GeoDyne

Geotechnical &
Environmental
Consultants

Site off Clayton Lane
Thurnscoe
South Yorkshire

Combined Phase I Desk Study and Phase II Exploratory Investigation

For

Rippon Homes Limited

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EXECUTIVE SUMMARY

Ground Conditions	Made Ground was encountered to depths ranging between 0.30m and 2.00m begl and generally comprised macadam surfacing/concrete floor slab and sub-base, with localised areas of soft to firm clay and silt, and loose to medium dense gravel. Deeper Made Ground was encountered generally in the southern half of the site. Asbestos fragments were encountered in TP2 in the south of the site. Locally underlying the Made Ground generally in the southern half of the site, a layer of Buried Topsoil was encountered. Natural Strata typically comprising stiff, silty, sandy locally gravelly CLAY was encountered in the majority of the exploratory holes at depths ranging between 0.30m and 2.20m begl. Underlying the Clay, Pennine Upper Coal Measures Formation bedrock was generally encountered at depths ranging between 1.20m and 2.60m begl, and typically comprised very weak to weak thinly bedded MUDSTONE, SILTSTONE and SANDSTONE.
Foundation Design	It is anticipated that the weathered Pennine Upper Coal Measures Formation Clay represents a suitable bearing stratum for typical 2/3 storey dwellings. Foundations for the proposed development may be traditional strip or trench fill to suit the loading characteristics of the proposed dwellings. The in-situ soil strength testing indicates that the natural stiff Clay appears suitable to support a nett allowable ground bearing pressure of up to 150kN/m^2 at typical minimum founding depth. Where a greater ground bearing pressure is required, foundations could be deepened to encounter more competent bedrock where a ground bearing pressure of up to 200kN/m^2 may be adopted. Foundations should be advanced to a minimum depth of 0.90m below existing or proposed ground level (whichever being the deeper) within cohesive clay soils, and a minimum of 0.60m within non-cohesive bedrock. Foundations should be advanced to encounter undisturbed suitably geotechnically competent Natural Strata. Due to the potentially variable nature of Natural Strata across a building footprint (i.e. both granular, cohesive and bedrock), consideration of the inclusion of reinforcement in strip foundations may be necessary. If consistent strata are encountered across a building footprint reinforcement in strip foundations would not be necessary. The foregoing foundations design recommendations may require reviewing and amending dependent on the final redevelopment proposals, site layout and an earthworks strategy for the site.
Fault	A fault is indicated crossing through the central area of the site orientated northeast-southwest, which may be encountered as a fracture zone with the potential for variable strata and localised soft ground to be present locally. We would recommend that a watching brief is maintained during construction works in relation to the presence of a fault. Any foundations or hardstanding/roads in the area of the fault should be designed accordingly.
Coal Mining	No coal mining precautions or investigations are required in relation to the proposed redevelopment.
Radon	No radon protective measures are necessary in the construction of new dwellings and extensions.
Floor Slabs	We understand that suspended beam and block floors are Rippon Homes preferred and standard method of floor construction and based on our findings this method of floor construction would be acceptable.
Ground Gas Precautions	Based on our findings specific ground gas protection measures for the ingress of Methane and Carbon Dioxide are considered not to be required for the site.
Building Near Trees	Foundation designs will require adjusting due to the presence of cohesive soils with a medium volume change potential. Where competent bedrock is encountered further deepening would not be required.
Water	Based on our findings, significant dewatering of excavations is unlikely to be required.
Excavations	Shallow excavations are likely to require sidewall support locally for health and safety reasons. Foundations should ideally be excavated during periods of dry weather and constructed as soon as possible thereafter.
Sulphate Classification	BRE Special Digest 1 Design Sulfate Class DS-1 and ACEC classification AC-1.
CBRs & Pavements	CBR values of between less than 2% and 5% may be anticipated for the shallow natural soils, subject to on site testing. No frost susceptible material should be within 450mm of the ground surface in road construction. Significant thicknesses of organic soils should be removed from beneath roads and pavements.
Soakaways	The Natural Strata was predominantly clayey and therefore the use of soakaways is unlikely to be feasible.
Contamination Assessment	Testing and assessment has revealed the presence of a localised hotspot of Lead contamination in the near surface Made Ground in trial pit TP1, and Chrysotile Asbestos cement fragments in trial pit TP2, in the south of the site. The Made Ground was observed to be visually undesirable.
Preliminary Remediation Proposals	The final remediation proposals will be dependent on existing and proposed ground levels and the final redevelopment layout. We would recommend that a suitable topsoil/subsoil capping layer is provided in proposed gardens and soft landscaped areas to act as a growing medium and to mitigate end user contact with localised Asbestos and Lead contamination, and visually undesirable Made Ground. Where hardstanding is proposed (i.e. new buildings, roads and paving etc.), this will effectively provide a barrier to end user contact with the Made Ground and no additional remediation would be required. Where it is necessary to remove localised Asbestos contaminated soils we would recommend that this is undertaken by a specialist contractor. Appropriate validation works will be required following remediation, dependent on the final proposals. The soil test results are not sufficiently elevated to represent a significant risk to controlled waters at the site. We would recommend that a watching brief is maintained in relation to any possible contamination from the above ground tanks in the works building.
Off-site Disposal	We would recommend that the re-use of excess uncontaminated soils on site or off-site is investigated in the first instance.
Unforeseen Circumstances	Should any areas of potentially contaminated soil or anomalous features be encountered during site construction works we would recommend consultation with GeoDyne to ensure that our recommendations continue to apply.

Construction Workers	It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE/RPE equipment together with welfare facilities in accordance with general health and safety guidelines.
Asbestos Survey	We would recommend that a pre-demolition Asbestos survey of the buildings is undertaken prior to the demolition, followed by the removal of all Asbestos containing material by a suitably qualified specialist contractor.
Utilities	We would recommend that this report is supplied to utility companies and their recommendations are adhered to.
Licenses, Permits, Registrations & Approvals	The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, registrations, plans and approvals are in place prior to commencing with the works at the site.
Statutory Consultation	We would recommend that a copy of our report is issued by the Client to the Local Authority and NHBC prior to redevelopment.
Further Works	• Production of a Remediation Method Statement for the site, including liaison with the Local Planning Authority. • Review of the foundation recommendations based on the final redevelopment proposals, site layout and the earthworks strategy for the site.

1.0 INTRODUCTION

1.1 Introduction

GeoDyne Limited has been appointed by the Client Rippon Homes Limited to undertake a Combined Phase I Desk Study and Phase II Exploratory Investigation at a site off Clayton Lane, Thurnscoe, South Yorkshire.

1.2 Scope of Works

The scope of the Phase I Desk Study included the following:

- Detailed site walkover.
- Review of historical and contemporary Ordnance Survey publications.
- Review of the sites geology, hydrology and hydrogeology.
- Review of the sites coal mining status.
- Review of the sites radon status.
- Review of a commissioned Landmark Envirocheck Report.

Phase II Exploratory Investigation works comprised:

- A subcontracted utility clearance scan of exploratory hole locations.
- A series of trial pits across the site.
- A series of boreholes across the site.
- Installation of combined ground gas and groundwater monitoring wells and a programme of monitoring.
- Geotechnical and environmental soil testing.

1.3 Project Understanding

We understand that it is currently proposed to develop the site with residential dwellings with private gardens; this has formed the basis of our report.

If our understanding is incorrect it would be necessary to review our report to ensure it continues to apply.

1.4 Limitations

The conclusions and recommendations made in this report are limited to those that can be made based on the findings of the investigation. Where comments are made based on information obtained from third parties, GeoDyne Limited assumes that all third party information is true and correct. No independent action has been undertaken to validate the findings of third parties.

This report has been prepared in accordance with our understanding of current good practice. However changes to good practice, guidance or legislation may necessitate revision of this report after the date of issue.

GeoDyne Limited has prepared this report for the sole use and reliance of the Client, Rippon Homes Ltd, in accordance with our Standard Conditions and Limitations (included in Appendix XII). This report may not be used or relied upon by any unauthorised third party without the explicit written agreement of GeoDyne Limited.

1.5 Confidentiality

The risk assessment herein remains the intellectual property and trade secret of GeoDyne Limited. The information contained within this report must not be disclosed or divulged to any commercial Consultant or other third party without the prior written agreement of GeoDyne Limited.

2.0 SITE DESCRIPTION & HISTORY

2.1 Site Description

The site comprises an irregularly shaped parcel of land situated to the east of Clayton Lane, Thurnscoe, South Yorkshire and may be located centred around approximate Ordnance Survey National Grid Reference 444660E 406550N. The total site area is approximately 1.76 hectares. At the time of our walkover the site comprised an active stone cutting business which appeared to primarily produce paving products, building stone and decorative stone products.

A large portal frame and breeze block/brick constructed works building was present in the northwestern corner of the site. It was not possible to inspect the roof to determine its construction. The building was divided into three main areas. The southern area was occupied by stone cutting machines, a workshop and was used for general storage. The northern area of the building was occupied by stone cutting machines. The smaller central area of the building was occupied by smaller stone cutting and working machines. Within the southern area of the building two above ground storage tanks were present, one of the tanks appeared to be used for fuelling fork lift trucks working on the site. A number of IBCs were also present adjacent to the tanks. A mobile electricity generator was present to the northeast of the works building, it is understood that the stone cutting and working machinery is powered by this generator. On the western side of the main building a settlement tank was present which accepted waste water from the stone cutting machines. The standard of housekeeping within the building and its environs was generally poor with some haphazard storage of products and wastes. We understand that the area to the south of the existing building historically was occupied by a similar works building to that current present in the northwest of the site.

Two settlement ponds were present in the east of the site, these ponds accepted waste water from the stone cutting machines. Stockpiles of solid arisings from the settlement ponds, comprising clay/silt, were present in the east of the site. A grassed area was present in the southeastern area of the site.

Waste stone offcuts were stockpiled around the site, particularly in the north and southwestern corner. Finished stone products were stored in the central area of the site.

A disused shipping container and portacabin were observed to the south of the main works building.

An ‘L’ shaped brick building was present in the central area of the site. Part of this building was being used as staff welfare facilities during our visit, the remainder of the building appeared disused.

The access road and hardstanding areas around the site comprised a mixture of macadam surfacing and concrete. An access road was observed along the western site boundary and extended to the west from the northwestern corner of the site.

The site generally sloped down to the south. Some cut and fill appeared to have taken place at the site, including cut in the northwest around the main site building (to provide a level area for the building) and raising of ground level in the central area of the site. A retaining wall was present in the south of the site, we understand that the area to the south of the main site building was formerly occupied by a building. Mounds and embankments were present in the east of the site.

Fields were present surrounding the site. Clayton Lane was present to the east. A School was present to the southeast of the site. An oil pipeline marker was present in the sites southwest corner, we understand that the oil pipeline crosses through the southeastern corner of the site.

A site location plan (Figure No. 35261/01) is included in Appendix I. An annotated site plan (Figure No. 35261/02) is included as Appendix II of this report. Plans showing general views of the site (Figure Nos. 35261/03 and 35261/04) are included in Appendix III.

2.2 Site History

The historical and contemporary Ordnance Survey publications included within the Landmark Envirocheck Report have been reviewed by GeoDyne to establish the history of the site. The historical Ordnance Survey maps are included as Appendix VII of this report.

We would note that the boundary marked on the historical sheets within the Envirocheck Report appears to 'shift' on several of the maps due to scaling inaccuracies between maps of differing dates. This is a function of Envirocheck transposition algorithms.

The key findings of the historical search are summarised in Table 1.

TABLE 1 – HISTORICAL PUBLICATION DATA

Date	Features on Site	Features off Site
1854 to 1907	• The site comprises fields. • Clayton Lane is present to the east, orientated approximately north-south. • The site is indicated to slope to the south with a total fall in the region of 7m to 8m.	• Fields surround the site.
1930 to 1955	• A group of buildings named Knabshill Farm is indicated in the central area of the site. Access into the farm appears to be in the northeastern corner of the site. • A Pump is indicated approximately in the centre of the site.	• A Reservoir is indicated approximately 100m to the northeast of the site.
1962 to 1967	• Further ancillary buildings are indicated on the site. • A track is indicated along the northern site boundary. • The Pump is no longer indicated in the centre of the site.	• The immediate surrounding area appears generally unchanged.
1971 to 1983	• The site appears broadly unchanged.	• Thurnscoe Comprehensive School is indicated approximately 100m to the southeast of the site.
1988 to present	• A large works building is indicated in the western half of the site. • Two remaining farm buildings are indicated in the centre and northeast of the site. • An entrance into the site appears to be in the southeastern corner. • The track along the northern site boundary is no longer indicated.	• The immediate surrounding area appears generally unchanged.

We would note that the southernmost extent of the building in the western part of the site appears to have been demolished relatively recently.

3.0 GEOLOGY & ENVIRONMENTAL SETTING

3.1 Geological References

The following geological publications were referred to:

- British Geological Survey (BGS) 1:50,000 Series Sheet 87 '*Barnsley*' Solid and drift edition (1976).
- Landmark 1:10,000 scale Geological Maps.
- BGS Online Lexicon.
- The Coal Authority and the Law Society Publication '*Coal Mining and Brine Subsidence Claim Searches - Directory and Guidance*', Sixth Edition (2006).

3.2 Geology

The geological information indicates that the southern half of the site is underlain by undifferentiated Pennine Upper Coal Measures dating from the Carboniferous period.

The Pennine Upper Coal Measures may be described as '*Interbedded grey mudstone, siltstone and pale grey sandstone, commonly with coal seams, but no mudstones containing marine fossils are present.*'

The northern half of the site is indicated to be underlain by Newstead Rock (Sandstone), part of the Pennine Upper Coal Measures, dating from the Carboniferous Period. No lithological description is provided for the Newstead Rock in the BGS Lexicon.

No superficial deposits are indicated to be present at the site on the geological maps.

3.3 Faults

A fault is indicated crossing through the central area of the site orientated approximately northeast-southwest. The fault is indicated to be downthrown to the northwest.

Faults are typically encountered as fracture zones with the potential for variable strata and localised soft ground to be present locally.

3.4 Made Ground

No Made Ground is indicated on the site, or in the immediate vicinity of the site, on the geological maps. However, localised Made Ground may potentially be present associated with the legacy of historical cut and fill activities and previous buildings on the site.

3.5 Coal Mining Report

The site lies in an area requiring commission of a Coal Mining Report in accordance with The Law Society and The Coal Authority publication '*Coal Mining and Brine Subsidence Claim Searches, Directory and Guidance, Sixth Edition*' (2006). A Coal Mining Report has been obtained for the site, a copy of which is included in Appendix VIII.

The key findings of the Coal Mining Report are summarised as follows:

Past Underground Coal Mining

The report states '*The property is in the likely zone of influence from workings in 8 seams of coal at 140m to 880m depth, and last worked in 1983. Any ground movement from these coal workings should have stopped by now.*'

Present Underground Mining

'*The property is not in the likely zone of influence of any present underground coal workings.*'

Future Underground Mining

'*The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.*

The property is not in an area for which a license has been granted to remove or otherwise work coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.'

Mine Entries

'*There are no known coal mine entries within, or within 20 metres of, the boundary of the property*'.

Coal Mining Geology

'*The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.*'

Past Opencast Mining

The Coal Authority report states that the site is not affected by past, present or future opencast coal mining.

Coal Mining Subsidence

The report states '*The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st October 1994.*'

Mine Gas

'*There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.*'

Hazards Related to Coal Mining

'*The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.*'

3.6 Landmark Envirocheck Report

A Landmark Report was commissioned to assist in ascertaining the environmental setting of the site. The full Landmark Report is presented in Appendix IX and has revealed the following key information considered relevant to this investigation.

3.6.1 Agency and Hydrological

Aquifer Status

The Landmark Envirocheck Report indicates that the site is underlain by a Secondary A Aquifer.

The Environment Agency describe Secondary A Aquifers as '*permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers*.'

Due to the absence of superficial deposits on the site there is no Superficial Aquifer Designation for the site.

Source Protection Zone Status

The Landmark Envirocheck report reveals that the site is not situated within an Environment Agency designated Source Protection Zone (SPZ). SPZs relate to the protection of groundwater used for public drinking water supply.

Flood Risk Status

The site is not indicated to be situated within an area at risk from flooding.

Surface Waters

A surface water feature is identified at a distance of 0m from the site, and are anticipated to relate to the settlement ponds in the east of the site.

There are no significant surface water features identified in the Landmark Report on the site, or in the immediate vicinity of the site.

3.6.2 Waste

There are no waste issues (i.e. former or current landfills etc.) identified on site, or within 250m of the site, in the Landmark Envirocheck Report.

3.6.3 Hazardous Substances

There are no Hazardous Substances issues (i.e. explosive sites etc.) identified on site, or within 250m of the site, in the Landmark Envirocheck Report.

3.6.4 Radon

The Landmark Envirocheck Report identifies that the site is in lower probability radon area and therefore no radon protective measures are necessary in the construction of new dwellings and extensions.

3.6.5 Geological Issues

There are no geological issues identified in the Landmark Envirocheck Report that are considered likely to have a potential significant adverse effect on the development (which have not been addressed elsewhere in this report).

3.6.6 Industrial Land Use

There are no Contemporary Trade Directory Entries identified at the site, or in the immediate vicinity of the site, in the Landmark Envirocheck Report.

3.6.7 Sensitive Vulnerability Land Uses

The site is situated within an Area of Adopted Green Belt and is also within a Nitrate Vulnerable Zone.

There are no other sensitive land uses identified in the Landmark Report that are considered to have a potential significant effect on the proposed redevelopment of the site.

3.7 BGS Estimated Soil Chemistry

The BGS has prepared estimated soil concentration maps for several metals (including Arsenic, Lead, Nickel, Chromium and Cadmium), which are extrapolated from records available for use within their assessments. Whilst potentially useful for the inference of Natural Metal Enrichment (NME) of the natural soils in a general area, the data should not be used to inform any detailed decisions with regards to the chemistry of a particular site as it does not allow for anthropogenic affects.

Estimates of the soil chemistry at the site indicate anticipated concentrations of Arsenic of <15-25mg/kg, Cadmium of <1.8mg/kg, Chromium of 40-120mg/kg, Lead of <150mg/kg and Nickel of 15-30mg/kg.

Based on the information supplied in the Landmark Envirocheck Report, the site is indicated to be located in an area where significant NME of the underlying natural soils is not anticipated to be present. However, this is only applicable to the specific determinands listed above.

3.8 Land Use Assessment

As part of the land use assessment, reference has been made to the '*Desk Reference Guide to Potentially Contaminative Land Uses*' produced by Mr P Syms and published jointly by the ISVA (The Professional Society for Valuers and Auctioneers) in association with The Royal Institution of Chartered Surveyors (RICS) and the Chartered Institute of Environmental Health (CIEH).

We have also made reference to the Department for Environment, Food and Rural Affairs and the Environment Agency Contaminated Land Report CLR8 '*Potential Contaminants for the Assessment of Land*' (March 2002). Although now formally withdrawn, this document identifies key contaminants which may potentially be present at a site as a result of a given historical land use and is considered useful as a ready reference.

3.8.1 On Site Assessment

The Phase I Desk study has revealed that the site has historically comprised open fields. A farm appeared on the site in the 1930s. A large works building appeared on the site in the 1980s. The site currently operates as a stone cutting yard.

No significant potentially contaminative historical land use has been identified at the site. The former uses of the site are not identified within any of the risk based classifications within the Syms and CLR8 documents.

Based on the Phase I Desk Study information and our observations made during the site walkover, the following potential contaminants may be present at the site:

- Metals associated with any Made Ground or Natural Metal Enrichment (NME) in Natural Strata.
- Polycyclic Aromatic Hydrocarbons (PAHs) derived from any carbonaceous or ashy inclusions in the near surface soils.
- Acid/Sulphate contaminated soils.
- Asbestos from the legacy of buildings on the site.
- Ground gases (i.e. Methane and Carbon Dioxide) associated with any Made Ground and buried organic soils (see Section 4.2).

3.8.2 Off Site Assessment

The Phase I Desk Study information has not revealed the presence of any significant former potentially contaminative land use in the immediate vicinity of the site.

4.0 GROUND INVESTIGATION

4.1 Introduction

Sub-Surface Utility Avoidance Scan

Prior to the commencement of our intrusive works at the site a sub-contracted sub-surface utility scan of proposed exploratory hole locations was undertaken to attempt to avoid buried services. Based on the results of the service scan, the exploratory holes were positioned in accessible areas of the site in order to maximise the amount of information obtained during our site works, whilst avoiding known utilities.

Trial Pits

Trial pitting works were undertaken on 25th November 2015 to provide a visual assessment of the near surface ground conditions and to obtain visually representative soil samples for subsequent analysis. A total of 9No. trial pits (designated TP1 to TP9) were excavated across the site to depths ranging between 1.40m and 3.50m below existing ground level (begl).

Window Sample Boreholes

A total of 6No. window sample boreholes (WS1 to WS6) were advanced across the site on 22nd December 2016 to depths of 2.00m and 3.00m begl. Boreholes WS3, WS4, WS5 and WS6 were installed with combined ground gas and groundwater level monitoring wells to enable a programme of monitoring to be undertaken (see Section 4.2).

Plans indicating the approximate locations of the exploratory holes (Figure No. 35261/05) and depth of Made Ground (Figure No. 35261/06) are included in Appendix IV, exploratory hole logs are included as Appendix V. General views of the site works are shown on the Plates included in Appendix XI.

4.2 Ground Conditions

The following section discusses the ground conditions encountered in the exploratory holes advanced across the site.

Made Ground

Exploratory holes revealed Made Ground to depths ranging between 0.30m and 2.00m begl, generally comprising macadam surfacing/concrete floor slab (within the building) and sub-base, with localised areas of soft to firm clay and silt, and loose to medium dense gravel. Deeper Made Ground was encountered generally in exploratory holes in the southern half of the site.

Trial pit TP2 encountered Made Ground containing fragments of possible Asbestos cement. Based on our observations it is possible that the Made Ground containing possible Asbestos cement relates to the re-use of demolition rubble from the former farm buildings on the site or from imported fill.

Buried Topsoil

Locally underlying the Made Ground in the southern half of the site, a layer of Buried Topsoil was encountered. An organic odour was noted when excavating through the Buried Topsoil.

The locally deep Made Ground and Buried Topsoil represent sources of hazardous ground gases (i.e. Methane and Carbon Dioxide). Ground gas monitoring wells were therefore installed in boreholes WS3, WS4, WS5 and WS6 followed by a programme of ground gas/groundwater level monitoring.

Natural Strata

Underlying the Made Ground/Buried Topsoil, Natural Strata typically comprising stiff, silty, sandy locally gravelly CLAY (weathered Pennine Upper Coal Measures Formation) was encountered in the majority of the exploratory holes at depths ranging between 0.30m and 2.20m begl. Underlying the Clay, Pennine Upper Coal Measures Formation bedrock was encountered in the majority of the exploratory holes at depths ranging between 1.20m and 2.60m begl, and generally comprised very weak to weak thinly bedded MUDSTONE, SILTSTONE and SANDSTONE.

4.3 Summary

The findings from the exploratory holes are summarised in Table 2.

TABLE 2 – SUMMARY OF EXPLORATORY HOLE FINDINGS

Stratum	Exploratory Holes Encountered	Depth to Base of Stratum (m begl)	Typical Description
MADE GROUND	All exploratory holes	0.30m to 2.00m	Macadam surfacing/concrete floor slab (within the building) and sub-base, with localised areas of soft to firm clay and silt, and loose to medium dense gravel
BURIED TOPSOIL	Exploratory holes generally in the southern half of the site	0.70m to 2.20m	Firm dark grey brown silty sandy CLAY with an organic odour
CLAY (Weathered Pennine Upper Coal Measures Formation)	Majority of exploratory holes (except TP5)	Recorded depths of 1.20m to 2.60m	Stiff yellow and grey silty sandy locally gravelly CLAY
MUDSTONE/ SILTSTONE/ SANDSTONE (Pennine Upper Coal Measures Formation)	Majority of exploratory holes (Except TP1, TP4 & TP8)	Base of strata not encountered	Very weak to weak thinly bedded MUDSTONE, SILTSTONE and SANDSTONE

4.4 Water

Water was encountered as seepage in trial pit TP6 at 2.20m begl. Water was not encountered in any of the remaining exploratory holes advanced at the site during advancement.

4.5 Stability and Excavations

Localised unstable Made Ground was encountered in exploratory holes, although the majority of the exploratory holes were observed to be generally stable for the short period of time they were left open during site works.

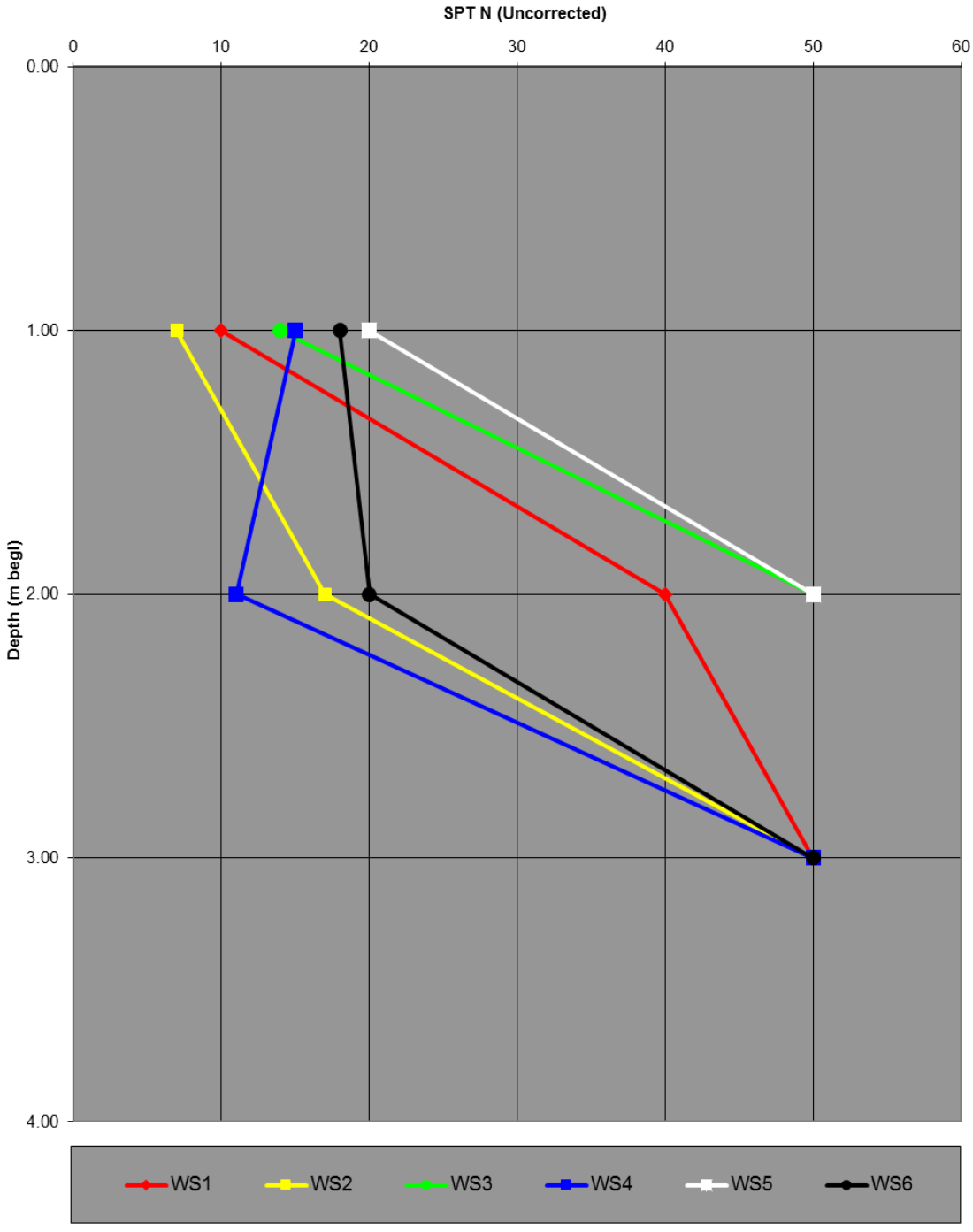
4.6 In-Situ Strength Testing

In order to establish a strength/depth profile of the strata encountered in the window sampling boreholes, SPT testing was undertaken in boreholes generally at 1m intervals. In-situ hand held shear vane testing was also undertaken in trial pits, wherever possible. The results of the strength testing is presented on the exploratory hole logs presented in Appendix V.

An SPT Vs Depth Chart of the data obtained from the window sampling boreholes advanced at the site is shown below.

Clayton Lane, Thurnscoe

SPT N Values Vs Depth (m begl)



5.0 GROUND GAS & WATER MONITORING RESULTS

5.1 Introduction

Locally deep Made Ground and Buried Topsoil were encountered in the exploratory holes, which represent sources of hazardous ground gases (i.e. Methane and Carbon Dioxide).

Based on the foregoing a programme of ground gas monitoring was considered necessary to determine the sites ground gas regime and possible requirement for ground gas protection measures for proposed dwellings.

5.2 Monitoring Installations

Upon completion, 4No. window sample boreholes (WS3, WS4, WS5 and WS6) were installed with combined ground gas and water monitoring standpipes to facilitate a programme of monitoring.

The full set of ground gas and water monitoring data is presented in Appendix X of this report.

5.3 Results of the Ground Gas Monitoring

A total of six monitoring visits over a six week period have been undertaken at the site as part of our works. The ground gas monitoring results are summarised in Table 3 below.

TABLE 3 – SUMMARY OF GROUND GAS MONITORING DATA

Parameter	Minimum % by volume (v/v)	Maximum % by volume (v/v)
Methane	0.0	0.1
Carbon Dioxide	0.7	4.8
Oxygen	8.2	20.3
Flow (l/h)	0.0	0.0

- Atmospheric pressure ranged between 983mb and 1010mb during the monitoring programme, and was below 1000mb on a single occasion.

- The water level ranged between 0.36m and 2.30m begl in the wells during the monitoring programme. Due to the generally impermeable nature of the soils and absence of groundwater during the site works, the water encountered in the monitoring wells is considered to represent standing water/perched water in the wells rather than true groundwater levels.

5.4 Appropriate Guidance

5.4.1 British Standard & CIRIA

The results of the gas monitoring have been reviewed with reference to the following documentation:

- British Standard BS 8485 '*Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings*' (2015).
- CIRIA Report C665 '*Assessing risks posed by hazardous ground gases to buildings*' (2007).

5.4.2 Gas Screening Value Calculation

BS 8485:2015 and CIRIA Report C665 recommend a risk-based methodology to ground gas assessment, the first step of which includes the calculation of a site-specific Gas Screening Value (GSV). The GSV of a particular ground gas regime equates to:

- GSV (L/h) = (maximum borehole flow rate (L/h) x maximum gas concentration)/100.

The GSV should be calculated for both Methane and Carbon Dioxide (where appropriate) to determine a site-specific Characteristic Situation for each gas. The higher the calculated GSV, the greater the risk posed by the presence of ground gas. The CIRIA guidance document notes that '*…the GSV is a guideline value and not an absolute threshold*'.

5.4.3 Site Classification

The next step in the assessment process is determining the sites classification. Table 2 of BS 8485:2015 (reproduced below) presents six Characteristic Situations (CS) to assist in the classification of the site, based on the calculated GSV for methane and carbon dioxide.

Table 2 **CS by site characteristic GSV**

CS	Hazard potential	Site characteristic GSV [A)] L/h	Additional factors
CS1	Very low	<0.07	Typically <1% methane concentration and <5% carbon dioxide concentration (otherwise consider an increase to CS2)
CS2	Low	0.07 to <0.7	Typical measured flow rate <70 L/h (otherwise consider an increase to CS3)
CS3	Moderate	0.7 to <3.5	–
CS4	Moderate to high	3.5 to <15	–
CS5	High	15 to <70	–
CS6	Very high	>70	–

[A)] The figures used in this column are empirical.

NOTE The CS is equivalent to the characteristic GSV in CIRIA C665 [6].

5.4.4 Proposed Building Type

In accordance with BS 8485:2015, the CS classification for the site should be considered in conjunction with the proposed Building Type to determine the appropriate level of ground gas protection measures that should be installed to mitigate the risk posed by ground gases.

BS 8485:2015 notes '*The Building Type is determined based the proposed construction and use of the building, together with the control of future structural changes to the building and its maintenance (the building's management) should be assessed, since potential risks posed by ground gases are strongly influenced by these factors*'.

Subject to the development proposals, each building may be categorised as a whole, or for each different part of the building.

The Building Types presented in Table 3 of BS 8485:2015, are reproduced below.

Table 3 **Building types**

	Type A	Type B	Type C	Type D
Ownership	Private	Private or commercial/ public, possible multiple	Commercial/ public	Commercial/ industrial
Control (change of use, structural alterations, ventilation)	None	Some but not all	Full	Full
Room sizes	Small	Small/ medium	Small to large	Large industrial/ retail park style

Summary of Building Types (taken from BS 8485:2015)

Type A Buildings — Examples include private housing and some retail premises.

Type B Buildings — Examples include managed apartments, multiple occupancy offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres) and parts of hotels.

Type C Buildings — Examples include offices, some retail premises and parts of some public buildings (such as schools, hospitals, leisure centres and parts of hotels).

Type D Buildings — Examples are retail park sales buildings, factory shop floor areas, warehouses. (Small rooms within these style buildings should be separately categorized as Type B or Type C).

5.4.5 Gas Protection Score (Number of Points to be Achieved)

Table 4 of BS 8485:2015, reproduced below, should be used to derive the minimum level of gas protection applicable to the Building Type, based on the CS determined from the calculated GSV. The Gas protection Score in Table 4 below is used to determine the level and type of protection measures used.

Table 4 **Gas protection score by CS and type of building**

CS	Minimum gas protection score (points)			
	High risk		Medium risk	Low risk
	Type A building	Type B building	Type C building	Type D building
1	0	0	0	0
2	3.5	3.5	2.5	1.5
3	4.5	4	3	2.5
4	6.5[A)]	5.5[A)]	4.5	3.5
5	—[B)]	6.5[A)]	5.5	4.5
6	—[B)]	—[B)]	7.5	6.5

[A)] Residential buildings should not be built on CS4 or higher sites unless the type of construction or site circumstances allow additional levels of protection to be incorporated, e.g. high-performance ventilation or pathway intervention measures, and an associated sustainable system of management of maintenance of the gas control system, e.g. in institutional and/or fully serviced contractual situations.

[B)] The gas hazard is too high for this empirical method to be used to define the gas protection measures.

5.4.6 Methods of Achieving Gas Protection Scores

The appropriate level of precautions, to be designed in accordance with the point scoring system of BS 8485:2015, should therefore be determined for the specific type of developments based on the GSV and CS of the site. These may include a combination of two or more of the following three types of protection measures, which could be used to achieve the required score:

- The structural barrier of the floor slab, or of the basement slab and walls if a basement is present;
- Ventilation measures; and
- Gas resistant membrane which may include an element of verification and potentially integrity testing.

Verification and integrity testing should be undertaken in accordance with CIRIA report C735 '*Good practice on the testing and verification of protection systems for buildings against hazardous ground gases*' (2014) and would be detailed in a Remediation Method Statement report in advance of construction which should be agreed with the Local Planning Authority.

The points achieved for each element of the ground gas precautions are summarised in Tables 5, 6 and 7 of the British Standard. These tables are reproduced below.

Table 5 **Gas protection scores for the structural barrier**

Floor and substructure design (see Annex A)	**Score** [A]
Precast suspended segmental subfloor (i.e. beam and block)	0
Cast in situ ground-bearing floor slab (with only nominal mesh reinforcement)	0.5
Cast in situ monolithic reinforced ground bearing raft or reinforced cast in situ suspended floor slab with minimal penetrations	1 or 1.5 [B]
Basement floor and walls conforming to BS 8102:2009, Grade 2 waterproofing [C]	2
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing [C]	2.5

[A] The scores are conditional on breaches of floor slabs, etc., being effectively sealed.
[B] To achieve a score of 1.5 the raft or suspended slab should be well reinforced to control cracking and have minimal penetrations cast in (see **A.2.2.2**).
[C] The score is conditional on the waterproofing not being based on the use of a geosynthetic clay liner waterproofing product (see **C.3**, Note 4).

Table 6 **Gas protection scores for ventilation protection measures**

Protection element/system	Score	Comments
(a) Pressure relief pathway (usually formed of low fines gravel or with a thin geocomposite blanket or strips terminating in a gravel trench external to the building)	0.5	Whenever possible a pressure relief pathway (as a minimum) should be installed in all gas protection measures systems. If the layer has a low permeability and/or is not terminated in a venting trench (or similar), then the score is zero.
(b) Passive sub floor dispersal layer: Very good performance: Good performance: Media used to provide the dispersal layer are: • Clear void • Polystyrene void former blanket • Geocomposite void former blanket • No-fines gravel layer with gas drains • No-fines gravel layer	 2.5 1.5	Performance criteria for methane and carbon dioxide are shown in Figure B.6 and Figure B.7, respectively. The ventilation effectiveness of different media depends on a number of different factors including the transmissivity of the medium, the width of the building, the side ventilation spacing and type and the thickness of the layer. The selected score should be assigned taking into account the recommendations in Annex B. Passive ventilation should be designed to meet at least "good performance", see Annex B.
(c) Active dispersal layer, usually comprising fans with active abstraction (suction) from a subfloor dilution layer, with roof level vents. The dilution layer may comprise a clear void or be formed of geocomposite or polystyrene void formers	1.5 to 2.5	This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place. There should be robust management systems in place to ensure the continued maintenance of the system, including pumps and vents. Active ventilation should always be designed to meet at least "good performance", as described in Annex B.
(d) Active positive pressurization by the creation of a blanket of external fresh air beneath the building floor slab by pumps supplying air to points across the central footprint of the building into a permeable layer, usually formed of a thin geocomposite blanket	1.5 to 2.5	This system relies on continued operation of the pumps, therefore alarm and response systems should be in place. The score assigned should be based on the efficient "coverage" of the building footprint and the redundancy of the system. Active ventilation should always be designed to meet at least "good performance".
(e) Ventilated car park (floor slab of occupied part of the building under consideration is underlain by a basement or undercroft car park)	4	Assumes that the car park is vented to deal with car exhaust fumes, designed to *Buildings Regulations 2000, Approved Document F* [9].

Table 7 **Gas protection score for the gas resistant membrane**

Protection element/system	Score	Comments
Gas resistant membrane meeting all of the following criteria: • sufficiently impervious to the gases with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheet and joints (tested in accordance with BS ISO 15105-1 manometric method); • sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • sufficiently strong to withstand in-service stresses (e.g. settlement if placed below a floor slab); • sufficiently strong to withstand the installation process and following trades until covered (e.g. penetration from steel fibres in fibre reinforced concrete, penetration of reinforcement ties, tearing due to working above it, dropping tools, etc); • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735 [N1]	2	The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints. For example, a minimum 0.4 mm thickness (equivalent to 370 g/m² for polyethelene) reinforced membrane (virgin polymer) meets the performance criteria in Table 7 (see C.3). If a membrane is installed that does not meet all the criteria in column 1 then the score is zero.

5.5 Ground Gas Analysis

5.5.1 Gas Screening Value & Site Classification

The ground gas monitoring undertaken has identified a maximum Methane concentration of 0.1% by volume (v/v). No measureable positive gas flow was detected in the monitoring wells. In accordance with good practice the Limit of Detection (0.1 l/hr) of the monitoring equipment should be adopted in this instance.

The GSV for Methane at the site may be calculated as follows:

- 0.1 x (0.1/100) = 0.0001 l/h

The ground gas monitoring undertaken has identified a maximum Carbon Dioxide concentration of 4.8% v/v.

The GSV for Carbon Dioxide at the site may be calculated as follows:

- 0.1 x (4.8/100) = 0.0048 l/h

Based on the foregoing the site may be classified as **'CS1**', in accordance with Table 2 of BS 8485:2015.

5.5.2 Building Type

It is currently understood that the site is to be redeveloped with private residential dwellings. Therefore, in accordance with Table 3 of BS 8485:2015, Building **Type A** is considered to be the most appropriate classification for the proposed structures.

5.5.3 Gas Protection Score

On the basis of Characteristic Situation 1 (CS1) and the development proposals with buildings that may be designated as Building Type A and in accordance with Table 4 of BS 8485:2015, the minimum gas protection score for the site is **0 points**.

5.5.4 Recommended Level of Precaution

The site has been characterised as Characteristic Situation 1 (**CS1**) based on the gas data recorded. In accordance with Table 3 of BS 8485:2015, **Building Type A** is considered to be the most appropriate classification for the proposed structures and in accordance with Table 4 of BS 8485:2015, the minimum gas protection score for the site is **0 points**.

Therefore, specific ground gas protection measures for the ingress of Methane and Carbon Dioxide are considered not to be required for the site.

6.0 LABORATORY TESTING & CONTAMINATION ASSESSMENT

6.1 Introduction

The following environmental soil testing was carried out on visually representative samples recovered from the exploratory holes, based on the land use assessment for the site:

- 8No. Standard contamination suites (including speciated PAH and TOC).
- 5No. Asbestos presence screen, including 1No. Asbestos identification test.

Geotechnical soil testing comprised the following:

- 4No. Plasticity Index (PI) tests.
- 4No. Water soluble sulphate tests.
- 8No. pH tests.

The environmental and geotechnical laboratory soil test results are presented in Appendix VI of this report.

6.2 Geotechnical Soil Test Results

Water Soluble Sulphate/pH

Water soluble sulphate testing was undertaken on 3No. samples of Natural Strata and 1No. sample of Buried Topsoil and revealed concentrations ranging between 0.03g/l and 0.09g/l SO_4. The pH values of the soils tested ranged between 7.44 and 9.18.

Adopting the highest water soluble sulphate concentration (0.09g/l), and the lowest pH value (7.44), in accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005) the site falls into Design Sulphate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1. The foregoing designation assumes a brownfield location with potentially mobile groundwater.

Plasticity Index Testing

Plasticity Index (PI) testing was undertaken on five samples of visually cohesive Natural Strata to determine the volume change potential of the samples.

In accordance with NHBC standards chapter 4.2-D5(b) the reported PI value may be modified based on the portion of the sample retained on the 425μm sieve.

The results of the PI analysis are summarised in Table 4.

TABLE 4 – SUMMARY OF PLASTICITY INDEX (PI) DATA

Sample Ref.	Reported PI Value (%)	Portion Passing 425μm Sieve (%)	Modified PI Value (%)	Volume Change Potential
TP1 (1.60m)	36	100	36	Medium
TP3 (1.00m)	34	100	34	Medium
TP6 (1.20m)	18	92	17	Low
TP9 (0.50m)	25	100	25	Medium

In accordance with NHBC Standards Chapter 4.2, the adjusted PI values reveal that the Natural Strata samples comprising Clay may be classified as having a low and medium volume change potential, and we would recommend that a medium volume potential classification is adopted for design purposes.

6.3 Contamination Assessment Rationale

It is understood that it is proposed to redevelop the site with residential dwellings with private gardens. Our assessment has therefore been undertaken on a generic residential with plant uptake end use.

