5th July 2019
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Status:	Issue 1

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The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

The National Planning Policy Framework requires a competent person to prepare site investigation information, which is defined as a person with a recognised relevant qualification, sufficient experience in dealing with the type(s) of pollution or land instability, and membership of a relevant professional organisation. EPS considers that it fulfils these criteria and would welcome any request for staff CVs or case studies to demonstrate it.

As stated within DEFRA's Contaminated Land Statutory Guidance, with any complex risk assessment it is possible that different suitably qualified people may reach slightly different conclusions when interpreting the same information. EPS recognises this and considers the conclusions presented within this report to be robust and appropriate but input from the Local Authority and their judgement in line with this guidance would still be welcomed.

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1 INTRODUCTION

In June 2019, Environmental Protection Strategies Ltd (EPS) was commissioned by Peter Humphrey Associates Ltd. on behalf of Wilf Hammond Homes Ltd. to complete a Phase I -Geo-Environmental Desk Study on land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, PE12 6LB, ('the site'); see Figure 1.

The work was commissioned in order to address the local authority's contaminated land planning requirements for the development of six residential properties and associated landscaping, under South Holland District Council's Planning Reference H13-1202-17.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study undertaken for the site as instructed.

1.1 Objectives

The purpose of this desk study is to evaluate the potential contaminant linkages which may be active at the site in its current condition, or could become active in future, and to determine if any action is required to investigate them further or to break them.

This is achieved by carrying out the following activities:

a) Examining the site history - late 1800s to present day, through collection of historical maps of the area, site records, records held by relevant local authorities, the Environment Agency and review of other information databases.
b) Characterising the site's environmental and geological sensitivity through examination of existing geological, hydrogeological, topographical, and historical maps and aerial photographs of the area.
c) Identifying Potential Areas of Concern (PAOCs) through a combination of historical map and data review and site inspection.
d) Consideration of any future plans for the site and the effects any proposed changes may have on contaminant linkages over time.
e) Development of a site conceptual model and preliminary risk assessment to determine the potential risks posed by the site and make recommendations for any further work that may be required and to ensure suitability for use and safe development in accordance with the *Model Procedures for the Management of Land Contamination* - Contaminated Land Report 11 and the *National Planning Policy Framework*.

1.2 Project Limitations and Constraints

The purpose of this report is to present the findings of a Phase I Geo-Environmental Desk Study conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, EPS makes the following statements:

This report does not include specific investigation for the presence of either Potential Asbestos Containing Material (PACM) or Japanese Knotweed at the subject site however, if obvious evidence of either is observed during EPS site walkover, details will be provided in this report. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

2 GEO-ENVIRONMENTAL SETTING

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site Location and Description

Detail	Description
Location	The site lies to the south of Hall Lane and west of Seas End Road in the village of Moulton Seas End, located 8km northeast of the centre of Spalding and 3.2km northwest of Holbeach, Lincolnshire.
Grid Reference	532070, 327050
Topography	The site lies at an approximate topographic elevation of 5m Above Ordnance Datum and is generally flat with no obvious gradient.
Description of Site	A walkover survey was undertaken on the 21st June 2019 where the site was found to be a largely overgrown fallow field. The field is open to the north on the border with Hall Lane, consisting of a grass verge along the road and a row of telegraph poles. The south and west edges of the field are bounded by hedges, with the eastern limit delineated by a wooden fence. The field itself has been ploughed and is now overgrown with weeds, wildflowers and grass; all well-established plants that have grown to above waist height. There is a large, mature coniferous tree in the garden of the adjacent property, 15 Hall Lane, and a cluster of smaller, semi- mature deciduous trees in the south west corner of the site. There is a small amount of litter towards Hall Lane, with grass cuttings and a small amount of plastic rubbish found.
Surrounding Land Use	On all sides the site is bordered by residential property, apart from the south west corner that is adjacent to an arable field. The property immediately to the south of the site has three large greenhouse buildings; it is unknown if these are used for private or commercial use.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs are included as Appendix A, an indicative proposed development plan as Appendix B and relevant extracts of a Landmark Envirocheck report are included as Appendix C.

2.2 Environmental Setting

Detail	Description
Geology	Geological maps of the area show the site to lie on Tidal Flat Deposits (clay & silt) overlying the West Walton Formation (mudstone & siltsone). Information on the site's geological context is included as Appendix D.

<table>
<tr><th>Detail</th><th colspan="2">Description</th></tr>
<tr><td>British Geological Survey (BGS)</td><td colspan="2">An historic borehole log was acquired from the British Geological Survey (BGS) for a location approximately 900mof the site and reports 0.6m of sandy clay overlying silty sand which extends to a depth of 12.19m bgl (below ground level), the full extent of the borehole. Groundwater was encountered at a depth of approximately 2.13m bgl. A copy of the historic borehole log is included within Appendix D.</td></tr>
<tr><td rowspan="8">Geological Hazards</td><td>Hazard</td><td>On Site Risk</td></tr>
<tr><td>Mining</td><td>No Hazard</td></tr>
<tr><td>Collapsible Ground</td><td>No Hazard</td></tr>
<tr><td>Compressible Ground</td><td>Moderate</td></tr>
<tr><td>Ground Dissolution</td><td>No Hazard</td></tr>
<tr><td>Running Sand</td><td>Moderate</td></tr>
<tr><td>Landslide</td><td>Very Low</td></tr>
<tr><td>Shrinking / Swelling Clay</td><td>Low</td></tr>
<tr><td>Radon</td><td colspan="2">The BGS and Health Protection Agency (HPA) report entitled 'Indicative Atlas of Radon in England and Wales' (November 2007) shows the site to lie within a 1km grid section where the percentage of homes above the radon action level is between 0% and 1%. The joint Building Research Establishment Ltd (BRE) report entitled: 'Radon: Guidance on Protective Measures for New Buildings - 2007' reports that the site does not lie within an area where basic radon protection methods will need to be employed.</td></tr>
<tr><td>Hydrogeology</td><td colspan="2">Groundwater vulnerability maps for the area show that the underlying geology (both superficial and bedrock) are classified as Unproductive Strata. The site does not lie within a Source Protection Zone for local groundwater abstraction and no groundwater abstraction points are listed within 1km. Groundwater vulnerability maps are included as Appendix E.</td></tr>
<tr><td>Hydrology</td><td colspan="2">The site is located within an area with a developed (fen) drainage system for irrigation, with the nearest ditch located roughly 60m to south. There are no reports of surface water abstractions within 500m.

The Envirocheck report lists 16 discharge consents within 250m, typically pertaining to treated sewage discharges from domestic properties or unknown discharges. The nearest active discharge is roughly 115m to the northwest.

Review of the EA Flood Zone Map for the area indicates that the majority of the site lies within Flood Zone 3, which is defined as the area with a high risk of flooding from fluvial or tidal sources, although the area is shown to benefit from local flood defences. Review of the planning portal indicates that a flood risk assessment has already been undertaken for this site. A copy of the flood map for the site and surrounding area is also included within Appendix E.</td></tr>
<tr><td>Landfill & Waste</td><td colspan="2">The EA public database lists a single historic landfill approximately 15m southwest of the site. The site was used to dispose of commercial waste.</td></tr>
</table>

Detail	Description		
Industrial Land Use	The Envirocheck report lists a number of industrial land uses in the area the most pertinent of which are summarised below.		
	Land Use	**Distance (Direction)**	**Status**
	Garage	7m SE	Active
	Printers	257m E	Inactive
	Car body repairs (spraying)	425m NE	Inactive
Pollution Incidents	There are no previous pollution incidents to controlled waters recorded within 500m.		
Sensitive Land Use	The site does not lie within an area of sensitive land use.		

2.3 Site History

A summary of historical map data from 1887 to 2019 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix F.

- During the late 1800s the site and most surrounding areas are presumed to be used as arable farmland. At this time, Moulton Seas End is a small village with residential dwellings and a public house built along Seas End Road as well as a number of properties with a small pond to the west along Hall Lane. The map shows the north extent of the site to extend into Hall Lane and the south east extent to overlap into three smaller fields with buildings, although this has been interpreted as a mapping boundary error. Irrigation drains to the north and west of the site are situated as in the present day.
- By 1931 there has been further residential development of Moulton Seas End along Hall Lane and Seas End Road, including a property adjacent to the south east boundary of the site.
- A drain is noted to run along Hall Lane, just past the northern site boundary between 1969 and 1976, however it is not noted after the 1990s and presumed to be infilled. There was no evidence of this drain during the EPS survey.
- From the 1960s to the 1990s there is continued development of properties in Moulton Seas End, particularly to the north. Immediately south of the site a small development of dwellings is developed by the 1970s followed by one large and three smaller glasshouses in 1991. By 2006 two outbuildings had been removed leaving behind two smaller glasshouses.
- The aerial photograph taken in 1999 shows the south-eastern boundary of the site to overlap the gardens of residential properties that border the site, however again this is considered a minor mapping error. During the EPS site visit it was clear that the gardens to the east have always remained separate from the site.

3 CONCEPTUAL MODEL & PRELIMINARY RISK ASSESSMENT

The following section provides a review of the contaminant linkages that may be active at the site through examination of the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Background

A Desk Study comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health.

3.2 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current & Historic Site Use	Current/historic use of the site as agricultural land.	Herbicides & Pesticides
Current and Historic Surrounding Land Use	Historic landfill site reported roughly 15m to the southwest.	Landfill Gas (CH_4, CO_2)
	Historically in-filled ponds within the surrounding area.	
	In-fill material of unknown origin (Made Ground) used to infill a historic drain.	

Potential Source	Source Description	Principal Contaminants of Concern
	Current / historic industrial land use of the surrounding area including an active garage services nearby to the site.	VOC, TPH, PAH, Metals

Notes: PAH Polycyclic Aromatic Hydrocarbons ACM Asbestos Containing Materials

3.3 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report: '*Using Science to Create A Better Place: Updated Technical Background to the CLEA Model* – Science Report SC050021/SR3'. This guidance document defines a series of standard land-uses, which form a basis for the development of an Environmental Conceptual Model.

The proposed development plan for the site includes the erection of 6 residential properties. This proposed future land use, as defined within Science Report SC050021/SR3, has been considered as:

- Residential (with home- grown produce)

In view of the environmental setting, current and potential future land use of the site and surrounding sites, the potential receptors for any contaminant impact are discussed below:

Receptor	Site Specific Description
Human	Future site users, site workers involved in the site redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The site is reported to be underlain by superficial Tidal Flat Deposit over bedrock of the West Walton Formation which are both defined by the EA as unproductive aquifers and the site does not lie within a SPZ for nearby groundwater abstraction. Therefore, underlying groundwater has not been considered as a potential receptor to site derived contaminants.
Surface Water	A detailed drainage network is present within the surrounding area including one around 60m south of the site. It is possible that site derived contaminants of concern may enter these watercourses by overland flow, migration through unsaturated soils or entering shallow surface drainage / historical land drainage which discharges to these drains, therefore surface waters must also be considered as a sensitive receptor at this stage.
Flora and Fauna	The proposed development includes the provision of domestic garden areas. Some of the identified contaminants of concern are known to be phytotoxic and as such, the potential for this impact should be considered.

Receptor	Site Specific Description
Buildings & Infrastructure	Subsurface structures are likely to be present at the site which may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Adjacent properties including private residential dwellings could also be at risk from potential contaminants found at the site.

3.4 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outdoors
- Inhalation of vapours indoors

Clearly, not all of these potential pathways apply for every standard land-use; the simplest example for exclusions being a commercial / industrial site which is covered by concrete hardstanding. The concrete precludes the direct exposure of humans working at the site to any contaminated soils.

However, in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the following:

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater.
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.5 Summary of Contaminant Linkages

Considering the site use and environmental setting, and the proposed land use; the plausible contaminant linkages that require further investigation are summarised in the following table:

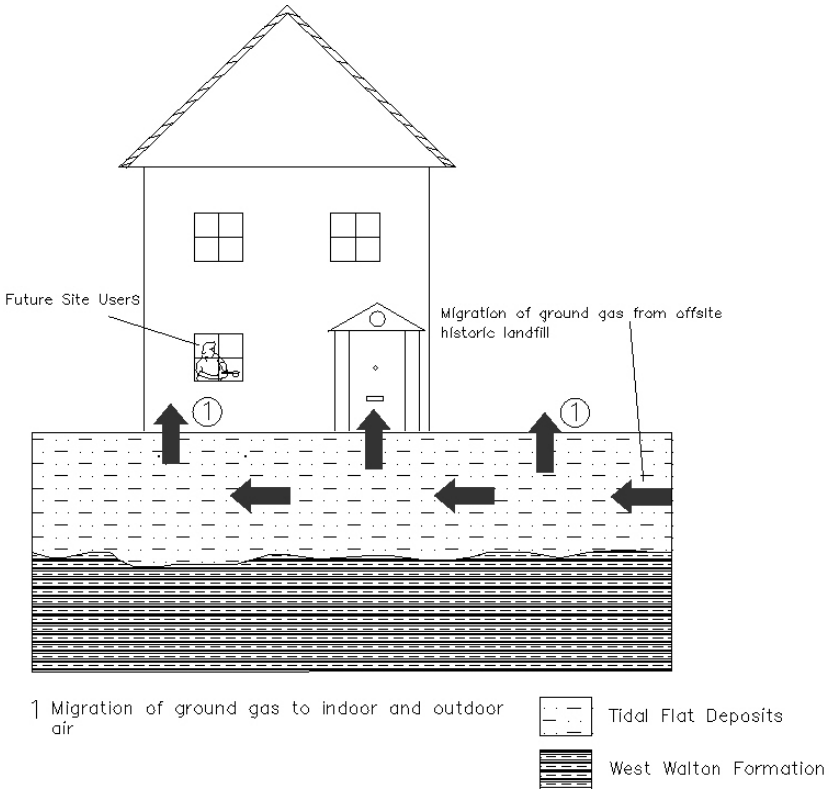
Source	Pathway	Receptor
Historic Landfill	On-site migration of ground gas to indoor and outdoor air	Site users

The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e. through which a significant possibility of significant harm could occur to an identified receptor:

- Whilst a number of small ponds have been historically in-filled within the surrounding area, given the size, age, (and therefore likely nature of fill material) and distance >100m of these features from the site, along with the low permeability of the underlying ground conditions, a plausible contaminant linkage is not recognised from the on-site migration of landfill gas from these sources. Additionally, although a small drain located adjacent to the northern boundary appears to have been infilled, given its size it is not anticipated to have been filled with significant quantities of putrescible material which would pose a risk of ground gases. Nevertheless, risks from ground gases associated with the nearby recorded landfill have not been discounted.
- No site derived contaminants of concern have been identified at the site which could pose a significant risk to the foundations of any on-site or adjacent buildings / infrastructure.
- Although pesticides and herbicides have been identified as potential contaminants associated with the use of the site as agricultural land, it is considered unlikely that they would have been used in significant enough concentrated quantities to pose an on-going risk.
- Although an active garage services is recorded 7m to the southwest, the recorded garage, namely 'Seas End Garage Whiting Autos' appears to lie further up Seas End Road approximately 100m to the northeast. As such, given the low permeability ground conditions of the local area, risks associated with the on-site migration and volatilisation of organic vapour to future buildings from this source are not considered to be present.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

Land adjacent to 1 Hall Lane – Illustrative Conceptual Site Model



4 GEOTECHNICAL GROUND MODEL

Geological records indicate the ground conditions to comprise Tidal Flat Deposits overlying the West Walton Formation. A conceptual geotechnical ground model is provided in the table below which assesses design elements, anticipated strata and ground conditions:

Element	Anticipated Strata	Parameter(s)	Anticipated Conditions
Foundations	Tidal Flat Deposits	Allowable Bearing Pressure	Maximum of 75kN/m^2
		Settlement	Moderate to High Sensitivity
		Volume Change	Low to moderate volume change potential
	West Walton Formation	Allowable Bearing Pressure	75 to 150kN/m^2
		Settlement	Moderate sensitivity / Long term consolidation under loading
		Volume Change	High volume change potential
Drainage	Tidal Flat Deposits	Permeability	Unlikely to be suitable for infiltration drainage
	West Walton Formation		
Concrete Grade	Tidal Flat Deposits	Grade	Low to moderate risk of high sulphate levels
	West Walton Formation		High risk of high sulphate levels.

