



Geotechnical &
Environmental
Consultants

Dam Gate
Holbeach

**Combined Phase I Desk Study and
Phase II Exploratory Investigation
For
Ashwood Homes**



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Project No: D38108		Date: 30th September 2019	
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EXECUTIVE SUMMARY

GEOTECHNICAL CONSIDERATIONS	
Ground Conditions	<p>Made Ground was encountered in localised areas of the site to depths of up to 2.20m begl and comprised a clay / silt which included peat and in addition to fragments of brick, glass bottles and pieces of plastic, metal and wood.</p> <p>Where Made Ground was absent, natural TOPSOIL was encountered to an average depth of approximately 0.30m begl. Underlying the Made Ground or natural topsoil, the Natural Strata initially comprised firm (locally stiff) silty sandy CLAY and / or firm sandy very clayey SILT. These soils were typically encountered to depths of between 1.40m and 2.70m begl and were noted to locally become softer with depth.</p> <p>With the exception of the eastern extremity of the site, very soft CLAY was encountered underlying the near surface Clay and Silt. In the majority of the exploratory holes, the very soft Clay was noted to be peaty.</p>
Foundation Design	<p>The natural near surface Clay and Silt soils underlying the site at shallow depth appear suitable to support a nett allowable ground bearing pressure of up to 75kN/m². Foundations for the proposed development are likely to comprise Engineer designed strip or raft foundations to suit the loading characteristics of the proposed structures. Softening of the soils was observed across the majority of the site at depths generally in excess of 1.40m begl. On the basis of the foregoing, it is important to ensure that all foundation excavations are kept as shallow as possible.</p> <p>Based on the presence of soils of a medium volume change potential and the presence of existing trees (the majority of which appear to be of high water demand), the required deepening of foundations in accordance with NHBC Standards is likely to result in foundations bearing onto soils of poor geotechnical competency (i.e the very soft peaty Clay). The requirement to deepen foundations due to trees together with the presence of localised areas of Made Ground may preclude the use of shallow foundations in specific areas of the site. Therefore the use of a deeper founding solution (i.e. piles, for example) may need to be considered.</p>
Floor Slab Design & Ground Gas Precautions	<p>At this stage, the site falls into Characteristic Situation CS2, in accordance with Table 4 of BS 8485:2015+A1:2019. The minimum gas protection score for the site is 3.5 points. Suspended floor slabs therefore required at this stage.</p> <p>Consideration should be given to undertaking further gas monitoring at the site which may potentially negate the need for gas protection measures or possibly reduce the area of the site / number of properties requiring gas protection measures.</p>
Radon	No radon precautions are required.
Building Near Trees	Foundation designs (including floor slabs) will need to be locally adjusted where building near existing, proposed or recently removed trees and hedgerows. Soils of a medium volume change potential should be assumed for the near surface soils for design purposes.
Water	It is unlikely that excavations will require significant dewatering across the site.
Excavations/Stability	Foundation excavations are unlikely to require trench support, other than for health and safety reasons. The assessment of excavations and provision of support will be the responsibility of the contractor on site.
Sulphate Classification	Design Class DS-1/ACEC Class AC-1. (BRE Spec. Digest 1:2005).
Coal Mining	No coal mining precautions or associated investigation works are required.
CBRs	The remoulded soaked CBR testing has revealed CBR values for the Made Ground to range between 0.3% and 1.3%. For the Natural Strata, the remoulded soaked CBR values ranged between 0.3% and 2.7%.
Surface Water Drainage	The results from the programme of in-situ infiltration rate testing have indicated that traditional soakaways and permeable paving are unlikely to be viable for the site and it may be prudent to investigate alternative methods for draining the site, at this stage.
ENVIRONMENTAL CONSIDERATIONS	
Soil Contamination Assessment	<p>The results of the contamination assessment have revealed an elevated concentration of lead and an elevated concentration of dibenzo(ah)anthracene above Tier 1 human health screening criteria within the Made Ground, based on a residential with plant uptake end-use. The natural Topsoil and the Natural Strata may generally be considered to be uncontaminated.</p> <p>There are considered to be no significant risks posed to Controlled Waters by the findings of the laboratory analysis undertaken.</p>
Remediation Proposals	Existing Made Ground to remain in-situ and the provision of a remedial capping layer to proposed areas of soft landscape where the Made Ground is exposed OR Made Ground to be removed from the site.
GENERAL CONSIDERATIONS	
Construction Workers	Construction personnel should use appropriate PPE/RPE equipment and hygiene facilities.
Utilities	We would recommend that our report is supplied to utility companies and their recommendations are adhered to.
Unforeseen Circumstances	Should any areas of potentially contaminated soil/anomalous features be encountered we would recommend consultation with GeoDyne.

Flood Risk	It is recommended that advice be sought from a Drainage Consultant with respect to this matter.
Licenses etc.	The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, plans, registrations and approvals are in place prior to commencing with the construction works at the site.
Statutory Consultation	We would recommend that our report is issued to the Local Authority (and NHBC or other Warranty Provider).
Recommended Further Works	<p>Further intrusive works should be undertaken associated with the Made Ground from a foundation design and environmental perspective:</p> <ul style="list-style-type: none"> • Localised areas of Made Ground should be delineated to a) determine areas of the site that are unsuitable for shallow foundations; and to b) determine areas of the site where remedial capping may be required. • Further sampling of the Made Ground may be undertaken to potentially confirm the exceedances within samples at TP5 and TP14 to be considered statistical hotspots and to therefore determine the potential suitability for retention and re-use or localised source removal. <p>It would be prudent to undertake further gas monitoring at the site to include the installation of additional monitoring standpipes which may potentially result in a reduction in the area of the site / number of properties requiring gas protection measures.</p>

1.0 INTRODUCTION

1.1 Introduction

GeoDyne Limited has been appointed by the Client, Ashwood Homes, to undertake a combined Phase I Desk Study & Phase II Exploratory Investigation on land located to the east of Dam Gate, Holbeach, Lincolnshire. A site location plan (Figure No. D38108/01) is included in Appendix I.

1.2 Project Understanding

We understand that it is proposed to develop the site with low-rise residential properties incorporating private gardens. It is also understood that current development proposals incorporate areas of Public Open Space (POS). This understanding has formed the basis of our report. Where our understanding is incorrect, it may be necessary to review our assessment to ensure that it continues to apply.

1.3 Objectives

The scope of works detailed herein have been designed to ascertain the key geotechnical and environmental issues pertaining to the proposed development.

1.4 Scope of Works

Based on the defined objectives of the works (detailed in Section 1.3), the scope of the Phase I Desk Study included the following:

- A site walkover.
- Review of available historical and contemporary Ordnance Survey publications relating to the site.
- Review of the sites geology, hydrology, hydrogeology and groundwater vulnerability.
- Review of the sites coal mining status.
- Review of the sites radon status.
- Commission of a full detailed Landmark Envirocheck Report relating to the site.
- Commission of Landmark geological mapping data.
- Production of a preliminary Conceptual Site Model (pCSM).

Phase II Exploratory Investigation works comprised:

- A sub-contracted sub-surface utility scan.
- A series of trial pits and window sampling boreholes across the site.
- Geotechnical and environmental soil testing.
- An initial programme of ground gas and water level monitoring.
- Revision of the pCSM.

1.5 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 Ashwood Homes, in accordance with our standard Conditions & Limitations (included in Appendix XV). This report may not be used or relied upon by any unauthorised third party without the explicit written agreement of GeoDyne Limited. Reliance may not be placed on our report until all invoices associated with the project have been paid.

2.0 SITE DESCRIPTION & HISTORY

2.1 Site Description

The site comprises an irregular shaped parcel of land located to the east of Dam Gate, Holbeach, Lincolnshire. The site may be located centred around approximate Ordnance Survey National Grid Reference 536750E 3245500N. The site covers an area of approximately 8 hectares.

At the time of our works (July and August 2019), the site comprised an undeveloped grassed field.

Numerous mature trees and small areas of dense vegetation were present across the site. A pond which included frequent reeds and vegetation was present in the central south of the site. The topography across the site appeared sensibly level.

The site was predominantly surrounded by trees and hedgerows although garden fences from adjacent residential properties locally formed the site boundary.

Drainage ditches were present either completely or partially along the western, southern and eastern site boundaries. Scar-like features (potentially representative of a culvert) were visible on the ground surface in the southeast and centre of the site.

The immediate surrounding area comprised cropped fields (to the south and east) and residential properties (to the west and north). A large residential property and associated garden was present to the immediate north of the site. A concrete path was present in the north of the site which originated from this residential property. An electricity substation was present to the immediate west of the site and Holbeach Community Centre was present to the west of the site, beyond Dam Gate.

An annotated site plan showing the main features of the site and the immediate surrounding area is included as Appendix II of this report (Figure No. D38108/02) and a plan showing general views of the site is included as Appendix III (Figure No. D38108/03)

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 and its environmental setting. The historical Ordnance Survey maps are included as Appendix IV 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
1880s	<ul style="list-style-type: none"> The site comprises parts of several undeveloped fields. A network of drains runs along the field boundaries. 	<ul style="list-style-type: none"> A road (now Dam Gate) is present to the immediate west of the site and an unnamed track is present to the immediate south of the site.

TABLE 1 – HISTORICAL PUBLICATION DATA

Date	Features on Site	Features off Site
	<ul style="list-style-type: none"> A pond / area of marsh is present in the central south of the site. Three additional ponds are present in the western half of the site. 	<ul style="list-style-type: none"> A railway line is present to the immediate south of the site. 'Old Brick Pits' are present from approximately 160m to the west of the site. 'Old Fish Ponds' are present from approximately 30m to the west of the site. A number of ponds are present in the general surrounding area. The surrounding area typically comprises undeveloped fields. Residential properties are present to the north of the site.
1890s	<ul style="list-style-type: none"> No maps available for viewing. 	<ul style="list-style-type: none"> No maps available for viewing.
1900s	<ul style="list-style-type: none"> The site remains essentially unchanged. 	<ul style="list-style-type: none"> The surrounding area remains essentially unchanged.
1910s to 1920s	<ul style="list-style-type: none"> No maps available for viewing. 	<ul style="list-style-type: none"> No maps available for viewing.
1930s	<ul style="list-style-type: none"> A pond in the west of the site is no longer present (presumably infilled). An orchard potentially part of the off-site estate is present in the north of the site. 	<ul style="list-style-type: none"> 'Redroofs' estate is present to the immediate north of the site which comprises a large residential property and garden area. Residential properties have been constructed to the northeast and east of the site.
1940s	<ul style="list-style-type: none"> No maps available for viewing. 	<ul style="list-style-type: none"> No maps available for viewing.
1950s	<ul style="list-style-type: none"> The site remains essentially unchanged. 	<ul style="list-style-type: none"> A pond to the west of the site is no longer present (presumably infilled). Further residential development has taken place to the east of the site.
1960s	<ul style="list-style-type: none"> A pond in the west of the site is no longer present (presumably infilled). Two elongated presumed agriculture related structures are present along the eastern edge of the site. Three small structures potentially representative of outbuildings or animal pens are present to the immediate north of one of the structures. 	<ul style="list-style-type: none"> The railway to the immediate south of the site has been dismantled. A number of depots and works are present to the northwest of the site. A previous network of ponds approximately 50m to the south of the site now appear as a single smaller pond (presumably partially infilled or dried up). A pond approximately 20m to the northeast of the site is no longer present (presumably infilled). The old brick pits are now indicated as ponds. Some of the ponds in this area are no longer present (presumably infilled). Further residential development has taken place, predominantly to the west of the site.
1970s	<ul style="list-style-type: none"> A small field is now present in the west of the site, adjacent to Dam Gate. 	<ul style="list-style-type: none"> An electricity substation is present to the immediate west of the site. An area of drain running along Dam Gate appears partially infilled or culverted. Further residential development has taken place, predominantly to the west and north of the site.
1980s	<ul style="list-style-type: none"> The western half of the site is labelled as 'Golf Course'. 	<ul style="list-style-type: none"> A pond at the location of the old fish ponds is no longer indicated to be present (presumably infilled). An area of drain running along Dam Gate is no longer present (presumably infilled or culverted).

TABLE 1 – HISTORICAL PUBLICATION DATA		
Date	Features on Site	Features off Site
1990s	<ul style="list-style-type: none"> The majority of the on-site drains are no longer present (presumably infilled or culverted). The aerial photograph reveals distinct scar-like features in the ground at the locations of the former drains potentially indicative of culverts. Trees appear present across the site. The three small outbuildings or potential animal pen structures are no longer present. A pond in the north of the site is no longer present (presumably infilled). 	<ul style="list-style-type: none"> A drain approximately 10m to the northwest of the site is no longer present (presumably infilled or culverted). A pond approximately 20m to the north of the site is no longer present (presumably infilled). The aerial photograph reveals a presumed large residential structure approximately 30m to the north of the site. Presumed farm-related (predominantly glasshouse) structures have been constructed from approximately 90m to the south of the site. The substation to the west appears to have approximately doubled in size.
2000	<ul style="list-style-type: none"> Several polygonal features are indicated in the western half of the site. These features are likely to relate to areas of vegetation. 	<ul style="list-style-type: none"> The surrounding area remains essentially unchanged.
2006	<ul style="list-style-type: none"> The structures along the eastern edge of the site are no longer present. The eastern extremity of the site is indicated to contain numerous trees. 	<ul style="list-style-type: none"> The surrounding area remains essentially unchanged.
2019	<ul style="list-style-type: none"> The site remains essentially unchanged. 	<ul style="list-style-type: none"> The surrounding area remains essentially unchanged.

No further historical information is available on the use of the presumed agriculture related structures present along the eastern edge of the site.

3.0 GEOLOGY & ENVIRONMENTAL SETTING

3.1 Geological References

The following geological publications were referred to:

- BGS 1:50000 Series Sheet 144 '*Spalding*' (1992).
- Landmark geological map sheets (included in Appendix V).
- The BGS online interactive map viewer and Lexicon of Named Rock Units.
- The Coal Authority online interactive map viewer.

3.2 Geology

The entire site and immediate surrounding area are indicated to be underlain by superficial drift deposits comprising Tidal Flat Deposits (formerly referred to as the Terrington Beds), which date from the Quaternary. These deposits are typically described as marine alluvium comprising salt marsh, tidal creek and river deposits (i.e. sandy silt, sand and clay). Drift deposits have the potential to alter rapidly in character and geotechnical properties both laterally and vertically over relatively short distances and may also be water bearing. Tidal Flat Deposits may also contain peat as pockets, lenses or discrete layers.

Beneath the drift deposits across the majority of the site, bedrock of the Ampthill Clay Formation (part of the Ancholme Group) is indicated to be present, which dates from the Jurassic. The Ampthill Clay Formation is described on the BGS Lexicon of Named Rock Units as '*Mudstone, mainly smooth or slightly silty, pale to medium grey with argillaceous limestone (cementstone) nodules*'.

Beneath the drift deposits in the western extremity of the site, bedrock of the West Walton Formation (part of the Ancholme Group) is indicated to be present, which dates from the Jurassic. The West Walton Formation is described on the BGS Lexicon of Named Rock Units as '*Calcareous mudstone, silty mudstone and siltstone, with subordinate fine-grained sandstones and argillaceous limestone (cementstone) or siltstone nodules*'.

3.3 Faults

No faults are indicated to be present within the boundary of the site or within the immediate vicinity of the site, on the geological maps viewed.

3.4 Man-Made Deposits

The geological publications do not show the presence of any man-made deposits (i.e. Made Ground, Worked Ground or Landscaped Ground) beneath the site, or within a 250m radius of the site.

3.5 Landmark Envirocheck Report

A Landmark Envirocheck Report was commissioned to assist in ascertaining the environmental setting of the site. The full Envirocheck Report is presented in Appendix VI and has revealed the following key relevant information (details are only listed where they are within potential influencing distance of the site).

3.5.1 Agency and Hydrological

Aquifer Status

The aquifer designation maps are presented in Appendix VI and are based on geological mapping provided to Landmark by the British Geological Survey. Different aquifer classifications may be applied to superficial (drift) deposits (typically forming shallow perched groundwater units where present) and bedrock aquifers (which may contain regional groundwater units). Possible aquifer designations comprise Principal Aquifers, Secondary (A, B or Undifferentiated) Aquifers and Unproductive Strata.

The superficial deposits (i.e. Tidal Flat Deposits) and the underlying bedrock (i.e. Ampthill Clay Formation and West Walton Formation) are classified as '*Unproductive Strata*'.

Unproductive Strata are described by the Environment Agency as '*rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.*'

Source Protection Zone Status

The site is not shown to lie within a Source Protection Zone (SPZ), as designated by the Environment Agency. SPZs relate to the protection of groundwater resources principally for public drinking water supply.

Flood Risk Status

The site is indicated to be situated within an area at risk from flooding from rivers or sea without defences.

This report does not constitute a formal flood risk assessment.

BGS Groundwater Flooding Susceptibility

The Landmark Envirocheck Report indicates that the site does not lie within an area with potential for groundwater flooding to occur at the surface.

However, the map included in Appendix VI within the Landmark report indicates that areas of the site are at a low risk of flooding from surface water.

Pollution Incidents to Controlled Waters

There are two entries listed but none are within close proximity to the site. Both entries have been classified as Minor Incidents.

Discharge Consents

There are two entries listed with 250m of the site, at 218m and 238m to the west of the site. Both entries relate to unknown discharges onto land, operated by Heritage Kitchens Ltd.

Surface Water

A pond is present in the central south of the site. Drains are also present around the site and partially around the western, southern and eastern site boundaries. The Landmark Envirocheck Report reveals the presence of numerous Inland Rivers within the surrounding site area, predominantly to the east, west and south of the site. Four Inland Rivers from between 81m and 217m to the southwest of the site are indicated as being underground, potentially representative of culverts.

3.5.2 Waste

Landfill Sites

There are no existing or former landfill sites identified on site. However, there are two historic landfill sites identified within a 250m radius of the site. The closest is located 11m to the south of the site and appears to relate to an existing cropped field. The second entry is located 46m to the west of the site and appears to relate to a former pond. The specified waste for both entries is listed as '*deposited waste included household waste*'.

Potentially Infilled Land (Water)

There are four on-site entries for Potentially Infilled Land (Water). These entries appear to relate to former drains and a former pond that were identified on the historical maps.

There are a further nine entries within 250m of the site which relate to former drains and ponds within the surrounding site area.

Potentially Infilled Land (Non-Water)

There is a single entry for Potentially Infilled Land (Non-Water) within 250m of the site, at 161m to the west of the site. Despite being listed as 'Non-Water' the entry appears to relate to former ponds associated with the old brick pits identified on the historical maps.

3.5.3 Hazardous Substances

There are no sites associated with hazardous substances (i.e. sites dealing with explosives etc.) identified on the site, or within a 250m radius of the site, in the Landmark Envirocheck Report.

3.5.4 Geological Issues

BGS 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 locale, 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 effects. Estimates of the soil chemistry at the site indicate anticipated concentrations of Arsenic of <15-25mg/kg, Cadmium of <1.8mg/kg, Chromium of 60-90mg/kg, Lead <100mg/kg and Nickel of 15-30mg/kg.

Based on the information supplied within the Envirocheck report, the site is not shown to be located within an area where Natural Metal Enrichment of the underlying natural soils is likely to be present. However, this is only applicable to the specific determinands listed above.

Ground Stability Hazards

No significant ground stability hazards have been identified by the Landmark Envirocheck Report that relate to the site (including from collapsible, ground dissolution, landslide and shrinking or swelling clay ground stability hazards). However, it should be noted that the site is listed as having a Moderate Hazard Potential associated with both the Potential for Compressible Ground and Running Sand.

Radon

The Landmark Envirocheck Report identifies that the site lies within a lower probability Radon area and no Radon protective measures are necessary in the construction of new dwellings or extensions.

BGS Borehole Records

There are four accessible BGS borehole records within the immediate vicinity of the site. Three of the entries relate to shallow exploratory holes (trial pit or auger hole) advanced to depths of up to 2m which comprised clay or silty clay to the base of the exploratory holes. One borehole (TF32SE/17), located approximated 230m to the west of the site, was advanced to a depth of 9m and records the following:

- MADE GROUND (concrete, hardcore, ashes and soft silty clay) to 0.6m
- MADE GROUND (very soft peaty clay with occasional gravel) to 1.8m
- Soft silty peaty CLAY to 5.0m
- Interbedded very soft grey silty CLAY and grey fine SAND to 9.0m

3.5.5 Industrial Land Use

There are no industrial land use entries identified at the site.

Four Contemporary Trade Directory Entries, all of which are indicated to be inactive, are listed within 250m of the site. The entries relate to garden machinery, metal products, printers and garage services.

3.5.6 Sensitive Land Use

The area to the north of the site is identified as being a Nitrate Vulnerable Zone. In our experience the majority of this area of the country is defined as a Nitrate Vulnerable Zone and this classification is considered not to present a potential risk to the site.

3.6 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 desk based ready reference guide.

3.6.1 On Site Assessment

At the time of our site works, the site comprised an undeveloped grassed field with numerous trees and small areas of dense vegetation present across the site. A pond which included frequent reeds and vegetation was present in the central south of the site.

Historically, the site has largely remained as an undeveloped grassed field. However, two presumed agriculture related buildings were present along the eastern edge of the site which became present circa 1960s and which appear to have become absent circa 2006. A number of ponds and drains were present on-site that have become absent and are presumed to have been infilled and / or culverted. According to the historical maps, the western site area comprised a golf course from circa 1980s.

Based on the information obtained from our desk study enquiries, our walkover of the site and experience of similar sites, potential general soil contamination that may be present could include:

- Metals and metalloids associated with any potential localised Made Ground beneath the site.
- Polycyclic Aromatic Hydrocarbons (PAHs) from any ashy inclusions and/or carbonaceous inclusions in the near surface soils.
- Asbestos in the ground associated with former buildings along the eastern edge of the site.
- Potentially hazardous ground gas (i.e. carbon dioxide and methane) associated with any infilled ground relating to the former ponds / drains at the site, any Made Ground at the site and / or organic soils within the Natural Strata.

3.6.2 Off Site Assessment

With regards to potential sources of chemical contamination, based on the findings of the Phase I Desk Study enquiries, there are no significant potentially contaminative land uses known to be present within close proximity to the site. The former railway line to the immediate south of the site is considered not to represent a potential source of contamination as there is no evidence of railway sidings where repair / maintenance of rail stock could have taken place.

Based on the information obtained from the desk study, the following source of potentially hazardous ground gas (i.e. carbon dioxide and methane) has been identified:

- Man-made deposits associated with two historical landfill sites, approximately 11m to the south and 46m to the west of the site.
- Potentially infilled ground associated with the old brick pits approximately 160m to the west of the site and numerous former drains and ponds within 250m of the site.

4.0 PRELIMINARY CONCEPTUAL SITE MODEL

4.1 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:

- (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...*
- (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.' For a contaminant linkage to be plausible, all three elements need to be present.

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 July 2018).

The preliminary CSM should identify the hazards (source of potential contamination) and should set out the potential pollutant linkages with a view to identifying the nature and magnitude of the potential risks to receptors.

In order to undertake the foregoing assessment, consideration is required with respect to the probability or likelihood of the linkage occurring and the severity and significance of the potential consequences; taking account the nature of the pollutant linkage and the potential severity of the hazard and the sensitivity of the receptor within the context of the proposed land use (in consideration of the planning regime).

Consideration of consequence/severity, probability/likelihood and risk has been based on the following guidance documentation:

- CIRIA C552 '*Contaminated Land Risk Assessment, A Guide to Good Practice*', 2001.
- EA R&D publication 66 '*Guidance for the Safe Development of Housing on Land Affected by Contamination*', 2008.

4.2 Classification of Consequences

In order to apply a consequence classification to a particular potential pollutant linkage, it is first necessary to define the terminology used within the classification system. The following terminology and definitions detailed in Table 2 have been adopted within our assessment, based on the guidance referenced in Section 4.1.

TABLE 2 – CLASSIFICATION OF CONSEQUENCES	
Classification	Definition
Severe	<ul style="list-style-type: none"> Acute risks to human health. Short-term risk of pollution of controlled waters or significant impact on controlled waters; e.g. large-scale pollution or very high levels of contamination. Catastrophic damage to buildings or property (such as building explosion causing collapse). Ecological system effects – immediate risks of major damage which is likely to result in irreversible substantial adverse changes in the functioning of the ecosystem or harm to a species of special interest that endangers the long-term maintenance of the population.
Medium	<ul style="list-style-type: none"> Chronic risks to human health. Pollution of sensitive water resources (such as leaching of contaminants into controlled waters) causing a significant effect on water quality. Ecological system effects – Immediate risks of significant damage which may result in substantial adverse changes to the ecosystems functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to buildings, structures and services (for example foundation damage or rendering the building unsuitable for habitation).
Mild	<ul style="list-style-type: none"> Non-permanent health effects to human health (i.e. exposure is unlikely to lead to 'significant harm' in the context of Part 2A of the Environmental Protection Act 1990). Pollution of controlled waters or non-sensitive water resources (for example non-classified groundwater) that results in a short-lived effect to water quality or a marginal effect on amenity value, agriculture or commerce. Minor damage to buildings, structures and services. Ecological system effects – Minor or short-term damage which is unlikely to result in substantial adverse changes to the ecosystems functioning or harm to a species of special interest. Substantial damage to non-sensitive environments (such as arable farmland for example).
Minor	<ul style="list-style-type: none"> No measurable effects on human health including non-permanent health effects to human health that are easily preventable by appropriate use of PPE/RPE. Minor pollution of controlled waters including non-sensitive water resources with no discernible effects on water quality or ecosystems. Minor damage to non-sensitive environments (including arable farmland for example). Easily repairable effects of damage to buildings, structures, services or the environment (for example discolouration of concrete, loss of plants in a landscaping scheme etc.).

4.3 Classification of Probability

Once the possibility of a pollutant linkage has been established (noting that probability classification does not apply when there is no possibility of a linkage being present), the probability should be classified in accordance with Table 3.

TABLE 3 – CLASSIFICATION OF PROBABILITY		
Classification	Definition	Likelihood
High Likelihood	There is a pollutant linkage and an event is highly likely to occur in the short-term, and is almost inevitable over the long-term OR there is evidence at the receptor of harm or pollution occurring.	>95% likelihood of Consequence Occurring
Likely	There is a pollutant linkage and it is probable that an event will occur. It is not inevitable, but possible in the short-term and likely over the long-term.	50 – 95% likelihood of Consequence Occurring
Low Likelihood	There is a pollutant linkage and circumstances are possible under which an event could occur. It is by no means certain that even over a longer period such an event would take place, and less likely in the short-term.	5 – 49% Likelihood of Consequence Occurring
Unlikely	There is a pollutant linkage and it is improbable that an event would occur even in the very long-term.	<5% likelihood of Consequence Occurring

4.4 Classification of Risk

In order to establish the relevant risk term applicable to the identified pollutant linkage, one of the risk phrases identified within Table 4 must be adopted, with the definitions of each risk term detailed within Table 5.

TABLE 4 - RISK CLASSIFICATION MATRIX (BASED ON C552 CIRIA, 2001)					
		Consequence of Risk			
		Severe	Medium	Mild	Minor
Probability (Likelihood)	High Likelihood	Very High	High	Moderate	Moderate/Low
	Likely	High	Moderate	Moderate/Low	Low
	Low Likelihood	Moderate	Moderate/Low	Low	Negligible
	Unlikely	Moderate/Low	Low	Negligible	Negligible or No Potential Risk

TABLE 5 - RISK CLASSIFICATION DEFINITIONS (BASED ON C552 CIRIA, 2001)	
Very High	There is a high probability that severe harm will arise to a designated receptor from an identified hazard OR there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate	It is possible that harm could arise to a designated receptor from an identified hazard. However, there is a low likelihood that such harm would be severe, or if any harm were to occur it is more likely that the harm would be mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Moderate/Low	It is possible that harm could arise to a receptor. However, a combination of likelihood and consequence results in a risk that is above low but is not of sufficient concern to be classified as moderate. It can be driven by cases where there is an acute risk which carries a severe consequence, but where the exposure is unlikely. Such harm would at worst normally be mild. The risk is unlikely to present a substantial liability. Some limited further investigation may be required to clarify the risk and any associated liability. If subsequent remediation works are necessary, they are likely to be limited in extent.
Low	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Negligible	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is unlikely to be any worse than mild. No liability would be associated with such risks.
No Potential Risk	There is no potential risk or liability where no pollutant linkage has been established.

4.5 Contaminant [C] - Pathway [P] - Receptor [R] Considerations

The following CPR assessment has been undertaken based on the assumption of a residential with plant uptake end-use for the proposed development.

4.6 Consideration of Potential Sources of Contamination [C]

Based on the findings of our desk study works, the potential key sources of contamination at the site that would require consideration for the derivation of a preliminary CSM would be the following:

TABLE 6 – SUMMARY OF POTENTIAL CONTAMINANT SOURCES	
Areas of Potential Concern (APCs)	Associated Contaminants
General Made Ground & Near Surface Soils	<ul style="list-style-type: none"> Metals & Metalloids. PAHs. Asbestos. Ground gases (including methane & carbon dioxide).
Off-Site Made Ground	<ul style="list-style-type: none"> Ground gases (including methane & carbon dioxide).

4.7 Consideration of Potential Pathways [P]

The potential pathways at the site are primarily:

- Direct ingestion of soil (either directly or as soil particles attached to produce).
- Inhalation of fugitive dust and vapours.
- Direct skin contact with the ground.
- Direct ingestion of home-grown produce.
- Direct ground contact with construction materials (including supply pipes).
- Vertical and lateral migration of contamination.
- Vertical and lateral migration of potentially hazardous ground gases/vapours.

4.8 Consideration of Potential Receptors [R]

The potential receptors at the site are:

- The final end users (residents - typically long term (chronic) exposure) and site visitors – (typically short term (acute) exposure).
- The construction personnel (i.e. site workers) involved with the development of the site (typically short term (acute) exposure).
- Neighbouring properties (off-site receptors).
- Controlled Waters (i.e. underlying groundwater and nearby surface waters).
- Buildings and construction materials (including buried utilities).

4.9 Preliminary Risk Assessment / Conceptual Site Model

Our preliminary conceptual model of possible pollutant linkages, applicable to the proposed site usage and based on our current understanding, is summarised in Table 7.

TABLE 7 – PRELIMINARY RISK ASSESSMENT SUMMARY TABLE DESK STUDY						
Potential Contaminant Source [C]	Potential Pathway(s) [P]	Potential Receptor [R]	Probability of CPR Linkage	Consequence of CPR Linkage	Risk Level	Comments / Justification
General Made Ground & Near Surface Soils	Direct contact, ingestion or inhalation of fugitive dust	End users	Likely	Medium	Moderate	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. End users are likely to come into contact with the in-situ soils. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Direct contact, ingestion or inhalation of fugitive dust	Site personnel	Likely	Medium	Moderate	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. Site personnel will inevitably come into contact with the soils at the site. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Plant uptake	End users	Likely	Medium	Moderate	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. Growing of vegetables for private consumption may be anticipated at the site. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Vertical and lateral migration	Neighbouring properties	Low Likelihood	Medium	Moderate/Low	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Leaching of contaminants through unsaturated zone and/or vertical and lateral migration	Controlled Waters	Low Likelihood	Mild	Low	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. Both the underlying superficial (drift) deposits and bedrock are classified as Unproductive Strata. The site does not lie within a designated SPZ.

TABLE 7 – PRELIMINARY RISK ASSESSMENT SUMMARY TABLE
DESK STUDY

Potential Contaminant Source [C]	Potential Pathway(s) [P]	Potential Receptor [R]	Probability of CPR Linkage	Consequence of CPR Linkage	Risk Level	Comments / Justification
						A pond is present in the central south of the site and partial drains are present around the site boundary. Significant amounts of Made Ground are not anticipated in close proximity to surface water features. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Direct contact or contact with vapours	Plastic buildings products (e.g. water supply pipes) and buried concrete	Low Likelihood	Mild	Low	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities. No potentially significant historical contaminative land uses have been identified at the site. Any localised Made Ground may contain elevated levels of contaminants that may affect plastic building products. Further consideration of this potential linkage should be provided during the course of the Phase II Exploratory Investigation works.
	Vertical and lateral migration of ground gases to indoor air	End users of new buildings (asphyxiation) or new buildings (damage via explosion)	Low Likelihood	Severe	Moderate	No Made Ground is indicated to be present on the site. However, Made Ground may locally be present associated with historical activities and with potentially infilled ponds and drains at the site, which may represent potential sources of hazardous ground gases. Phase II Exploratory works will provide further information relating to the possible presence of significant depths of Made Ground at the site.
Off-Site Made Ground	Vertical and lateral migration of ground gases to indoor air	End users of new buildings (asphyxiation) or new buildings (damage via explosion)	Low Likelihood	Severe	Moderate	Man-made deposits associated with two historical landfill sites, former brick pit and numerous former drains and ponds within 250m of the site. Further consideration of this potential linkage (including a programme of ground gas monitoring) should be provided during the course of the Phase II Exploratory Investigation works.

The foregoing preliminary conceptual model highlights the potential plausible pollutant linkages that may relate to the site and would therefore require addressing by appropriate Phase II Exploratory Works. The information contained within the conceptual model should be confirmed and revised upon completion of an appropriate intrusive investigation, as detailed in the following sections.

5.0 GROUND INVESTIGATION

5.1 Introduction

Sub-Surface Utility Avoidance Scan

Prior to the commencement of our intrusive works at the site a sub-contracted sub-surface utility scan was undertaken to attempt to avoid buried services during the intrusive works. Based on the results of the service scan and taking account of the requirement to avoid buried services, the exploratory holes were positioned to maximise the amount of information obtained at the site.

Trial Pits

A total of twenty-six trial pits (TP1 to TP26) and eight soakaway pits (SA1 to SA7 including SA2A) were excavated at the site between 5th and 8th August 2019. The pits were excavated to depths of up to 3.60m below existing ground level (begl).

Window Sampling Borehole Works

Six window sampling boreholes (WS1 to WS6) were advanced at the site on 12th August 2019. The boreholes were predominantly advanced to a depth of 5.00m below existing ground level (begl). One borehole (WS3) was advanced to a depth of 3.00m begl.

Standard Penetration Tests (SPTs) were undertaken generally at 1m centres in order to provide initial strength data for the near surface soils.

Following completion, five of the window sampling boreholes (WS1, WS2, WS4, WS5 and WS6) were installed with combined ground gas and water monitoring wells in order to facilitate a programme of ground gas and water level monitoring.

Exploratory Hole Locations/Logs

The approximate locations of the exploratory holes are indicated on the plan presented in Appendix VII of this report (Figure No. D38108/04). The exploratory hole logs are presented in Appendix VIII of this report.

5.2 Ground Conditions

The general ground conditions encountered across the site may be summarised as follows.

5.2.1 Made Ground

Made Ground (including Made Ground topsoil) was encountered in localised areas of the site (i.e. in 6 of the 40 exploratory holes). In four of the exploratory holes (WS6, TP5, TP21 and TP24), the Made Ground comprised topsoil containing fragments of brick over reworked natural clay / silt strata to depths of up to 0.90m begl. In the remaining two exploratory holes (TP14 and TP20), the Made Ground comprised a clay / silt which was encountered to depths of 1.40m and 2.20m begl and included peat in addition to fragments of brick, glass bottles and pieces of plastic, metal and wood.

A plan showing the depth to the base of the Made Ground at each exploratory hole location is presented in Appendix IX of this report (Drawing No. D38108/05).

5.2.2 Topsoil

Where Made Ground was absent, natural TOPSOIL was encountered at the surface in the exploratory holes to an average depth of approximately 0.30m begl.

5.2.3 Natural Strata

Underlying the Made Ground or natural topsoil, the Natural Strata initially comprised firm (locally stiff) silty sandy CLAY and / or firm sandy very clayey SILT. These soils were typically encountered to depths of between 1.40m and 2.70m begl. It should be noted that the Clay and Silt locally became softer with depth.

With the exception of the eastern extremity of the site, very soft CLAY was encountered underlying the near surface Clay and Silt. In the majority of the exploratory holes, the very soft Clay was noted to be peaty. Shell fragments were present in localised areas within the very soft Clay.

These soils are considered to be representative of Tidal Flat Deposits, which are indicated from geological information to underlie the site.

5.3 Visual & Olfactory Evidence of Soil Contamination

We would note that no obvious visual or olfactory evidence of significant soil contamination was identified during the course of the site works (such as ashy soils, hydrocarbons or asbestos fragments, for example), with the exception of clinker in TP5 at 0.10-0.40m begl.

5.4 Water

Water was absent from the majority of the exploratory holes. However, water was encountered within twelve of the exploratory holes at depths typically between 1.40m and 4.00m begl, typically as very slight or slight seepages associated with peaty pockets or localised soils comprising moderate amounts of sand. A moderate perched water seepage was noted at a depth of 1.50m within the Made Ground in TP20.

5.5 Stability

The sides of the majority of the trial pits remained stable for the short period of time they remained open following completion. In the eastern extremity of the site, the sides of the trial pits became unstable when excavating in Silt strata below typical depths of between 2.50m and 2.80m begl which resulted in collapse up to depths in the region of 1.20m begl.

The boreholes were typically cased to depths of between 1m and 4m begl as a precautionary measure. The sides of the boreholes remained stable for the short period of time the boreholes remained open after completion.

5.6 Plates

A photographic record of the exploratory investigation was obtained during the intrusive works. Selected photographs of the intrusive works are presented on the Plates presented in Appendix X of this report (Plate Nos. 1 to 29).

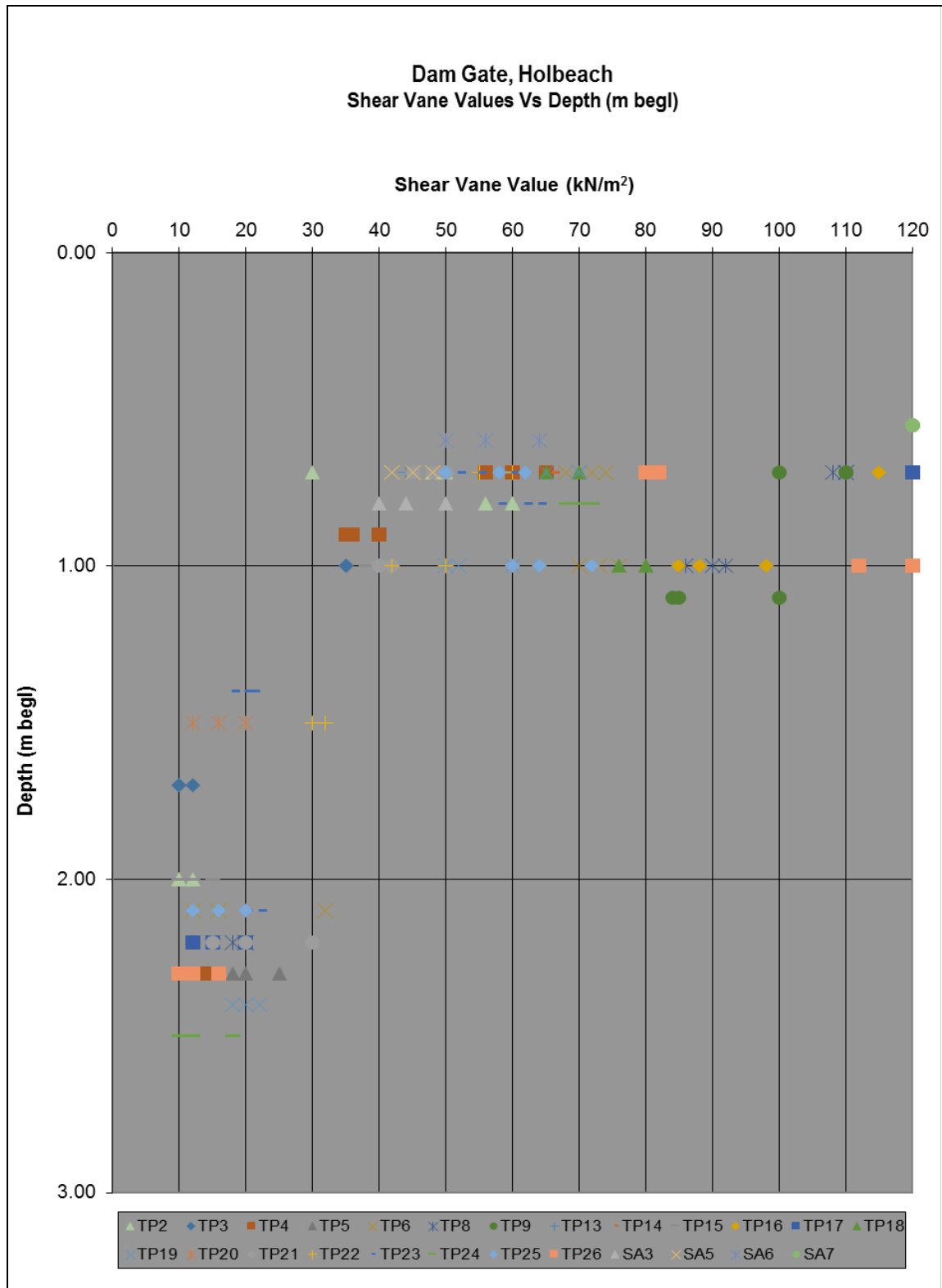
5.7 Shear Vane Values

Shear vane testing was undertaken within the predominantly clay soils within the trial pits and soakaway pits.

The results typically revealed soil shear strength values of between 60kN/m^2 and $>120\text{kN/m}^2$ at depths of between 0.70m and 1.10m begl for the natural predominantly Clay soils. Lower values (as low 30kN/m^2) were revealed at depths of up to approximately 1.00m begl within silty / very silty Clay or Silt soils. At depths of 1.40m begl or greater, the results typically revealed soil shear strength values of between 10kN/m^2 and 32kN/m^2 .

Shear vane values taken at depths in excess of 1.20m begl were taken ex-situ due to health and safety reasons.

The following chart presents the shear vane values in relation to depth recorded in the trial pits and soakaway pits excavated at the site. Individual shear vane results are provided on the exploratory hole logs included in Appendix VIII of this report.

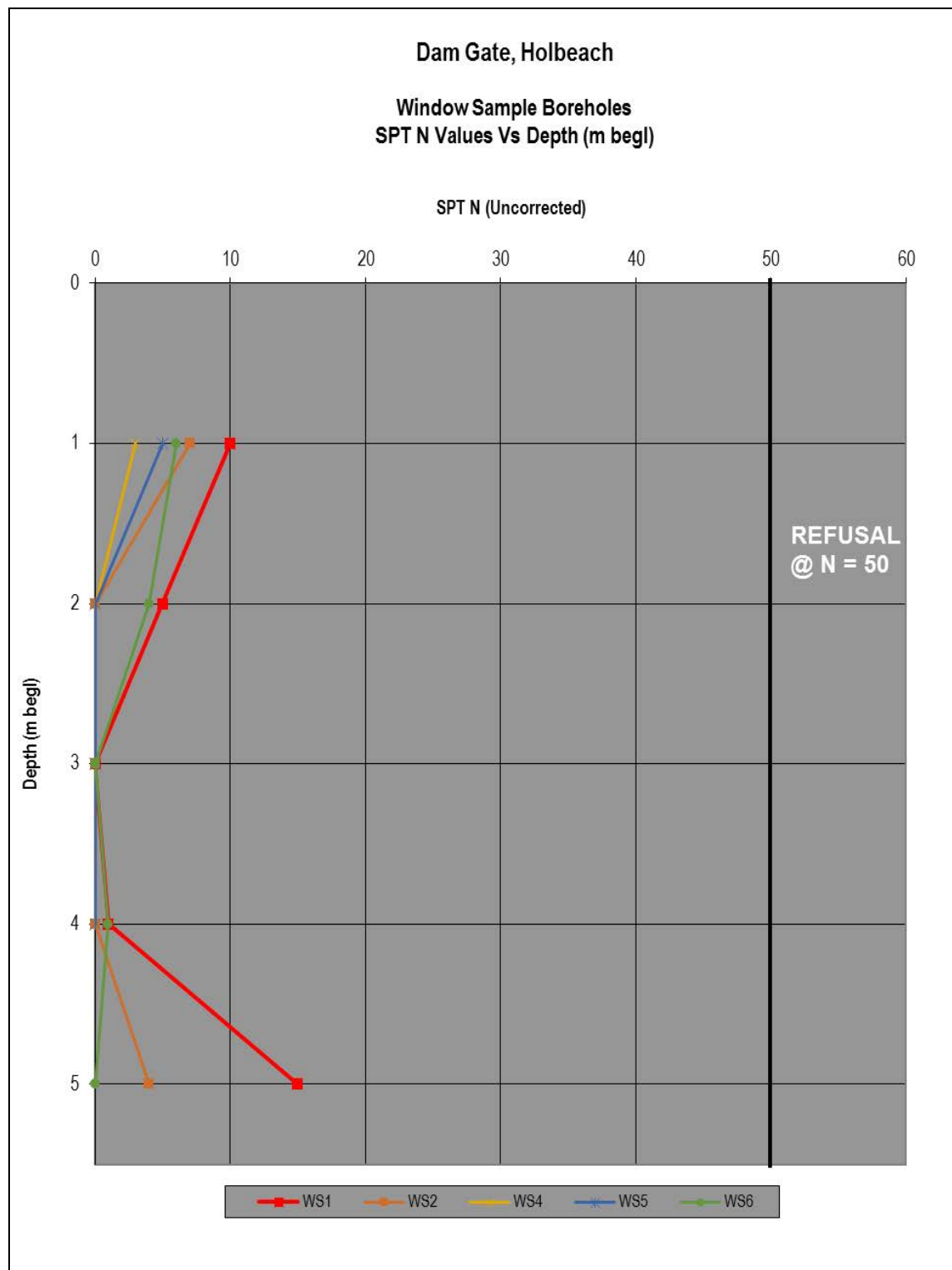


5.8 Standard Penetration Test (SPT) Data

In order to establish a strength/depth profile of the strata beneath the site, SPT testing was undertaken in selected boreholes.

The uncorrected SPT 'N' values within the natural drift deposits, at a depth of 1.00m were variable and ranged between 3 and 10. At a depth of 2.00m uncorrected SPT 'N' values ranged between 0 and 5. At depths of 3.00m and greater, uncorrected SPT 'N' values ranged between 0 and 15.

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



5.9 Soakaway Testing

Three soakaway tests (SA2, SA4 and SA5) were conducted in deep pits (i.e. 1.60m to 2.20m begl) to determine the suitability of traditional soakaways for the site. Four additional soakaway tests (SA1, SA3, SA6 and SA7) were conducted in shallower soakaway pits advanced to depths of between 0.55m and 0.90m begl to determine the suitability of permeable paving as a possible drainage solution for the site.

The approximate locations of the soakaway pits are included on the plan presented in Appendix VII (Figure No. D38108/04).