6.4 Appropriate Guidance

Reference has been made to documents reflecting current good practice, including (but not limited to) the following:

- Environment Agency Contaminated Land Report 11 '*Model Procedures for the Management of Land Contamination*', September 2004, ISBN: 1844322955.
- British Standard BS10175:2011+A1:2013, '*Investigation of potentially contaminated sites. Code of practice*', March 2011.
- Nathanail, C.P., McCaffrey, C. Gillett, A.G, Ogden, R.C. and Nathanail, J.F 2015. '*The LQM/CIEH S4ULs for Human Health Risk Assessment. Land Quality Press, Nottingham. "Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved.*"'
- DEFRA publication '*SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*', Final Project Report (Revision 2), dated 24th September 2014 and Erratum dated December 2014.
- DEFRA publication '*SP1010 – Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination*' – Policy Companion Document, dated December 2014.
- EIC/AGS/CL:AIRE publication '*Soil Generic Assessment Criteria for Human Health Risk Assessment*', January 2010, ISBN 978-1-905046-20-1.
- Department of Environment, Food and Rural Affairs (DEFRA) and the Environment Agency publication – *'Contaminated Land Exposure Assessment (CLEA) model'* (March 2002).
- Environment Agency Science Report, '*Using Soil Guideline Values'*, SC050021/SGV, March 2009.
- R & D Draft Technical Report P5-079/TR1 '*Review of the Fate and Transport of Selected Contaminants in the Soil Environment*' dated 2003.
- CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*' (May 2008).
- Environment Agency Science Report SC050021/SR7 '*Compilation of Data for Priority Organic Pollutants for Derivation of Soil Guideline Values*', dated November 2008, ISBN 978-84432-964-9.
- Environment Agency Science Report Final SC050021/SR2 '*Human health toxicological assessment of contaminants in soil*', dated January 2009, ISBN 978-84432-858-1.
- Environment Agency Science Report SC050021/SR3 '*Updated technical background to the CLEA model*', dated January 2009, ISBN 978-84432-856-7.
- Environment Agency Science Report SC050021/SR4 '*CLEA Software (Version 1.05) Handbook*', dated September 2009, ISBN 978-1-84911-105-8.

6.4.1 Selection of Appropriate Tier 1 Screening Values

Generic Assessment Criteria (GAC)

The assessment of contaminated land in the UK was historically undertaken with reference to ICRCL Guidance Note 59/83 together with successive versions of the CLEA model (inc. CLEA2002 (2002), CLEA UK (2005), CLEA V1.03 beta (2008), CLEA V1.04 (January 2009), CLEA V1.05 (September 2009) and CLEA V1.06 (October 2009)).

The CLEA V1.06 model is a deterministic quantitative risk assessment (QRA) model, which has historically been utilised by the Environment Agency to produce Soil Guideline Values (SGVs) for several contaminants, and has been used and modified by the authors of the LQM/CIEH S4UL publication and the authors of the DEFRA SP1010 series of documents in the derivation of their respective human health screening values.

Of key importance is the basis on which these two differing sets of commercially available screening criteria have been created, with the SP1010 values reflective of a '*Low Level of Toxicological Concern*' (LLTC) and the S4UL values based on a 'Minimal Risk Level' (MRL).

Based on our understanding of current good practice within the contaminated land field, we have adopted the S4UL values (representing a compatible approach to risk assessments undertaken since the initial derivation of the CLEA model, and based on an established and fully justifiable methodology) as our initial Generic Assessment Criteria (GAC) values for human health. In the absence of a suitable S4UL value (such as lead), reference has been made to the relevant C4SL, and these have been adopted where considered justifiable and as appropriate (further consideration of their use is provided below).

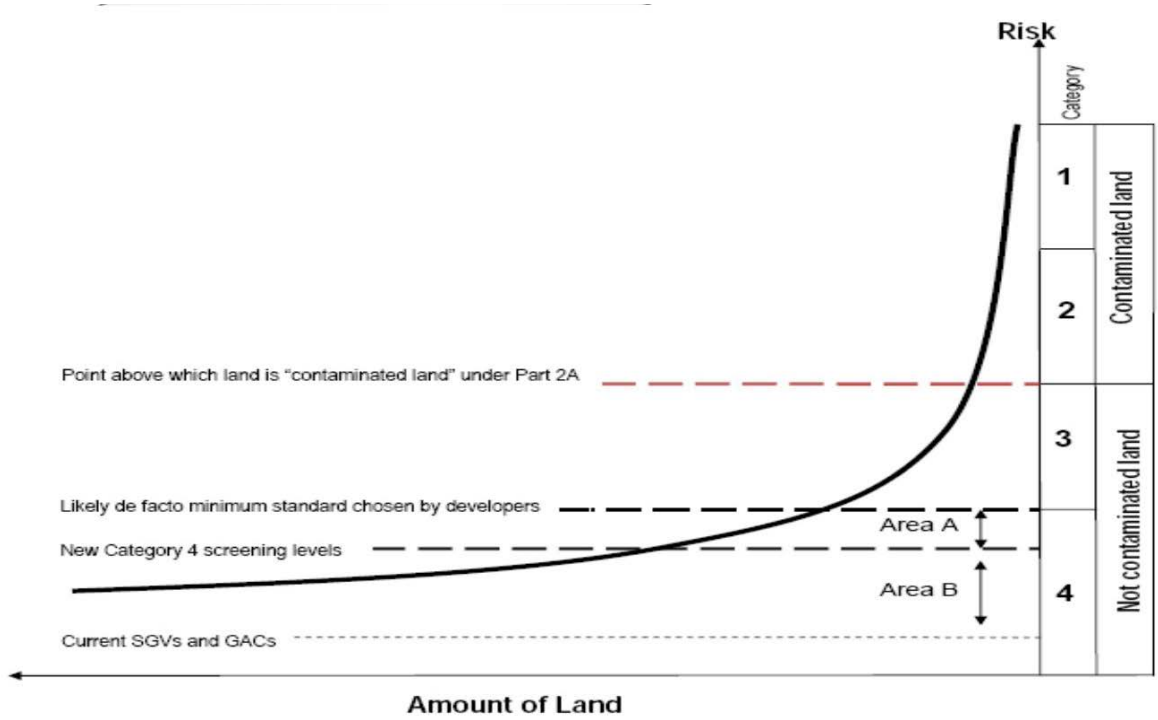
We would additionally note that other GAC values are commercially available, such as the Atkins ATRISKSOIL values (to which GeoDyne subscribe) and the EIC/AGS/CL:AIRE values for organic substances; and these have been referred to where relevant to the site.

Category 4 Screening Levels

Revised Statutory guidance for the assessment of land under Part 2A of the Environmental Protection Act 1990 was published by the Department for Environment, Food and Rural Affairs (Defra) in April 2012. The guidance introduced a new four-part category system for classifying land under Part 2A; Section 4.17 of the Guidance states:

'In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the categorisations described in paragraphs 4.19 – 4.30...Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on the grounds of significant possibility of harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds'.

The foregoing categories are depicted in diagrammatical form in the following graph (taken from Defra publication SP1010):



Defra has subsequently commissioned the production of Category 4 Screening Levels (C4SLs) for a total of six substances (cadmium, benzo(a)pyrene, benzene, arsenic, lead and chromium VI), which are detailed within the SP1010 document titled 'Development of Category 4 Screening Levels for Assessment of Land Affected by Contamination – Policy Companion Document', dated March 2014. The C4SL values represent a level below which a contaminant concentration is considered to have a 'Low' risk to human health. The C4SL values are stated within the SP1010 document (page 7) as still remaining 'strongly precautionary' and represent a more pragmatic approach to contaminated land risk assessment than the minimal risk values represented by the SGV/GAC levels.

In addition to the use of C4SLs in contaminated land risk assessment, the SP1010 document states the following with respect to background levels of contaminants:

'*The outputs of Defra-funded research to determine 'normal' background concentrations of various contaminants in England and Wales and the outputs of this research project to develop new screening levels for contaminants in soil, are both designed as tools to be used by contaminated land risk assessors to inform decisions about whether or not it is necessary to proceed to a Detailed Quantitative Risk Assessment (DQRA) on a particular site taking into account the broad aims of the regime as set out in Section 1 of the Statutory Guidance. Questions have been raised about how these tools relate and interact.*

41. Ultimately, it is up to individual risk assessors to make the most appropriate decisions on a site-by-site basis and to use the most appropriate tools in each case. However, with reference to the Part 2A Statutory Guidance, which states that 'normal' background concentrations should not be considered to cause a site to be determined as contaminated under Part 2A unless there is a reason to consider otherwise, it is envisaged that, where available, Category 4 Screening Levels should be the initial value against which site concentrations can be compared. Where a value on a particular site exceeds the Category 4 Screening Level for that substance, reference can then be made to the normal background concentration for that contaminant in that area. If concentrations are higher than the relevant Category 4 Screening Level but within 'normal' background concentrations for that area, it is not envisaged that a site would be determined as contaminated under Part 2A (unless there was a reason to consider otherwise).

42. The British Geological Survey has derived 'normal' background concentrations for lead for England and Wales. In England, the 'normal' background concentrations of lead are 180 mg/kg for the 'principal' domain, 2,400 mg/kg for the 'mineralisation' domain and 820 mg/kg for the 'urban' domain (Defra, 2012) (see table below). In Wales the 'normal' background concentrations are 230 mg/kg for the 'principal' domain, 280 mg/kg for the 'mineralisation' domain and 890 - 1300 mg/kg for the 'urban' domain (Defra, 2013). Current advances in our understanding of the toxicology of lead have resulted in Category 4 Screening Levels for Residential, Allotments and Public Open Space 1 that are lower than the 'normal' background concentration of lead in ***urban*** *areas. This was also the case for the (now withdrawn) Soil Guideline Value for lead of 450 mg/kg.*

43. The report identifies other relevant considerations that may have a bearing on the final choice of Category 4 Screening Levels and the background level in soil is one of these. A pragmatic approach for lead would be to recommend the use of the 'normal' background concentration when the land use and domain permit (for example, providing other site and contaminant specific characteristics such as chemical form, bioavailability, soil depth, site use, etc. are comparable between the background and the site under investigation) so as not to disproportionately target land where there is widespread diffuse pollution of lead.

Normal background concentrations of contaminants in England

Substance	Principal domain	Urban domain	Mineralisation domain 1	Mineralisation domain 2	Ironstone	Chalk South
Arsenic	32 mg/kg		290 mg/kg		220 mg/kg	
Benzo-a-pyrene	0.5 mg/kg	3.6 mg/kg				
Cadmium	1.0 mg/kg	2.1 mg/kg	17 mg/kg	2.9 mg/kg		2.5 mg/kg
Lead	180 mg/kg	820 mg/kg	2400 mg/kg			

Where a valid Soil Guideline Value exists for a contaminant where a Category 4 Screening Level has also been derived, it is anticipated that risk assessors will use the Category 4 Screening Level in line with the Part 2A Statutory Guidance. In the absence of a suitable C4SL, risk assessors should identify and select appropriate generic assessment criteria in accordance with established good practice....'

The general approach indicated in the SP1010 document has been adopted in this report (as appropriate), although the C4SL values have been used as a second Tier of risk assessment, due to the difference in the level of 'acceptable' risk between the various GACs (which we will adopt as the first tier of risk assessment) and the C4SLs.

National Planning Policy Framework (NPPF)

In relation to the requirements of a contaminated land risk assessment, the Department for Communities and Local Government publication titled '*National Planning Policy Framework*' (NPPF), dated March 2012, provides the following commentary:

'*121. Planning policies and decisions should also ensure that:*

- *the site is suitable for its new use taking account of ground conditions and land instability, including from natural hazards or former activities such as mining, pollution arising from previous uses and any proposals for mitigation including land remediation or impacts on the natural environment arising from that remediation;*

- *after remediation, as a minimum, land should not be capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990; and*

- *adequate site investigation information, prepared by a competent person, is presented.*'

The Defra SP1010 document states: '***The Part 2A Statutory Guidance and accompanying Impact Assessment were developed on the basis that Category 4 Screening Levels could be used under the planning regime, as they would be in Part 2A investigations directly***' [GeoDyne emphasis added].

Summary

Taking account of the foregoing, we consider that industry good practice is currently best represented by GAC (variously LQM/CIEH, Atkins ATRISKSOIL or EIC/AGS/CL:AIRE) that adopt a MRL as the foundation for its derivation. In the case of Lead (which is modelled on blood lead concentrations rather than typical exposure scenarios applicable to other contaminants), the relevant C4SL value has been adopted, as this incorporates the most up-to-date toxicological information in the derivation of the various end-use specific screening criteria.

In relation to the remaining C4SL values, these have been adopted as a second tier of generic assessment criteria, and will be utilised where the GAC has been exceeded at a Tier 1 generic level and where justified in a site-specific context. Whilst representing a LLTC, the C4SL values are considered to represent a suitably conservative assessment tool, given that they fall comfortably within Category 4.

In the following sections, screening criteria have collectively been referred to as Generic Assessment Criteria (GAC). The C4SL values have been referenced as such. The GAC/C4SL adopted herein, i.e. residential, are included in the tables provided in Section 6.7.

6.4.2 Selection of Soil Organic Matter (SOM) Content

The SOM content and soil type are used to provide an assessment of the applicability of the Tier 1 SAC adopted (the GAC are typically based upon SOM of 1%, 2.5% and 6%, as applicable, with Defra C4SL based on the default assumption of a UK Sandy Loam soil with 6% SOM).

Determinands have in the first instance, been compared to GAC adopting a conservative SOM of 1%, or, in the absence of one of the former, a relevant C4SL value. Where the determinand exceeds the relevant SAC at 1% SOM, a site specific SOM may be adopted as appropriate to derive new GAC and the dataset reassessed.

6.4.3 Assessment Methodology

Taking account of the foregoing, an initial qualitative Tier 1 Soil Assessment has been undertaken to assess the soils at the site. We have adopted a policy whereby determinands within the dataset are individually compared to the relevant screening values.

Where determinands within the dataset are less than the appropriate Tier 1 GAC value the determinand is considered to be present at an acceptable concentration and no further assessment is required. However, where a determinand exceeds the relevant Tier 1 GAC value on at least one occasion further assessment is required and will be undertaken in accordance with CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*'.

Further assessment will comprise a quantitative Tier 1 assessment to examine the contamination data set in more detail. The methodology for undertaking the statistical assessment is provided below.

6.5 Statistical Considerations

Statistical tests relating to contaminated land, typically referred to as a Mean and Maximum Value Tests, were detailed in Department for Environment, Food and Rural Affairs and The Environment Agency publication CLR 7 '*Assessment of Risks to Human Health From Land Contamination: An Overview of the Development of Soil Guideline Values and Related Research*', dated 2002, ISBN 1-857-05732-5.

This guidance was superseded by publication of CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*' dated May 2008.

6.5.1 Null and Alternative Hypothesis

In consideration of statistical guidance jointly published by CL:AIRE/CIEH '*Guidance on Comparing Soil Contamination Data with a Critical Concentration*', statistical convention requires consideration of the Null Hypothesis (expressed as H_o) or an Alternative Hypothesis (expressed as H_1). Appropriate statistical tests are then applied to the data to assess whether the strength of evidence favours the Null or the Alternative Hypothesis.

For the purpose of the following contamination assessments and in accordance with the CL:AIRE/CIEH guidance the key question for the site is as follows.

Question - '*Is there sufficient evidence that the true mean concentration of a contaminant in soil (μ) is less than some critical concentration (Cc)?*'

The Null and Alternative hypotheses are therefore defined as follows.

The Null Hypothesis (H_o)

$\mu \geq Cc$ (i.e. Tier 1 or 2 Assessment Criteria).

The Alternative Hypothesis (H_1) (the question the selected statistical test is designed to answer)

$\mu < Cc$ (i.e. Tier 1 or 2 Assessment Criteria).

6.5.2 95th Percentile Upper Confidence Level Mean Values

The selected relevant statistical assessment undertaken to evaluate the Null and Alternative Hypotheses requires consideration of the 95th Percentile Upper Confidence Level Mean value (this is abbreviated as the UCL).

The UCL value takes account the number of samples tested, the data set mean and the standard deviation of the data set and applies a correction factor to take account of the uncertainty of the data set.

CL:AIRE/CIEH guidance states that *'…since the 95% UCL is at most times greater than the true population mean, it follows that if the 95% UCL is less than Cc, the assessor will know (with a defined high level of confidence) that the true population mean (μ, the value which is not known) is also likely to be less than Cc'*.

6.5.3 Considerations for Appropriate Dataset(s)

The CL:AIRE/CIEH statistical guidance requires consideration of the appropriateness of the dataset being subjected to the statistical testing and notes the following three key elements to be considered.

- Consideration of any non-detects within the dataset.
- Consideration of potential outliers within the dataset.
- Consideration of the statistical distribution of the data (i.e. normality/non normality).

6.5.4 Consideration of Normality of Dataset

CL:AIRE/CIEH statistical guidance notes that the choice of statistical test to be applied to the dataset will depend on the assumptions about the distribution of the data being tested. The assumptions of the statistical test adopted therefore must be appropriate to the distribution assumptions of the data being considered.

The CL:AIRE/CIEH statistical guidance details the following two key statistical tests.

- **The one-sample t test** - assumes the data being assessed is approximately normally distributed.
- **The one-sided Chebychev Theorem** - assumes the data being assessed does not demonstrate normality (method makes no assumption about the shape of the distribution).

CL:AIRE/CIEH statistical guidance, however notes *'…with large datasets, minor deviations from normality may be flagged as statistically significant even though small deviations from a normal distribution will not affect the reliability of the one sample t-test'*. The guidance goes on to note *'Conversely, datasets with a small sample size more easily pass normality tests.* ***Failing, however to detect non-normality in a small dataset is unlikely to compromise the validity of the one sample t-test'*** [GeoDyne emphasis added].

CL:AIRE/CIEH statistical guidance further notes *'When considering which of the two tests to use, however, assessors should bear in mind that, in general, the one-sample t-test is more powerful that the method based on the Chebychev Theorem…****Given that the one sample t-test is also not sensitive to moderate departures from normality, it is recommended that assessors use the t-test unless there is good evidence that the dataset departs significantly from normality'*** [GeoDyne emphasis added]**.**

On the basis of the above, an assumption of data normality has been made and the one-sample t-test adopted accordingly.

6.5.5 Consideration of Non-Detects within the Dataset.

The dataset may reveal the presence of non-detects for a number of the determinands tested. Where this occurs, we have adopted the LOD as the chemical concentration, which provides a suitably conservative approach. However, please note that SACs have only been used for determinands where they are present at concentrations in excess of the LOD on at least one occasion.

6.5.6 Consideration of Outliers

The CL:AIRE/CIEH statistical guidance advises that '*…if outliers are identified, assessors have to decide whether they represent genuine soil concentrations or are the result of an error*'.

The guidance further notes that outliers should only be excluded from a dataset where they '*…are obviously and demonstrably the result of an error that can be identified and explained'* or '*…clearly indicate that more than one soil population exists within the dataset and this can be justified by (or informs the further development of) the conceptual model- in which case the different population expressed by the outlier(s) should be explored in more detail*'.

Taking account of the foregoing, we have adopted a policy of interrogating the relevant dataset to calculate the UCL and to ascertain the possible presence of statistical outliers (where relevant). At this point the possible relevance of statistical outliers to the interpretation of the data is considered, in accordance with the following matrix.

TABLE 5 – OUTLIER DECISION MATRIX		
	UCL < SAC	UCL > SAC
Outlier Test reveals No Hotspot(s)	Determinand present at acceptable concentrations.	Pervasive contamination present in soil at unacceptable concentrations.
Outlier Test reveals Hotspot(s)	Determinand present at acceptable concentrations. Possible second population identified. Only of potential concern where outlier is at an individual concentration in excess of the Tier 1 SAC.	Pervasive contamination present in soil at unacceptable concentrations with possible hotspots of contamination identified.

6.5.7 CLEA Averaging Area

The CLEA Model requires consideration of an averaging area, i.e. an area within which the UCL is calculated and compared to the Tier 1 SAC. Within our assessments (where appropriate) the entire site has been adopted as the averaging area, in the first instance.

6.6 Sampling Strategy

It was considered appropriate to base our sampling and investigation strategy on the potential contamination issues identified by the Desk Study, and on the ground conditions encountered during our Phase II exploratory works.

The ground conditions encountered during our Phase II works revealed the presence of three distinct types of material i) Made Ground, ii) Buried Topsoil and iii) Natural Strata.

Representative samples were obtained during our Phase II works and subjected to chemical analysis for a suite of contaminants deemed appropriate based on the land use assessment.

6.7 Contamination Soil Test Results

The contamination assessment for the soils at the site is summarised in Table 6.

TABLE 6 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL END-USE						
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 SAC (mg/kg)	Tier 2 C4SL (mg/kg)	UCL (mg/kg)	Tier 1 SAC Exceeded @ UCL (Yes/No)
Metals						
Arsenic	8	1 – 12	37 $_{S4UL}$	37	NA	No
Copper	8	6 – 67	2400 $_{S4UL}$	-	NA	No
Chromium III	8	9 – 31	910 $_{S4UL}$	-	NA	No
Lead	8	8 – 286	200 $_{C4SL}$	200	25*	Yes - Hotspot in TP1 at 0.10m
Mercury	8	<0.17 – 0.99	40 $_{S4UL}$	-	NA	No
Nickel	8	13 – 29	130 $_{S4UL\ \#}$	-	NA	No
Selenium	8	<1 - 2	250 $_{S4UL}$	-	NA	No
Zinc	8	28 - 420	3700 $_{S4UL}$	-	NA	No
PAHs						
Benzo(a)anthracene	8	<0.1 – 0.1	7.2 $_{S4UL}$	-	NA	No
Benzo(a)pyrene	8	<0.1 – 0.1	2.2 $_{S4UL}$	5	NA	No

TABLE 6 – SUMMARY OF TIER 1 SITE ACCEPTANCE CRITERIA DATA ASSESSMENT RESIDENTIAL END-USE						
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 SAC (mg/kg)	Tier 2 C4SL (mg/kg)	UCL (mg/kg)	Tier 1 SAC Exceeded @ UCL (Yes/No)
Benzo(b)fluoranthene	8	<0.1 – 0.2	2.6 S4UL	-	NA	No
Benzo(k)fluoranthene	8	<0.1 – 0.1	77 S4UL	-	NA	No
Chrysene	8	<0.1 – 0.1	15 S4UL	-	NA	No
Fluoranthene	8	<0.1 – 0.2	280 S4UL	-	NA	No
Pyrene	8	<0.1 – 0.2	620 S4UL	-	NA	No

Key
S4UL – CIEH/LQM Suitable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved.
S4UL # - CIEH/LQM Suitable 4 Use Level (August 2015).
C4SL – Value for Lead taken from DEFRA publication SP1010 and based on a commercial end-use.
* - Geometric Mean.
NA – UCL not applicable as all individual concentrations are present at concentrations individually below the GAC.

Based on the soil test results and the findings of the CLEA Mean Value and Outlier tests, the majority of determinand concentrations were recorded to be below the appropriate Tier 1 SAC (assuming a proposed residential end use) or Limit of Detection of the method of analysis employed.

Assessment has revealed the presence of a localised hotspot of Lead contamination (286mg/kg) detected in a sample of near surface Made Ground in trial pit TP1 at 0.10m begl.

6.8 Asbestos Screening

Four samples of Made Ground were submitted for Asbestos presence screens to determine the presence of Asbestos in soil. An Asbestos identification on suspected Asbestos cement tile fragments observed in trial pit TP2 was also undertaken.

The screening test revealed Chrysotile cement in the soil sample from TP2. The fragment of suspected Asbestos cement tile was confirmed by laboratory identification as Chrysotile cement. No Asbestos fibres were detected in the remaining three samples of Made Ground screened for the presence of Asbestos.

We would note that the Made Ground in TP2 which contained Chrysotile cement tile fragments was observed to be localised and based on our observations may be associated with the historical demolition of the former farm buildings on the site or imported fill used during the construction of the works buildings.

7.0 CONCEPTUAL SITE MODEL

7.1 General

The DEFRA publication '*Environmental Protection Act 1990: Part 2A Contaminated Land Statutory Guidance*' (dated April 2012) states the following with regards to the production of a Conceptual Site Model (CSM) for a site:

'*The process of risk assessment involves understanding the risks presented by land, and the associated uncertainties. In practice, this understanding is usually developed and communicated in the form of a "conceptual model."*' The development of a CSM is typically undertaken in an iterative process, reflecting the changes in understanding as more detailed site information becomes available.

In developing a CSM, and specifically in the context of land contamination, consideration needs to be given to three essential elements; which form the basis of any risk present. The statutory guidance sections 3.8 and 3.9 (April 2012) states the following with respect to Part 2A.

'*Under Part 2A, for a relevant risk to exist there needs to be one or more contaminant-pathway-receptor* [CPR] *linkages – "contaminant linkage" – by which a relevant receptor might be affected by the contaminants in question. In other words, for a risk to exist there must be contaminants present in, on or under the land in a form and quantity that poses a hazard, and one or more pathways by which they might significantly harm people, the environment, or property; or significantly pollute controlled waters. For the purposes of this guidance:*

(a) A "contaminant" is a substance which is in, on or under the land and which has the potential to cause significant harm to a relevant receptor, or to cause significant pollution of controlled waters.
(b) A "receptor" is something that could be adversely affected by a contaminant, for example a person, an organism, and ecosystem, property, or controlled waters. The various types of receptors that are relevant under the Part 2A regime are explained in later sections.
(c) A "pathway" is a route by which a receptor is or might be affected by a contaminant.

The term "contaminant linkage" means the relationship between a contaminant, a pathway and a receptor. All three elements of a contaminant linkage must exist in relation to a particular land before the land can be considered potentially to be contaminated land under Part 2A, including evidence of the actual presence of contaminants. The term "significant contaminant linkage", as used in this Guidance, means a contaminant linkage which gives rise to a level of risk sufficient to justify a piece of land being determined as contaminated land. The term "significant contaminant" means the contaminant which forms part of a significant contaminant linkage.'

With respect to the presence of background levels of contaminants, section 3.21 to 3.23 states '*The Part 2A regime was introduced to help identify and deal with land which poses unacceptable levels of risk. It was not intended to apply to land with levels of contaminants in soil that are commonplace and widespread throughout England or parts of it, and for which in the very large majority of cases there is no reason to consider that there is an unacceptable risk.*

Normal levels of contaminants in soil should not be considered to cause land to qualify as contaminated land, unless there is a particular reason to consider otherwise. Therefore, if it is established that land is at or close to normal levels of particular contaminants, it should usually not be considered further in relation to the Part 2A regime...

For the purpose of this Guidance, "normal" levels of contaminants in soil may result from:

(a) The natural presence of contaminants (e.g. caused by soil formation processes and underlying geology) at levels that might reasonably be considered typically in a given area and have not been shown to pose an unacceptable risk to health or the environment.
(b) The presence of contaminants caused by low level diffuse pollution, and common human activity other than specific industrial processes. For example, this would include diffuse pollution caused by historic use of leaded petrol and the presence of benzo(a)pyrene from vehicle exhausts, and the spreading of domestic ash in gardens at levels that might reasonably be considered typical.'

In selecting appropriate generic assessment criteria Section 3.27 of the Guidance states:

'It is common practice in contaminated land risk assessment to use "generic assessment criteria" (GACs) as screening tools in generic quantitative human health risk assessment to help assessors decide when land can be excluded from the need for further inspection and assessment, or when further work would be warranted.'

With respect to assessing contaminated land, section 4.17 of the Guidance states:

'*In deciding whether or not land is contaminated land on grounds of significant possibility of significant harm to human health, the local authority should use the categorisations described in paragraphs 4.19 – 4.30 below. Categories 1 and 2 would encompass land which is capable of being determined as contaminated land on the grounds of significant possibility of harm to human health. Categories 3 and 4 would encompass land which is not capable of being determined on such grounds.'*

In relation to the use of GAC values in the assessment of contaminated land, section 3.29 of the Guidance states:

'GACs relating to human health risk assessment represent cautious estimates of levels of contaminants in soil at which there is considered to be no risk to health or, at most, a minimal risk to health. With regards to such GACs:

(a) They may be used to indicate when land is very unlikely to pose a significant possibility of significant harm to human health. This is on the basis that they are designed to estimate levels of contamination at which risks are likely to be negligible or minimal and far from posing a significant possibility of significant harm to human health.
(b) They should not be used as direct indicators of whether a significant possibility of significant harm to human health may exist. Also, the local authority should not view the degree by which the GACs are exceeded (in itself) as being particularly relevant to this consideration, given that the degree of risk posed by land would normally depend on many factors other than simply the amount of contaminants in soil.
(c) They should not be seen as screening levels which describe the boundary between Categories 3 and 4 in terms of Section 4 (i.e. the two Categories in which land would not be contaminated land on grounds of risk to human health). In the very large majority of cases, these SGVs/GACs describe levels of contamination from which risks should be considered to be comfortably within Category 4.
(d) They should not be viewed as indicators of levels of contamination above which detailed risk assessment would automatically be required under Part 2A.
(e) They should not be used as generic remediation targets under the Part 2A regime. Nor should they be used in this way under the planning system, for example in relation to ensuring that land affected by contaminated does not meet the Part 2A definition of contaminated land after it has been developed.'

In undertaking a risk assessment and deriving a CSM for the purposes of the redevelopment of a site (i.e. planning and development control) reference has been made to both the Model Procedures for the Management of Land Contamination, as well as the National Planning Policy Framework (NPPF, dated March 2012). Reference has also been made to the Contaminated Land Statutory Guidance (referenced above), although this is primarily concerned with Local Government determinations of Statutory '*Contaminated Land*', which is separate to planning framework requirements.

7.2 CPR Considerations

It is understood that it is proposed to redevelop the site with residential dwellings with private gardens, our assessment has been undertaken on this basis.

7.3 Consideration of Potential Sources of Contamination (C)

Based on the findings of our works the potential key sources of contamination at the site are considered to be the following:

- Metals associated with any Made Ground or Natural Metal Enrichment (NME) in Natural Strata.
- Polycyclic Aromatic Hydrocarbons (PAHs) derived from any carbonaceous or ashy inclusions in the near surface soils.
- Acid/Sulphate contaminated soils.
- Asbestos from the legacy of buildings on the site.
- Ground gases (i.e. Methane and Carbon Dioxide) associated with the Made Ground and buried organic soils.

7.4 Consideration of Potential Pathways (P)

The potential pathways at the site are primarily:

- Direct ingestion of soil.
- Inhalation of dust and vapours.
- Direct skin contact with the ground.
- Direct contact with building materials.
- Direct ingestion of home-grown produce.
- Vertical and lateral migration of contamination.
- Vertical and lateral migration of potentially hazardous ground gases.

7.5 Consideration of Potential Receptors (R)

The potential receptors at the site are:

- The construction personnel (i.e. site workers) involved with the development of the site (typically short term (acute) exposure).
- The final end users (site residents - typically long term (chronic) exposure).
- Controlled waters (i.e. underlying groundwater and surface water).
- Buildings/construction materials.

7.6 Summary

Our conceptual site model of possible CPR pollutant linkages, applicable to the proposed site usage, is summarised in Table 7.

TABLE 7– SUMMARY OF CPR ASSESSMENT						
Contaminant	Pathway	Receptor	Comments	Plausible Pollutant Linkage	Possible Mitigation	Possible Statutory 'Contaminated Land' following mitigation
Contaminated Soils	*Direct Ingestion & Direct Contact*	*Site Workers*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1 at 0.10m and localised Asbestos fragments in the Made Ground in TP2.	✔	Site workers to wear appropriate PPE for health and safety reasons.	X
Contaminated Soils	*Inhalation of Dust and Vapours*	*Site Workers*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1 at 0.10m and localised Asbestos fragments in the Made Ground in TP2.	✔	Site workers to wear appropriate PPE for health and safety reasons.	X
Contaminated Soils	*Direct Ingestion & Direct Contact*	*End Users – Site Residents/ Users*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1 at 0.10m and localised Asbestos fragments in the Made Ground in TP2. Made Ground visually undesirable.	✔	Provide a topsoil/subsoil capping in proposed gardens and soft landscaped areas.	X
Contaminated Soils	*Plant Uptake*	*End Users – Site Residents*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1 at 0.10m and localised Asbestos fragments in the Made Ground in TP2. Made Ground visually undesirable.	✔	Provide a topsoil/subsoil capping in proposed gardens and soft landscaped areas.	X
Contaminated Soils	*Inhalation of Dust and Vapours*	*End Users – Site Residents/ Users*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1 at 0.10m and localised Asbestos fragments in the Made Ground in TP2. Following site development, generation of significant levels of dust on a chronic basis unlikely.	✔	Provide a topsoil/subsoil capping in proposed gardens and soft landscaped areas. Hardstanding areas (buildings, roads and drives etc.) will effectively provide a barrier to end user contact with contaminated soils. Dependent on proposed ground levels it may be necessary to remove localised Made Ground including Asbestos, followed by appropriate validation works.	X
Contaminated Soils	*Vertical and lateral migration*	*Controlled Waters*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1.	X	The soil test results are not considered to be sufficiently elevated to represent a significant risk to controlled waters beneath the site.	X
Contaminated Soils	*Direct contact*	*Building Materials*	Design Class DS-1/ACEC Class AC-1 (BRE Spec. Digest 1).	X	Adopt appropriate concrete mix to all buried concrete.	X

TABLE 7– SUMMARY OF CPR ASSESSMENT						
Contaminant	Pathway	Receptor	Comments	Plausible Pollutant Linkage	Possible Mitigation	Possible Statutory 'Contaminated Land' following mitigation
Contaminated Soils	*Direct contact*	*Services*	Soil testing and assessment has revealed the presence of a localised hotspot of Lead in TP1.	✔	Consult utility companies regarding appropriate utility materials (including water supply pipes).	X
Ground Gases	*Vertical and lateral migration*	*End Users & Building Envelope*	Our works have not revealed the presence of elevated concentrations of ground gases (Methane and Carbon Dioxide).	X	Based on our works no specific ground gas protection measures for Methane and Carbon Dioxide are required for proposed buildings.	X
Radon	*Vertical and lateral migration*	*End Users & Building Envelope*	The Landmark Envirocheck Report identifies that the site is in a lower probability radon area.	X	No radon protective measures are necessary in the construction of new dwellings and extensions.	X

KEY

Where text is in *Bold Italic* item is potentially present. Where normal text is used item is not present/plausible.

X - Pollutant linkage not plausible.
✔ - Pollutant linkage plausible, mitigation required.
? - Insufficient information, further work necessary.

In the foregoing CPR assessment, determinants identified by chemical analysis are only considered to be contaminated with respect to generic guidance where the determinant is present at a concentration above the appropriate Tier 1 SAC.

8.0 CONCLUSIONS & RECOMMENDATIONS

8.1 Ground Conditions

Exploratory holes revealed Made Ground to depths ranging between 0.30m and 2.00m begl, generally comprising macadam surfacing/concrete floor slab (within the building) and sub-base, with localised areas of soft to firm clay and silt, and loose to medium dense gravel. Deeper Made Ground was encountered generally in exploratory holes in the southern half of the site.

Trial pit TP2 encountered Made Ground containing fragments of possible Asbestos cement, this has been confirmed by laboratory testing as Chrysotile Asbestos cement. The Made Ground containing Asbestos may relate to the historical re-use of demolition rubble from the former farm buildings on the site or from imported fill.

Locally underlying the Made Ground generally in the southern half of the site, a layer of Buried Topsoil was encountered. An organic odour was noted when excavating through the Buried Topsoil.

Underlying the Made Ground/Buried Topsoil, Natural Strata typically comprising stiff, silty, sandy locally gravelly CLAY was encountered in the majority of the exploratory holes at depths ranging between 0.30m and 2.20m begl. Underlying the Clay, Pennine Upper Coal Measures Formation bedrock was encountered in the majority of the exploratory holes at depths ranging between 1.20m and 2.60m begl, and generally comprised very weak to weak thinly bedded MUDSTONE, SILTSTONE and SANDSTONE.

8.2 Foundation Design

Based on the ground conditions it is anticipated that the weathered Pennine Upper Coal Measures Formation Clay represents a suitable bearing stratum for typical 2/3 storey dwellings. Based on our findings, foundations for the proposed development may be traditional strip or trench fill to suit the loading characteristics of the proposed dwellings. The in-situ soil strength testing results indicate that the natural stiff Clay beneath the site appears suitable to support a nett allowable ground bearing pressure of up to 150kN/m^2 at typical minimum founding depth. Where a greater nett allowable ground bearing pressure is required, foundations could be deepened to encounter more competent bedrock which was encountered at depths ranging between 1.20m and 2.60m begl, where a ground bearing pressure of up to 200kN/m^2 may be adopted.

Based on the soil test results foundations should be advanced to a minimum depth of 0.90m below existing or proposed ground level (whichever being the deeper) within cohesive clay soils, and a minimum of 0.60m below existing or proposed ground level (whichever being the deeper) within non-cohesive bedrock.

Foundations should be advanced to encounter undisturbed suitably geotechnically competent Natural Strata. Where Made Ground, disturbed ground or soft spots (possibly associated with a fault) are encountered at founding depth, foundations will require further deepening to encounter underlying undisturbed suitably competent Natural Strata.

Due to the potentially variable nature of Natural Strata across a building footprint (i.e. both granular, cohesive and bedrock), consideration of the inclusion of reinforcement in strip foundations may be necessary. If consistent strata are encountered across a building footprint reinforcement in strip foundations would not be necessary.

The foregoing foundations design recommendations may require reviewing and amending dependent on the final redevelopment proposals, site layout and an earthworks strategy for the site.

8.3 Fault

A fault is indicated crossing through the central area of the site orientated northeast-southwest. The fault is indicated to be downthrown to the northwest.

Faults are typically encountered as fracture zones with the potential for variable strata and localised soft ground to be present locally.

We would recommend that a watching brief is maintained during construction works in relation to the presence of a fault and possible variable and soft strata locally. Any foundations or hardstanding/roads in the area of the fault should be designed accordingly, and for foundations may include reinforcement (subject to a visual assessment of the variability of the Natural Strata and Structural Engineer design).

8.4 Coal Mining

The site lies in an area requiring commission of a Coal Mining Report in accordance with The Law Society and The Coal Authority publication '*Coal Mining and Brine Subsidence Claim Searches, Directory and Guidance, Sixth Edition*' (2006). A Coal Mining Report has been obtained for the site, and reveals that no coal mining precautions or investigations are required in relation to the proposed redevelopment.

8.5 Radon

The Landmark Envirocheck Report identifies that the site is in an area where no radon protective measures are necessary in the construction of new dwellings and extensions.

8.6 Floor Slabs

We understand that suspended beam and block floors are Rippon Homes preferred and standard method of floor construction. Due to the presence of deep Made Ground and the possible requirement to deepen foundations for existing, recently removed or proposed trees, based on our findings this method of floor construction would be acceptable at the site. We would recommend consultation with GeoDyne if alternative methods of floor construction are proposed so we can provide further comment and advice.

8.7 Ground Gas Precautions (Methane and Carbon Dioxide)

Locally deep Made Ground and Buried Topsoil was encountered in the exploratory holes, which represent sources of hazardous ground gases (i.e. Methane and Carbon Dioxide).

A programme of ground gas monitoring has been undertaken which has not revealed the presence of significantly elevated concentrations of Methane and Carbon Dioxide. Therefore, specific ground gas protection measures for the ingress of Methane and Carbon Dioxide are considered not to be required for the site.

8.8 Building Near Trees

Foundation designs will require adjusting in accordance with NHBC Standards Chapter 4.2 '*Building near trees*' when building near existing, recently removed or proposed trees due to the presence of cohesive soils at the site. Laboratory testing has revealed that the shallow cohesive soils may be regarded as having a medium volume change potential and this classification should be assumed for design purposes.

Where competent bedrock is encountered in foundation excavations, further deepening due to the influence of trees would not be required.

8.9 Water

Water was encountered as seepage in trial pit TP6 at 2.20m begl during the investigation works. Water was not encountered in any of the remaining exploratory holes advanced at the site.

The water level ranged between 0.36m and 2.30m begl in the wells during the monitoring programme. Due to the generally impermeable nature of the soils and absence of groundwater during the site works, the water encountered in the monitoring wells is considered to represent standing water in the wells rather than true groundwater levels.

Based on the findings from the investigation works, significant dewatering of excavations is unlikely to be required other than pumping from deep excavations where water seepages occur (particularly during periods of heavy rainfall).

8.10 Excavations

The majority of the exploratory holes were observed to be generally stable for the short period of time they were left open during site works.

Localised unstable Made Ground was encountered in exploratory holes. Based on the foregoing, shallow excavations in Made Ground are likely to require sidewall support locally for health and safety reasons. The assessment of excavations and provision of support will be the responsibility of the contractor on site.

Clay soils are likely to deteriorate if left exposed to wet weather conditions for extended periods of time; consequently foundations should ideally be excavated during periods of dry weather and foundations constructed as soon as possible thereafter.

8.11 Sulphate Classification

Based on the laboratory soil test results, and in accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005), the site falls into Design Sulfate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1.

Therefore an appropriate concrete mix should be adopted in accordance with BRE Special Digest 1 for all buried concrete in contact with the ground.

8.12 CBRs and Pavements

Typical CBR values of between less than 2% and 5% may be anticipated for the shallow natural soils at the site, subject to confirmation by on site testing.

No frost susceptible material should be within 450mm of the ground surface in road construction.

Significant thicknesses of organic soils should be removed from beneath roads and pavements to avoid the potential for differential settlement.

8.13 Soakaways

The Natural Strata was noted to be predominantly clayey, and therefore the use of soakaways is unlikely to be feasible to dispose of surface water from the site. We would therefore recommend that alternative methods of surface water disposal are investigated at this stage. This was evidenced by the presence of settlement ponds on site.

8.14 Contamination Assessment

Based on the soil test results and our contamination assessment, the majority of determinand concentrations were recorded to be below the appropriate Tier 1 screening values or Limit of Detection of the method of analysis employed.

Assessment has revealed the presence of a localised hotspot of Lead contamination (286mg/kg) detected in a sample of near surface Made Ground in trial pit TP1 in the southwest of the site at 0.10m begl.

Chrysotile Asbestos cement fragments have been identified in trial pit TP2 in the south of the site. It is anticipated that the Made Ground containing Asbestos may relate to the historical re-use of demolition rubble from the former farm buildings on the site or from imported fill.

The Made Ground was observed to be visually undesirable.

8.15 Preliminary Remediation Proposals

The final remediation proposals will be dependent on existing and proposed ground levels and the final redevelopment layout. When these have been finalised we would recommend that a Remediation Method Statement (RMS) is produced for the site to provide a guide to the remediation process, and options for the re-use or disposal of in-situ soils.

Based on our findings we can make the following preliminary remediation proposals.

We would recommend that a suitable topsoil/subsoil capping layer is provided in proposed gardens and soft landscaped areas to act as a growing medium and to mitigate end user contact with localised Asbestos and Lead contamination, and visually undesirable Made Ground. We would recommend that a minimum 0.60m topsoil/subsoil capping is provided in proposed gardens and 0.30m in proposed soft landscaped areas, however the final capping thickness will be confirmed in the RMS. Sufficient visually good quality topsoil was not present at the site therefore it is likely that it will be necessary to import any Topsoil to site for use as a capping material. Any imported topsoil should ideally conform to BS3882: 2015 '*Specification for topsoil*', with respect to the presence of deleterious material and nutrient levels etc. Based on our soil testing, Natural Strata arisings would be suitable for re-use as a capping material.

Where hardstanding is proposed (i.e. new buildings, roads and paving etc.), this will effectively provide a barrier to end user contact with the Made Ground. No additional remediation would be required where buildings and hardstanding areas are proposed.

Where it is necessary to remove Made Ground from the site, it is anticipated that the main driver for remediation at that stage would be reducing disposal costs and attempting to re-use soils on site. Where it is necessary to remove localised Asbestos contaminated soils we would recommend that this is undertaken by a specialist contractor. Based on our findings it is anticipated that the Asbestos fragments encountered in Trial Pit TP2 may relate to the historical re-use of demolition rubble from the former farm buildings or from imported fill used during the construction of the main works buildings (the southern works building is no longer present). We would recommend the careful excavation, segregation and disposal of Asbestos contaminated soils if it is proposed to reduce levels in the area of the works buildings. Any contaminated soil removed from site should be undertaken by an appropriately licensed waste haulier under chain of custody documentation and disposed off-site at a suitably licensed waste disposal facility with suitable records retained.

Appropriate validation works will be required following remediation, dependent on the final proposals. The level of validation works required will be presented in the RMS.