5 CONCLUSIONS & RECOMMENDATIONS

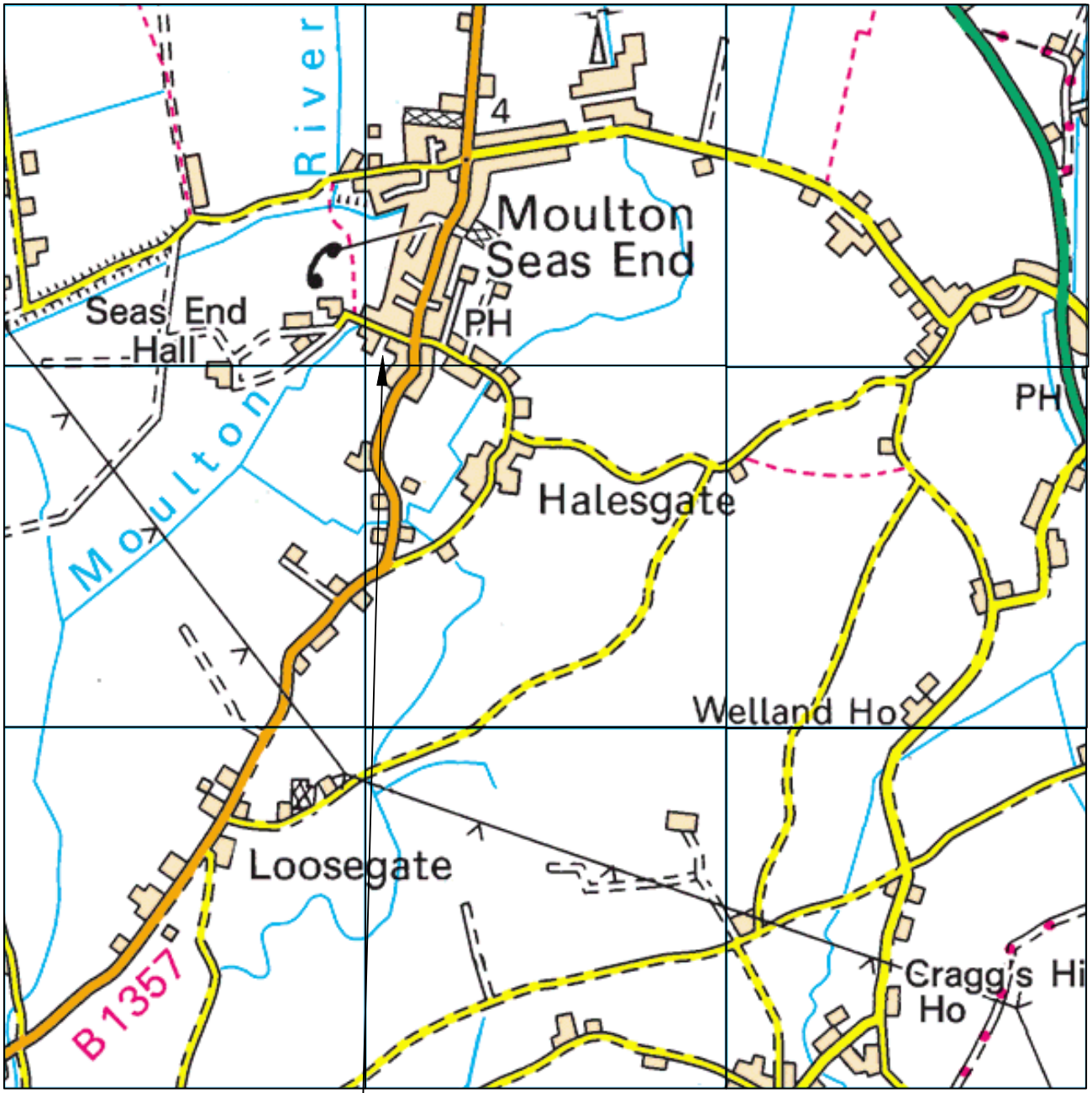
This Phase I Desk Study has identified that the site hasn't previously been developed and it appears the risks from contamination are low. However, the databases suggests that an historic landfill is located roughly 15m to the south west and although limited evidence of any infilling in this area is present, risks associated with the on-site migration of landfill gas to indoor and outdoor air cannot be discounted at this stage.

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11) the risks identified by this work will require further targeted assessment.

It is therefore recommended that, initially, the identified plausible contaminant linkages should be further investigated by means of intrusive investigation comprising the drilling of a number of boreholes in order to install ground gas monitoring standpipes and a series of follow up monitoring visits. A proposed scope and costing for this work can be provided upon request and, where appropriate discussed and agreed with the local authority prior to commencement.

A copy of this report should be provided to the Environmental Health department of South Holland District Council for inclusion into their land quality records

FIGURES



Approximate Site Location

Crown Copyright. All rights reserved.
Licence Number: 100054115

Title: Land Adjacent to 1 Hall Lane

Project: 1 Hall Lane, Moulton Seas End, Spalding PE12 6LB

Fig No: 1

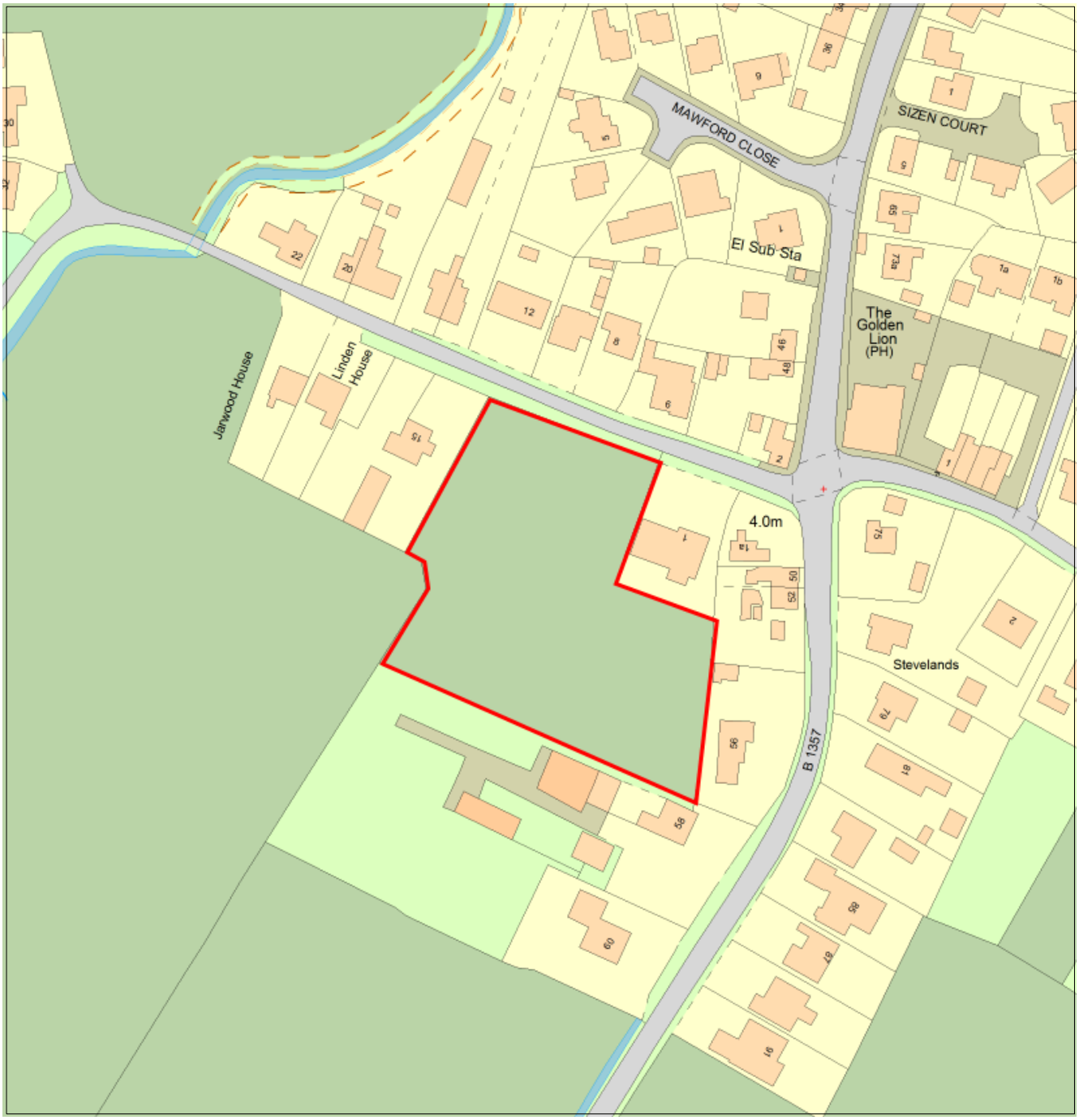
Scale: NTS

Drawn By: AH | Approved By: BV

Job No: UK19.4517

Dwg No: HallLane/0619/01

Date: June 2019



Approximate Site Boundary

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Title: Existing Site Layout Plan

Project: 1 Hall Lane, Moulton Seas End, Spalding PE12 6LB

Fig No: 2

Scale: NTS

Drawn By: AH | Approved By: BV

Job No: UK19.4517

Dwg No: HallLane/0619/02

Date: June 2019



Approximate Site Boundary

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Title: Aerial Photograph

Project: 1 Hall Lane, Moulton Seas End, Spalding PE12 6LB

Fig No: 3

Scale: NTS

Drawn By: AH | Approved By: BV

Job No: UK19.4517

Dwg No: HallLane/0619/03

Date: June 2019

APPENDICES

APPENDIX A

Selected Site Photographs

Photo 1: view from the northern boundary, facing 15 Hall Lane	Photo 2: view from the northern boundary, facing 1 Hall Lane
	
Photo 3: looking west from the fence of 1 Hall Lane and the site	Photo 4: The adjacent property with associated greenhouses
	
Photo 5: looking towards Hall Lane	Photo 6: example of the small amount of litter found on site.
	

APPENDIX B

Indicative Proposed Development Plan

Indicative Site Layout

1:500 scale



mlp Moulton Land and Planning

moultonlandandplanning.co.uk 7 Broad Lane Moulton Lincs PE12 6PN
tel 01406 370081 mob 07484 101655 e-mail alan@moultonland.co.uk