The water level failed to significantly drop within any of the soakaway test pits for the duration of the testing period, therefore infiltration rates have not been calculated.

6.0 LABORATORY TESTING & CONTAMINATION ASSESSMENT

6.1 Introduction

As part of our works a suite of geotechnical laboratory soils testing has been undertaken, which comprised the following:

- 10No. Plasticity Index tests.
- 12No. Water soluble sulphate tests.
- 26No. pH tests.
- 16No. Remoulded Soaked CBR tests.
- 4No. Loss on Ignition tests.

In addition, environmental soil testing was carried out on visually representative samples recovered from the exploratory holes. The testing strategy was based on the land use assessment and preliminary CSM derived by the desk study works, and was considered sufficient to enable an assessment of the chemical status of the soils at the site. The following testing has been undertaken as part of our works:

- 21No. Contamination suites (including metals, speciated Polycyclic Aromatic Hydrocarbons and Total Organic Carbon).
- 2No. Asbestos screens.

All laboratory soil test results are included in Appendix XI.

6.2 Geotechnical Soil Test Results

Water Soluble Sulphate/pH

Water soluble sulphate testing was undertaken on 4No. samples of the Made Ground and 8No. samples of the Natural Strata obtained during the site works. The testing revealed water soluble sulphate concentrations of between <10mg/l SO₄ and 320mg/l SO₄ within the samples analysed. The pH values of the samples of soils analysed (both Made Ground and Natural Strata but excluding topsoil) ranged between 7.61 and 8.38.

In accordance with the Building Research Establishment publication Special Digest 1 '*Concrete in Aggressive Ground*' (2005) the mean of the highest 20% of the sulphate results should be used to indicate the Design Sulphate Class (i.e. 200mg/l SO₄), together with the mean of the lowest 20% of the pH values (7.63).

Therefore, in accordance with Special Digest 1:2005 the site falls into Design Sulfate Class DS-1 and an Aggressive Chemical Environment for Concrete (ACEC) classification of AC-1. This classification has been made based on the assumption of a natural ground location with potentially mobile groundwater conditions beneath the site.

Plasticity Index Tests

A total of 10No. Plasticity Index tests have been undertaken on selected samples of the near surface Natural Strata obtained during the site works. In accordance with NHBC standards Chapter 4.2 '*Building Near Trees*' and BRE Digest 240 '*Low-rise buildings on shrinkable clay soils: Part 1*' (1993) the reported PI values may be modified based on the portion of the sample passing the 425µm sieve.

The result of the PI analysis is summarised in Table 8.

TABLE 8 – SUMMARY OF PLASTICITY INDEX (PI) DATA				
Sample Ref.	Reported PI Value (%)	Portion <425µm (%)	Modified PI Value (%)	Volume Change Potential
TP8, 0.70-1.20m (CLAY)	24	100	24	Medium
TP11, 2.00-2.50m (SILT)	Non-Plastic			
TP12, 1.00-1.50m (SILT)	Non-Plastic			
TP14, 0.90-1.40m (MG)	26	100	26	Medium
TP19, 2.40-2.90m (Peaty CLAY)	64	100	64	High
TP23, 1.20-1.70m (CLAY)	34	98	33	Medium
TP26, 0.90-1.40m (CLAY)	32	96	31	Medium
WS5, 0.80-1.00m (CLAY)	Non-Plastic			
WS6, 1.00-1.50m (CLAY)	17	100	17	Low
SA5, 1.50-2.00m (SILT)	16	100	16	Low

Table 8 reveals that the near surface soils analysed (i.e. Clay / Silt) may typically be regarded as being of low volume to medium volume change potential.

The 1No. sample of peaty Clay analysed may be regarded as being of high volume change potential. It should be noted however that these soils (i.e. very soft peaty Clay) were encountered across the site at depths of between 1.40m and 2.40m begl.

Soils of a medium volume change potential should be assumed for design purposes for foundations bearing onto the shallow Clay / Silt strata (i.e. at depths shallower than 1.40m begl).

Loss on Ignition

Loss on ignition testing was undertaken on four soil samples soil across the site comprising 2No. tests on the shallow Clay strata, 1No. test on the shallow Silt strata and 1No. test of Made Ground comprising peat. The analysis revealed loss on ignition values of 4.9% and 8.4% for the shallow Clay strata, 1.2% for the shallow Silt strata and 27.9% for the Made Ground comprising peat.

The results indicate that the shallow Clay strata and Made Ground comprising peat have the potential to be compressible and subject to peat wastage (i.e. biodegradation).

Remoulded Soaked California Bearing Ratio (CBR) Testing

Remoulded soaked California Bearing Ratio testing was undertaken on 16 No. samples of shallow Natural Strata across the site. The results of the recompacted CBR testing are summarised in Table 9 below. CBR values for the top and bottom of the remoulded soaked sample are recorded. The approximate locations of the CBR samples are shown on the plan presented in Appendix XII (Figure No. D38108/06).

TABLE 9 – SUMMARY OF LABORATORY CBR TEST RESULTS

Sample Ref.	Depth (m begl)	Initial Moisture Content (%)	CBR Value Sample Top (%)	CBR Value Sample Bottom (%)
LB1; SA2A (CLAY)	0.50-0.80	24	0.3	0.5
LB2; TP7 (CLAY)	0.40-0.90	24	0.6	1.0
LB3; TP9 (CLAY)	0.60-1.10	24	1.9	2.5
LB4; TP10 (SILT)	0.50-1.00	23	0.7	0.9
LB5; TP11 (SILT)	0.50-1.00	21	0.8	1.2
LB6; SA4 (CLAY)	0.50-1.00	26	0.4	0.6
LB7; TP13 (CLAY)	0.60-1.10	32	0.5	0.7
LB8; TP15 (CLAY)	0.60-1.10	31	1.2	1.4
LB9; TP17 (CLAY)	0.60-1.10	22	1.8	2.4
LB10; TP18 (CLAY)	0.50-1.00	23	1.5	2.3
LB11; TP20 (MADE GROUND)	0.50-1.00	29	0.3	0.7
LB12; TP21 (CLAY)	0.60-1.00	26	0.8	1.3
LB13; TP22 (CLAY)	0.50-1.00	22	0.4	0.6
LB14; TP24 (MADE GROUND)	0.40-0.70	29	1.3	1.3
LB15; TP25 (CLAY)	0.30-0.70	23	2.0	2.7
LB16; TP26 (CLAY)	0.40-0.80	33	1.4	1.6

6.3 Contamination Assessment Rationale

We understand that it is proposed to develop the site with low-rise residential properties incorporating private gardens. It is also understood that current development proposals incorporates areas of Public Open Space (POS).

6.3.1 Assessment Methodology

In order to undertake a Generic Quantitative Risk Assessment (GQRA) we have adopted the Suitable for Use Levels (S4ULs) published by LQM/CIEH in their publication referenced: 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. All rights reserved.'* In the absence of an S4UL screening value, we have made reference to the Category 4 Screening Levels (C4SLs) published by DEFRA.

In consideration of the available generic land uses utilised in the derivation of the adopted screening criteria, we have adopted a residential end-use with plant uptake scenario for the purposes of our assessments.

For assessment purposes, we have adopted a policy whereby determinands within the dataset are individually compared to the relevant screening value (i.e. individual S4ULs). Where determinands within the dataset are less than the appropriate screening value, the determinand is considered to be present at an acceptable concentration and no further assessment is required. Additional comment, statistical assessment or further Detailed Quantitative Risk Assessment (DQRA) may be provided where elevated values are revealed.

6.3.2 Selection of Soil Organic Matter (SOM) Content

The SOM content and soil type are used to provide an assessment of the applicability of the screening values adopted (the S4UL values are typically based upon SOM of 1%, 2.5% and 6%, as applicable, with all metals derived utilising 6% SOM as standard).

Where available at Tier 1 level, determinands have in the first instance been compared to screening values adopting a conservative SOM of 1%.

Where the determinand exceeds the relevant screening value at 1% SOM, a site-specific SOM may be adopted as appropriate to derive more site-specific screening values and the dataset reassessed.

6.4 Sampling Strategy

The sampling strategy for the site was primarily to retrieve visually representative soil samples from a selection of locations that provide an initial coverage across the entire site area (where access allowed).

The sampling strategy was based on a review of the historical, geological and environmental information obtained from the Desk Study enquiries and the current and proposed site setting together with and the ground conditions encountered during our Phase II exploratory works.

Specific areas of concern were identified at the site with respect to ground contamination including the former presumed agriculture related buildings at the eastern edge of the site and the former drains and ponds across the site. Exploratory holes were therefore advanced to target these specific areas and also to provide general site coverage, taking account the access restrictions and the presence of known buried services.

Table 10 summarises the reasoning behind the exploratory hole positions.

TABLE 10 – REASONING FOR EXPLORATORY HOLE LOCATION	
Exploratory Hole Reference	Reasoning Behind Location
TP1-TP26, SA1-SA7, WS1-WS6	General site coverage avoiding known utilities.
TP5	Targeted to the former pond in the west of the site.
WS3 & TP14	Targeted to the former presumed agriculture related buildings at the eastern edge of the site.
TP20	Targeted to the former pond in the north of the site.
TP22	Targeted to the former drain in the west of the site.
WS1 & WS2, WS4-WS6	General site coverage for the purposes of installing ground gas monitoring points.
Key TP – Trial Pit SA – Soakaway Test Pit WS – Window Sampling Borehole	

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

Representative samples of these soil types were obtained during our Phase II works and subjected to chemical analysis for a suite of contaminants deemed appropriate based on the findings of the Desk Study and the ground conditions encountered during the intrusive investigation. It is noted that the suite of contaminants detailed in Section 4.6 were considered to remain applicable as an initial chemical screen of the encountered soils following completion of the site investigation works.

6.5 Contamination Analysis

Contamination tests were undertaken on visually representative samples of the Made Ground (10No.), natural Topsoil (7No.) and underlying Natural Strata (3No.) obtained from the site during our works. The Made Ground soil types subjected to analysis included topsoil, clay with brick gravel; peat with brick, glass, metal, wood and plastic pieces; and silt with metal and wooden pieces.

In addition, one sample of the Made Ground and one sample of the Topsoil from the area of the former presumed agriculture related buildings were subjected to asbestos screening.

For initial assessment purposes, we have combined the results into three datasets, for individual comparison of the reported determinand concentrations against appropriate Tier 1 GACs, namely Made Ground, Topsoil and the underlying undisturbed Natural Strata.

Please note that screening values have only been used for determinands where they are present at concentrations in excess of the LOD on at least one occasion.

6.6 Contamination Soil Test Results

6.6.1 Made Ground

The contamination assessment for the Made Ground (including Made Ground topsoil) at the site is summarised in Table 11.

TABLE 11 – SUMMARY OF TIER 1 GAC ASSESSMENT (MADE GROUND - RESIDENTIAL WITH PLANT UPTAKE END-USE)				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No) & No. of Exceedances (n/10)
Metals				
Arsenic	10	5 – 12	37 S4UL	No
Cadmium	10	0.8 – 1.7	11 S4UL	No
Chromium III	10	17 – 39	910 S4UL	No
Copper	10	8 – 30	2400 S4UL	No
Lead	10	15 – 1040	200 C4SL	Yes (1/10)
Mercury	10	<0.17 – 1.42	40 S4UL	No
Nickel	10	14 – 31	130 S4UL	No
Selenium	10	<1 – 2	250 S4UL	No
Zinc	10	50 – 283	3700 S4UL	No
PAH				
Acenaphthene	10	<0.1 – 0.2	210 S4UL	No
Anthracene	10	<0.1 – 0.6	2400 S4UL	No
Benzo(a)anthracene	10	<0.1 – 1.9	7.2 S4UL	No
Benzo(a)pyrene	10	<0.1 – 1.9	2.2 S4UL	No
Benzo(b)fluoranthene	10	<0.1 – 1.9	2.6 S4UL	No
Benzo(ghi)perylene	10	<0.1 – 1.4	320 S4UL	No
Benzo(k)fluoranthene	10	<0.1 – 0.7	77 S4UL	No
Chrysene	10	<0.1 – 1.9	15 S4UL	No

TABLE 11 – SUMMARY OF TIER 1 GAC ASSESSMENT (MADE GROUND - RESIDENTIAL WITH PLANT UPTAKE END-USE)				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No) & No. of Exceedances (n/10)
Dibenzo(ah)anthracene	10	<0.1 – 0.3	0.24 ^{S4UL}	Yes (1/10)
Fluoranthene	10	<0.1 – 4.3	280 ^{S4UL}	No
Fluorene	10	<0.1 – 0.2	170 ^{S4UL}	No
Indeno(123-cd)pyrene	10	<0.1 – 1.6	27 ^{S4UL}	No
Phenanthrene	10	<0.1 – 2.0	95 ^{S4UL}	No
Pyrene	10	<0.1 – 3.7	620 ^{S4UL}	No
Key S4UL – CIEH/LQM Suitable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved. C4SL – value for Lead taken from DEFRA publication SP1010 and based on a residential (with home-grown produce) end-use.				

The data within Table 11 may be summarised as follows.

Lead

The contamination assessment undertaken from the samples of Made Ground obtained from the exploratory holes has indicated an elevated concentration of lead (1040mg/kg) in a single sample in TP14 (2.00m). The sample was located in the area formerly occupied by presumed agriculture related buildings at the eastern edge of the site. This sample comprised slightly sandy slightly gravelly peat and included pieces of brick, glass, metal, wood and plastic.

Dibenzo(ah)anthracene

The contamination assessment undertaken from the samples of Made Ground obtained from the exploratory holes has indicated a marginally elevated concentration of the PAH compound dibenzo(ah)anthracene (0.3mg/kg) in a single sample in TP5 (0.40m) which was located in the western extremity of the site. This sample comprised slightly gravelly clay and included fragments of brick and clinker.

Further Comments

All remaining determinands for the Made Ground assessed were present at individual concentrations below the Limit of Detection of the method of analysis adopted by the laboratory or below the appropriate Tier 1 GAC based on a residential with plant uptake end-use.

6.6.2 Topsoil

The contamination assessment for the natural Topsoil at the site is summarised in Table 12.

TABLE 12 – SUMMARY OF TIER 1 GAC ASSESSMENT (TOPSOIL - RESIDENTIAL WITH PLANT UPTAKE END-USE)				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No) & No. of Exceedances (n/7)
Metals				
Arsenic	7	4 – 8	37 ^{S4UL}	No
Cadmium	7	0.6 – 1.3	11 ^{S4UL}	No
Chromium III	7	14 – 35	910 ^{S4UL}	No

TABLE 12 – SUMMARY OF TIER 1 GAC ASSESSMENT (TOPSOIL - RESIDENTIAL WITH PLANT UPTAKE END-USE)				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No) & No. of Exceedances (n/7)
Copper	7	5 – 24	2400 ^{S4UL}	No
Lead	7	9 – 35	200 ^{C4SL}	No
Nickel	7	11 – 25	130 ^{S4UL}	No
Selenium	7	<1 – 1	250 ^{S4UL}	No
Zinc	7	27 – 154	3700 ^{S4UL}	No
PAH				
Benzo(a)anthracene	7	<0.1 – 0.2	7.2 ^{S4UL}	No
Benzo(a)pyrene	7	<0.1 – 0.3	2.2 ^{S4UL}	No
Benzo(b)fluoranthene	7	<0.1 – 0.3	2.6 ^{S4UL}	No
Benzo(ghi)perylene	7	<0.1 – 0.3	320 ^{S4UL}	No
Chrysene	7	<0.1 – 0.3	15 ^{S4UL}	No
Fluoranthene	7	<0.1 – 0.4	280 ^{S4UL}	No
Indeno(123-cd)pyrene	7	<0.1 – 0.3	27 ^{S4UL}	No
Phenanthrene	7	<0.1 – 0.4	95 ^{S4UL}	No
Pyrene	7	<0.1 – 0.4	620 ^{S4UL}	No
Key S4UL – CIEH/LQM Sutable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved. C4SL – value for Lead taken from DEFRA publication SP1010 and based on a residential (with home-grown produce) end-use.				

All of the determinands assessed for the natural Topsoil were present at individual concentrations below the Limit of Detection of the method of analysis adopted by the laboratory or below the appropriate Tier 1 GAC based on a residential with plant uptake end-use.

6.6.3 Natural Strata

The contamination assessment for the Natural Strata at the site is summarised in Table 13.

TABLE 13 – SUMMARY OF TIER 1 GAC ASSESSMENT (NATURAL STRATA - RESIDENTIAL WITH PLANT UPTAKE END-USE)				
Contaminants – Potentially Harmful to Human Health	No. of Samples Tested	Concentration Range (mg/kg)	Tier 1 GAC (mg/kg)	Tier 1 GAC Exceeded (Yes/No) & No. of Exceedances (n/7)
Metals				
Arsenic	3	3 – 11	37 ^{S4UL}	No
Cadmium	3	<0.5 – 1.5	11 ^{S4UL}	No
Chromium III	3	11 – 36	910 ^{S4UL}	No
Copper	3	2 – 15	2400 ^{S4UL}	No
Lead	3	5 – 30	200 ^{C4SL}	No
Nickel	3	9 – 29	130 ^{S4UL}	No
Selenium	3	<1 – 1	250 ^{S4UL}	No
Zinc	3	25 – 101	3700 ^{S4UL}	No
Key S4UL – CIEH/LQM Sutable 4 Use Levels (2015). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL3026. All rights reserved. C4SL – value for Lead taken from DEFRA publication SP1010 and based on a residential (with home-grown produce) end-use.				

All of the determinands assessed for Natural Strata were present at individual concentrations below the Limit of Detection of the method of analysis adopted by the laboratory or below the appropriate Tier 1 GAC based on a residential with plant uptake end-use.

6.7 Asbestos Analysis

One sample of the Made Ground and one sample of the Topsoil from the area of the former presumed agriculture related buildings were subjected to asbestos screening (for any bulk fragments and/or fibres) by the laboratory as part of the contamination assessment. The results revealed that asbestos was not detected in any of the samples screened.

6.8 Contamination Assessment Summary

Human Health

Contamination testing was carried out on selected samples of the Made Ground, natural Topsoil and the underlying Natural Strata. The results of the contamination assessment have revealed an elevated concentration of lead and an elevated concentration of dibenzo(ah)anthracene above Tier 1 human health screening criteria within the Made Ground at two locations, based on a residential with plant uptake end-use.

Based on the chemical contamination assessment undertaken the natural Topsoil and the Natural Strata may generally be considered to be uncontaminated for the proposed residential with plant uptake end-use.

Controlled Waters

It is the opinion of GeoDyne that from a Controlled Waters protection perspective, the contaminant concentrations recorded at the site (including the localised exceedances of human health generic assessment criteria for the PAH dibenzo(ah)anthracene and lead) are relatively low. On the basis of the foregoing, there are considered to be no significant risks posed to Controlled Waters by the findings of the laboratory analysis undertaken.

7.0 GROUND GAS & WATER LEVEL MONITORING RESULTS

7.1 Introduction

Based on the potential presence of on and off-site sources of potentially harmful ground gas, monitoring points were installed in selected completed boreholes to facilitate an initial programme of monitoring (i.e. for methane and carbon dioxide).

7.2 Monitoring Installations

Upon completion, five of the window sampling boreholes (WS1, WS2, WS4, WS5 and WS6) were installed with combined ground gas and water monitoring standpipes to depths of up to 5.00m bgl to facilitate an initial programme of monitoring.

The ground gas and water monitoring data obtained from the site is presented in Appendix XIII of this report.

7.3 Results of the Ground Gas Monitoring

A total of six ground gas and water monitoring visits have been undertaken at the site over a six week period. The ground gas monitoring results are summarised in Table 14.

TABLE 14 – SUMMARY OF GROUND GAS MONITORING DATA		
Parameter	Minimum	Maximum
Methane (v/v)	0.0	0.7
Carbon Dioxide (v/v)	0.1	6.8
Oxygen (v/v)	13.5	20.9
Peak Flow (L/h)	0.0	0.1 (and -12.3)
Steady Flow (L/h)	0.0	0.0
KEY v/v - % by volume L/h – litres/hour		

Carbon dioxide concentrations in excess of 5% by volume were recorded within one monitoring standpipe (WS6) on five of the six monitoring visits. Methane concentrations in excess of 0.1% by volume were generally not recorded with the exception of one monitoring standpipe (WS5) where concentrations of 0.7% and 0.4% were recorded on two monitoring visits.

Positive flow rates in excess of 0.1 litres / hour were not recorded during the monitoring carried out at the site. However, negative flow rates were recorded within three monitoring standpipes (WS2, WS4 and WS5) over four monitoring visits. It should be noted that the negative flow rates decreased to 0.0 litres / hour after periods of 60 to 90 seconds.

Periods of rapidly falling atmospheric pressure are considered to be the optimum barometric conditions for gas emissions from the ground. One of the gas monitoring visits was carried out during a period of steady atmospheric pressure (around 1018mb) on 30th August 2019. The remaining visits were undertaken during periods of rising atmospheric pressure.

The atmospheric pressure trends are summarised below:

- 23rd August 2019 – Rise of 2mb
- 30th August 2019 – Steady around 1018mb
- 5th September 2019 – Rise of 13mb

- 12th September 2019 – Rise of 11mb
- 18th September 2019 – Rise of 6mb
- 26th September 201 – Rise of 2mb

Water was encountered within each of the boreholes during the programme of monitoring, at depths of between 1.09m and 3.31m begl. Within the three boreholes that recorded negative flow rates, the water levels were noted to be typically shallower at depths of between 1.09m and 1.48m begl.

As stated in industry guidance, flow rates can be affected by changes in groundwater levels with artificial pressure building up in the monitoring standpipe headspace if water levels increase when the gas tap is closed. The converse situation can also occur in relation to the notable negative flow rates recorded when groundwater levels fall prior to monitoring creating a negative pressure within the solid section of the standpipe and when the gas tap is opened to undertake the monitoring, air is drawn into the standpipe resulting in a high negative flow rate. It also occurs where more permeable strata are confined by impermeable material such as clay over sand layers. Given the presence of clay above the water levels within each of the response zones of the three monitoring standpipes at this site that recorded negative flow rates, it is considered that this scenario is therefore more susceptible to artificial flow rates caused by fluctuations in groundwater trapping the air / ground gas under pressure within the available headspace within the monitoring standpipe.

7.4 Appropriate Guidance

7.4.1 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*' (2019).
- CIRIA Report C665 '*Assessing risks posed by hazardous ground gases to buildings*' (2007).
- CIRIA Report C735 '*Good practice on the testing and verification of protection systems for buildings against hazardous ground gases*' (2014).

7.4.2 Gas Screening Value Calculation

8485:2015+A1:2019 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:

- $GSV (l/h) = \text{maximum borehole flow rate (l/h)} \times (\text{maximum gas concentration}/100).$

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*'.

7.4.3 Site Classification

The next step in the assessment process is determining the sites classification. Table 2 of 8485:2015+A1:2019+A1:2019 (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)}	Additional factors
		L/h	
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].

7.4.4 Proposed Building Type

In accordance with 8485:2015+A1:2019+A1:2019, 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.

8485:2015+A1:2019+A1:2019 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 8485:2015+A1:2019+A1:2019, 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

- **Type A building:** private ownership with no building management controls on alterations to the internal structure, the use of rooms, the ventilation of rooms or the structural fabric of the building. Some small rooms present. Probably conventional building construction (rather than civil engineering). Examples include private housing and some retail premises.
- **Type B building:** private or commercial property with central building management control of any alterations to the building or its uses but limited or no central building management control of the maintenance of the building, including the gas protection measures. Multiple occupancy. Small to medium size rooms with passive ventilation of rooms and other internal spaces throughout ground floor and basement areas. May be conventional building or civil engineering construction. 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 building:** commercial building with central building management control of any alterations to the building or its uses and central building management control of the maintenance of the building, including the gas protection measures. Single occupancy of ground floor and basement areas. Small to large size rooms with active ventilation or good passive ventilation of all rooms and other internal spaces throughout ground floor and basement areas. Probably civil engineering construction. Examples include offices, some retail premises, and parts of some public buildings (such as schools, hospitals, leisure centres and parts of hotels).
- **Type D building:** industrial style building having large volume internal space(s) that are well ventilated. Corporate ownership with building management controls on alterations to the ground floor and basement areas of the building and on maintenance of ground gas protective measures. Probably civil engineering construction. 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).

NOTE 2 Type A buildings are those where the risk of failure of the gas protection measures is likely to be most significant to the safety of the occupants and Type D buildings are those where this same risk is likely to be least significant.

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

Table 4 of 8485:2015+A1:2019+A1:2019, 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  ^{A)}	5.5	4.5
6	— ^{B)}	— ^{B)}	 — ^{B)} 	 6 

^{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.

7.4.6 Methods of Achieving Gas Protection Scores

The appropriate level of precautions, to be designed in accordance with the point scoring system of 8485:2015+A1:2019+A1:2019, 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 ^B
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 ^{A1} ^D ^{A1}	2
Basement floor and walls conforming to BS 8102:2009, Grade 3 waterproofing ^C ^{A1} ^D ^{A1}	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 ^{A1} being provided by a suitable structural barrier with the design and detailing of the walls and floor meeting the requirements for Type B protection. The score cannot be assigned for Type A (waterproof membrane) or Type C (drained cavity wall). ^{A1}

^D) ^{A1} If a membrane is installed beneath and around the basement to provide Type A waterproofing (BS 8102:2009), it can be assigned a gas protection score in accordance with Table 7, if it meets all the criteria for a gas resistant membrane in that table. ^{A1}

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.

Table 6 (continued)

Protection element/system	Score	Comments
(b) Passive sub floor dispersal layer:	2.5	Performance criteria for methane and carbon dioxide are shown in Figure B.6 and Figure B.7 , respectively.
Very good performance:	1.5	
Good performance:		
Media used to provide the dispersal layer are:		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 .
<ul style="list-style-type: none"> • Clear void • Polystyrene void former blanket • Geocomposite void former blanket • No-fines gravel layer with gas drains • No-fines gravel layer 		
(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	<p>This system relies on continued serviceability of the pumps, therefore alarm and response systems should be in place.</p> <p>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.</p>
(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	<p>This system relies on continued operation of the pumps, therefore alarm and response systems should be in place.</p> <p>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".</p>
(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 <i>Buildings Regulations 2000, Approved Document F</i> [9].

Table 7 — Gas protection score for the gas resistant membrane

Protection element/system	Score	Comments
<p>Gas resistant membrane meeting all of the following criteria:</p> <ul style="list-style-type: none"> • sufficiently impervious ^{A1)}, both in the sheet material ^{A1)} and in the sealing of sheets and sealing around sheet penetrations, to prevent any significant passage of methane and/or carbon dioxide through the membrane; ^{A1)} • sufficiently durable to remain serviceable for the anticipated life of the building and duration of gas emissions; • ^{A1)} Text deleted ^{A1)} • sufficiently strong ^{A1)} ^{B)} ^{A1)} 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); ^{A1)} and to withstand in-service stresses (e.g. settlement if placed below a floor slab); ^{A1)} • capable, after installation, of providing a complete barrier to the entry of the relevant gas; and • verified in accordance with CIRIA C735 [N1]. 	2	<p>The performance of membranes is heavily dependent on the quality and design of the installation, resistance to damage after installation and integrity of joints.</p> <p>^{A1)} Text deleted ^{A1)}</p> <p>If a membrane is installed that does not meet all the criteria in column 1 then the score is zero.</p>

^{A1)} ^{A1)} A membrane with a methane gas transmission rate <40.0 ml/day/m²/atm (average) for sheets and joints (tested in accordance with BS ISO 15105-1:2007 manometric method) is regarded as sufficiently impervious.

^{B)} For example, reinforced LDPE (virgin polymer) membranes having a minimum mass per unit area of 370 g/m² and not significantly less than 0.4 mm thickness between the reinforcement scrim (tested in accordance with Procedure D (2 mm diameter tip) of BS EN ISO 9863-1:2016) installed above floor slabs are considered sufficiently strong to meet the performance criteria (see also C.3). Thicker and more robust membranes or an additional membrane protection layer should be installed directly beneath cast-in-situ floor slabs. ^{A1)}

7.5 Ground Gas Analysis

7.5.1 Gas Screening Value & Site Classification

The ground gas monitoring undertaken to date has identified maximum carbon dioxide concentrations of 6.8% v/v and a maximum methane concentration of 0.7% v/v. With regard to flow rates, for the purposes of the ground gas risk assessment BS8576:2013 states that “*steady state flow rates, rather than brief peak values on opening, should be used in screening risk assessments, if these are considered to be representative of the conceptual site model*”. Measureable steady flow rates were not recorded during the monitoring visits. In the absence of a measurable steady flow rate, the limit of detection of the gas monitoring instrument (0.1 l/h) should be utilised. The atmospheric pressure trends noted during the monitoring period do not appear to have affected the low ground gas concentrations recorded.

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

- $0.1 \times (6.8/100) = 0.0068 \text{ l/h}$

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

- $0.1 \times (0.7/100) = 0.0007 \text{ l/h}$

Therefore, with a maximum GSV of 0.0068 l/h, a carbon dioxide concentration of 6.8% v/v, a methane concentration of 0.7% v/v and no measurable steady flow rate, this initially classifies the site as Characteristic Situation CS1, in accordance with Table 2 of 8485:2015+A1:2019+A1:2019 and based on the visits undertaken. However, where carbon dioxide concentrations exceed 5% by volume the British Standard recommends that consideration should be given to increasing the ground gas regime from CS1 to CS2. A CS2 ground gas regime would therefore indicate that gas protection measures would be required in the proposed new dwellings at the site. However, the gas protection measures are only indicated to be required by virtue of the carbon dioxide concentration exceeding 5% by volume in one of the five monitoring standpipes on five occasions (i.e. a maximum of 6.8% by volume in WS6).

7.5.2 Building Type

We understand that it is proposed to construct low-rise residential properties at the site. In accordance with Table 3 of BS 8485, **Building Type A** is considered to be the most appropriate classification.

7.5.3 Gas Protection Score

On the basis of Characteristic Situation (CS2) and the development proposals with buildings that may be designated as Building Type A and in accordance with Table 4 of 8485:2015+A1:2019+A1:2019, the minimum gas protection score for the site is **3.5 points**.

7.5.4 Comments

It should be noted that the site has been classified as Characteristic Situation (CS2) based on carbon dioxide concentrations exceeding 5% by volume in one of the five gas monitoring standpipes, i.e. up to 6.8% by volume. In view of this, consideration should therefore be given to undertaking further gas monitoring at the site (including from additional gas monitoring installations and falling periods of rapidly falling atmospheric pressure) in order to obtain a more robust dataset and better characterise the ground gas regime at the site. It is considered possible that the findings of such further monitoring may potentially result in a reduction in the area of the site / number of properties requiring gas protection measures.

8.0 REVISED CONCEPTUAL SITE MODEL

8.1 Introduction

In accordance with the approach detailed within Section 4.0, the Conceptual Site Model (CSM) for the site should be refined following acquisition and collection of additional data following completion of the site investigation works.

Our revised assessment following the acquisition and collection of information from the site investigation works is provided in Table 15.

**TABLE 15 – REVISED RISK ASSESSMENT SUMMARY TABLE
PHASE II EXPLORATORY INVESTIGATION**

Potential Contaminant Source [C]	Potential Pathway(s) [P]	Potential Receptor [R]	Probability of CPR Linkage	Consequence of CPR Linkage	Risk Level	Comments / Justification
General Made Ground & Near Surface Soils	Direct contact, ingestion or inhalation of fugitive dust	End users	Likely	Medium	Moderate	<p>Phase II Exploratory Investigation works have revealed an elevated concentration of lead and an elevated concentration of dibenzo(ah)anthracene within the localised Made Ground. The natural Topsoil and the Natural Strata may be regarded as uncontaminated.</p> <p>Further delineation of the localised Made Ground at the site should be undertaken and subjected to supplementary chemical analysis.</p> <p>Subject to the results of the supplementary analysis it may become necessary to undertake localised source removal works or provide localised remedial capping to proposed gardens or areas of soft landscape.</p>
	Direct contact, ingestion or inhalation of fugitive dust	Site personnel	Likely	Medium	Moderate	<p>Phase II Exploratory Investigation works have revealed an elevated concentration of lead and an elevated concentration of dibenzo(ah)anthracene within the localised Made Ground. The natural Topsoil and the Natural Strata may be regarded as uncontaminated.</p> <p>We would recommend that site personnel use appropriate PPE and welfare facilities in accordance with normal working practices.</p>
	Plant uptake	End users	Likely	Medium	Moderate	<p>Phase II Exploratory Investigation works have revealed an elevated concentration of lead and an elevated concentration of dibenzo(ah)anthracene within the localised Made Ground. The natural Topsoil and the Natural Strata may be regarded as uncontaminated.</p> <p>Further delineation of the localised Made Ground at the site should be undertaken and subjected to supplementary chemical analysis.</p> <p>Subject to the results of the supplementary analysis it may become necessary to undertake localised source removal works or provide localised remedial capping to proposed gardens or areas of soft landscape.</p>
	Vertical and lateral migration	Neighbouring properties	Unlikely	Mild	Negligible	No significant sources of potential mobile hydrocarbon contamination have been identified on site and there was no obvious visual or olfactory evidence of any significant contamination (i.e. hydrocarbon impacted soils, for example).
	Leaching of Contaminants through unsaturated zone	Controlled Waters	Unlikely	Mild	Negligible	The soil test results are not sufficiently elevated to represent a significant risk to Controlled Waters. No significant sources of potential mobile hydrocarbon contamination have been identified on site and there was no obvious visual or

**TABLE 15 – REVISED RISK ASSESSMENT SUMMARY TABLE
PHASE II EXPLORATORY INVESTIGATION**

Potential Contaminant Source [C]	Potential Pathway(s) [P]	Potential Receptor [R]	Probability of CPR Linkage	Consequence of CPR Linkage	Risk Level	Comments / Justification
	and/or vertical and lateral migration					olfactory evidence of any significant contamination (i.e. hydrocarbon impacted soils, for example). A consistent groundwater level was not encountered in the exploratory holes. The ground conditions revealed during the Phase II investigation works have confirmed the presence of typically low permeability typically cohesive soils beneath the site, which would act to minimise any vertical migration of leachate to groundwater.
	Direct contact or contact with vapours	Plastic buildings products (i.e. water supply pipes) and buried concrete	Unlikely	Mild	Negligible	No sources of potentially mobile hydrocarbon contamination have been identified on site. Design Class DS-1/ACEC Class AC-1. (BRE Spec. Digest 1:2005).
	Vertical and lateral migration of ground gases to indoor air	End users of new buildings (asphyxiation) or new buildings (damage via explosion)	Low Likelihood	Severe	Moderate	Based on the ground gas monitoring undertaken to date, the site may be classified as Characteristic Situation 'CS2' in accordance with BS8485:2015. Phase II Exploratory Investigation works revealed the presence of localised Made Ground across the site at depths of up to 2.20m begl. Further gas monitoring and risk assessment may reduce or negate the requirement for gas protection measures.
Off-Site Made Ground	Vertical and lateral migration of ground gases to indoor air	End users of new buildings (asphyxiation) or new buildings (damage via explosion)	Low Likelihood	Severe	Moderate	Based on the ground gas monitoring undertaken to date, the site may be classified as Characteristic Situation 'CS2' in accordance with BS8485:2015. Further gas monitoring and risk assessment may reduce or negate the requirement for gas protection measures.

9.0 CONCLUSIONS & RECOMMENDATIONS

9.1 Site Summary

At the time of our site works, the site comprised an undeveloped grassed field with numerous trees and small areas of dense vegetation present across the site. A pond which included frequent reeds and vegetation was present in the central south of the site.

Historically, the site has largely remained as an undeveloped grassed field. However, two presumed agriculture related buildings were present along the eastern edge of the site which became present circa 1960s which appear to have become absent circa 2006. A number of ponds and drains were present on-site that have become absent and are presumed infilled and / or culverted. According to the historical maps, the western site area comprised a golf course from circa 1980s.

The site is indicated to be underlain by superficial drift deposits comprising Tidal Flat Deposits. The underlying bedrock is indicated to predominantly comprise mudstone of the Ampthill Clay Formation and the West Walton Formation.

9.2 Geotechnical Information

9.2.1 Ground Conditions

Made Ground (including Made Ground topsoil) was encountered in localised areas of the site. In four of the exploratory holes, the Made Ground comprised topsoil over reworked natural clay / silt strata to depths of up to 0.90m begl. In the remaining two exploratory holes, the Made Ground was encountered to depths of 1.40m and 2.20m begl and comprised a clay / silt which included peat and in addition to fragments of brick, glass bottles and pieces of plastic, metal and wood.

Where Made Ground was absent, natural TOPSOIL was encountered at the surface in the exploratory holes to an average depth of approximately 0.30m begl.

Underlying the Made Ground or natural topsoil, the Natural Strata initially comprised firm (locally stiff) silty sandy CLAY and / or firm sandy very clayey SILT. These soils were typically encountered to depths of between 1.40m and 2.70m beg and were noted to locally become softer with depth.

With the exception of the eastern extremity of the site, very soft CLAY was encountered underlying the near surface Clay and Silt. In the majority of the exploratory holes, the very soft Clay was noted to be peaty.

9.2.2 Foundation Design

Structural Engineer designed strip or raft foundations are likely to be suitable for the proposed dwellings across the majority of the site. The near surface natural drift deposits underlying the site appear suitable to support a nett allowable ground bearing pressure of up to 75kN/m².

We would note that softening of the soils was observed across the majority of the site at depths generally in excess of approximately 1.40m begl. On the basis of the foregoing, it is important to ensure that all foundation excavations are kept as shallow as possible to avoid potential decreases in soil strength from affecting foundation integrity. However, based on the current site layout, foundations for several plots are anticipated to require deepening due to the proximity of existing trees.

Based on the presence of soils of a medium volume change potential and the presence of existing trees (the majority of which appear to be of high water demand), the required deepening of foundations in accordance with NHBC Standards is likely to result in foundations bearing onto soils of poor geotechnical competency (i.e. the very soft peaty Clay). The requirement to deepen foundations due to trees together with the presence of localised areas of Made Ground may preclude the use of shallow foundations in specific areas of the site. Therefore the use of a deeper founding solution (i.e. piles, for example) may need to be considered

A piled solution may also need to be considered if there is a need to raise site levels and / or where excessive loads from buildings are present and shallow foundations are not deemed appropriate, subject to advice from a Structural Engineer.

The use of piles at the site would be subject to advice from a specialist piling contractor to confirm the depths of the piles and the most feasible and cost efficient type of pile to be used at the site. It would be necessary to undertake further intrusive works at the site involving cable percussive boreholes to assess the deeper ground conditions to assist with a piled foundation solution for the proposed development.

A further consideration as an alternative to strips / rafts may be the use of ground improvement by vibro stone columns. However, the soft nature and the depth of the soft soils (typically encountered at depths in excess of 1.40m begl) may preclude the use of this technique. Advice from a specialist contractor should be sought to confirm the feasibility of ground improvement at the site, if necessary.

Further delineation of the Made Ground is recommended from a foundation design and environmental perspective (see Section 9.3.2). A plan showing areas of Made Ground requiring further investigation is included as Appendix XIV (Figure No. D38108/07).

The natural near surface typically stiff Clay soil underlying the area of the site adjacent to the Internal Drainage Board (IDB) drain crossing point in the west of the site at shallow depth appears suitable to support a nett allowable ground bearing pressure of up to 100kN/m², based on in-situ shear vane and SPT testing. We would note that softening of the soils was observed in this area of the site at depths greater than approximately 2.00m begl.

9.2.3 Floor Slab Design & Ground Gas Precautions

Based on the results of the ground gas monitoring undertaken, and the development proposals that may be assumed at this stage, the site has been provisionally classified as Characteristic Situation CS2, in accordance with Table 4 of 8485:2015+A1:2019, subject to recommended further monitoring. The minimum gas protection score for the site is 3.5 points. Typically, the following mitigation measures are considered appropriate for the site (assuming an Engineer designed strip foundation) to achieve the required level of protection to dwellings:

- Suspended floors with a clear ventilated void (i.e. beam and block).
- Provision of periscopic air-brick ventilation on two sides of each dwelling. The recommended minimum area of ventilation for a sub-floor void is 1500mm² per metre run of wall or 500mm² per square metre of floor area, whichever gives the greater area of opening.
- Low-permeability well installed proprietary gas membrane. The membrane should be suitably lapped and taped and should be extended across wall cavities and lapped with cavity trays to effectively exclude ground gases from the footprint of the proposed buildings. Service penetrations through the membrane should be kept to a minimum and should be suitably sealed to the membrane. The membrane should be inspected by third party in accordance with the requirements of CIRIA C735 '*Good practice on the*

testing and verification of protection systems for buildings against hazardous ground gas' (2014). The membrane must be suitably robust to withstand the construction process and should be suitably protected following installation and inspection to minimise damage during construction.

The foregoing precautions would score 4.5 points in accordance with 8485:2015+A1:2019 and are therefore considered appropriate for the site, based on the requirements for a minimum protection level of 3.5 points. Alternative floor slab design and gas protection measures that give a minimum protection level of 3.5 points may be considered in accordance with BS8485 '*Code of practice for the characterization and remediation from ground gas in affected developments*' (2007) and subject to Local Authority approval.

In accordance with BS8485, for dwellings where a raft foundation is considered appropriate, the requirement for a minimum protection level of 3.5 points may be achieved by ensuring that the raft is well reinforced (to control cracking) and is designed with minimal penetrations. This would score 1.5 points, which in conjunction with an appropriate membrane (as detailed above) would achieve the minimum gas protection score.

As the site has been classified as CS2 based on carbon dioxide concentrations exceeding 5% by volume in one of the five gas monitoring standpipes, consideration should be given to undertaking further gas monitoring at the site (as discussed in Section 7.5.5) which may potentially negate the need for gas protection measures or possibly reduce the area of the site / number of properties requiring gas protection measures.

9.2.4 Radon

No radon precautions are required at the site.

9.2.5 Building Near Trees

Foundation designs (including floor slabs) will need to be adjusted where building near existing, proposed or recently removed trees and hedgerows, in accordance with NHBC Standards Chapter 4.2 '*Building near trees*'. The geotechnical laboratory test results have revealed near surface soils to be of a low to medium volume change potential. A medium volume change potential should therefore be assumed for design purposes.

Numerous trees of varying types and sizes are present both around the peripheries of the site and within the site, which may influence foundation design. Therefore, we would recommend that an arborist survey is undertaken (where not already completed) to identify the species and heights of the existing trees where detailed foundation design within cohesive shrinkable soils needs to be considered.

9.2.6 Water

Water was absent from the majority of the exploratory holes. However, water was encountered within twelve of the exploratory holes at depths of between 1.30m and 4.00m begl, typically as very slight or slight seepages associated with peaty pockets or localised soils comprising moderate amounts of sand. Water was encountered within each of the boreholes during the programme of monitoring, at depths of between 1.09m and 3.31m begl.

Therefore, it is unlikely that excavations will require significant dewatering across the site. We would note that groundwater levels may vary due to seasonal effects. Excavations within shallow soils may be susceptible to standing water following periods of wet weather.

9.2.7 Excavations / Stability

The sides of the majority of the trial pits remained stable for the short period of time they remained open following completion. In the eastern extremity of the site, the sides of the trial pits became unstable when excavating in Silt strata below typical depths of between 2.50m and 2.80m begl.

The boreholes were typically cased to depths of between 1m and 4m begl as a precautionary measure. The sides of the boreholes remained stable for the short period of time the boreholes remained open after completion.

On the basis of the intrusive works, foundation excavations are unlikely to require trench support, other than for health and safety reasons. The assessment of excavations and provision of support will be the responsibility of the contractor on site.

The natural soils are likely to be subject to deterioration and softening if excavations are left open and exposed to wet weather. Any softened soils should be removed from excavations prior to the pouring of concrete and foundation construction.

9.2.8 Sulphate Classification

In accordance with BRE Special Digest 1 (2005), the site falls into Design Sulphate 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.

9.2.9 Coal Mining

No coal mining precautions or associated investigation works are required at the site.

9.2.10 California Bearing Ratios (CBRs)

The remoulded soaked CBR testing has revealed CBR values for the Made Ground to range between 0.3% and 1.3%. For the Natural Strata, the remoulded soaked CBR values ranged between 0.3% and 2.7%.

9.2.11 Surface Water Drainage

The results from the programme of in-situ infiltration rate testing have indicated that traditional soakaways and permeable paving are unlikely to be viable for the site and it may be prudent to investigate alternative methods for draining the site, at this stage.

9.3 Environmental Considerations

9.3.1 Soil Contamination Assessment

Human Health

Contamination testing was carried out on selected samples of the Made Ground (including topsoil), natural Topsoil and the underlying Natural Strata. The results of the contamination assessment have revealed an elevated concentration of lead in TP14 and an elevated concentration of dibenzo(ah)anthracene in TP5 above Tier 1 human health screening criteria within the Made Ground at these locations, based on a residential with plant uptake end-use.

With regard to the lead and dibenzo(ah)anthracene concentrations, at this stage, only one sample of each of the Made Ground soil types have been tested at the laboratory to obtain an initial indication of the chemical quality of the soils as these soil types with the noted man-made inclusions were only encountered in TP14 and TP5. In view of this, a requirement has been identified to either carry out further laboratory testing to obtain a more robust dataset of each of the soil types for statistical assessment, or alternatively carry out remediation works.

However, it should be noted that given the magnitude of the elevated lead concentration (i.e. 1040mg/kg in TP14 in relation to the screening criteria of 200mg/kg) the outcome of the further testing may indicate that the Made Ground material in TP14 is not suitable for re-use at surface in proposed garden areas. However, the exceedance of the PAH dibenzo(ah)anthracene is relatively marginal and may therefore benefit from further assessment. Without the benefit of further investigation and assessment at this stage, then the alternative approach would be to carry out remediation works, as discussed in Section 9.3.2 below.

Based on the chemical contamination assessment undertaken, the natural Topsoil and the Natural Strata may generally be considered to be uncontaminated for the proposed residential with plant uptake end-use.

Controlled Waters

It is the opinion of GeoDyne that from a Controlled Waters protection perspective, the contaminant concentrations recorded at the site (including the localised exceedances of human health generic assessment criteria for the PAH dibenzo(ah)anthracene and lead) are relatively low. On the basis of the foregoing, there are considered to be no significant risks posed to Controlled Waters by the findings of the laboratory analysis undertaken.

9.3.2 Remediation Proposals / Re-Use of Soils

Human Health

Without the benefit of further investigation and site assessment works, the following options are considered appropriate for the site, taking account of the lead and PAH contamination within the Made Ground and the locally aesthetically undesirable nature of the Made Ground.

- **OPTION 1** – Existing Made Ground to remain in-situ. We would recommend the provision of a remedial capping layer to proposed areas of soft landscape where the Made Ground is exposed. Further exploratory works should be undertaken with the aim of delineating the areas of Made Ground at the site to determine where remedial capping is required.