Ground levels are variable at the site and large stockpiles of stone offcuts are present which could potentially be processed and re-used during redevelopment, subject to their geotechnical and chemical suitability.

The soil test results are not sufficiently elevated to represent a significant risk to controlled waters at the site therefore no specific remediation is considered necessary in relation to the chemical status of the soils.

We would recommend that a watching brief is maintained in relation to any possible contamination from the above ground tanks in the works building. The tanks were situated on a concrete floor slab therefore any possible migration into the underlying soils is anticipated to be negligible. If any locally contaminated soil is encountered beneath the slab it may be necessary to undertake limited remediation and validation works.

8.16 Off-site Disposal

Excess uncontaminated Natural Strata should be regarded as a potential asset and we would recommend that the re-use of excess uncontaminated soils on site or off-site is investigated in the first instance.

Where the off-site disposal of soils is being considered, we would recommend that the chemical soil test results included in this report are provided to several landfill operators for consideration and cost provision in the first instance, prior to the material being removed from the site. This may include the requirement for Waste Acceptance Criteria testing.

8.17 Unforeseen Circumstances

Should any areas of potentially contaminated soil, or anomalous features be encountered during site construction works we would recommend consultation with GeoDyne to ensure that our recommendations continue to apply.

Any potentially contaminated soils should be left in-situ and subjected to further assessment, to potentially include further chemical testing and risk assessment.

The following procedure should be adhered to if any areas of previously unidentified suspected contamination are encountered during the development of the site:

i. Suspected contaminated material will remain in-situ.
ii. GeoDyne to be notified, and will inform the Local Authority Environmental Health Department and NHBC (if appropriate).

iii. GeoDyne will undertake a visual assessment of the possible contamination, followed by appropriate sampling/testing (as necessary).
iv. If necessary, an appropriate strategy to remove/remediate the contamination will be submitted to the Local Authority and NHBC.

8.18 Construction Workers

It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE/RPE equipment together with welfare facilities in accordance with general health and safety guidelines. The presence of localised Asbestos in the soils should be considered when assessing risks to construction works at the site.

8.19 Asbestos Survey

We would recommend that a pre-demolition Asbestos survey is undertaken prior to the demolition of the buildings on the site, followed by the removal of all Asbestos containing material from the site by a suitably qualified specialist contractor.

8.20 Utilities

We would recommend that this report is supplied to utility companies (including water supply), and that their recommendations relating to appropriate supply pipes are adhered to.

8.21 Licenses, Permits, Registrations and Approvals

The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, registrations, plans and approvals are in place prior to commencing with the works at the site. These will include any Mobile Treatment Licenses (MTLs), Site Waste Management Plans / Materials Management Plans and/or Waste Management Licenses/Exemptions as necessary to enable the completion of the proposed works.

8.22 Statutory Consultation

In accordance with normal planning requirements, we would recommend that a copy of our report is issued by the Client to the Local Authority (and NHBC, if necessary) for review/comment and approval prior to commencing with the redevelopment of the site.

8.23 Further Works

The following works are considered necessary at the site:

- Production of a Remediation Method Statement for the site, including liaison with the Local Planning Authority.
- Review of the foundation recommendations based on the final redevelopment proposals, site layout and the earthworks strategy for the site.

APPENDIX I

Site Location Plan
(Figure No. 35261/01)



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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	Site Location Plan	Revision	
		Figure No.	35261/01

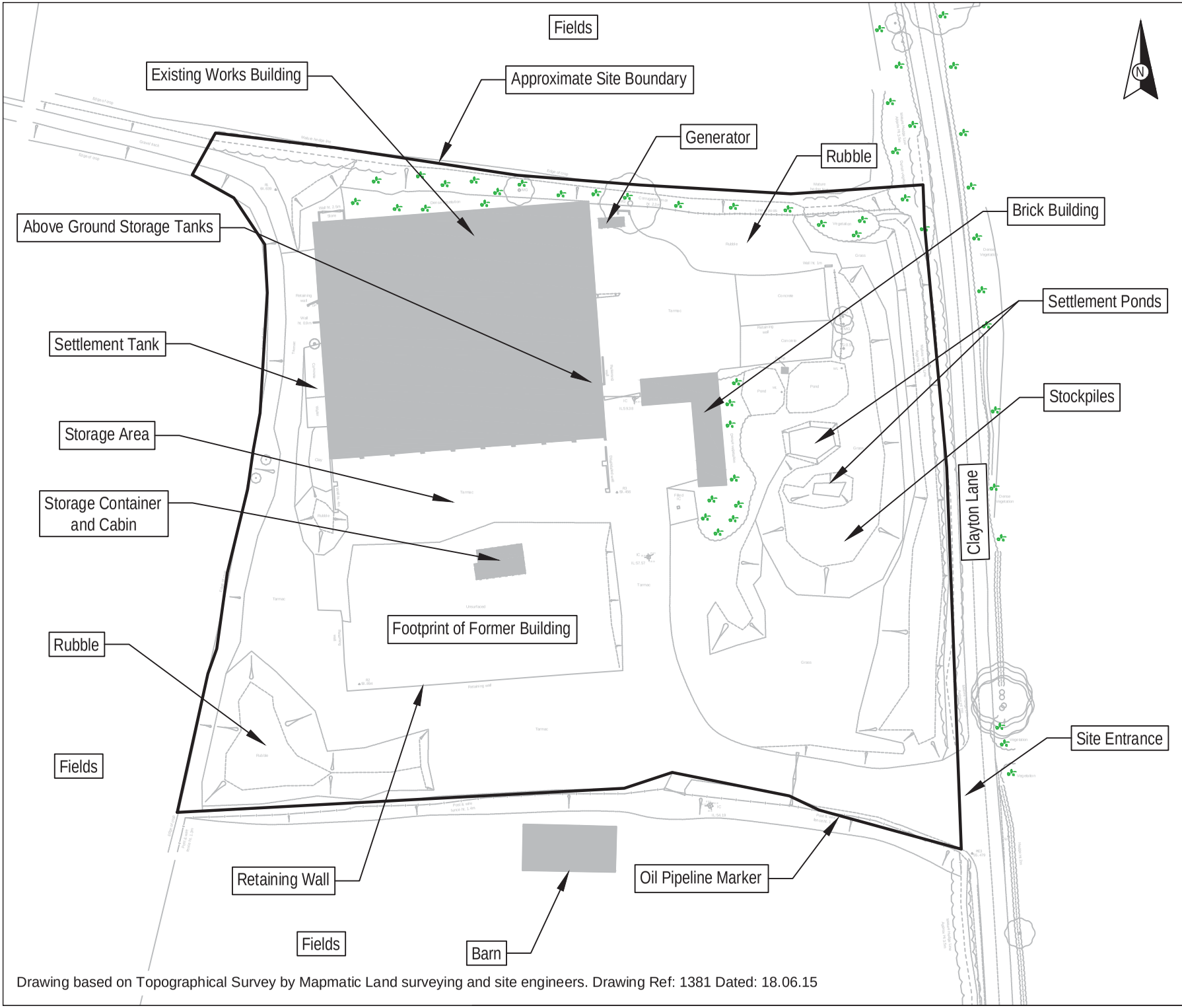
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APPENDIX II

Annotated Site Plan
(Figure No. 35261/02)



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Project No.	35261
Client	Rippon Homes Ltd
Project	Clayton Lane, Thurnscoe
Title	Annotated Site Plan
Drawn By	HW
Checked By	JPH
Approved By	JPH
Scale	NTS
Date Drawn	12/01/2016
Revision	
Figure No.	35261/02

Drawing based on Topographical Survey by Mapmatic Land surveying and site engineers. Drawing Ref: 1381 Dated: 18.06.15

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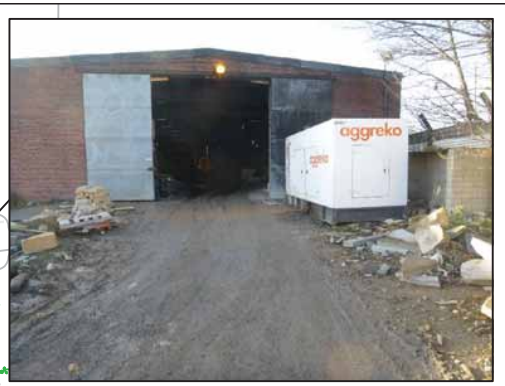
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APPENDIX III

Site Plans Showing General Site Views
(Figure No. 35261/03 & 35261/04)















Drawing based on Topographical Survey by Mapmatic Land surveying and site engineers. Drawing Ref: 1381 Dated: 18.06.15

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Project No.	35261
Client	Rippon Homes Ltd
Project	Clayton Lane, Thurnscoe
Title	Site Plan with General Site Views
Drawn By	HW
Checked By	JPH
Approved By	JPH
Scale	NTS
Date Drawn	27/11/2015
Revision	
Figure No.	35261/03

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Project No.	35261
Client	Rippon Homes Ltd
Project	Clayton Lane, Thurnscoe
Title	Site Plan with General Site Views
Drawn By	HW
Checked By	JPH
Approved By	JPH
Scale	NTS
Date Drawn	27/11/2015
Revision	
Figure No.	35261/04

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APPENDIX IV

Exploratory Hole Location Plan
(Figure No. 35261/05)
&
Plan Showing Depth of Made Ground
(Figure No. 35261/06)



Drawing based on Topographical Survey by Mapmatic Land surveying and site engineers. Drawing Ref: 1381 Dated: 18.06.15

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KEY

NB: All locations shown are approximate

TP - Trial Pit

WS - Window Sample Borehole

(G) Gas/Groundwater Monitoring Standpipe

Project No.	35261
Client	Rippon Homes Ltd
Project	Clayton Lane, Thurnscoe
Title	Exploratory Hole Location Plan
Drawn By	HW
Checked By	JPH
Approved By	JPH
Scale	NTS
Date Drawn	27/11/2015
Revision	
Figure No.	35261/05

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KEY

NB: All locations shown are approximate

TP - Trial Pit

WS - Window Sample Borehole

(G) Gas/Groundwater Monitoring Standpipe

[1.00] Depth of Made Ground (m)

Project No.	35261
Client	Rippon Homes Ltd
Project	Clayton Lane, Thurnscoe
Title	Plan Showing Depth of Made Ground
Drawn By	HW
Checked By	JPH
Approved By	JPH
Scale	NTS
Date Drawn	27/11/2015
Revision	
Figure No.	35261/06

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APPENDIX V

Exploratory Hole Logs

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WS1

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Reinforced concrete floor slab with plastic membrane beneath (MADE GROUND)		0.17 (0.43)			
0.50	D	D1				0.60			
0.80	D	D2		Medium dense to dense grey-brown very clayey sandy sandstone and brick gravel sub-base (MADE GROUND)					
1.00-1.45	C		10				1.00		
				Stiff yellow-brown and light grey slightly silty slightly sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		(1.20)			
						1.80			
2.00-2.45	C		40	Very weak brown mottled light grey very thinly bedded SANDSTONE with frequent clay partings (PENNINE UPPER COAL MEASURES FORMATION)		2.00			
				Very weak grey and brown very thinly bedded SILTSTONE (PENNINE UPPER COAL MEASURES FORMATION)		(1.00)			
3.00-3.45	C		50/145mm			3.00			
				End of Borehole at 3.00 m					

Remarks:

1.Borehole sides generally stable.
2.No water encountered.
3.Borehole terminated at 3.00m begl due to SPT refusal.
4.Borehole backfilled with arisings upon completion.

Key:

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe		**Client:** Rippon Homes Ltd		
Logged: PDA	**Checked & Approved:**	**Field Book Ref:**	**Plant:** Competitor Rig	**Drawing Ref:**
Date: 22/12/2015	JPH	PDA/022	**Scale:** 1:50	WS1

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WS2

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Unreinforced concrete floor slab (MADE GROUND)		0.20			
				Loose to medium dense silty sandy sandstone gravel with rare breeze block fragments (MADE GROUND)					
1.00-1.45	C		7			(1.80)			
1.60	D	D1							
2.00-2.45	C		17			2.00	2.00		
				Stiff grey CLAY (PENNINE UPPER COAL MEASURES FORMATION)		(0.60)			
2.50	D	D2				2.60			
				Very weak brown and grey very thinly bedded SILTSTONE with occasional bands of sandstone and mudstone (PENNINE UPPER COAL MEASURES FORMATION)		(0.40)			
3.00-3.45	C		50			3.00			
				End of Borehole at 3.00 m					

Remarks:
1.Borehole sides unstable to 2.00m begl, sides stable within Natural Strata.
2.No water encountered.
3.Borehole backfilled with arisings upon completion.

Key:
D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
W = Water Sample
S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
▽ = Water Strike (m)
▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe

Client: Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing Ref:
PDA	JPH	PDA/022	Competitor Rig	WS2
Date: 22/12/2015			**Scale:** 1:50	

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WS3

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Macadam surfacing (MADE GROUND)		0.06 (0.34) 0.40			
				Medium dense very silty sandy gravel of sandstone and clinker (MADE GROUND)					
1.00-1.45	C		14	Stiff yellow-brown mottled light grey silty CLAY (PENNINE UPPER COAL MEASURES FORMATION)		(1.20)	1.00		
						1.60			
2.00-2.45	C		50/265mm	Very weak grey-brown very thinly bedded SILTSTONE (PENNINE UPPER COAL MEASURES FORMATION)		(0.40) 2.00			
				End of Borehole at 2.00 m					

Remarks:

1. Borehole sides generally stable.
2. No water encountered.
3. Plain pipe with a bentonite seal installed from ground level to 1.00m begl. Slotted pipe in a gravel surround installed from 1.00m to 2.00m begl.
4. Bung, valve and lockable cover installed.
5. Borehole terminated at 2.00m begl due to SPT refusal.

Key:

- D = Disturbed Sample
- U = Undisturbed Sample
- B = Bulk Sample
- J = Jar Sample
- W = Water Sample
- S = Standard Penetration Test (Split Spoon)
- C = Standard Penetration Test (Cone)
- ▽ = Water Strike (m)
- ▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe		**Client:** Rippon Homes Ltd		
Logged: PDA	**Checked & Approved:**	**Field Book Ref:**	**Plant:** Competitor Rig	**Drawing Ref:**
Date: 22/12/2015	JPH	PDA/022	**Scale:** 1:50	WS3

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WS4

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Firm grey-brown silty sandy gravelly clay. Gravel is predominantly sandstone and occasional concrete (MADE GROUND)		(0.90)			
1.00-1.45	C		15	Firm grey-brown silty slightly sandy CLAY with a slight organic odour (BURIED TOPSOIL)		0.90 0.95	1.00		
2.00-2.45	C		11	Stiff yellow-brown mottled light grey very silty very sandy very gravelly CLAY (PENNINE UPPER COAL MEASURES FORMATION)		(1.25)			
				Very weak grey and dark grey very thinly bedded MUDSTONE with occasional thin bands of coal (PENNINE UPPER COAL MEASURES FORMATION)		2.20 (0.80)			
3.00-3.45	C		50/275mm	End of Borehole at 3.00 m		3.00			

Remarks:

1. Borehole sides gnerally stable.
2. No water encountered.
3. Plain pipe with a bentonite seal installed from ground level to 1.00m begl. Slotted pipe in a gravel surround installed from 1.00m to 3.00m begl.
4. Bung, valve and lockable cover installed.
5. Borehole terminated at 3.00m begl due to SPT refusal.

Key:

- D = Disturbed Sample
- U = Undisturbed Sample
- B = Bulk Sample
- J = Jar Sample
- W = Water Sample
- S = Standard Penetration Test (Split Spoon)
- C = Standard Penetration Test (Cone)
- ▽ = Water Strike (m)
- ▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe		**Client:** Rippon Homes Ltd		
Logged: PDA	**Checked & Approved:**	**Field Book Ref:**	**Plant:** Competitor Rig	**Drawing Ref:**
Date: 22/12/2015	JPH	PDA/022	**Scale:** 1:50	WS4

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WS5

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Macadam surfacing (MADE GROUND)		0.05 (0.35)			
				Medium dense sandy sandstone and limestone gravel sub-base (MADE GROUND)		0.40 (0.30)			
1.00-1.45	C		20	Firm grey-brown silty sandy clay with an organic odour (BURIED TOPSOIL)		0.70 (0.70)	1.00		
				Stiff grey silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		1.40 (0.60)			
2.00-2.45	C		50/245mm	Very weak light grey and yellow-brown very thinly bedded MUDSTONE (PENNINE UPPER COAL MEASURES FORMATION)		2.00			
				End of Borehole at 2.00 m					

Remarks:

1. Borehole sides generally stable.
2. No water encountered.
3. Plain pipe with a bentonite seal installed from ground level to 1.00m begl. Slotted pipe in a gravel surround installed from 1.00m to 2.00m begl.
4. Bung, valve and lockable cover installed.
5. Borehole terminated at 2.00m begl due to SPT refusal.

Key:

- D = Disturbed Sample
- U = Undisturbed Sample
- B = Bulk Sample
- J = Jar Sample
- W = Water Sample
- S = Standard Penetration Test (Split Spoon)
- C = Standard Penetration Test (Cone)
- ▽ = Water Strike (m)
- ▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe		**Client:** Rippon Homes Ltd		
Logged: PDA	**Checked & Approved:**	**Field Book Ref:**	**Plant:** Competitor Rig	**Drawing Ref:**
Date: 22/12/2015	JPH	PDA/022	**Scale:** 1:50	WS5

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WS6

Project No. 35261

Sheet 1 of 1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
				Soft buff silty clay (MADE GROUND)		0.20			
				Firm grey-brown silty sandy very gravelly clay. Gravel is predominantly brick, concrete and sandstone (MADE GROUND)		(0.90)			
1.00-1.45	C		18			1.10			
				Firm grey-brown silty sandy clay with an organic odour (BURIED TOPSOIL)		(0.40) 1.50			
				Stiff yellow-brown and light grey silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		(0.50) 2.00			
2.00-2.45	C		20						
				Very weak brown and grey-brown very thinly bedded SILTSTONE (PENNINE UPPER COAL MEASURES FORMATION)		(1.00)			
3.00-3.45	C		50/285mm			3.00			
				End of Borehole at 3.00 m					

Remarks:

1. Borehole sides generally stable.
2. No water encountered.
3. Plain pipe with a bentonite seal installed from ground level to 1.00m begl. Slotted pipe in a gravel surround installed from 1.00m to 3.00m begl.
4. Bung, valve and lockable cover installed.
5. Borehole terminated at 3.00m begl due to SPT refusal.

Key:

- D = Disturbed Sample
- U = Undisturbed Sample
- B = Bulk Sample
- J = Jar Sample
- W = Water Sample
- S = Standard Penetration Test (Split Spoon)
- C = Standard Penetration Test (Cone)
- ▽ = Water Strike (m)
- ▼ = Steady Water Level (m)

Project: Site off Clayton Lane, Thurnscoe		**Client:** Rippon Homes Ltd		
Logged: PDA	**Checked & Approved:**	**Field Book Ref:**	**Plant:** Competitor Rig	**Drawing Ref:**
Date: 22/12/2015	JPH	PDA/022	**Scale:** 1:50	WS6

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TP1

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Loose grey-brown sandy very clayey gravel and cobbles of sandstone with brick and rare plastic (MADE GROUND)		0.10	D1	D			
Medium dense buff slightly clayey limestone gravel sub-base (MADE GROUND)		1.00					
Firm to stiff dark grey-brown silty slightly sandy CLAY with a slight organic odour (BURIED TOPSOIL)		1.20 1.30	D2	D			
Stiff yellow-brown and grey slightly silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		1.50 1.60 1.70	B1	B	SV	80 72 76	
...becoming light grey below approximately 1.90m begl							
End of Trial Pit at 2.80 m		2.80					

Remarks:
1.Trial pit sides unstable within Made Ground, sides generally stable within Natural Strata.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m²) P = Penetrometer (kN/m²)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP1
Date: 25/11/2015			**Scale:** 1:20	

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TP2

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Loose sandy clayey gravel of brick, tile and concrete with occasional metal and plastic and rare possible asbestos cement tile fragments (MADE GROUND)		0.20	D1	D			
		0.90	B1	B			
...concrete pad/base to 1.00m in southern side of pit extended to north		1.10			SV	100	
Firm to stiff grey-brown silty CLAY (PENNINE UPPER COAL MEASURES FORMATION)		1.15 1.20				110	
Weak yellow-brown very thinly bedded SANDSTONE (PENNINE UPPER COAL MEASURES FORMATION)		1.30	D2/B2	D/B		108	
End of Trial Pit at 1.40 m		1.40					

Remarks:

1.Trial pit sides unstable within Made Ground, sides generally stable within Natural Strata.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.
4.Hard dig at bottom of pit.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP2
Date: 25/11/2015			**Scale:** 1:20	

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TP3

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Thin layer of macadam over limestone gravel sub-base (MADE GROUND)							
		0.50					
Firm dark grey-brown silty CLAY with rare wood fragments and a slight organic odour (BURIED TOPSOIL)		0.60	D1	D			
		0.80					
Stiff light grey and yellow-brown CLAY (PENNINE UPPER COAL MEASURES FORMATION)		0.90			SV	90	
		1.00	D2/B2	D/B		78 80	
		2.10					
Very weak very thinly bedded MUDSTONE (PENNINE UPPER COAL MEASURES FORMATION)							
End of Trial Pit at 2.80 m		2.80					

Remarks:
1.Trial pit sides generally stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP3
Date: 25/11/2015			**Scale:** 1:20	

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TP4

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Macadam surfacing (MADE GROUND)		0.10					
Limestone gravel sub-base (MADE GROUND)							
Firm dark grey-brown silty CLAY with slightly organic odour (BURIED TOPSOIL)		0.50					▽
Stiff yellow-brown slightly silty CLAY (PENNINE UPPER COAL MEASURES FORMATION)		0.80 0.90 0.90	D1	D	SV	82 80 70	
End of Trial Pit at 2.70 m		2.70					

Remarks:
1.Trial pit sides unstable within Made Ground.
2.Sides generally stable in Natural Strata.
3.No water encountered.
4.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m²) P = Penetrometer (kN/m²)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP4
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP5

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Soft dark brown sandy clay with occasional fragments of brick, tile, glass, plastic and tyres (MADE GROUND)							
		1.50	D1	D			
Very weak grey-brown very thinly bedded MUDSTONE (PENNINE UPPER COAL MEASURES FORMATION)		1.80					
		2.00	B1	B			
End of Trial Pit at 2.60 m		2.60					

Remarks:
1.Trial pit sides unstable within Made Ground, sides generally stable within Natural Strata.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP5
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP6

Project No: 35261

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Soft dark brown silty sandy clay with occasional fragments and cobbles of concrete, plastic and rare metal (MADE GROUND)		0.40	D1	D			
Firm dark grey-brown silty sandy CLAY with a slight organic odour (BURIED TOPSOIL)		0.60					
Stiff yellow-brown and grey slightly silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		1.00 1.10 1.20	D2/B1	D/B	SV	68 70 74	▽
Very weak yellow-brown very thinly bedded SANDSTONE (PENNINE UPPER COAL MEASURES FORMATION)		2.20					
Stiff dark grey CLAY grading into dark grey-black very thinly laminated shale with occasional bands of coal (PENNINE UPPER COAL MEASURES FORMATION)		2.50					

Continued on next sheet

Remarks:

1.Trial pit sides generally stable.
2.Water encountered as seepage at 2.20m begl.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m²) P = Penetrometer (kN/m²)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP6
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP6

Project No: 35261

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Stiff dark grey CLAY grading into dark grey-black very thinly laminated shale with occasional bands of coal (PENNINE UPPER COAL MEASURES FORMATION)							
		3.50					
End of Trial Pit at 3.50 m							

Remarks:
1.Trial pit sides generally stable.
2.Water encountered as seepage at 2.20m begl.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP6
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
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Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP7

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Loose sandy brick rubble (MADE GROUND)							
		1.20	D1	D			
Stiff brown very silty sandy to very sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		1.30					
		2.60					
Very weak yellow-brown very thinly bedded SANDSTONE. Recovered as silty clayey very sandy gravel (PENNINE UPPER COAL MEASURES FORMATION)							
		2.90					
End of Trial Pit at 2.90 m							

Remarks:

1.Trial pit sides unstable within Made Ground, sides generally stable in Natural Strata.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.
4.Hard dig at bottom of pit.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP7
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
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TP8

Project No: 35261

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Soft brown clayey silt (possible settlement pond arisings) with rare plastic fragments and timber and metal (MADE GROUND)		0.40	D1	D			
Firm dark grey-brown silty sandy CLAY with a slight organic odour (BURIED TOPSOIL)		1.90					
Firm to stiff brown silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		2.20 2.30	D2	D			

Continued on next sheet

Remarks:
1.Trial pit sides generally stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP8
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP8

Project No: 35261

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Firm to stiff brown silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)							
		3.50					
End of Trial Pit at 3.50 m							

Remarks:
1.Trial pit sides generally stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP8
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park, Clumber Avenue
Nottingham NG5 1AH
Tel: 0115 962 0001
email: info@geodyne.co.uk

TP9

Project No: 35261

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-Water
Macadam surfacing (MADE GROUND)		0.10					
Loose sandy clinker gravel and quartzite sub-base (MADE GROUND)		0.30					
Stiff yellow-brown and light grey silty sandy CLAY (PENNINE UPPER COAL MEASURES FORMATION)		0.50	D1/B1	D/B			
		0.80			SV	110 80 86	
Very weak grey-brown very thinly bedded SANDSTONE (PENNINE UPPER COAL MEASURES FORMATION)		1.60					
End of Trial Pit at 2.20 m		2.20					

Remarks:
1.Trial pit sides generally stable.
2.No water encountered.
3.Trial pit backfilled with arisings upon completion.
4.Hard dig at bottom of pit.

Key: B = Bulk Sample D = Disturbed Sample W = Water Sample SV = Shear Vane (kN/m^2) P = Penetrometer (kN/m^2)
J = Jar Sample V = Vial Sample T = Tub Sample ▽ = Water Strike (m) ▼ = Steady Water Level (m)

Project:
Site off Clayton Lane, Thurnscoe

Client:
Rippon Homes Ltd

Logged:	Checked & Approved:	Field Book Ref:	Plant:	Drawing No.
PDA	JPH	PDA/022	JCB 3CX	TP9
Date: 25/11/2015			**Scale:** 1:20	

GeoDyne

APPENDIX VI

Laboratory Soil Test Results
&
CLEA Mean and Maximum Value Test Results

envirolab
Units 7 & 8 Sandpits Business Park
Mottram Road, Hyde, Cheshire, SK14 3AR

FINAL ANALYTICAL TEST REPORT

Envirolab Job Number: 15/07704
Issue Number: 1 **Date:** 07 December, 2015

Client:
GeoDyne (Nottingham)
Unit 2, 2 Clarendon House
Clarendon Business Park
Clumber Avenue
Nottingham
Nottinghamshire
UK
NG5 1AH

Project Manager: info/Phil Anelay
Project Name: Site off Clayton Lane, Thurnscoe
Project Ref: 35261
Order No: 35261/PA
Date Samples Received: 30/11/15
Date Instructions Received: 30/11/15
Date Analysis Completed: 07/12/15

Prepared by:

Melanie Marshall
Laboratory Coordinator

Approved by:

Lianne Bromiley
Senior Client Manager

UKAS TESTING 1247

Envirolab Job Number: 15/07704

Client Project Name: Site off Clayton Lane, Thurnscoe

Client Project Ref: 35261

Lab Sample ID	15/07704/1	15/07704/2	15/07704/3	15/07704/4	15/07704/9	15/07704/10	15/07704/11	15/07704/13	Units	Method ref
Client Sample No	D1	D2	D1	B1	D1	D1	D2	D1		
Client Sample ID	TP1	TP1	TP2	TP2	TP5	TP6	TP6	TP8		
Depth to Top	0.10	1.30	0.20	0.90	1.50	0.40	1.20	0.40		
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D	Soil - D	Solid - Fragment / Tile	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	4ABE	6A	4AB	8	6AE	6AE	5	5A		
% Stones >10mm$_A$ #	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	% w/w	A-T-044
pH$_D$ M#	9.18	7.44	8.56	-	-	8.59	7.81	8.66	pH	A-T-031s
Sulphate (water sol 2:1)$_D$ M#	-	0.06	-	-	-	-	0.09	-	g/l	A-T-026s
Total Organic Carbon$_D$ M#	2.66	2.07	1.17	-	-	1.44	0.21	0.10	% w/w	A-T-032s
Arsenic$_D$ M#	8	9	12	-	-	8	1	4	mg/kg	A-T-024s
Cadmium$_D$ M#	<0.5	<0.5	<0.5	-	-	<0.5	<0.5	<0.5	mg/kg	A-T-024s
Copper$_D$ M#	67	19	32	-	-	19	6	26	mg/kg	A-T-024s
Chromium$_D$ M#	17	31	21	-	-	18	13	9	mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1	<1	-	-	<1	<1	<1	mg/kg	A-T-040s
Chromium (trivalent)	17	31	21	-	-	18	13	9	mg/kg	Calc
Lead$_D$ M#	286	37	43	-	-	24	9	8	mg/kg	A-T-024s
Mercury$_D$	0.99	0.18	0.22	-	-	0.71	<0.17	0.38	mg/kg	A-T-024s
Nickel$_D$ M#	13	21	22	-	-	16	13	25	mg/kg	A-T-024s
Selenium$_D$	1	2	<1	-	-	1	<1	<1	mg/kg	A-T-024s
Zinc$_D$ M#	420	89	111	-	-	86	30	28	mg/kg	A-T-024s

Envirolab Job Number: 15/07704

Client Project Name: Site off Clayton Lane, Thurnscoe

Client Project Ref: 35261

Lab Sample ID	15/07704/1	15/07704/2	15/07704/3	15/07704/4	15/07704/9	15/07704/10	15/07704/11	15/07704/13	Units	Method ref
Client Sample No	D1	D2	D1	B1	D1	D1	D2	D1		
Client Sample ID	TP1	TP1	TP2	TP2	TP5	TP6	TP6	TP8		
Depth to Top	0.10	1.30	0.20	0.90	1.50	0.40	1.20	0.40		
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D	Soil - D	Solid - Fragment / Tile	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	4ABE	6A	4AB	8	6AE	6AE	5	5A		
Asbestos in Soil (inc. matrix)										
Asbestos in soil$_A^{\#}$	NAD	-	Chrysotile	-	NAD	-	NAD	-		A-T-045
Asbestos Matrix (visual)$_A$	-	-	Cement	-	-	-	-	-		A-T-045
Asbestos ACM - Suitable for Water Absorption Test?$_D$	N/A	-	Yes	-	N/A	-	N/A	-		Gravimetry
Bulk Fibre ID (inc. matrix)										
Bulk Fibre Identification$_A^{\#}$	-	-	-	Chrysotile	-	-	-	-		A-T-045
Bulk Fibre Identification Matrix (visual)$_A$	-	-	-	Cement	-	-	-	-		A-T-045
Bulk Fibre Identification - Suitable for Water Absorption Test?$_D$	-	-	-	Yes	-	-	-	-		Gravimetry

Envirolab Job Number: 15/07704

Client Project Name: Site off Clayton Lane, Thurnscoe

Client Project Ref: 35261

Lab Sample ID	15/07704/1	15/07704/2	15/07704/3	15/07704/4	15/07704/9	15/07704/10	15/07704/11	15/07704/13	Units	Method ref
Client Sample No	D1	D2	D1	B1	D1	D1	D2	D1		
Client Sample ID	TP1	TP1	TP2	TP2	TP5	TP6	TP6	TP8		
Depth to Top	0.10	1.30	0.20	0.90	1.50	0.40	1.20	0.40		
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D	Soil - D	Solid - Fragment / Tile	Soil - D	Soil - D	Soil - D	Soil - D		
Sample Matrix Code	4ABE	6A	4AB	8	6AE	6AE	5	5A		
PAH 16 (0.1 LOD)										
Acenaphthene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	0.1	<0.1	0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	0.1	<0.1	0.1	-	-	0.1	<0.1	<0.1	mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	0.2	0.2	0.2	-	-	0.2	<0.1	<0.1	mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Benzo(k)fluoranthene $_A^{M\#}$	<0.1	<0.1	0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Chrysene$_A^{M\#}$	0.1	<0.1	0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	0.2	0.2	0.2	-	-	0.2	<0.1	0.1	mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.1	<0.1	<0.1	-	-	<0.1	<0.1	<0.1	mg/kg	A-T-019s
Pyrene$_A^{M\#}$	0.2	0.2	0.2	-	-	0.2	<0.1	0.1	mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	1.6	1.1	1.6	-	-	1.1	<0.1	0.6	mg/kg	A-T-019s

Envirolab Job Number: 15/07704

Client Project Name: Site off Clayton Lane, Thurnscoe

Client Project Ref: 35261

Lab Sample ID	15/07704/14	15/07704/15							Units	Method ref
Client Sample No	D2	D1								
Client Sample ID	TP8	TP9								
Depth to Top	2.30	0.50								
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	4A	5								
% Stones >10mm$_A^{\#}$	<0.1	<0.1							% w/w	A-T-044
pH$_D^{M\#}$	7.98	7.86							pH	A-T-031s
Sulphate (water sol 2:1)$_D^{M\#}$	0.03	0.05							g/l	A-T-026s
Total Organic Carbon$_D^{M\#}$	0.25	0.10							% w/w	A-T-032s
Arsenic$_D^{M\#}$	4	2							mg/kg	A-T-024s
Cadmium$_D^{M\#}$	<0.5	<0.5							mg/kg	A-T-024s
Copper$_D^{M\#}$	10	23							mg/kg	A-T-024s
Chromium$_D^{M\#}$	16	26							mg/kg	A-T-024s
Chromium (hexavalent)$_D$	<1	<1							mg/kg	A-T-040s
Chromium (trivalent)	16	26							mg/kg	Calc
Lead$_D^{M\#}$	8	15							mg/kg	A-T-024s
Mercury$_D$	<0.17	<0.17							mg/kg	A-T-024s
Nickel$_D^{M\#}$	20	29							mg/kg	A-T-024s
Selenium$_D$	<1	<1							mg/kg	A-T-024s
Zinc$_D^{M\#}$	49	68							mg/kg	A-T-024s

Envirolab Job Number: 15/07704

Client Project Name: Site off Clayton Lane, Thurnscoe

Client Project Ref: 35261

Lab Sample ID	15/07704/14	15/07704/15							Units	Method ref
Client Sample No	D2	D1								
Client Sample ID	TP8	TP9								
Depth to Top	2.30	0.50								
Depth To Bottom										
Date Sampled										
Sample Type	Soil - D	Soil - D								
Sample Matrix Code	4A	5								
PAH 16 (0.1 LOD)										
Acenaphthene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Acenaphthylene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Anthracene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(a)anthracene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(a)pyrene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(b)fluoranthene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(ghi)perylene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Benzo(k)fluoranthene $_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Chrysene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Dibenzo(ah)anthracene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Fluoranthene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Fluorene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Indeno(123-cd)pyrene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Naphthalene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Phenanthrene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
Pyrene$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s
PAH (total 16)$_A^{M\#}$	<0.1	<0.1							mg/kg	A-T-019s

REPORT NOTES

Notes - Soil chemical analysis
All results are reported as dry weight (<40°C).
For samples with Matrix Codes 1 - 6 natural stones and brick and concrete fragments >10mm are removed or excluded from the sample prior to analysis and reported results corrected to a whole sample basis. For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis.

Notes - General
This report shall not be reproduced, except in full, without written approval from Envirolab.
Subscript "A" indicates analysis performed on the sample as received. "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve, unless asbestos is found to be present in which case all analysis is performed on the sample as received.
All analysis is performed on the dried and crushed sample for samples with Matrix Code 7 and this supersedes any "A" subscripts.
All analysis is performed on the sample as received for soil samples which are positive for asbestos and/or if they are from outside the European Union and this supercedes any "D" subscripts.
Superscript "M" indicates method accredited to MCERTS.
If results are in italic font they are associated with an AQC failure. These are not accredited and are unreliable.
A deviating samples report is appended and will indicate if samples or tests have been found to be deviating. Any test results affected may not be an accurate record of the concentration at the time of sampling and, as a result, may be invalid.

TPH analysis of water by method A-T-007
Free and visible oils are excluded from the sample used for analysis so that the reported result represents the dissolved phase only.

Asbestos in soil
Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if present as discrete fibres/fragments. Stones etc. are not removed from the sample prior to analysis.
Quantification of asbestos is a 3 stage process including visual identification, hand picking and weighing and fibre counting by sedimentation/phase contrast optical microscopy if required. If asbestos is identified as being present but is not in a form that is suitable for analysis by hand picking and weighing (normally if the asbestos is present as free fibres) quantification by sedimentation is performed. Where ACMs are found a percentage asbestos is assigned to each with reference to 'HSG264, Asbestos: The survey guide' and the calculated asbestos content is expressed as a percentage of the dried soil sample aliquot used.

Predominant Matrix Codes:
1 = SAND, 2 = LOAM, 3 = CLAY, 4 = LOAM/SAND, 5 = SAND/CLAY, 6 = CLAY/LOAM, 7 = OTHER, 8 = Asbestos bulk ID sample.
Samples with Matrix Code 7 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations.

Secondary Matrix Codes:
A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal, E = contains roots/twigs.

IS indicates Insufficient sample for analysis.
NDP indicates No Determination Possible.
NAD indicates No Asbestos Detected.
N/A indicates Not Applicable.
Superscript # indicates method accredited to ISO 17025.
Analytical results reflect the quality of the sample at the time of analysis only. Opinions and interpretations expressed are outside the scope of our accreditation.

Please contact us if you need any further information.

PSL
Professional Soils Laboratory

LABORATORY REPORT

UKAS TESTING
4043

Contract Number: PSL15/6137

Report Date: 04 January 2016

Client's Reference: 35261

Client Name: Geodyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH

For the attention of: Phil Anelay

Contract Title: Site off Clayton Lane, Thurnscoe

Date Received: 21/12/2015
Date Commenced: 21/12/2015
Date Completed: 23/12/2015

Notes: Opinions and Interpretations are outside the UKAS Accreditation

A copy of the Laboratory Schedule of accredited tests as issued by UKAS is attached to this report. This certificate is issued in accordance with the accreditation requirements of the United Kingdom Accreditation Service. The results reported herein relate only to the material supplied to the laboratory. This certificate shall not be reproduced in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson (Director)
A Watkins (Director)
M Beastall (Laboratory Manager)
D Lambe (Senior Technician)
S Royle (Senior Technician)

5 – 7 Hexthorpe Road, Hexthorpe,
Doncaster DN4 0AR
tel: +44 (0)844 815 6641
fax: +44 (0)844 815 6642
e-mail: rgunson@prosoils.co.uk
awatkins@prosoils.co.uk

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
TP1	1	B	1.60		Brown slightly sandy CLAY.
TP3	1	B	1.00		Grey slightly sandy CLAY.
TP6	1	B	1.20		Brown slightly gravelly sandy CLAY.
TP9	1	B	0.50		Brown mottled grey sandy CLAY.

UKAS TESTING 4043

PSL Professional Soils Laboratory

Checked / Approved		Date	23/12/15	Contract No:
Site Off Clayton Lane, Thurnscoe				PSL15/6137
				Client Ref:
				35261

SUMMARY OF SOIL CLASSIFICATION TESTS

(BS1377 : PART 2 : 1990)

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Moisture Content % Clause 3.2	Linear Shrinkage % Clause 6.5	Particle Density Mg/m^3 Clause 8.2	Liquid Limit % Clause 4.3/4	Plastic Limit % Clause 5.3	Plasticity Index % Clause 5.4	Passing .425mm %	Remarks
TP1	1	B	1.60		30			66	30	36	100	High plasticity CH.
TP3	1	B	1.00		26			62	28	34	100	High plasticity CH.
TP6	1	B	1.20		21			41	23	18	92	Intermediate plasticity CI.
TP9	1	B	0.50		20			50	25	25	100	High plasticity CH.

SYMBOLS : **NP : Non Plastic** *** : Liquid Limit and Plastic Limit Wet Sieved.**

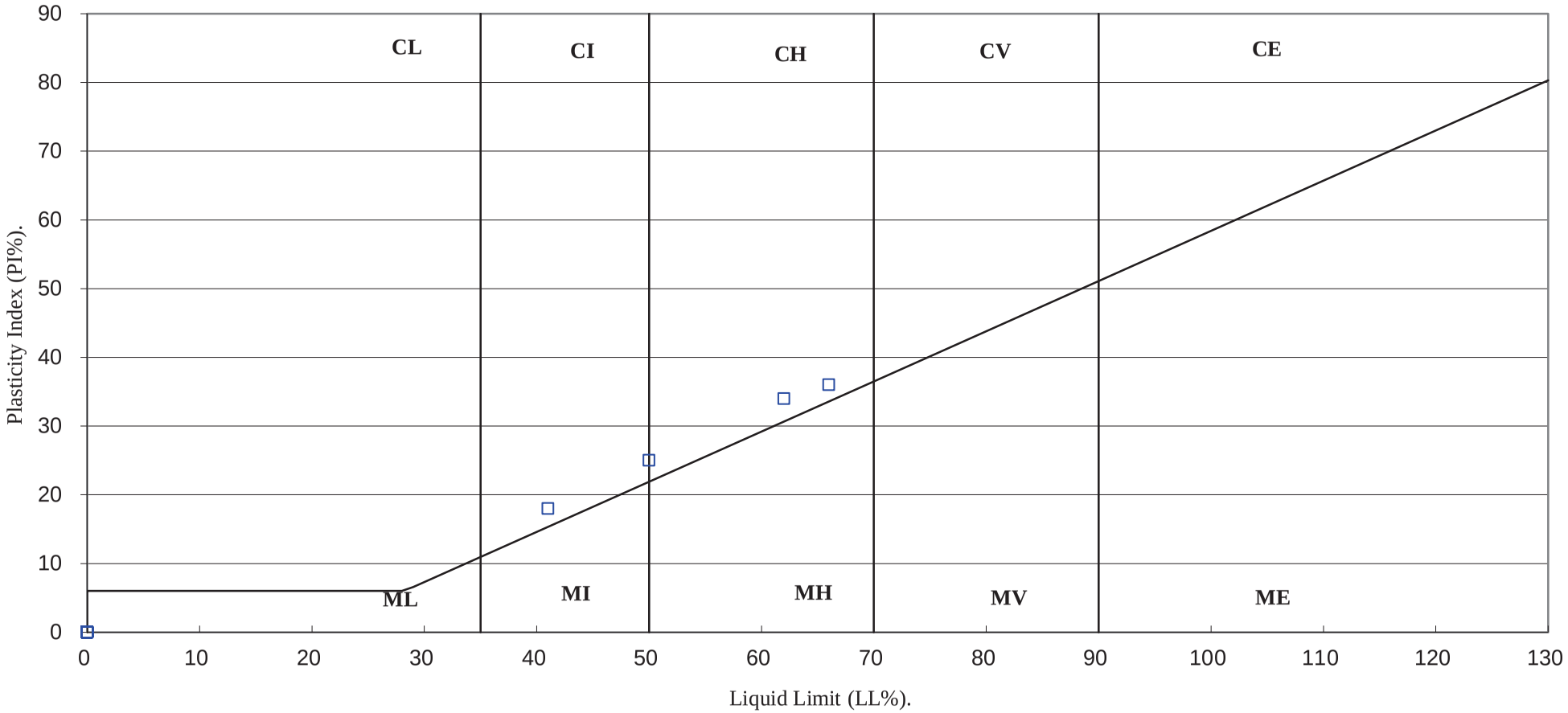
UKAS TESTING 4043

PSL Professional Soils Laboratory

Checked / Approved		Date	23/12/15	Contract No:
Site Off Clayton Lane, Thurnscoe				PSL15/6137
				Client Ref:
				35261

PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.