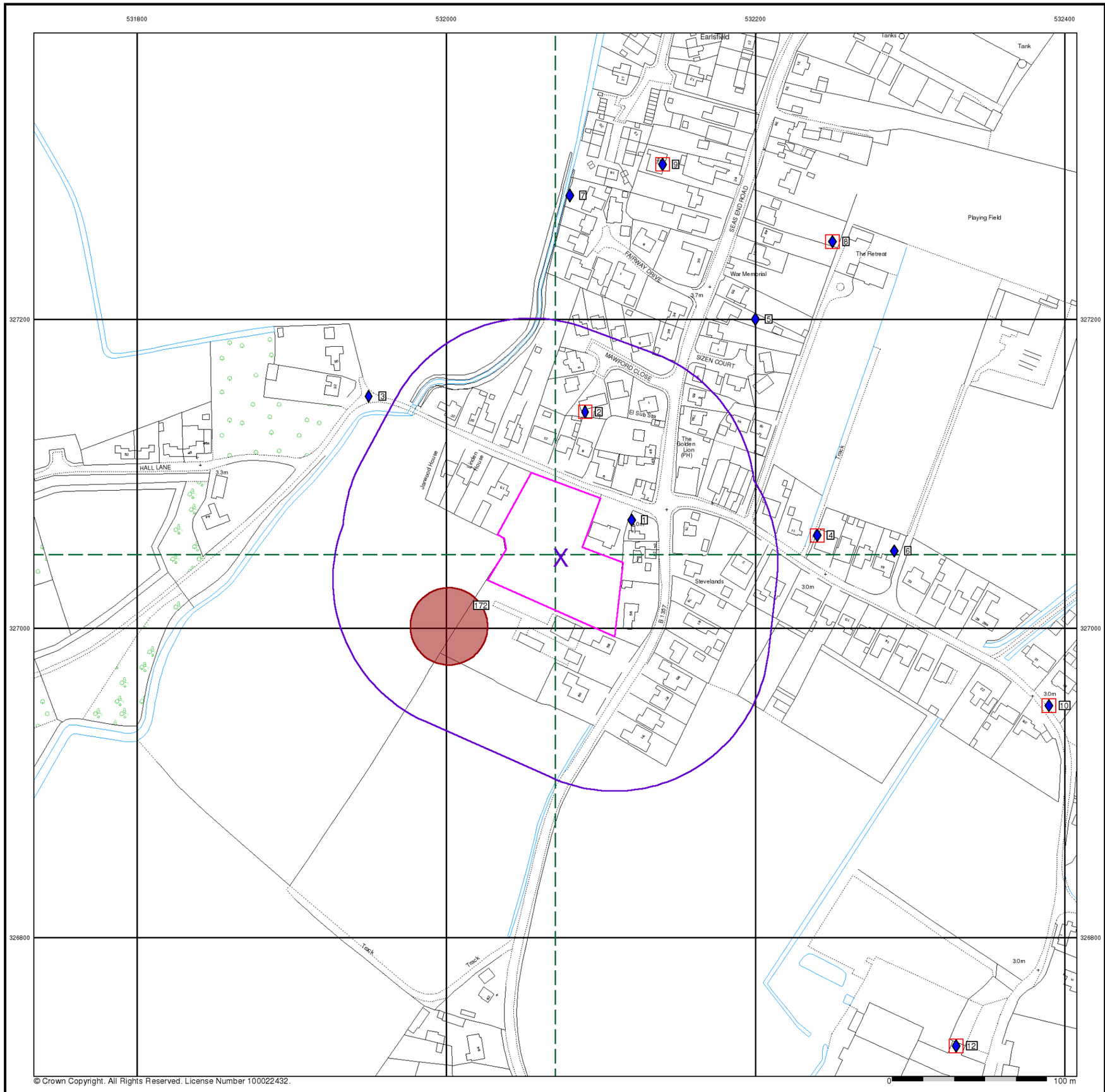
Project
Proposed Residential Development
land adjacent No. 1 Hall Lane, Moulton Seas End, Spalding
for Mr. A. Cooley

Drawing
Indicative Site Layout

date	nov 2017
scale(s)	1:500 @A3
DRG. No.	CLY01 / pl 002

APPENDIX C

Surrounding Land Use



General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location
- Pylon
- Overhead Transmission Line

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

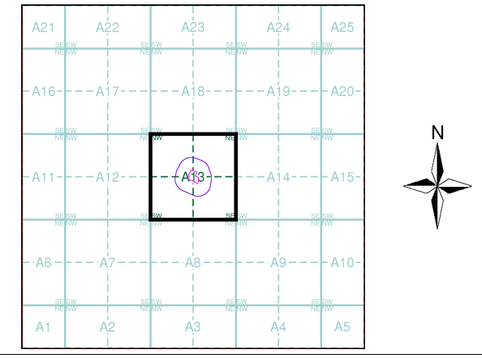
Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Geological

- BGS Recorded Mineral Site

Site Sensitivity Map - Segment A13



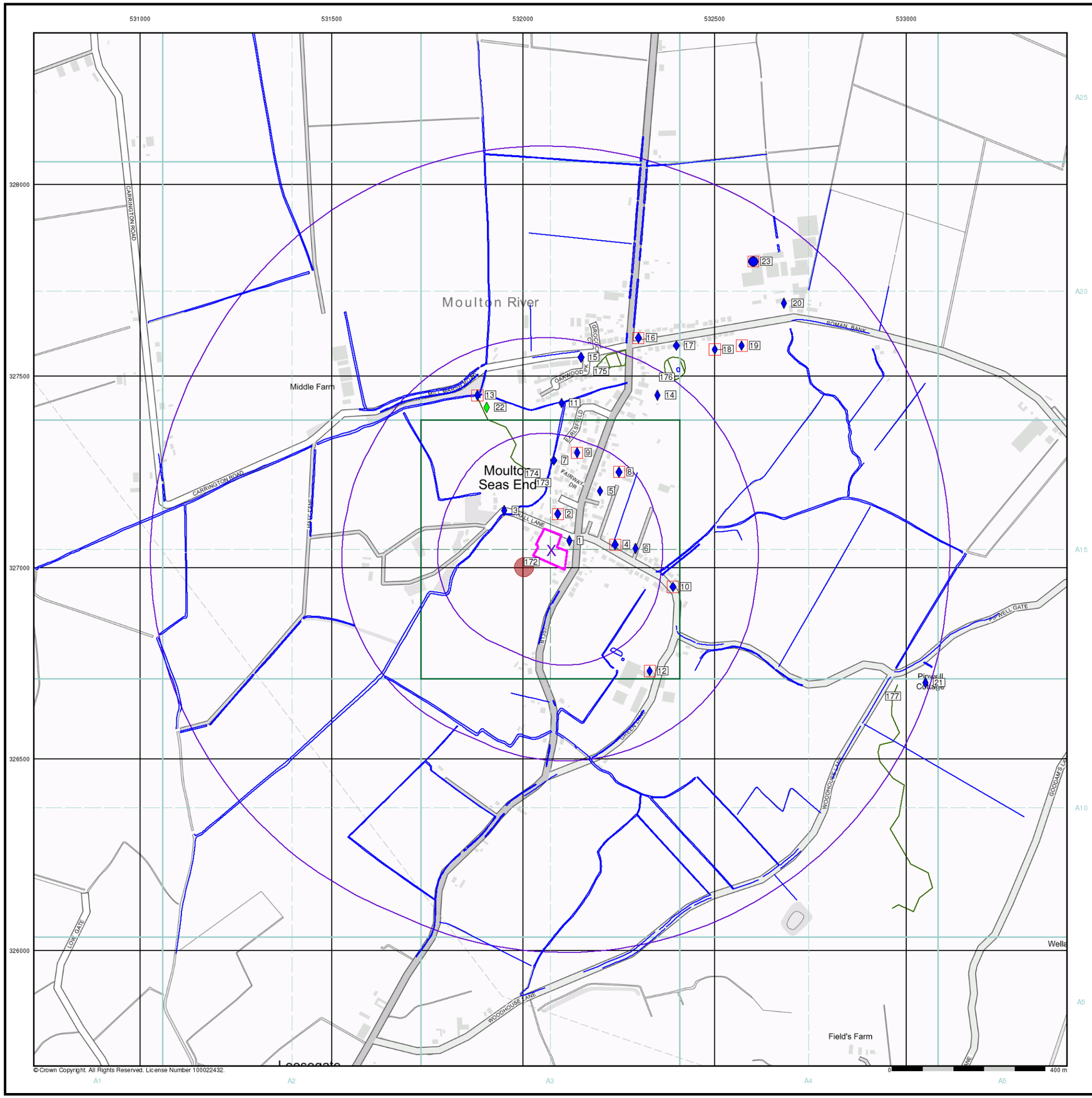
Order Details

Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Plot Buffer (m):	100

Site Details

Land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, Lincolnshire, PE12 6LB

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



General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Several of Type at Location

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Hazardous Substances

- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

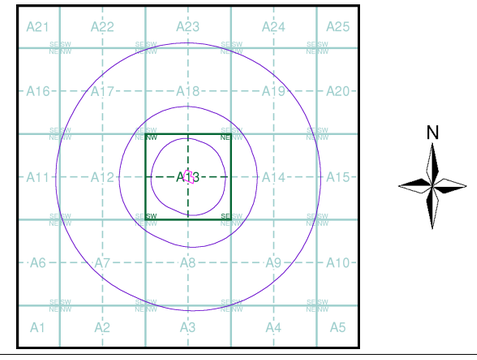
Geological

- BGS Recorded Mineral Site

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Non-water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Potentially Infilled Land (Water)
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Site Sensitivity Map - Slice A



Order Details

Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

Site Details

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APPENDIX D

Geological Context

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Not Supplied - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	TFD	Tidal Flat Deposits	Clay and Silt	Not Supplied - Holocene

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	WWB	West Walton Formation	Mudstone and Siltstone	Not Supplied - Oxfordian
	OXC	Oxford Clay Formation	Mudstone	Not Supplied - Callovian

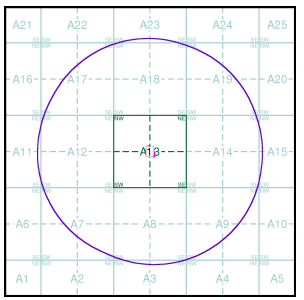
Geology 1:50,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

Map ID:	**1**
Map Sheet No:	**144**
Map Name:	**Spalding**
Map Date:	**1992**
Bedrock Geology:	**Available**
Superficial Geology:	**Available**
Artificial Geology:	**Available**
Faults:	**Not Supplied**
Landslip:	**Not Available**
Rock Segments:	**Not Supplied**

Geology 1:50,000 Maps - Slice A

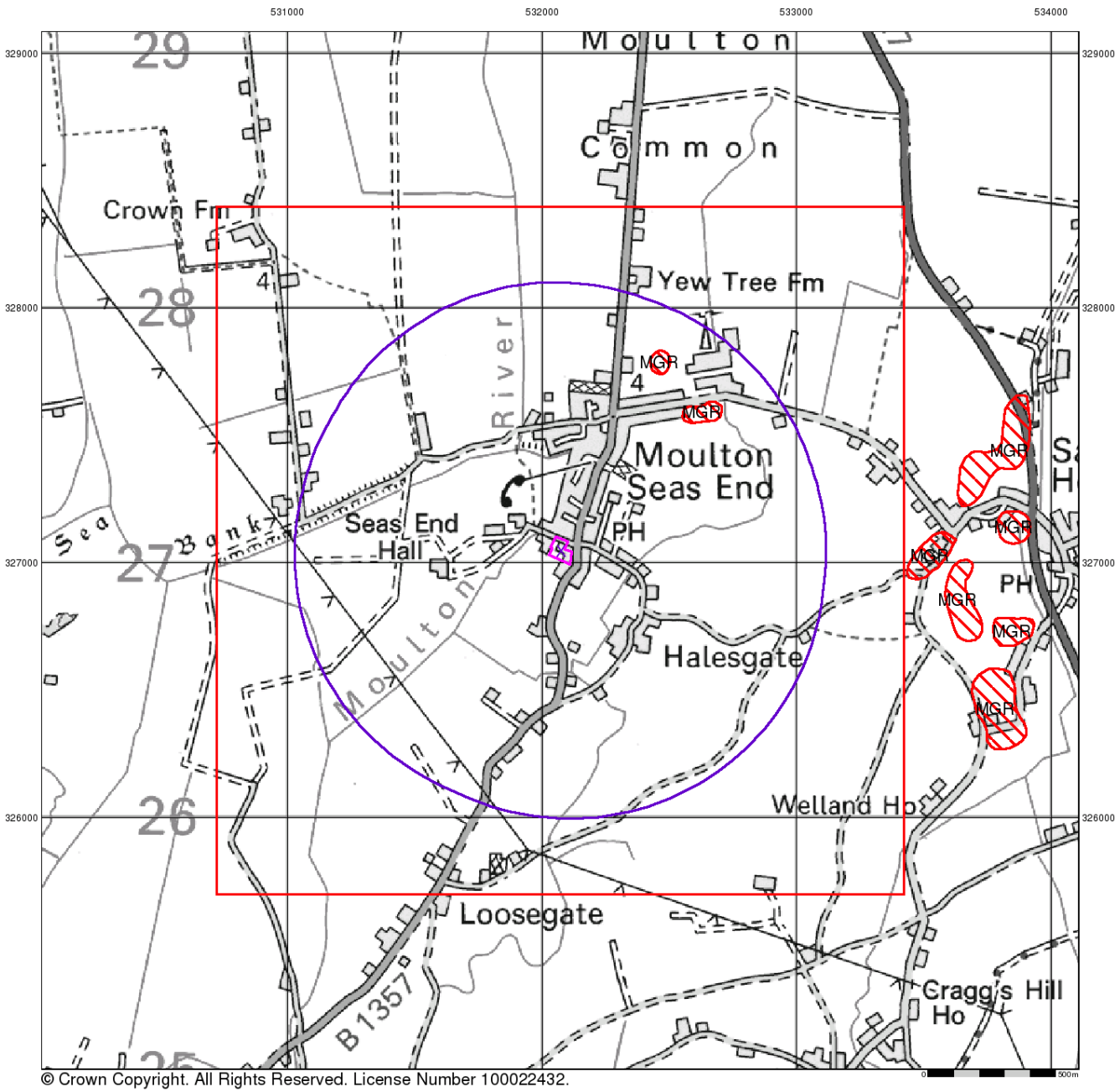


Order Details:

Order Number:	207932013_1_1
Customer Reference:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

Site Details:

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Artificial Ground and Landslip

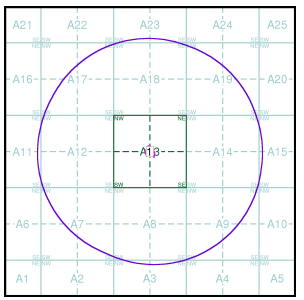
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions and unstable ground.

Artificial ground includes:

- Made ground - man-made deposits such as embankments and spoil heaps on the natural ground surface.
- Worked ground - areas where the ground has been cut away such as quarries and road cuttings.
- Infilled ground - areas where the ground has been cut away then wholly or partially backfilled.
- Landscaped ground - areas where the surface has been reshaped.
- Disturbed ground - areas of ill-defined shallow or near surface mineral workings where it is impracticable to map made and worked ground separately.

Mass movement (landslip) deposits on BGS geological maps are primarily superficial deposits that have moved down slope under gravity to form landslips. These affect bedrock, other superficial deposits and artificial ground. The dataset also includes foundered strata, where the ground has collapsed due to subsidence.