The recommended remedial capping thicknesses are detailed in Table 16 and are subject to Local Authority Approval.

TABLE 16 – REMEDIAL CAPPING PROPOSALS			
Land Use	Subsoil (m)	Topsoil (m)	Total (m)
Rear Gardens	0.45	0.15	0.60
Front Gardens	0.15	0.15	0.30
Public Open Space	0.15	0.15	0.30

Please note that, subject to finished levels at the site, it may be necessary to locally reduce levels within areas of soft landscape (i.e. remove some of the existing Made Ground) to accommodate an appropriate thickness of remedial capping.

- **OPTION 2 – Existing Made Ground to be removed from site.** It may be preferred to remove the existing Made Ground containing elevated lead and dibenzo(ah)anthracene from TP14 and TP5 from proposed areas of gardens and soft landscaping to expose the underlying uncontaminated Natural Strata. This would require delineation works to determine the extent of the contaminated soils. If this option is preferred, we would recommend a nominal thickness of clean imported topsoil (150mm for example) is placed onto the Natural Strata to act as a suitable growing media.

The existing natural Topsoil is considered suitable for re-use within the proposed development. We would recommend that the existing natural Topsoil is stripped and appropriately stockpiled prior to commencement of the development.

The Natural Strata may be regarded as suitable for re-use within proposed gardens as subsoil within the remedial capping or to raise levels (as appropriate), if suitable control measures are adopted to segregate the overlying contaminated Made Ground soils.

Controlled Waters

No specific remediation in relation to Controlled Waters is considered to be necessary at the site on the basis of the available information.

Off-Site Disposal

Excess uncontaminated soils (for example the natural Topsoil and the underlying 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 (subject to appropriate permits, plans and registrations etc.).

Furthermore, where there is an excess volume of Topsoil, consideration should be given to re-use on other developments (subject to regulatory approval) rather than off-site disposal. Similarly, the Natural Strata may be regarded as suitable for re-use within proposed gardens as subsoil (to raise levels, as appropriate) or for landscaping/capping on alternative developments (subject to regulatory approval) where surplus arisings are generated from the site.

Should off-site disposal be required, the chemical testing regime can be different to the chemical testing required to assess the suitability of the soils for retention on site and the risks to human health and Controlled Waters. Therefore, Waste Acceptance Criteria [WAC] testing may be required to confirm disposal costs, although in the first instance, the test results from this investigation should be supplied to landfill operators to determine likely disposal costs before any further testing is carried out.

9.4 Construction Workers

It is recommended that construction personnel involved with direct contact with the soils at the site use appropriate PPE equipment together with hygiene facilities in accordance with general health and safety guidelines.

The chosen Contractor should undertake the necessary Risk Assessments and Method Statements (RAMS) to determine the most appropriate protection required for safe working practices at the site.

A copy of this report should be included in the site health and safety file, and site workers should be made fully aware of the sites setting.

9.5 Utilities

Prior to development of the site, we would recommend that a copy of this report is supplied to utility companies, and that their recommendations relating to appropriate supply pipes are adhered to.

9.6 Unforeseen Circumstances

Should any areas of potentially contaminated soil 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. We will then undertake a visual assessment of the possible contamination, followed by appropriate sampling/testing (as necessary).
- iii. If necessary, contamination will then be treated or removed from site. All necessary remediation works should be validated by testing in accordance with an approved strategy, with the relevant Regulators informed accordingly.

9.7 Flood Risk

The desk study information has revealed the site to lie within an area identified as being at risk of flooding. It is recommended that advice be sought from a Drainage Consultant with respect to this matter.

9.9 Licenses, Permits, Registrations, Plans and Approvals

The Contractor/Developer is responsible for, and must ensure that, all necessary licenses, permits, plans, registrations and approvals are in place prior to commencing with the construction works at the site. These may include any Materials Management Plans (MMPs), Site Waste Management Plans (SWMPs) and/or Environmental Permits/Exemptions as necessary to enable the completion of the proposed works. Any MMP should be accompanied by a Qualified Person Declaration (QPD) and will require verification in due course.

9.10 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 or other Warranty Provider, if necessary) for review/comment and approval prior to commencing with the development of the site.

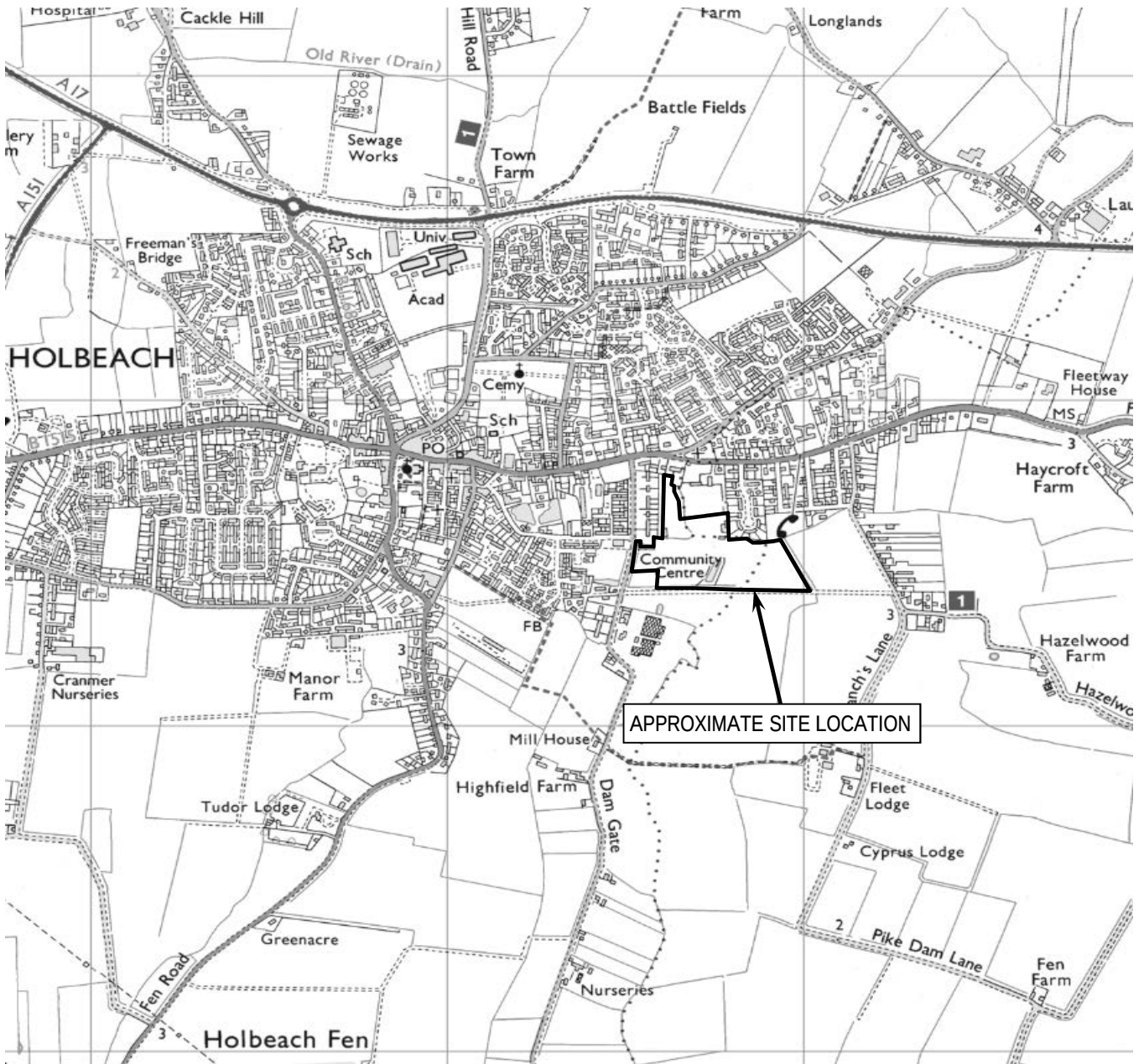
9.11 Recommended Further Works

- Further intrusive works should be undertaken associated with the Made Ground from a foundation design and environmental perspective:

- o Localised areas of Made Ground should be delineated to a) determine areas of the site that are unsuitable for shallow foundations; and to b) determine areas of the site where remedial capping may be required.
 - o Further sampling of the Made Ground may be undertaken to potentially confirm the exceedances within samples at TP5 and TP14 to be considered statistical hotspots and to therefore determine the potential suitability for retention and re-use or localised source removal.
- It would be prudent to undertake further gas monitoring at the site to include the installation of additional monitoring standpipes which may potentially result in a reduction in the area of the site / number of properties requiring gas protection measures.

APPENDIX I

**Site Location Plan
(Figure No. D38108/01)**



Do Not Scale

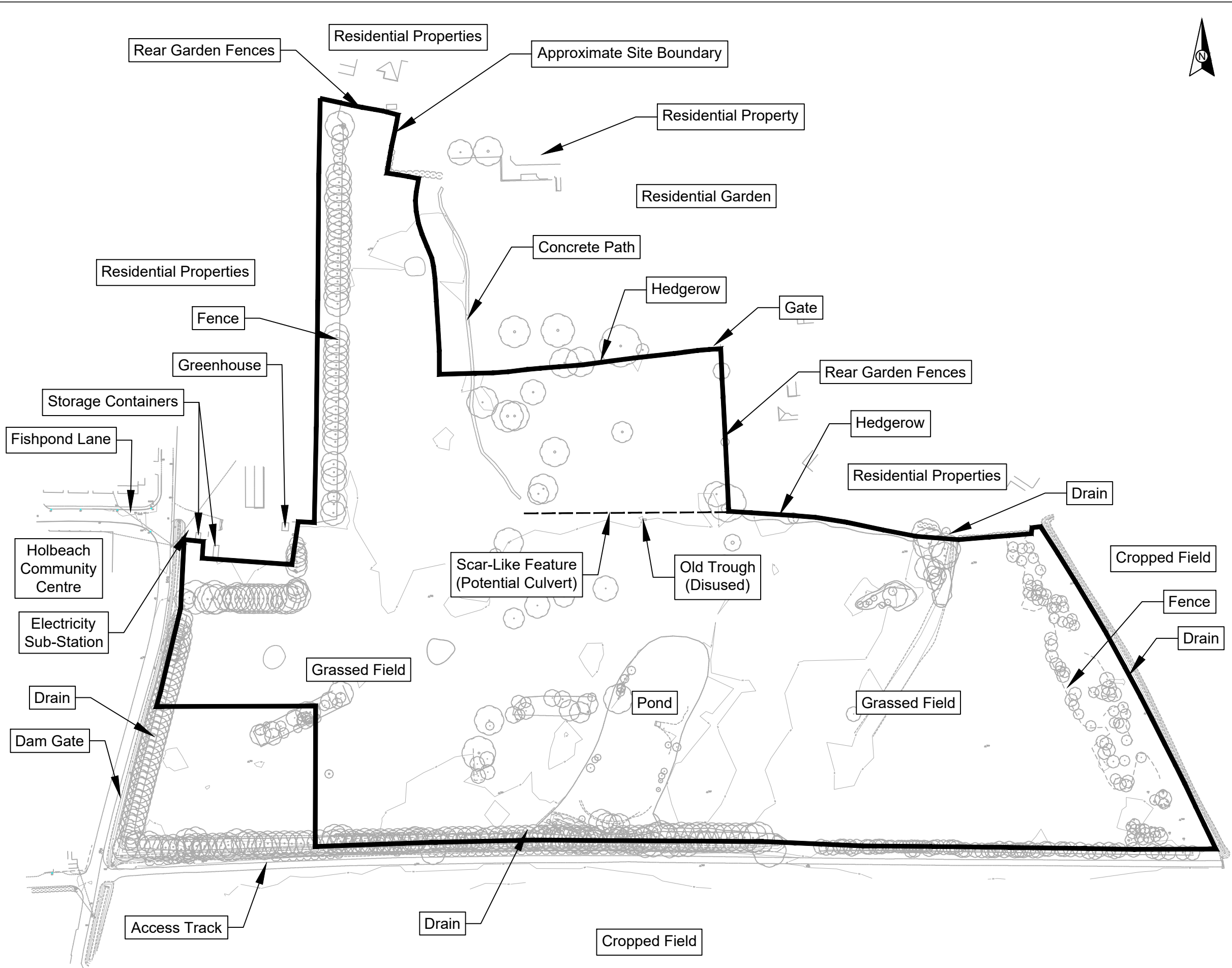
REPRODUCED FROM THE ORDNANCE SURVEY MAP WITH THE PERMISSION OF THE CONTROLLER OF HER MAJESTY'S STATIONERY OFFICE. CROWN COPYRIGHT RESERVED. LICENCE NO. LAN 1001274

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Client	Ashwood Homes	Checked	DB
Project	Dam Gate Holbeach	Approved	PK
		Scale	NTS
		Date Drawn	25/09/2019
Title	Site Location Plan	Rev.	
		Figure No.	D38108/01



APPENDIX II

**Annotated Site Plan
(Figure No. D38108/02)**



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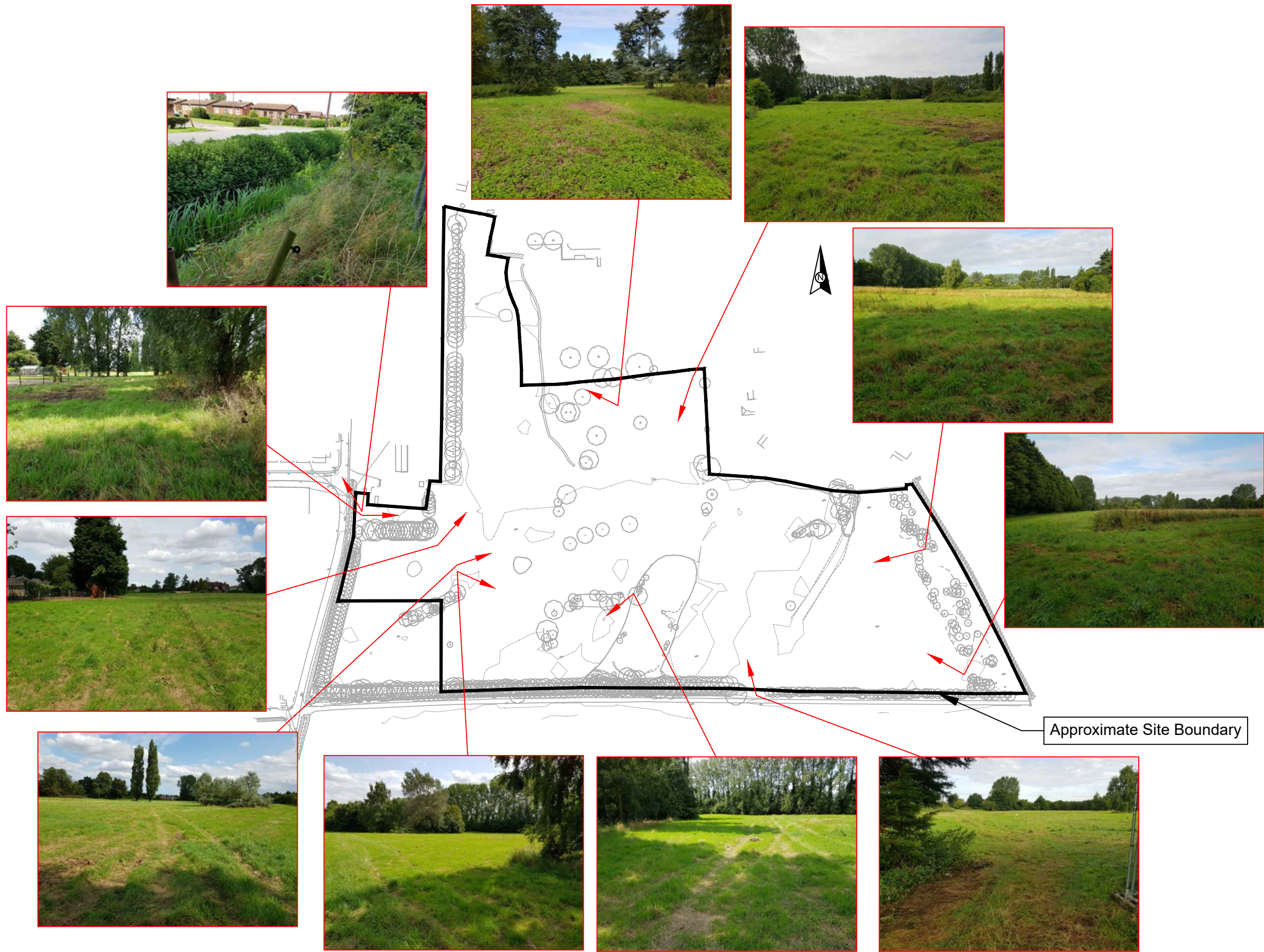
Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Annotated Site Plan
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/02



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APPENDIX III

**Site Plan Showing General Site Views
(Figure No. D38108/03)**



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Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Site Plan Showing General Site Views
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/03

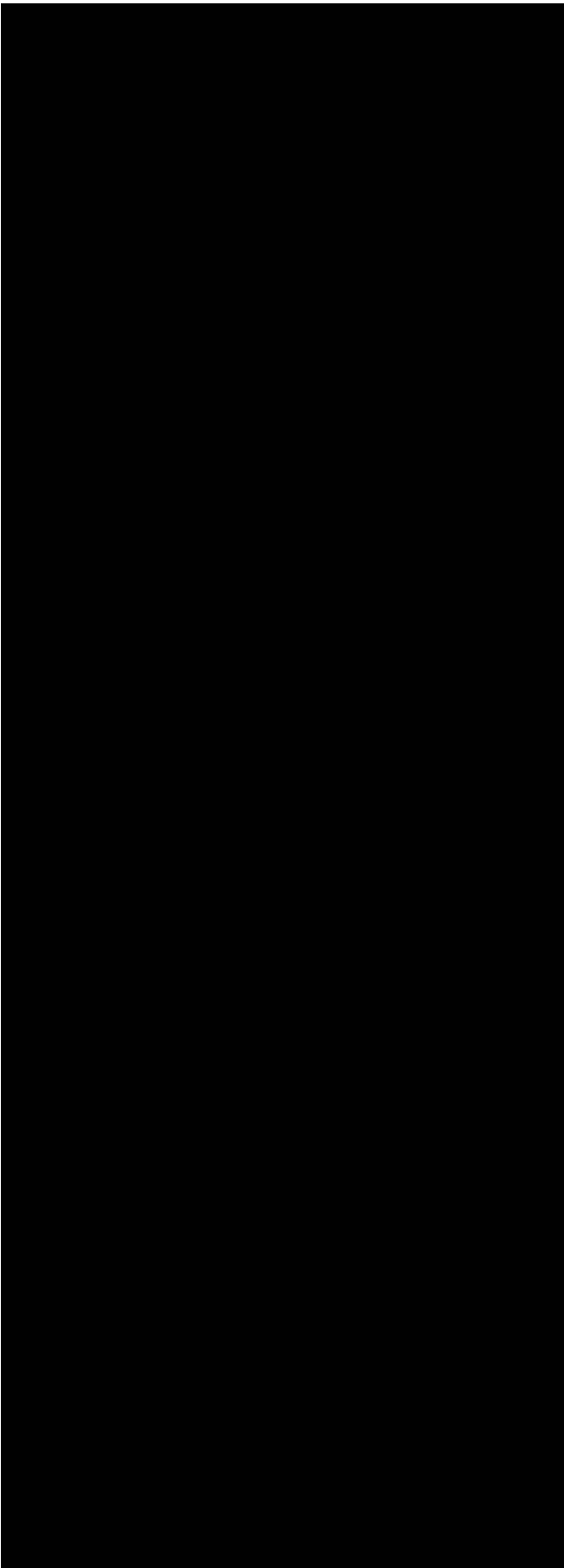


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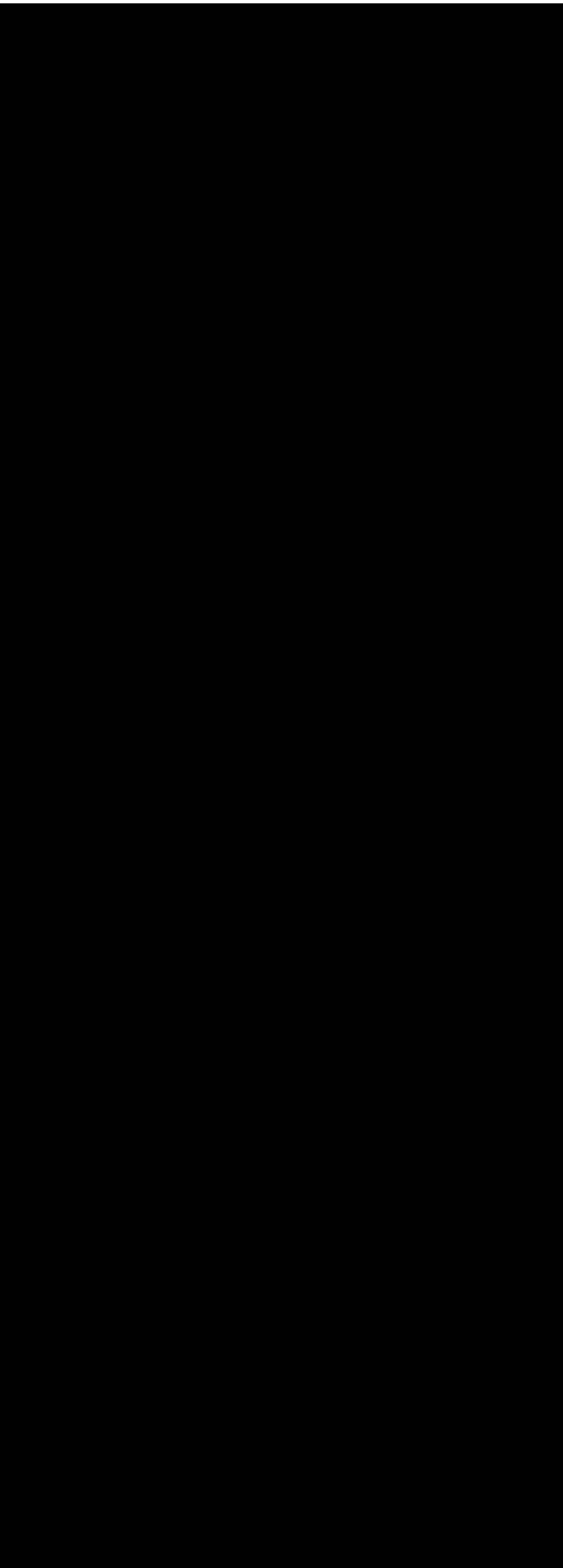
APPENDIX IV
Historical Plans

Historical Mapping Legends

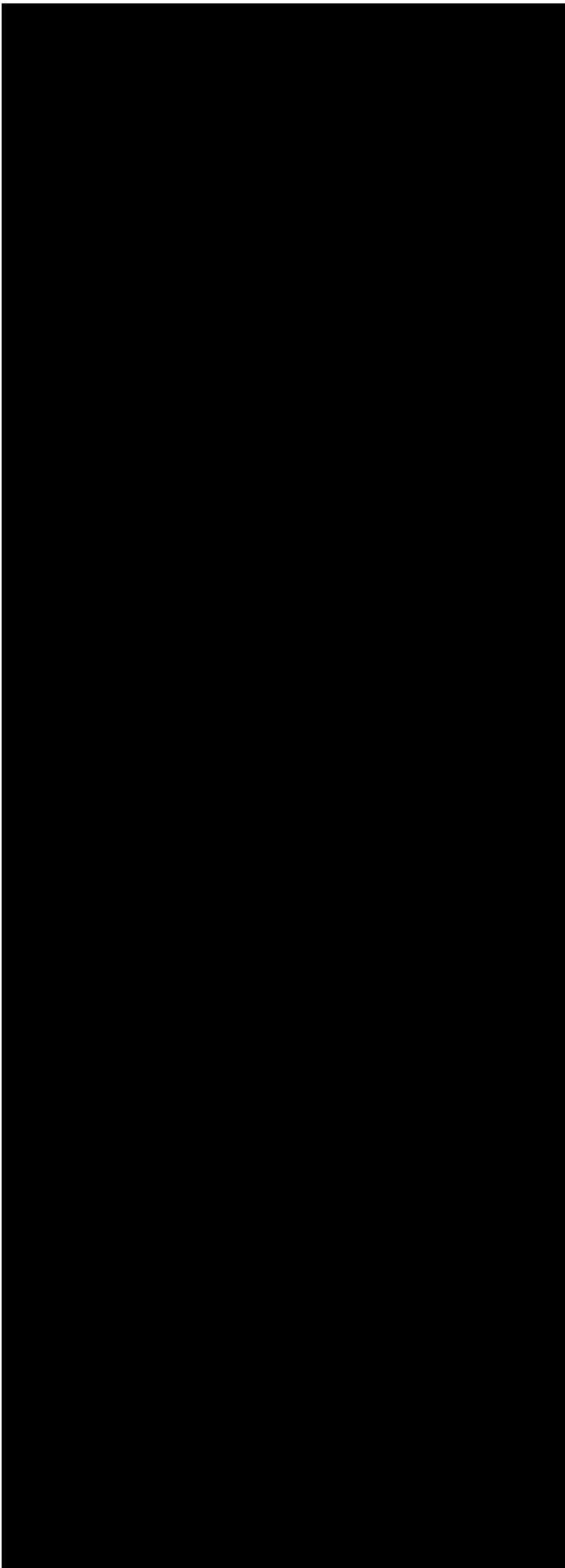
Ordnance Survey County Series and
Ordnance Survey Plan 1:2,500



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



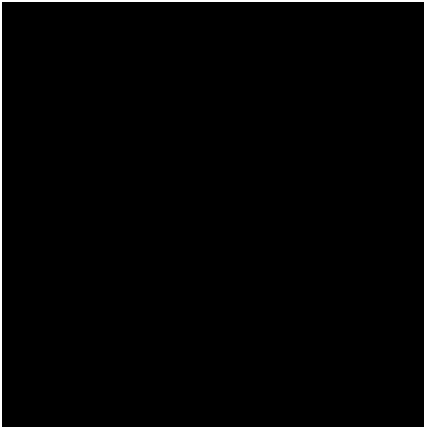
Large-Scale National Grid Data 1:2,500 and
1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lincolnshire	1:2,500	1888	2
Lincolnshire	1:2,500	1904	3
Lincolnshire	1:2,500	1931 - 1932	4
Ordnance Survey Plan	1:2,500	1969	5
Additional SIMs	1:2,500	1977	6
Additional SIMs	1:2,500	1983	7
Additional SIMs	1:2,500	1984	8
Additional SIMs	1:2,500	1986	9
Additional SIMs	1:2,500	1992	10
Large-Scale National Grid Data	1:2,500	1995	11
Historical Aerial Photography	1:2,500	1999	12

Historical Map - Segment A10



Order Details

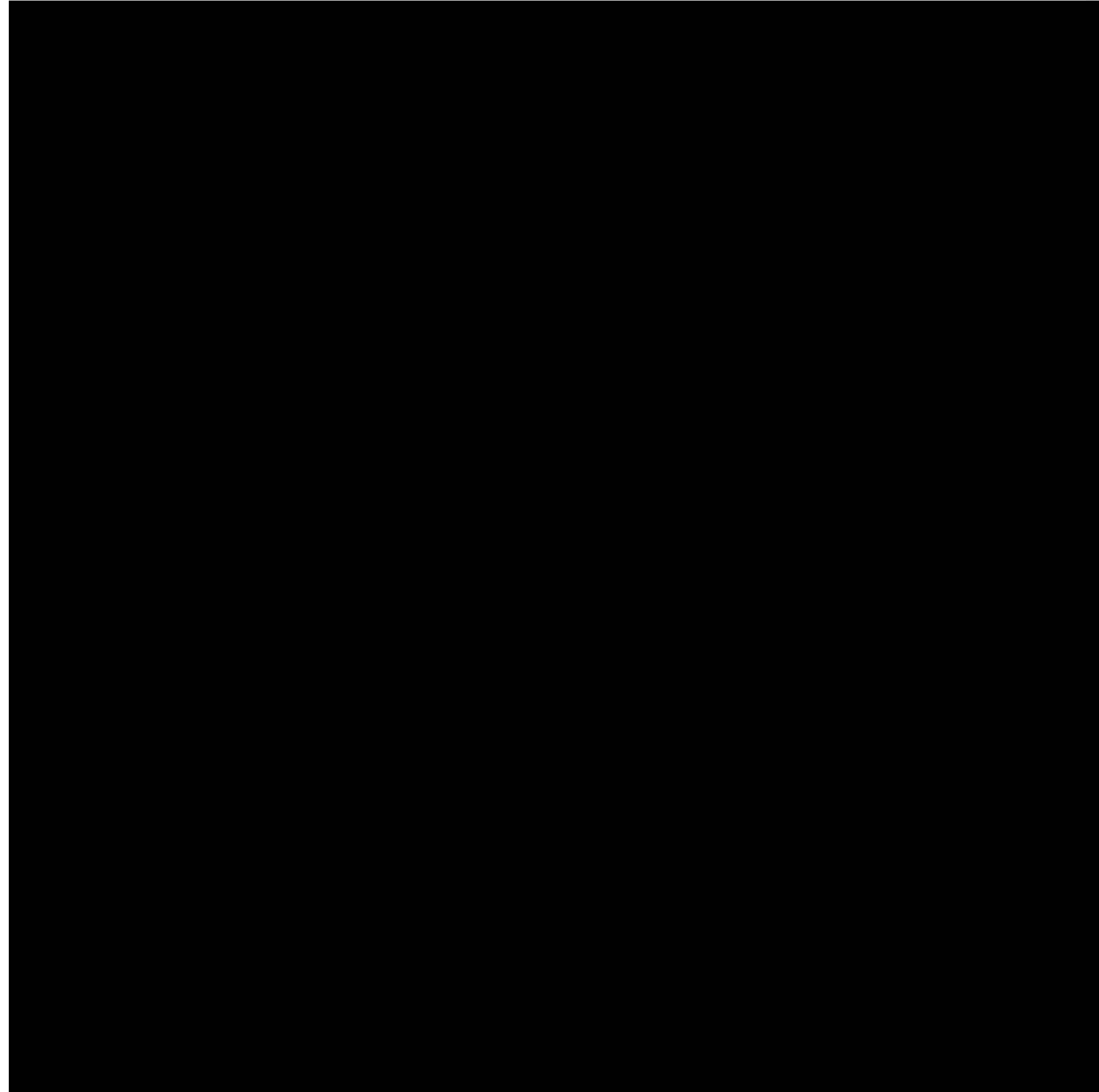
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Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

Damgate, Holbeach



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





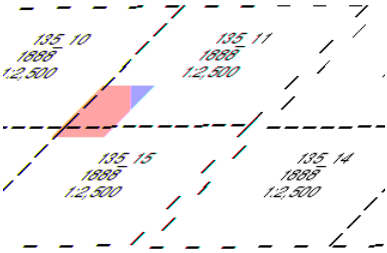
Lincolnshire

Published 1888

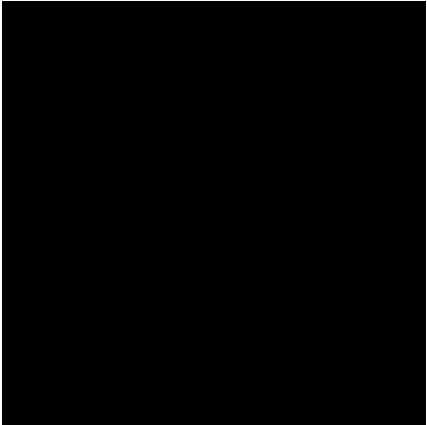
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

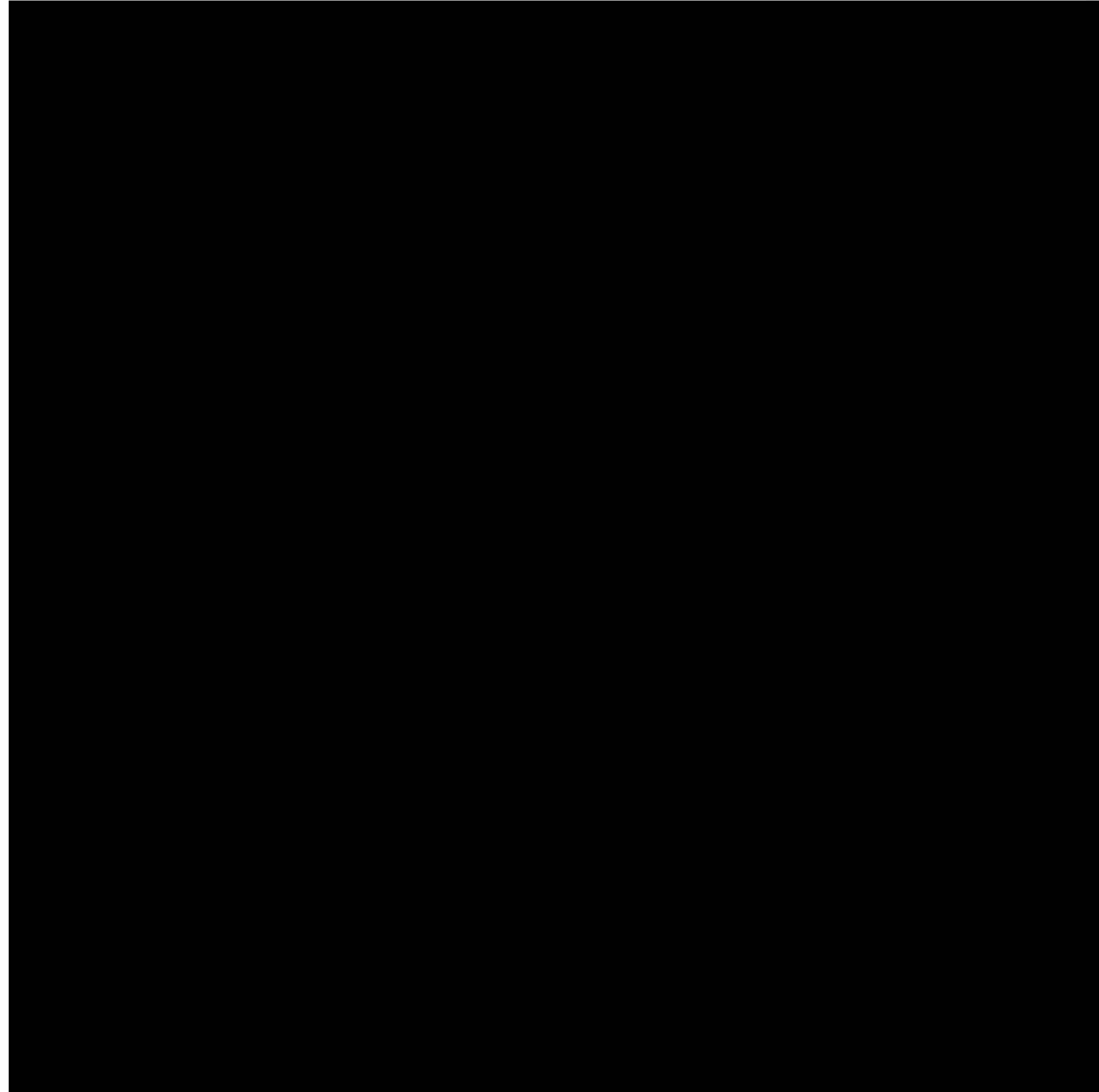
Site Details

Damgate, Holbeach



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A Landmark Information Group Service v50.0 02-Sep-2019 Page 2 of 12





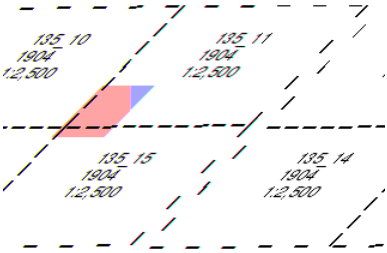
Lincolnshire

Published 1904

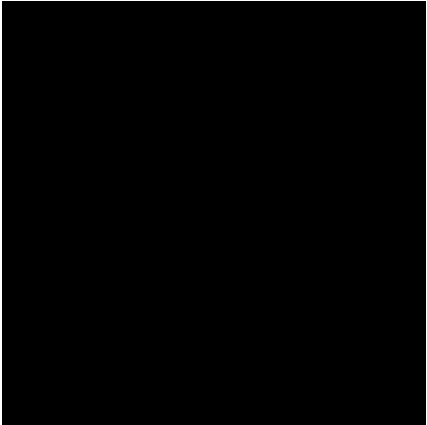
Source map scale - 1:2,500

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 A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

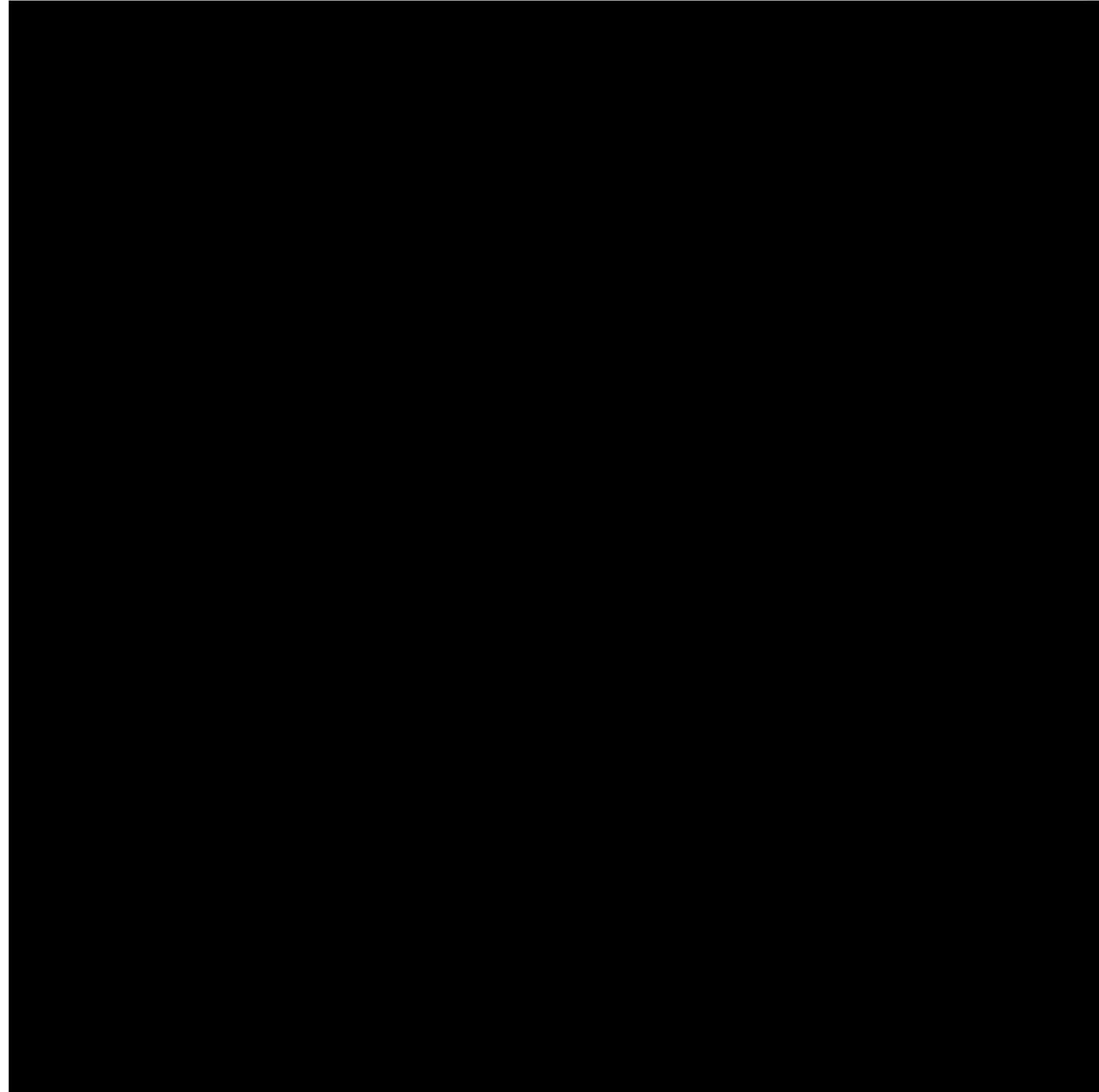
Site Details

Damgate, Holbeach



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

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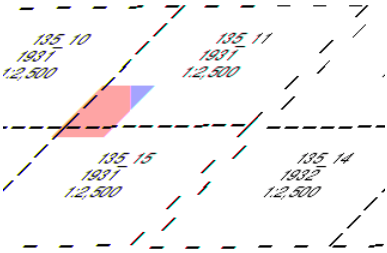
Lincolnshire

Published 1931 - 1932

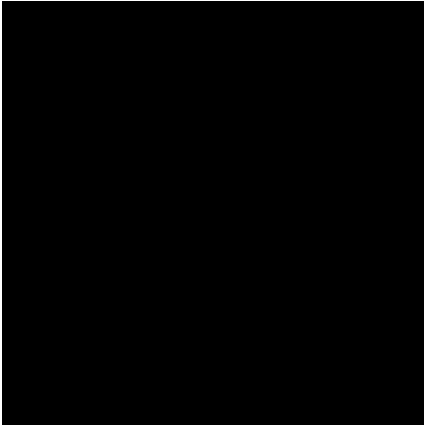
Source map scale - 1:2,500

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 A10



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Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

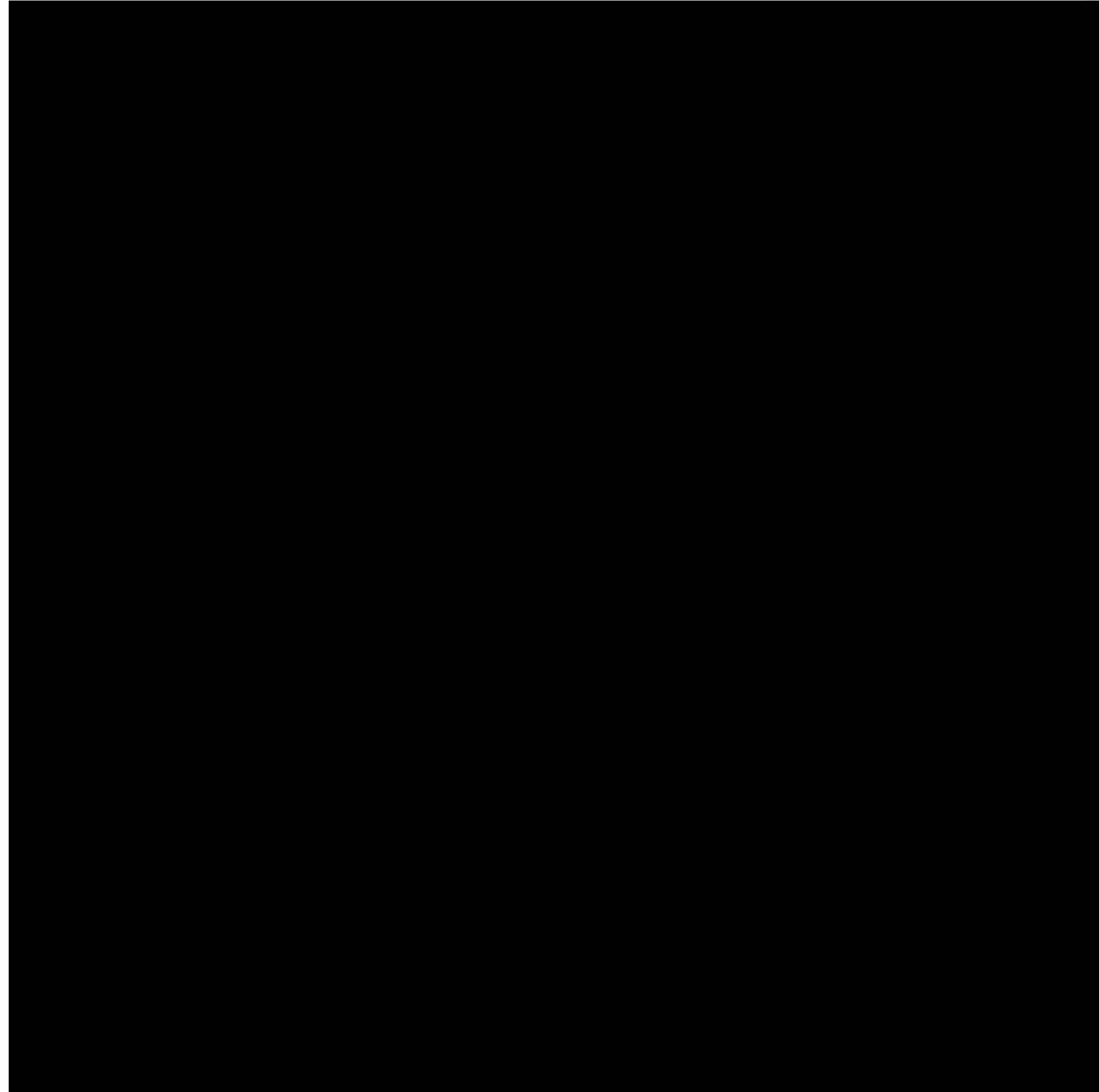
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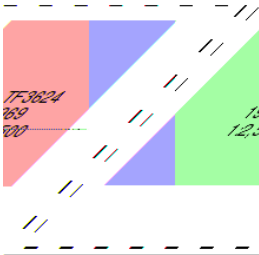
Ordnance Survey Plan

Published 1969

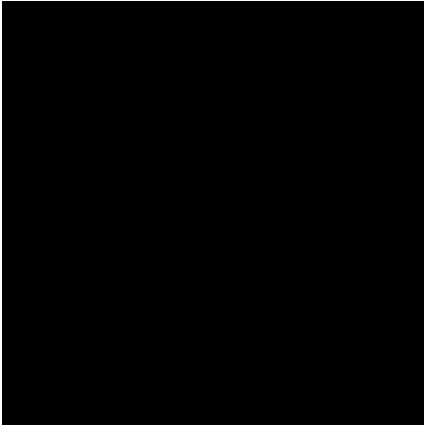
Source map scale - 1:2,500

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.