(BS5930 :2015)



UKAS TESTING 4043	PSL Professional Soils Laboratory	**Checked /Approved**		**Date**	23/12/15	**Contract No:**
		Site Off Clayton Lane, Thurnscoe				**PSL15/6137**
						Client Ref:
						35261

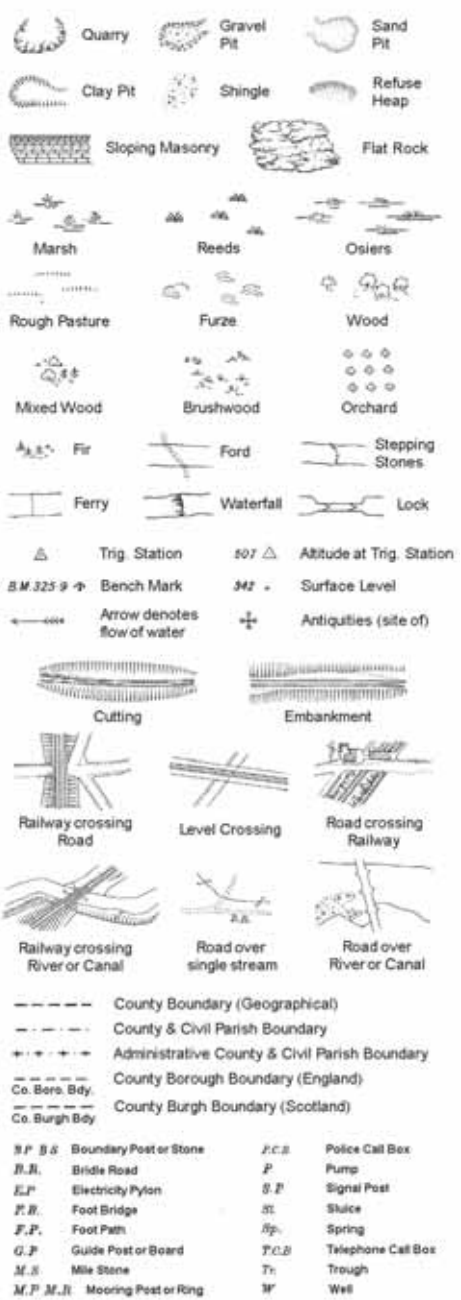
GeoDyne

APPENDIX VII

Historical Plans

Historical Mapping Legends

Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



B.S	Boundary Post or Stone	P.C.B.	Police Call Box
B.R.	Bridle Road	P	Pump
E.P	Electricity Pylon	S.P	Signal Post
F.B.	Foot Bridge	Sl.	Sluice
F.P.	Foot Path	Sp.	Spring
G.P	Guide Post or Board	T.C.B	Telephone Call Box
M.S	Mile Stone	Tr.	Trough
M.P M.R.	Mooring Post or Ring	W	Well

Ordnance Survey Plan, Additional SIMs and Supply of Unpublished Survey Information 1:2,500 and 1:1,250



BH	Beer House	P	Pillar, Pole or Post
BP, BS	Boundary Post or Stone	PO	Post Office
Cn, C	Capstan, Crane	PC	Public Convenience
Chy	Chimney	PH	Public House
D Fn	Drinking Fountain	Pp	Pump
El P	Electricity Pillar or Post	SB, S Br	Signal Box or Bridge
FAP	Fire Alarm Pillar	SP, SL	Signal Post or Light
FB	Foot Bridge	Spr	Spring
GP	Guide Post	Tk	Tank or Track
H	Hydrant or Hydraulic	TCB	Telephone Call Box
LC	Level Crossing	TCP	Telephone Call Post
MH	Manhole	Tr	Trough
MP	Mile Post or Mooring Post	Wr Pt, Wr T	Water Point, Water Tap
MS	Mile Stone	W	Well
NTL	Normal Tidal Limit	Wd Pp	Wind Pump

Large-Scale National Grid Data 1:2,500 and 1:1,250



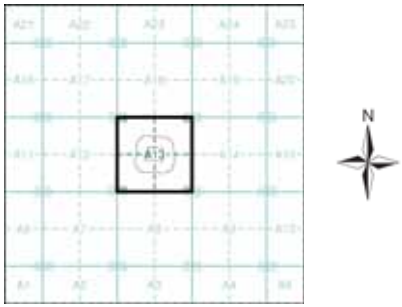
Bks	Barracks	P	Pillar, Pole or Post
Bty	Battery	PO	Post Office
Cemy	Cemetery	PC	Public Convenience
Chy	Chimney	Pp	Pump
Cis	Cistern	Ppg Sta	Pumping Station
Dismtd Rly	Dismantled Railway	PW	Place of Worship
El Gen Sta	Electricity Generating Station	Sewage Ppg Sta	Sewage Pumping Station
El P	Electricity Pole, Pillar	SB, S Br	Signal Box or Bridge
El Sub Sta	Electricity Sub Station	SP, SL	Signal Post or Light
FB	Filter Bed	Spr	Spring
Fn / D Fn	Fountain / Drinking Ftn.	Tk	Tank or Track
Gas Gov	Gas Valve Compound	Tr	Trough
GVC	Gas Governer	Wd Pp	Wind Pump
GP	Guide Post	Wr Pt, Wr T	Water Point, Water Tap
MH	Manhole	Wks	Works (building or area)
MP, MS	Mile Post or Mile Stone	W	Well

GeoDyne

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:2,500	1892	2
Yorkshire	1:2,500	1906	3
Yorkshire	1:2,500	1930	4
Ordnance Survey Plan	1:1,250	1961	5
Ordnance Survey Plan	1:2,500	1962	6
Ordnance Survey Plan	1:1,250	1971	7
Additional SIMs	1:2,500	1988	8
Large-Scale National Grid Data	1:1,250	1993	9

Historical Map - Segment A13



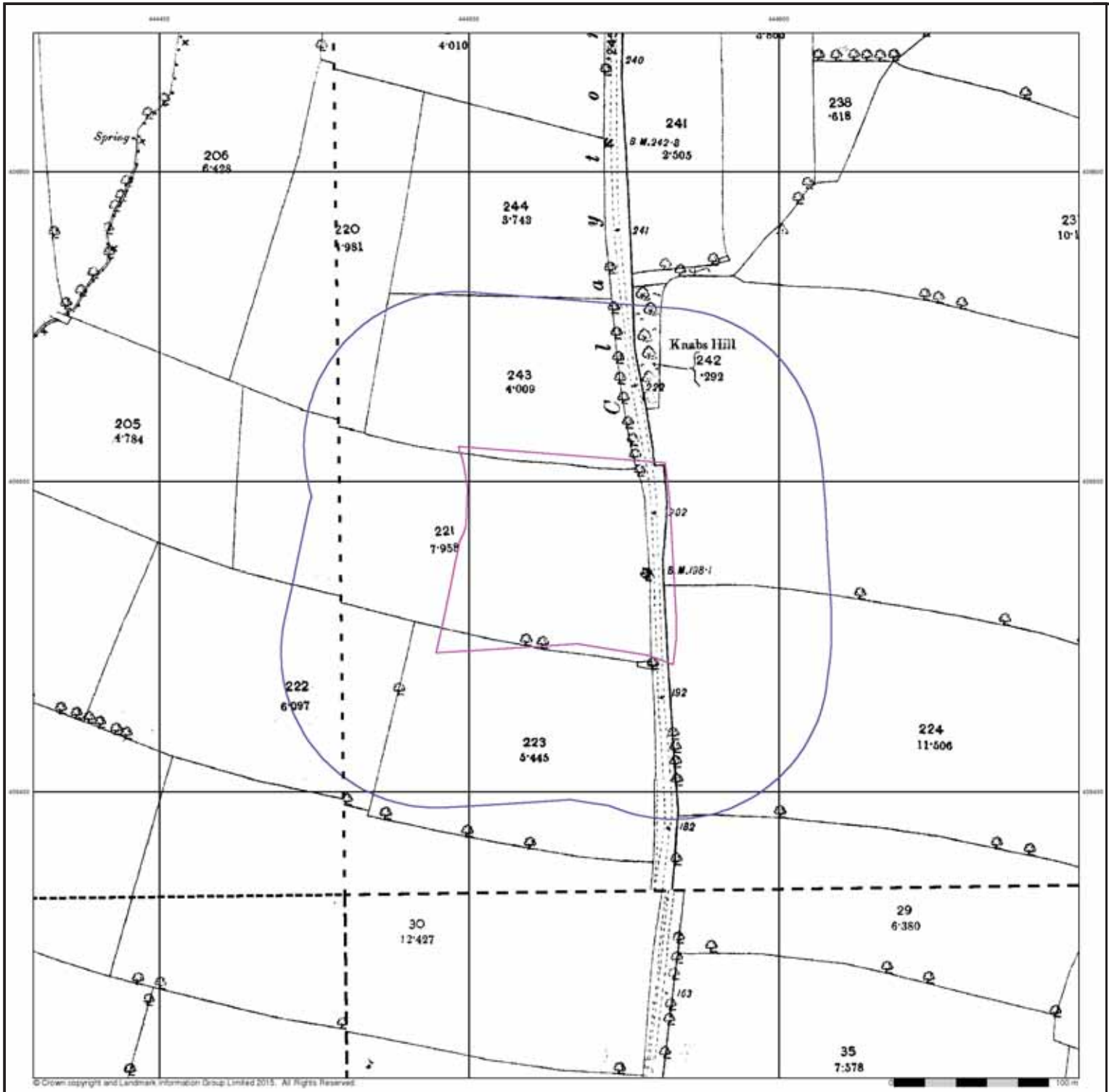
Order Details

Order Number: 74838960_1_1
Customer Ref: 35261
National Grid Reference: 444660, 406550
Slice: A
Site Area (Ha): 1.76
Search Buffer (m): 100

Site Details

Clayton Lane, Thurnscoe

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



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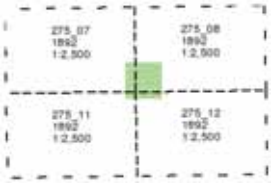
Yorkshire

Published 1892

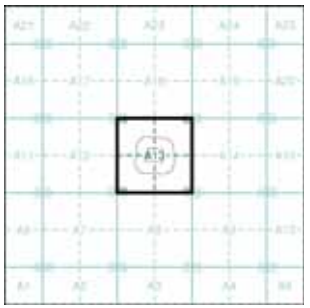
Source map scale - 1:2,500

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

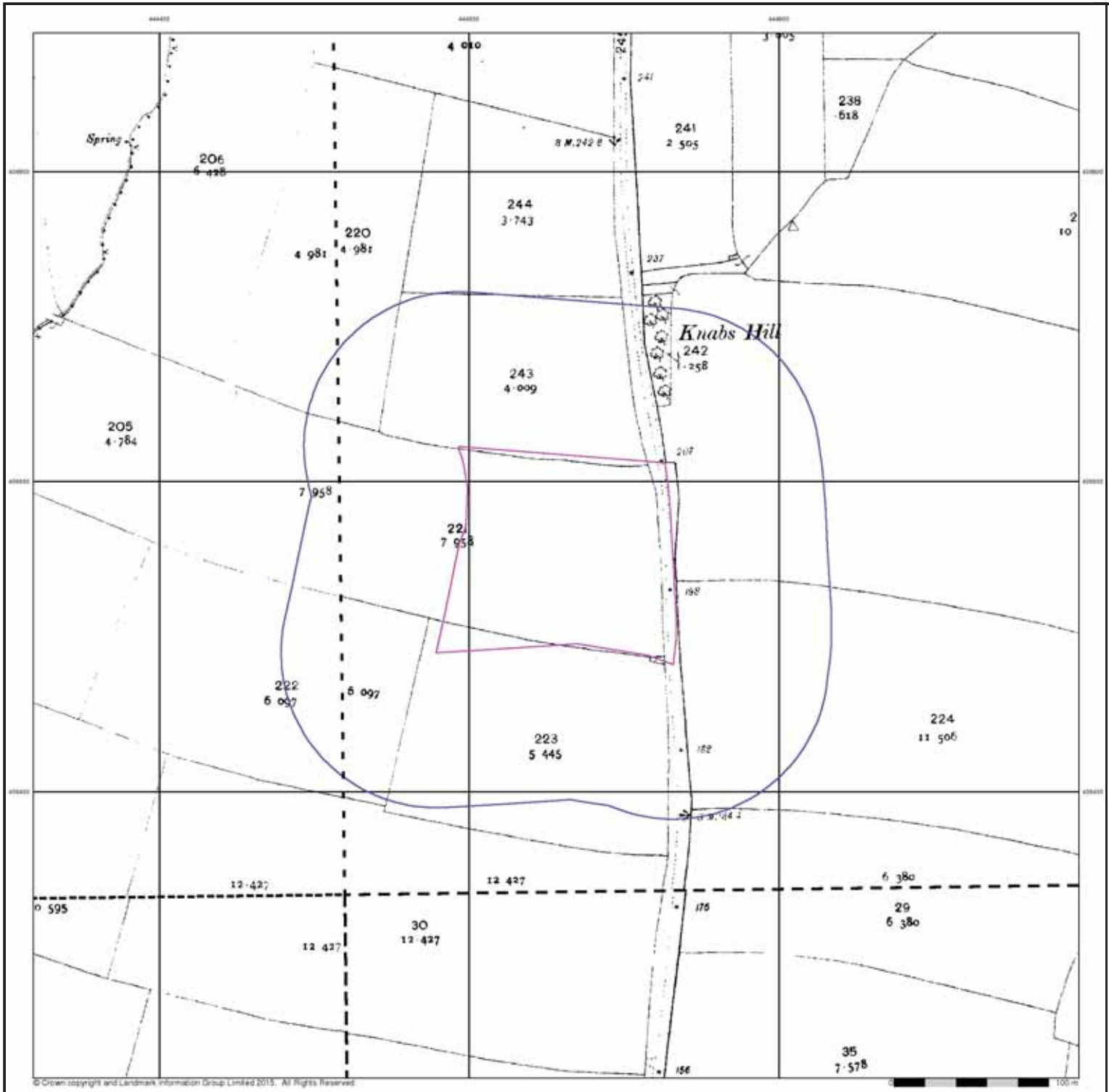
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Search Buffer (m):	100

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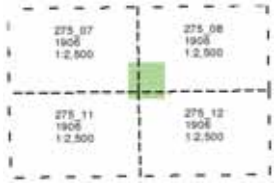
Yorkshire

Published 1906

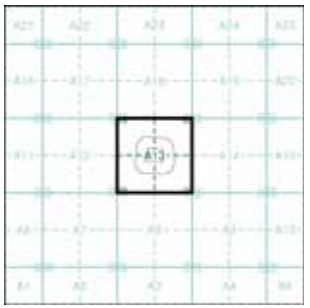
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



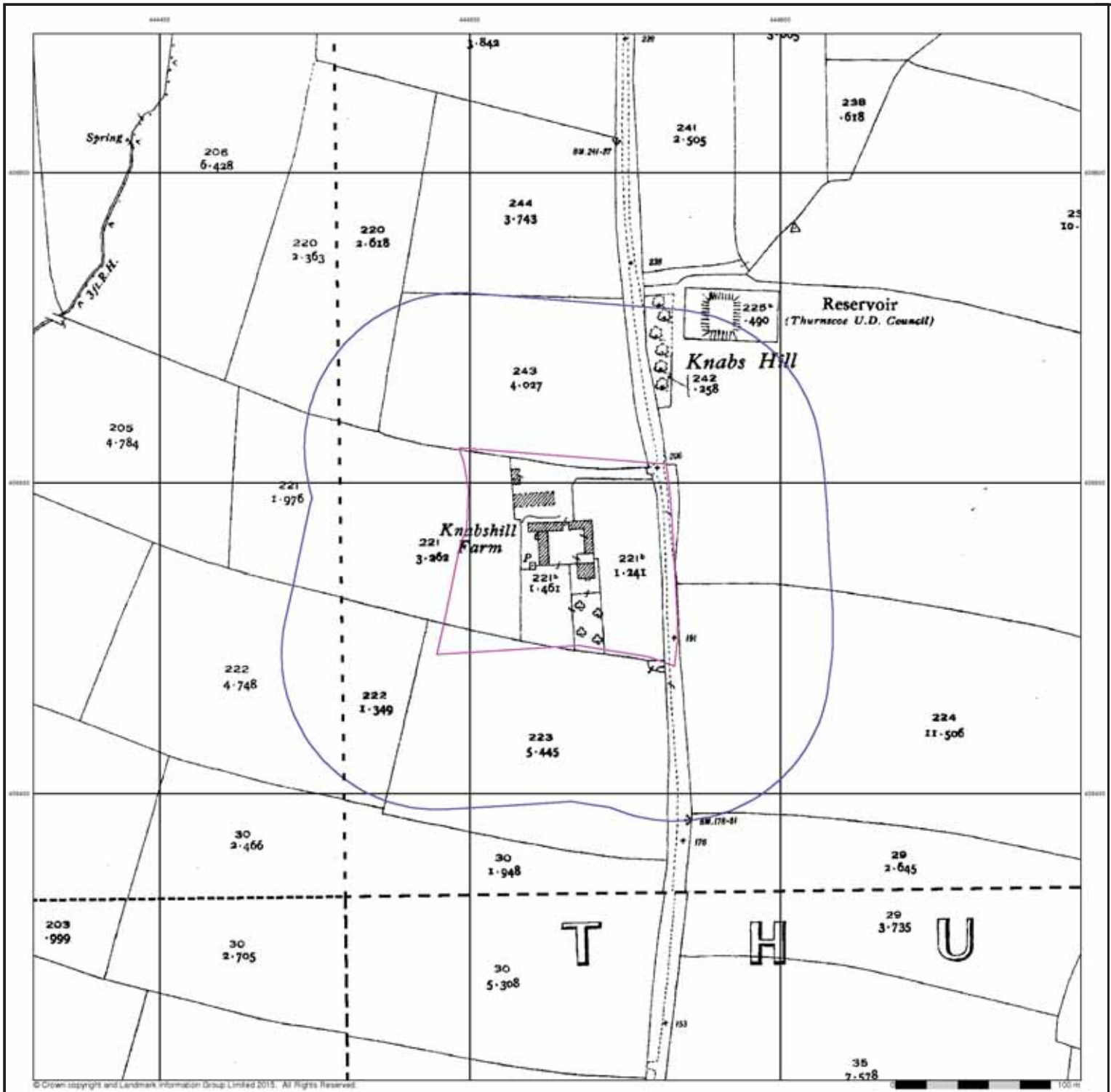
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National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	100

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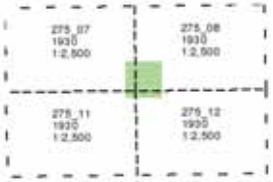
Yorkshire

Published 1930

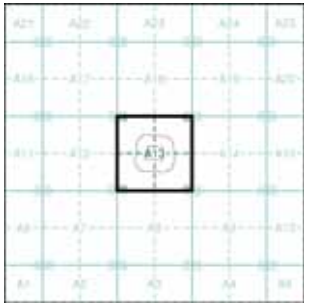
Source map scale - 1:2,500

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



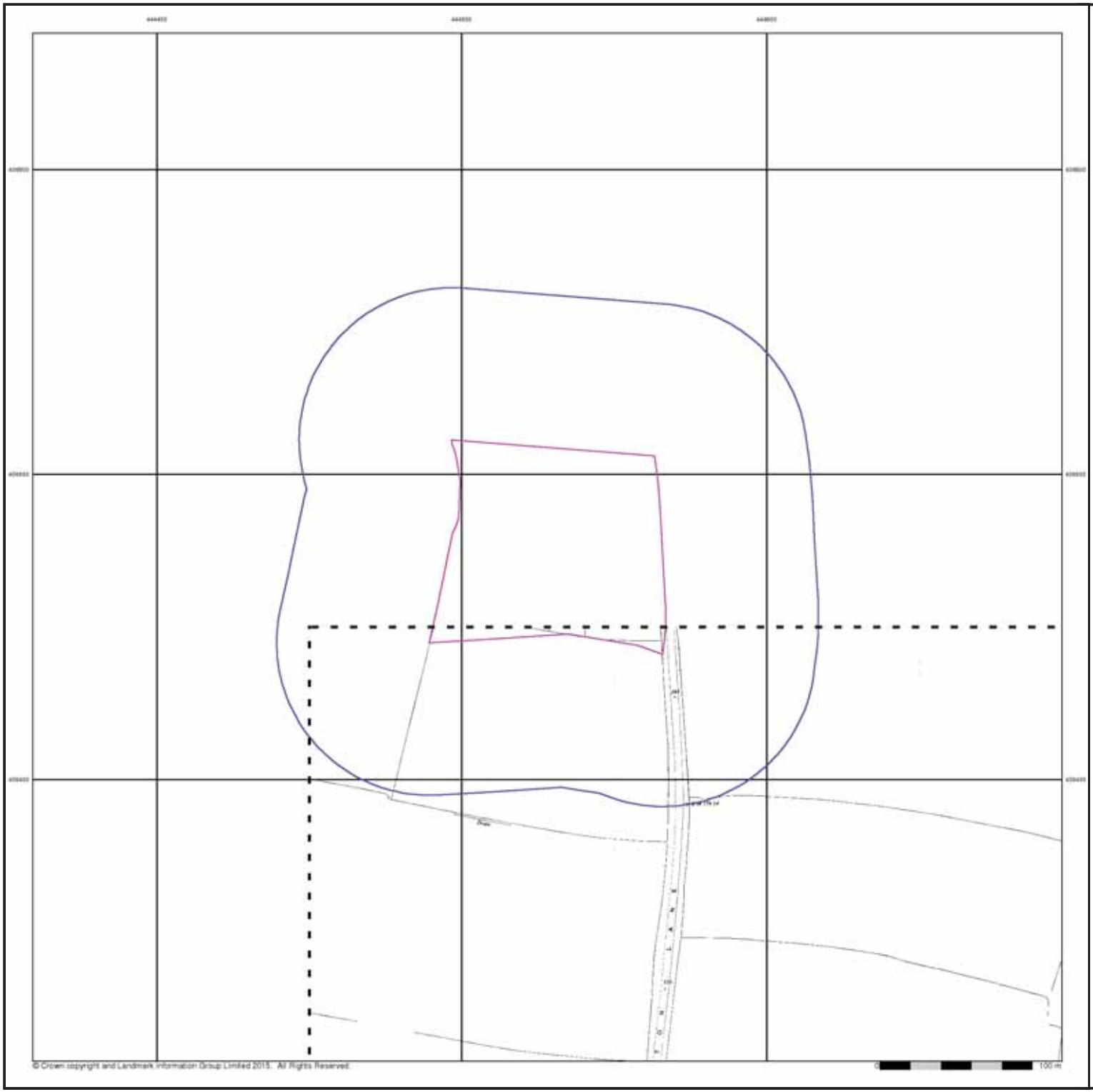
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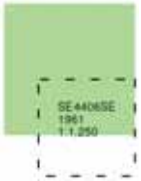
Ordnance Survey Plan

Published 1961

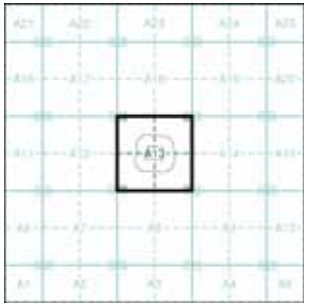
Source map scale - 1:1,250

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

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Slice:	A
Site Area (Ha):	1.76
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Ordnance Survey Plan

Published 1962

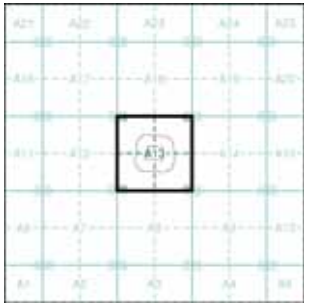
Source map scale - 1:2,500

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

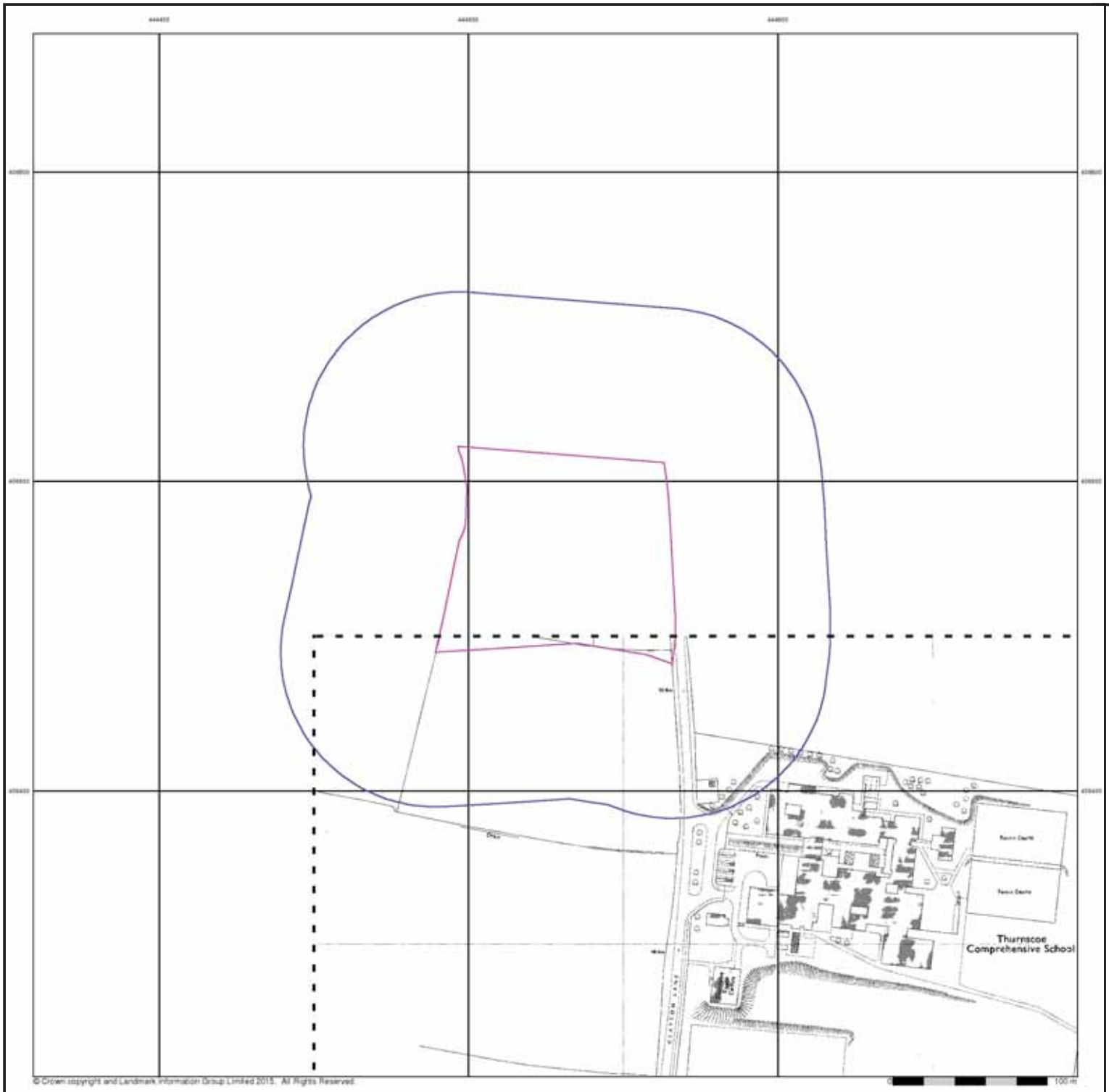
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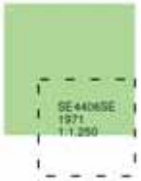
Ordnance Survey Plan

Published 1971

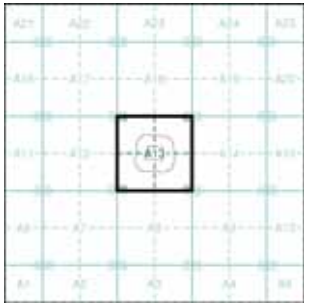
Source map scale - 1:1,250

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



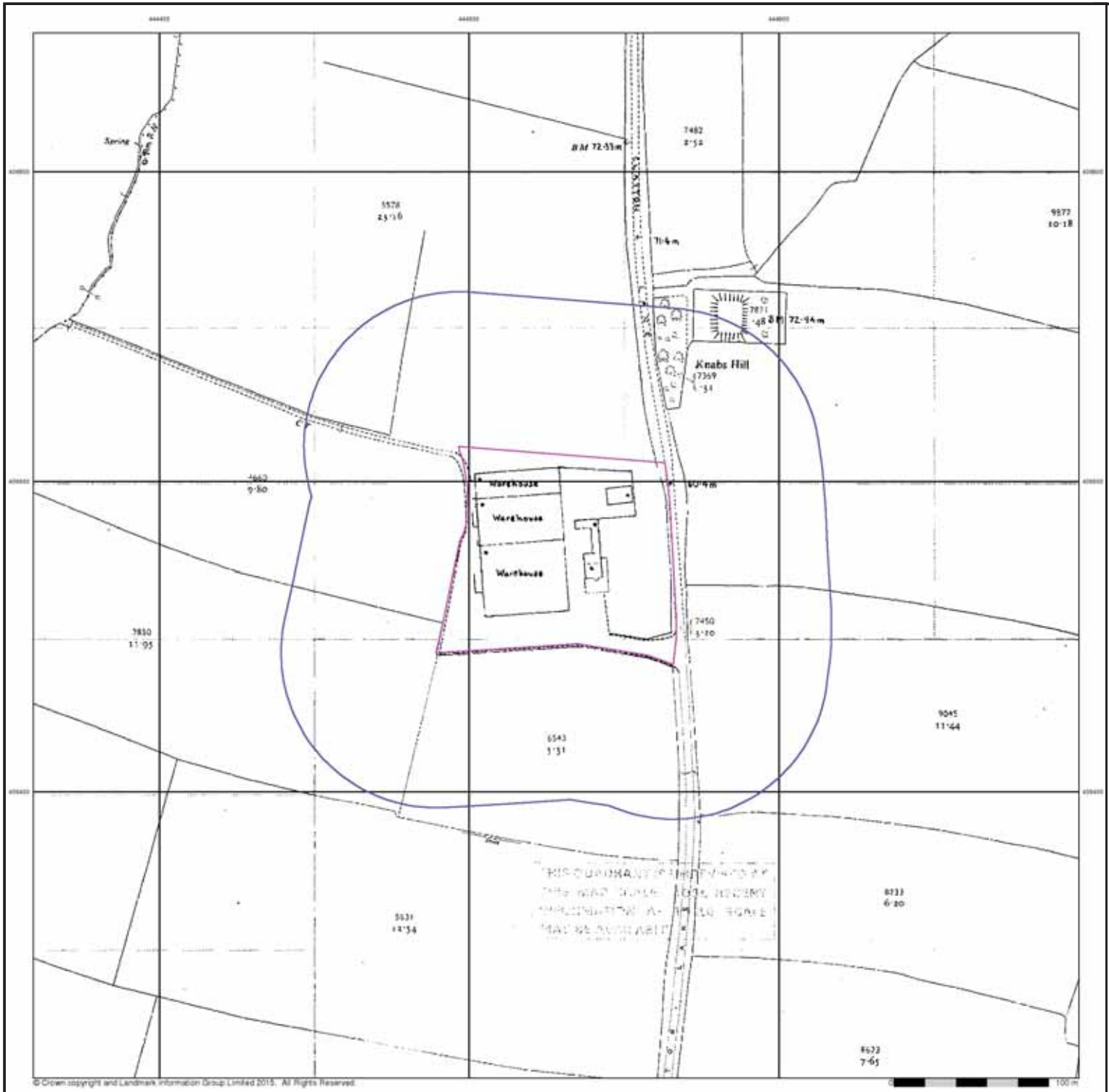
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Additional SIMs

Published 1988

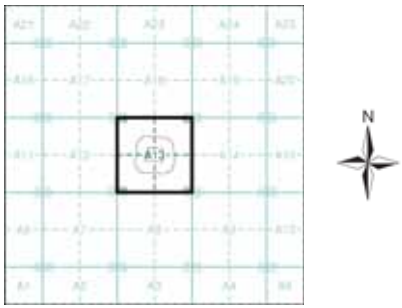
Source map scale - 1:2,500

The SIM cards (Ordnance Survey's `Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. 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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Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
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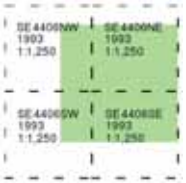
Large-Scale National Grid Data

Published 1993

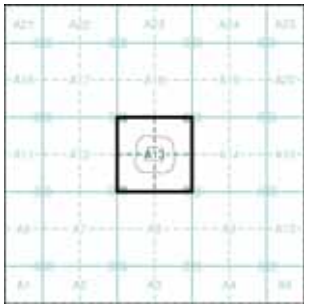
Source map scale - 1:1,250

'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

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	100

Site Details

Clayton Lane, Thurnscoe

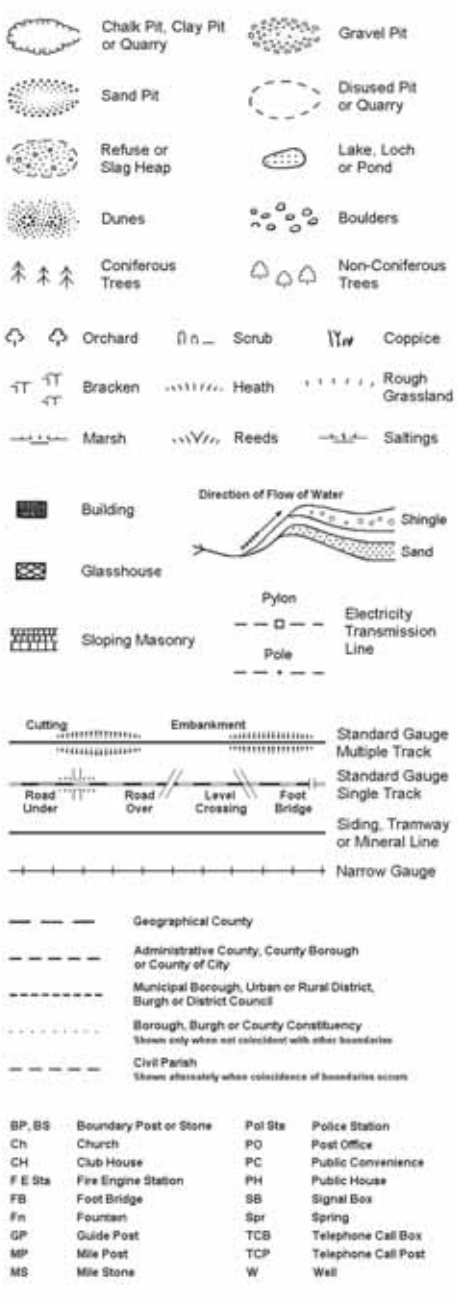
Landmark
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk

Historical Mapping Legends

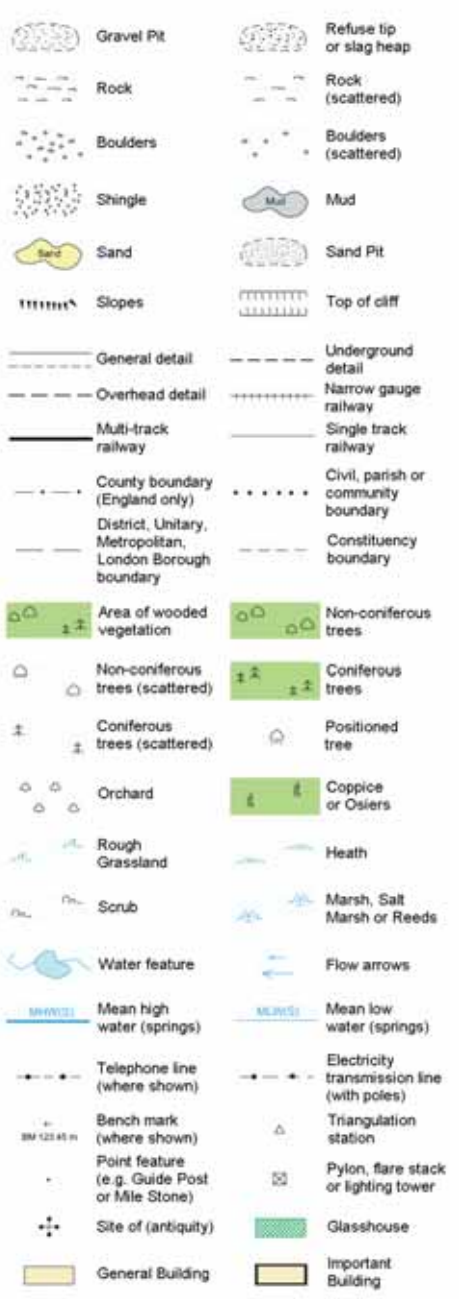
Ordnance Survey County Series 1:10,560



Ordnance Survey Plan 1:10,000



1:10,000 Raster Mapping

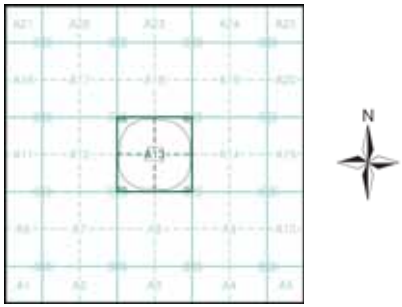


GeoDyne

Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Yorkshire	1:10,560	1854	2
Yorkshire	1:10,560	1894	3
Yorkshire	1:10,560	1906 - 1907	4
Yorkshire	1:10,560	1931 - 1932	5
Yorkshire	1:10,560	1938 - 1948	6
Yorkshire	1:10,560	1948	7
Ordnance Survey Plan	1:10,000	1955 - 1956	8
Ordnance Survey Plan	1:10,000	1966 - 1967	9
Ordnance Survey Plan	1:10,000	1983	10
Ordnance Survey Plan	1:10,000	1989	11
Ordnance Survey Plan	1:10,000	1991	12
10K Raster Mapping	1:10,000	2006	13
VectorMap Local	1:10,000	2015	14

Historical Map - Slice A



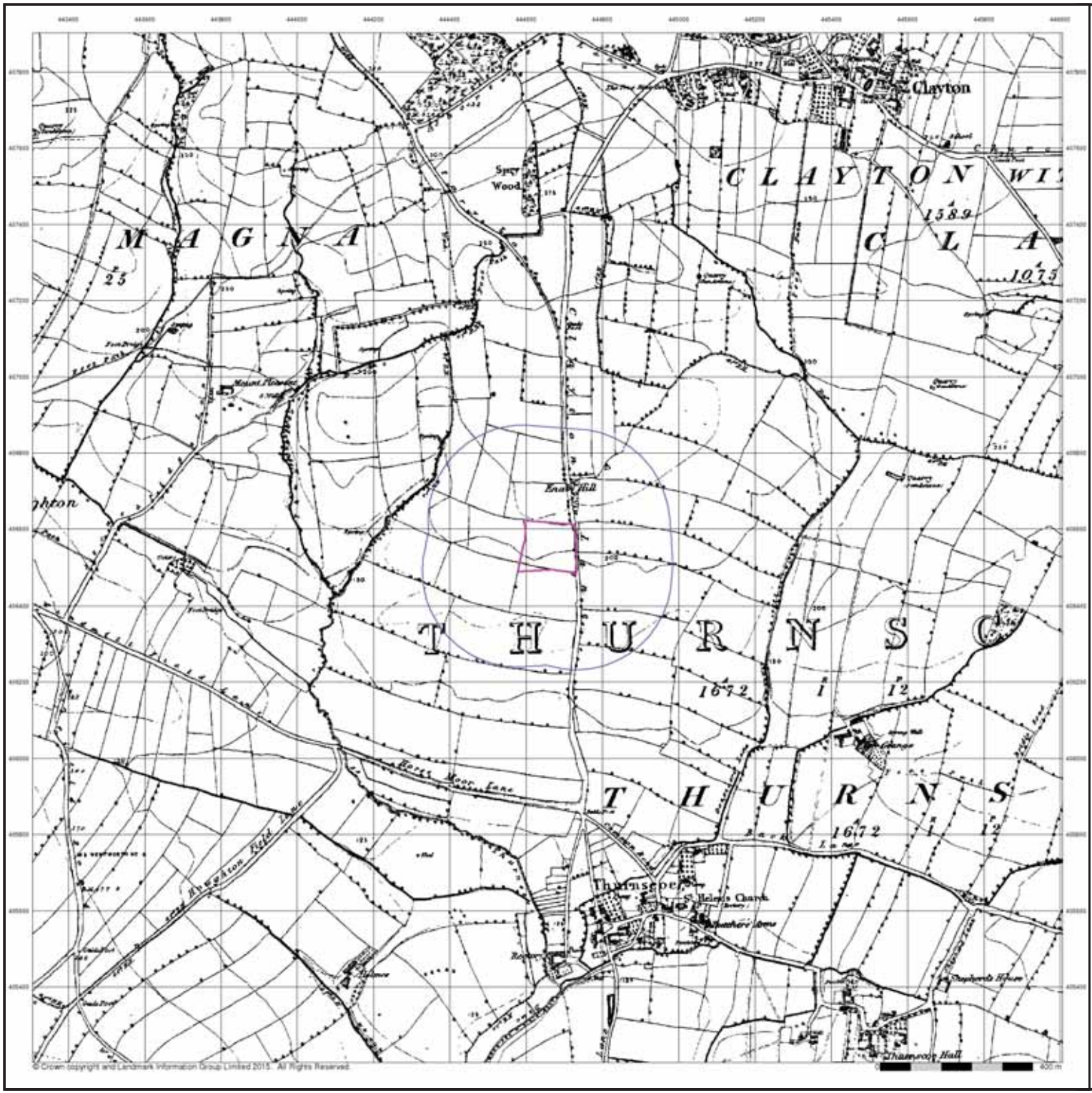
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Customer Ref: 35261
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Slice: A
Site Area (Ha): 1.76
Search Buffer (m): 250

Site Details

Clayton Lane, Thurnscoe

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



GeoDyne

Yorkshire

Published 1854

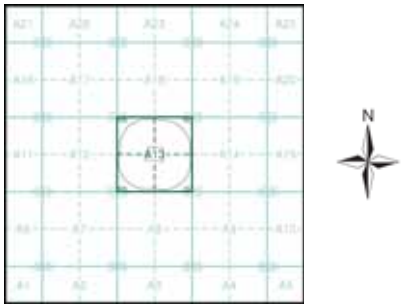
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