Artificial Ground and Landslip Map - Slice A



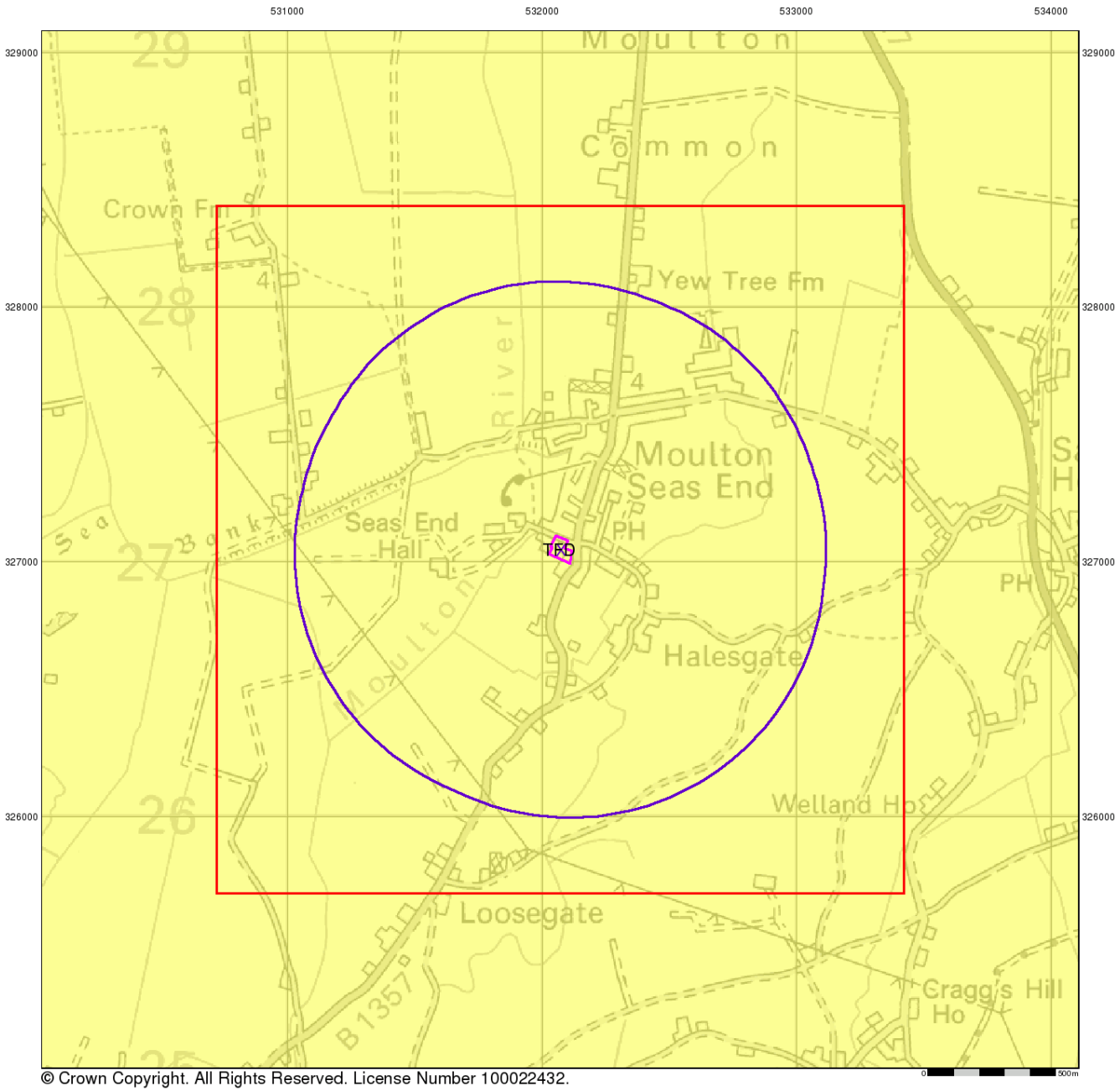
Order Details:

Order Number:	207932013_1_1
Customer Reference:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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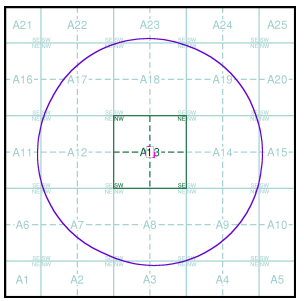
Superficial Geology

Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, the Quaternary, which extends back about 1.8 million years from the present.

They rest on older deposits or rocks referred to as Bedrock. This dataset contains Superficial deposits that are of natural origin and 'in place'. Other superficial strata may be held in the Mass Movement dataset where they have been moved, or in the Artificial Ground dataset where they are of man-made origin.

Most of these Superficial deposits are unconsolidated sediments such as gravel, sand, silt and clay, and onshore they form relatively thin, often discontinuous patches or larger spreads.

Superficial Geology Map - Slice A



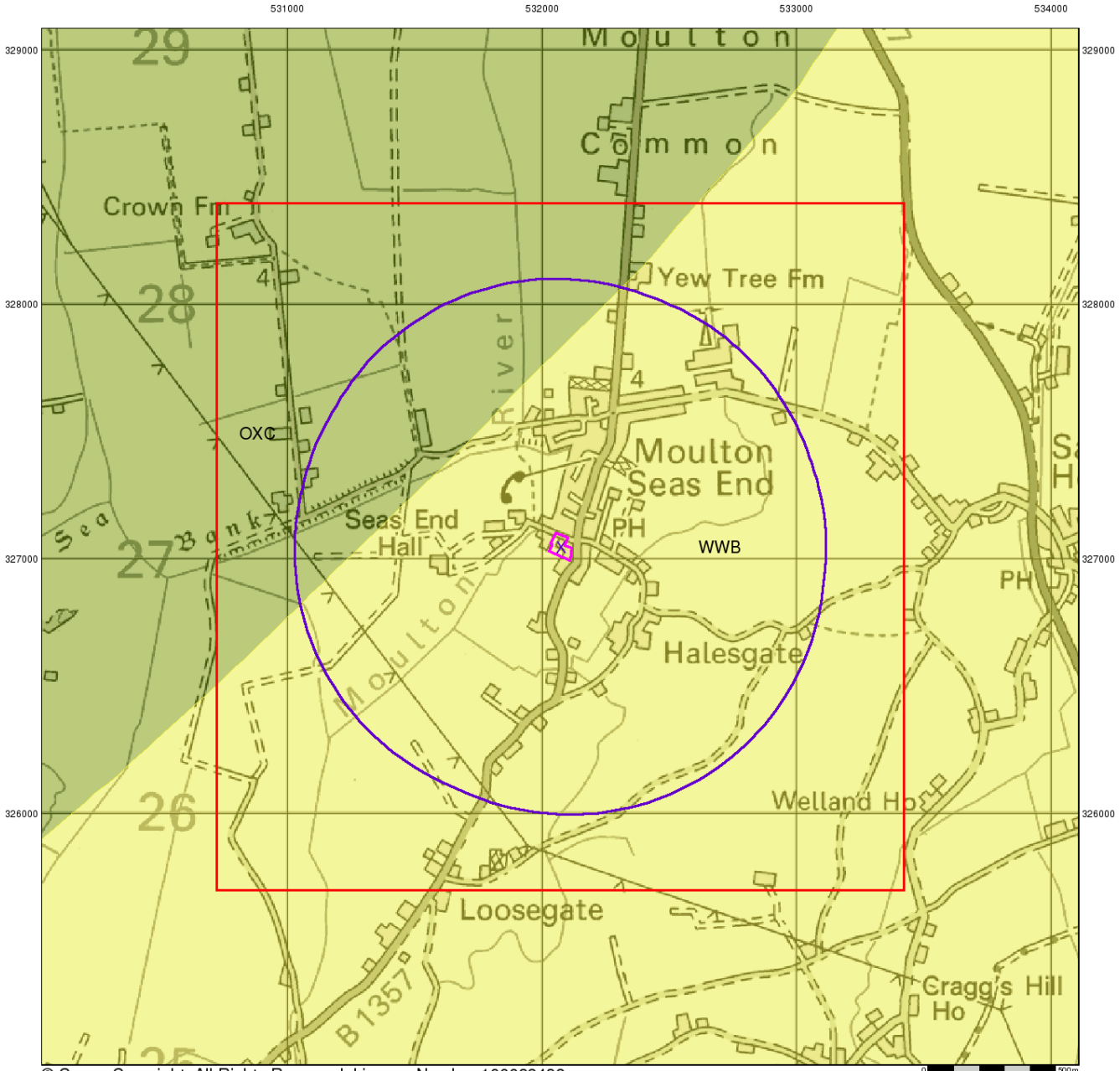
Order Details:

Order Number:	207932013_1_1
Customer Reference:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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Bedrock and Faults

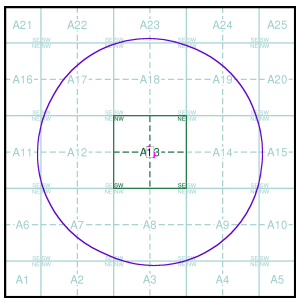
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

The bedrock has formed over vast lengths of geological time ranging from ancient and highly altered rocks of the Proterozoic, some 2500 million years ago, or older, up to the relatively young Pliocene, 1.8 million years ago.

The bedrock geology includes many lithologies, often classified into three types based on origin: igneous, metamorphic and sedimentary.

The BGS Faults and Rock Segments dataset includes geological faults (e.g. normal, thrust), and thin beds mapped as lines (e.g. coal seam, gypsum bed). Some of these are linked to other particular 1:50,000 Geology datasets, for example, coal seams are part of the bedrock sequence, most faults and mineral veins primarily affect the bedrock but cut across the strata and post date its deposition.

Bedrock and Faults Map - Slice A



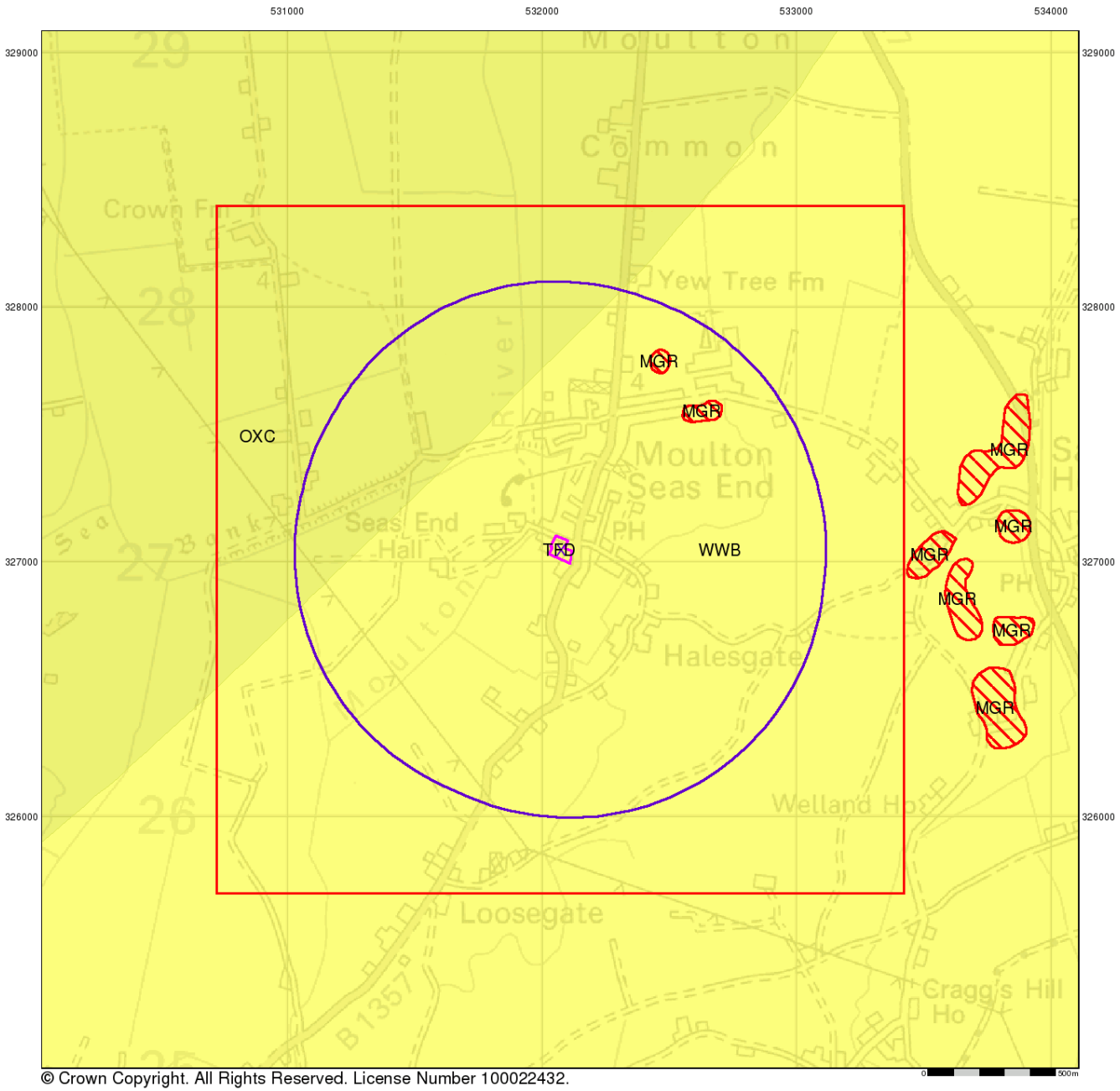
Order Details:

Order Number:	207932013_1_1
Customer Reference:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

Site Details:

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Combined Surface Geology

The Combined Surface Geology map combines all the previous maps into one combined geological overview of your site.

Please consult the legends to the previous maps to interpret the Combined "Surface Geology" map.

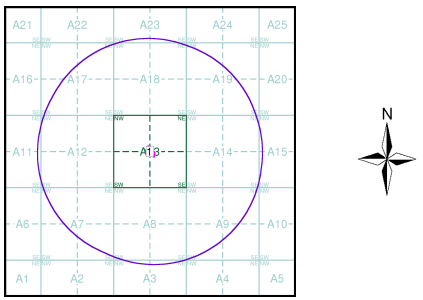
Additional Information

More information on 1:50,000 Geological mapping and explanations of rock classifications can be found on the BGS website. Using the LEX Codes in this report, further descriptions of rock types can be obtained by interrogating the 'BGS Lexicon of Named Rock Units'. This database can be accessed by following the 'Information and Data' link on the BGS website.

Contact

British Geological Survey
Kingsley Dunham Centre
Keyworth
Nottingham
NG12 5GG
Telephone: 0115 936 3143
Fax: 0115 936 3276
email: enquiries@bgs.ac.uk
website: www.bgs.ac.uk

Combined Geology Map - Slice A



Order Details:

Order Number:	207932013_1_1
Customer Reference:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

Site Details:

Land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, Lincolnshire, PE12 6LB

FOUNDATION ENGINEERING Ltd.