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Site Area (Ha):	8.37
Search Buffer (m):	100

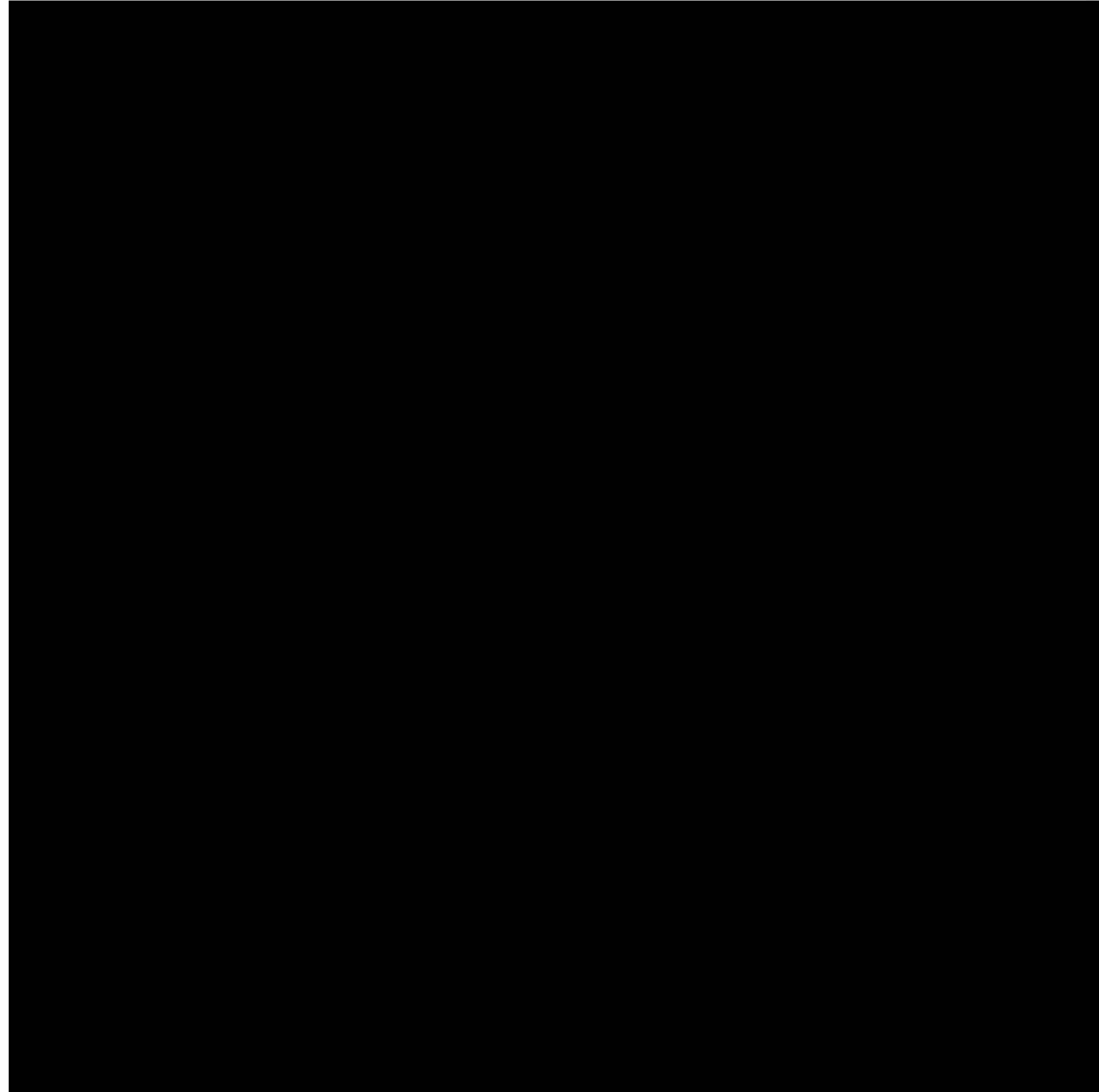
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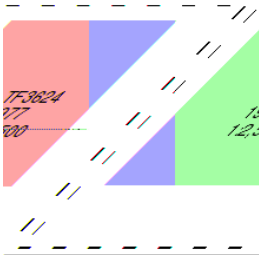
Additional SIMs

Published 1977

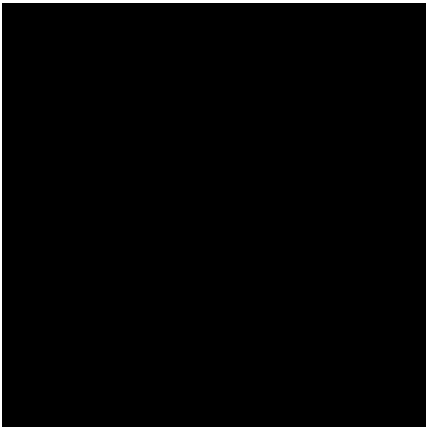
Source map scale - 1:2,500

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 A10



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Order Number:	216516353_1_1
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Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

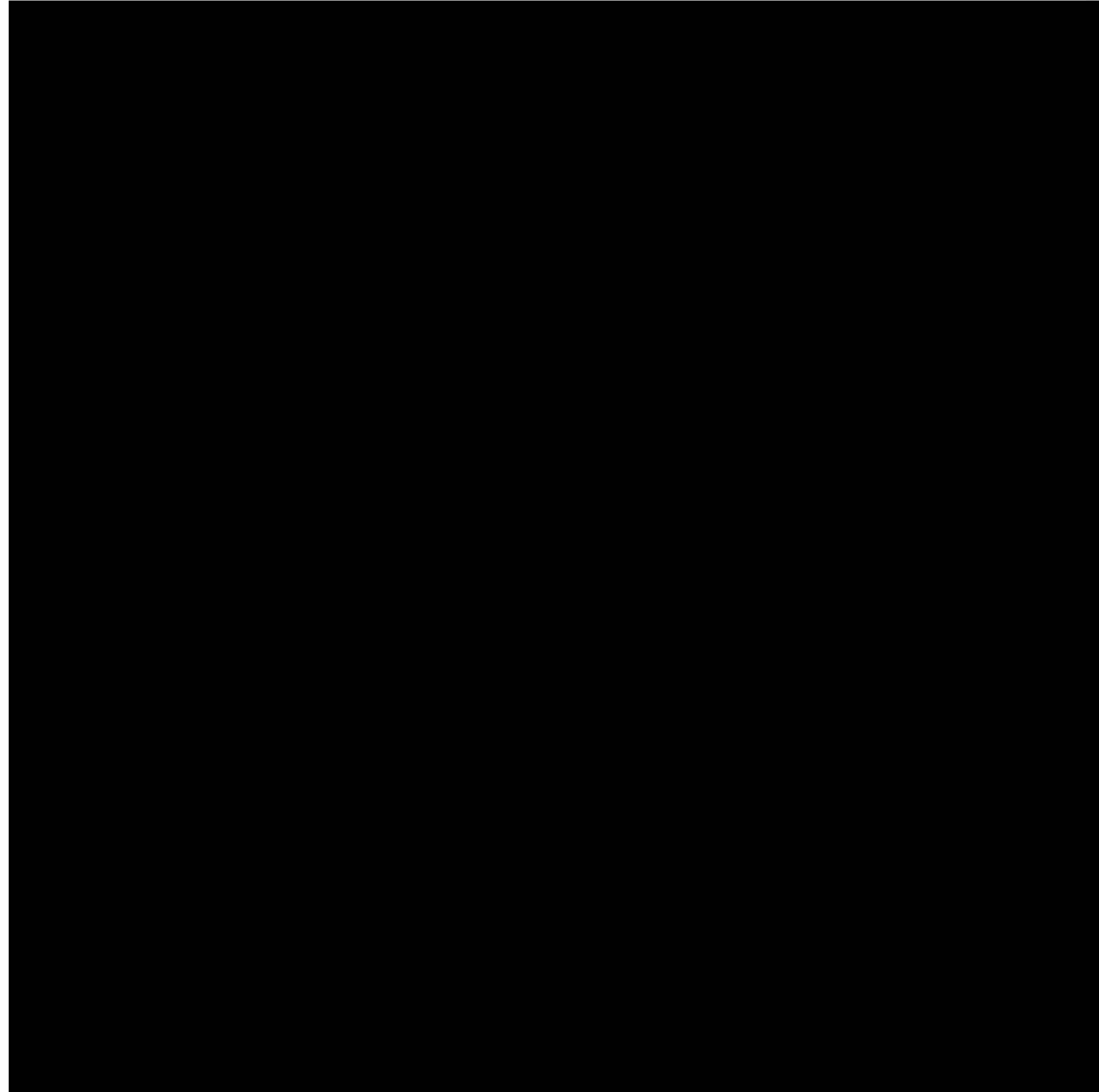
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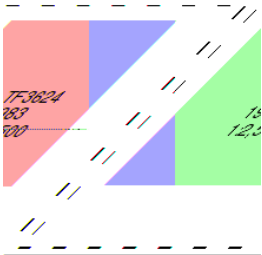
Additional SIMs

Published 1983

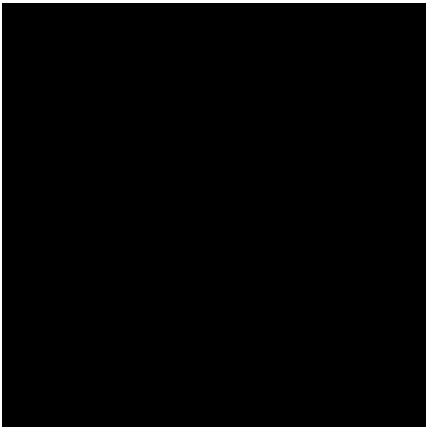
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

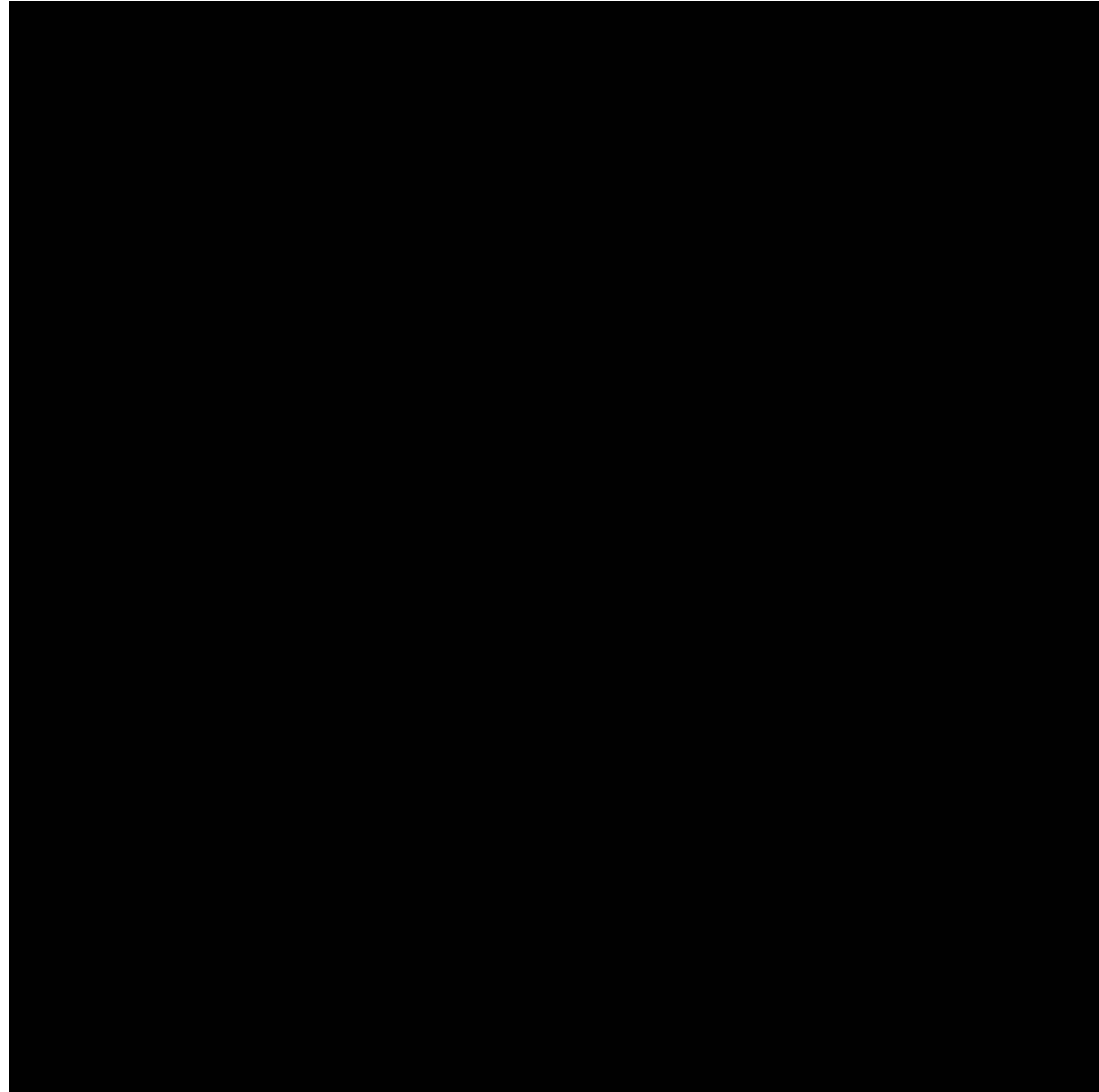
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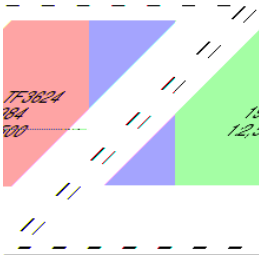
Additional SIMs

Published 1984

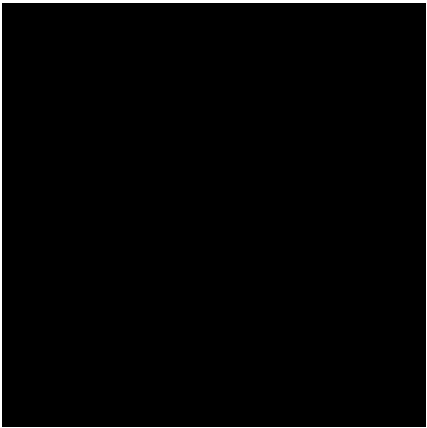
Source map scale - 1:2,500

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 A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

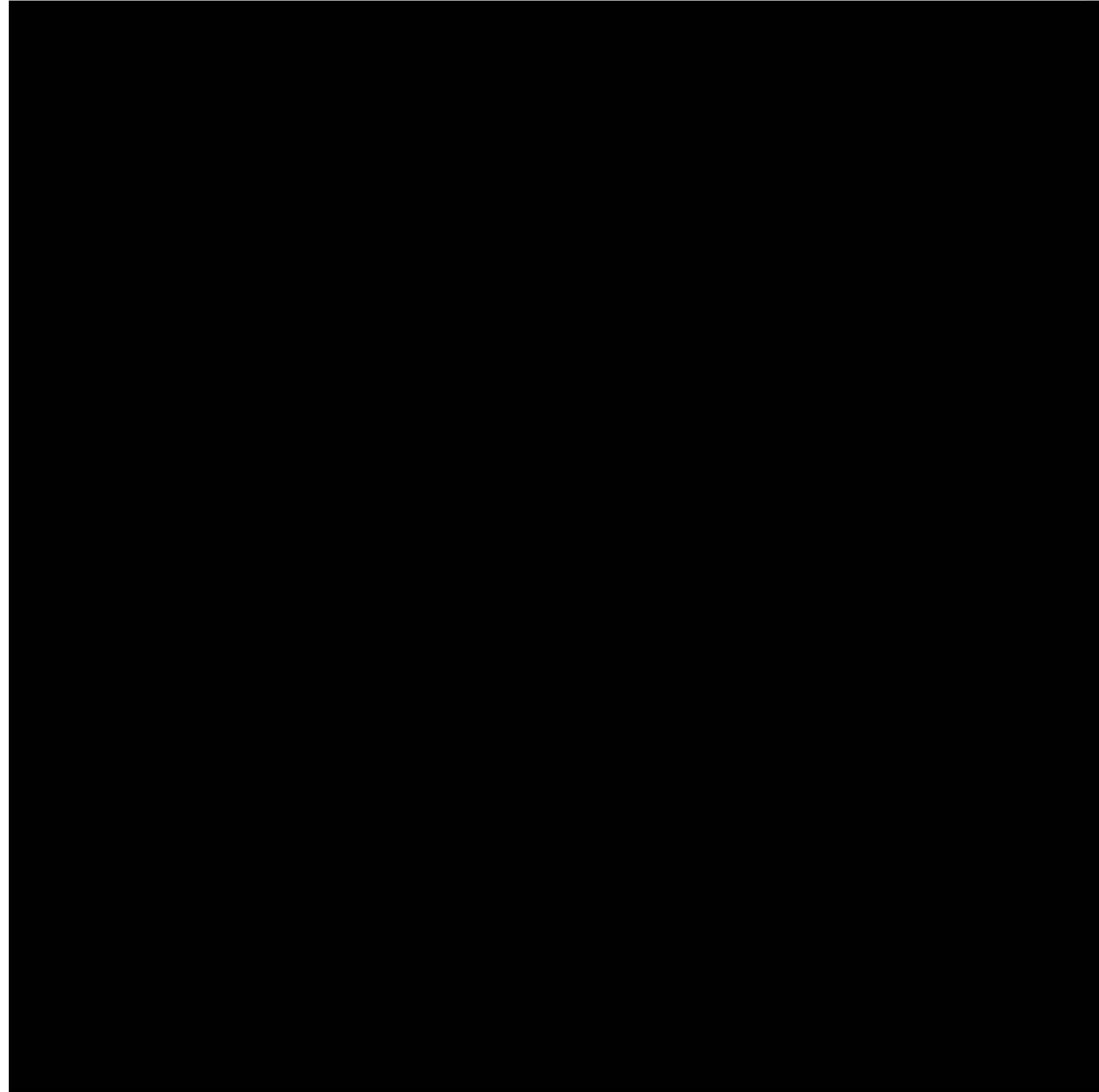
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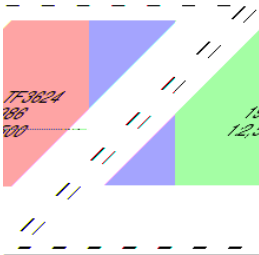
Additional SIMs

Published 1986

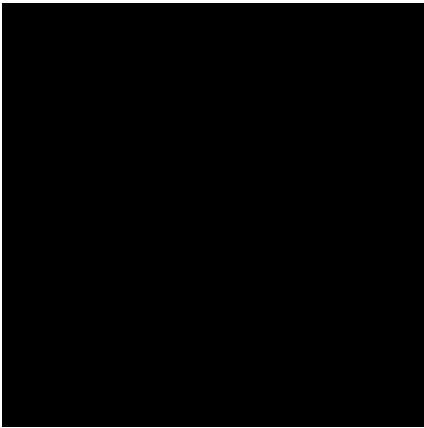
Source map scale - 1:2,500

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 A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

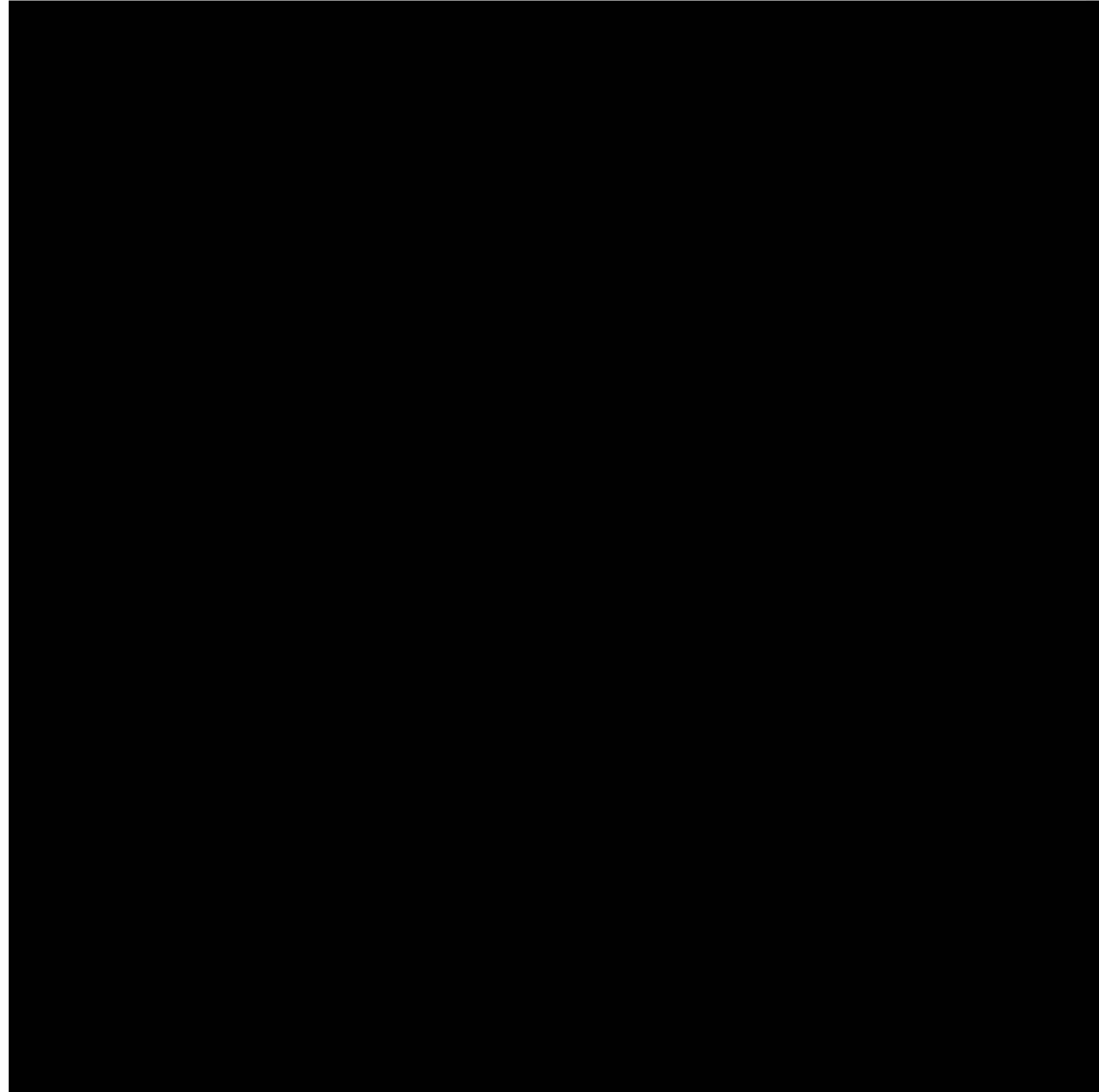
Site Details

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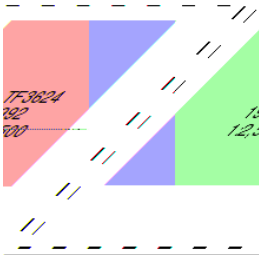
Additional SIMs

Published 1992

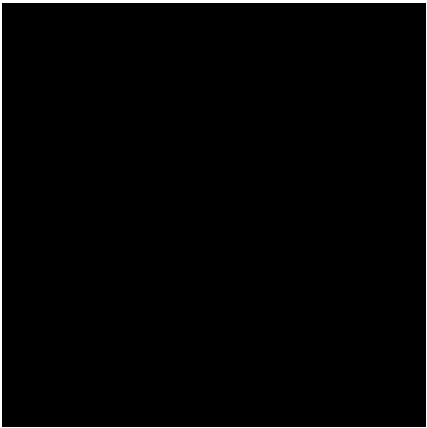
Source map scale - 1:2,500

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 A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

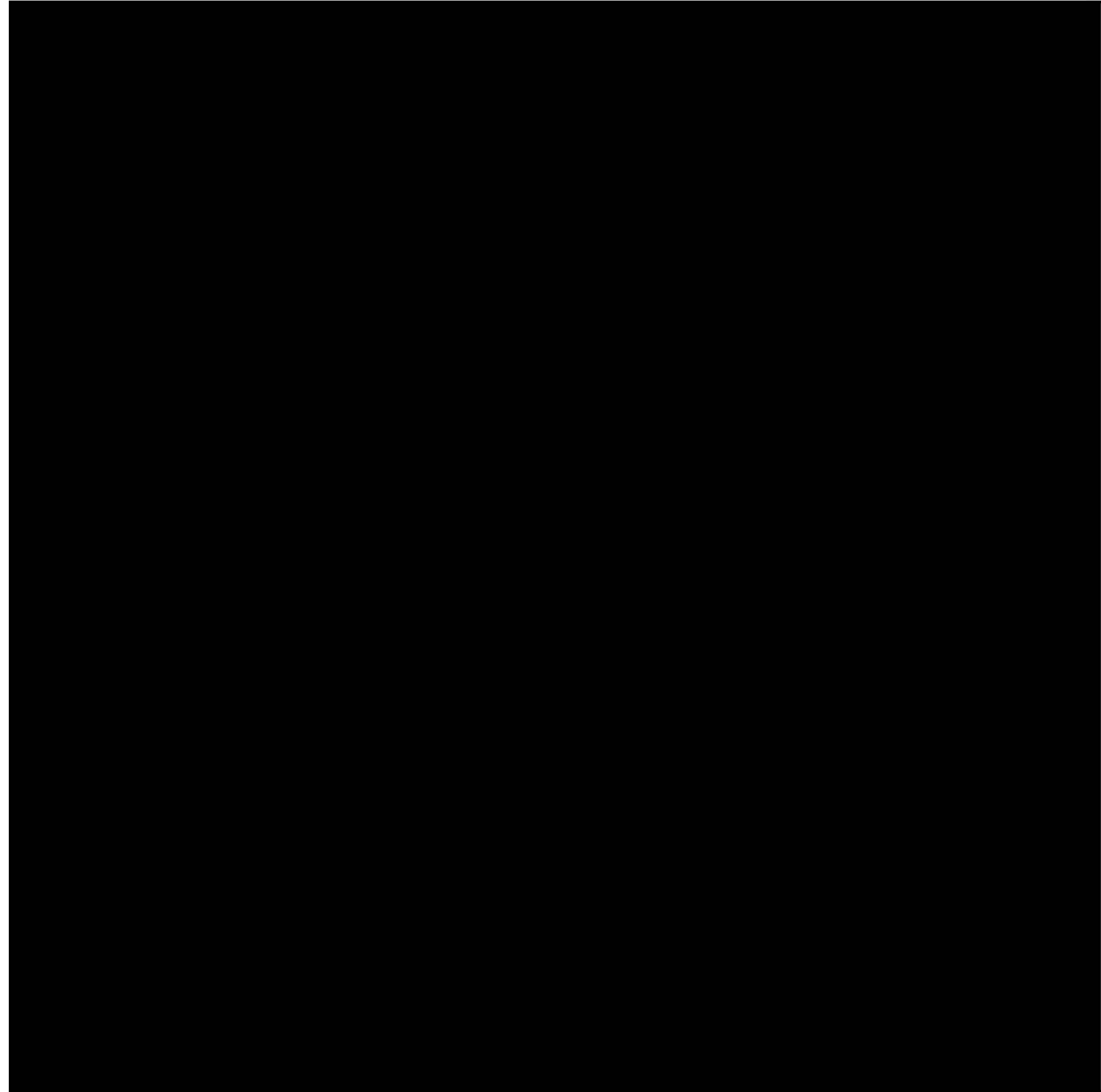
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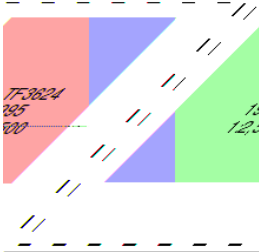
Large-Scale National Grid Data

Published 1995

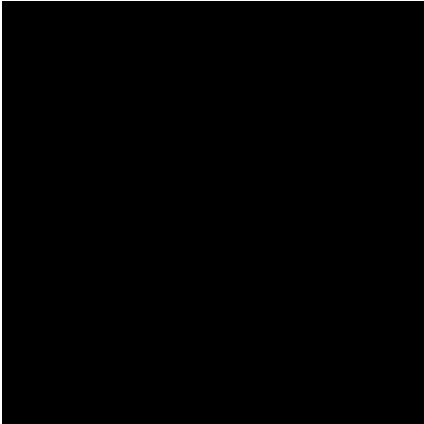
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

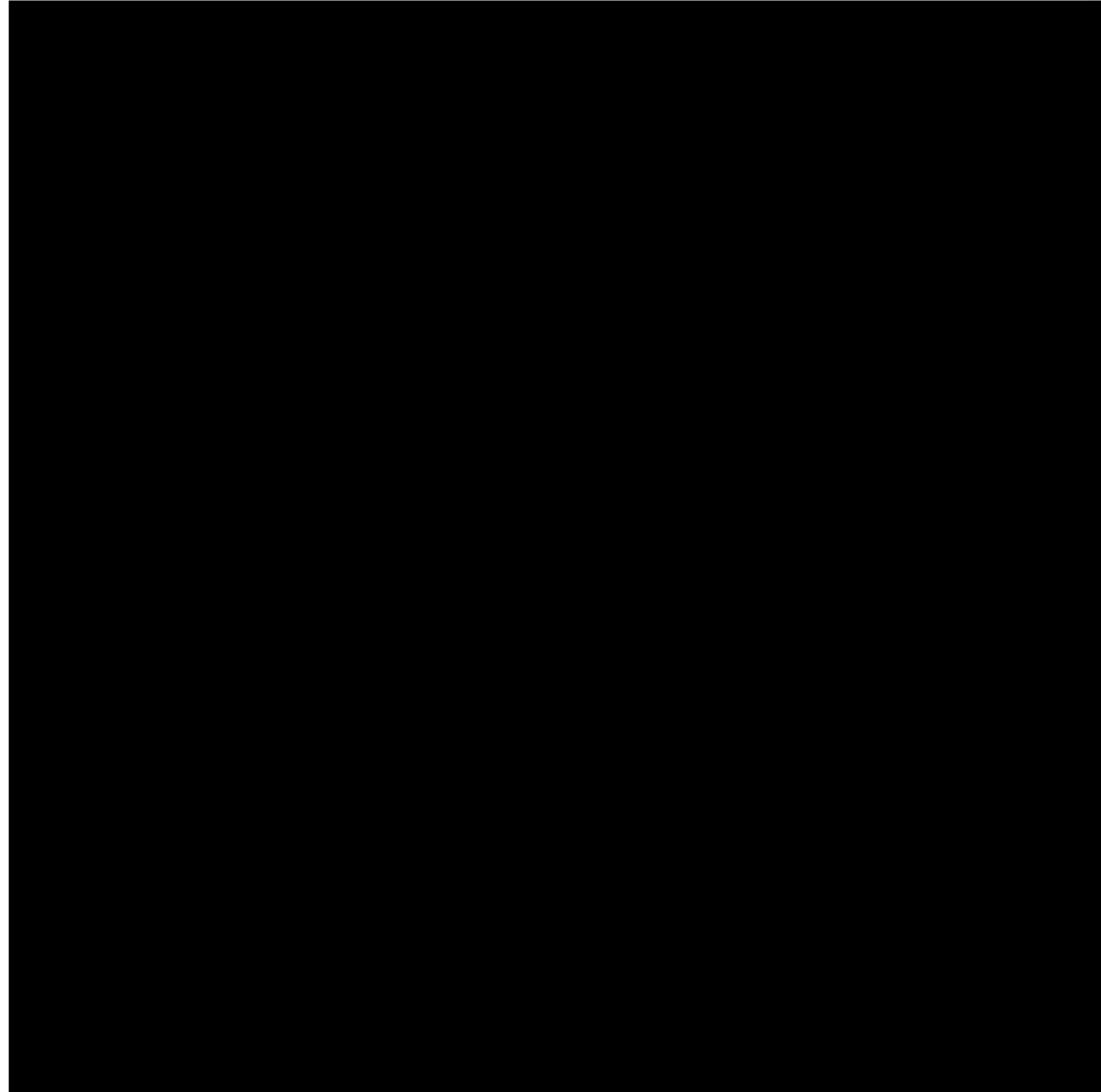
Site Details

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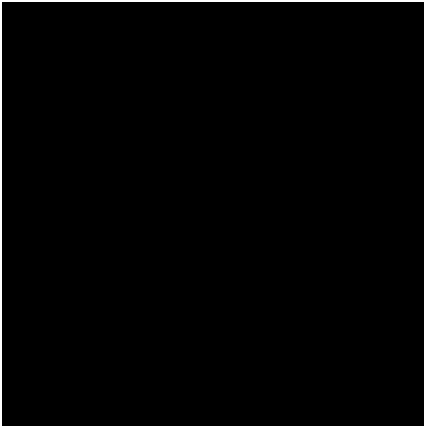


Historical Aerial Photography

Published 1999

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

Historical Aerial Photography - Segment A10



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

Site Details

Damgate, Holbeach

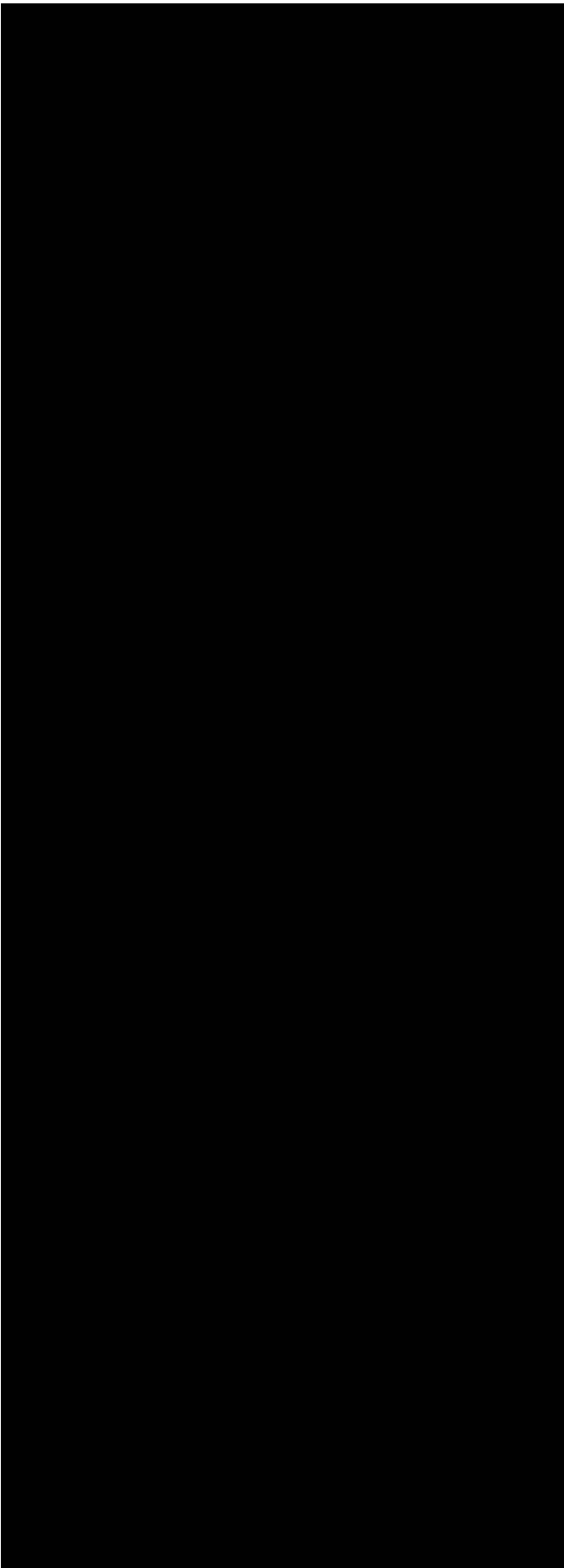


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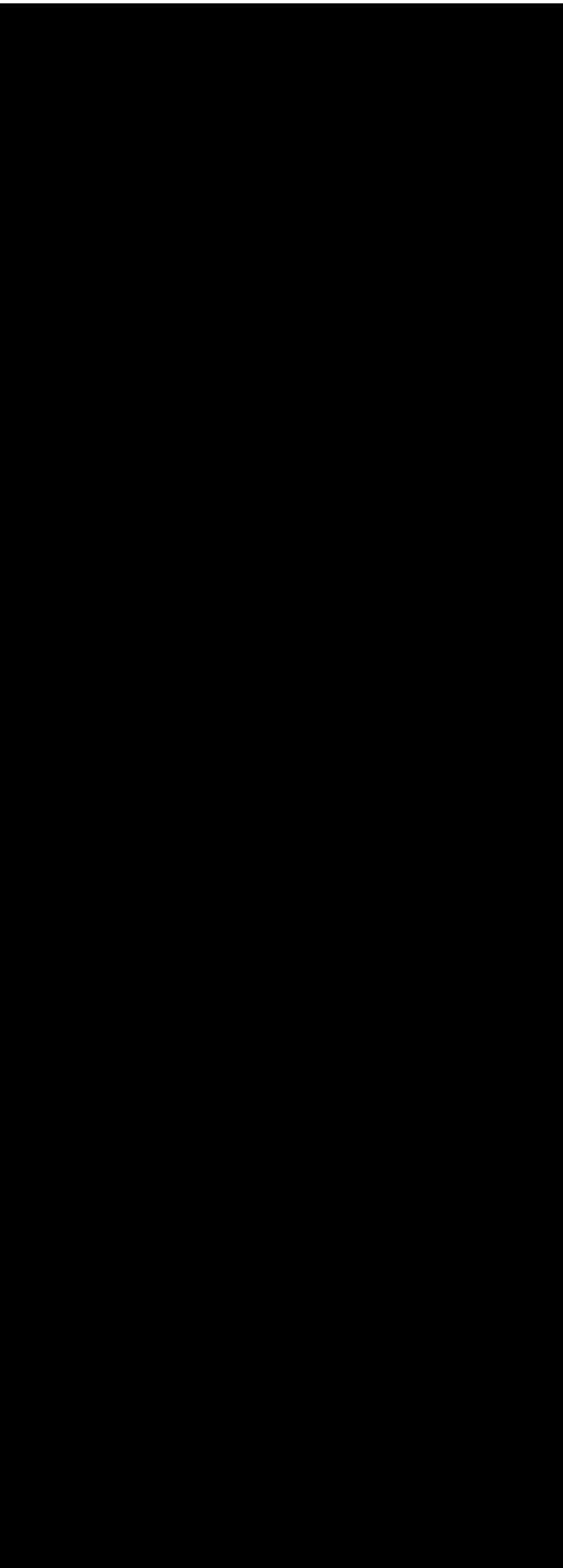
A Landmark Information Group Service v50.0 02-Sep-2019 Page 12 of 12

Historical Mapping Legends

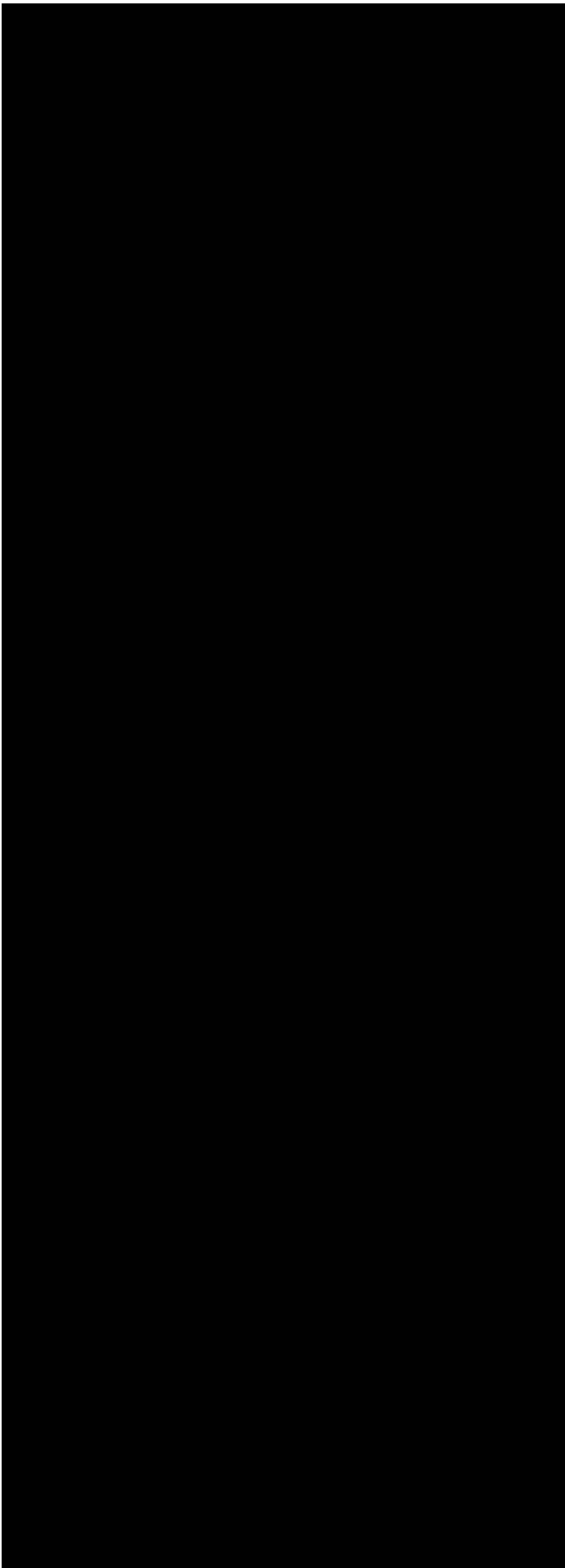
Ordnance Survey County Series and
Ordnance Survey Plan 1:2,500



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



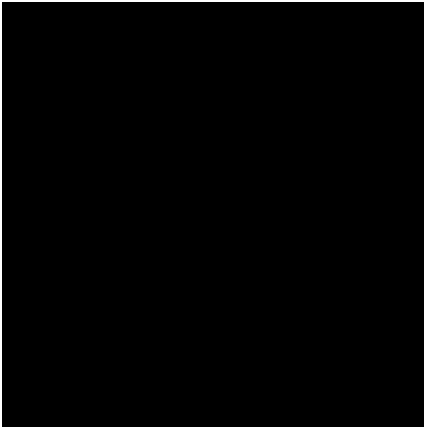
Large-Scale National Grid Data 1:2,500 and
1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lincolnshire	1:2,500	1888	2
Lincolnshire	1:2,500	1904	3
Lincolnshire	1:2,500	1931	4
Ordnance Survey Plan	1:2,500	1969	5
Additional SIMs	1:2,500	1977 - 1981	6
Additional SIMs	1:2,500	1983 - 1991	7
Additional SIMs	1:2,500	1984	8
Additional SIMs	1:2,500	1986	9
Additional SIMs	1:2,500	1992	10
Large-Scale National Grid Data	1:2,500	1995	11
Historical Aerial Photography	1:2,500	1999	12

Historical Map - Segment A11



Order Details

Order Number: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

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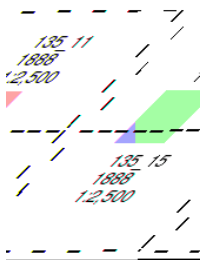
Lincolnshire

Published 1888

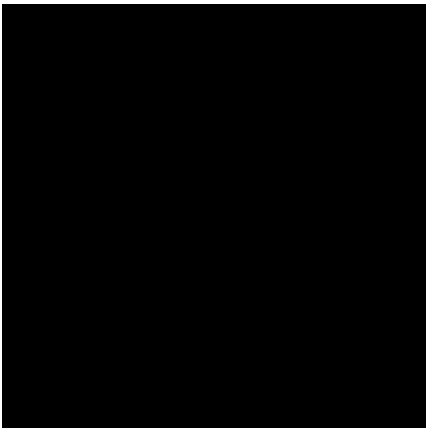
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

Order Number: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

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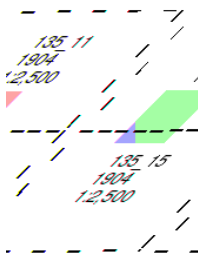
Lincolnshire

Published 1904

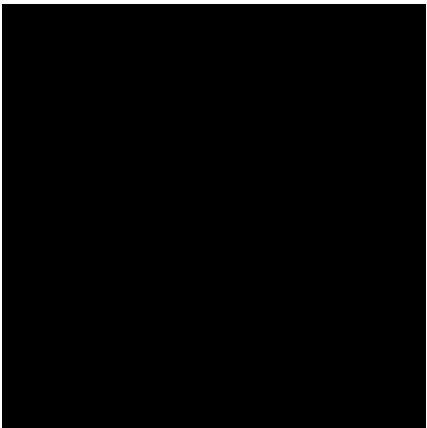
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

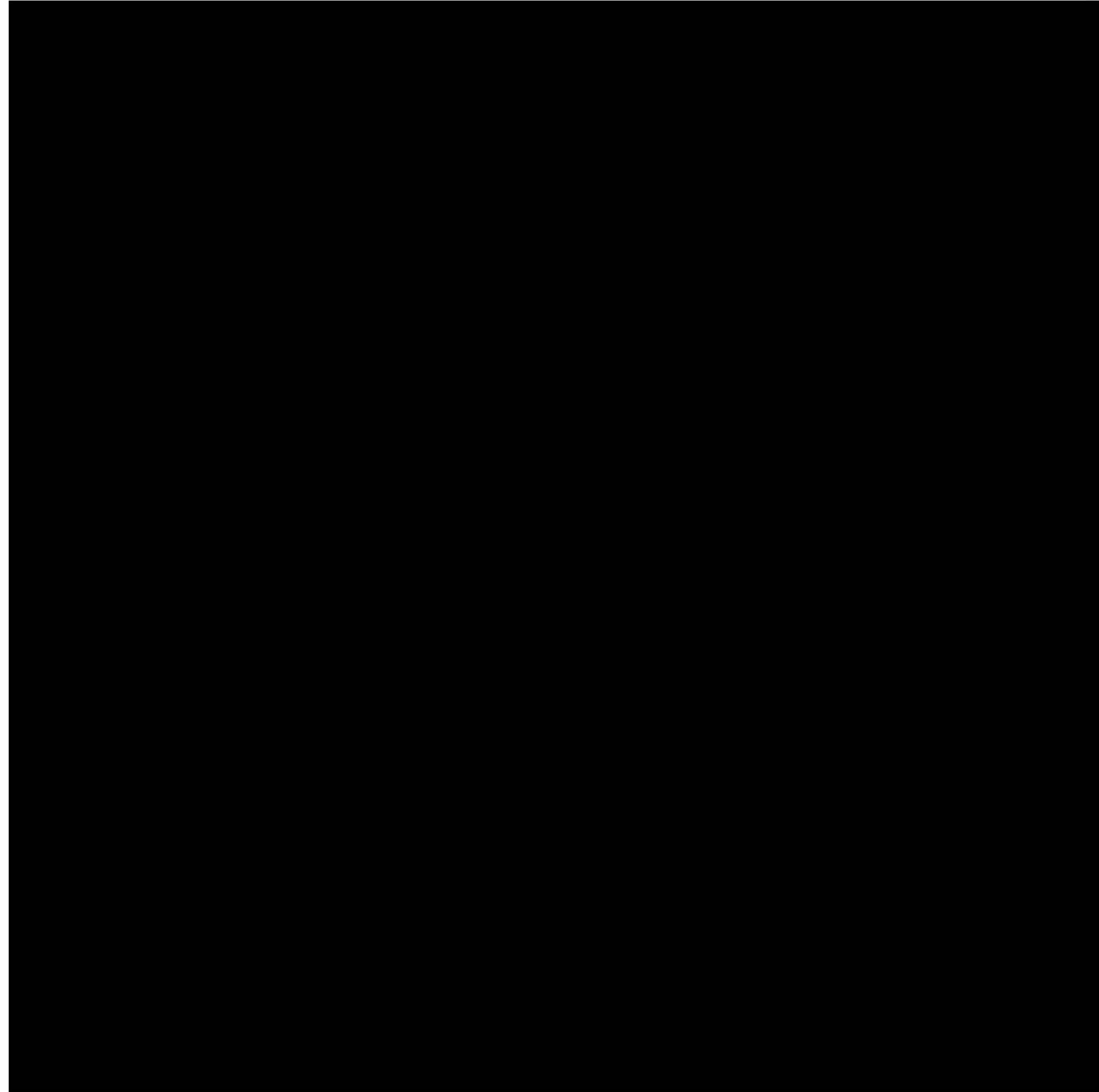
Order Number: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

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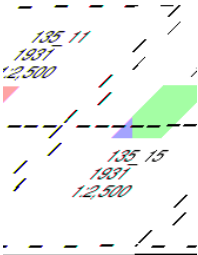
Lincolnshire

Published 1931

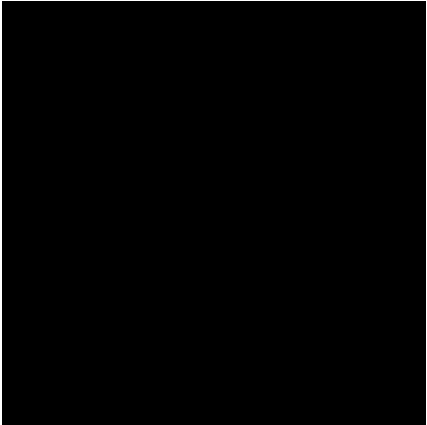
Source map scale - 1:2,500

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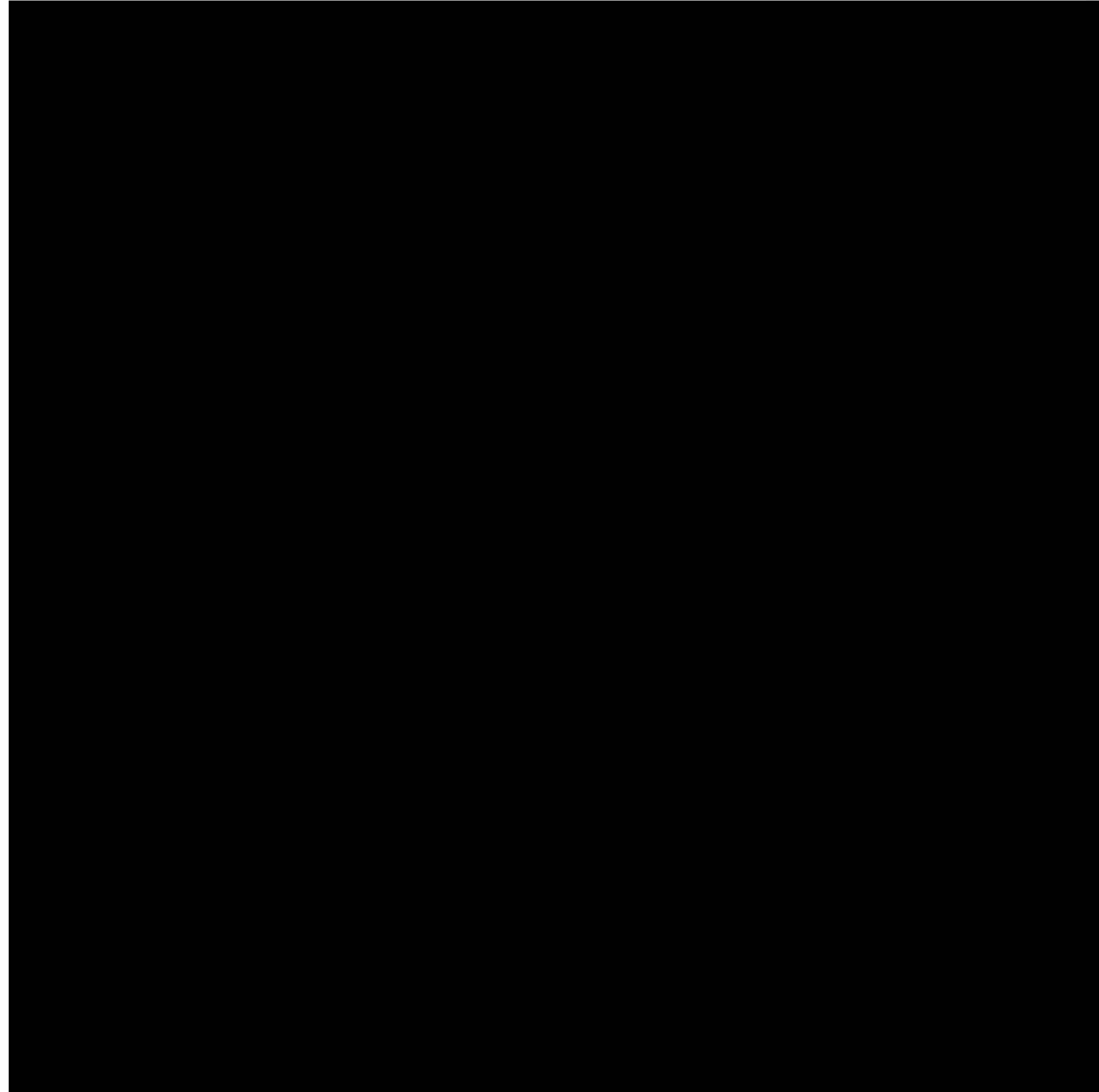
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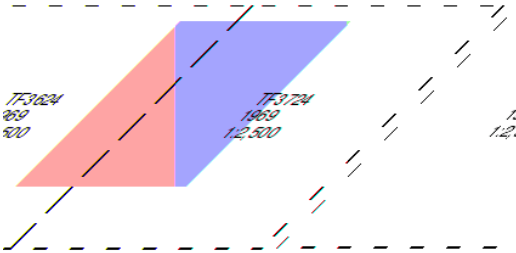
Ordnance Survey Plan

Published 1969

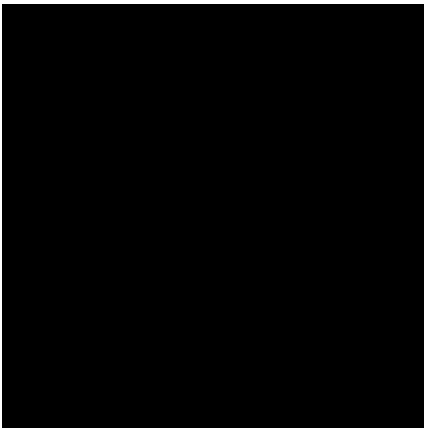
Source map scale - 1:2,500

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.