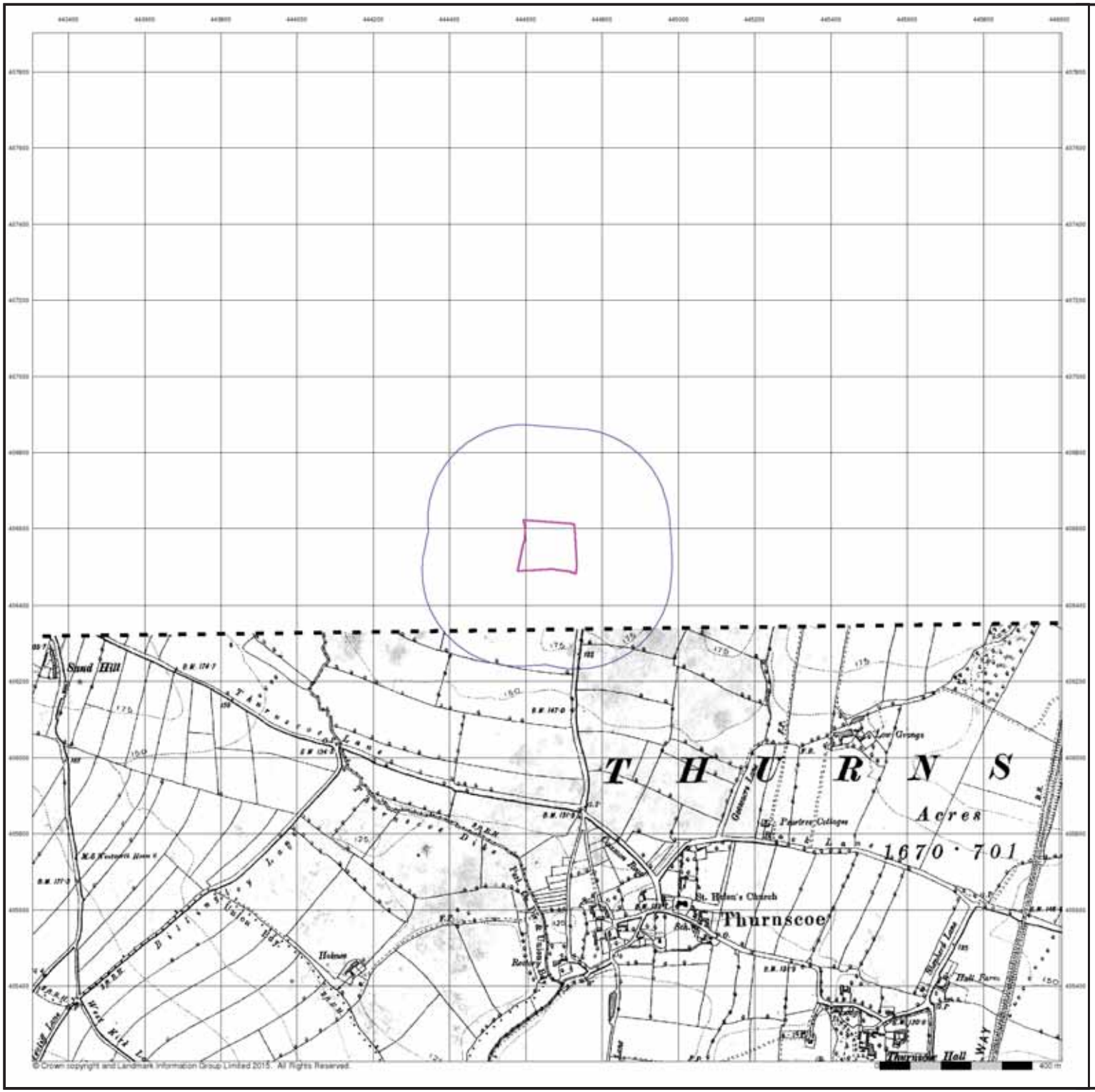
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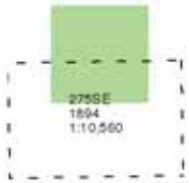
Yorkshire

Published 1894

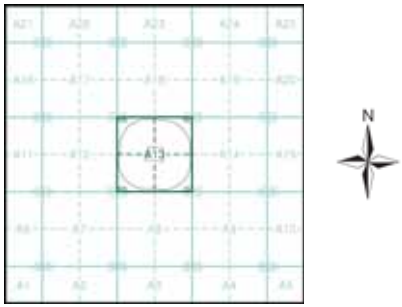
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Map Name(s) and Date(s)



Historical Map - Slice A



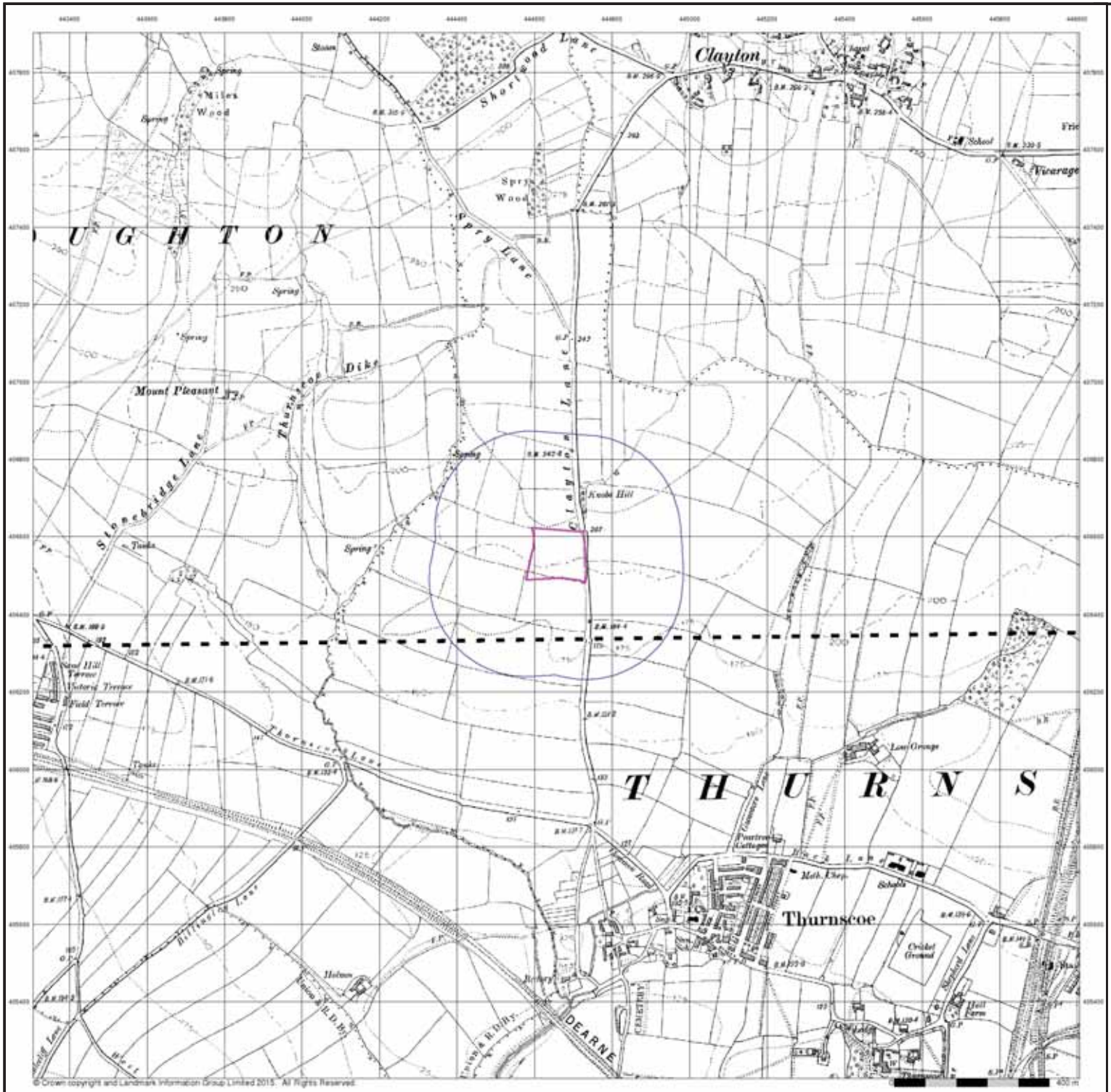
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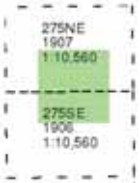
Yorkshire

Published 1906 - 1907

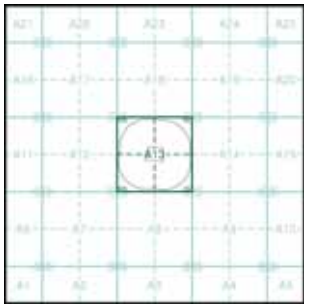
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



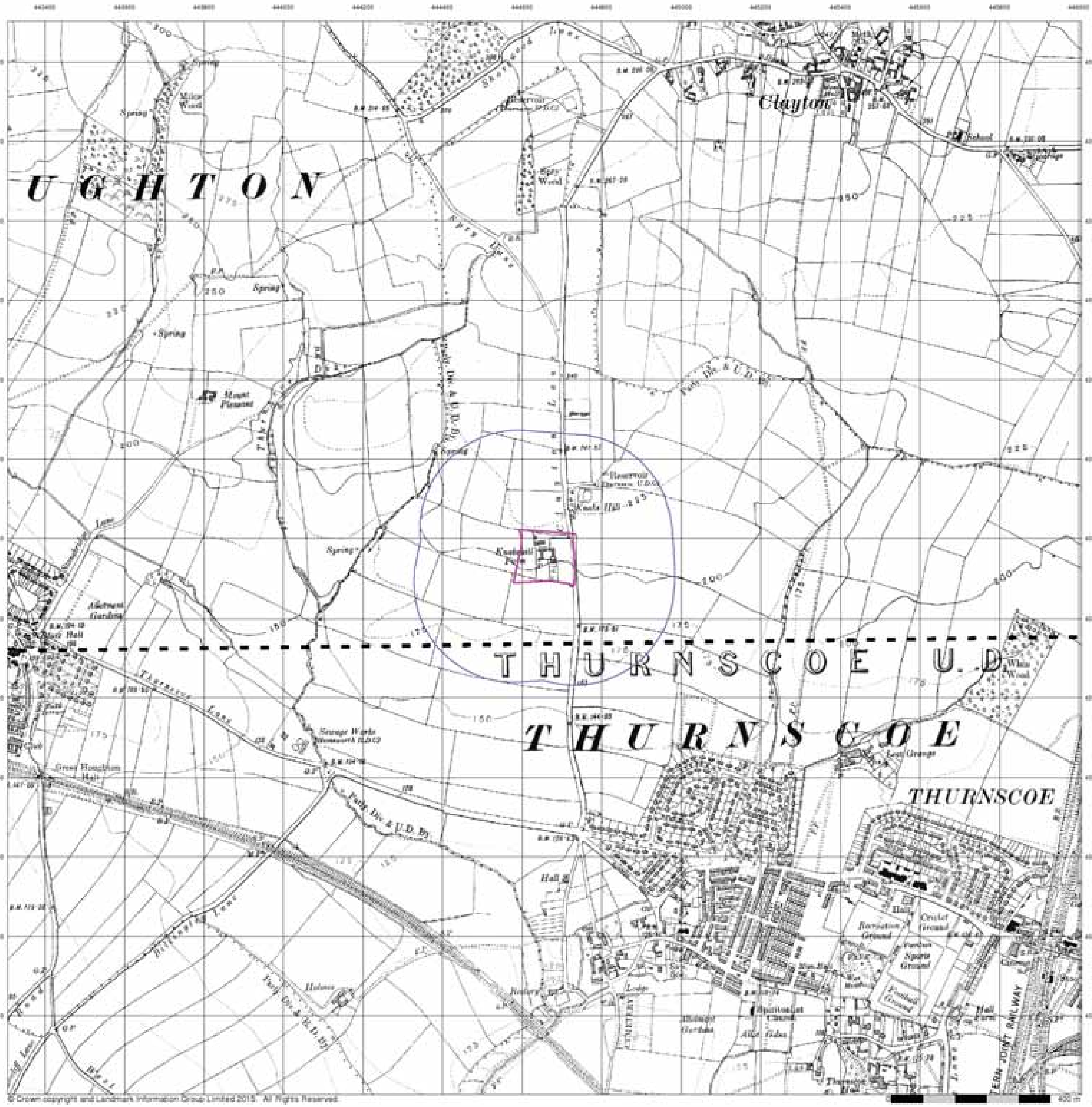
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GeoDyne

Yorkshire

Published 1931 - 1932

Source map scale - 1:10,560

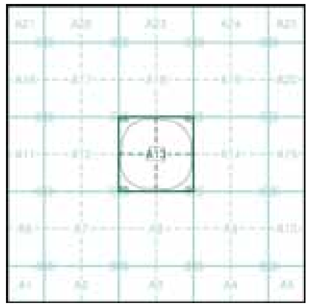
The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840`s. In 1854 the 1:2,500 scale was adopted for mapping urban areas; these maps were used to update the 1:10,560 maps. The published date given therefore is often some 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)

275NE
1932
1:10,560

275SE
1931
1:10,560

Historical Map - Slice A



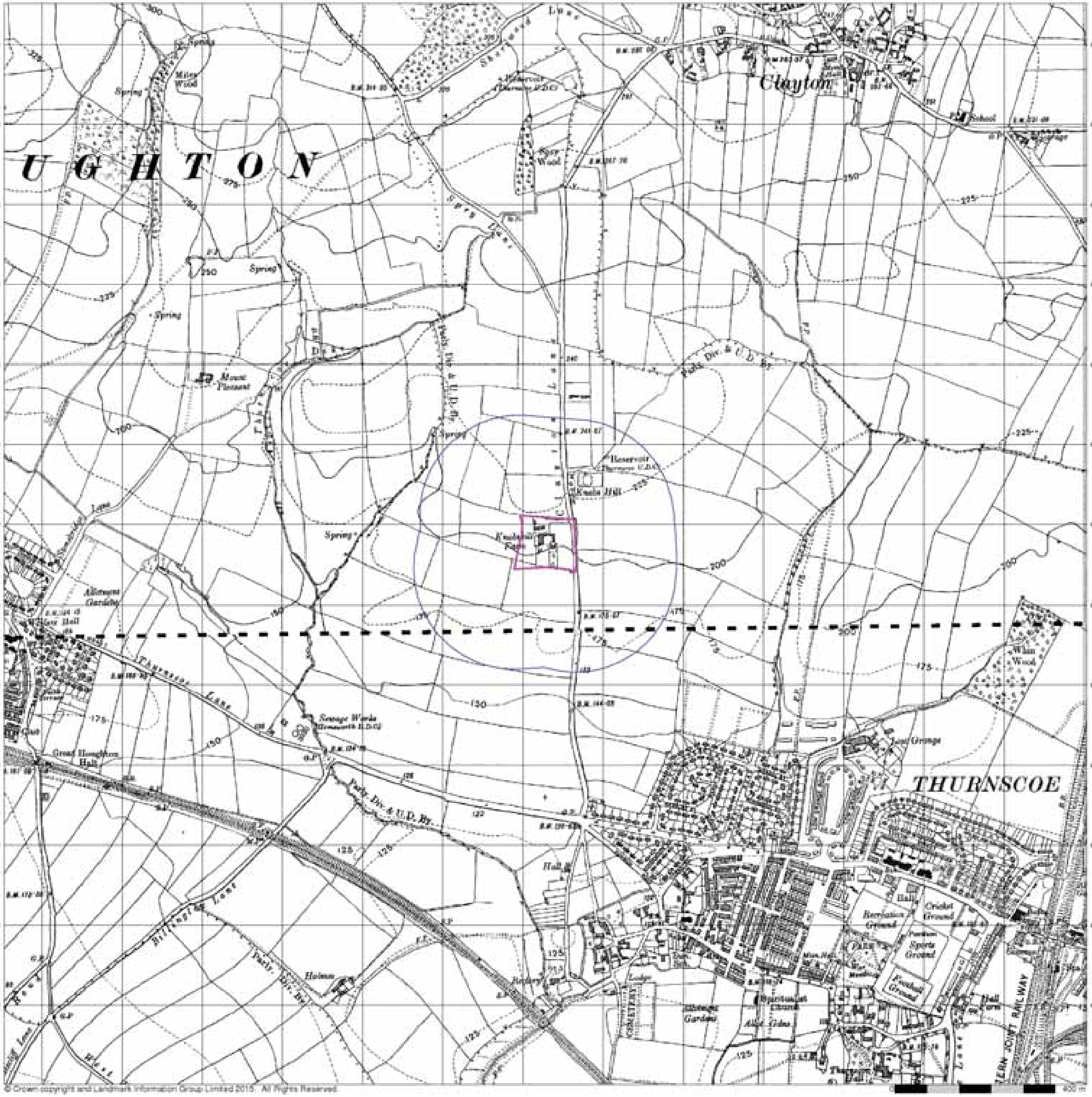
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National Grid Reference: 444660, 406550
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GeoDyne

Yorkshire

Published 1938 - 1948

Source map scale - 1:10,560

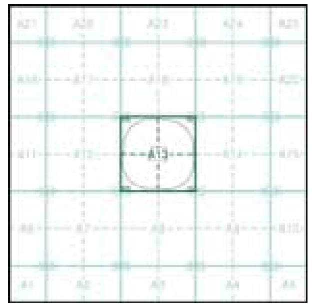
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Map Name(s) and Date(s)

275NE
1948
1:10,560

275SE
1938
1:10,560

Historical Map - Slice A



Order Details

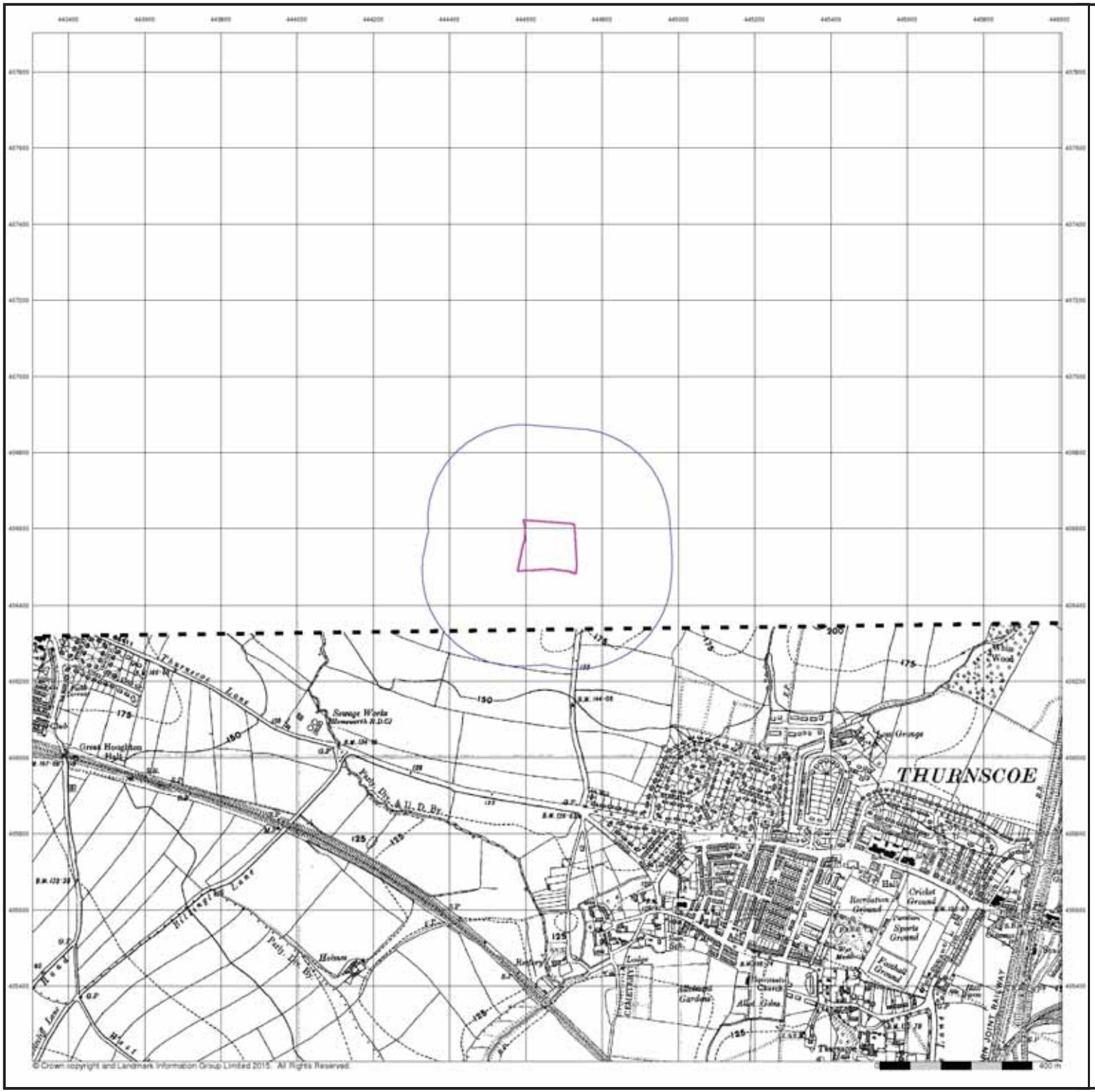
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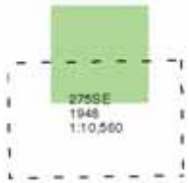
Yorkshire

Published 1948

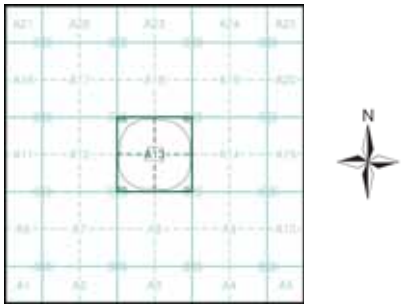
Source map scale - 1:10,560

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Map Name(s) and Date(s)



Historical Map - Slice A



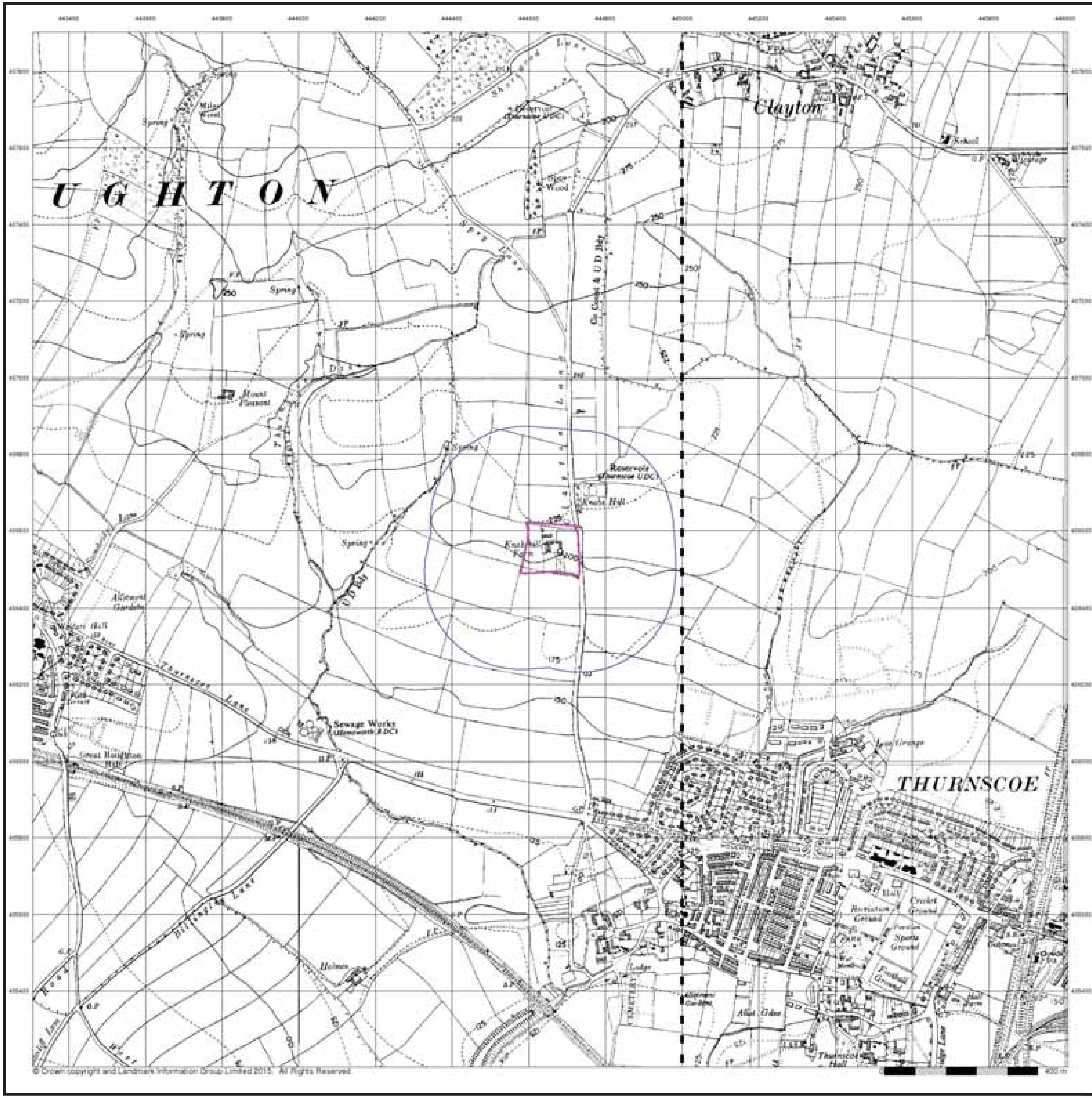
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National Grid Reference:	444660, 406550
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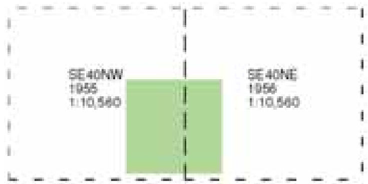
Ordnance Survey Plan

Published 1955 - 1956

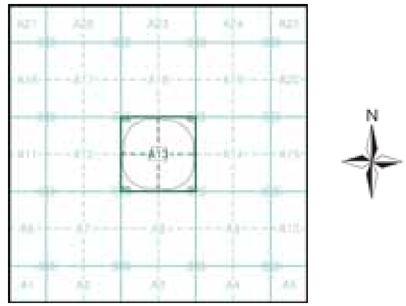
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

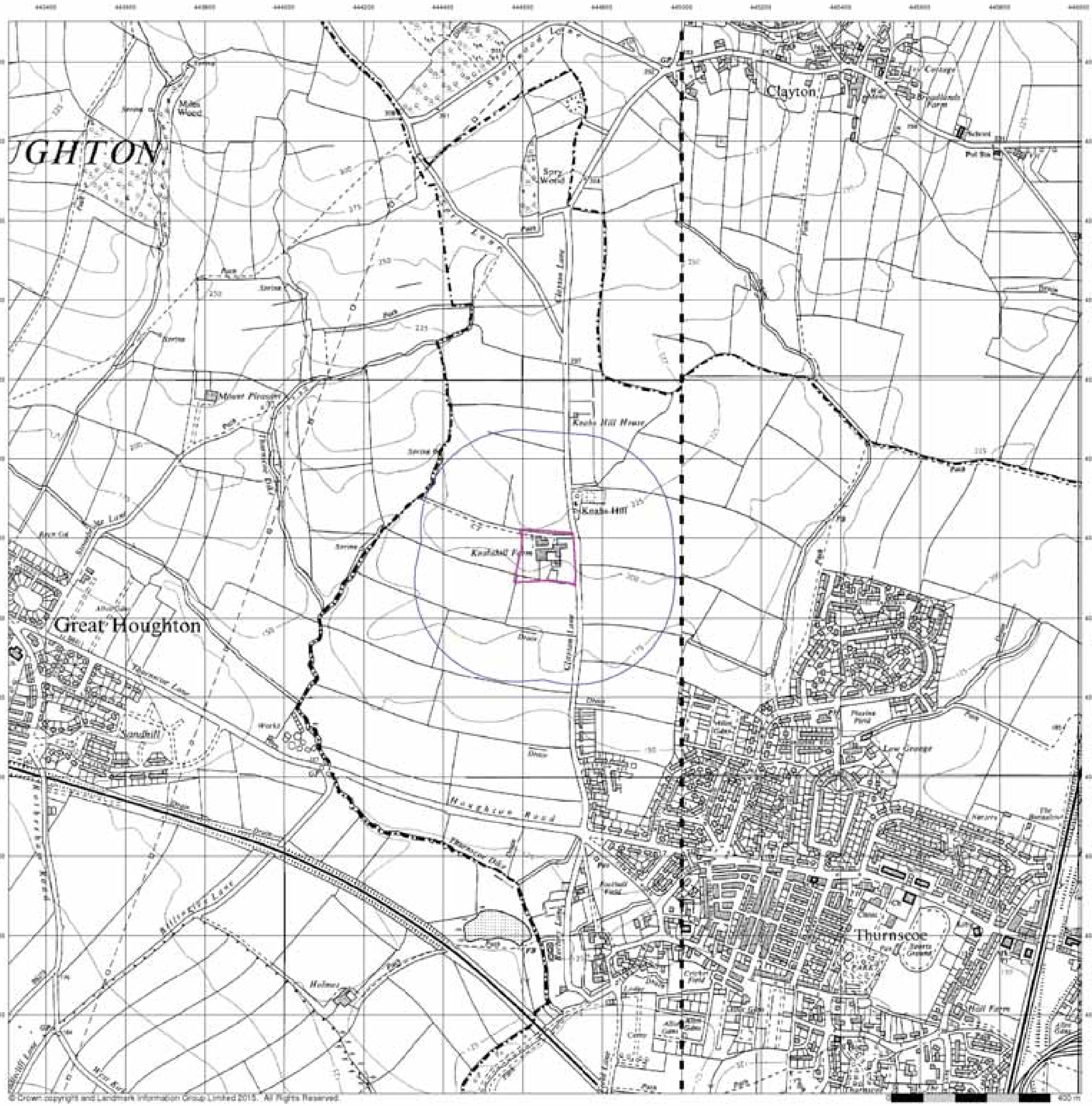
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Site Area (Ha): 1.76
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Site Details

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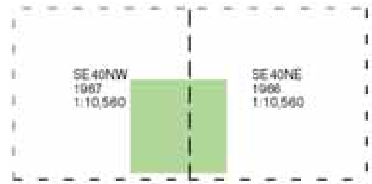
Ordnance Survey Plan

Published 1966 - 1967

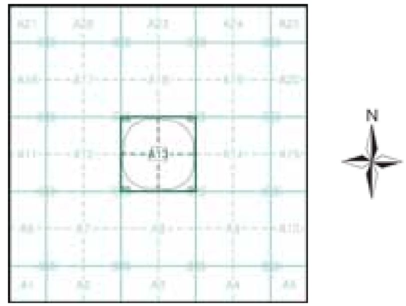
Source map scale - 1:10,000

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Map Name(s) and Date(s)



Historical Map - Slice A



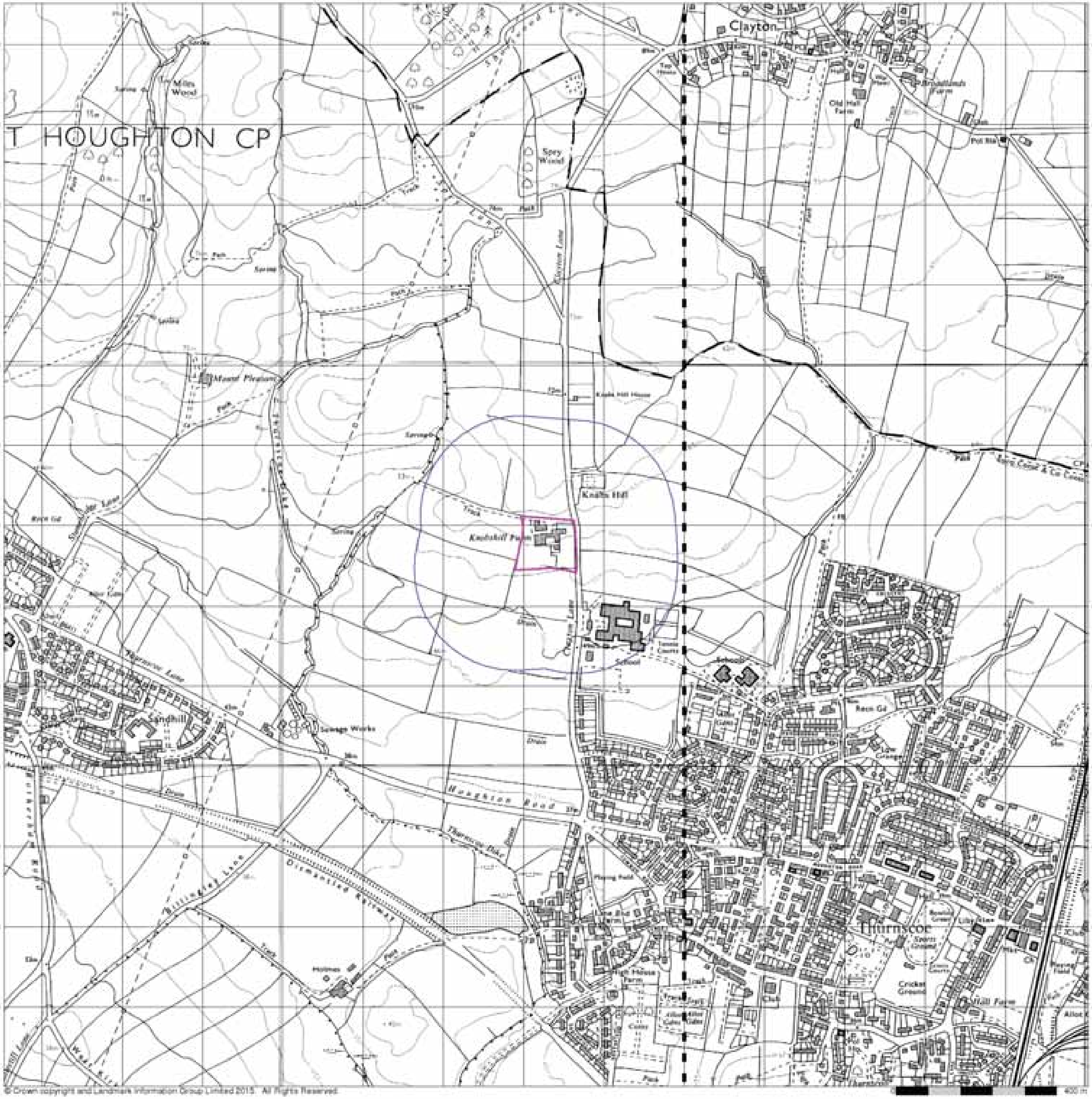
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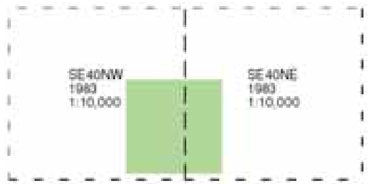
Ordnance Survey Plan

Published 1983

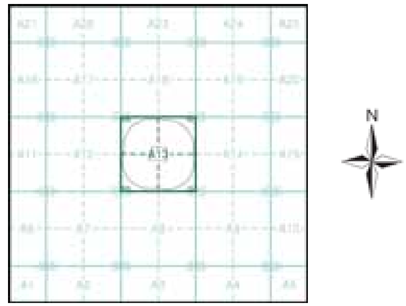
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Map Name(s) and Date(s)



Historical Map - Slice A



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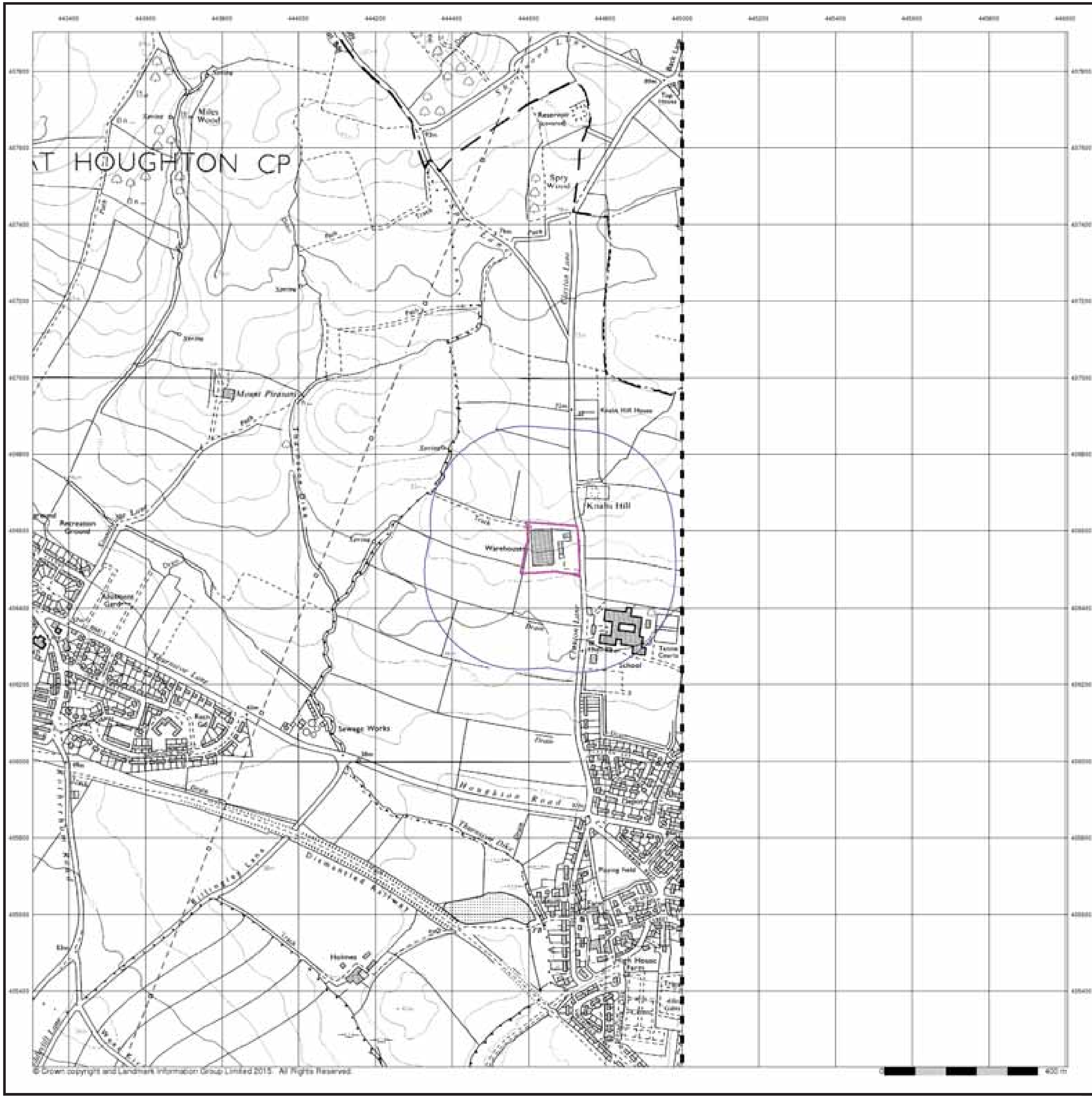
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Ordnance Survey Plan

Published 1989

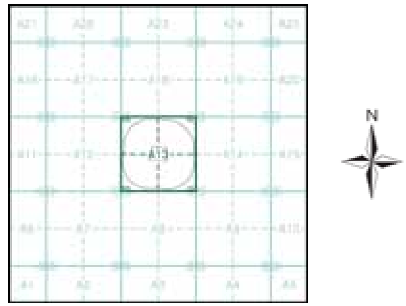
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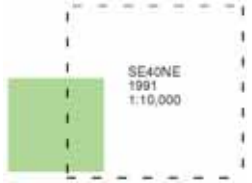
Ordnance Survey Plan

Published 1991

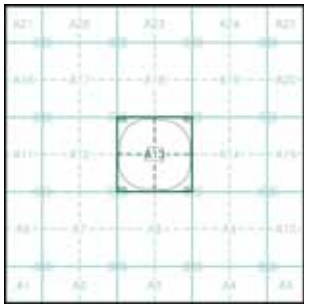
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Map Name(s) and Date(s)



Historical Map - Slice A



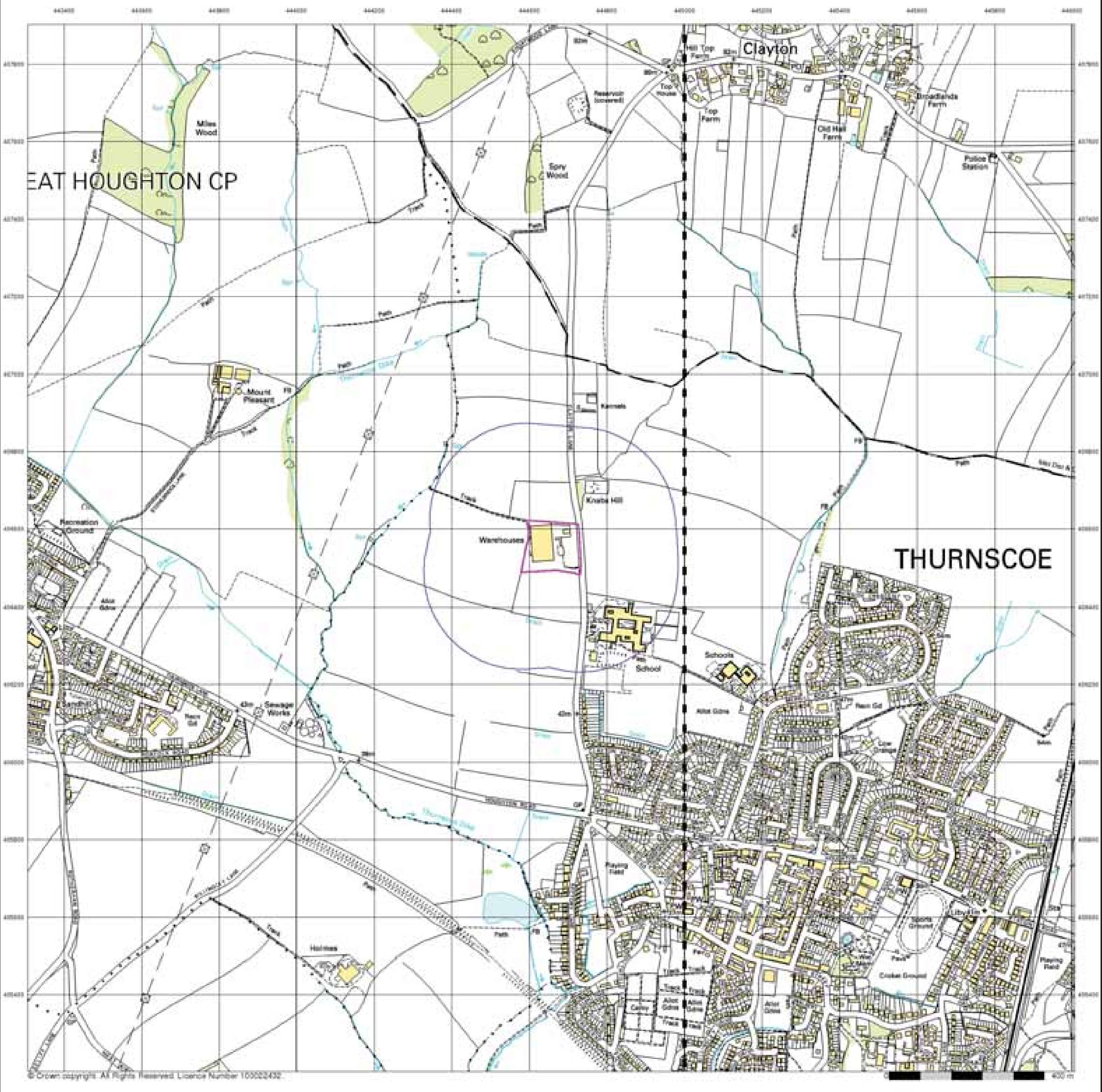
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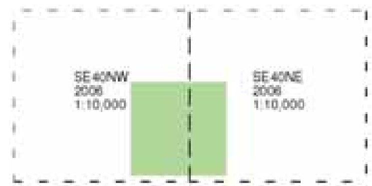
10k Raster Mapping

Published 2006

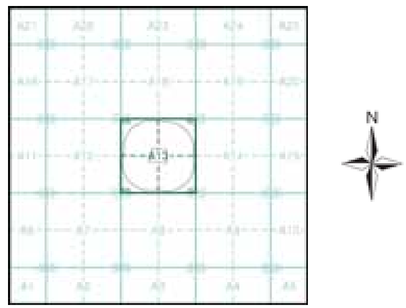
Source map scale - 1:10,000

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



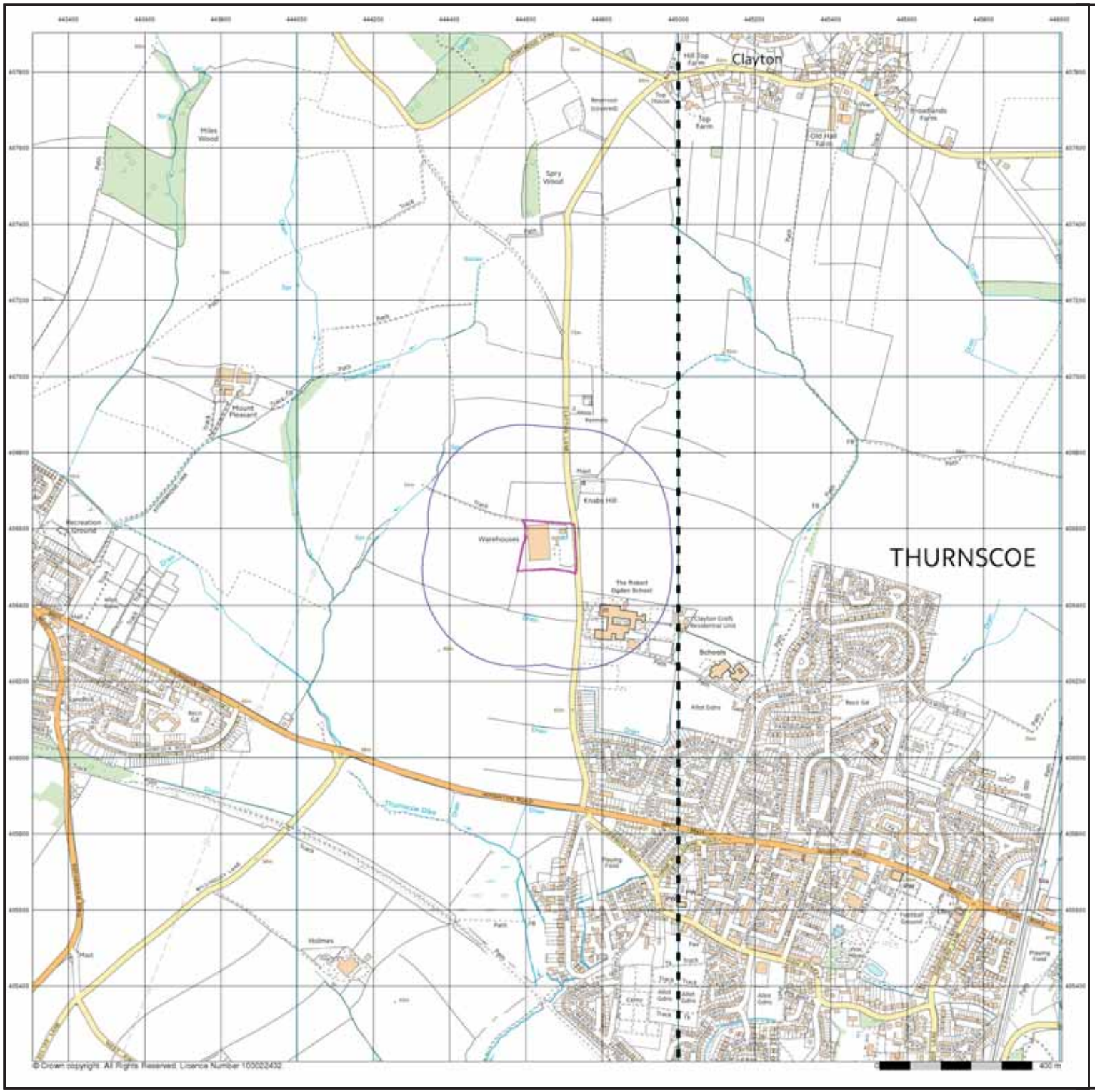
Order Details

Order Number: 74838960_1_1
Customer Ref: 35261
National Grid Reference: 444660, 406550
Slice: A
Site Area (Ha): 1.76
Search Buffer (m): 250

Site Details

Clayton Lane, Thurnscoe

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



GeoDyne

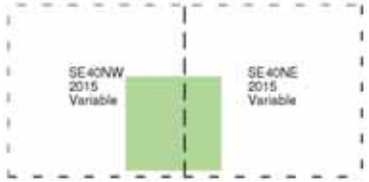
VectorMap Local

Published 2015

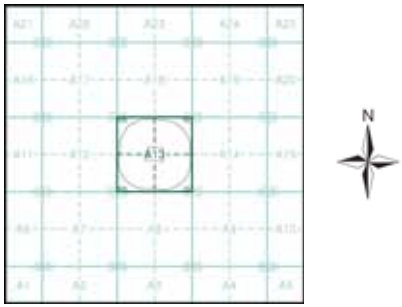
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

Landmark

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

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APPENDIX VIII

Coal Mining Report

The Coal Authority

Issued by:
The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848 DX 716176 MANSFIELD 5

LANDMARK INFORMATION GROUP LIMITED
SOWTON INDUSTRIAL ESTATE
ABBEY COURT
UNIT 5/7 EAGLE WAY
EXETER
DEVON
EX2 7HY

Our reference:	**51001034662001**
Your reference:	**74838960_2|**
Date of your enquiry:	**11 November 2015**
Date we received your enquiry:	**11 November 2015**
Date of issue:	**11 November 2015**

This report is for the property described in the address below and the attached plan.