BOREHOLE LOG

TF 3.2 NW/8 3171.2619

LOCATION : WESTBURTON - WALTHAM CROSS - NORTHERN SEC.

BOREHOLE No. : 393.+6

GROUND LEVEL : = 399 1" 144

BOREHOLE DIA. : 6".

DATE (Start) : 26/4/63.

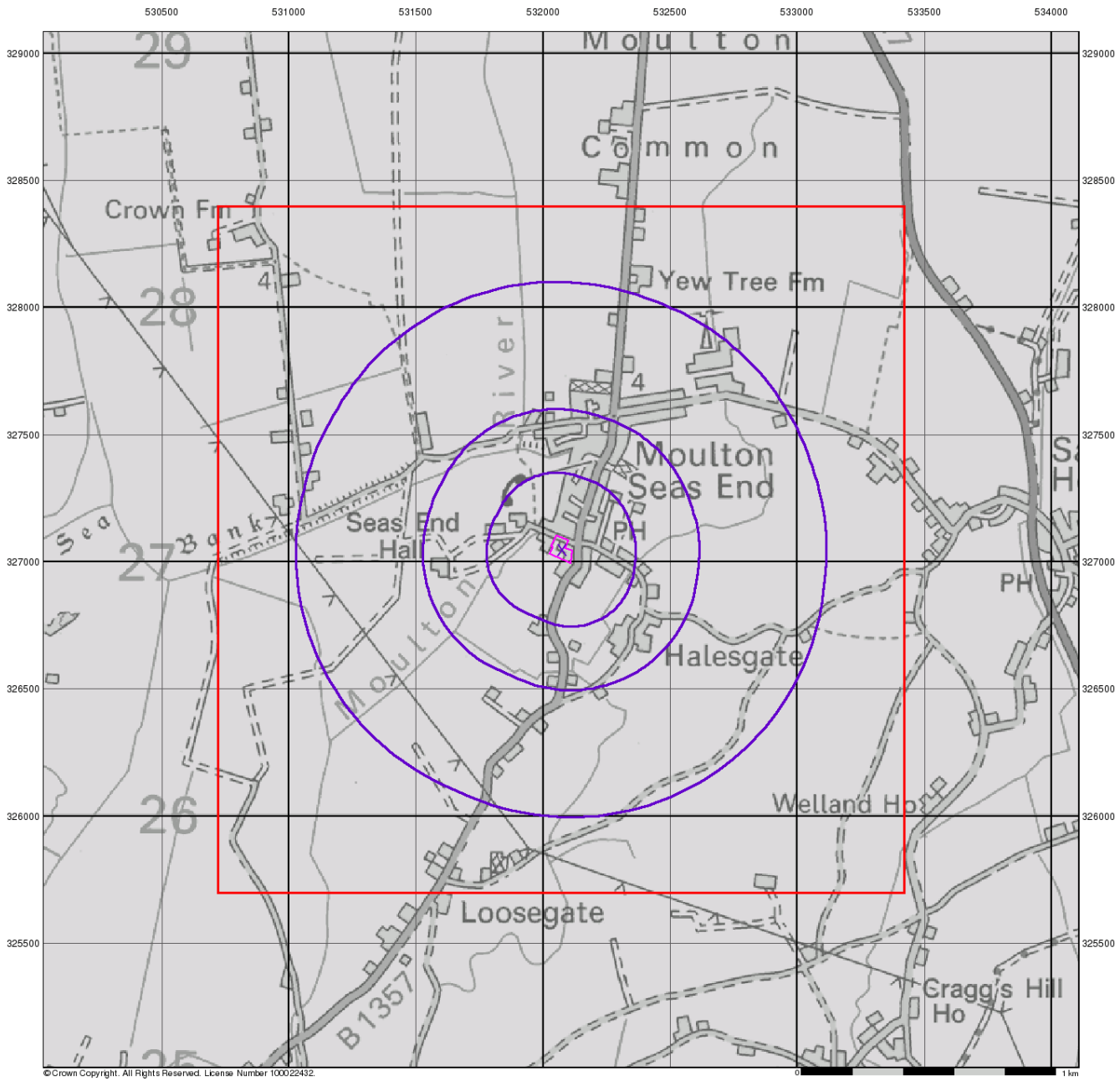
WATER LEVEL : 8'0" below gl.

Description	Thickness	Depth	Sample	Remarks
		0'-0"		
Medium density fine brown sandy SILT	7'0"	2.13m 7'0"	• 1	
			• 2 +	20 Blows / ft.
Medium density fine brown silty SAND	9'0"	5.03m 16'0"	• 3	
			• 4 +	27 Blows / ft.
Medium density fine brown silty SAND with some shells.	12'0"	8.69m 28'0"	• 5	
			• 6 +	46 Blows / ft.
Compact fine brown silty SAND with some shells.	11'6"	12.19m 40'0" Ref.	• 7	
			• 8 +	60 Blows / ft.
				Borehole Completed.

BOREHOLE SCALE : 1"=5' • : DISTURBED SAMPLE ▮ : UNDISTURBED SAMPLE + STANDARD PENETRATION TEST

APPENDIX E

Groundwater Vulnerability Maps



Groundwater Vulnerability

General

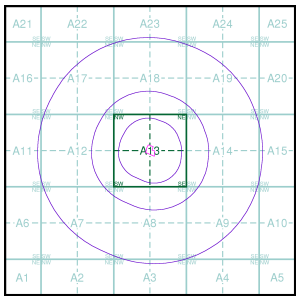
Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Agency and Hydrological

Bedrock Aquifers	Superficial Aquifers
High Vulnerability, Principal Aquifer	High Vulnerability, Principal Aquifer
High Vulnerability, Secondary Aquifer	High Vulnerability, Secondary Aquifer
Medium Vulnerability, Principal Aquifer	Medium Vulnerability, Principal Aquifer
Medium Vulnerability, Secondary Aquifer	Medium Vulnerability, Secondary Aquifer
Low Vulnerability, Principal Aquifer	Low Vulnerability, Principal Aquifer
Low Vulnerability, Secondary Aquifer	Low Vulnerability, Secondary Aquifer

Unproductive Aquifer
Soluble Rock

Site Sensitivity Context Map - Slice A



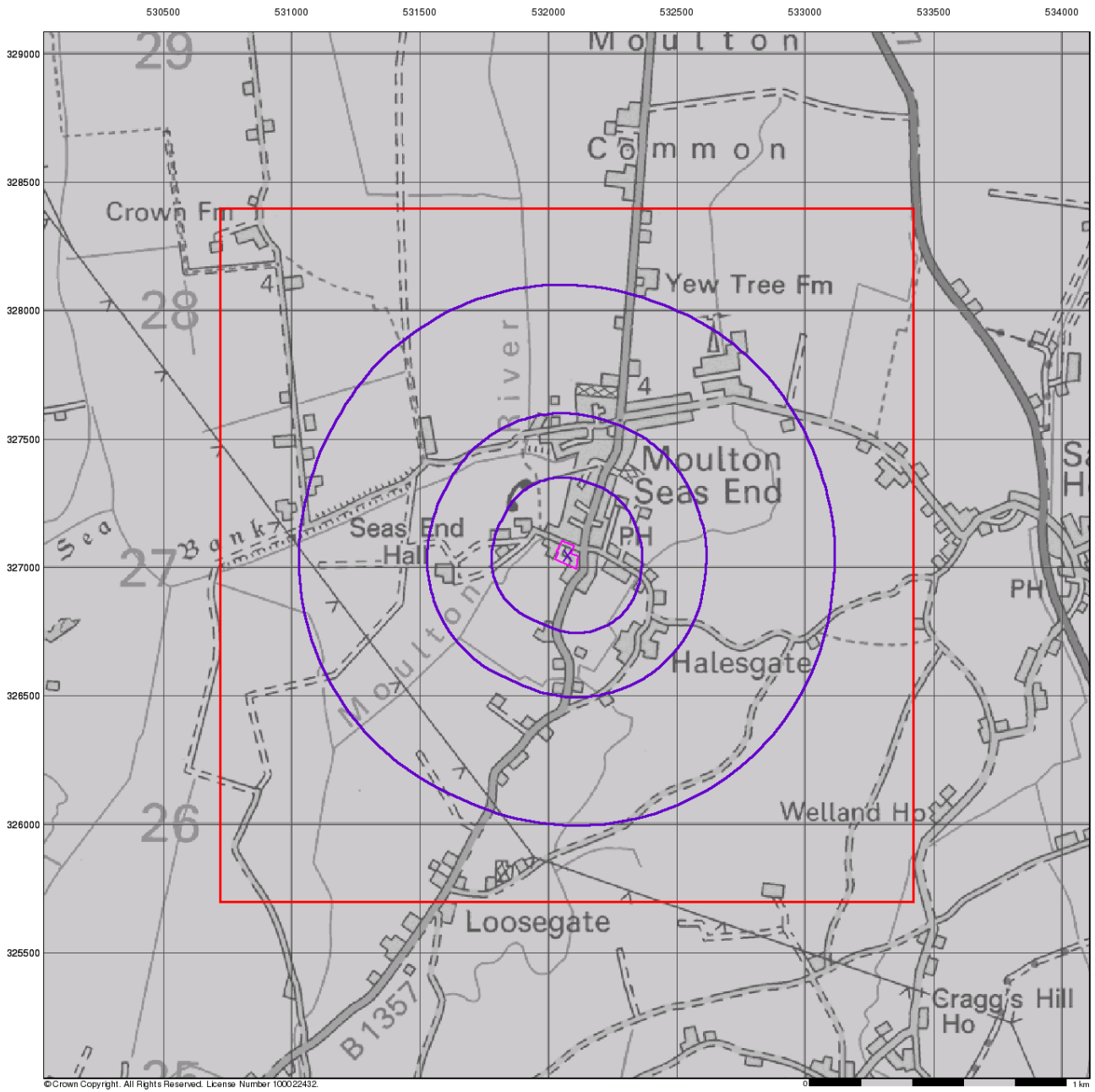
Order Details

Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

Site Details

Land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, Lincolnshire, PE12 6LB

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Bedrock Aquifer Designation

General

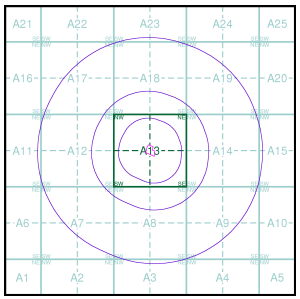
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



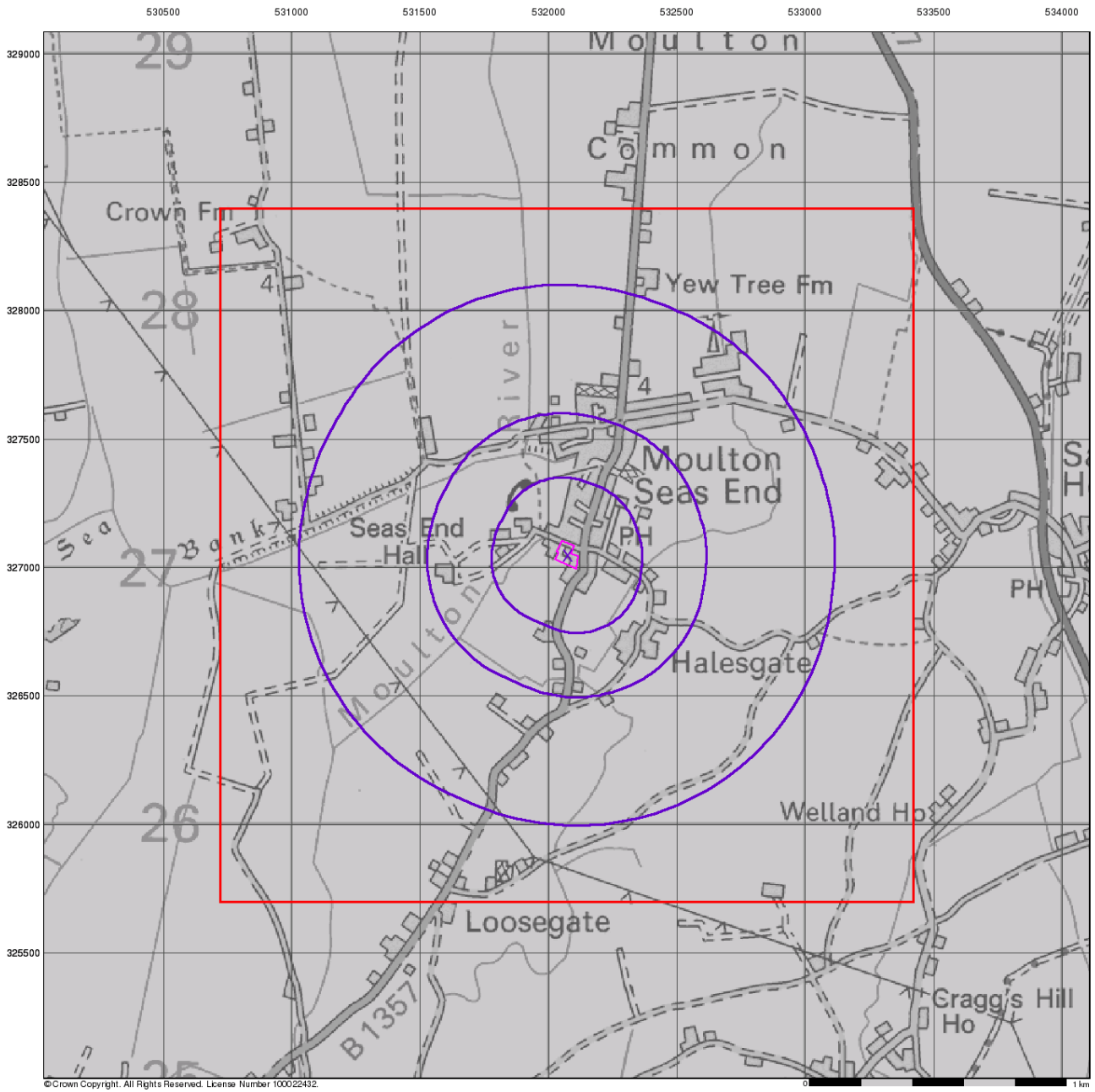
Order Details

Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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Web: www.envirocheck.co.uk