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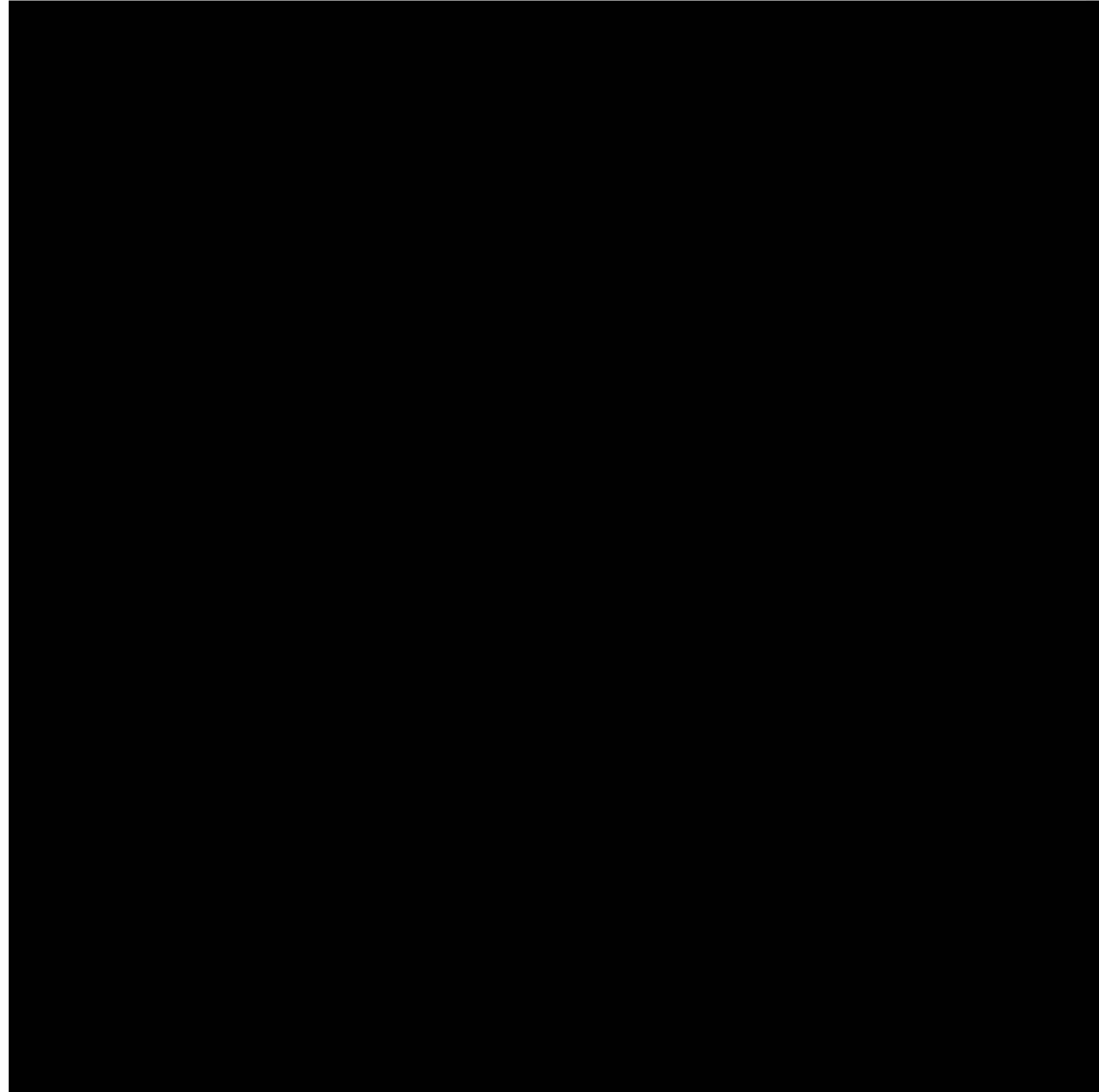
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A Landmark Information Group Service v50.0 02-Sep-2019 Page 5 of 12



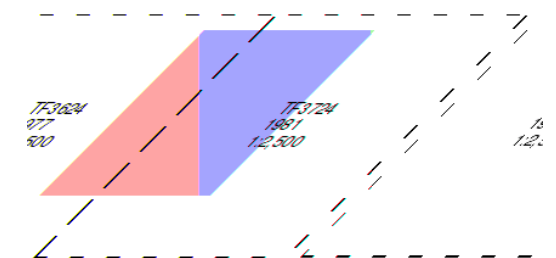
Additional SIMs

Published 1977 - 1981

Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details

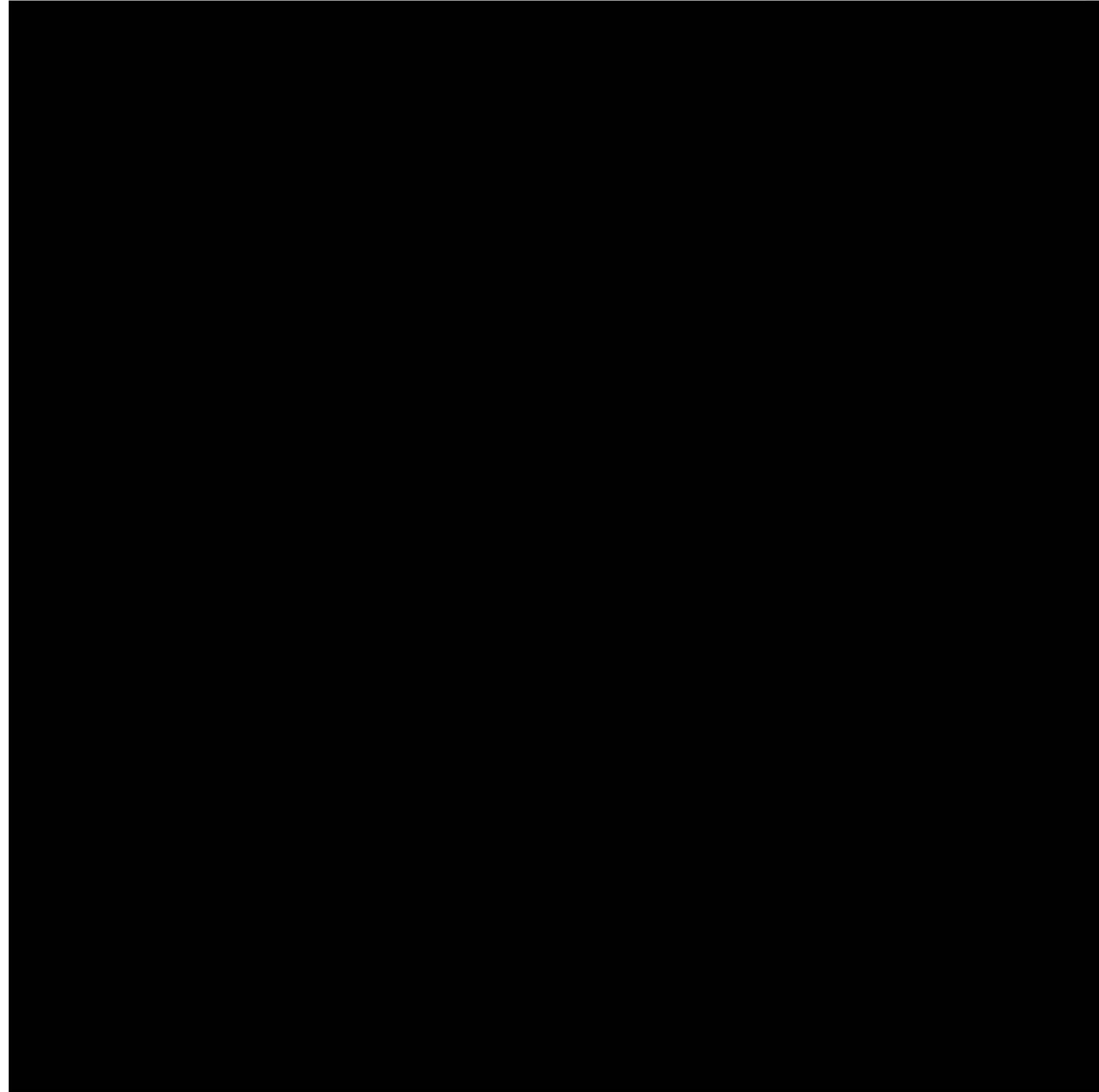
Order Number: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

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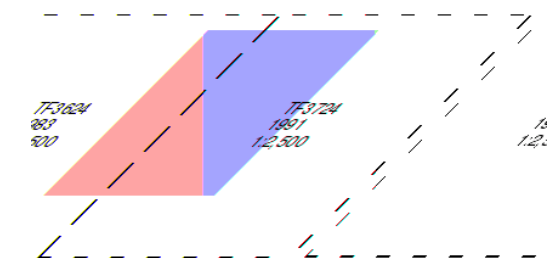
Additional SIMs

Published 1983 - 1991

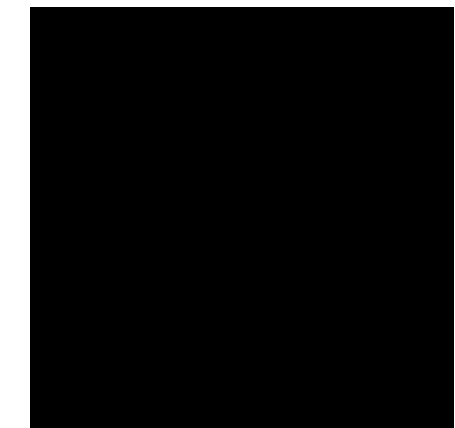
Source map scale - 1:2,500

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 A11



Order Details

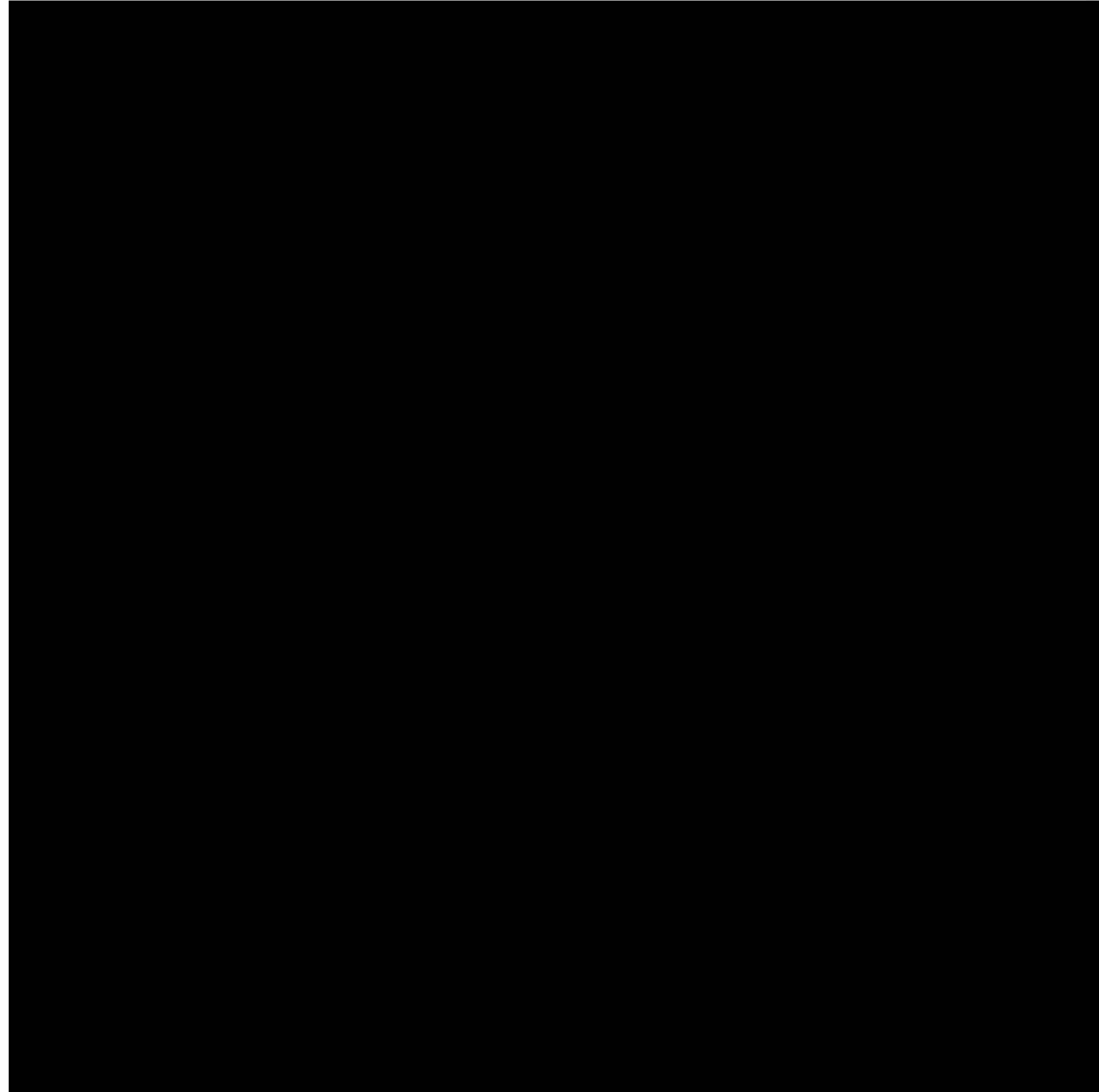
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Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100

Site Details

Damgate, Holbeach



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



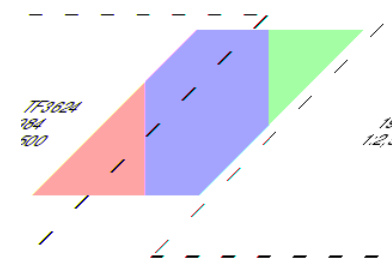
Additional SIMs

Published 1984

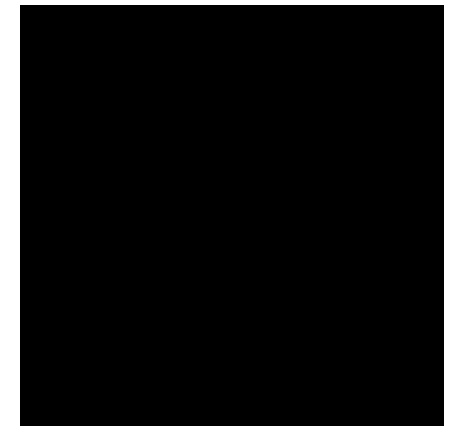
Source map scale - 1:2,500

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 A11



Order Details

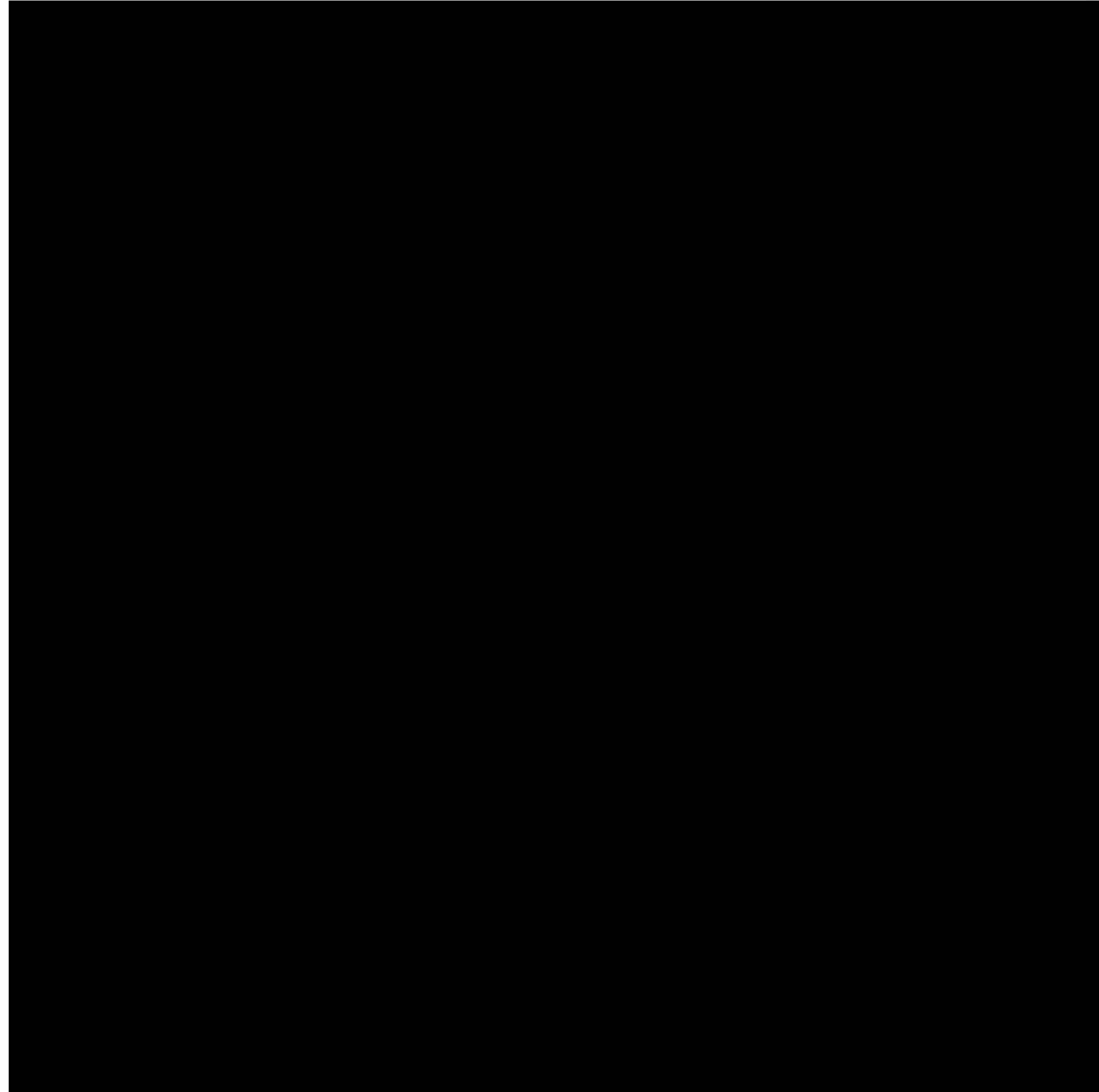
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National Grid Reference: 536750, 324550
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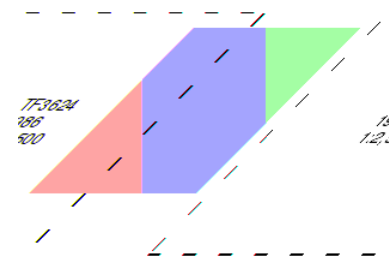
Additional SIMs

Published 1986

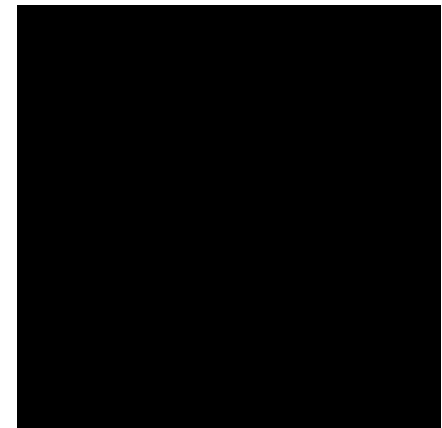
Source map scale - 1:2,500

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 A11



Order Details

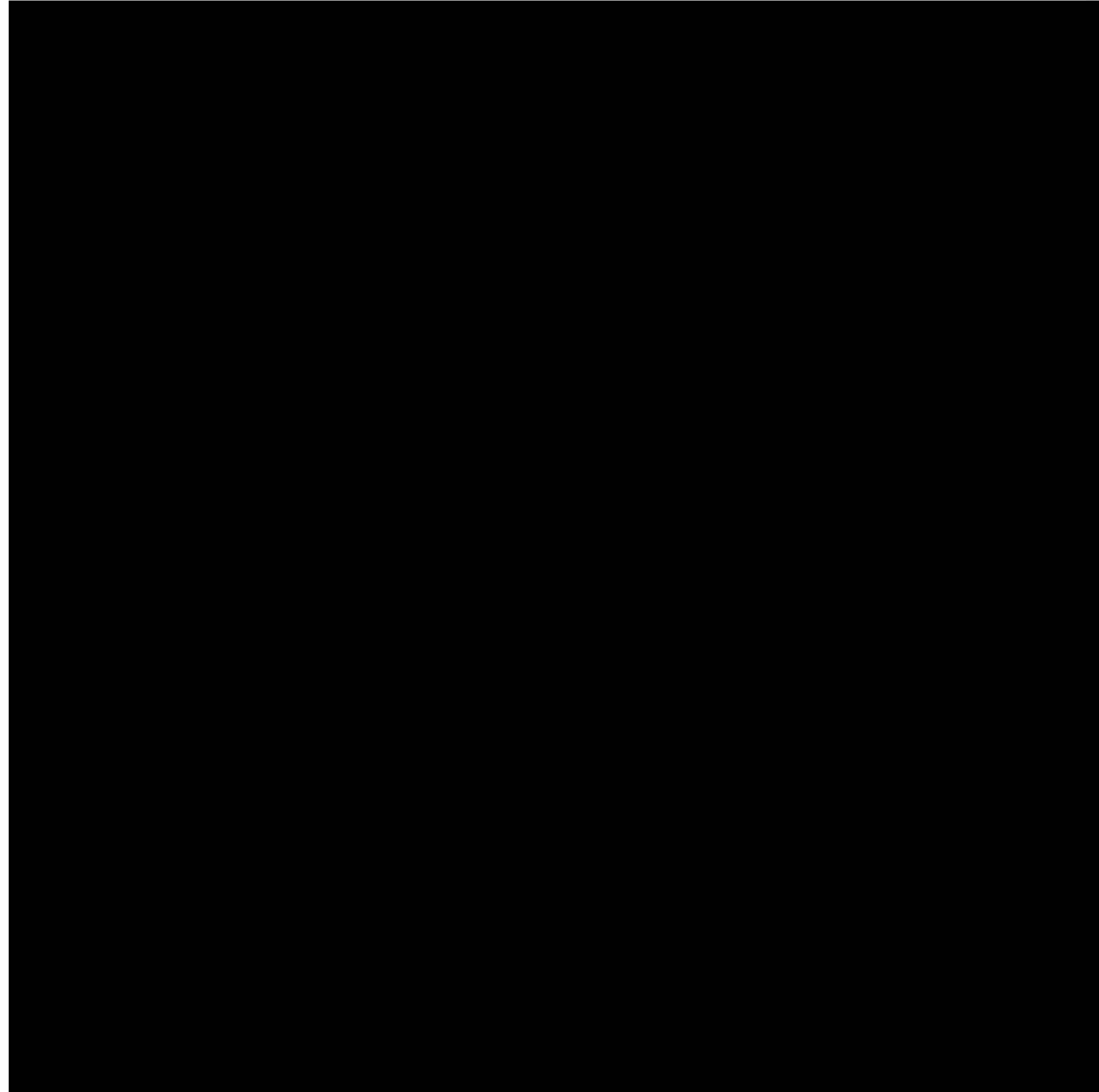
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Customer Ref: D38108
National Grid Reference: 536750, 324550
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Site Area (Ha): 8.37
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Site Details

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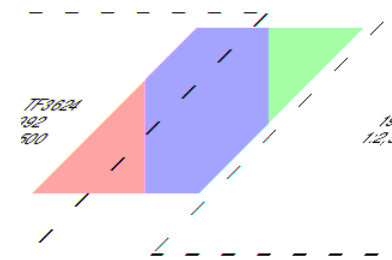
Additional SIMs

Published 1992

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 A11



Order Details

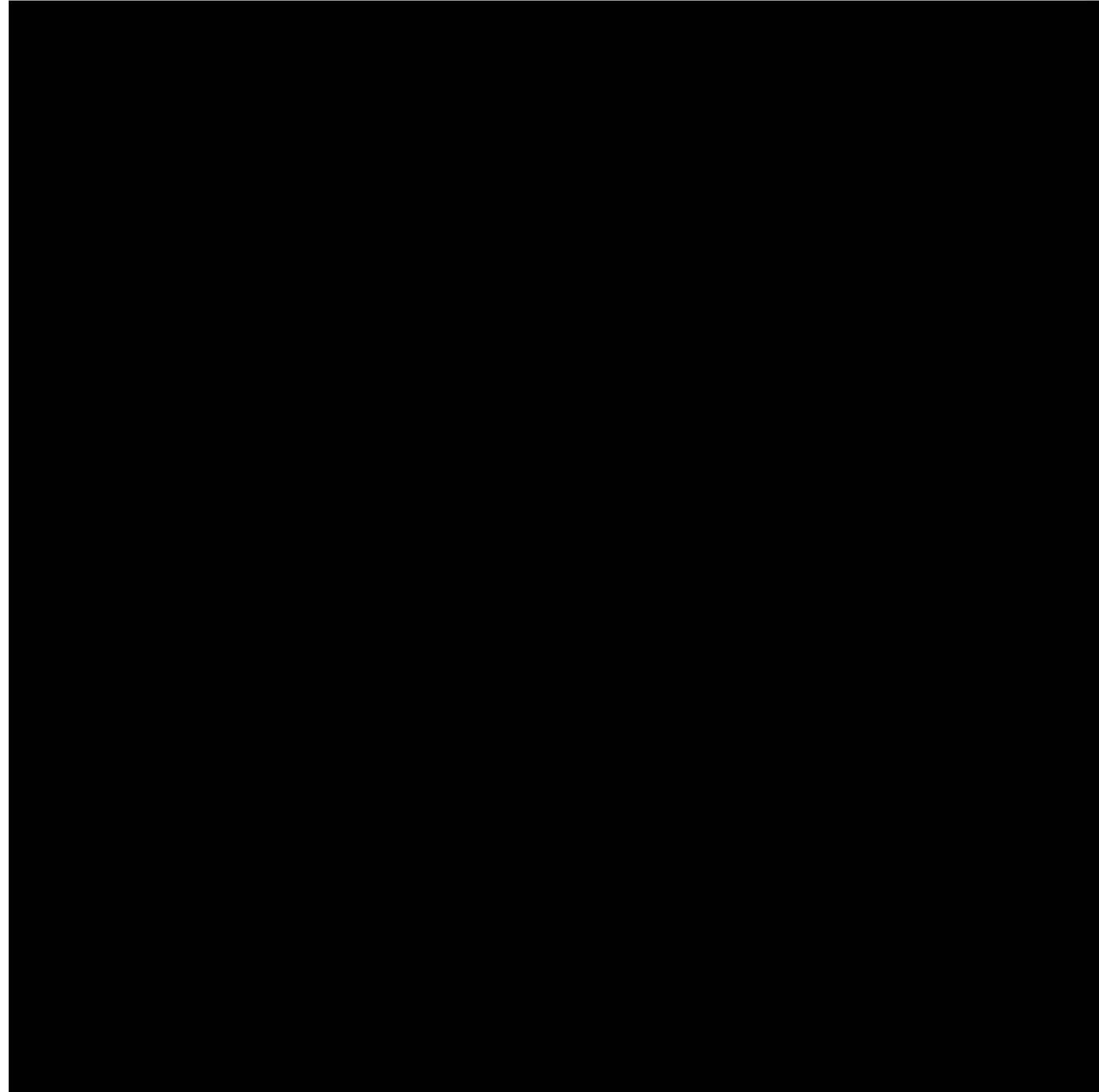
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Site Details

Damgate, Holbeach



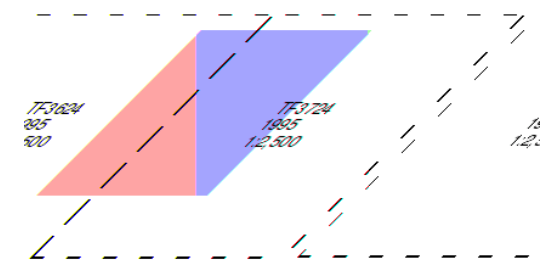
Tel: 0844 844 9952
Fax: 0844 844 9951
Web: www.envirocheck.co.uk



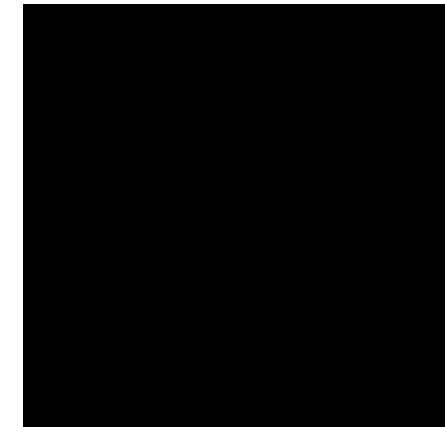
GeoDyne
Large-Scale National Grid Data
Published 1995
Source map scale - 1:2,500

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

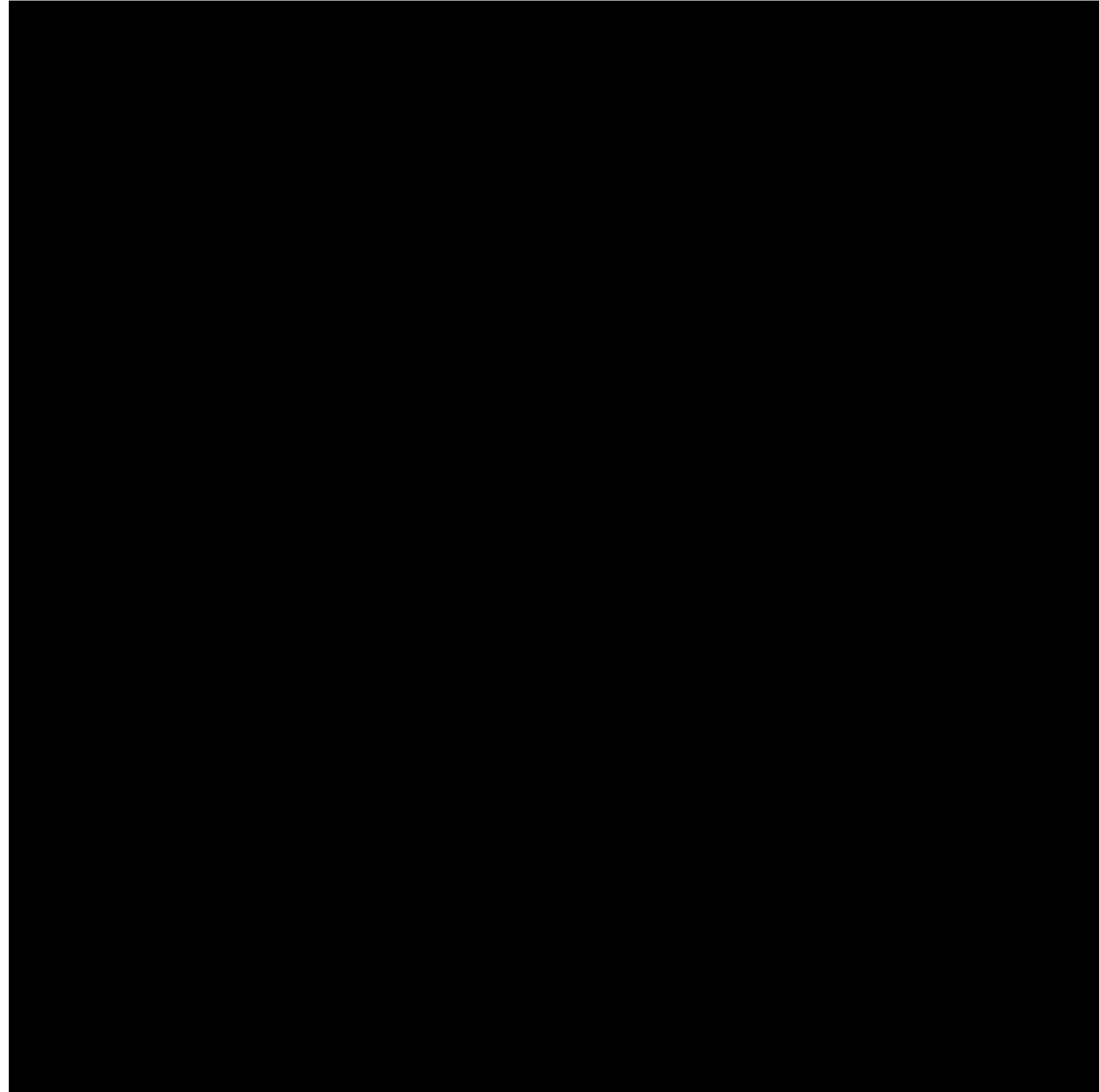
Map Name(s) and Date(s)



Historical Map - Segment A11



Order Details
Order Number: 216516353_1_1
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Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 100
Site Details
Damgate, Holbeach





Historical Aerial Photography

Published 1999

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

Historical Aerial Photography - Segment A11



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	100

Site Details

Damgate, Holbeach

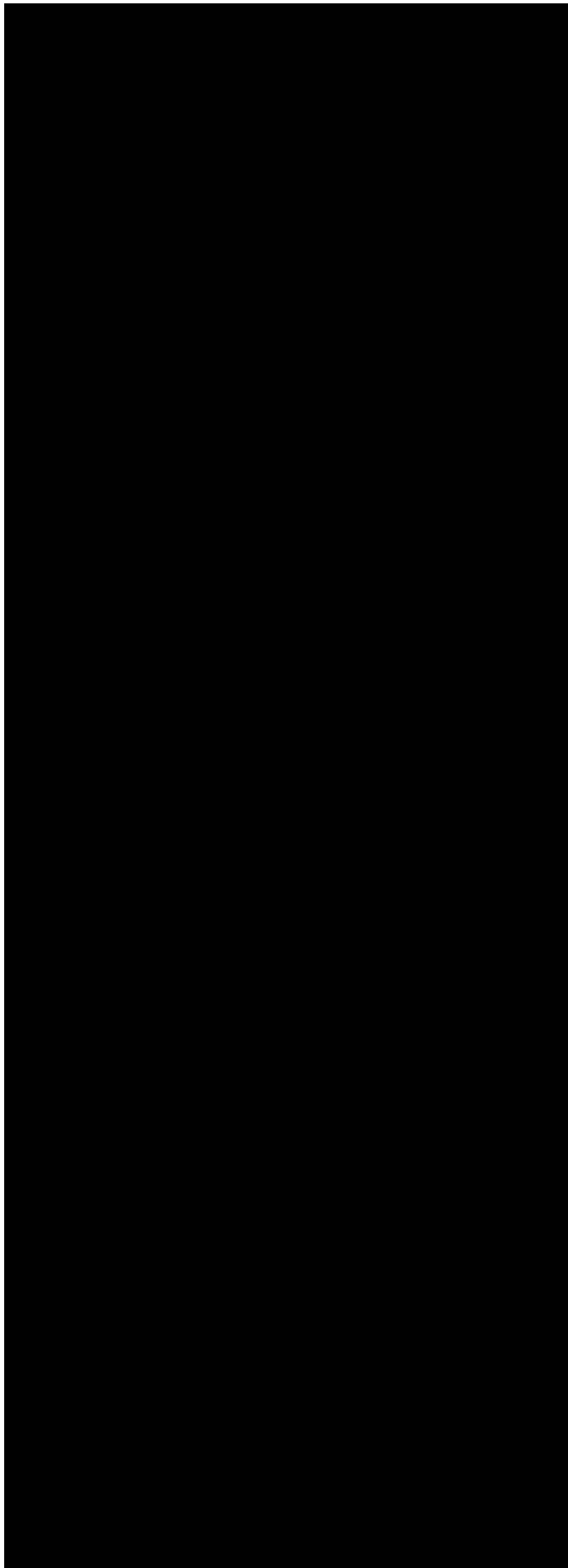


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Web: www.envirocheck.co.uk

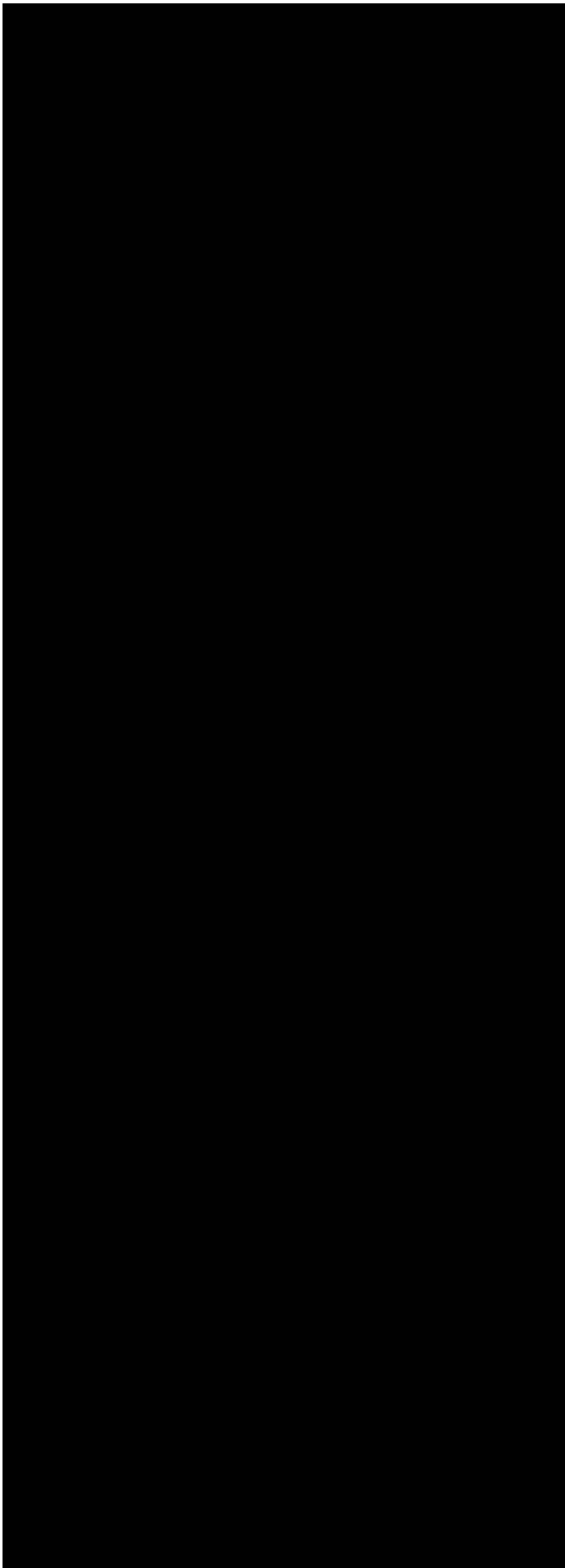
A Landmark Information Group Service v50.0 02-Sep-2019 Page 12 of 12