Non-Residential Coal Authority Mining Report

SITE AT CLAYTON LANE, THURNSCOE, SOUTH YORKSHIRE,

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	See comments below
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

The property is in the likely zone of influence from workings in 8 seams of coal at 140m to 880m depth, and last worked in 1983.

Any ground movement from these coal workings should have stopped by now.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove or otherwise work coal using underground methods.

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© The Coal Authority --

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However, reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Coal mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast coal mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal mining subsidence

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

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

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

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of support

The property is in an area for which notices of entitlement to withdraw support were published in 1986, 1987.

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

Working facilities orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to owners of former copyhold land

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

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Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional Remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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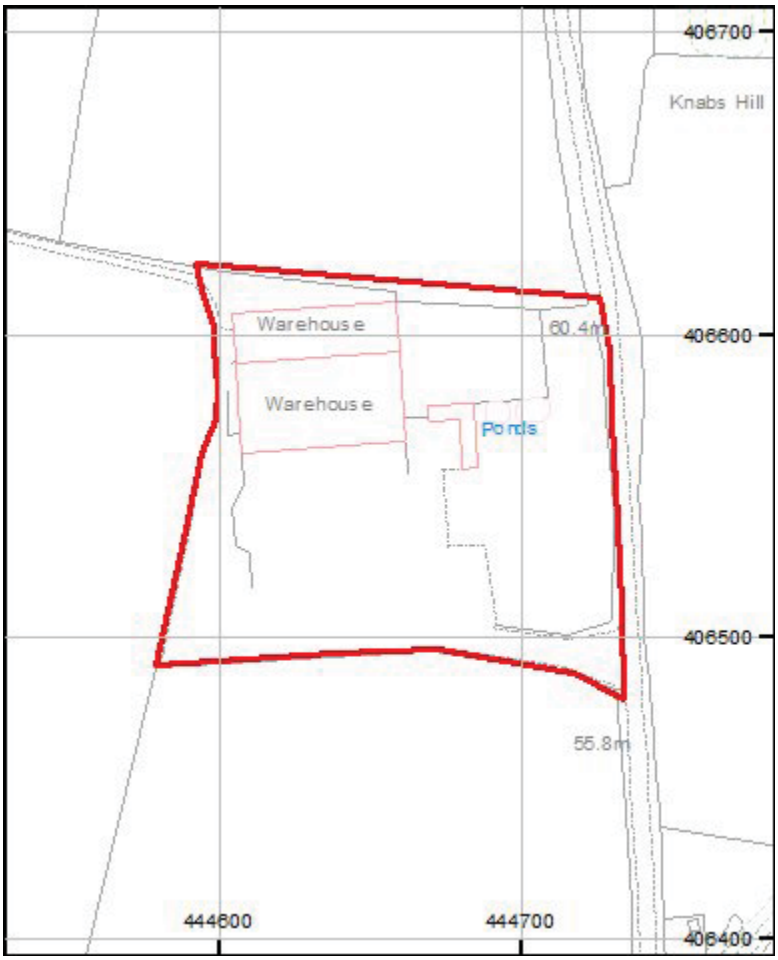
Location map

Approximate position of property



Enquiry boundary

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Key

Approximate position of enquiry boundary shown

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APPENDIX IX

Landmark Envirocheck Report

GeoDyne

Envirocheck® Report:

Datasheet

Order Details:

Order Number:
74838960_1_1

Customer Reference:
35261

National Grid Reference:
444660, 406550

Slice:
A

Site Area (Ha):
1.76

Search Buffer (m):
250

Site Details:

Clayton Lane
Thurnscoe

Client Details:

Mr R Spencer
GeoDyne Ltd
Unit 2.2 Clarendon House
Clarendon Business Park
Clumber Avenue
Nottingham
NG5 1AH

Prepared For:

Rippon Homes Ltd
Leeming Lane South
Mansfield Woodhouse
Nottinghamshire
NG19 9AQ

Landmark Information Group

Contents

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	2
Hazardous Substances	-
Geological	3
Industrial Land Use	-
Sensitive Land Use	5
Data Currency	6
Data Suppliers	10
Useful Contacts	11

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency/Natural Resources Wales and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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Peter Brett Associates Copyright Notice

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Radon Potential dataset Copyright Notice

Information supplied from a joint dataset compiled by The British Geological Survey and Public Health England.

Report Version v50.0

GeoDyne

Summary

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Agency & Hydrological			
Contaminated Land Register Entries and Notices			
Discharge Consents			
Enforcement and Prohibition Notices			
Integrated Pollution Controls			
Integrated Pollution Prevention And Control			
Local Authority Integrated Pollution Prevention And Control			
Local Authority Pollution Prevention and Controls			
Local Authority Pollution Prevention and Control Enforcements			
Nearest Surface Water Feature	pg 1	Yes	
Pollution Incidents to Controlled Waters			
Prosecutions Relating to Authorised Processes			
Prosecutions Relating to Controlled Waters			
Registered Radioactive Substances			
River Quality			
River Quality Biology Sampling Points			
River Quality Chemistry Sampling Points			
Substantiated Pollution Incident Register			
Water Abstractions			
Water Industry Act Referrals			
Groundwater Vulnerability	pg 1	Yes	n/a
Bedrock Aquifer Designations	pg 1	Yes	n/a
Superficial Aquifer Designations			n/a
Source Protection Zones			
Extreme Flooding from Rivers or Sea without Defences			
Flooding from Rivers or Sea without Defences			
Areas Benefiting from Flood Defences			
Flood Water Storage Areas			
Flood Defences			
Detailed River Network Lines			
Detailed River Network Offline Drainage	pg 1		Yes

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Summary

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Waste			
BGS Recorded Landfill Sites			
Historical Landfill Sites			
Integrated Pollution Control Registered Waste Sites			
Licensed Waste Management Facilities (Landfill Boundaries)			
Licensed Waste Management Facilities (Locations)			
Local Authority Recorded Landfill Sites			
Registered Landfill Sites			
Registered Waste Transfer Sites			
Registered Waste Treatment or Disposal Sites			
Hazardous Substances			
Control of Major Accident Hazards Sites (COMAH)			
Explosive Sites			
Notification of Installations Handling Hazardous Substances (NIHHS)			
Planning Hazardous Substance Consents			
Planning Hazardous Substance Enforcements			
Geological			
BGS 1:625,000 Solid Geology	pg 3	Yes	n/a
BGS Estimated Soil Chemistry	pg 3	Yes	Yes
BGS Recorded Mineral Sites			
BGS Urban Soil Chemistry			
BGS Urban Soil Chemistry Averages			
Brine Compensation Area			n/a
Coal Mining Affected Areas	pg 4	Yes	n/a
Mining Instability	pg 4	Yes	n/a
Man-Made Mining Cavities			
Natural Cavities			
Non Coal Mining Areas of Great Britain			
Potential for Collapsible Ground Stability Hazards	pg 4	Yes	
Potential for Compressible Ground Stability Hazards			
Potential for Ground Dissolution Stability Hazards			
Potential for Landslide Ground Stability Hazards	pg 4	Yes	
Potential for Running Sand Ground Stability Hazards			
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 4	Yes	
Radon Potential - Radon Affected Areas			n/a
Radon Potential - Radon Protection Measures			n/a

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Summary

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Industrial Land Use			
Contemporary Trade Directory Entries			
Fuel Station Entries			
Sensitive Land Use			
Areas of Adopted Green Belt	pg 5	1	
Areas of Unadopted Green Belt			
Areas of Outstanding Natural Beauty			
Environmentally Sensitive Areas			
Forest Parks			
Local Nature Reserves			
Marine Nature Reserves			
National Nature Reserves			
National Parks			
Nitrate Sensitive Areas			
Nitrate Vulnerable Zones	pg 5	1	
Ramsar Sites			
Sites of Special Scientific Interest			
Special Areas of Conservation			
Special Protection Areas			

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Nearest Surface Water Feature	A13NE (NE)	0	-	444689 406572
	Groundwater Vulnerability Soil Classification: Soils of Low Leaching Potential - Soils in which pollutants are unlikely to penetrate the soil layer because water movement is largely horizontal or they have large ability to attenuate diffuse pollutants. Lateral flow from these soils contribute to groundwater recharge elsewhere in the catchment Map Sheet: Sheet 12 Vale of York Scale: 1:100,000	A13SE (NW)	0	2	444657 406549
	Drift Deposits None				
	Bedrock Aquifer Designations Aquifer Designation: Secondary Aquifer - A	A13SE (NW)	0	3	444657 406549
	Superficial Aquifer Designations No Data Available				
	Extreme Flooding from Rivers or Sea without Defences None				
	Flooding from Rivers or Sea without Defences None				
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
	Detailed River Network Lines None				
1	**Detailed River Network Offline Drainage** River Type: Tertiary River Hydrographic Area: D004	A13SW (S)	114	2	444623 406371

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Local Authority Landfill Coverage Name: Barnsley Metropolitan Borough Council - Has supplied landfill data		0	10	444657 406549

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: Pennine Upper Coal Measures Formation	A13SE (NW)	0	3	444657 406549
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (N)	0	3	444656 406563
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (NW)	0	3	444643 406564
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (NW)	0	3	444657 406549
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NW (N)	74	3	444598 406696
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13NE (NE)	140	3	444808 406725
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: <15 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 90 - 120 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SW (SW)	154	3	444463 406388

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS Estimated Soil Chemistry Source: British Geological Survey, National Geoscience Information Service Soil Sample Type: Rural Soil Arsenic Concentration: 15 - 25 mg/kg Cadmium Concentration: <1.8 mg/kg Chromium Concentration: 40 - 60 mg/kg Lead Concentration: <150 mg/kg Nickel Concentration: 15 - 30 mg/kg	A13SE (S)	202	3	444710 406280
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas Description: In an area which may be affected by coal mining activity. It is recommended that a coal mining report is obtained from the Coal Authority. Contact details are included in the Useful Contacts section of this report.	A13SE (NW)	0	4	444657 406549
	Mining Instability Mining Evidence: Inconclusive Coal Mining Source: Ove Arup & Partners Boundary Quality: As Supplied	A13SE (NW)	0	-	444657 406549
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Compressible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Running Sand Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	0	3	444659 406539
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13NE (NE)	115	3	444739 406732
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A13SE (S)	209	3	444744 406274
	Radon Potential - Radon Protection Measures Protection Measure: No radon protective measures are necessary in the construction of new dwellings or extensions Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549
	Radon Potential - Radon Affected Areas Affected Area: The property is in a lower probability radon area, as less than 1% of homes are above the action level Source: British Geological Survey, National Geoscience Information Service	A13SE (NW)	0	3	444657 406549

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
2	**Areas of Adopted Green Belt** Authority: Barnsley Metropolitan Borough Council, Planning Department Plan Name: Barnsley Unitary Development Plan **Status: Adopted** Plan Date: 31st December 2000	A13SE (NW)	0	5	444657 406549
3	**Nitrate Vulnerable Zones** Name: Not Supplied Description: Surface Water Source: Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	A13SE (NW)	0	8	444657 406549

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices		
Doncaster Metropolitan Borough Council - Environmental Services	April 2014	Annual Rolling Update
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	July 2013	Annual Rolling Update
Discharge Consents		
Environment Agency - North East Region	November 2015	Quarterly
Enforcement and Prohibition Notices		
Environment Agency - North East Region	March 2013	As notified
Integrated Pollution Controls		
Environment Agency - North East Region	October 2008	Not Applicable
Integrated Pollution Prevention And Control		
Environment Agency - North East Region	October 2015	Quarterly
Local Authority Integrated Pollution Prevention And Control		
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	April 2014	Annual Rolling Update
Doncaster Metropolitan Borough Council - Environmental Services	June 2014	Annual Rolling Update
Local Authority Pollution Prevention and Controls		
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	April 2014	Annual Rolling Update
Doncaster Metropolitan Borough Council - Environmental Services	June 2014	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements		
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	April 2014	Annual Rolling Update
Doncaster Metropolitan Borough Council - Environmental Services	June 2014	Annual Rolling Update
Nearest Surface Water Feature		
Ordnance Survey	July 2012	Quarterly
Pollution Incidents to Controlled Waters		
Environment Agency - North East Region	December 1998	Not Applicable
Prosecutions Relating to Authorised Processes		
Environment Agency - North East Region	March 2013	As notified
Prosecutions Relating to Controlled Waters		
Environment Agency - North East Region	March 2013	As notified
River Quality		
Environment Agency - Head Office	November 2001	Not Applicable
River Quality Biology Sampling Points		
Environment Agency - Head Office	July 2012	Annually
River Quality Chemistry Sampling Points		
Environment Agency - Head Office	July 2012	Annually
Substantiated Pollution Incident Register		
Environment Agency - North East Region - Ridings Area	October 2015	Quarterly
Environment Agency - North East Region - Yorkshire Area	October 2015	Quarterly
Water Abstractions		
Environment Agency - North East Region	July 2015	Quarterly
Water Industry Act Referrals		
Environment Agency - North East Region	October 2015	Quarterly
Groundwater Vulnerability		
Environment Agency - Head Office	April 2015	Not Applicable
Drift Deposits		
Environment Agency - Head Office	January 1999	Not Applicable
Bedrock Aquifer Designations		
British Geological Survey - National Geoscience Information Service	October 2012	As notified
Superficial Aquifer Designations		
British Geological Survey - National Geoscience Information Service	January 2015	As notified
Source Protection Zones		
Environment Agency - Head Office	July 2015	Quarterly

Agency & Hydrological	Version	Update Cycle
Extreme Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	August 2015	Quarterly
Flooding from Rivers or Sea without Defences		
Environment Agency - Head Office	August 2015	Quarterly
Areas Benefiting from Flood Defences		
Environment Agency - Head Office	August 2015	Quarterly
Flood Water Storage Areas		
Environment Agency - Head Office	August 2015	Quarterly
Flood Defences		
Environment Agency - Head Office	August 2015	Quarterly
Detailed River Network Lines		
Environment Agency - Head Office	March 2012	Annually
Detailed River Network Offline Drainage		
Environment Agency - Head Office	March 2012	Annually
Surface Water 1 in 30 year Flood Extent		
Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 100 year Flood Extent		
Environment Agency - Head Office	October 2013	As notified
Surface Water 1 in 1000 year Flood Extent		
Environment Agency - Head Office	October 2013	As notified
Surface Water Suitability		
Environment Agency - Head Office	October 2013	As notified
Waste	**Version**	**Update Cycle**
BGS Recorded Landfill Sites		
British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites		
Environment Agency - North East Region - Ridings Area	May 2015	Quarterly
Environment Agency - North East Region - Yorkshire Area	May 2015	Quarterly
Integrated Pollution Control Registered Waste Sites		
Environment Agency - North East Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries)		
Environment Agency - North East Region - Ridings Area	August 2014	Quarterly
Environment Agency - North East Region - Yorkshire Area	August 2014	Quarterly
Licensed Waste Management Facilities (Locations)		
Environment Agency - North East Region - Ridings Area	October 2015	Quarterly
Environment Agency - North East Region - Yorkshire Area	October 2015	Quarterly
Local Authority Landfill Coverage		
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	May 2000	Not Applicable
Doncaster Metropolitan Borough Council - Environmental Services	May 2000	Not Applicable
Local Authority Recorded Landfill Sites		
Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards	May 2000	Not Applicable
Doncaster Metropolitan Borough Council - Environmental Services	May 2000	Not Applicable
Registered Landfill Sites		
Environment Agency - North East Region - Ridings Area	March 2003	Not Applicable
Registered Waste Transfer Sites		
Environment Agency - North East Region - Ridings Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites		
Environment Agency - North East Region - Ridings Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	June 2015	Bi-Annually
Explosive Sites Health and Safety Executive	June 2015	Bi-Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements Barnsley Metropolitan Borough Council - Planning Department Doncaster Metropolitan Borough Council	October 2013 October 2015	Annual Rolling Update Annual Rolling Update
Planning Hazardous Substance Consents Barnsley Metropolitan Borough Council - Planning Department Doncaster Metropolitan Borough Council	October 2013 October 2015	Annual Rolling Update Annual Rolling Update
Geological	**Version**	**Update Cycle**
BGS 1:625,000 Solid Geology British Geological Survey - National Geoscience Information Service	January 2009	Not Applicable
BGS Estimated Soil Chemistry British Geological Survey - National Geoscience Information Service	January 2010	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	May 2015	Bi-Annually
Brine Compensation Area Cheshire Brine Subsidence Compensation Board	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Mining Report Service	March 2014	As notified
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	July 2014	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	June 2015	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	As notified
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	As notified
Industrial Land Use	**Version**	**Update Cycle**
Contemporary Trade Directory Entries Thomson Directories	August 2015	Quarterly
Fuel Station Entries Catalist Ltd - Experian	August 2015	Quarterly

Data Currency

Sensitive Land Use	Version	Update Cycle
Areas of Adopted Green Belt		
Barnsley Metropolitan Borough Council - Planning Department	November 201	As notified
Doncaster Metropolitan Borough Council	November 201	As notified
Areas of Unadopted Green Belt		
Barnsley Metropolitan Borough Council - Planning Department	November 201	As notified
Doncaster Metropolitan Borough Council	November 201	As notified
Areas of Outstanding Natural Beauty		
Natural England	October 2015	Bi-Annually
Environmentally Sensitive Areas		
Natural England	October 2015	Annually
Forest Parks		
Forestry Commission	April 1997	Not Applicable
Local Nature Reserves		
Natural England	October 2015	Bi-Annually
Marine Nature Reserves		
Natural England	October 2015	Bi-Annually
National Nature Reserves		
Natural England	October 2015	Bi-Annually
National Parks		
Natural England	August 2015	Bi-Annually
Nitrate Sensitive Areas		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	Not Applicable
Nitrate Vulnerable Zones		
Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	October 2015	Annually
Ramsar Sites		
Natural England	October 2015	Bi-Annually
Sites of Special Scientific Interest		
Natural England	October 2015	Bi-Annually
Special Areas of Conservation		
Natural England	October 2015	Bi-Annually
Special Protection Areas		
Natural England	October 2015	Bi-Annually

Data Suppliers

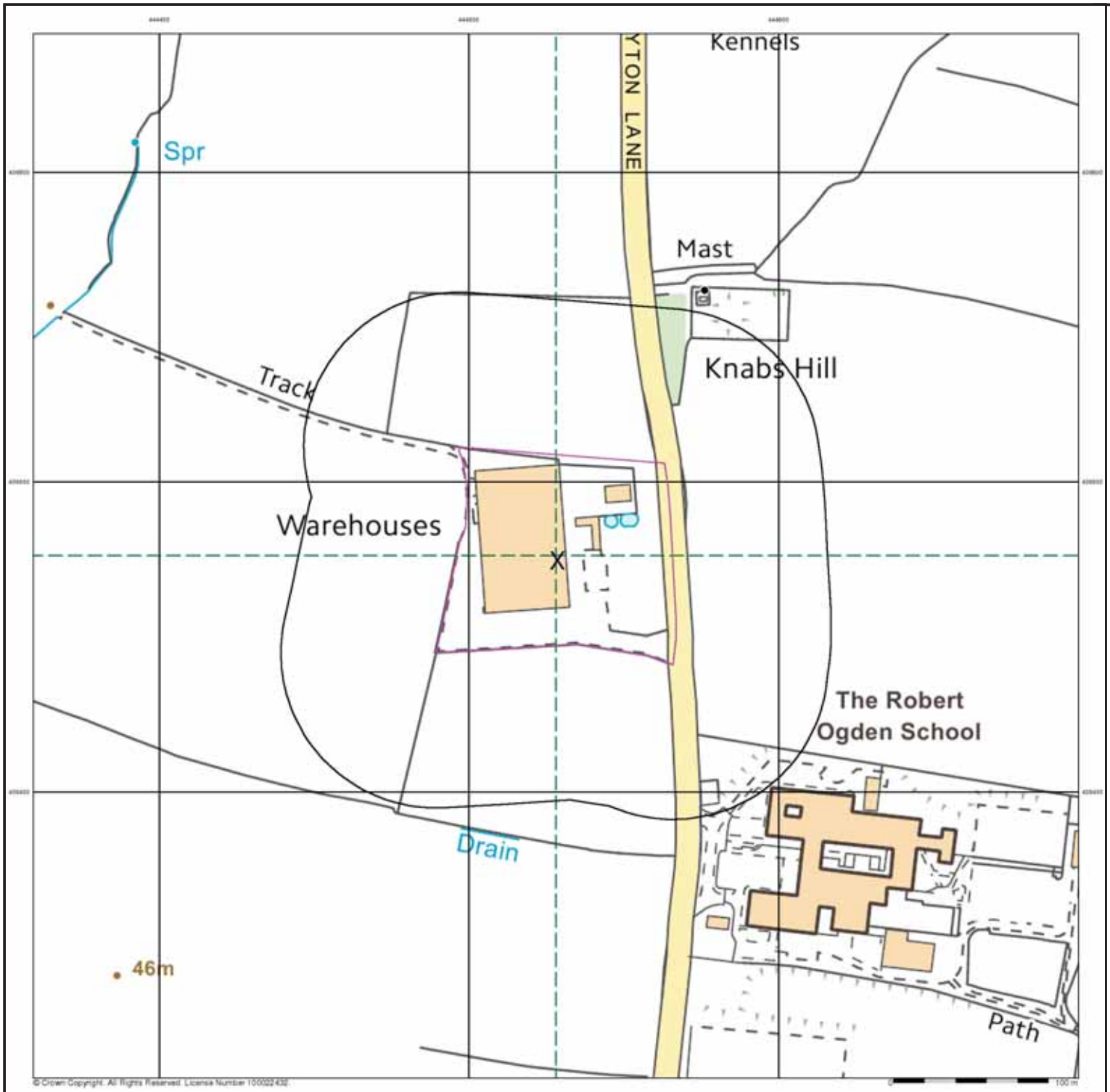
A selection of organisations who provide data within this report

Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	
Centre for Ecology and Hydrology	
Natural Resources Wales	
Scottish Natural Heritage	
Natural England	
Public Health England	
Ove Arup	
Peter Brett Associates	

Useful Contacts

Contact	Name and Address	Contact Details
2	**Environment Agency - National Customer Contact Centre (NCCC)** PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 08708 506 506 Email: enquiries@environment-agency.gov.uk
3	**British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
4	**The Coal Authority - Mining Report Service** 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG	Telephone: 0845 7626848 Email: thecoalauthority@coal.gov.uk
5	**Barnsley Metropolitan Borough Council - Planning Department** Central Offices, Kendray Street, Barnsley, South Yorkshire, S70 2TN	Telephone: 01226 770770 Fax: 01226 772599 Website: www.barnsley.gov.uk
6	**Doncaster Metropolitan Borough Council** Danum House, St Sepulchre Gate, Doncaster, South Yorkshire, DN1 1UB	Telephone: 01302 734854 Fax: 01302 734949 Website: www.doncaster.gov.uk
7	**Natural England** Suite D, Unex House, Bourges Boulevard, Peterborough, Cambridgeshire, PE1 1NG	Telephone: 0845 600 3078 Email: enquiries@naturalengland.org.uk Website: www.naturalengland.org.uk
8	**Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)** Government Buildings, Otley Road, Lawnswood, Leeds, West Yorkshire, LS16 5QT	Telephone: 0113 2613333 Fax: 0113 230 0879
9	**Environment Agency - Head Office** Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
10	**Barnsley Metropolitan Borough Council - Environmental Health and Trading Standards** Central Offices, Kendray Street, Barnsley, South Yorkshire, S70 2TN	Telephone: 01226 770770 Fax: 01226 772599 Website: www.barnsley.gov.uk
-	**Public Health England - Radon Survey, Centre for Radiation, Chemical and Environmental Hazards** Chilton, Didcot, Oxfordshire, OX11 0RQ	Telephone: 01235 822622 Fax: 01235 833891 Email: radon@phe.gov.uk Website: www.ukradon.org
-	**Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD	Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk

Please note that the Environment Agency / Natural Resources Wales / SEPA have a charging policy in place for enquiries.



GeoDyne

General

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

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
- 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

Geological

- BGS Recorded Mineral Site

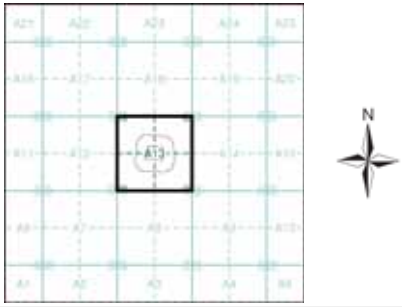
Hazardous Substances

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Segment A13



Order Details

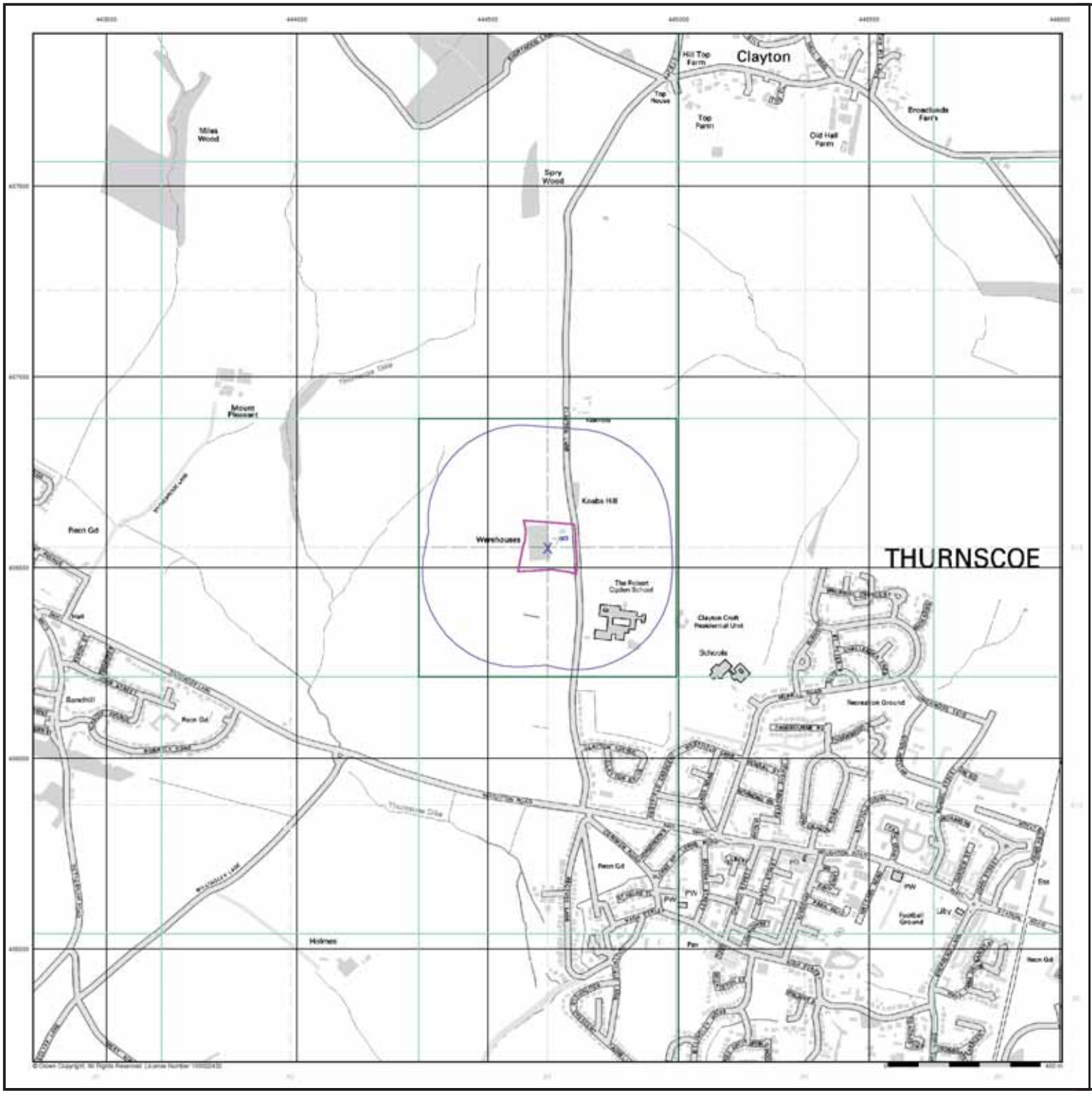
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Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76

Site Details

Clayton Lane, Thurnscoe

Landmark Information Group

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



GeoDyne

General

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

Several or 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

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- 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
- 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

Geological

- BGS Recorded Mineral Site

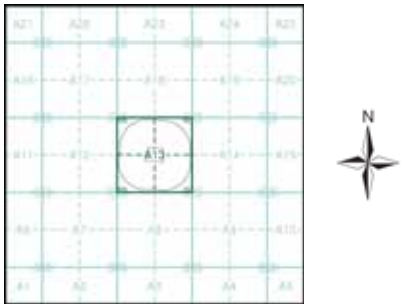
Hazardous Substances

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

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

Site Sensitivity Map - Slice A



Order Details

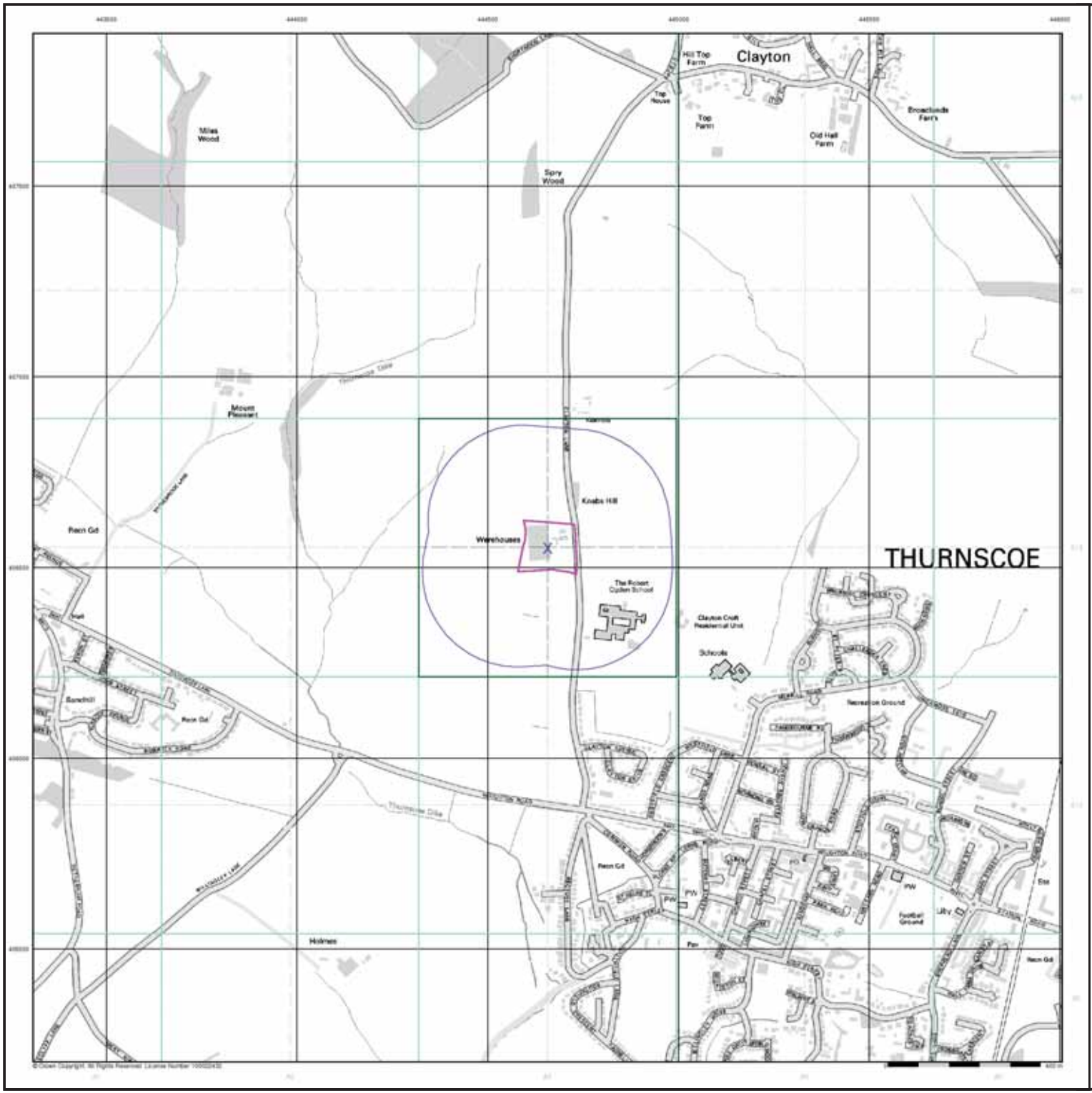
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Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

Landmark

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



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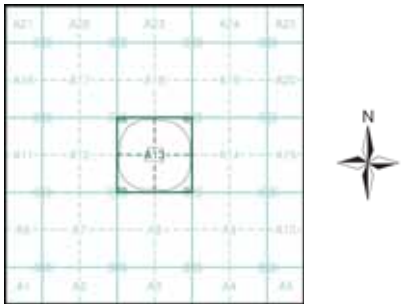
General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point

Agency and Hydrological (Flood)

- Extreme Flooding from Rivers or Sea without Defences (Zone 2)
- Flooding from Rivers or Sea without Defences (Zone 3)
- Area Benefiting from Flood Defence
- Flood Water Storage Areas
- Flood Defence

Flood Map - Slice A



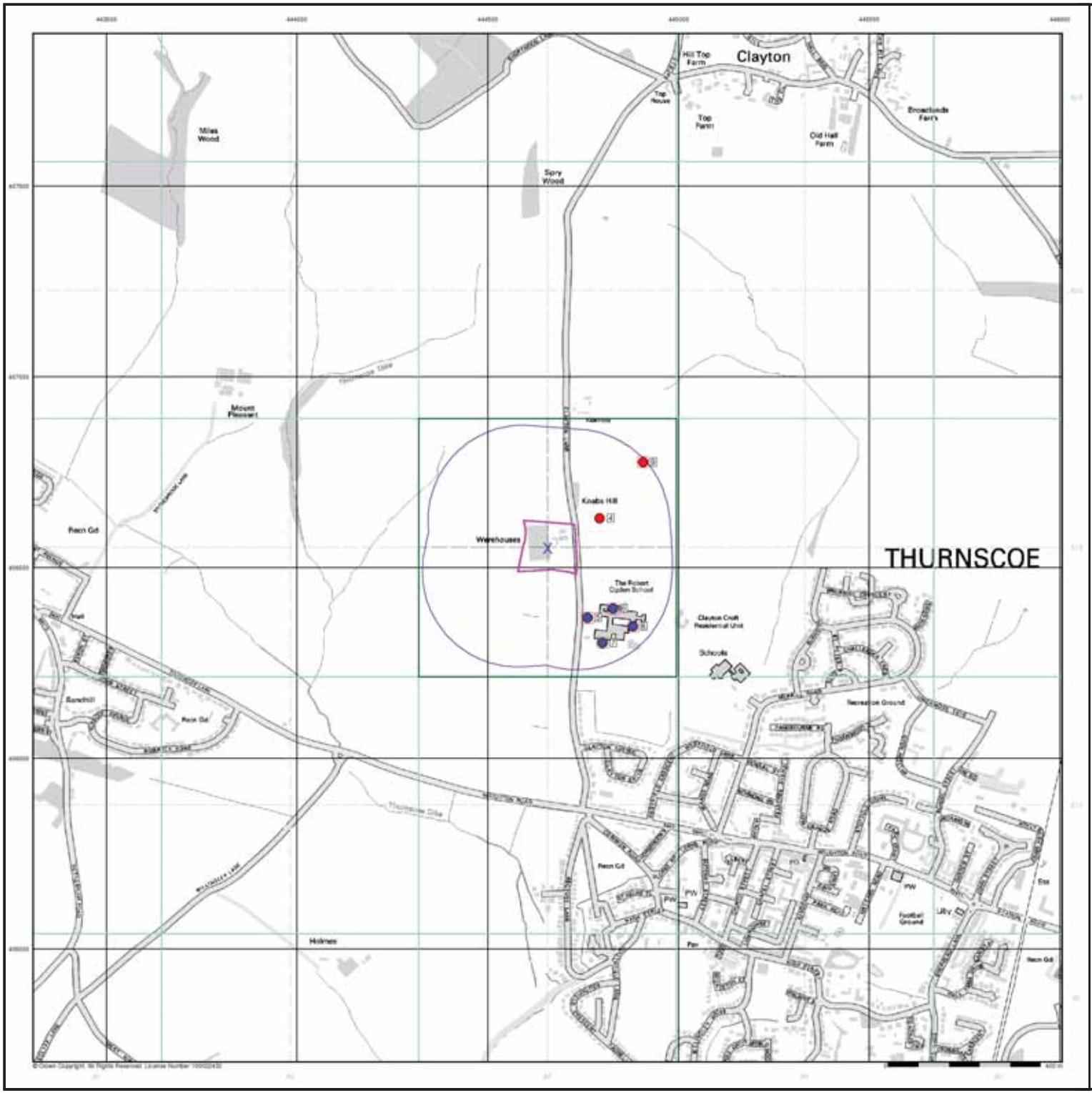
Order Details

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

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GeoDyne

General

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

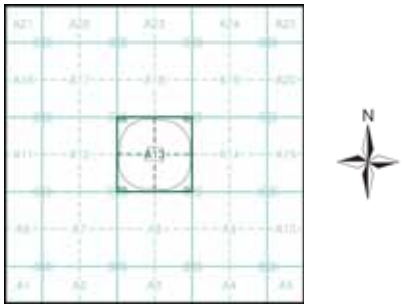
Agency and Hydrological (Boreholes)

- BGS Borehole Depth 0 - 10m
- BGS Borehole Depth 10 - 30m
- BGS Borehole Depth 30m +
- Confidential
- Other

For Borehole information please refer to the Borehole datasheet which accompanied this slice.