Superficial Aquifer Designation

General

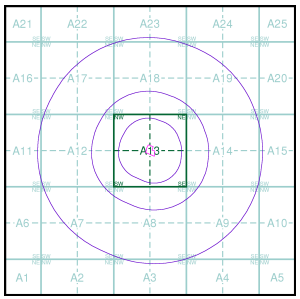
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown
- Unknown (Lakes and Landslip)

Site Sensitivity Context Map - Slice A



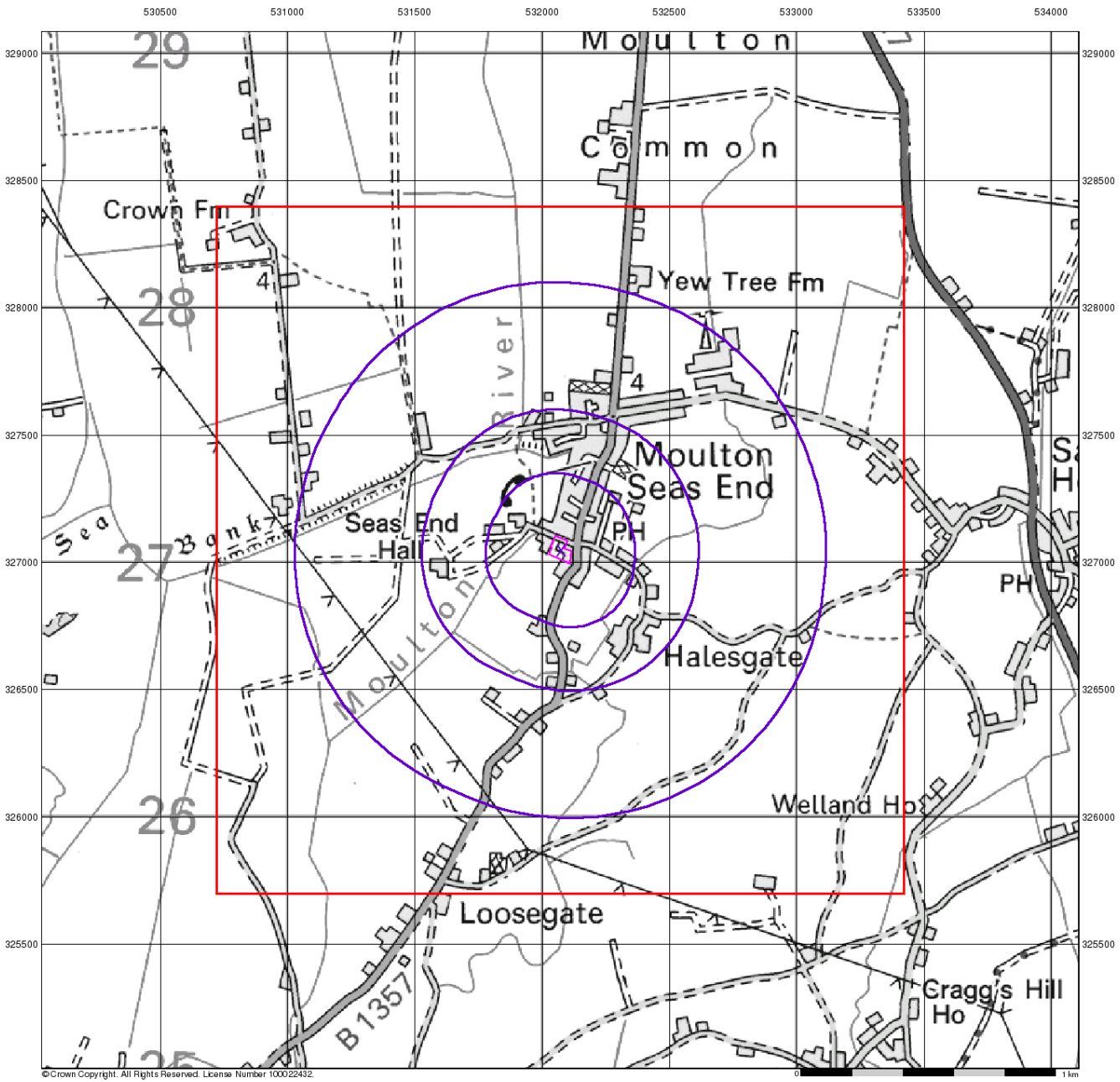
Order Details

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Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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Source Protection Zones

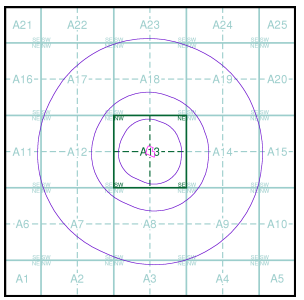
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

- Inner zone (Zone 1)
- Inner zone - subsurface activity only (Zone 1c)
- Outer zone (Zone 2)
- Outer zone - subsurface activity only (Zone 2c)
- Total catchment (Zone 3)
- Total catchment - subsurface activity only (Zone 3c)
- Special interest (Zone 4)

Site Sensitivity Context Map - Slice A



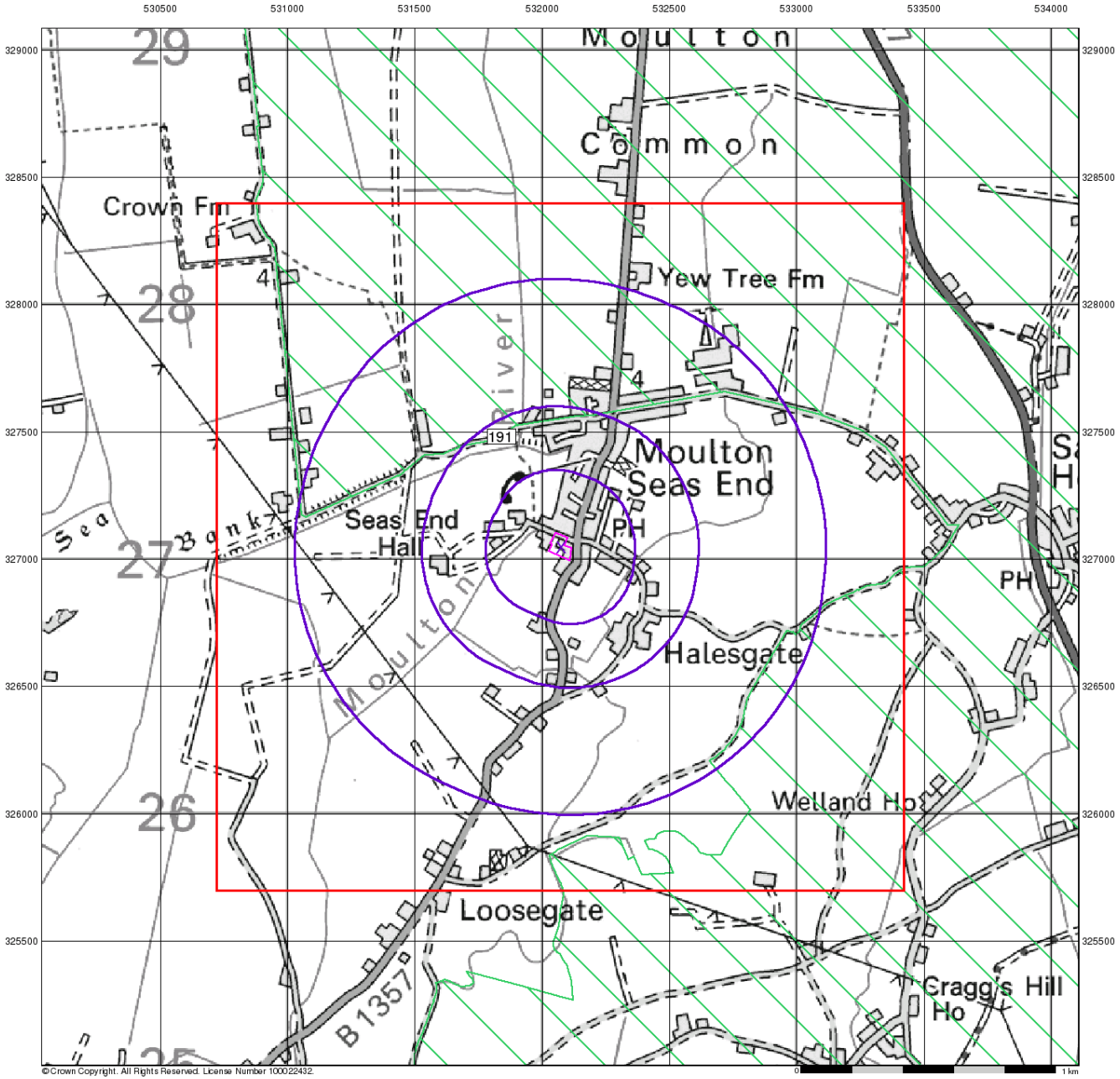
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Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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Sensitive Land Uses

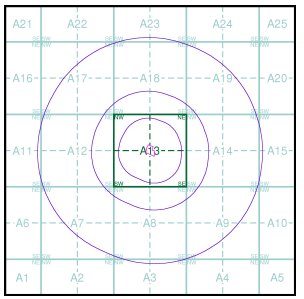
General

Specified Site | Specified Buffer(s) | Bearing Reference Point
Slice | Map ID

Sensitive Land Uses

- Ancient Woodland
- Area of Adopted Green Belt
- Area of Unadopted Green Belt
- Area of Outstanding Natural Beauty
- Environmentally Sensitive Area
- Forest Park
- Local Nature Reserve
- Marine Nature Reserve
- National Nature Reserve
- National Park
- Nitrate Sensitive Area
- Nitrate Vulnerable Zone
- Ramsar Site
- Site of Special Scientific Interest
- Special Area of Conservation
- Special Protection Area
- World Heritage Sites

Site Sensitivity Context Map - Slice A



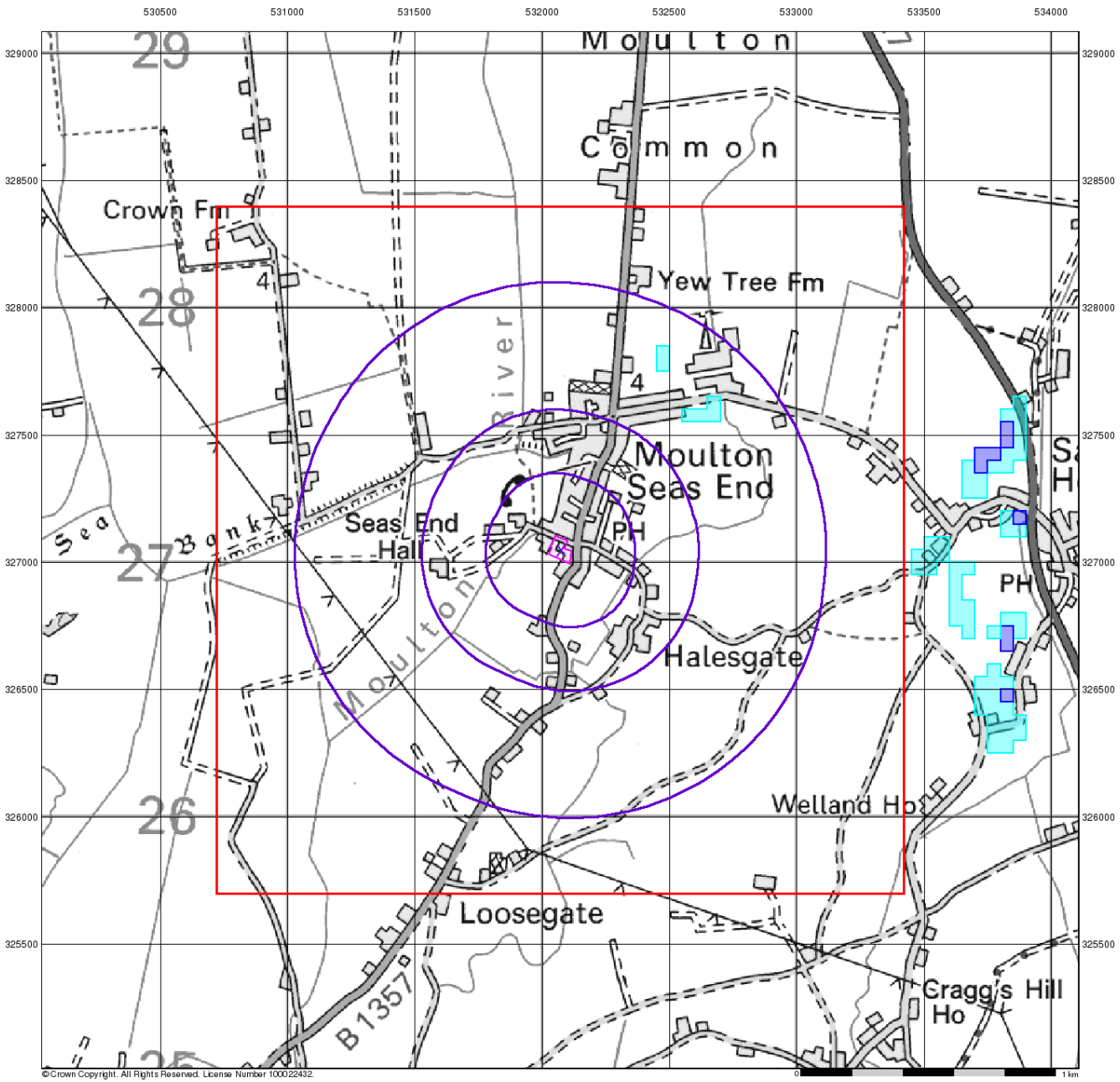
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Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

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BGS Flood GFS Data

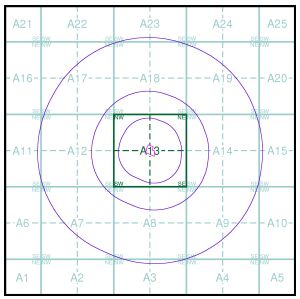
General

Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice

Agency and Hydrological (Flood)

- Limited Potential for Groundwater Flooding to Occur
- Potential for Groundwater Flooding of Property Situated Below Ground Level
- Potential for Groundwater Flooding to Occur at Surface