Historical Mapping Legends

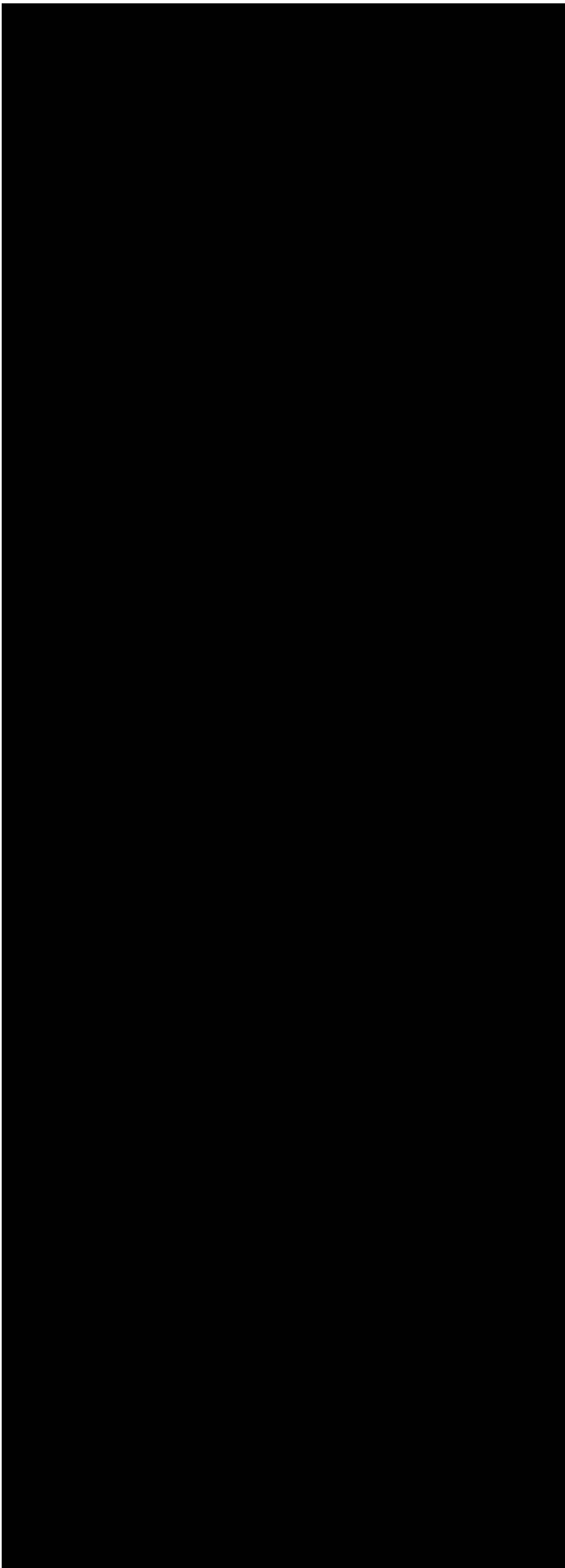
Ordnance Survey County Series 1:10,560



Ordnance Survey Plan 1:10,000



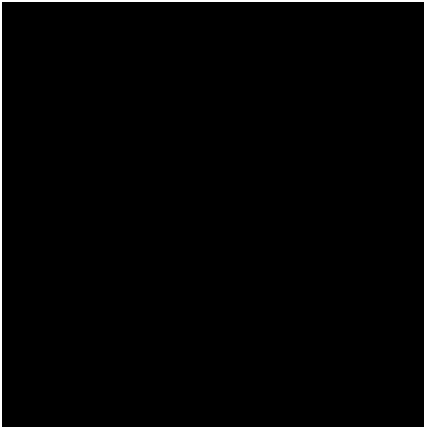
1:10,000 Raster Mapping



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
Lincolnshire	1:10,560	1887	2
Lincolnshire	1:10,560	1906	3
Lincolnshire	1:10,560	1906	4
Lincolnshire	1:10,560	1932	5
Lincolnshire	1:10,560	1938	6
Lincolnshire	1:10,560	1951 - 1952	7
Ordnance Survey Plan	1:10,000	1956 - 1959	8
Ordnance Survey Plan	1:10,000	1970 - 1977	9
Ordnance Survey Plan	1:10,000	1992	10
10K Raster Mapping	1:10,000	2000	11
10K Raster Mapping	1:10,000	2006	12
VectorMap Local	1:10,000	2019	13

Historical Map - Slice A



Order Details

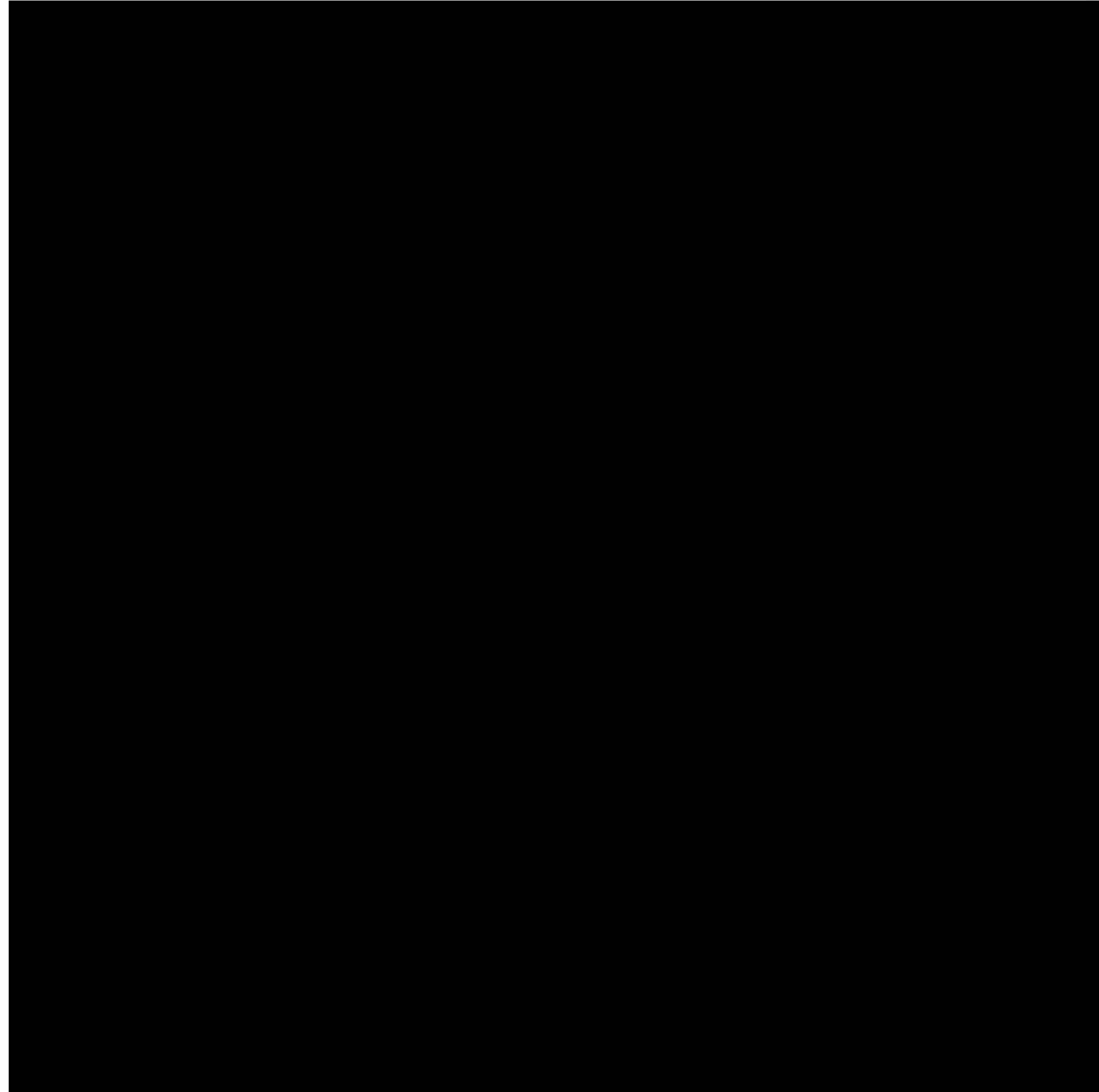
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Customer Ref: D38108
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Site Details

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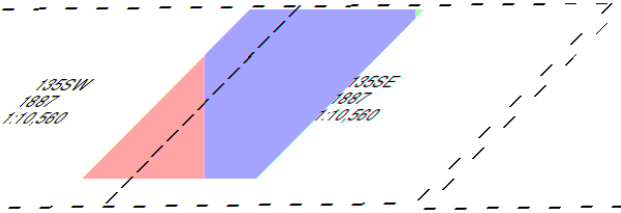
Lincolnshire

Published 1887

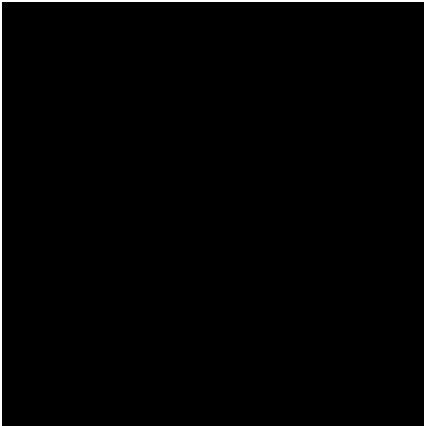
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

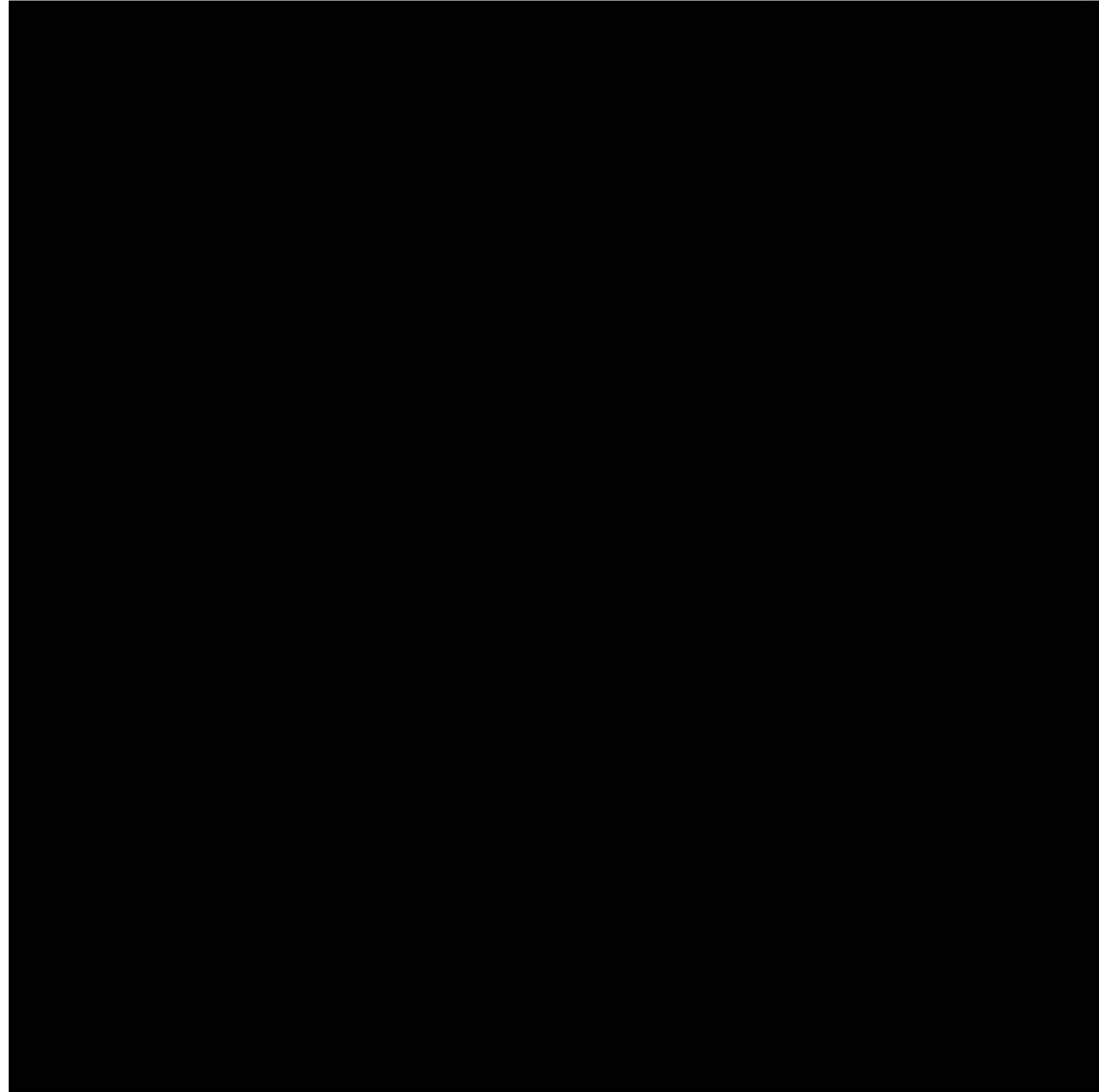
Site Details

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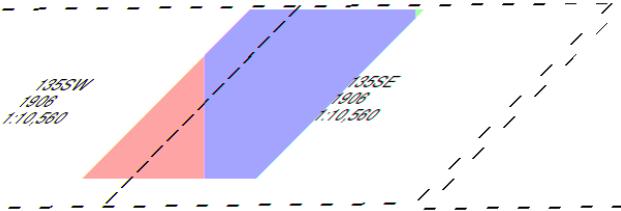
Lincolnshire

Published 1906

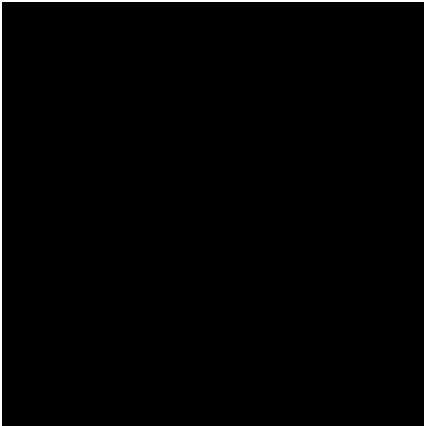
Source map scale - 1:10,560

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



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
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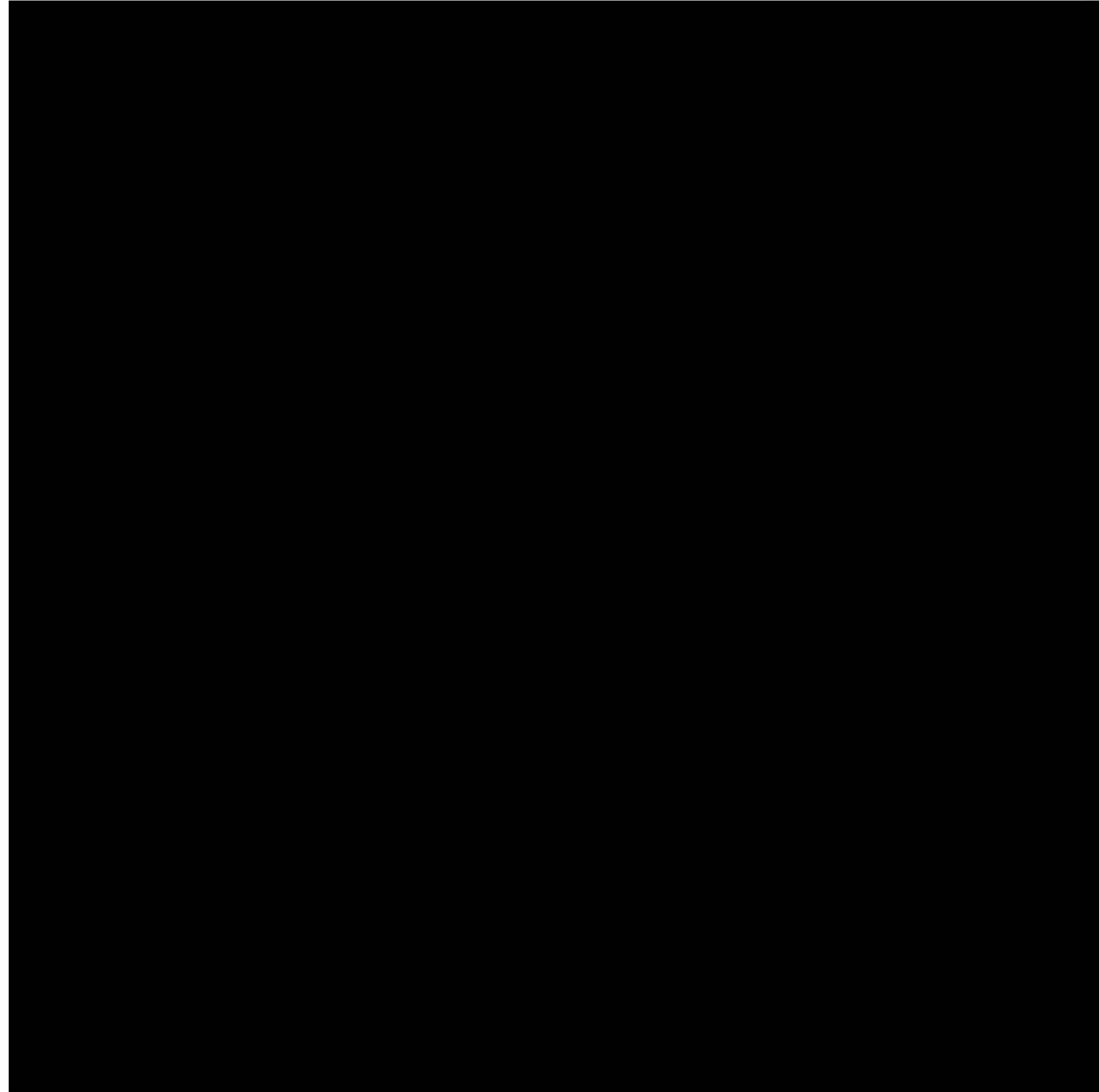
Site Details

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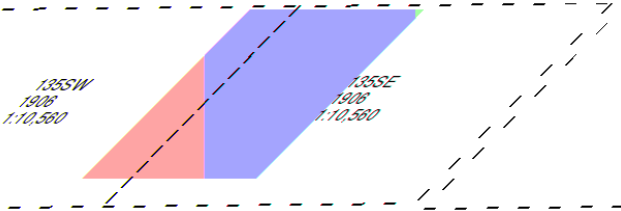
Lincolnshire

Published 1906

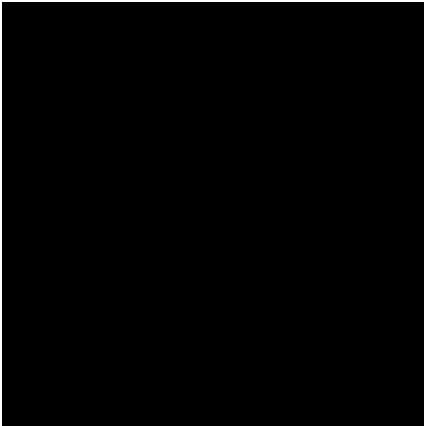
Source map scale - 1:10,560

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



Order Details

Order Number:	216516353_1_1
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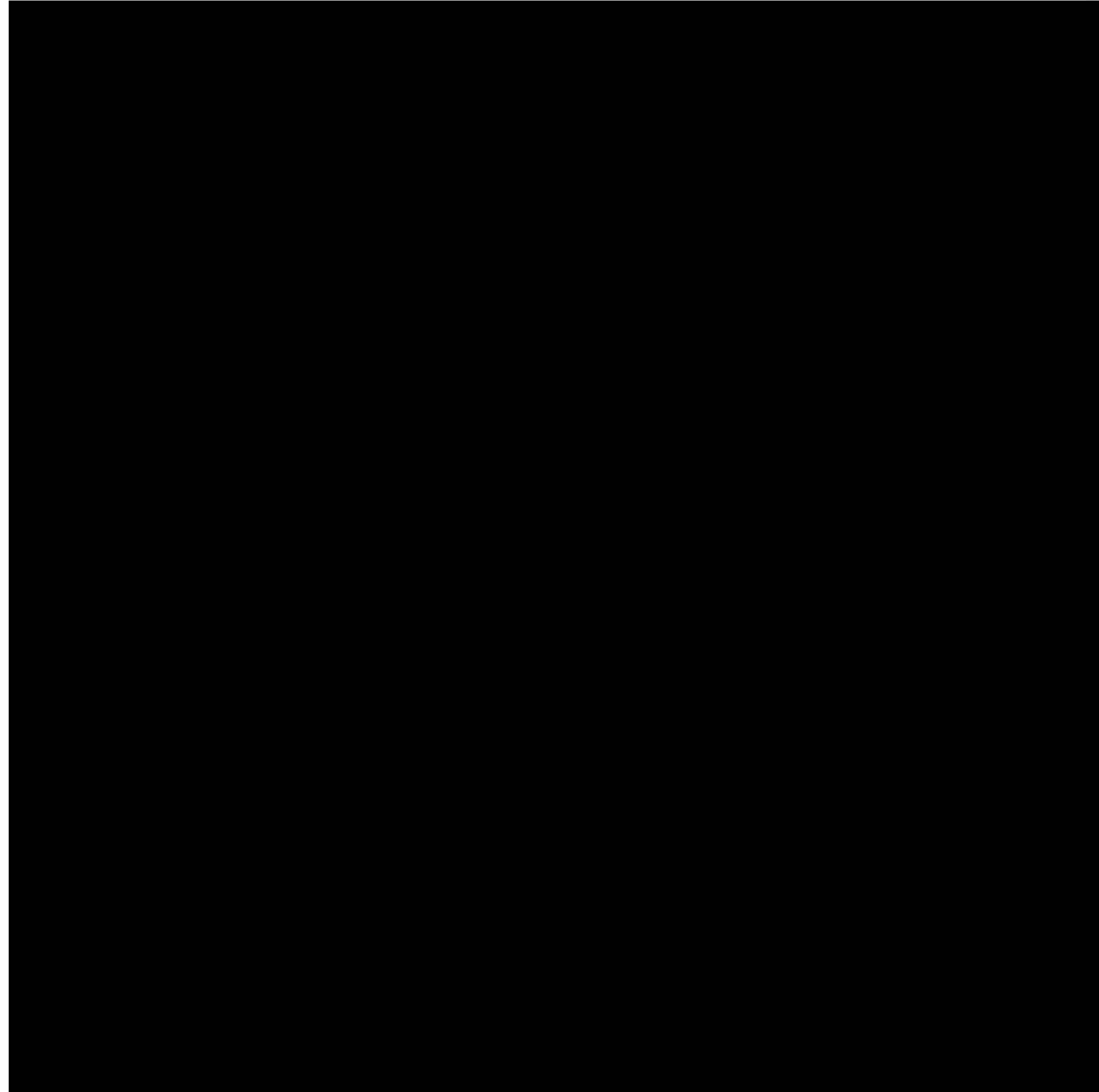
Site Details

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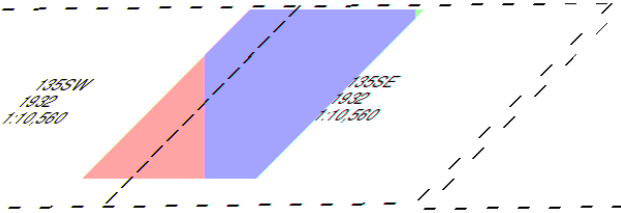
Lincolnshire

Published 1932

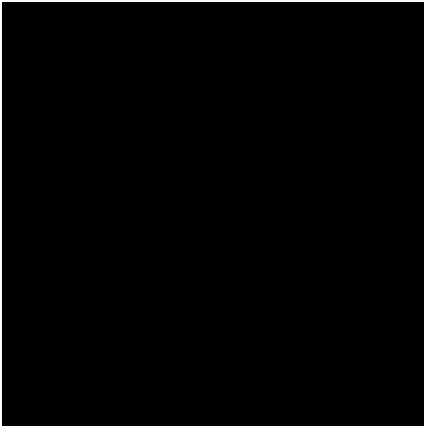
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
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Slice:	A
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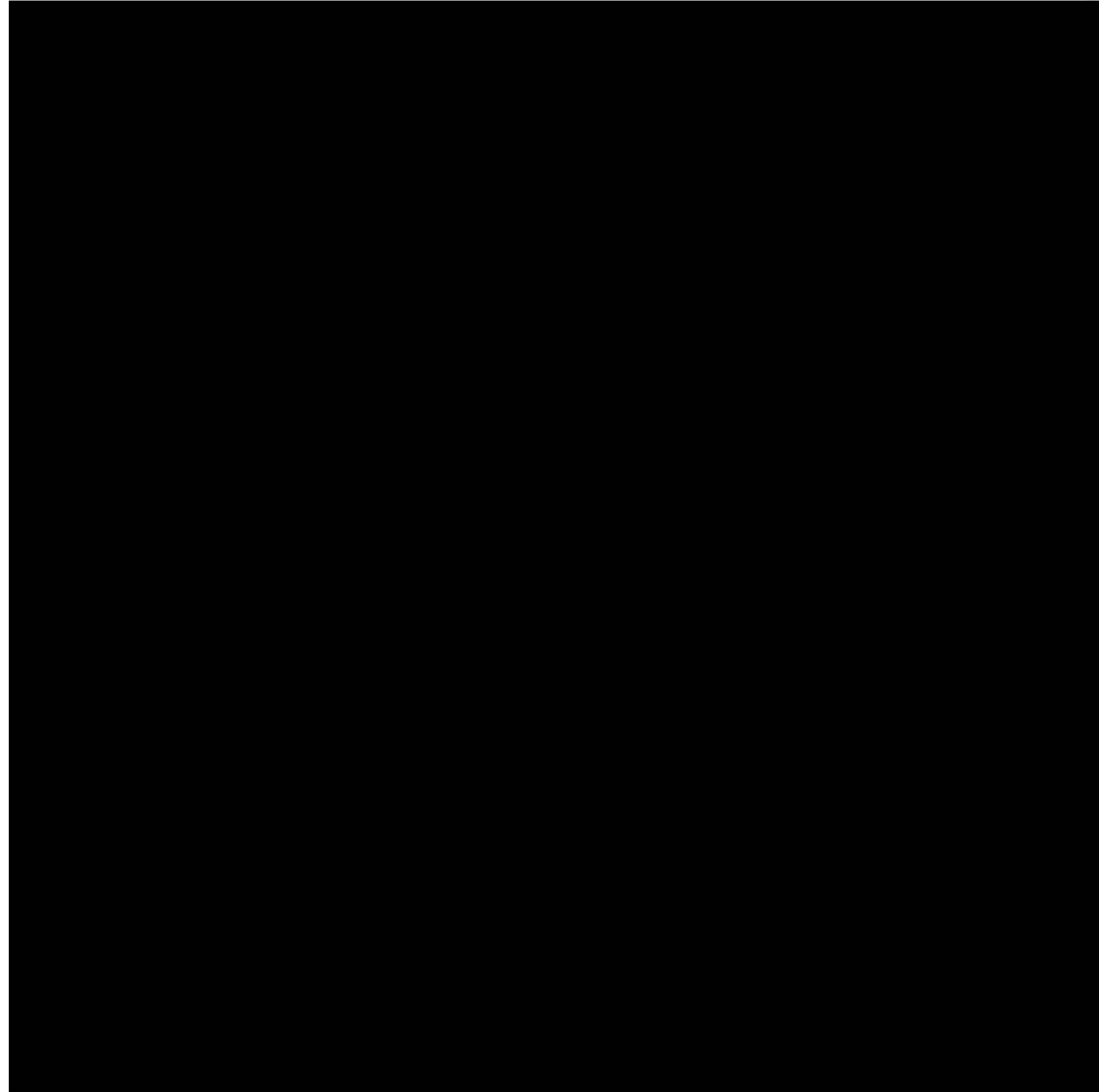
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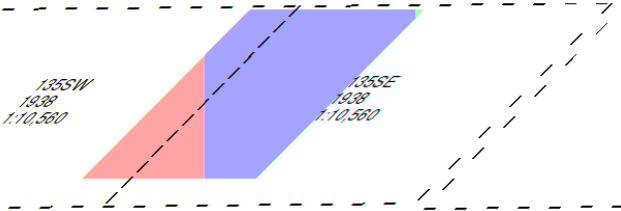
Lincolnshire

Published 1938

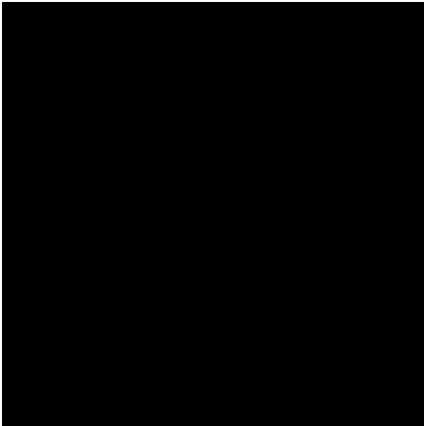
Source map scale - 1:10,560

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



Order Details

Order Number:	216516353_1_1
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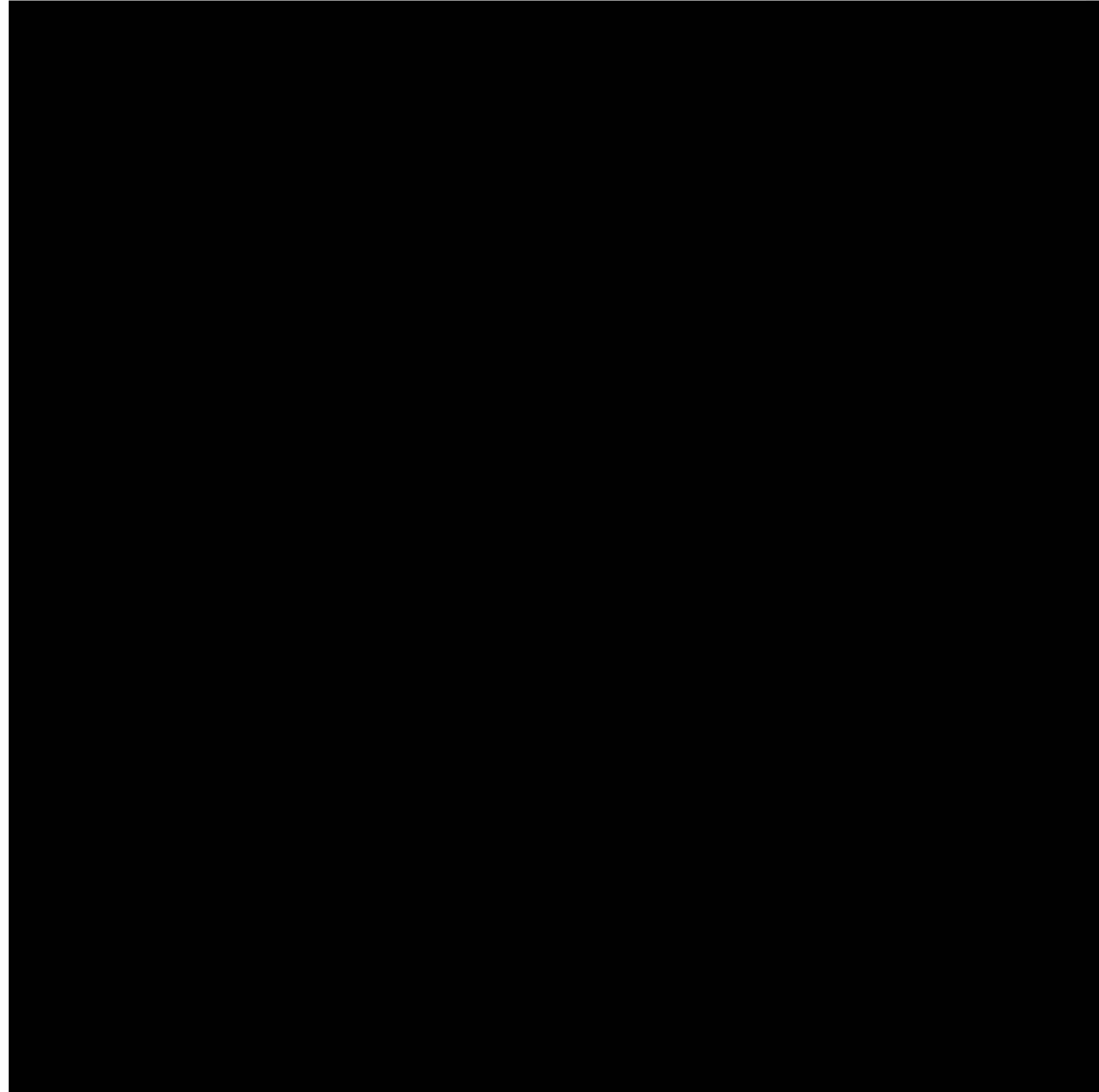
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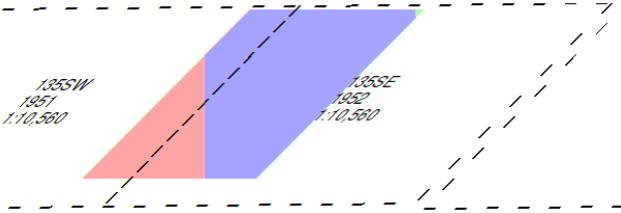
Lincolnshire

Published 1951 - 1952

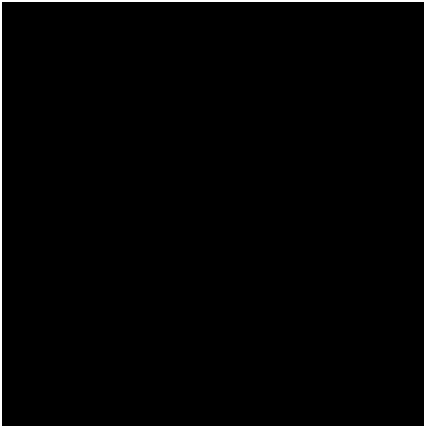
Source map scale - 1:10,560

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



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
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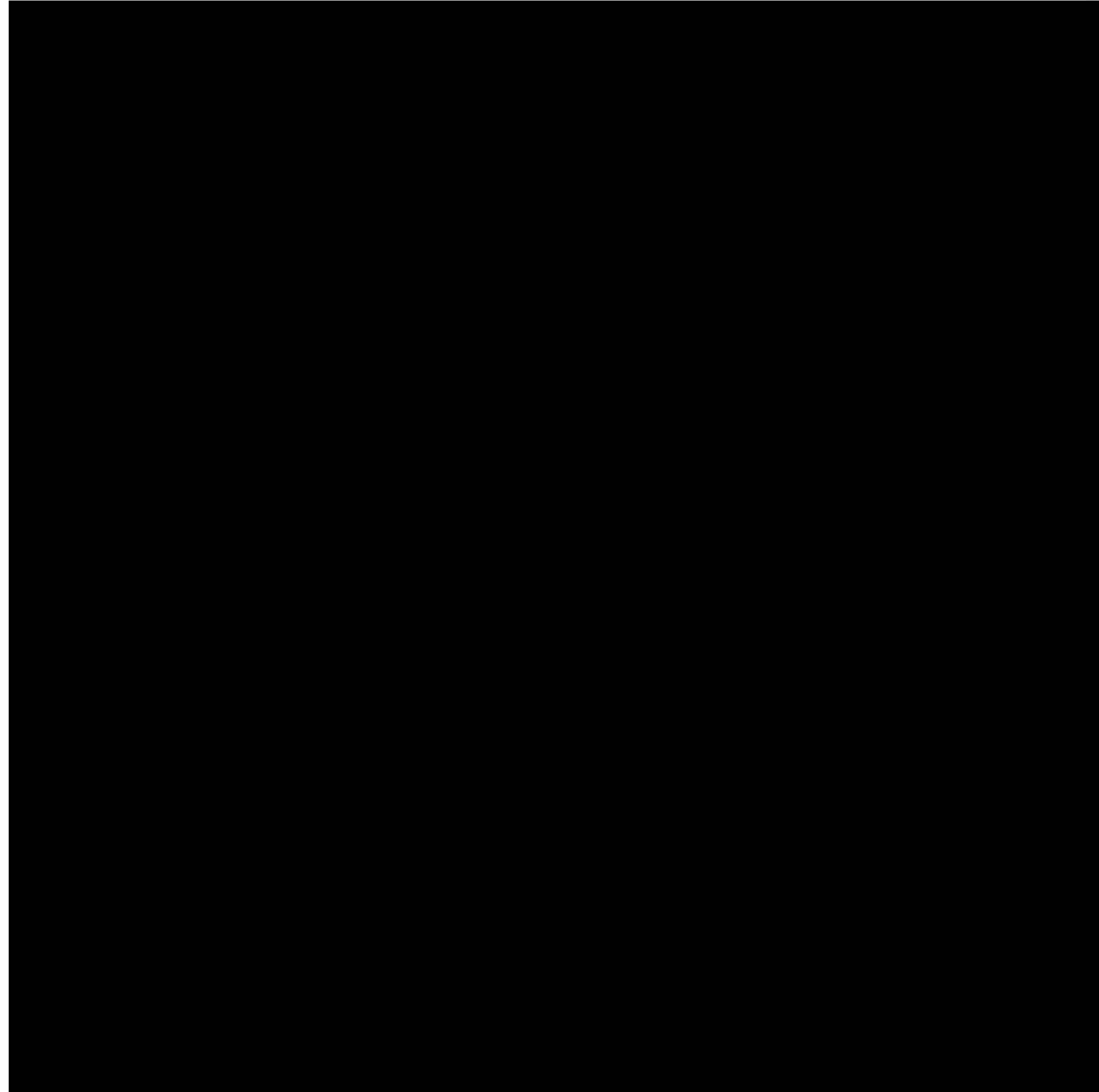
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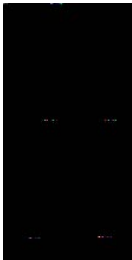
Ordnance Survey Plan

Published 1956 - 1959

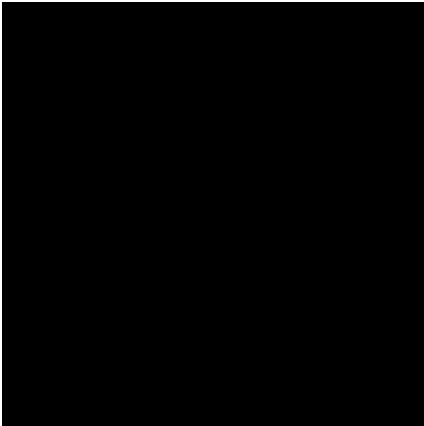
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
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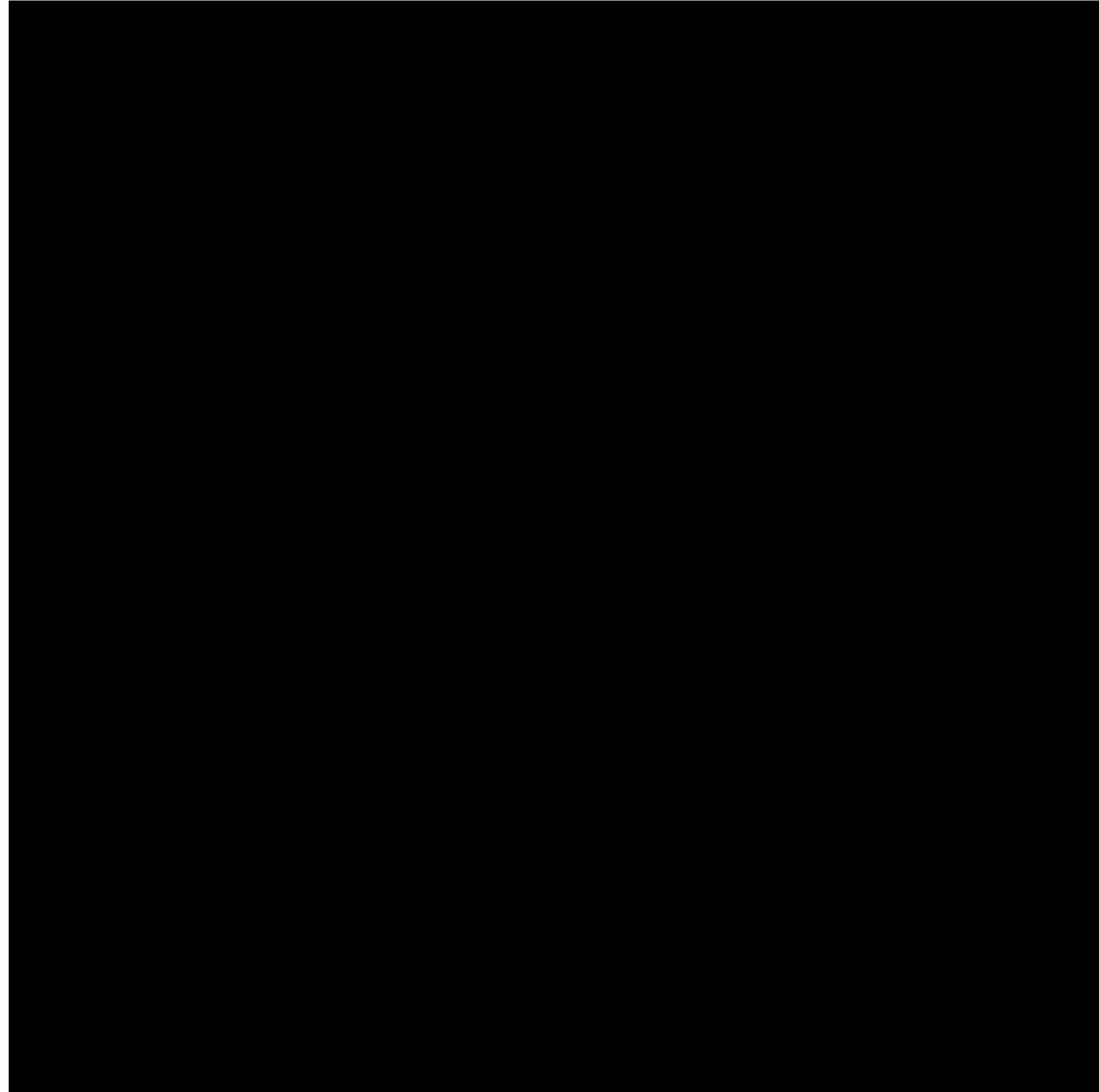
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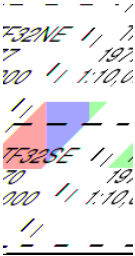
Ordnance Survey Plan

Published 1970 - 1977

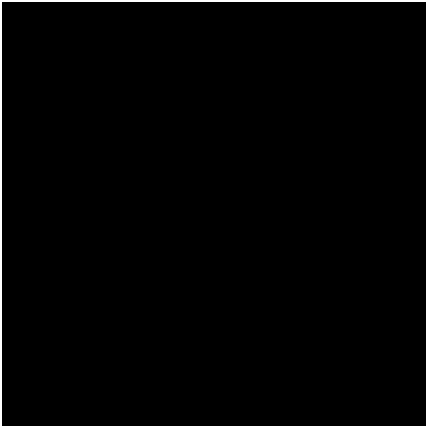
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
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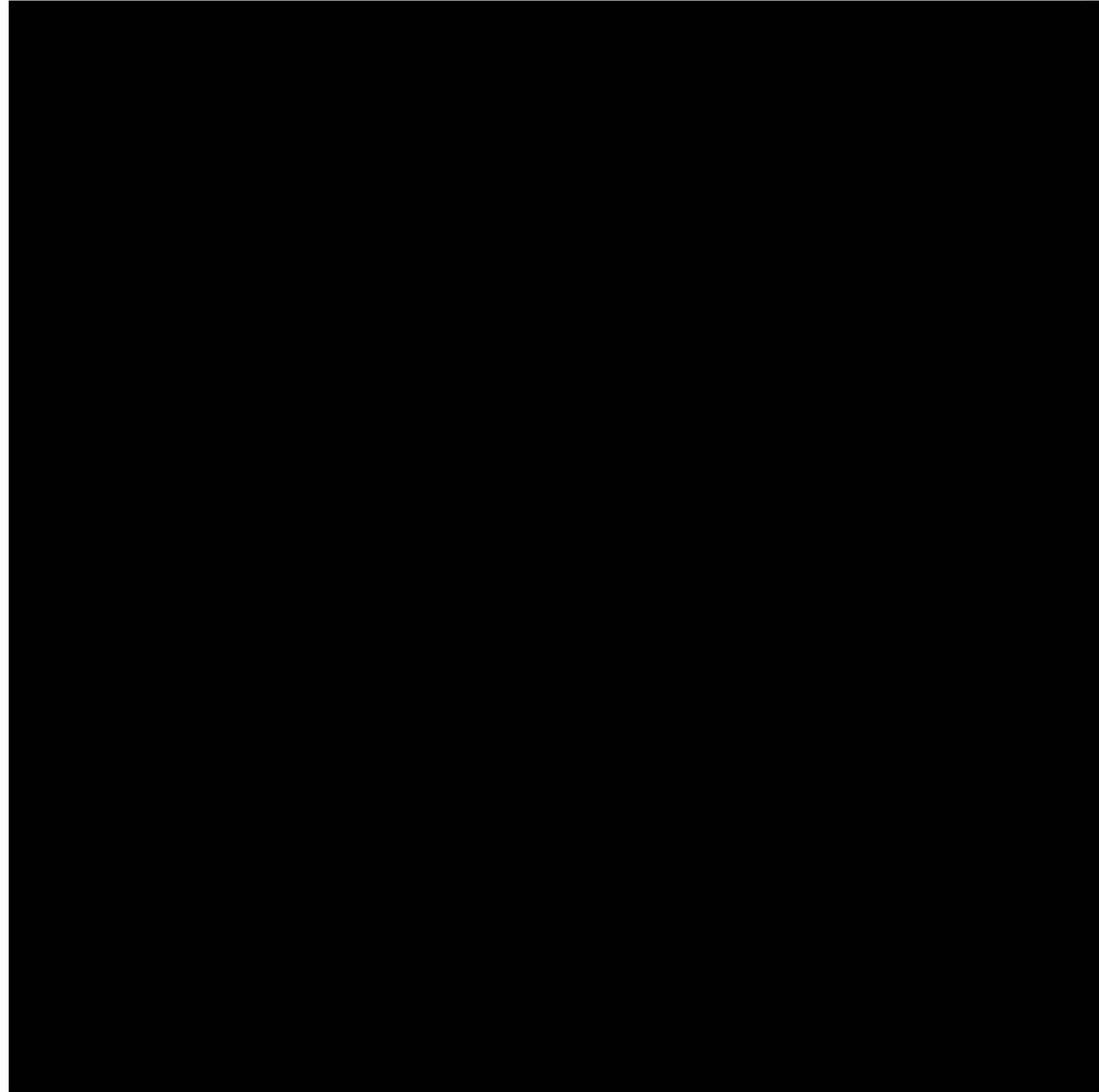
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Ordnance Survey Plan

Published 1992

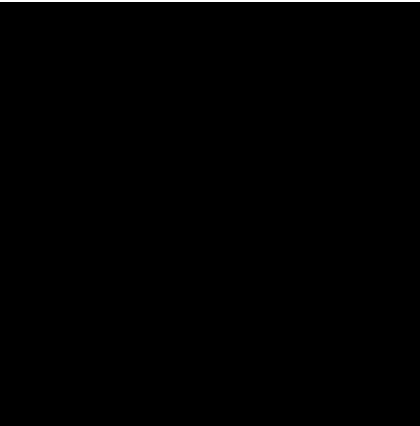
Source map scale - 1:10,000

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

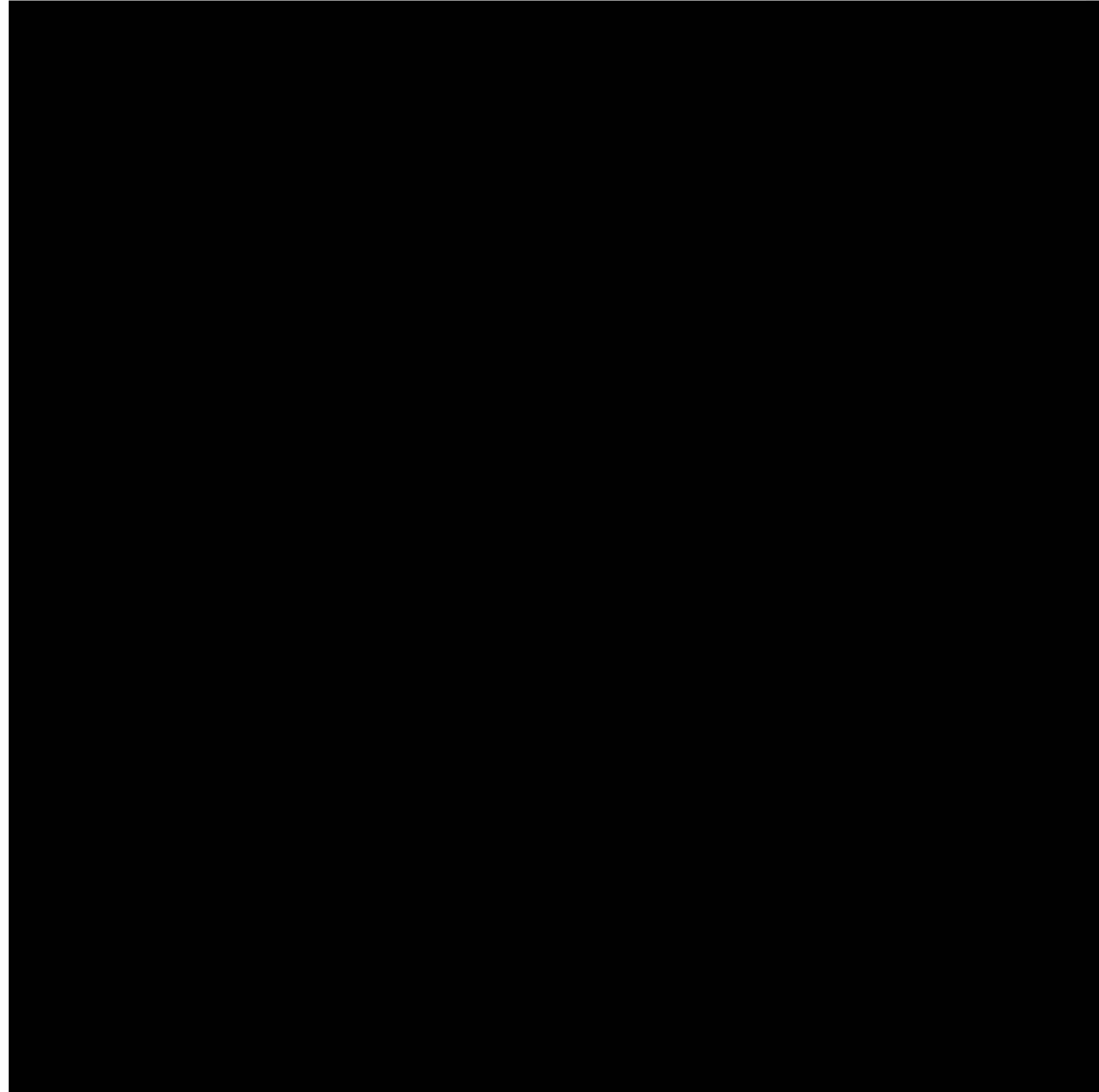
Site Details

Damgate, Holbeach



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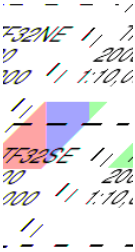
10k Raster Mapping

Published 2000

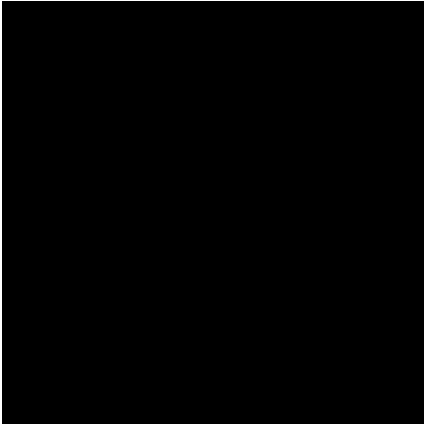
Source map scale - 1:10,000

The historical maps shown were produced from the Ordnance Survey's 1:10,000 colour raster mapping. These maps are derived from Landplan which replaced the old 1:10,000 maps originally published in 1970. The data is highly detailed showing buildings, fences and field boundaries as well as all roads, tracks and paths. Road names are also included together with the relevant road number and classification. Boundary information depiction includes county, unitary authority, district, civil parish and constituency.