A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Borehole Map - Slice A



Order Details

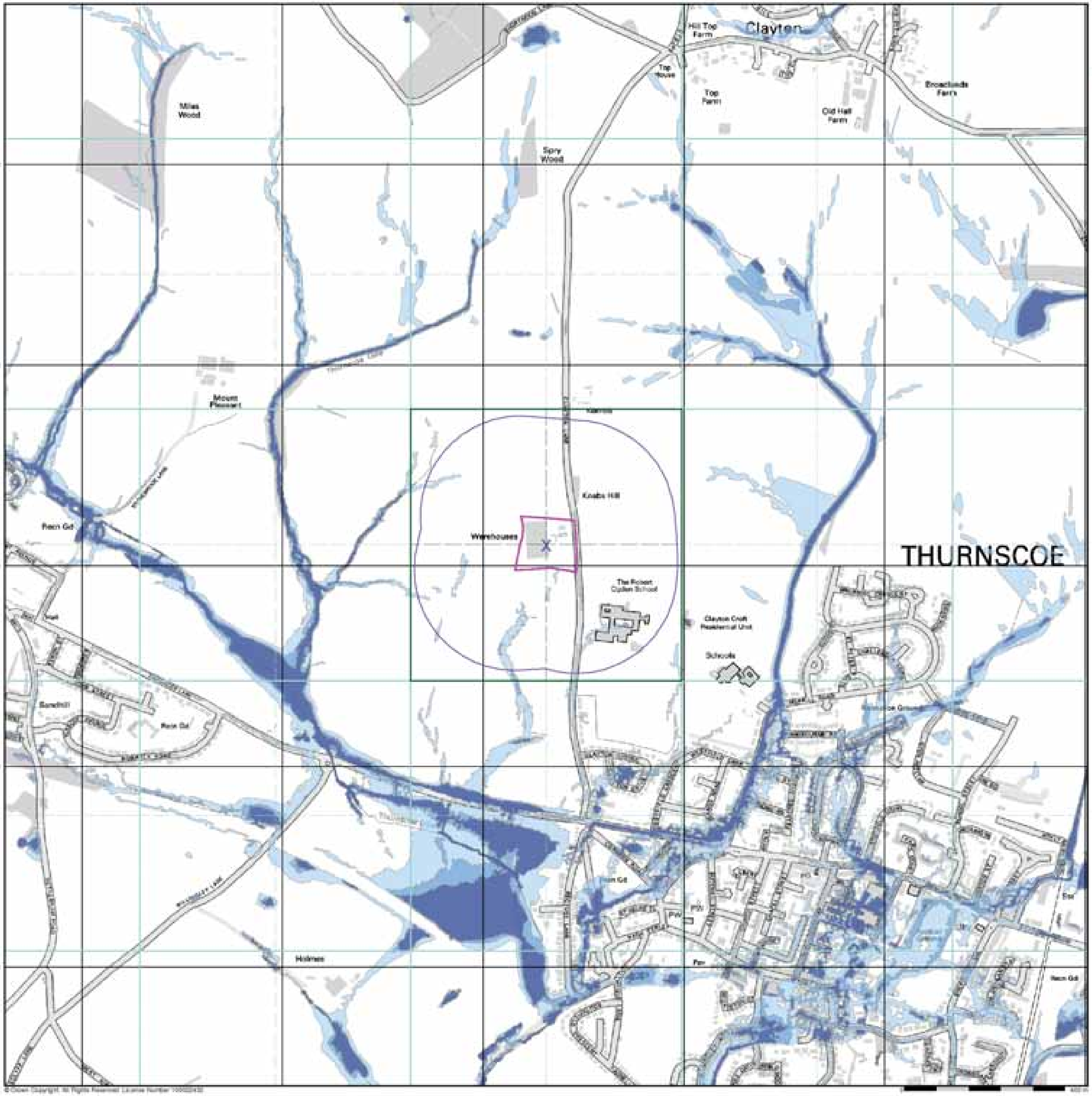
Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

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Web: www.envirocheck.co.uk



GeoDyne

General

Specified Site

Specified Buffer(s)

Bearing Reference Point

Risk of Flooding from Surface Water

High - 30 Year Return

Medium - 100 Year Return

Low - 1000 Year Return

Suitability

See the suitability map below

National to county

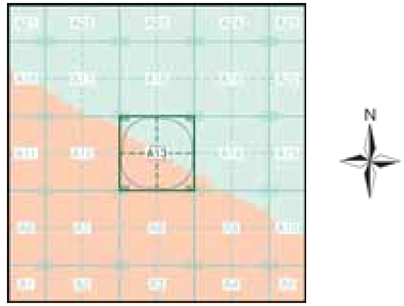
County to town

Town to street

Street to parcels of land

Property

EA/NRW Suitability Map - Slice A



Order Details

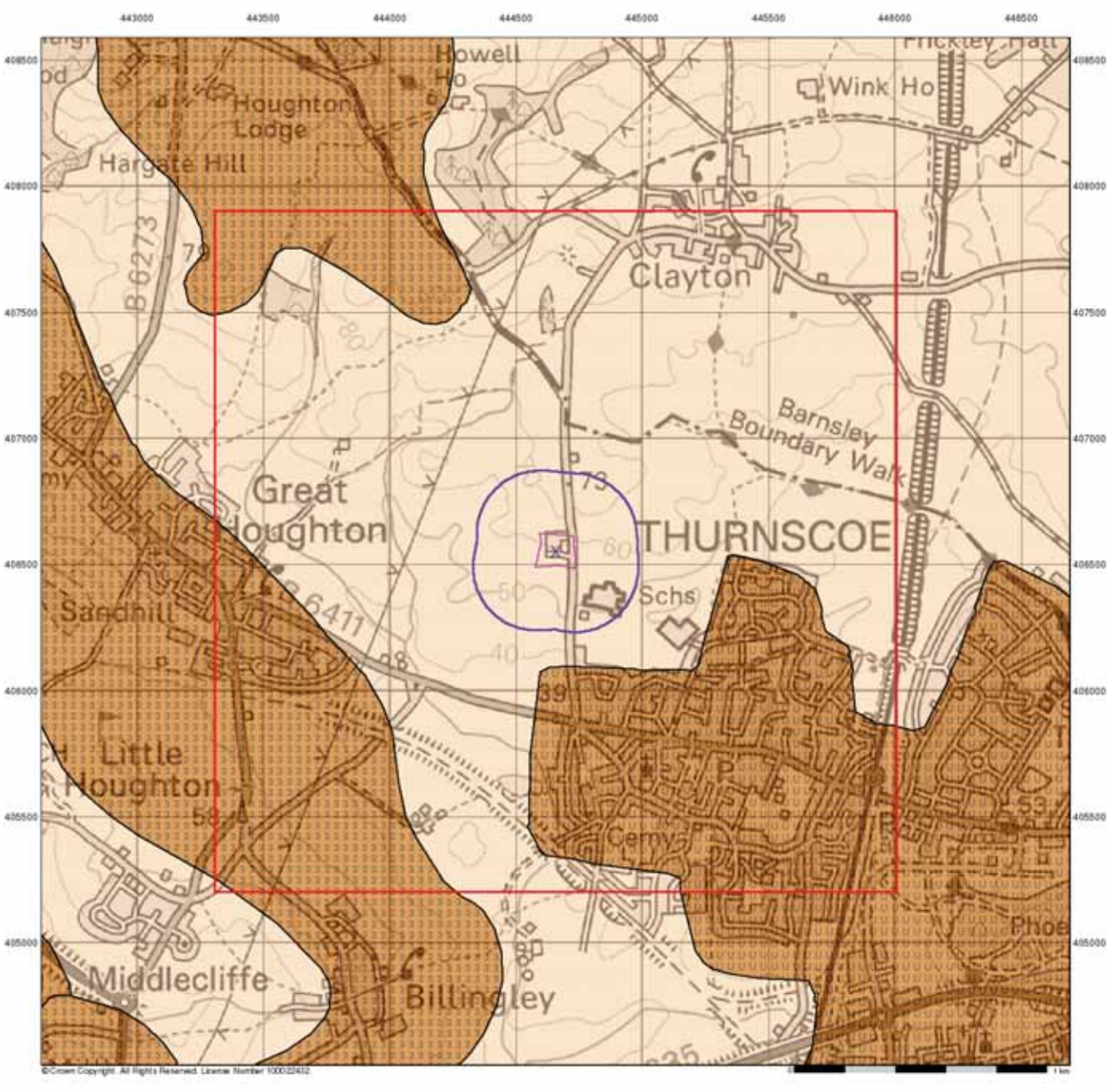
Order Number: 74838960_1_1
Customer Ref: 35261
National Grid Reference: 444660, 406550
Slice: A
Site Area (Ha): 1.76
Search Buffer (m): 250

Site Details

Clayton Lane, Thurnscoe

Landmark

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Web: www.envirocheck.co.uk



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Groundwater Vulnerability

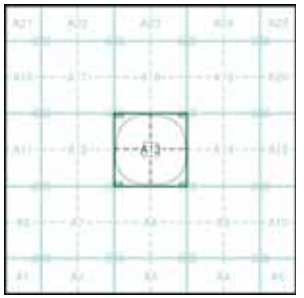
General

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

Agency and Hydrological

Geological Classes	Soil Classes
Major Aquifer (Highly Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Minor Aquifer (Variably Permeable)	High (H) 1, 2, 3, U
	Intermediate (I) 1, 2
	Low
Non Aquifer (Negligibly Permeable)	
Water or Sea	
Drift Deposit	

Site Sensitivity Context Map - Slice A



Order Details

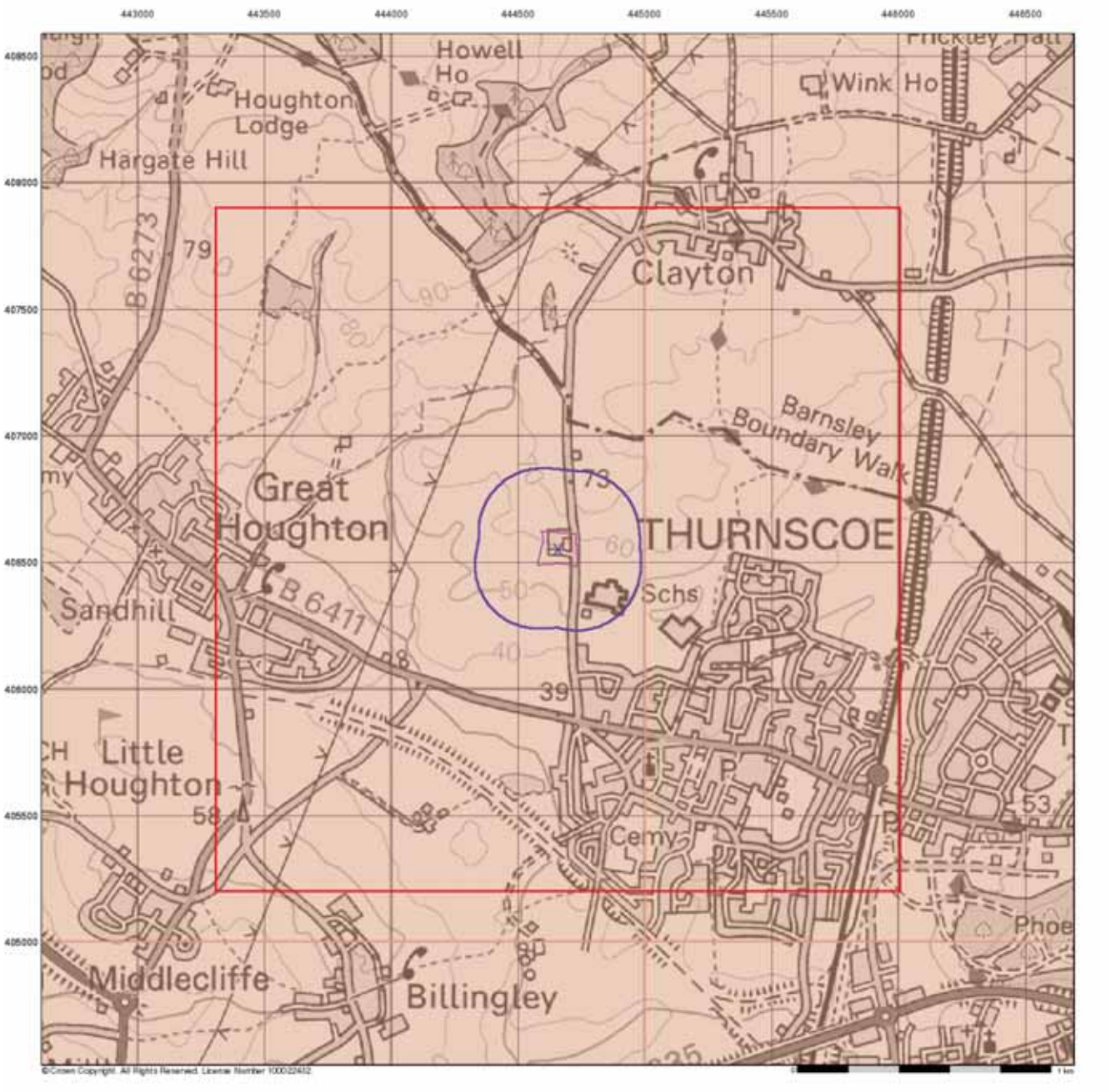
Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

Landmark Information Group

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Web: www.envirocheck.co.uk



GeoDyne

Bedrock Aquifer Designation

General

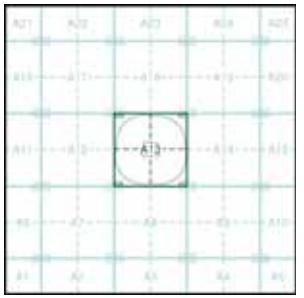
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



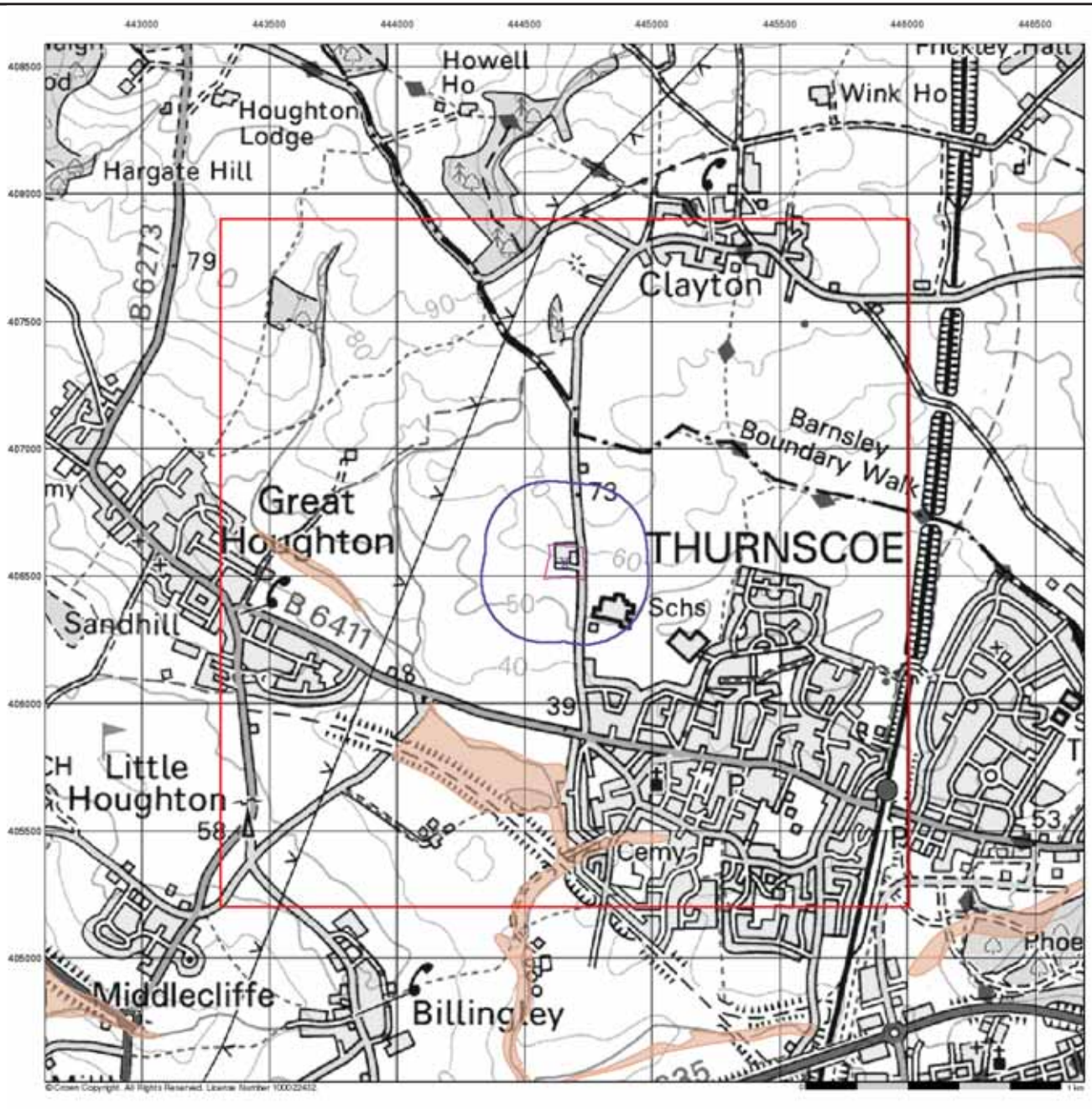
Order Details

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

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



GeoDyne

Superficial Aquifer Designation

General

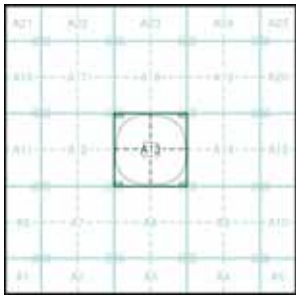
Specified Site | Specified Buffer(s) | Bearing Reference Point | Slice | Map ID

Agency and Hydrological

Geological Classes

- Principal Aquifer
- Secondary A Aquifer
- Secondary B Aquifer
- Secondary Undifferentiated
- Unproductive Strata
- Unknown

Site Sensitivity Context Map - Slice A



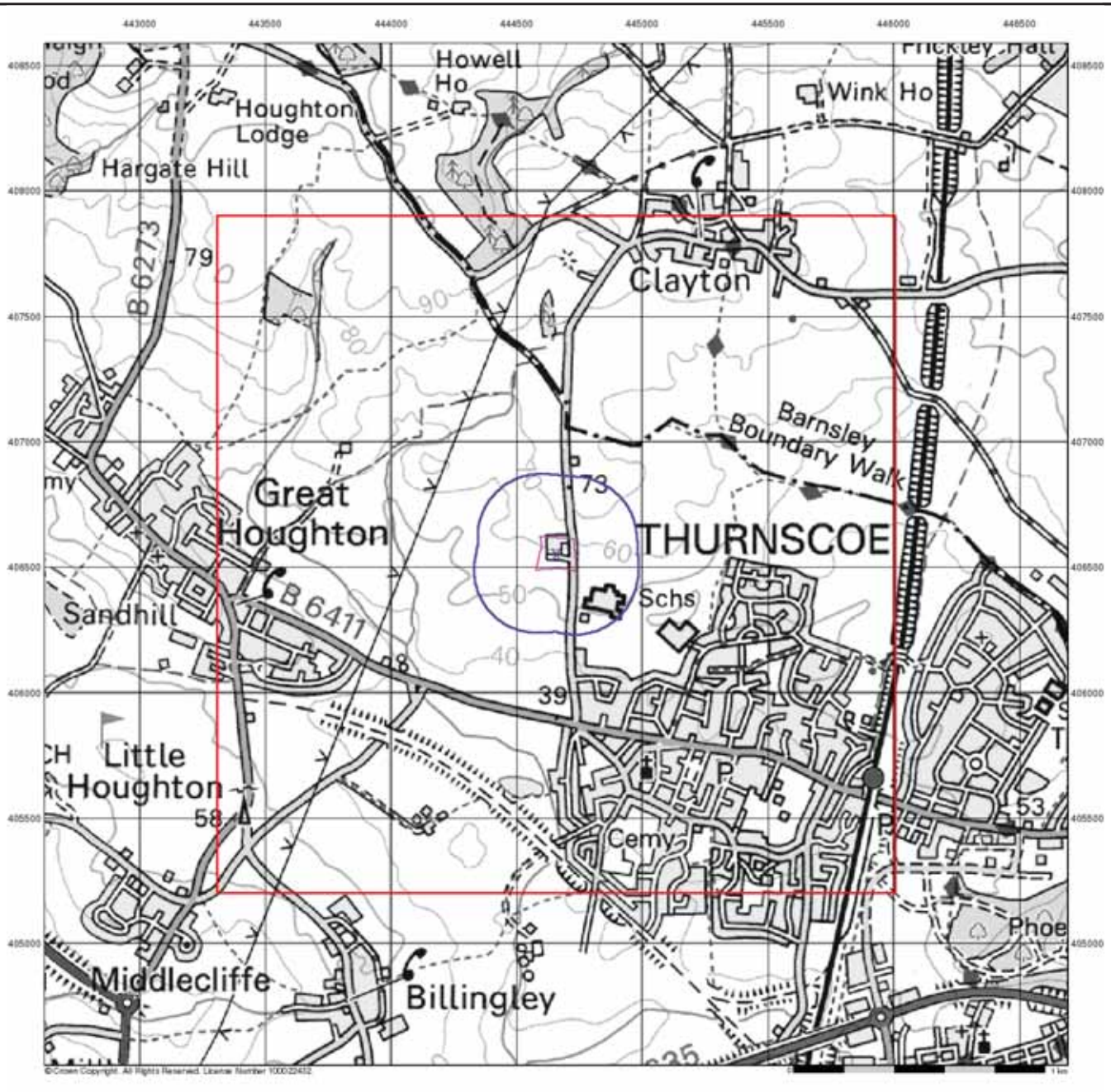
Order Details

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

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



GeoDyne

Source Protection Zones

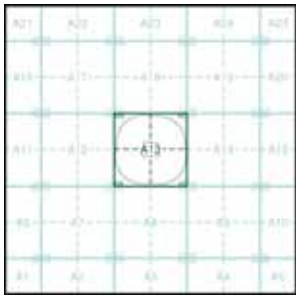
General

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)
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



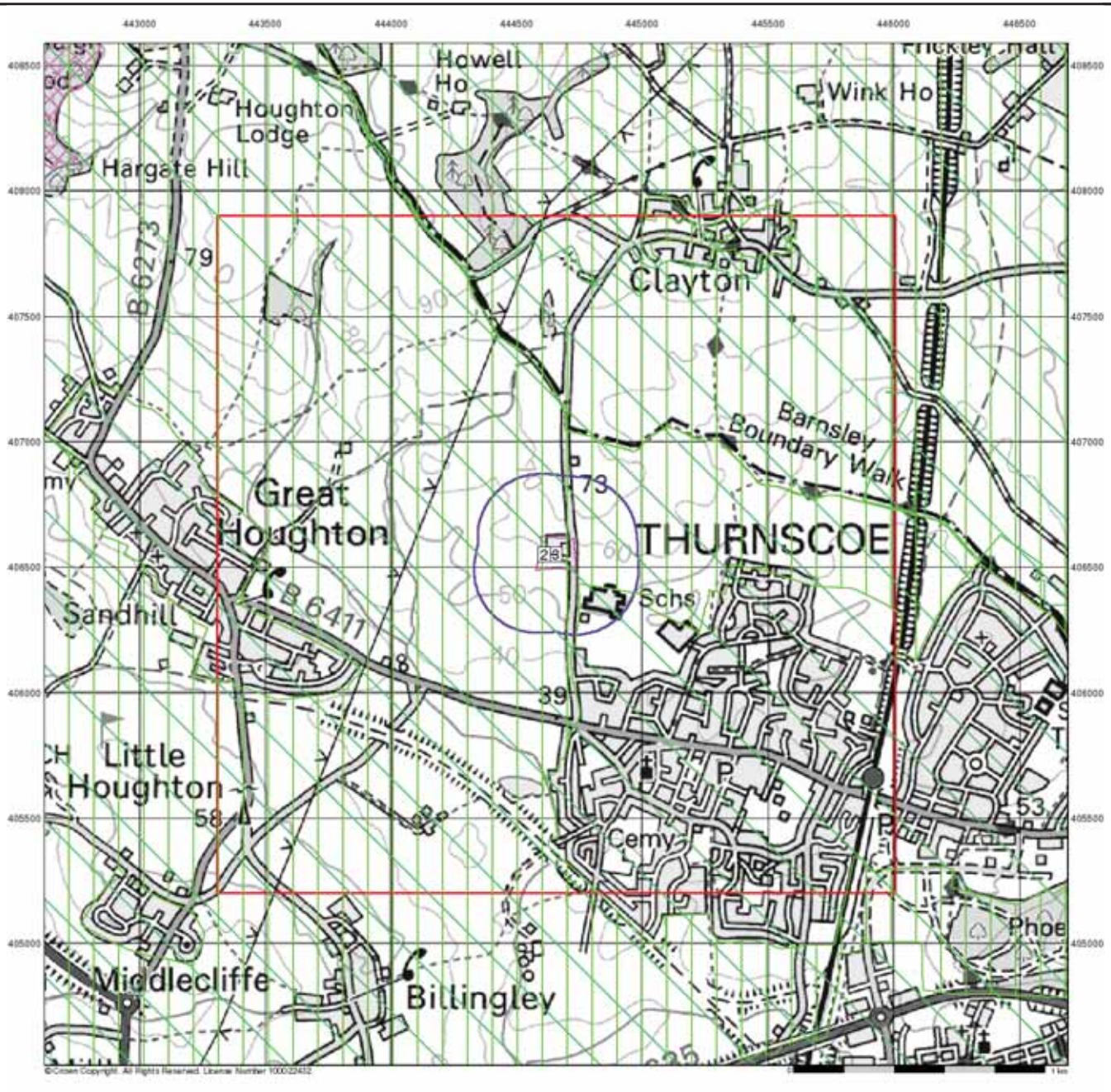
Order Details

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National Grid Reference:	444660, 406550
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Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thumscoe

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



GeoDyne

Sensitive Land Uses

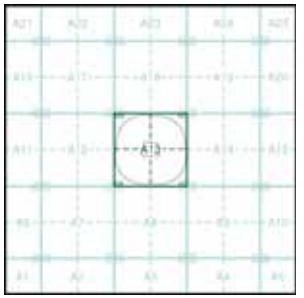
General

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

Sensitive Land Uses

- 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

Site Sensitivity Context Map - Slice A



Order Details

Order Number:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

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

GeoDyne

Envirocheck® Report:

BGS Boreholes Datasheet

Order Details:

Order Number:
74838960_1_1

Customer Reference:
35261

National Grid Reference:
444660, 406550

Slice:
A

Site Area (Ha):
1.76

Borehole Search Buffer (m):
250

Site Details:

Clayton Lane
Thurnscoe

Client Details:

Mr R Spencer
GeoDyne Ltd
Unit 2.2 Clarendon House
Clarendon Business Park
Clumber Avenue
Nottingham
NG5 1AH

Prepared For:

Rippon Homes Ltd
Leeming Lane South
Mansfield Woodhouse
Nottinghamshire
NG19 9AQ

Landmark Information Group

BGS Boreholes Summary

Data Type	Page Number	On Site	0 to 250m
BGS Boreholes	pg 1	None	17

Introduction

The Environment Act 1995 has made site sensitivity a key issue, as the legislation pays as much attention to the pathways by which contamination could spread, and to the vulnerable targets of contamination, as it does the potential sources of contamination.
For this reason, Landmark's Site Sensitivity maps and Datasheet(s) place great emphasis on statutory data provided by the Environment Agency and the Scottish Environment Protection Agency; it also incorporates data from Natural England (and the Scottish and Welsh equivalents) and Local Authorities; and highlights hydrogeological features required by environmental and geotechnical consultants. It does not include any information concerning past uses of land. The datasheet is produced by querying the Landmark database to a distance defined by the client from a site boundary provided by the client.

In the attached datasheet the National Grid References (NGRs) are rounded to the nearest 10m in accordance with Landmark's agreements with a number of Data Suppliers.

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A copy of the BGS Borehole Ordering Form is available to download from the Support section of www.envirocheck.co.uk.

Report Version v50.0

GeoDyne

BGS Boreholes Detail

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	**BGS Boreholes** BGS Reference: Se40nw122 Drilled Length (m): 271.16 Borehole Name: Knabs Hill Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105604/	A13NE (NE)	68	3	444792 406628
5	**BGS Boreholes** BGS Reference: Se40nw179 Drilled Length (m): 1.83 Borehole Name: Thurnscoe Comp School 2 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105662/	A13SE (SE)	106	3	444794 406397
5	**BGS Boreholes** BGS Reference: Se40nw178 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 1 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105661/	A13SE (SE)	117	3	444760 406369
5	**BGS Boreholes** BGS Reference: Se40nw182 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 5 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105665/	A13SE (SE)	152	3	444796 406345
5	**BGS Boreholes** BGS Reference: Se40nw188 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 11 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105671/	A13SE (SE)	166	3	444766 406320
6	**BGS Boreholes** BGS Reference: Se40nw180 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 3 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105663/	A13SE (SE)	132	3	444828 406393
6	**BGS Boreholes** BGS Reference: Se40nw183 Drilled Length (m): 1.83 Borehole Name: Thurnscoe Comp School 6 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105666/	A13SE (SE)	161	3	444821 406349
6	**BGS Boreholes** BGS Reference: Se40nw181 Drilled Length (m): 1.83 Borehole Name: Thurnscoe Comp School 4 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105664/	A13SE (SE)	170	3	444871 406385
6	**BGS Boreholes** BGS Reference: Se40nw184 Drilled Length (m): 2.44 Borehole Name: Thurnscoe Comp School 7 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105667/	A13SE (SE)	173	3	444849 406356
7	**BGS Boreholes** BGS Reference: Se40nw189 Drilled Length (m): .91 Borehole Name: Thurnscoe Comp School 12 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105672/	A13SE (SE)	191	3	444800 406304
7	**BGS Boreholes** BGS Reference: Se40nw190 Drilled Length (m): .91 Borehole Name: Thurnscoe Comp School 13 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105673/	A13SE (SE)	198	3	444832 406312
8	**BGS Boreholes** BGS Reference: Se40nw185 Drilled Length (m): 1.52 Borehole Name: Thurnscoe Comp School 8 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105668/	A13SE (SE)	202	3	444880 406346

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BGS Boreholes Detail

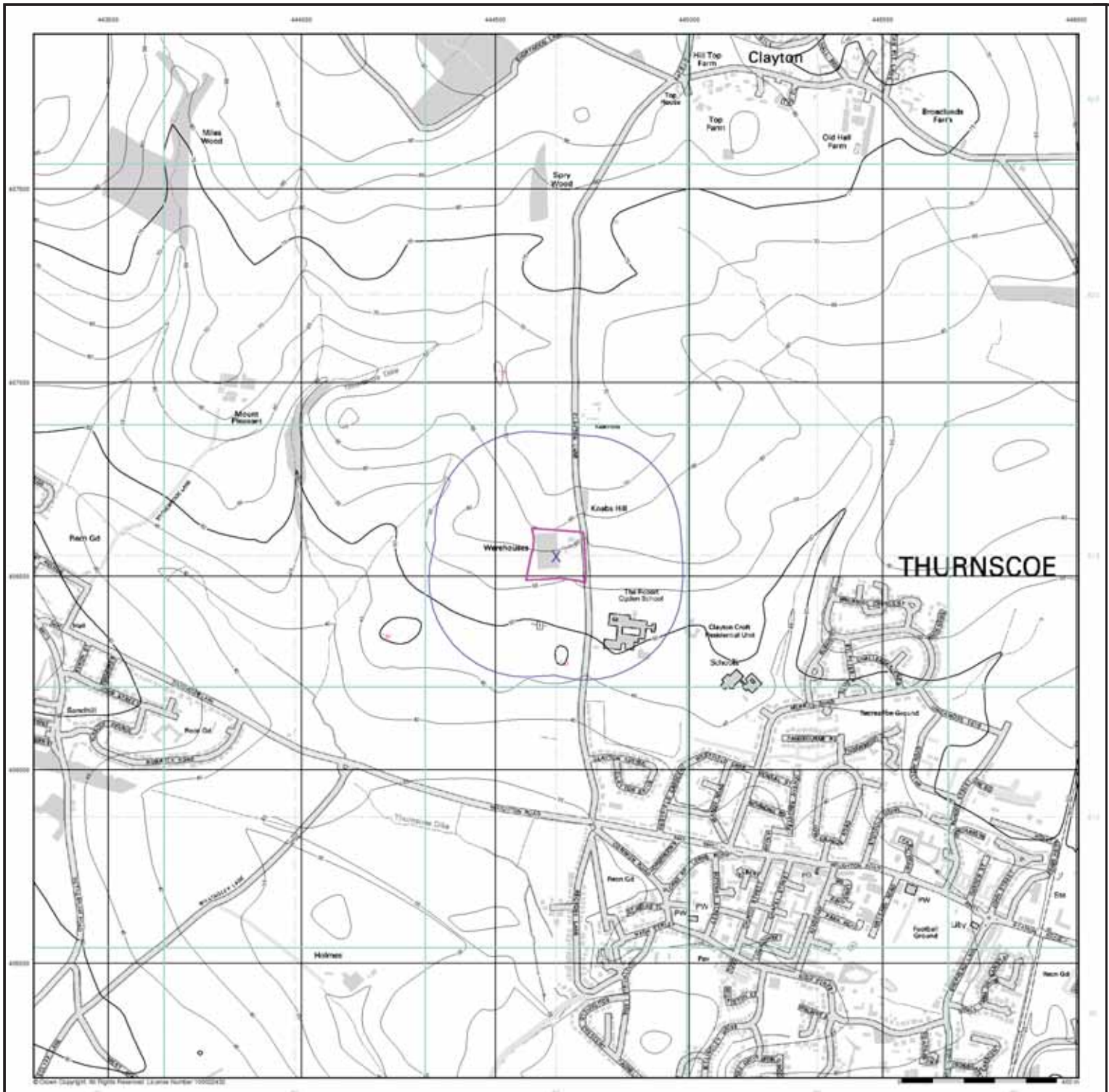
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8	**BGS Boreholes** BGS Reference: Se40nw186 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 9 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105669/	A13SE (SE)	229	3	444906 406335
8	**BGS Boreholes** BGS Reference: Se40nw192 Drilled Length (m): 2.13 Borehole Name: Thurnscoe Comp School 15 Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105675/	A13SE (SE)	250	3	444905 406303
9	**BGS Boreholes** BGS Reference: Se40nw94 Drilled Length (m): 119.18 Borehole Name: Houghton Main Colliery No.42 Ugbh Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105566/	A13NE (NE)	244	3	444906 406776
9	**BGS Boreholes** BGS Reference: Se40nw134 Drilled Length (m): 55.78 Borehole Name: Hickleton Colliery Ug28 & 28a Link to Borehole Scan: http://scans.bgs.ac.uk/sobi_scans/boreholes/105616/	A13NE (NE)	245	3	444925 406755

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Data Currency and Contact Details

BGS Boreholes	Version	Update Cycle
BGS Boreholes British Geological Survey - National Geoscience Information Service	November 2015	Quarterly

Contact Details	Contact Logo
3 **British Geological Survey - Enquiry Service** British Geological Survey, Kingsley Dunham Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk	British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
- **Landmark Information Group Limited** Imperium, Imperial Way, Reading, Berkshire, RG2 0TD Telephone: 0844 844 9952 Fax: 0844 844 9951 Email: customerservices@landmarkinfo.co.uk Website: www.landmarkinfo.co.uk	LANDMARK Information Group



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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID

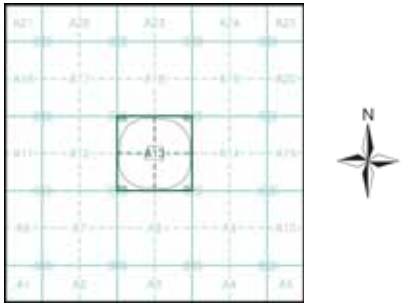
Detailed River Network Data

- Primary River
- Secondary River
- Tertiary River
- Canal
- Canal Tunnel
- Undefined River
- Lake/Reservoir
- Offline Drainage Feature
- Extended Culvert (greater than 50m)
- Underground River (inferred)
- Underground River (local knowledge)
- Downstream of High Water Mark
- Downstream of Seaward Extension
- Not assigned River feature

Contours (height in metres)

- Standard Contour
- Master Contour
- Spot Height
- Mean Low Water
- Mean High Water

EA/NRW Detailed River Network Map - Slice A



Order Details

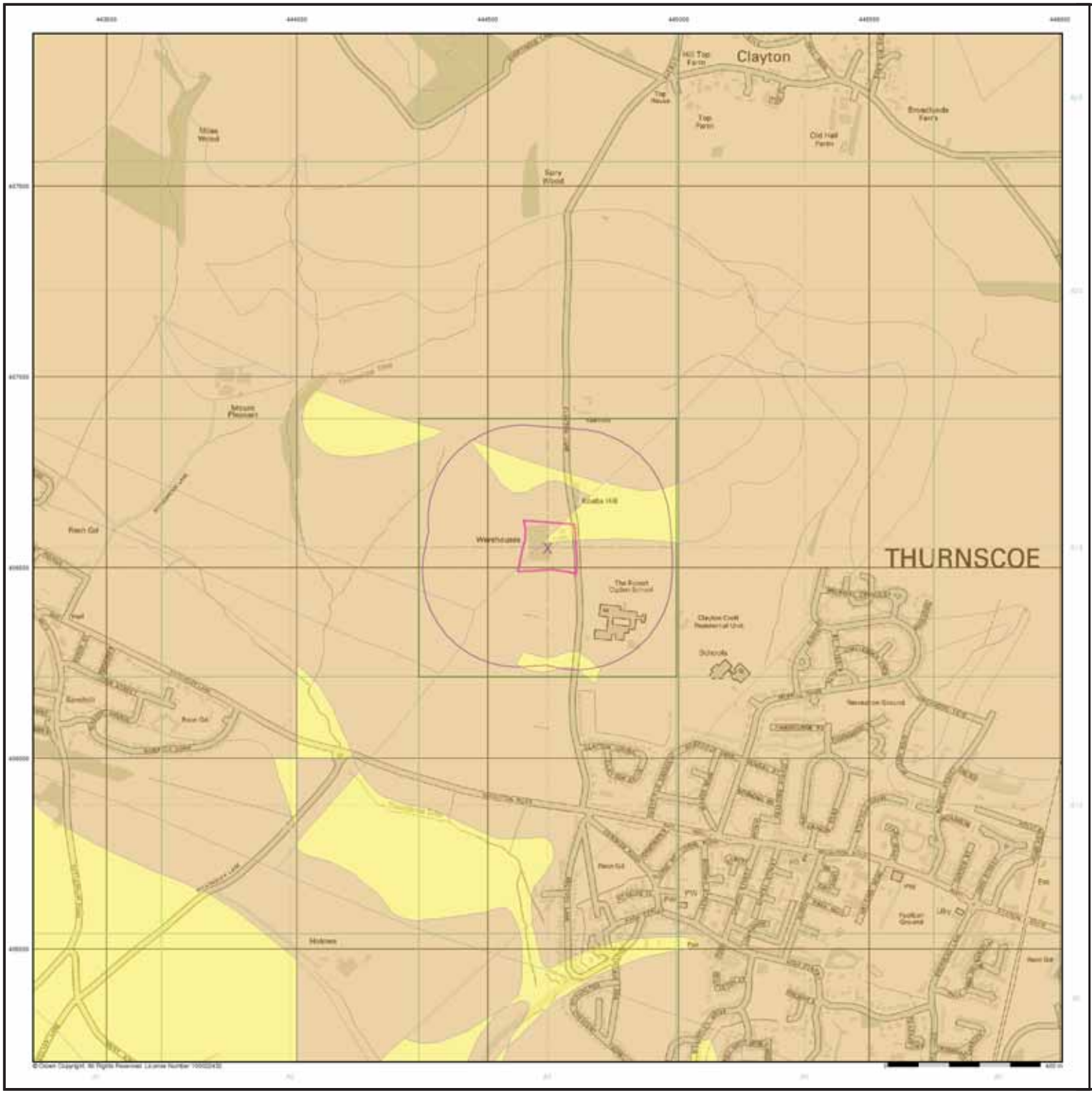
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National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

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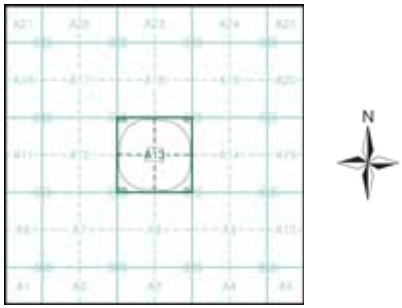
Specified Site | Specified Buffer(s) | X Steering Reference Point

Estimated Soil Chemistry Arsenic

Arsenic Concentrations mg/kg

- < 15
- 15 - 25
- 25 - 35
- 35 - 45
- 45 - 60
- 60 - 120
- > 120

Estimated Soil Chemistry Arsenic - Slice A



Order Details

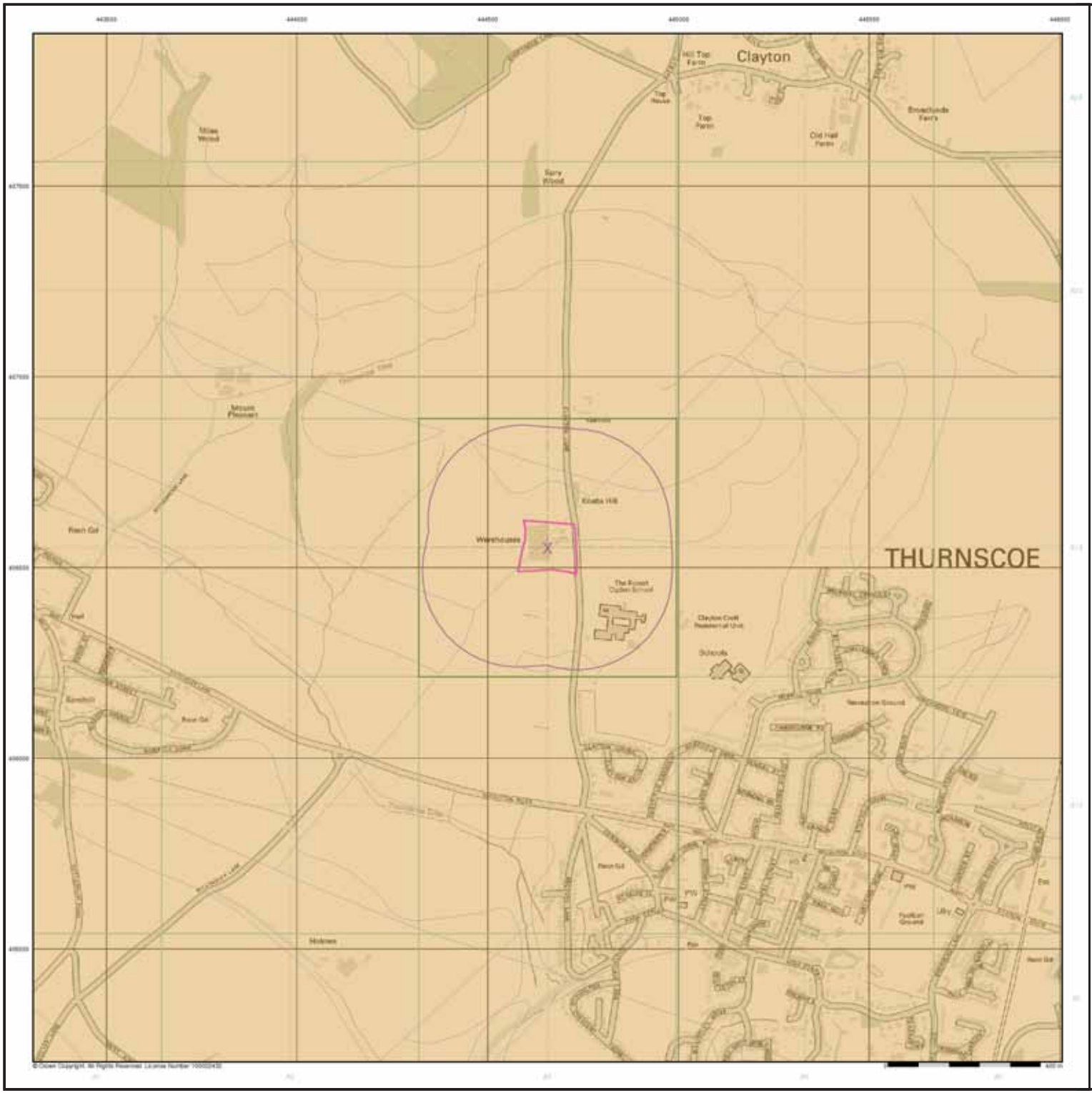
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Customer Ref:	35261
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General

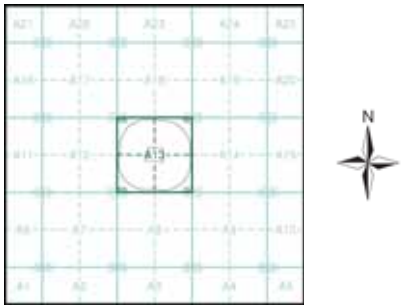
Specified Site | Specified Buffer(s) | Bearing Reference Point