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	1000

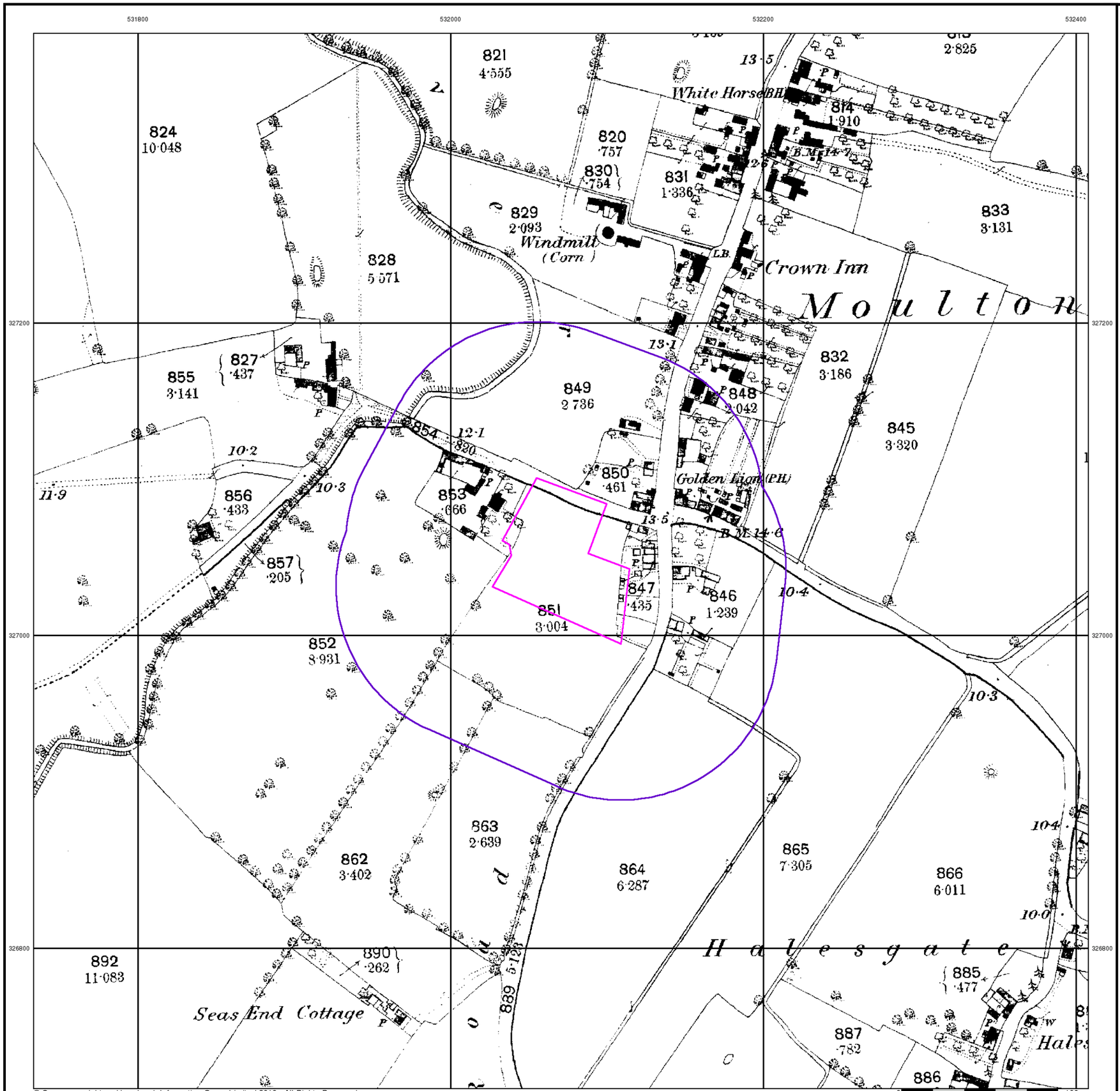
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APPENDIX F

Selection of Historic Maps



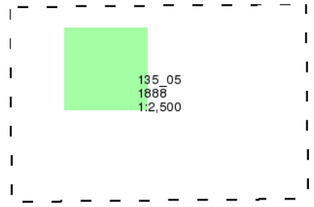
Lincolnshire

Published 1888

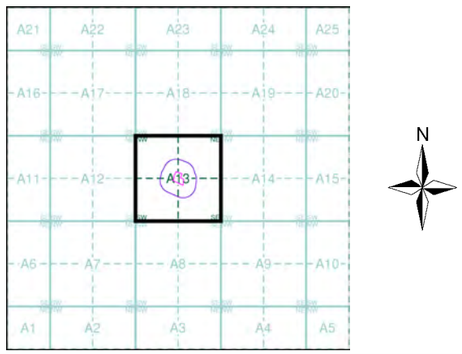
Source map scale - 1:2,500

The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

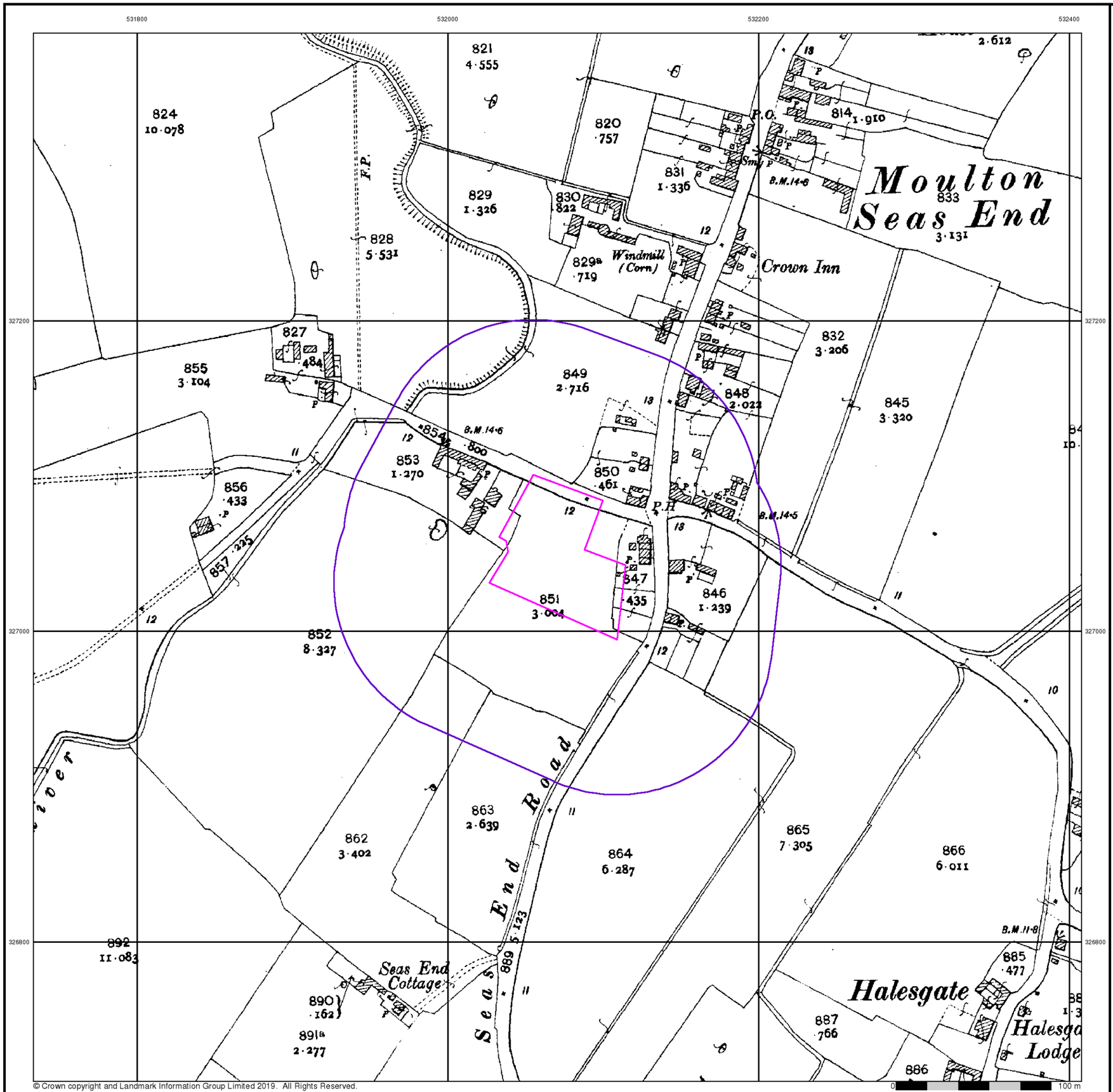
Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
Site Area (Ha):	0.54
Search Buffer (m):	100

Site Details

Land adjacent to 1 Hall Lane, Moulton Seas End, Spalding, Lincolnshire, PE12 6LB

Landmark INFORMATION GROUP

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



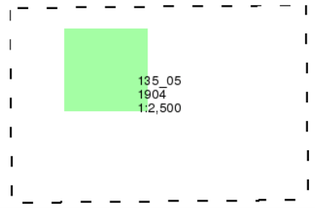
Lincolnshire

Published 1904

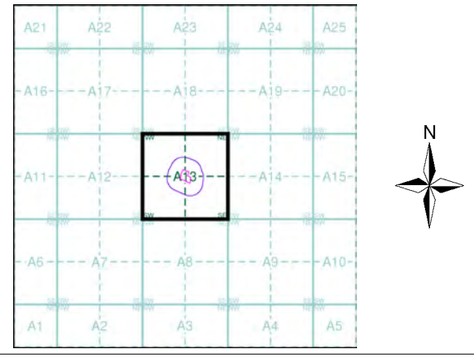
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

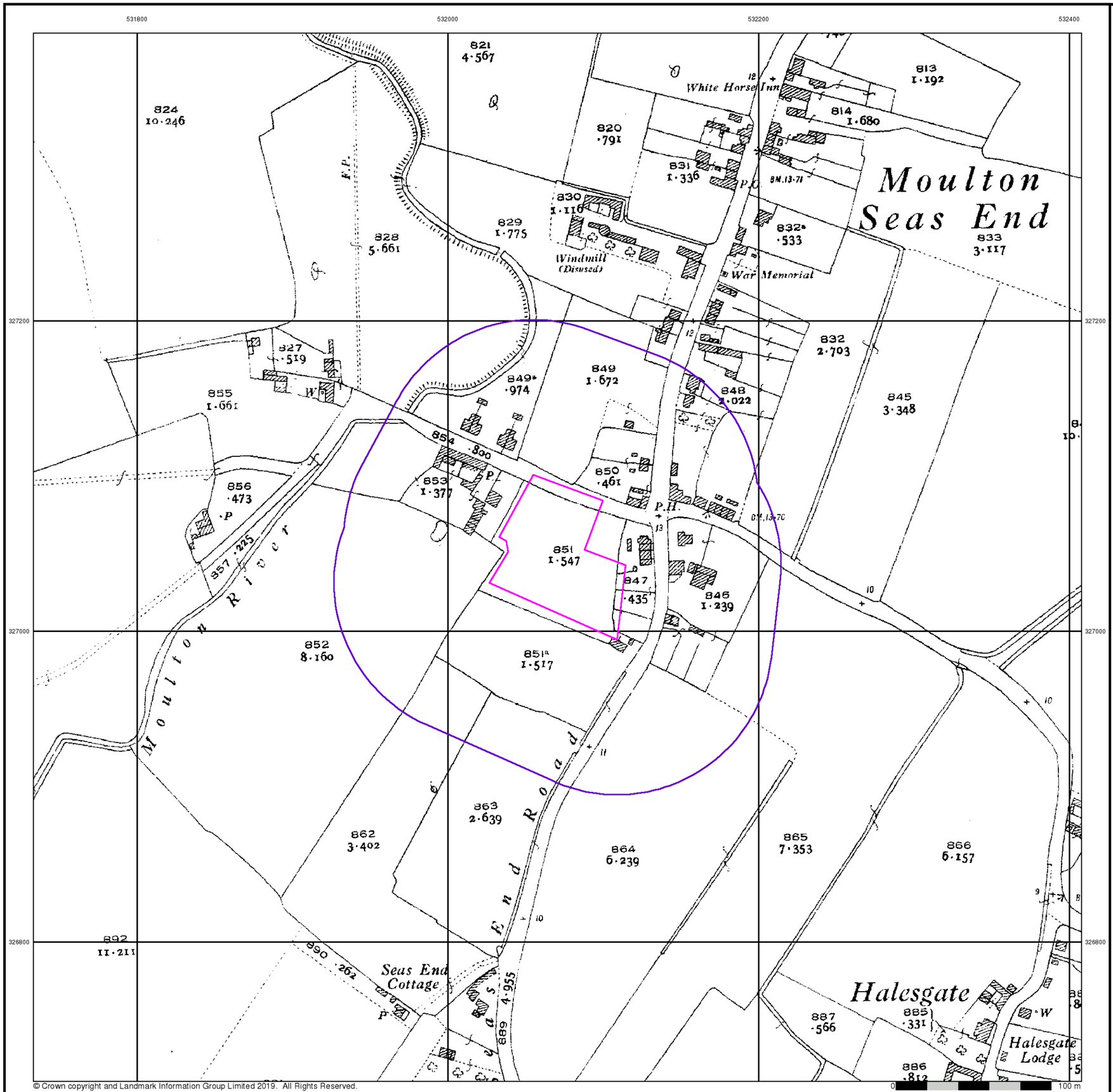
Order Number:	207932013_1_1
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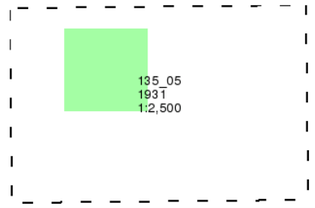
Lincolnshire

Published 1931

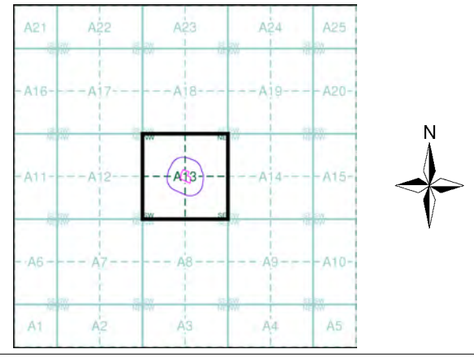
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