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

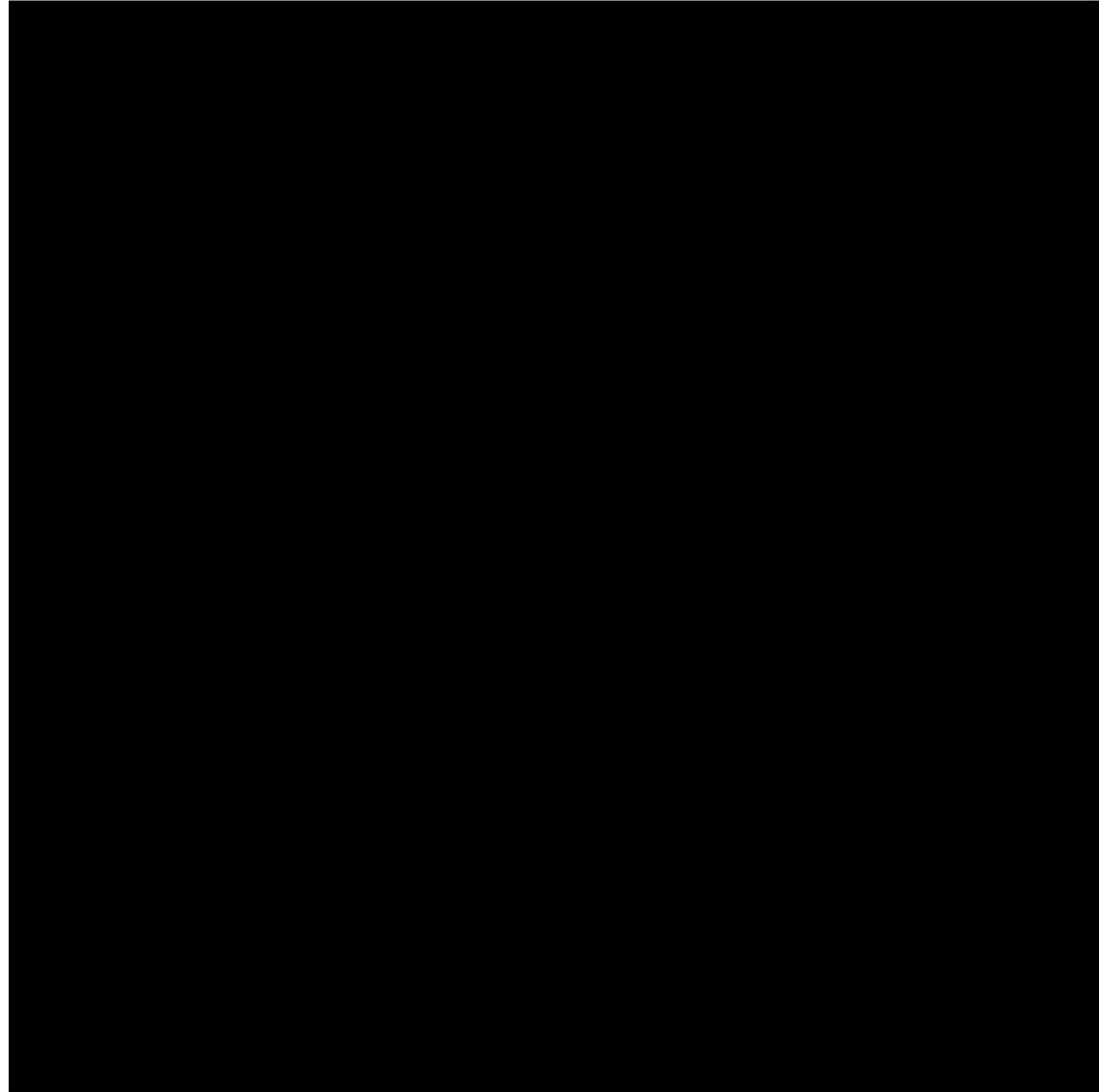
Site Details

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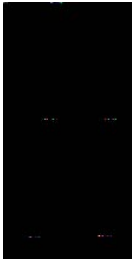
10k Raster Mapping

Published 2006

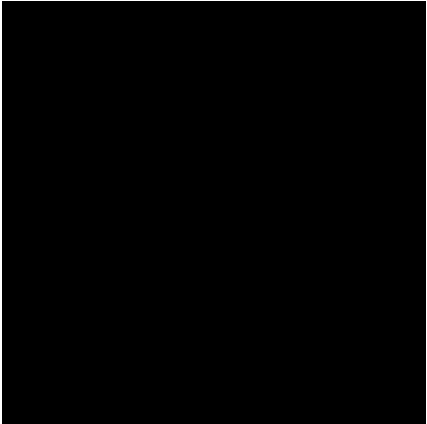
Source map scale - 1:10,000

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:	216516353_1_1
Customer Ref:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

Site Details

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APPENDIX V

Landmark Geological Maps

Geology 1:50,000 Maps Legends

Superficial Geology

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

Bedrock and Faults

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



Geology 1:50,000 Maps

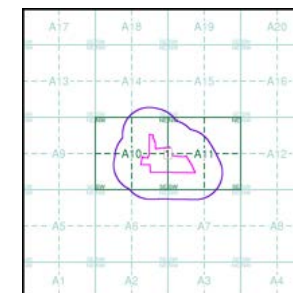
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published paper maps.

The various geological layers - artificial and landslip deposits, superficial geology and solid (bedrock) geology are displayed in separate maps, but superimposed on the final 'Combined Surface Geology' map. All map legends feature on this page. Not all layers have complete nationwide coverage, so availability of data for relevant map sheets is indicated below.

Geology 1:50,000 Maps Coverage

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

Geology 1:50,000 Maps - Slice A



Order Details:

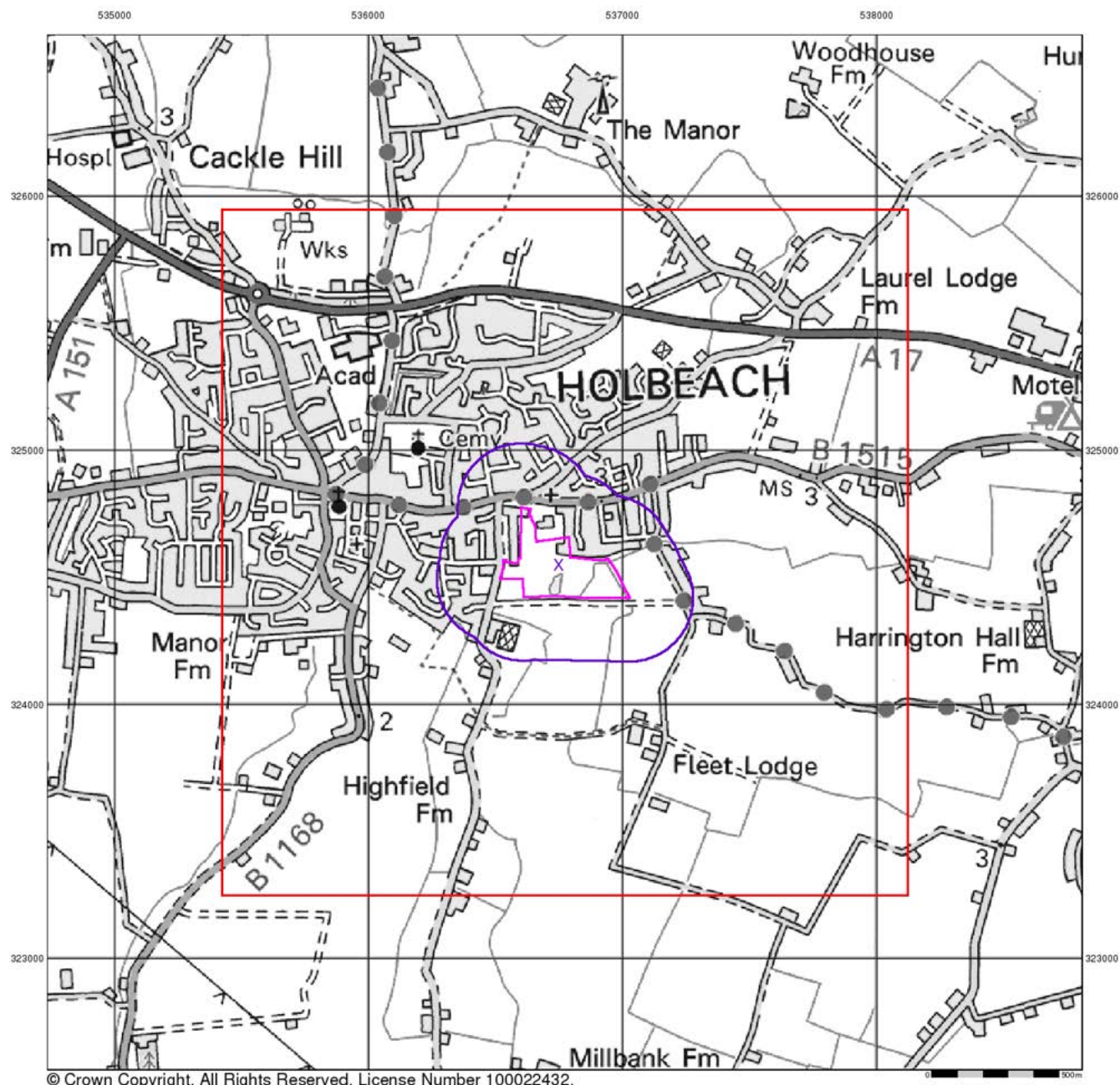
Order Number:	216516353_1_1
Customer Reference:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

Site Details:

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Artificial Ground and Landslip

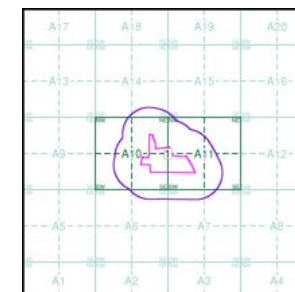
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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

Artificial ground includes:

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

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

Artificial Ground and Landslip Map - Slice A



Order Details:

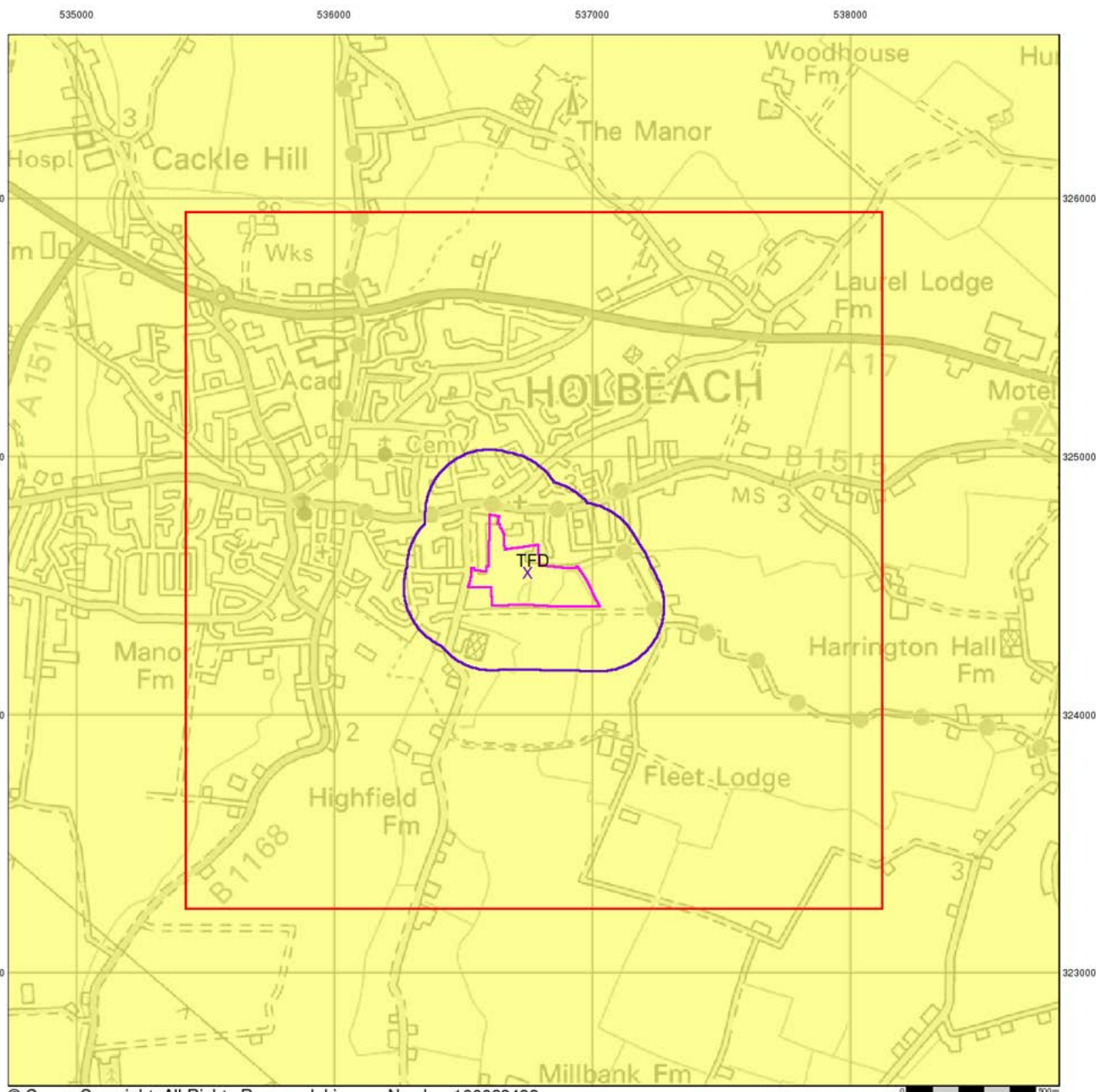
Order Number: 216516353_1_1
 Customer Reference: D38108
 National Grid Reference: 536750, 324550
 Slice: A
 Site Area (Ha): 8.37
 Search Buffer (m): 250

Site Details:

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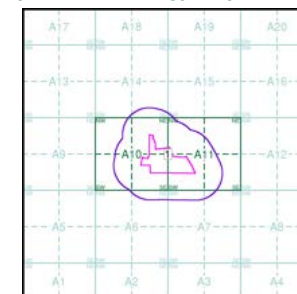
Superficial Geology

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

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

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

Superficial Geology Map - Slice A



Order Details:

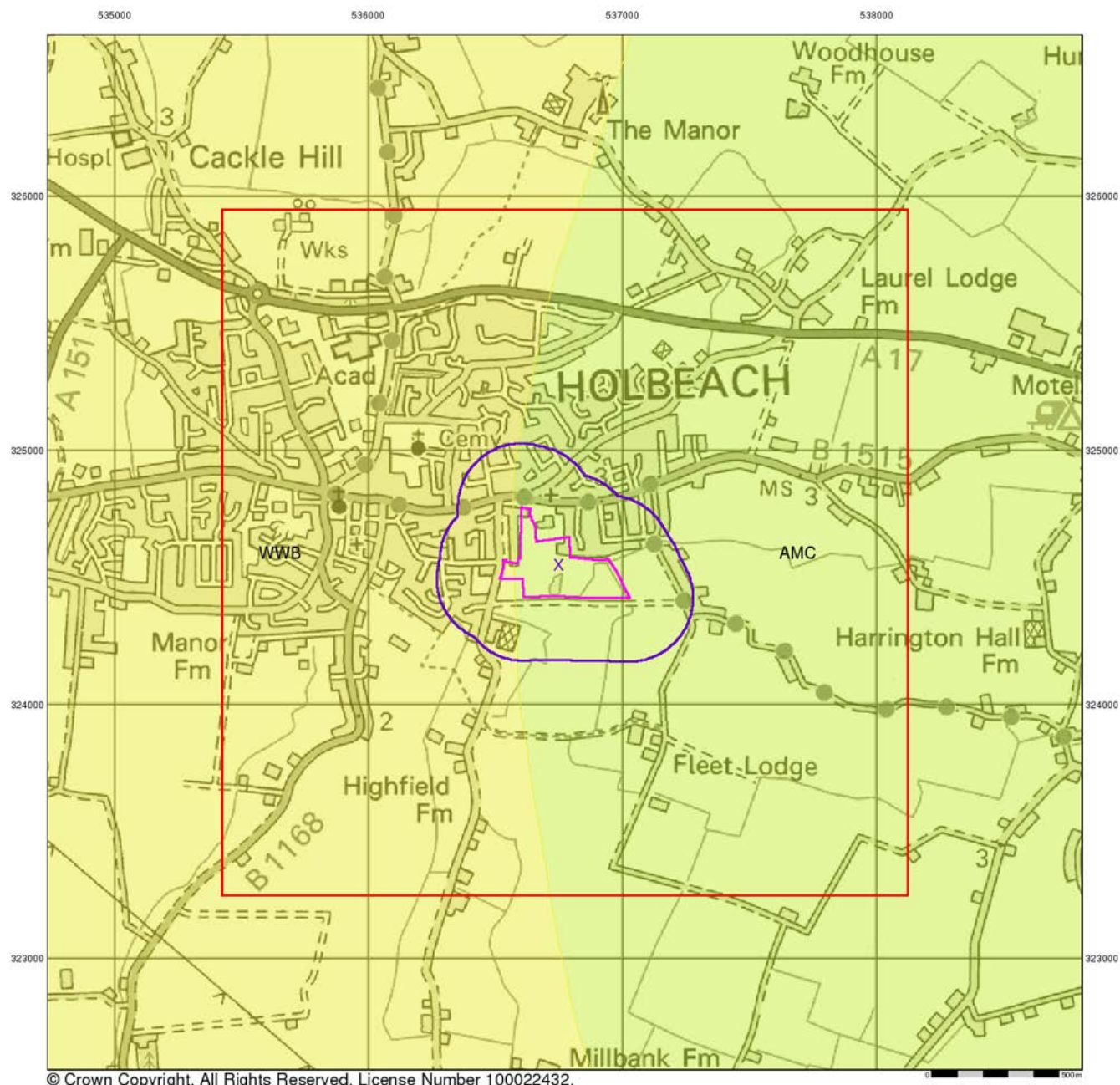
Order Number:	216516353_1_1
Customer Reference:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

Site Details:

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GeoDyne

Bedrock and Faults

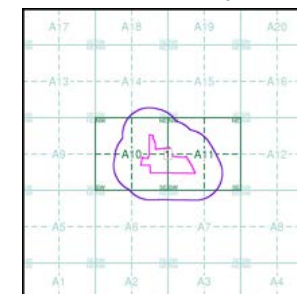
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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

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

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

Bedrock and Faults Map - Slice A



Order Details:

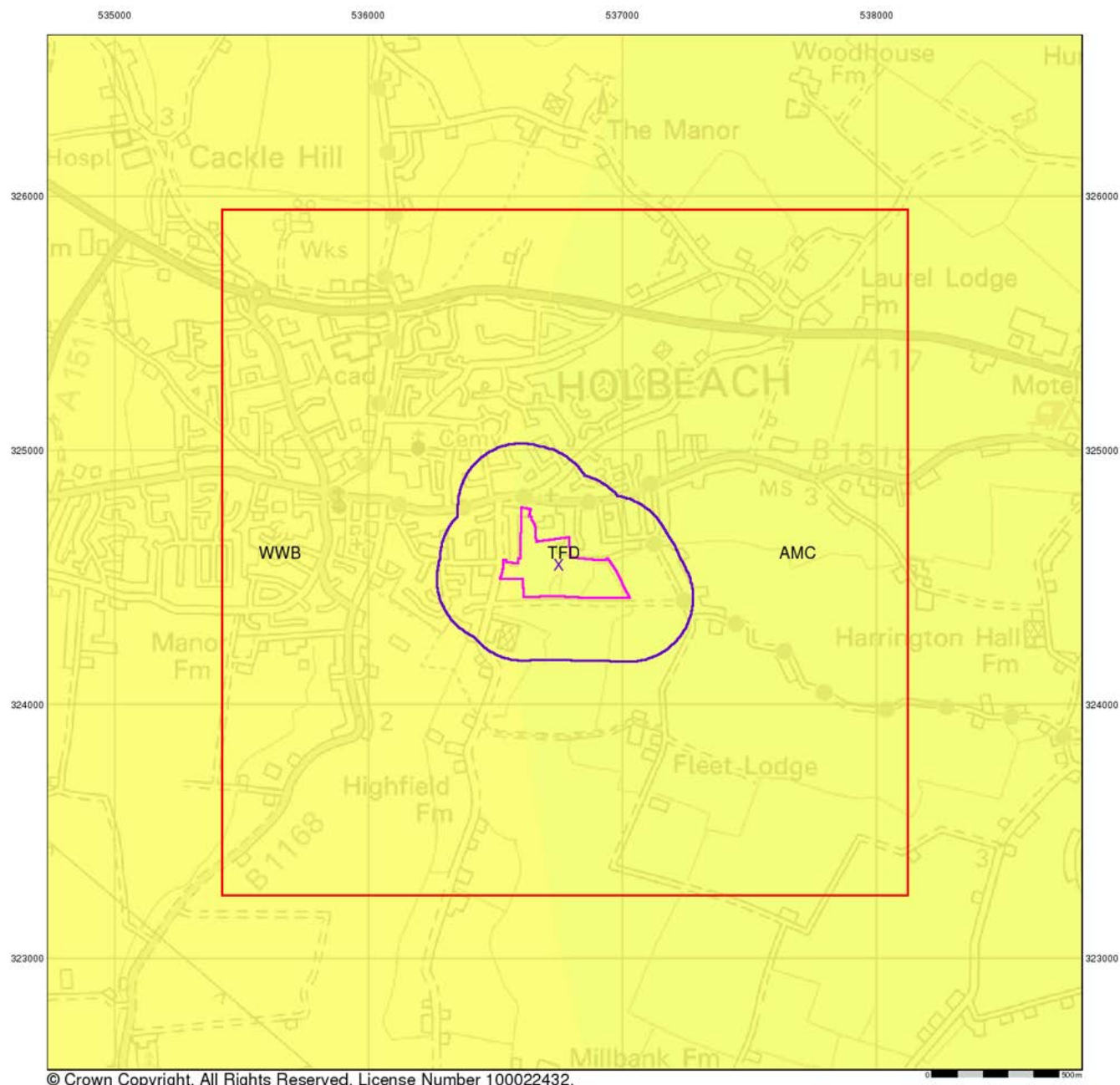
Order Number: 216516353_1_1
Customer Reference: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details:

Damgate, Holbeach

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Combined Surface Geology

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

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

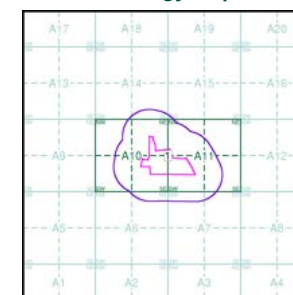
Additional Information

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

Contact

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

Combined Geology Map - Slice A



Order Details:

Order Number:	216516353_1_1
Customer Reference:	D38108
National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

Site Details:

Damgate, Holbeach



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Web: www.envirocheck.co.uk

APPENDIX VI

Landmark Envirocheck Report

Envirocheck[®] Report:

Datasheet

Order Details:

Order Number:

216516353_1_1

Customer Reference:

D38108

National Grid Reference:

536750, 324550

Slice:

A

Site Area (Ha):

8.37

Search Buffer (m):

250

Site Details:

Damgate

Holbeach

Client Details:

Mr J Hollands

GeoDyne Ltd

Unit 2.2 Clarendon House

Clarendon Business Park

Clumber Avenue

Nottingham

NG5 1AH

Report Section	Page Number
Summary	-
Agency & Hydrological	1
Waste	8
Hazardous Substances	-
Geological	10
Industrial Land Use	12
Sensitive Land Use	13
Data Currency	14
Data Suppliers	18
Useful Contacts	19

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 this 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

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Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Agency & Hydrological			
BGS Groundwater Flooding Susceptibility			
Contaminated Land Register Entries and Notices			
Discharge Consents	pg 1		6
Prosecutions Relating to Controlled Waters			n/a
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 2	Yes	
Pollution Incidents to Controlled Waters	pg 2		2
Prosecutions Relating to Authorised Processes			
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 Map	pg 2	Yes	n/a
Groundwater Vulnerability - Soluble Rock Risk			n/a
Groundwater Vulnerability - Local Information			n/a
Bedrock Aquifer Designations	pg 3	Yes	n/a
Superficial Aquifer Designations	pg 3	Yes	n/a
Source Protection Zones			
Extreme Flooding from Rivers or Sea without Defences	pg 3	Yes	Yes
Flooding from Rivers or Sea without Defences	pg 4	Yes	Yes
Areas Benefiting from Flood Defences			
Flood Water Storage Areas			
Flood Defences			
OS Water Network Lines	pg 4	2	22

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Waste			
BGS Recorded Landfill Sites			
Historical Landfill Sites	pg 8		2
Integrated Pollution Control Registered Waste Sites			
Licensed Waste Management Facilities (Landfill Boundaries)			
Licensed Waste Management Facilities (Locations)			
Local Authority Landfill Coverage	pg 8	2	n/a
Local Authority Recorded Landfill Sites			
Potentially Infilled Land (Non-Water)	pg 8		1
Potentially Infilled Land (Water)	pg 8	4	9
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			

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Geological			
BGS 1:625,000 Solid Geology	pg 10	Yes	n/a
BGS Estimated Soil Chemistry	pg 10	Yes	
BGS Recorded Mineral Sites	pg 10		1
BGS Urban Soil Chemistry			
BGS Urban Soil Chemistry Averages			
CBSCB Compensation District			n/a
Coal Mining Affected Areas			n/a
Mining Instability			n/a
Man-Made Mining Cavities			
Natural Cavities			
Non Coal Mining Areas of Great Britain			
Potential for Collapsible Ground Stability Hazards			
Potential for Compressible Ground Stability Hazards	pg 10	Yes	Yes
Potential for Ground Dissolution Stability Hazards			
Potential for Landslide Ground Stability Hazards	pg 10	Yes	Yes
Potential for Running Sand Ground Stability Hazards	pg 11	Yes	Yes
Potential for Shrinking or Swelling Clay Ground Stability Hazards	pg 11	Yes	Yes
Radon Potential - Radon Affected Areas			n/a
Radon Potential - Radon Protection Measures			n/a
Industrial Land Use			
Contemporary Trade Directory Entries	pg 12		4
Fuel Station Entries			
Points of Interest - Commercial Services			
Points of Interest - Education and Health			
Points of Interest - Manufacturing and Production	pg 12		3
Points of Interest - Public Infrastructure			
Points of Interest - Recreational and Environmental			
Gas Pipelines			
Underground Electrical Cables			

Data Type	Page Number	On Site	0 to 250m (*up to 500m)
Sensitive Land Use			
Ancient Woodland			
Areas of Adopted Green Belt			
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 13		1
Ramsar Sites			
Sites of Special Scientific Interest			
Special Areas of Conservation			
Special Protection Areas			
World Heritage Sites			

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
1	Discharge Consents Operator: Mr Ashley J King And Mr Howard M King Property Type: Domestic Property (Single) Location: Holbeach Manor Fleet Road, Holbeach, Spalding, Lincs, Pe12 7ax Authority: Environment Agency, Anglian Region Catchment Area: Not Supplied Reference: Pm1f00368 Permit Version: 1 Effective Date: 1st January 1980 Issued Date: 1st January 1980 Revocation Date: 1st October 1996 Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Land/Soakaway Environment: Receiving Water: Not Supplied Status: Pre National Rivers Authority Legislation where issue date < 01/09/1989 Positional Accuracy: Located by supplier to within 10m	A10NE (N)	103	1	536741 324761
2	Discharge Consents Operator: Mr & Mrs B Ward Property Type: Not Supplied Location: Damgate Road, Holbeach, Lincolnshire Authority: Environment Agency, Anglian Region Catchment Area: Not Supplied Reference: Pm1f02942 Permit Version: 1 Effective Date: 7th June 1990 Issued Date: 7th June 1990 Revocation Date: 1st October 1996 Discharge Type: Unknown Discharge: Onto Land Environment: Receiving Water: Land Status: Post National Rivers Authority Legislation where issue date > 31/08/1989 Positional Accuracy: Located by supplier to within 10m	A10SE (SW)	159	1	536540 324280
3	Discharge Consents Operator: Mr & Mrs N Brown Property Type: Domestic Property (Multiple) Location: Damgate Road Holbeach, Spalding, Lincs, Pe12 7bq Authority: Environment Agency, Anglian Region Catchment Area: Low River Welland (Spalding) Reference: Pm1nf12386 Permit Version: 1 Effective Date: 21st January 2000 Issued Date: 2nd February 2000 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Dyke Trib Of The River Welland Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A10SW (SW)	215	1	536380 324330
3	Discharge Consents Operator: Mr & Mrs N Brown Property Type: Sewage Disposal Works - Other Location: Plot 3 Damgate, Holbeach, Spalding, Lincolnshire Authority: Environment Agency, Anglian Region Catchment Area: Low River Welland (Spalding) Reference: Pm1nf12386 Permit Version: 1 Effective Date: 21st January 2000 Issued Date: 2nd February 2000 Revocation Date: Not Supplied Discharge Type: Sewage Discharges - Final/Treated Effluent - Not Water Company Discharge: Freshwater Stream/River Environment: Receiving Water: Dyke Trib Of The River Welland Status: New Consent (Water Resources Act 1991, Section 88 & Schedule 10 as amended by Environment Act 1995) Positional Accuracy: Located by supplier to within 10m	A10SW (SW)	215	1	536380 324330

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
4	Discharge Consents Operator: Heritage Kitchens Ltd Property Type: Not Supplied Location: Plot 1 Semi Farrow Avenue, Holbeach, Spalding Authority: Environment Agency, Anglian Region Catchment Area: Not Supplied Reference: Pr5lf5553 Permit Version: 1 Effective Date: 29th July 1988 Issued Date: 29th July 1988 Revocation Date: 1st October 1996 Discharge Type: Unknown Discharge: Onto Land Environment: Receiving Water: Land Status: Pre National Rivers Authority Legislation where issue date < 01/09/1989 Positional Accuracy: Located by supplier to within 10m	A10SW (W)	218	1	536300 324480
4	Discharge Consents Operator: Heritage Kitchens Ltd Property Type: Not Supplied Location: Plot 2 Semi Farrow Avenue, Holbeach, Spalding Authority: Environment Agency, Anglian Region Catchment Area: Not Supplied Reference: Pr5lf5554 Permit Version: 1 Effective Date: 29th July 1988 Issued Date: 29th July 1988 Revocation Date: 1st October 1996 Discharge Type: Unknown Discharge: Onto Land Environment: Receiving Water: Land Status: Pre National Rivers Authority Legislation where issue date < 01/09/1989 Positional Accuracy: Located by supplier to within 10m	A10SW (W)	238	1	536280 324500
	Nearest Surface Water Feature	A10SE (SW)	0	-	536697 324425
5	Pollution Incidents to Controlled Waters Property Type: Water Company Sewage: Other Location: Spalding District Authority: Environment Agency, Anglian Region Pollutant: Crude Sewage Note: Local Dyke Incident Date: 26th June 1998 Incident Reference: 2678 Catchment Area: Not Given Receiving Water: Potential River Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A10NE (NW)	99	1	536500 324700
6	Pollution Incidents to Controlled Waters Property Type: Not Given Location: Spalding District Authority: Environment Agency, Anglian Region Pollutant: Unknown Note: Pond Incident Date: 20th September 1993 Incident Reference: 1660 Catchment Area: Not Given Receiving Water: Not Given Cause of Incident: Unknown Incident Severity: Category 3 - Minor Incident Positional Accuracy: Located by supplier to within 100m	A10NW (W)	232	1	536300 324600
	Groundwater Vulnerability Map Combined: Unproductive Aquifer (may have productive aquifer beneath) Classification: Unproductive Combined: Unproductive Vulnerability: Combined Aquifer: Unproductive Bedrock Aquifer, Unproductive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial: >90% Patchiness: Superficial: >10m Thickness: Superficial: Low Recharge:	A10SE (NE)	0	3	536750 324551

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Groundwater Vulnerability Map Combined Classification: Unproductive Aquifer (may have productive aquifer beneath) Combined Vulnerability: Unproductive Combined Aquifer: Unproductive Bedrock Aquifer, Unproductive Superficial Aquifer Pollutant Speed: High Bedrock Flow: Well Connected Fractures Dilution: <300 mm/year Baseflow Index: >70% Superficial Patchiness: >90% Superficial Thickness: >10m Superficial Recharge: Low	A11SW (E)	0	3	537000 324551
	Groundwater Vulnerability - Soluble Rock Risk None				
	Bedrock Aquifer Designations Aquifer Designation: Unproductive Strata	A10SE (NE)	0	3	536750 324551
	Superficial Aquifer Designations Aquifer Designation: Unproductive Strata	A10SE (NE)	0	3	536750 324551
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A10SE (NE)	0	1	536750 324551
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A11SW (SE)	0	1	536954 324457
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A10NE (N)	16	1	536715 324730
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (NE)	100	1	536985 324665
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	151	1	536785 324810
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	152	1	536800 324820
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	157	1	536795 324815
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NE (E)	205	1	537145 324640
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11SE (E)	222	1	537245 324470
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A14SE (N)	222	1	536765 324950
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11SE (SE)	223	1	537220 324310

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (NE)	242	1	536890 324878
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	247	1	536875 324890
	Extreme Flooding from Rivers or Sea without Defences Type: Extent of Extreme Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	250	1	536870 324895
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A10SE (NE)	0	1	536750 324551
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A10NE (N)	16	1	536715 324730
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Fluvial/Tidal Models Boundary Accuracy: As Supplied	A10NE (N)	63	1	536750 324820
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NE (E)	203	1	537145 324640
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11SE (SE)	221	1	537215 324305
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A14SE (N)	222	1	536765 324950
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11SE (E)	222	1	537245 324470
	Flooding from Rivers or Sea without Defences Type: Extent of Flooding from Rivers or Sea without Defences Flood Plain Type: Tidal Models Boundary Accuracy: As Supplied	A11NW (N)	245	1	536870 324890
	Areas Benefiting from Flood Defences None				
	Flood Water Storage Areas None				
	Flood Defences None				
7	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 38.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	0	4	536533 324563
8	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 116.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	0	4	536531 324534

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
9	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 383.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A11SW (E)	2	4	536945 324575
10	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 316.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (S)	2	4	536749 324424
11	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 185.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A11SW (E)	3	4	536901 324571
12	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 29.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	8	4	536521 324544
13	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 68.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	9	4	536513 324511
14	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.8 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	9	4	536515 324515
15	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 579.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A11SW (SE)	10	4	536972 324349
16	OS Water Network Lines Watercourse Form: Lake Watercourse Length: 31.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (W)	54	4	536489 324449
17	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 5.1 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	76	4	536504 324421

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
18	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 712.7 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (S)	78	4	536664 324322
19	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 12.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	81	4	536502 324416
20	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 32.5 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	93	4	536500 324404
21	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 4.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	125	4	536493 324372
22	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 9.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	129	4	536491 324368
23	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 39.0 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	135	4	536490 324359
24	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 14.9 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	164	4	536480 324321
25	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 48.6 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SE (SW)	177	4	536475 324307
26	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 269.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A11NE (E)	217	4	537142 324662

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
27	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 15.3 Watercourse Level: Underground Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A6NE (SW)	217	4	536465 324260
28	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 170.2 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A10SW (SW)	221	4	536376 324321
29	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 58.3 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A6NE (SW)	231	4	536450 324255
30	OS Water Network Lines Watercourse Form: Inland river Watercourse Length: 510.9 Watercourse Level: On ground surface Permanent: True Watercourse Name: Not Supplied Catchment Name: Nene Primacy: 2	A11SE (E)	232	4	537257 324404

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
31	Historical Landfill Sites Licence Holder: Not Supplied Location: Dam Gate, Holbeach, Lincolnshire Name: Holbeach Fen Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD00258 First Input Date: Not Supplied Last Input Date: Not Supplied Specified Waste: Deposited Waste included Household Waste Type: EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: Not Supplied BGS Ref: Not Supplied Other Ref: RD7-53-01/89, SH-53-01/89, 2500/5036	A10SE (S)	11	1	536753 324412
32	Historical Landfill Sites Licence Holder: Not Supplied Location: Holbeach, Lincolnshire Name: Allison Avenue Operator Location: Not Supplied Boundary Accuracy: As Supplied Provider Reference: EAHLD00259 First Input Date: Not Supplied Last Input Date: Not Supplied Specified Waste: Deposited Waste included Household Waste Type: EA Waste Ref: 0 Regis Ref: Not Supplied WRC Ref: Not Supplied BGS Ref: Not Supplied Other Ref: SH-54-01/89, RD7-54-01/89, RD7-55-01/89, 2500/5263	A10SE (W)	46	1	536489 324590
	Local Authority Landfill Coverage Name: South Holland District Council - Has no landfill data to supply		0	2	536750 324551
	Local Authority Landfill Coverage Name: Lincolnshire County Council - Had landfill data but passed it to the relevant environment agency		0	5	536750 324551
33	Potentially Infilled Land (Non-Water) Bearing Ref: W Use: Unknown Filled Ground (Pit, quarry etc) Date of Mapping: 1992	A10SW (W)	161	-	536370 324577
34	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (N)	0	-	536749 324587
35	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A11SW (SE)	0	-	536863 324484
36	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (W)	0	-	536606 324575
37	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10NE (NW)	0	-	536645 324634
38	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A11NW (NE)	26	-	536816 324639
39	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (W)	29	-	536529 324597
40	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (SW)	96	-	536481 324406
41	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (S)	103	-	536656 324322
42	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10NE (N)	122	-	536686 324880

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
43	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A10SE (SW)	132	-	536487 324366
44	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1938	A10NE (W)	136	-	536437 324666
45	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A11NW (N)	202	-	536788 324903
46	Potentially Infilled Land (Water) Use: Unknown Filled Ground (Pond, marsh, river, stream, dock etc) Date of Mapping: 1959	A6NE (S)	247	-	536722 324177

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	BGS 1:625,000 Solid Geology Description: West Walton Formation, Ampthill Clay Formation And Kimmeridge Clay Formation (Undifferentiated)	A10SE (NE)	0	6	536750 324551
	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: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A11SW (E)	0	6	537000 324551
	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: 60 - 90 mg/kg Lead Concentration: <100 mg/kg Nickel Concentration: 15 - 30 mg/kg	A10SE (NE)	0	6	536750 324551
47	BGS Recorded Mineral Sites Site Name: Holbeach Brick Pits Location: Holbeach, Lincolnshire Source: British Geological Survey, National Geoscience Information Service Reference: 136220 Type: Opencast Status: Ceased Operator: Unknown Operator Operator Location: Not Supplied Periodic Type: Quaternary Geology: Tidal Flat Deposits Commodity: Common Clay and Shale Positional Accuracy: Located by supplier to within 10m	A10NW (W)	245	6	536298 324645
	BGS Measured Urban Soil Chemistry No data available				
	BGS Urban Soil Chemistry Averages No data available				
	Coal Mining Affected Areas In an area that might not be affected by coal mining				
	Non Coal Mining Areas of Great Britain No Hazard				
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	Potential for Collapsible Ground Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	Potential for Compressible Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	Potential for Ground Dissolution Stability Hazards Hazard Potential: No Hazard Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
	Potential for Landslide Ground Stability Hazards Hazard Potential: Very Low Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	Potential for Running Sand Ground Stability Hazards Hazard Potential: Moderate Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	Potential for Shrinking or Swelling Clay Ground Stability Hazards Hazard Potential: Low Source: British Geological Survey, National Geoscience Information Service	A14SE (N)	223	6	536750 325000
	Radon Potential - Radon Affected Areas Affected Area: The property is in a Lower probability radon area (less than 1% of homes are estimated to be at or above the Action Level). Source: British Geological Survey, National Geoscience Information Service	A10SE (NE)	0	6	536750 324551
	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	A10SE (NE)	0	6	536750 324551

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
48	Contemporary Trade Directory Entries Name: S M T Garden Machinery Specialist Location: Fleet Rd Plant Centre, Fleet Rd, Holbeach, Spalding, Lincolnshire, PE12 7AX Classification: Lawnmowers & Garden Machinery - Sales & Service Status: Inactive Positional Accuracy: Manually positioned to the road within the address or location	A10NE (N)	58	-	536665 324820
49	Contemporary Trade Directory Entries Name: Pro Mech Engineering Ltd Location: 9, Fleet Road, Holbeach, Spalding, Lincolnshire, PE12 8LA Classification: Metal Products - Fabricated Status: Inactive Positional Accuracy: Automatically positioned to the address	A11NW (N)	182	-	536829 324837
49	Contemporary Trade Directory Entries Name: Premier Publications (Stratford) Ltd Location: 7, Fleet Road, Holbeach, Spalding, Lincolnshire, PE12 8LA Classification: Printers Status: Inactive Positional Accuracy: Automatically positioned to the address	A11NW (N)	186	-	536820 324841
50	Contemporary Trade Directory Entries Name: A W Burnett Location: Hallgate, Holbeach, Spalding, Lincolnshire, PE12 8NG Classification: Garage Services Status: Inactive Positional Accuracy: Automatically positioned in the proximity of the address	A7NW (SE)	201	-	536998 324219
51	Points of Interest - Manufacturing and Production Name: Tank Location: PE12 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A10NE (NW)	107	7	536544 324868
52	Points of Interest - Manufacturing and Production Name: Tank Location: PE12 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to an adjacent address or location	A10SE (SW)	152	7	536617 324272
52	Points of Interest - Manufacturing and Production Name: Tank Location: PE12 Category: Industrial Features Class Code: Tanks (Generic) Positional Accuracy: Positioned to address or location	A6NE (SW)	168	7	536599 324256

Map ID	Details	Quadrant Reference (Compass Direction)	Estimated Distance From Site	Contact	NGR
53	Nitrate Vulnerable Zones Name: Whaplode River Nvz Description: Surface Water Source: Environment Agency, Head Office	A10NE (N)	57	3	536641 324836