Estimated Soil Chemistry Cadmium

Cadmium Concentrations mg/kg

- < 1.8
- 1.8 - 2.2
- 2.2 - 3.0
- > 3.0

Estimated Soil Chemistry Cadmium - Slice A



Order Details

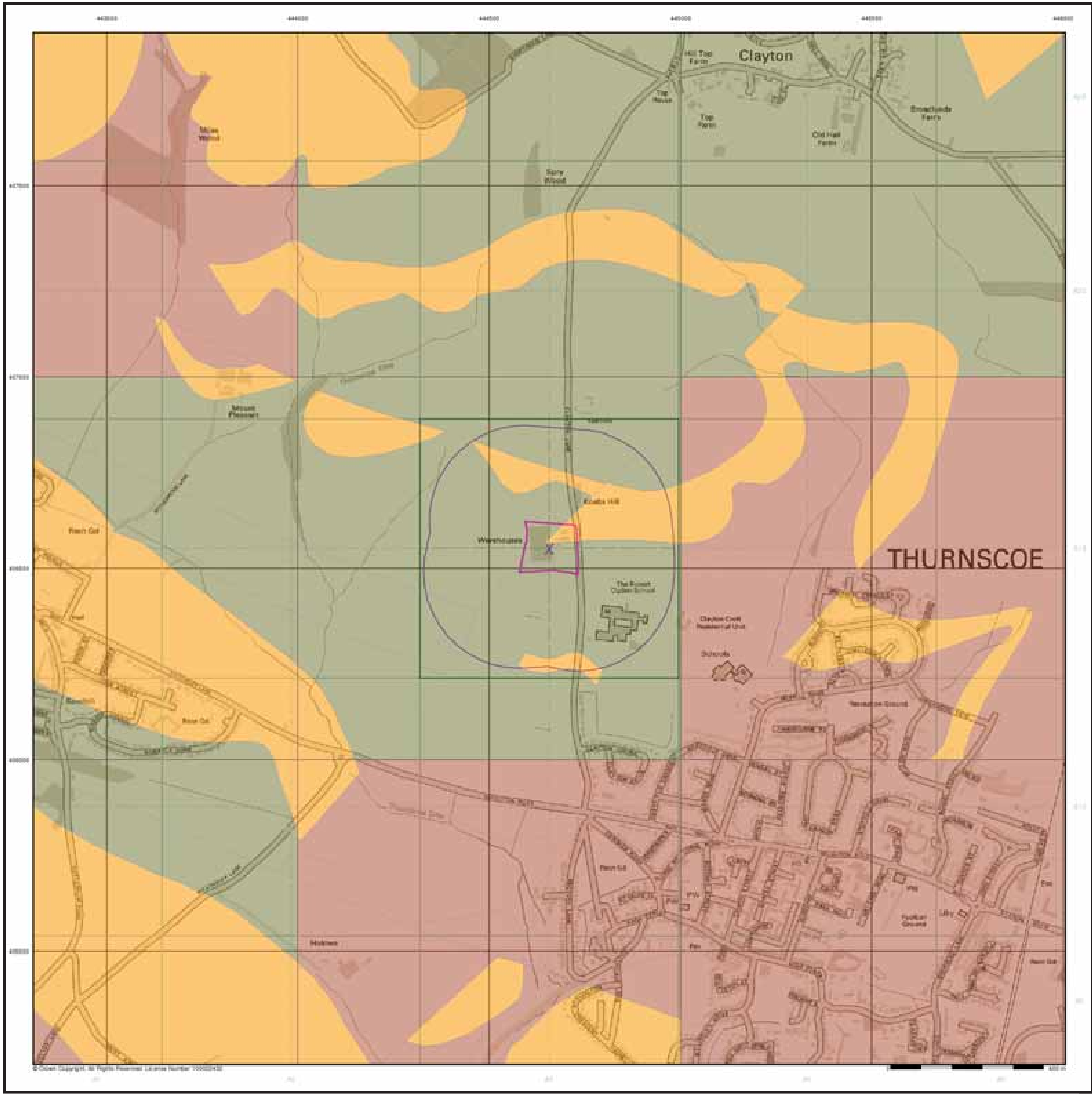
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Customer Ref:	35261
National Grid Reference:	444660, 406550
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Search Buffer (m):	250

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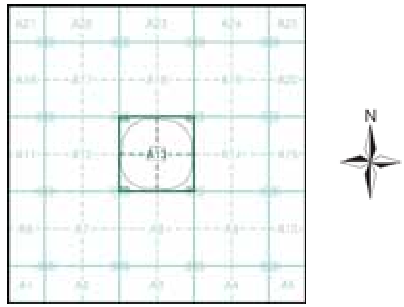
Specified Site　Specified Buffer(s)　X Bearing Reference Point

Estimated Soil Chemistry Chromium

Chromium Concentrations mg/kg

- < 20
- 20 - 40
- 40 - 60
- 60 - 90
- 90 - 120
- 120 - 180
- > 180

Estimated Soil Chemistry Chromium - Slice A



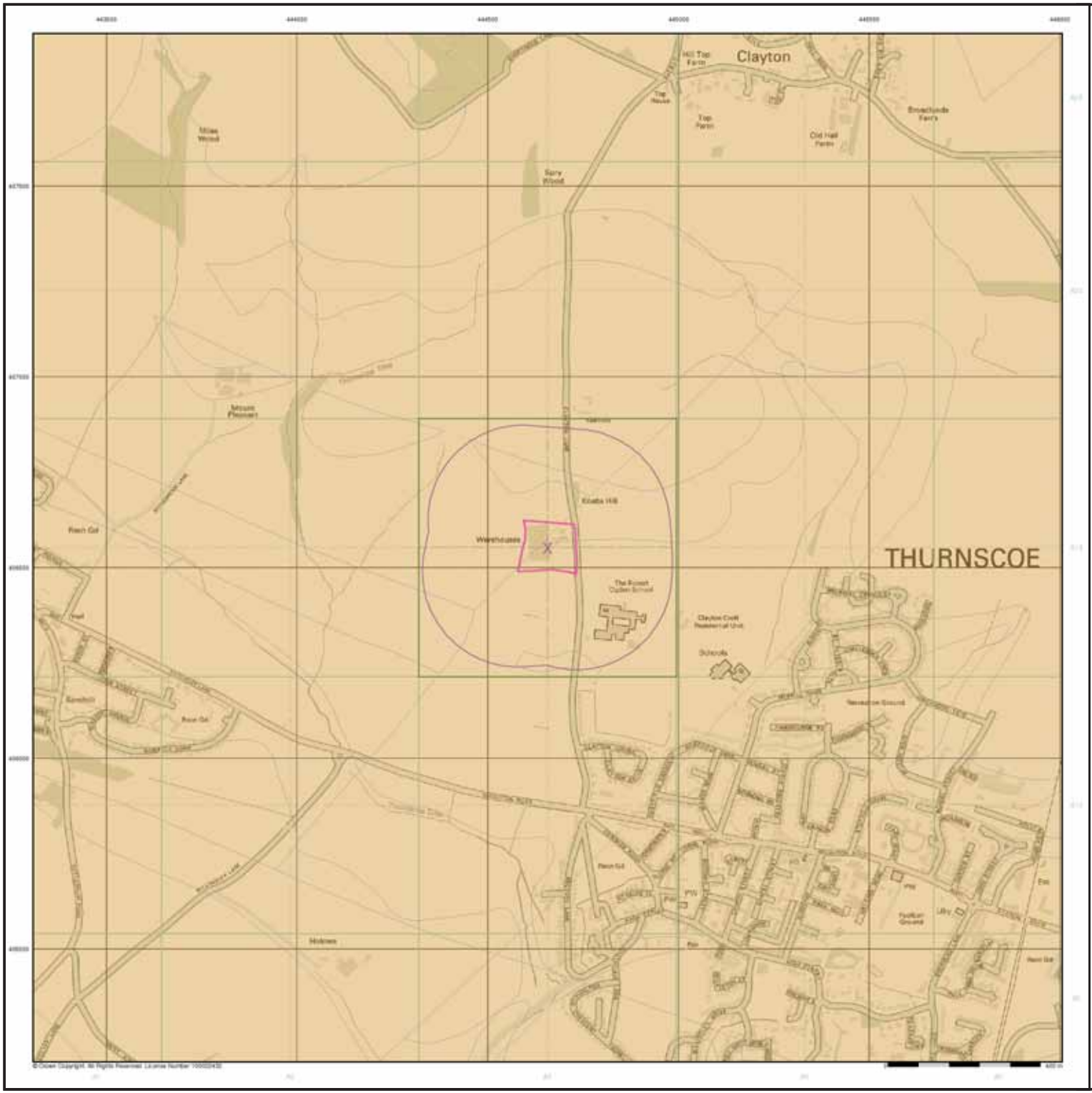
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Order Details:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
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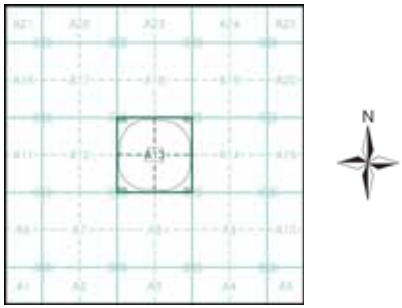
Specified Site | Specified Buffer(s) | Bearing Reference Point

Estimated Soil Chemistry Lead

Lead Concentrations mg/kg

- < 150
- 150 - 300
- 300 - 600
- 600 - 900
- > 900

Estimated Soil Chemistry Lead - Slice A



Order Details

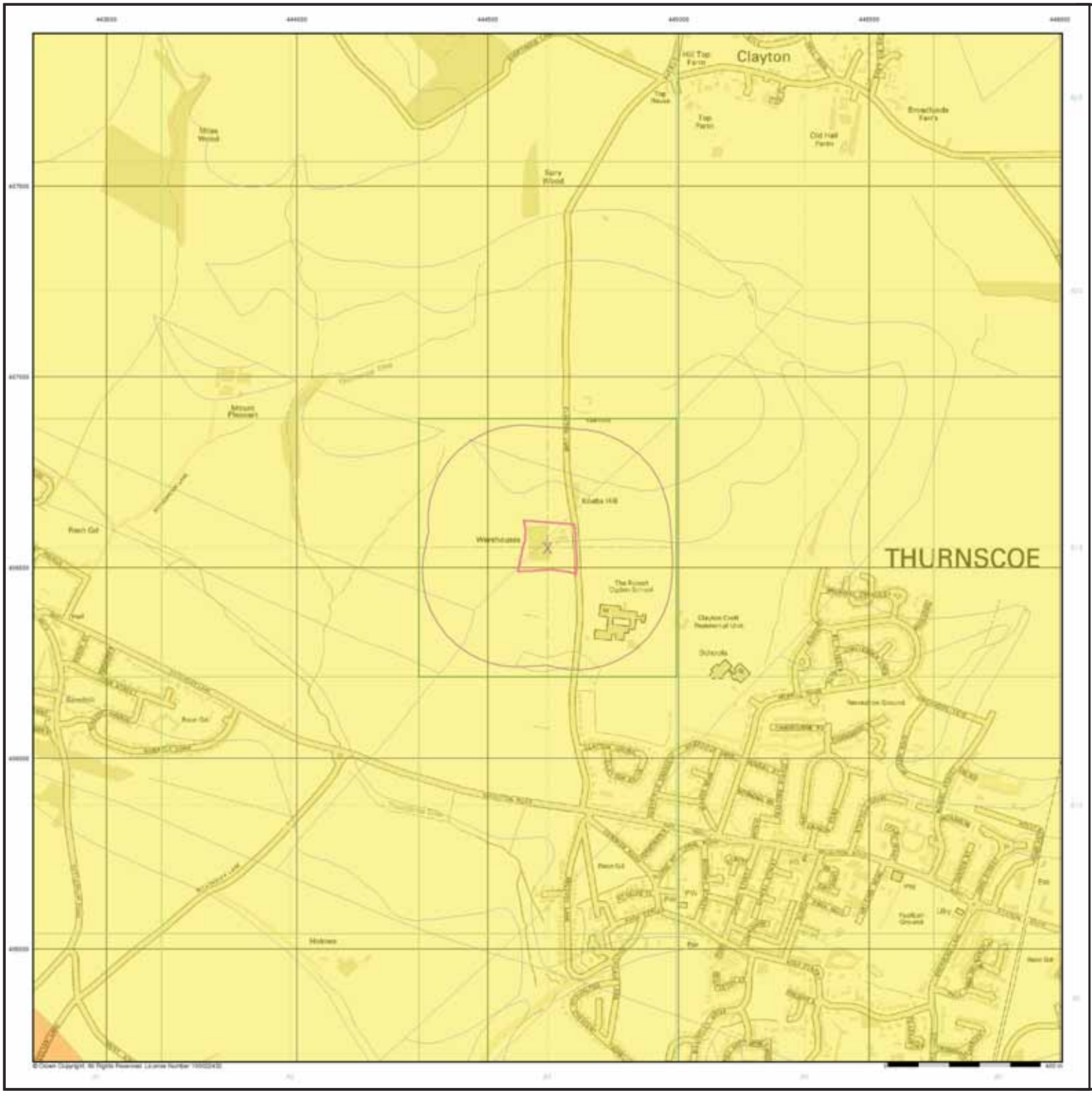
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General

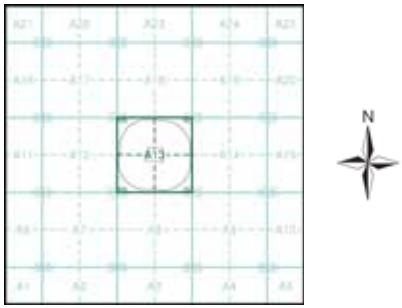
Specified Site | Specified Buffer(s) | Bearing Reference Point

Estimated Soil Chemistry Nickel

Nickel Concentrations mg/kg

- < 15
- 15 - 30
- 30 - 45
- 45 - 60
- 60 - 80
- 80 - 100
- > 100

Estimated Soil Chemistry Nickel - Slice A



Order Details

Order Details:	74838960_1_1
Customer Ref:	35261
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Slice:	A
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Site Details

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Geology 1:10,000 Maps Legends

Artificial Ground and Landslip

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	MGR	Made Ground (Undivided)	Artificial Deposit	Holocene - Holocene
	WMGR	Infilled Ground	Artificial Deposit	Holocene - Holocene
	WGR	Worked Ground (Undivided)	Void	Holocene - Holocene

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay and Silt	Flandrian - Pleistocene

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	NEWR	Newstead Rock	Sandstone	Bolsovian - Bolsovian
	PUCM	Pennine Upper Coal Measures Formation	Mudstone, Siltstone and Sandstone	Westphalian D - Bolsovian
	PUCM	Pennine Upper Coal Measures Formation	Sandstone	Westphalian D - Bolsovian
	AR	Ackworth Rock	Sandstone	Bolsovian - Bolsovian
	PMCM	Pennine Middle Coal Measures Formation	Mudstone, Siltstone and Sandstone	Bolsovian - Duckmantian
	PMCM	Pennine Middle Coal Measures Formation	Sandstone	Bolsovian - Duckmantian
	Fault			
	Rock			

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Geology 1:10,000 Maps

This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:10,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around a site. This mapping may be more up to date than previously published paper maps.

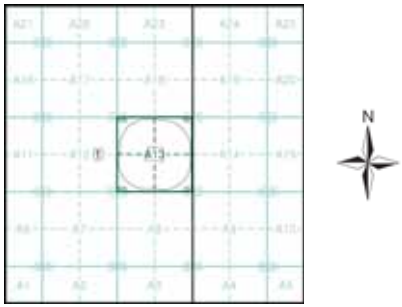
The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page.

Please Note: Not all of the layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:10,000 Maps Coverage

Map ID:	1	**Map ID:**	
Map Name:	SE40NW	**Map Name:**	SE40NE
Map Date:	2005	**Map Date:**	2005
Bedrock Geology:	Available	**Bedrock Geology:**	Available
Superficial Geology:	Available	**Superficial Geology:**	Available
Artificial Geology:	Available	**Artificial Geology:**	Available
Faults:	Available	**Faults:**	Available
Landslip:	Not Available	**Landslip:**	Not Available
Rock Segments:	Available	**Rock Segments:**	Available

Geology 1:10,000 Maps - Slice A



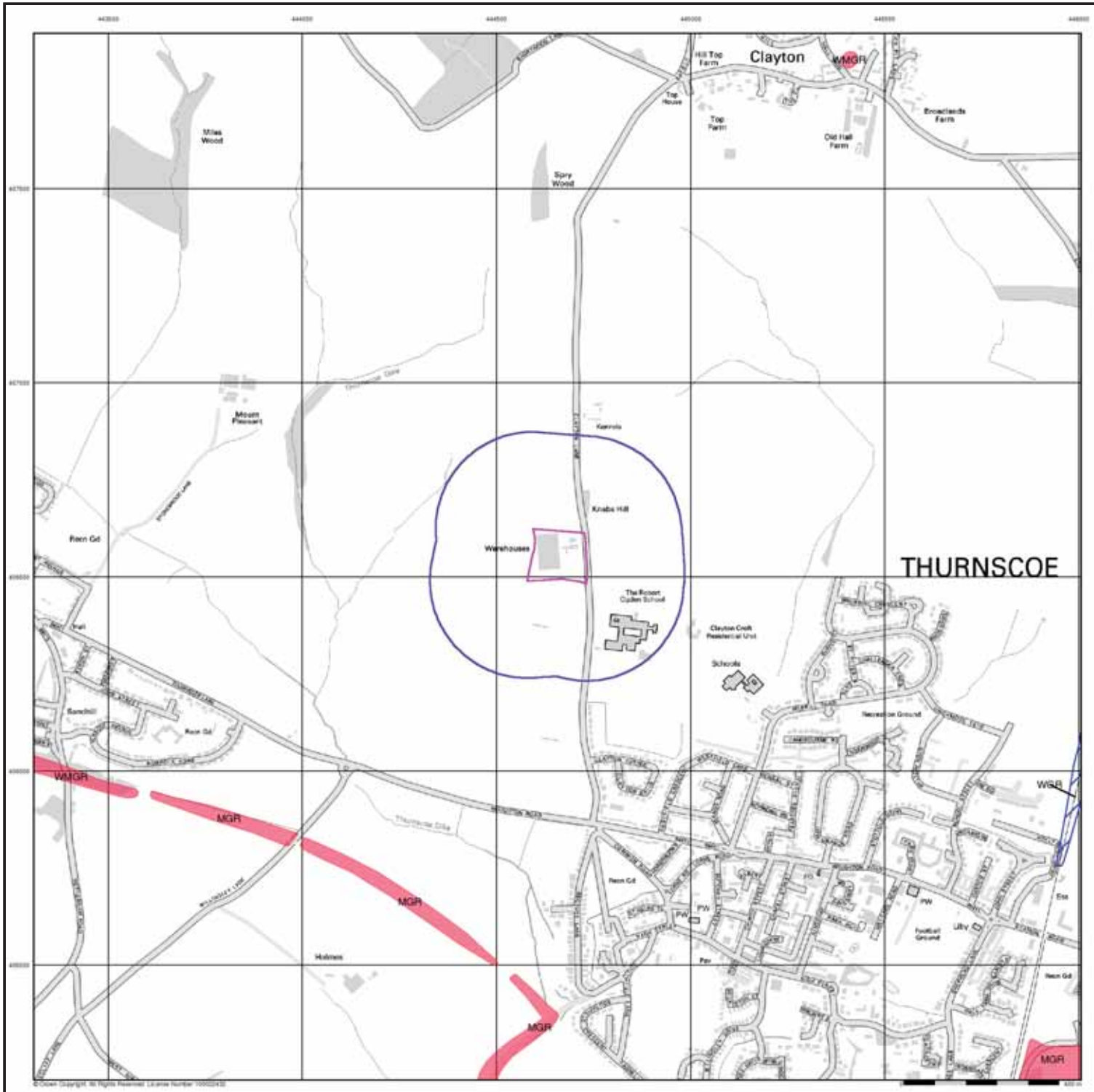
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National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

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Artificial Ground and Landslip

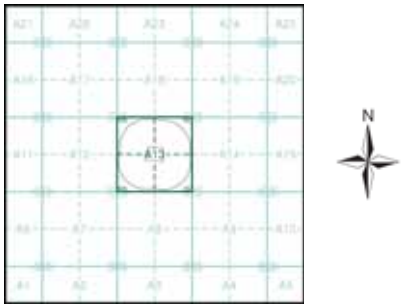
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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



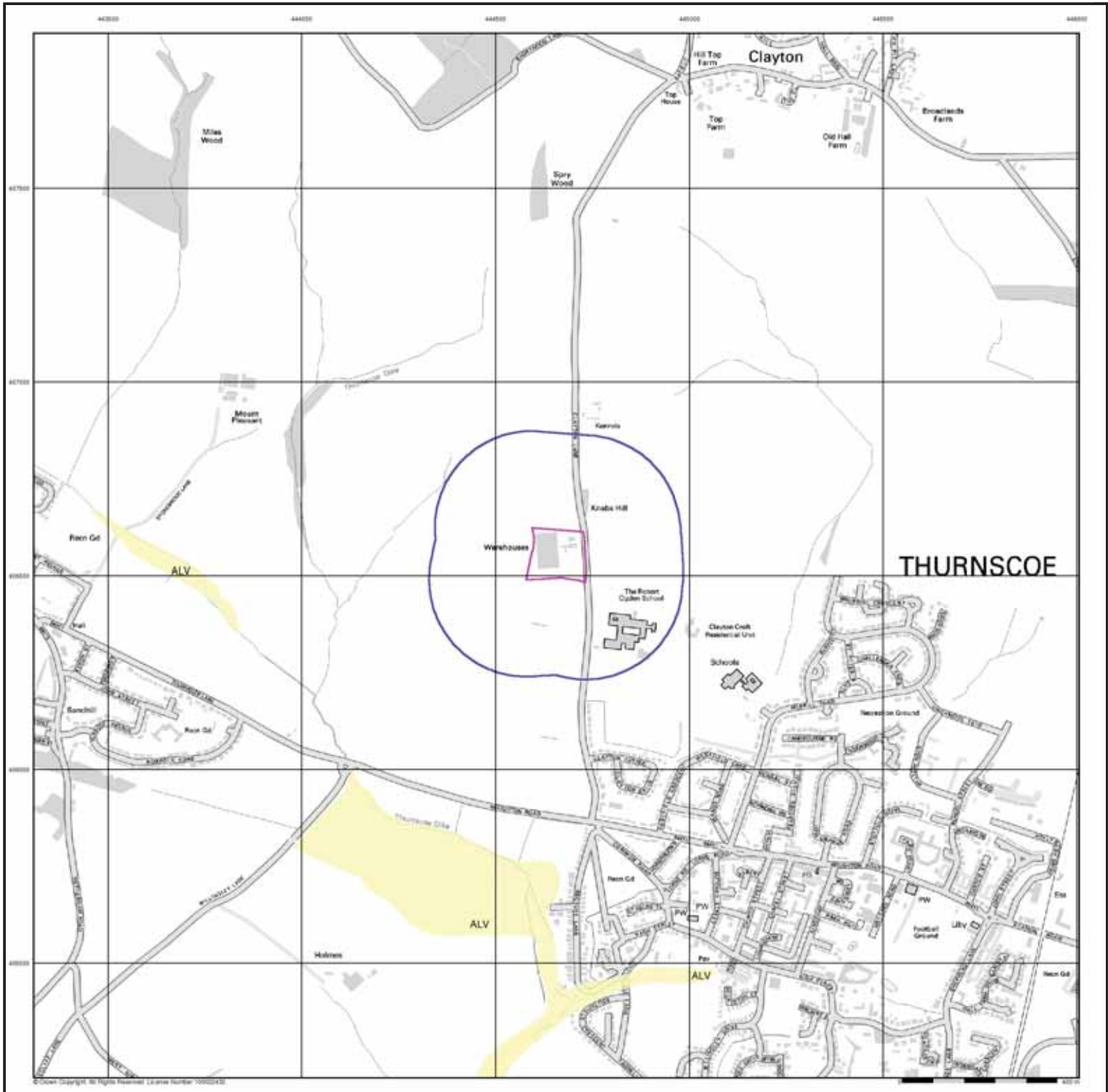
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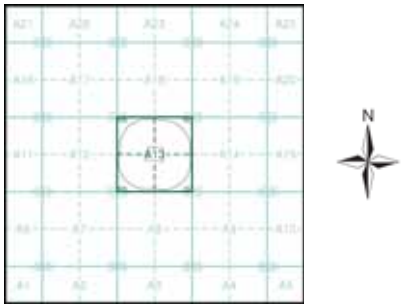
Superficial Geology

BGS 1:10,000 Superficial Deposits are the youngest geological deposits formed during the most recent period of geological time, 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



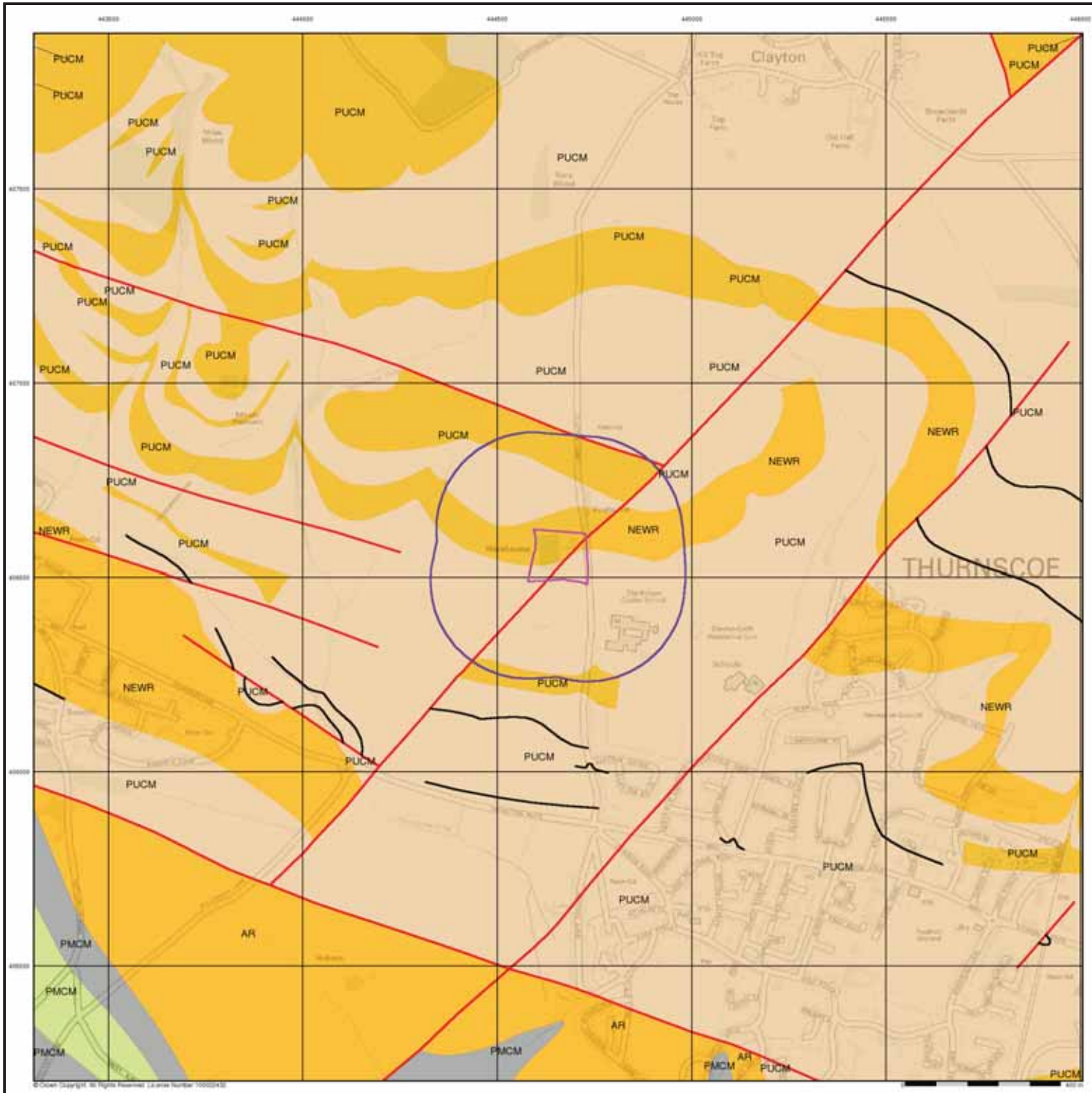
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Bedrock and Faults

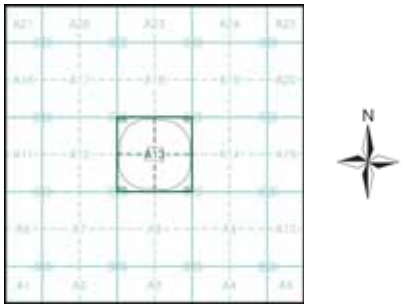
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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 and thin beds mapped as lines such as coal seams and mineral veins. These are not restricted by age and could relate to features of any of the 1:10,000 geology datasets.

Bedrock and Faults Map - Slice A



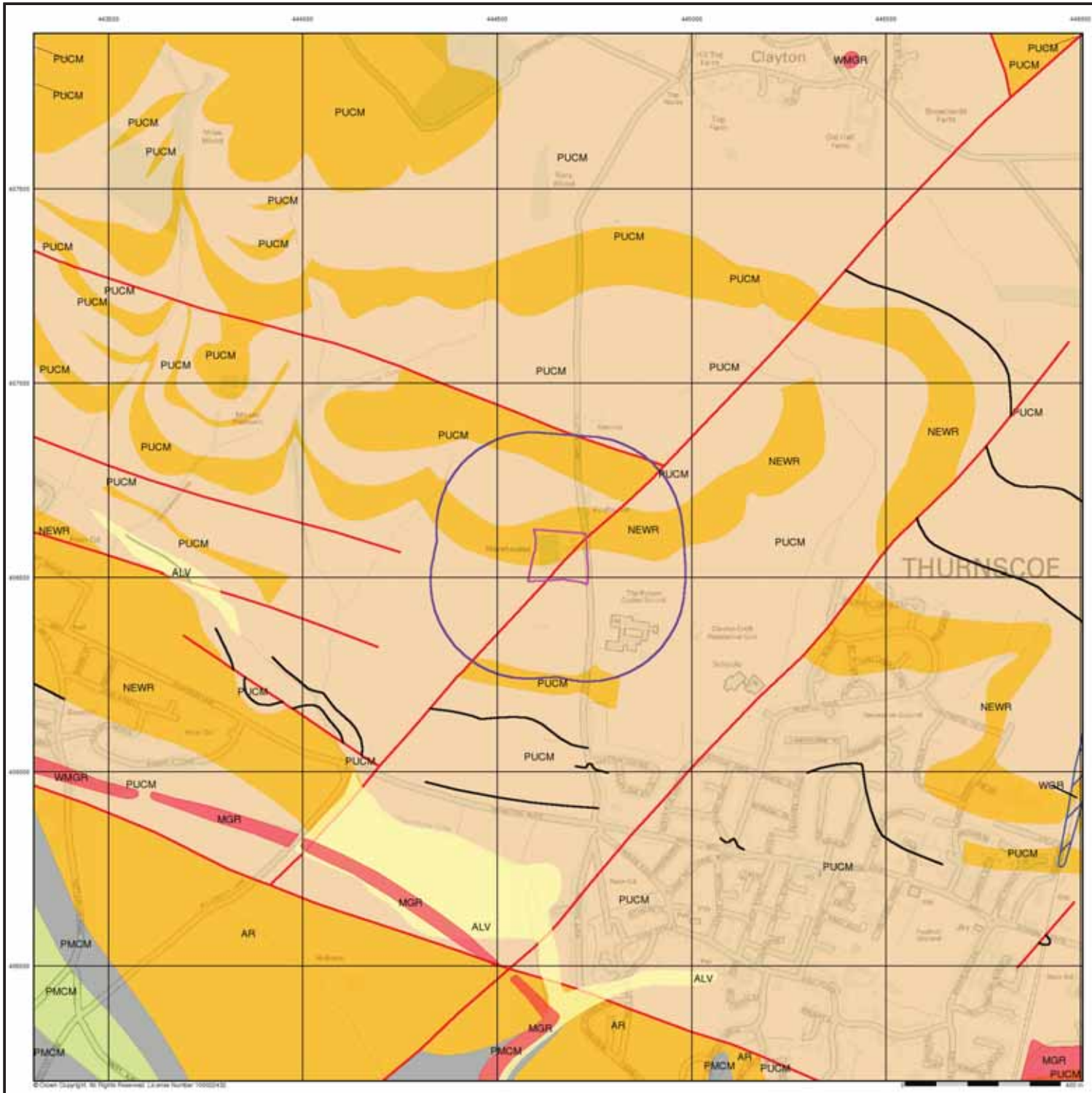
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Combined Surface Geology

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.

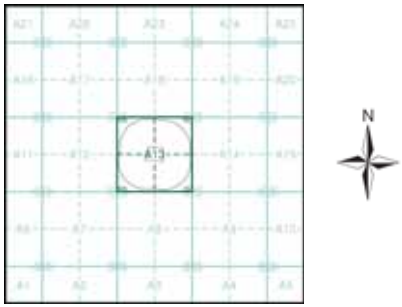
Additional Information

More information on 1:10,000 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:	74838960_1_1
Customer Ref:	35261
National Grid Reference:	444660, 406550
Slice:	A
Site Area (Ha):	1.76
Search Buffer (m):	250

Site Details

Clayton Lane, Thurnscoe

GeoDyne

APPENDIX X

Ground Gas and Groundwater Monitoring Data

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH
Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	08/01/2016
Weather	Overcast
Atmospheric Pressure Range (mb)	983
Equipment	GA2000 (DERBY) & dipmeter
Operator	HW

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.0	2.0	19.3	0.0	0.36	15	Monitored for 120 seconds
	Steady	0.0	2.0	19.3	0.0			
WS4	Peak	0.0	0.7	19.3	0.0	0.47	20	Monitored for 120 seconds
	Steady	0.0	0.7	19.3	0.0			
WS5	Peak	0.0	0.8	16.5	0.0	1.52	25	Monitored for 120 seconds
	Steady	0.0	0.8	16.5	0.0			
WS6	Peak	0.0	3.3	18.9	0.0	1.27	20	Monitored for 120 seconds
	Steady	0.0	3.3	18.9	0.0			
Ambient		0.0	0.0	21.2	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH
Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	15/01/2016
Weather	Sunny after morning frost
Atmospheric Pressure Range (mb)	1009
Equipment	GA2000 (DERBY) & dipmeter
Operator	RS

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.1	1.2	20.1	0.0	0.55	20	Monitored for 120 seconds
	Steady	0.0	1.2	20.1	0.0			
WS4	Peak	0.0	1.0	20.3	0.0	0.42	20	Monitored for 120 seconds
	Steady	0.0	1.0	20.3	0.0			
WS5	Peak	0.0	2.2	14.0	0.0	1.78	50	Monitored for 120 seconds
	Steady	0.0	2.2	14.0	0.0			
WS6	Peak	0.0	3.8	18.1	0.0	1.81	35	Monitored for 120 seconds
	Steady	0.0	3.8	18.1	0.0			
Ambient		0.0	0.0	21.5	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH
Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	21/01/2016
Weather	Overcast
Atmospheric Pressure Range (mb)	1006
Equipment	GA2000 (DERBY) & dipmeter
Operator	CP

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.0	1.8	20.3	0.0	0.60	80	Monitored for 120 seconds
	Steady	0.0	1.2	20.1	0.0			
WS4	Peak	0.0	2.2	19.1	0.0	0.41	37	Monitored for 120 seconds
	Steady	0.0	2.2	19.1	0.0			
WS5	Peak	0.0	3.2	12.5	0.0	1.94	64	Monitored for 120 seconds
	Steady	0.0	3.2	12.5	0.0			
WS6	Peak	0.0	4.0	18.3	0.0	2.30	54	Monitored for 120 seconds
	Steady	0.0	4.0	18.3	0.0			
Ambient		0.0	0.0	21.6	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
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Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	28/01/2016
Weather	Overcast
Atmospheric Pressure Range (mb)	1007
Equipment	GA2000 (DERBY) & dipmeter
Operator	HW

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.0	0.9	20.0	0.0	0.57	20	Monitored for 120 seconds
	Steady	0.0	0.9	20.0	0.0			
WS4	Peak	0.0	1.0	18.8	0.0	0.43	30	Monitored for 120 seconds
	Steady	0.0	1.0	18.8	0.0			
WS5	Peak	0.0	4.2	8.9	0.0	2.06	35	Monitored for 120 seconds
	Steady	0.0	4.2	8.9	0.0			
WS6	Peak	0.0	3.7	18.3	0.0	1.97	30	Monitored for 120 seconds
	Steady	0.0	3.7	18.3	0.0			
Ambient		0.0	0.0	21.6	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH
Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	04/02/2016
Weather	Overcast
Atmospheric Pressure Range (mb)	1007
Equipment	GA2000 (DERBY) & dipmeter
Operator	HW

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.0	1.0	20.0	0.0	0.59	20	Monitored for 120 seconds
	Steady	0.0	1.0	20.0	0.0			
WS4	Peak	0.0	1.1	19.0	0.0	0.43	30	Monitored for 120 seconds
	Steady	0.0	1.1	19.0	0.0			
WS5	Peak	0.0	4.8	8.2	0.0	1.98	30	Monitored for 120 seconds
	Steady	0.0	4.8	8.2	0.0			
WS6	Peak	0.0	3.8	19.1	0.0	1.98	30	Monitored for 120 seconds
	Steady	0.0	3.8	19.1	0.0			
Ambient		0.0	0.0	21.6	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

GeoDyne
Unit 2.2 Clarendon House
Clarendon Park
Clumber Avenue
Nottingham
NG5 1AH
Tel: 0115 962 0001

Project No.	35261
Client	Rippon Homes Ltd
Site Location	Clayton Lane, Thurnscoe
Date	11/02/2016
Weather	Sunny
Atmospheric Pressure Range (mb)	1010
Equipment	GA2000 (DERBY) & dipmeter
Operator	HW

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665								
Borehole No.	Peak Steady	Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Gas Flow (l/h)	Depth to Groundwater (mbgl)	Time to steady reading (secs)	Other Issues i.e. odour, condition of installation, etc
WS3	Peak	0.0	1.9	19.5	0.0	0.60	20	Monitored for 120 seconds
	Steady	0.0	1.9	19.5	0.0			
WS4	Peak	0.0	0.9	19.0	0.0	0.43	30	Monitored for 120 seconds
	Steady	0.0	0.9	19.0	0.0			
WS5	Peak	0.0	2.8	13.1	0.0	1.95	30	Monitored for 120 seconds
	Steady	0.0	2.8	13.1	0.0			
WS6	Peak	0.0	3.7	19.1	0.0	1.98	30	Monitored for 120 seconds
	Steady	0.0	3.7	19.1	0.0			
Ambient		0.0	0.0	21.6	N/A	N/A	N/A	

Notes

Cell is highlighted in the following conditions
1. Where Methane exceeds 1% v/v (after BR212)
2. Where Carbon Dioxide exceeds 5% v/v (after BR212)

N/A - Not Applicable/ Not Available
BOH - Bottom of Hole
ND - Not Determined
NGW - No groundwater encountered

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APPENDIX XI

Plates





Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Arisings from Window Sample Boreholes WS1 and WS2	Revision	
		Plate No.	35261/P1

GeoDyne
Unit 2.2, Clarendon House, Clarendon Business Park, Clumber Avenue, Nottingham
NG5 1AH
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Tel: 01332 290 798
info@geodyne.co.uk

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Arisings from Window Sample Boreholes WS3 and WS4	Revision	
		Plate No.	35261/P2

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Arisings from Window Sample Boreholes WS3 and WS4	Revision	
		Plate No.	35261/P3

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit TP1 and Arisings	Revision	
		Plate No.	35261/P4

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit TP2 and Arisings	Revision	
		Plate No.	35261/P5

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit TP3 and Arisings	Revision	
		Plate No.	35261/P6

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit TP4 and Arisings	Revision	
		Plate No.	35261/P7

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit TP5	Revision	
		Plate No.	35261/P8

GeoDyne

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit 6 and Arisings	Revision	
		Plate No.	35261/P9

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit 7 and Arisings	Revision	
		Plate No.	35261/P10

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit 8 and Arisings	Revision	
		Plate No.	35261/P11

GeoDyne

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Project No.	35261	Drawn By	HW
Client	Rippon Homes Ltd	Checked By	JPH
		Approved By	JPH
Project	Clayton Lane, Thurnscoe	Scale	NTS
		Date Drawn	12/01/2016
Title	View of Trial Pit 9 and Arisings	Revision	
		Plate No.	35261/P12

GeoDyne
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GeoDyne

APPENDIX XII

Conditions and Limitations

Conditions & Limitations

Phase I Desk Studies

1. Works undertaken to provide the basis of the Phase I Desk Study report comprise a review of information available from a number of sources/parties (potentially also including the Client) together with a walk over of the site (where applicable and included within the quotation). The opinions given in the Phase I Desk Study are based on the information available from third parties/sources that has been obtained within the available timeframe. GeoDyne Limited assumes all third party information to be true and correct and therefore cannot accept liability for the accuracy of such information supplied.

2. Should additional information become available that may affect the comments and opinions made within the Phase I Desk Study, GeoDyne Limited reserves the right to review such information and make modifications to comments/opinions as appropriate.

3. It should be borne in mind that a Phase I Desk Study collates available information to generate a conceptual model of the site. The actual geotechnical and environmental considerations can only be fully quantified by intrusive investigation works to confirm the accuracy of the conceptual site model.

Phase II Intrusive Investigations

1. Our quotation assumes that access to the site will be arranged by others at no cost to ourselves.

2. We have assumed that free access is available throughout to the entire site and that works can be undertaken during a single mobilisation. Where restricted access is encountered, or where additional unscheduled mobilisations are required, additional costs may be incurred to the client.

3. We have assumed that all available information relating to buried services will be supplied by the Client at no cost to ourselves. No responsibility will be accepted for damage to underground services that have not been brought to our prior attention by the Client.

4. All excavations/boreholes will be backfilled with compacted arisings upon completion, with any excess arisings left proud of ground levels. Excess arisings will not be removed from the site unless specifically requested by the Client. Where we are requested to remove excess arisings, all associated costs will be passed to the Client.

5. We will attempt to leave the site in a clean and tidy state, however, it must be understood that some disturbance of the site is unavoidable during intrusive works.

6. Exploratory holes are positioned approximately on site by GeoDyne Limited. Should the client require precise locations of all exploratory points, additional fees will be incurred. It must be borne in mind that backfilled trial pits can create ‘soft spots’, therefore, should the Client wish to designate ‘no dig’ zones, for example under the footprint of proposed structures, these must be brought to our attention prior to commencement of works.

7. Groundwater observations relate to conditions encountered at the time of investigation. It must be understood that groundwater levels may vary as a result of recent climatic conditions or seasonal variation.

8. Trial pits and boreholes examine only a small proportion of the total site area. No liability can be accepted for conditions not revealed in exploratory holes, particularly between positions. All extrapolations of available data are given in good faith.

Payment

1 Payment terms are strictly 28 days from the invoice date.

2 Prior to commencement of works, we require receipt of formal written instruction from the party accepting full financial responsibility for the work. In the absence of such an instruction, we would expect the instructing Consulting Engineers/Architects to accept full financial responsibility for the works.

3 Receipt of instruction to commence work shall be taken as acceptance and compliance of the foregoing conditions.

Liability

1. GeoDyne Limited offer £5,000,000.00 Professional Indemnity Insurance (in aggregate over the year). This shall be the limit of our liability for works undertaken. No individual liability shall be implied to, or accepted by, any employee for works undertaken for and on the behalf of GeoDyne Limited.