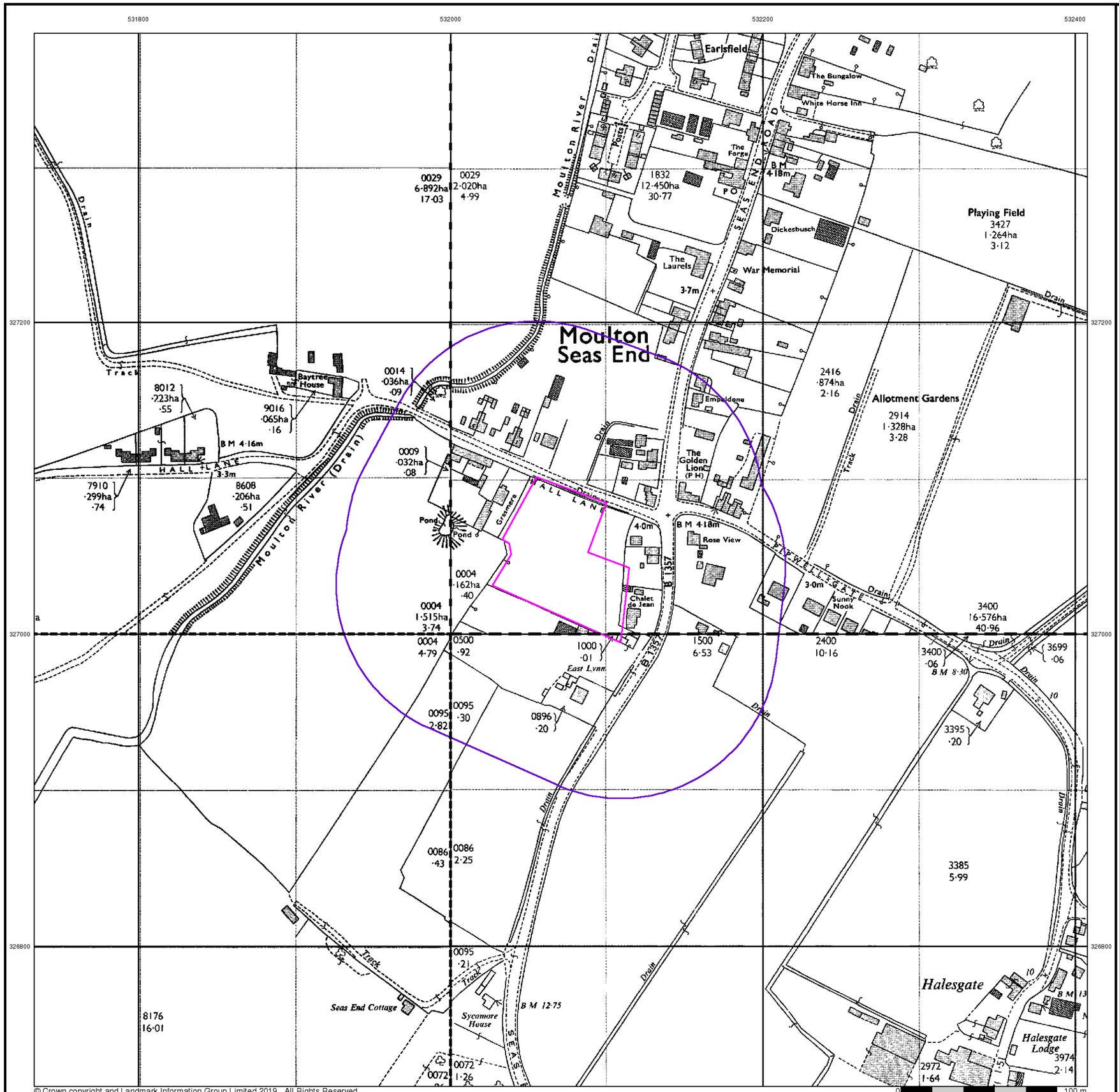
Order Number:	207932013_1_1
Customer Ref:	UK19.4517
National Grid Reference:	532070, 327050
Slice:	A
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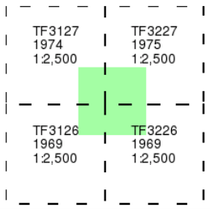
Ordnance Survey Plan

Published 1969 - 1975

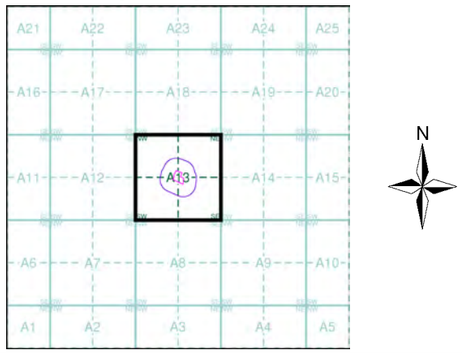
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



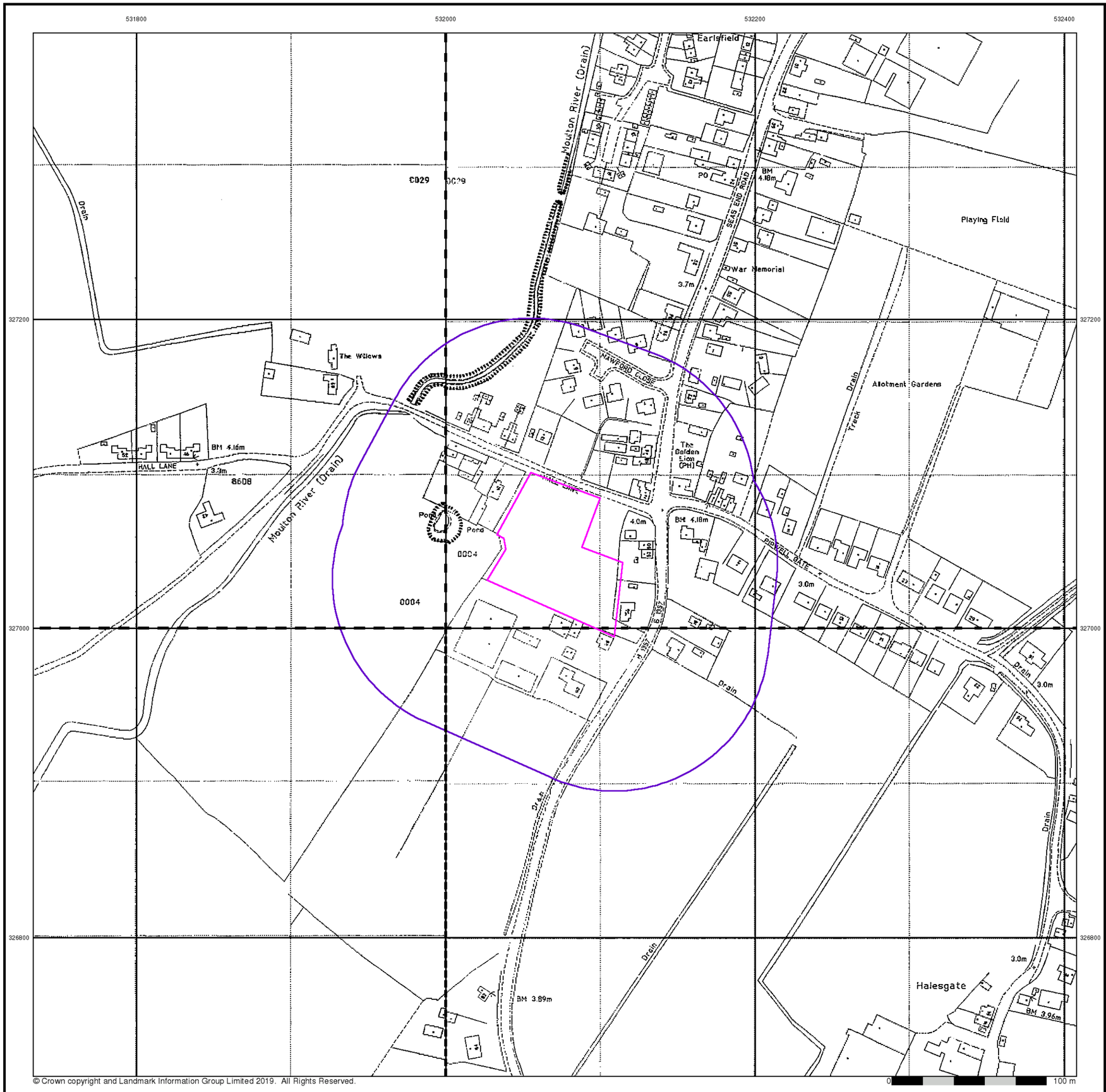
Order Details

Order Number:	207932013_1_1
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National Grid Reference:	532070, 327050
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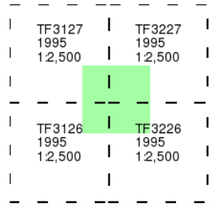
Large-Scale National Grid Data

Published 1995

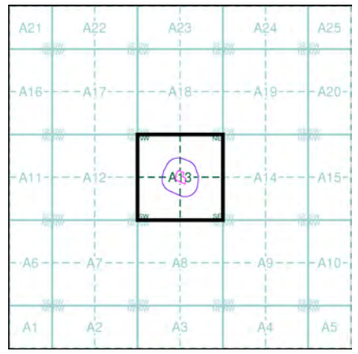
Source map scale - 1:2,500

'Large Scale National Grid Data' superseded SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') in 1992, and continued to be produced until 1999. These maps were the fore-runners of digital mapping and so provide detailed information on houses and roads, but tend to show less topographic features such as vegetation. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)



Historical Map - Segment A13



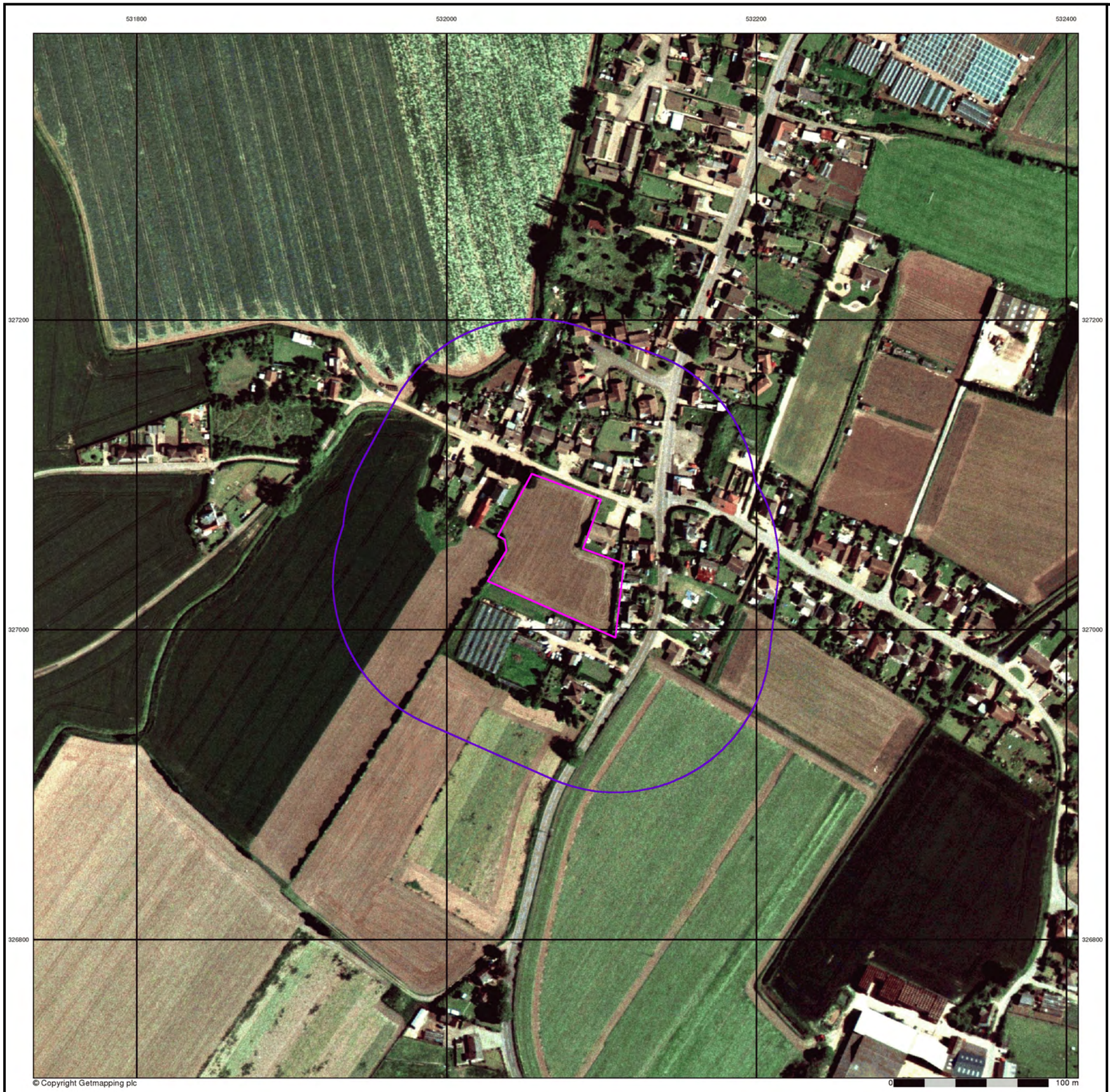
Order Details

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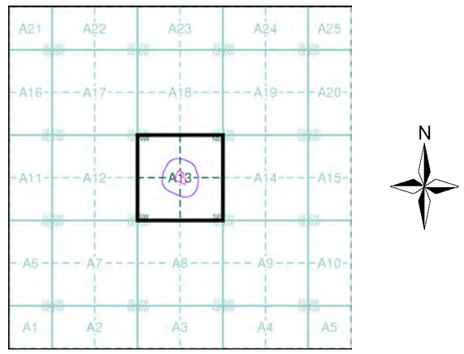


Historical Aerial Photography

Published 1999

This aerial photography was produced by Getmapping, these vertical aerial photographs provide a seamless, full colour survey of the whole of Great Britain

Historical Aerial Photography - Segment A13



Order Details

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