Agency & Hydrological	Version	Update Cycle
Contaminated Land Register Entries and Notices South Holland District Council - Environmental Services	October 2013	Annual Rolling Update
Discharge Consents Environment Agency - Anglian Region	July 2019	Quarterly
Enforcement and Prohibition Notices Environment Agency - Anglian Region	March 2013	Annual Rolling Update
Integrated Pollution Controls Environment Agency - Anglian Region	October 2008	Variable
Integrated Pollution Prevention And Control Environment Agency - Anglian Region	July 2019	Quarterly
Local Authority Integrated Pollution Prevention And Control South Holland District Council - Environmental Services	October 2014	Variable
Local Authority Pollution Prevention and Controls South Holland District Council - Environmental Services	October 2014	Annual Rolling Update
Local Authority Pollution Prevention and Control Enforcements South Holland District Council - Environmental Services	October 2014	Variable
Nearest Surface Water Feature Ordnance Survey	January 2019	
Pollution Incidents to Controlled Waters Environment Agency - Anglian Region	September 1999	Not Applicable
Prosecutions Relating to Authorised Processes Environment Agency - Anglian Region	March 2013	Annual Rolling Update
Prosecutions Relating to Controlled Waters Environment Agency - Anglian Region	March 2013	Annual Rolling Update
Registered Radioactive Substances Environment Agency - Anglian Region	June 2016	
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 - Anglian Region - Northern Area	July 2019	Quarterly
Water Abstractions Environment Agency - Anglian Region	July 2019	Quarterly
Water Industry Act Referrals Environment Agency - Anglian Region	October 2017	Quarterly
Groundwater Vulnerability Map Environment Agency - Head Office	June 2018	Annually
Bedrock Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Superficial Aquifer Designations Environment Agency - Head Office	January 2018	Annually
Source Protection Zones Environment Agency - Head Office	July 2019	Quarterly
Extreme Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2019	Quarterly
Flooding from Rivers or Sea without Defences Environment Agency - Head Office	August 2019	Quarterly

Agency & Hydrological	Version	Update Cycle
Areas Benefiting from Flood Defences Environment Agency - Head Office	August 2019	Quarterly
Flood Water Storage Areas Environment Agency - Head Office	August 2019	Quarterly
Flood Defences Environment Agency - Head Office	August 2019	Quarterly
OS Water Network Lines Ordnance Survey	April 2019	Quarterly
Surface Water 1 in 30 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water 1 in 100 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water 1 in 1000 year Flood Extent Environment Agency - Head Office	October 2013	Annually
Surface Water Suitability Environment Agency - Head Office	October 2013	Annually
BGS Groundwater Flooding Susceptibility British Geological Survey - National Geoscience Information Service	May 2013	Annually
Waste	Version	Update Cycle
BGS Recorded Landfill Sites British Geological Survey - National Geoscience Information Service	June 1996	Not Applicable
Historical Landfill Sites Environment Agency - Head Office	July 2019	Quarterly
Integrated Pollution Control Registered Waste Sites Environment Agency - Anglian Region	October 2008	Not Applicable
Licensed Waste Management Facilities (Landfill Boundaries) Environment Agency - Anglian Region - Northern Area	July 2018	Quarterly
Licensed Waste Management Facilities (Locations) Environment Agency - Anglian Region - Northern Area	July 2019	Quarterly
Local Authority Landfill Coverage Lincolnshire County Council South Holland District Council - Environmental Services	May 2000 May 2000	Not Applicable Not Applicable
Local Authority Recorded Landfill Sites Lincolnshire County Council South Holland District Council - Environmental Services	May 2000 May 2000	Not Applicable Not Applicable
Potentially Infilled Land (Non-Water) Landmark Information Group Limited	December 1999	Not Applicable
Potentially Infilled Land (Water) Landmark Information Group Limited	December 1999	Not Applicable
Registered Landfill Sites Environment Agency - Anglian Region - Northern Area	March 2003	Not Applicable
Registered Waste Transfer Sites Environment Agency - Anglian Region - Northern Area	March 2003	Not Applicable
Registered Waste Treatment or Disposal Sites Environment Agency - Anglian Region - Northern Area	March 2003	Not Applicable

Hazardous Substances	Version	Update Cycle
Control of Major Accident Hazards Sites (COMAH) Health and Safety Executive	April 2018	Bi-Annually
Explosive Sites Health and Safety Executive	March 2017	Annually
Notification of Installations Handling Hazardous Substances (NIHHS) Health and Safety Executive	November 2000	Not Applicable
Planning Hazardous Substance Enforcements South Holland District Council Lincolnshire County Council - Highways and Planning Department	January 2016 June 2010	Variable Variable
Planning Hazardous Substance Consents Lincolnshire County Council - Highways and Planning Department South Holland District Council	August 2007 January 2016	Variable Variable
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	October 2015	Annually
BGS Recorded Mineral Sites British Geological Survey - National Geoscience Information Service	April 2019	Bi-Annually
CBSCB Compensation District Cheshire Brine Subsidence Compensation Board (CBSCB)	August 2011	Not Applicable
Coal Mining Affected Areas The Coal Authority - Property Searches	March 2014	Annual Rolling Update
Mining Instability Ove Arup & Partners	October 2000	Not Applicable
Non Coal Mining Areas of Great Britain British Geological Survey - National Geoscience Information Service	May 2015	Not Applicable
Potential for Collapsible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Compressible Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Ground Dissolution Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Landslide Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Running Sand Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Potential for Shrinking or Swelling Clay Ground Stability Hazards British Geological Survey - National Geoscience Information Service	January 2019	Annually
Radon Potential - Radon Affected Areas British Geological Survey - National Geoscience Information Service	July 2011	Annually
Radon Potential - Radon Protection Measures British Geological Survey - National Geoscience Information Service	July 2011	Annually

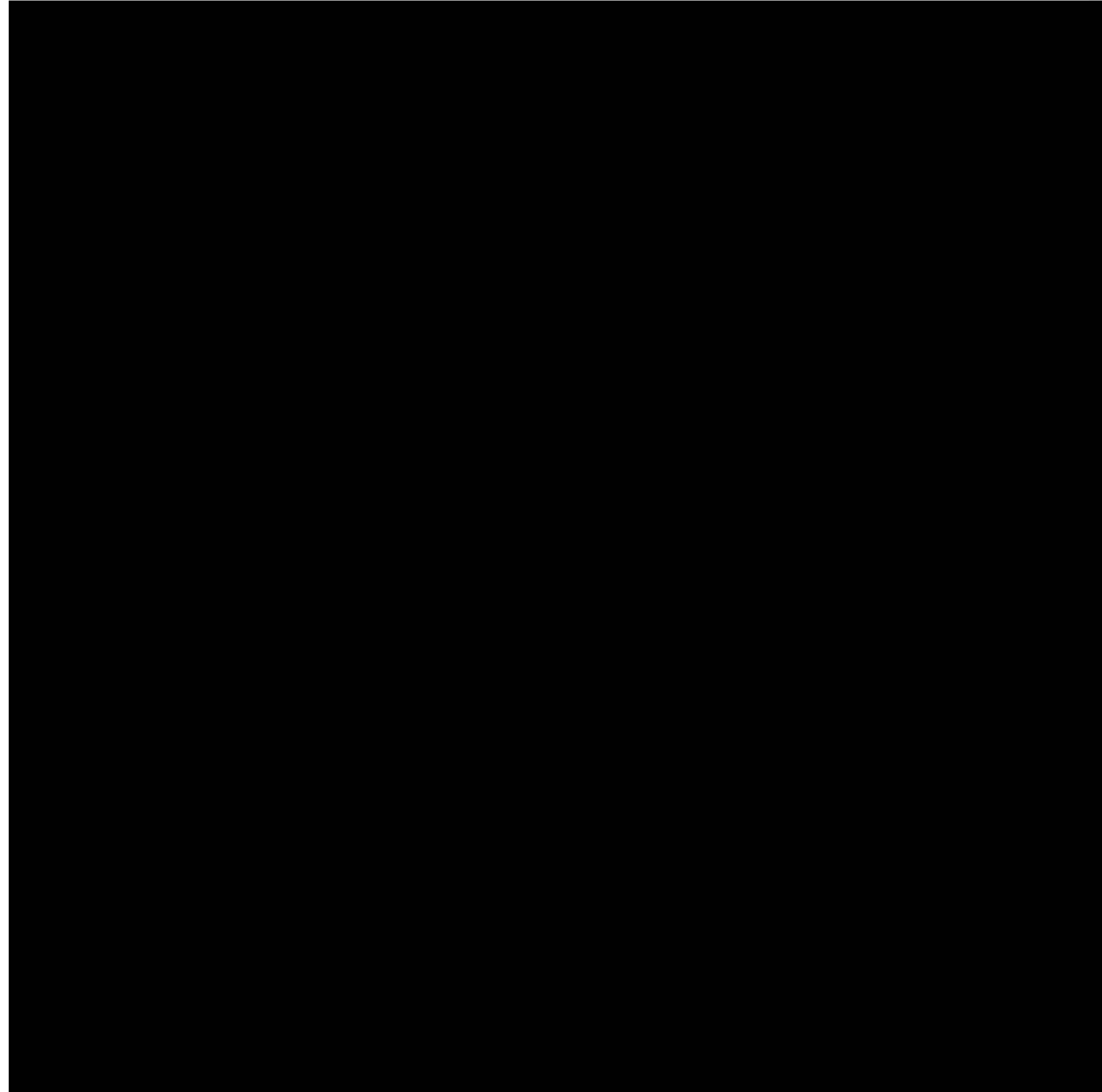
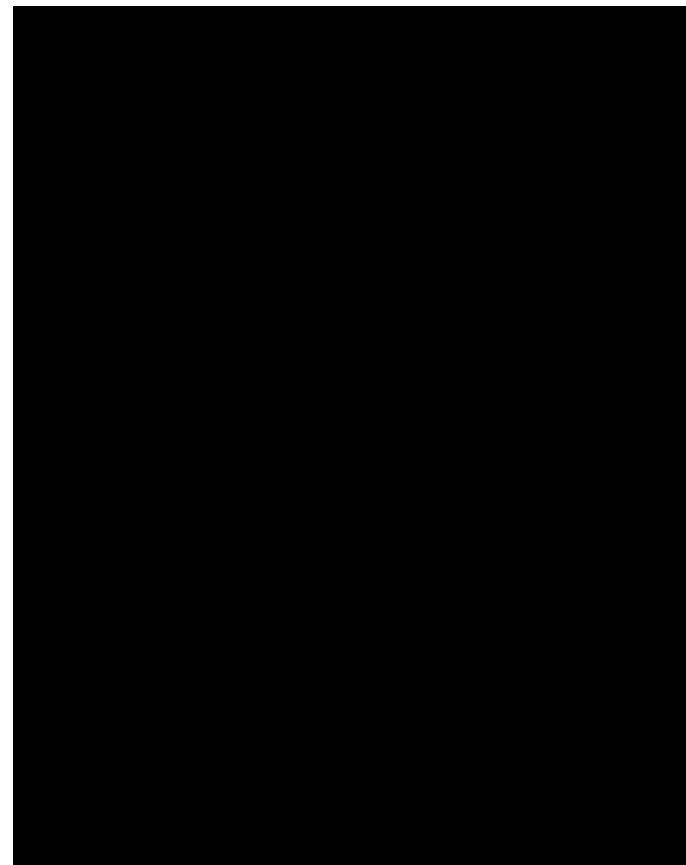
Industrial Land Use	Version	Update Cycle
Contemporary Trade Directory Entries Thomson Directories	July 2019	Quarterly
Fuel Station Entries Catalist Ltd - Experian	May 2019	Quarterly
Gas Pipelines National Grid	July 2014	
Points of Interest - Commercial Services PointX	July 2019	Quarterly
Points of Interest - Education and Health PointX	July 2019	Quarterly
Points of Interest - Manufacturing and Production PointX	July 2019	Quarterly
Points of Interest - Public Infrastructure PointX	July 2019	Quarterly
Points of Interest - Recreational and Environmental PointX	July 2019	Quarterly
Underground Electrical Cables National Grid	December 2015	
Sensitive Land Use	Version	Update Cycle
Ancient Woodland Natural England	August 2018	Bi-Annually
Areas of Outstanding Natural Beauty Natural England	June 2019	Bi-Annually
Environmentally Sensitive Areas Natural England	January 2017	
Forest Parks Forestry Commission	April 1997	Not Applicable
Local Nature Reserves Natural England	March 2019	Bi-Annually
Marine Nature Reserves Natural England	July 2019	Bi-Annually
National Nature Reserves Natural England	July 2019	Bi-Annually
National Parks Natural England	April 2017	Bi-Annually
Nitrate Vulnerable Zones Environment Agency - Head Office Department for Environment, Food and Rural Affairs (DEFRA - formerly FRCA)	December 2017 October 2015	Bi-Annually
Ramsar Sites Natural England	April 2019	Bi-Annually
Sites of Special Scientific Interest Natural England	March 2019	Bi-Annually
Special Areas of Conservation Natural England	June 2019	Bi-Annually
Special Protection Areas Natural England	April 2019	Bi-Annually

A selection of organisations who provide data within this report

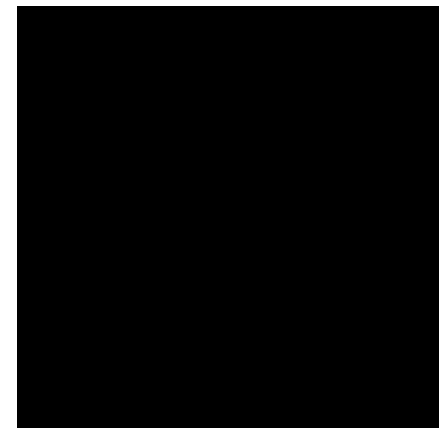
Data Supplier	Data Supplier Logo
Ordnance Survey	
Environment Agency	
Scottish Environment Protection Agency	
The Coal Authority	
British Geological Survey	 British Geological Survey NATURAL ENVIRONMENT RESEARCH COUNCIL
Centre for Ecology and Hydrology	 Centre for Ecology & Hydrology NATURAL ENVIRONMENT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

Contact	Name and Address	Contact Details
1	Environment Agency - National Customer Contact Centre (NCCC) PO Box 544, Templeborough, Rotherham, S60 1BY	Telephone: 03708 506 506 Email: enquiries@environment-agency.gov.uk
2	South Holland District Council - Environmental Services Council Offices, Priory Road, Spalding, Lincolnshire, PE11 2XE	Website: www.sholland.gov.uk
3	Environment Agency - Head Office Rio House, Waterside Drive, Aztec West, Almondsbury, Bristol, Avon, BS32 4UD	Telephone: 01454 624400 Fax: 01454 624409
4	Ordnance Survey Adanac Drive, Southampton, Hampshire, SO16 0AS	Telephone: 03456 05 05 05 Email: customerservices@ordnancesurvey.co.uk Website: www.ordnancesurvey.gov.uk
5	Lincolnshire County Council 4th Floor, City Hall, Lincoln, Lincolnshire, LN1 1DN	Telephone: 01522 552222 Fax: 01522 552288 Email: PublicRelations@lincolnshire.gov.uk Website: www.lincolnshire.gov.uk
6	British Geological Survey - Enquiry Service British Geological Survey, Environmental Science Centre, Keyworth, Nottingham, Nottinghamshire, NG12 5GG	Telephone: 0115 936 3143 Fax: 0115 936 3276 Email: enquiries@bgs.ac.uk Website: www.bgs.ac.uk
7	PointX 7 Abbey Court, Eagle Way, Sowton, Exeter, Devon, EX2 7HY	Website: www.pointx.co.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.



Site Sensitivity Map - Segment A10

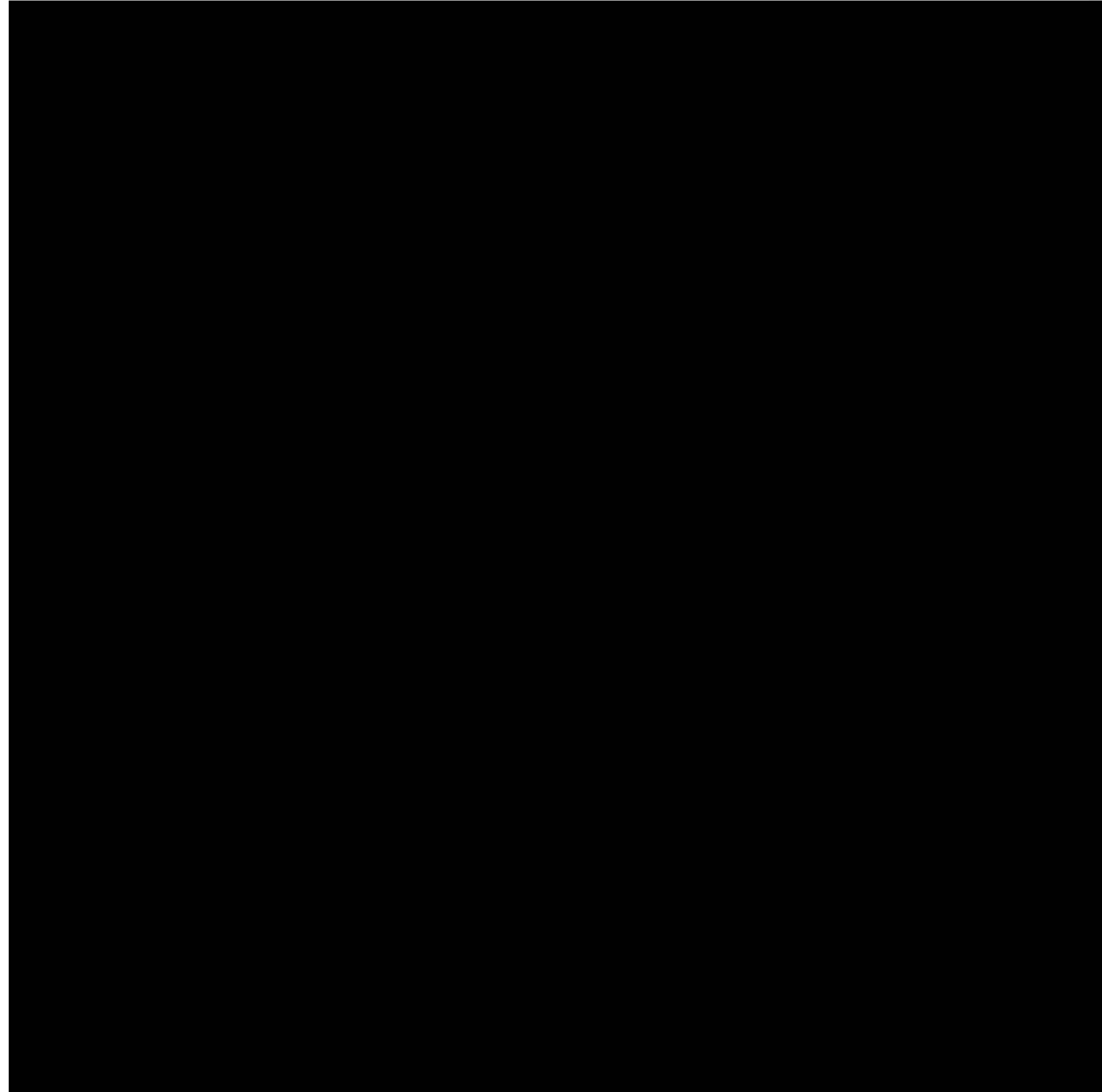
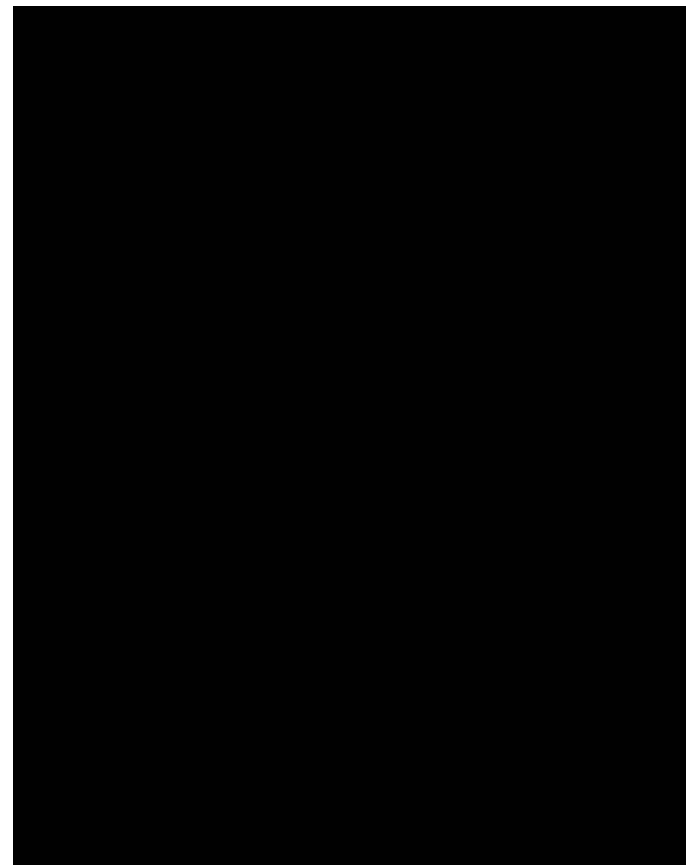


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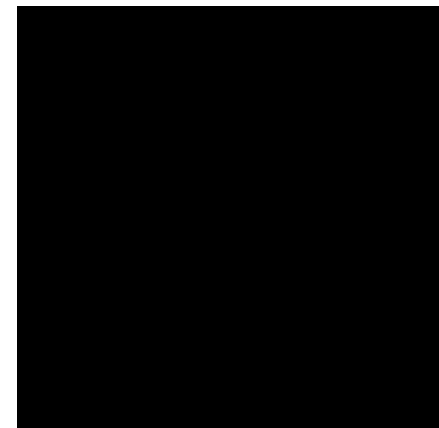
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National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Plot Buffer (m): 100

Site Details

Damgate, Holbeach



Site Sensitivity Map - Segment A11



Order Details

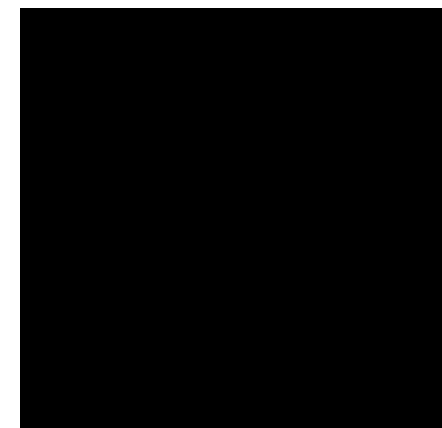
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Customer Ref: D38108
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Slice: A
Site Area (Ha): 8.37
Plot Buffer (m): 100

Site Details

Damgate, Holbeach



Site Sensitivity Map - Slice A



Order Details

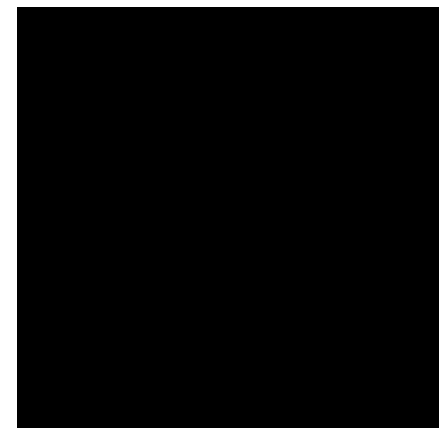
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Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



Industrial Land Use Map - Slice A

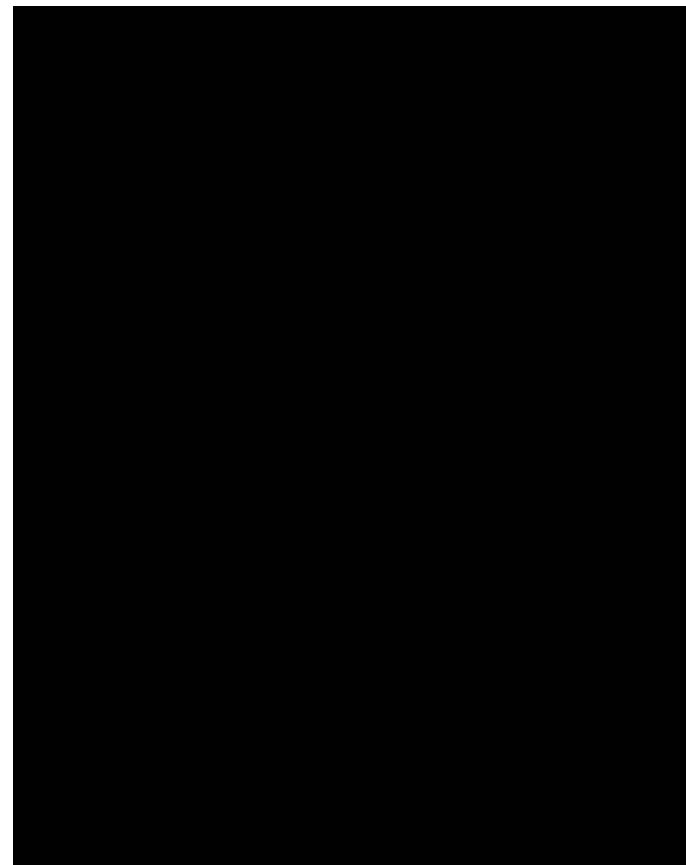


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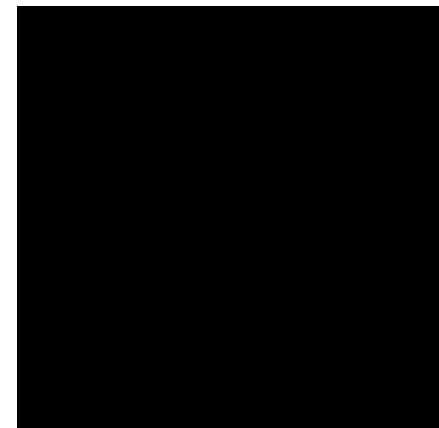
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Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



Flood Map - Slice A

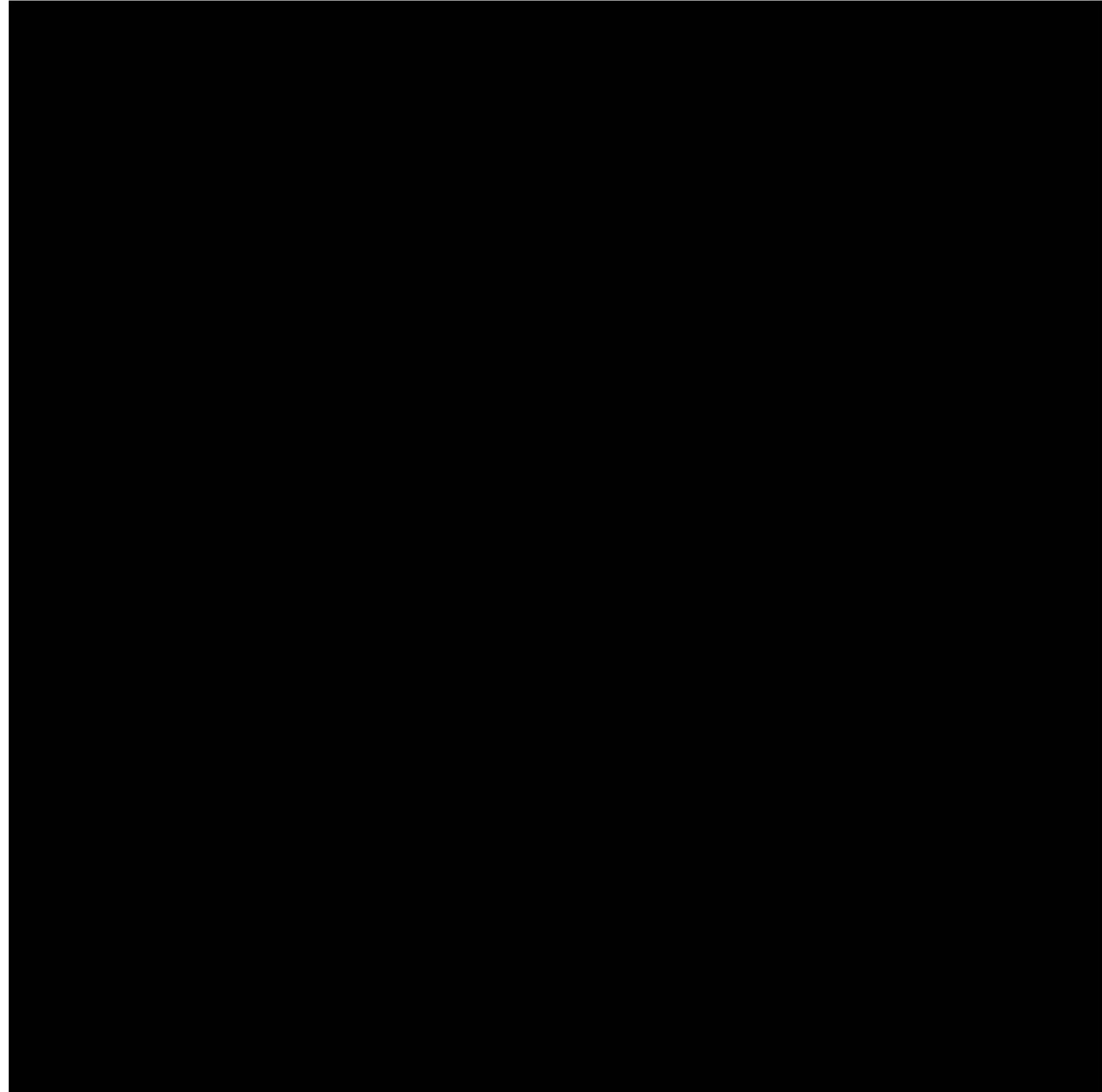
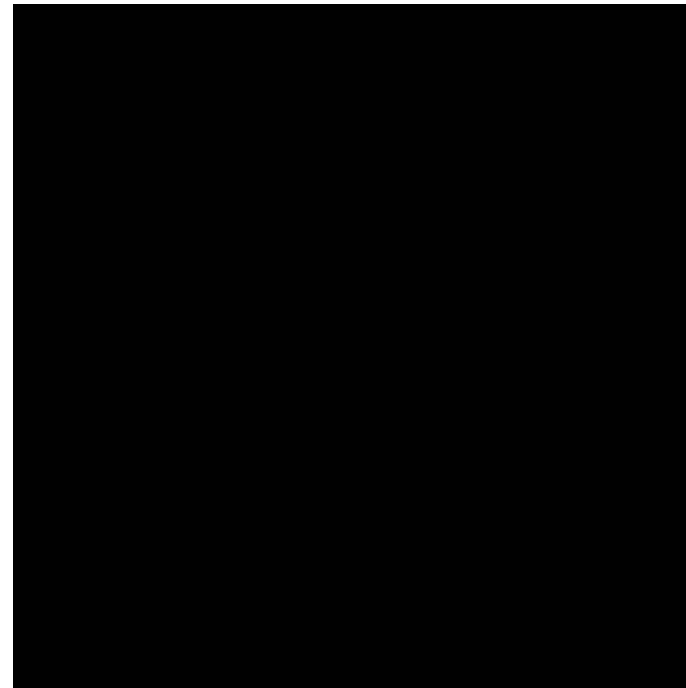


Order Details

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Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

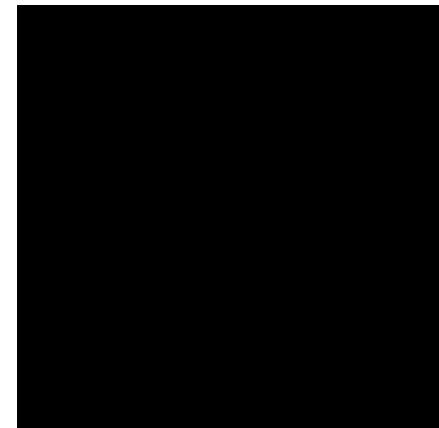
Damgate, Holbeach



For Borehole information please refer to the Borehole .csv file 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

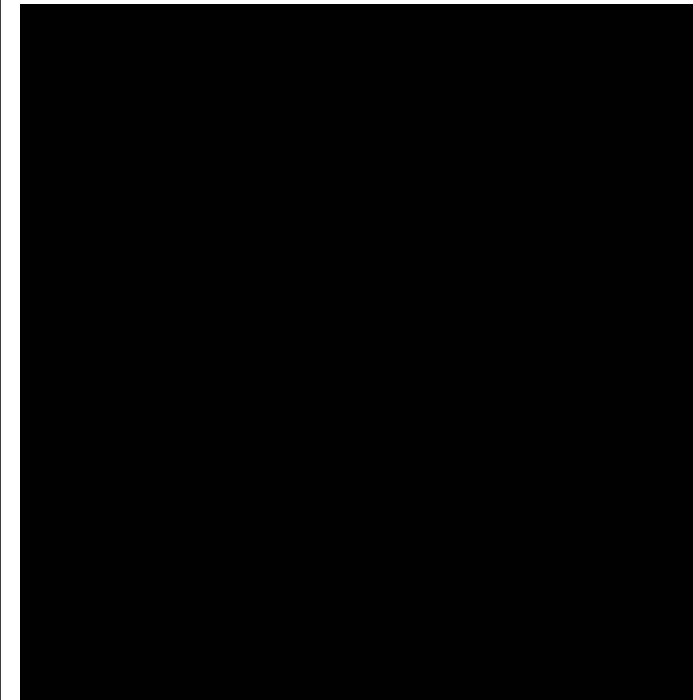


Order Details

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Customer Ref: D38108
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Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



OS Water Network Map - Slice A



Order Details

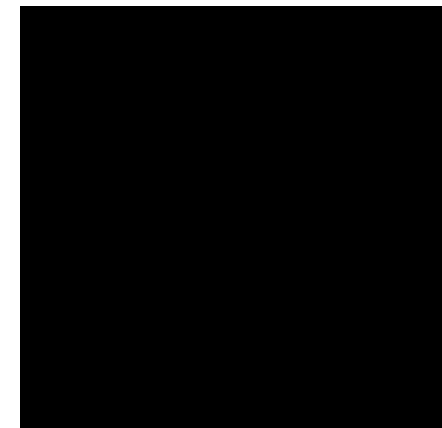
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Search Buffer (m): 250

Site Details

Damgate, Holbeach



EA/NRW Suitability Map - Slice A

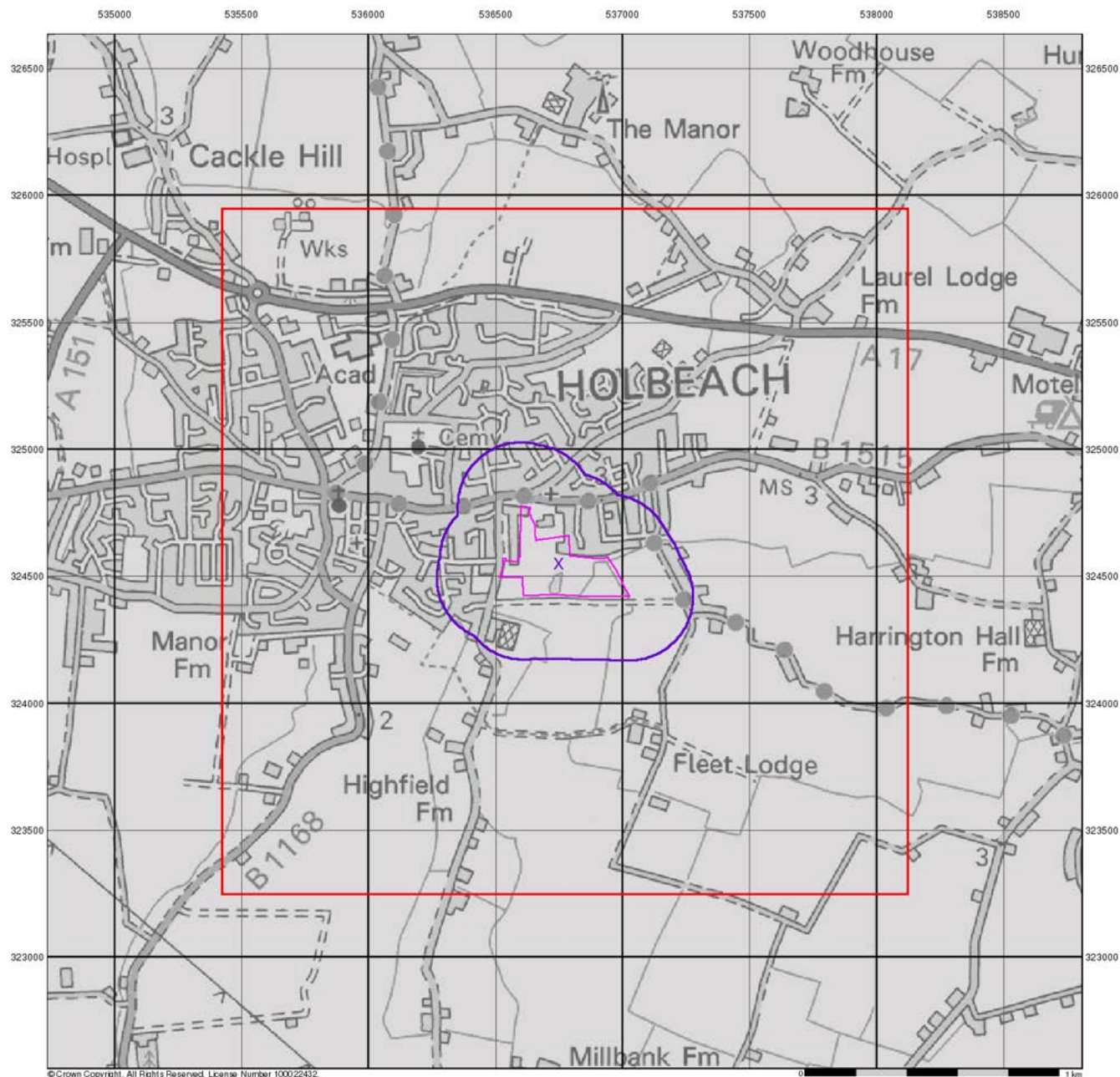


Order Details

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Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



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Groundwater Vulnerability

General

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

Agency and Hydrological

Bedrock Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

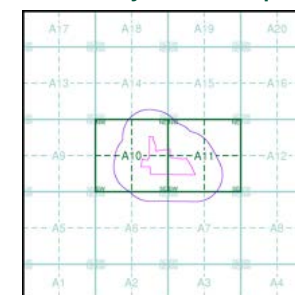
Superficial Aquifers

- High Vulnerability, Principal Aquifer
- High Vulnerability, Secondary Aquifer
- Medium Vulnerability, Principal Aquifer
- Medium Vulnerability, Secondary Aquifer
- Low Vulnerability, Principal Aquifer
- Low Vulnerability, Secondary Aquifer

Unproductive Aquifer

Soluble Rock

Site Sensitivity Context Map - Slice A



Order Details

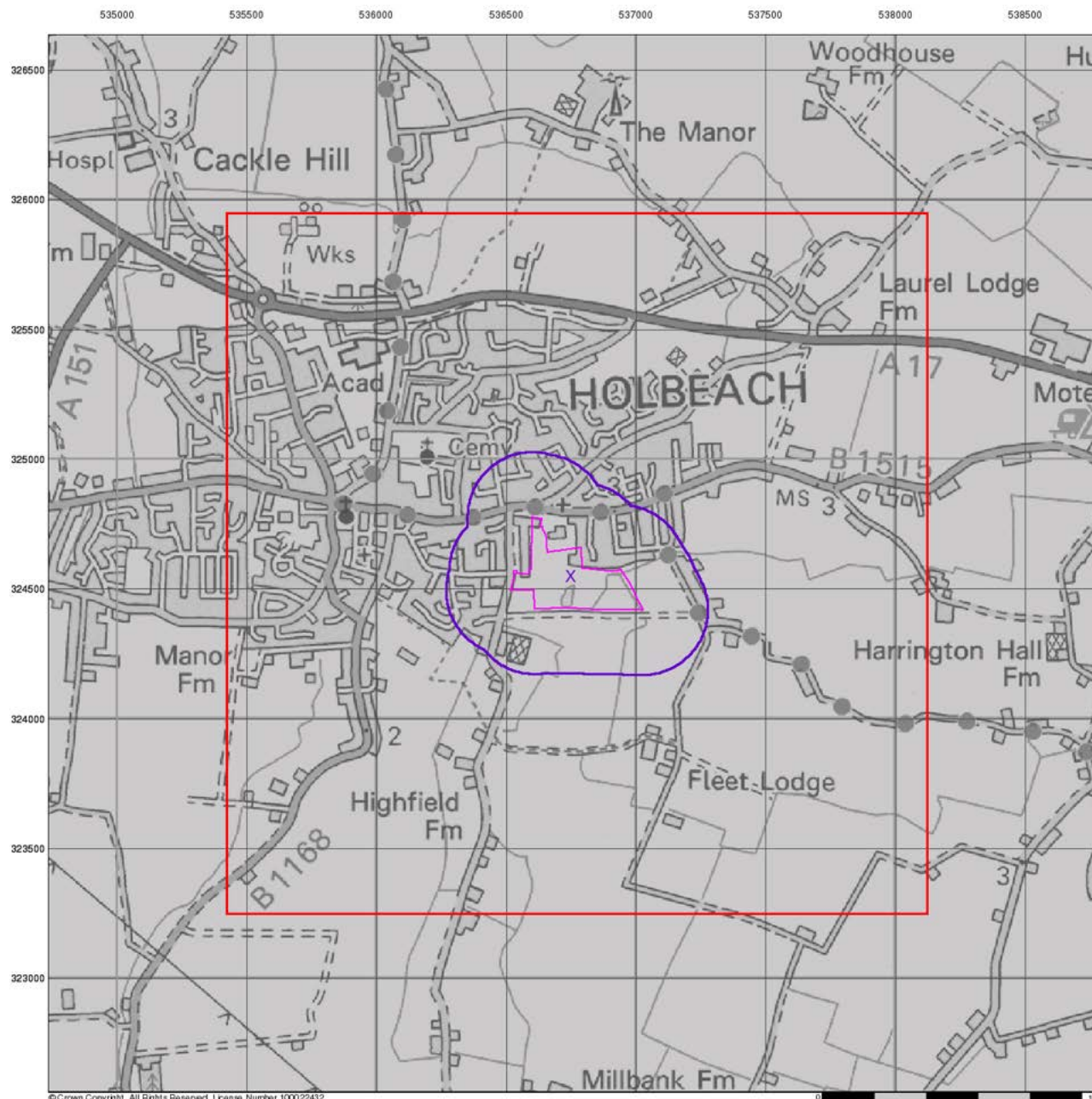
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 Customer Ref: D38108
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 Slice: A
 Site Area (Ha): 8.37
 Search Buffer (m): 250

Site Details

Damgate, Holbeach

Landmark
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Bedrock Aquifer Designation

General

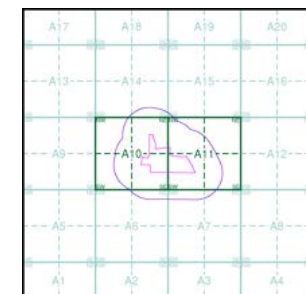
- ▮ Specified Site
- ▮ Specified Buffer(s)
- X Bearing Reference Point
- ▮ Slice
- B Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

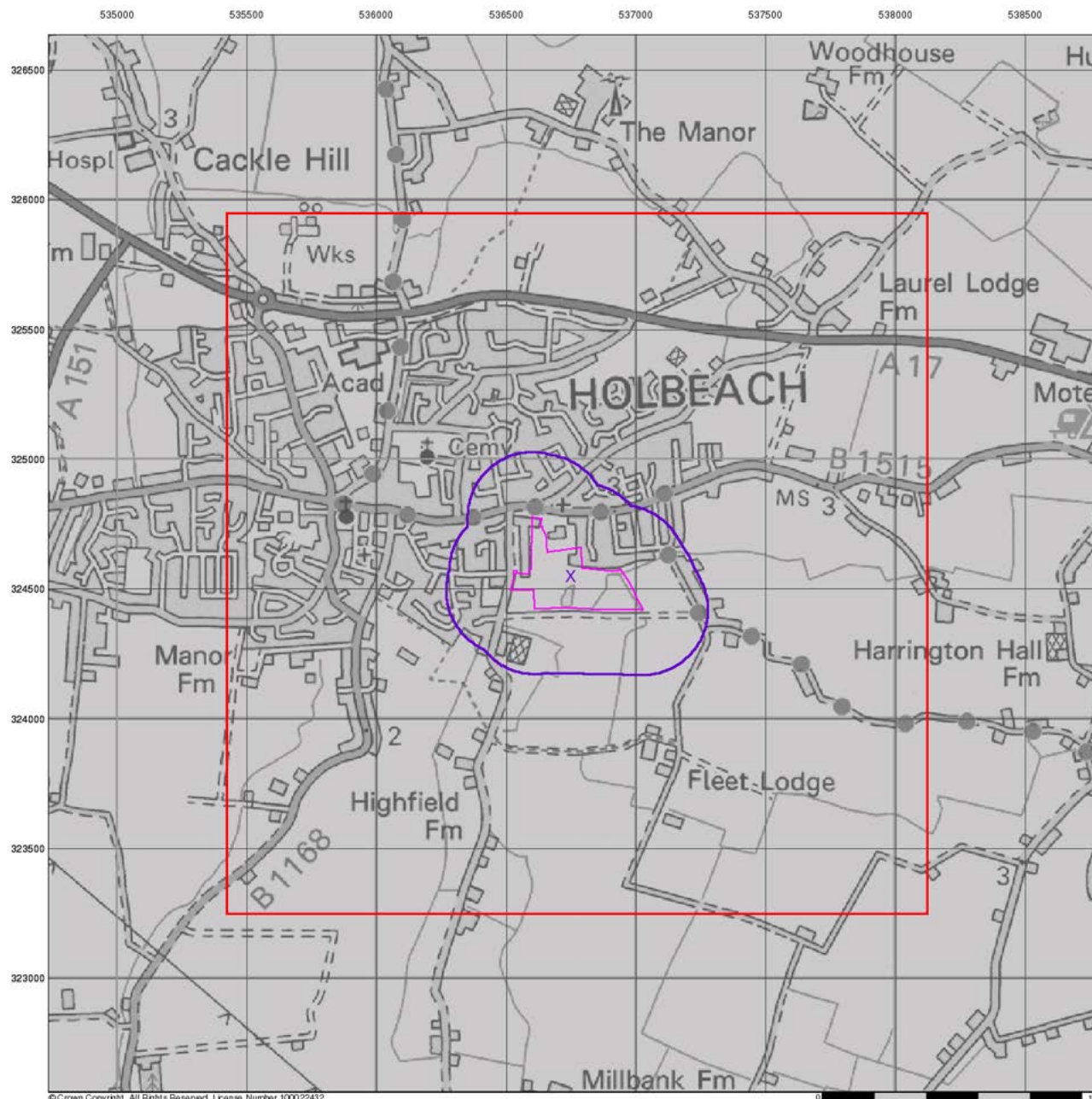
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 Customer Ref: D38108
 National Grid Reference: 536750, 324550
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 Site Area (Ha): 8.37
 Search Buffer (m): 250

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Superficial Aquifer Designation

General

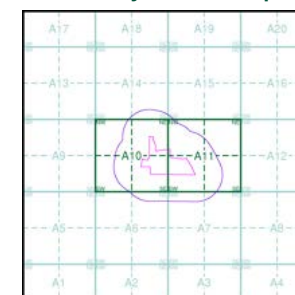
- ▮ Specified Site
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- X Bearing Reference Point
- ▮ Slice
- B Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

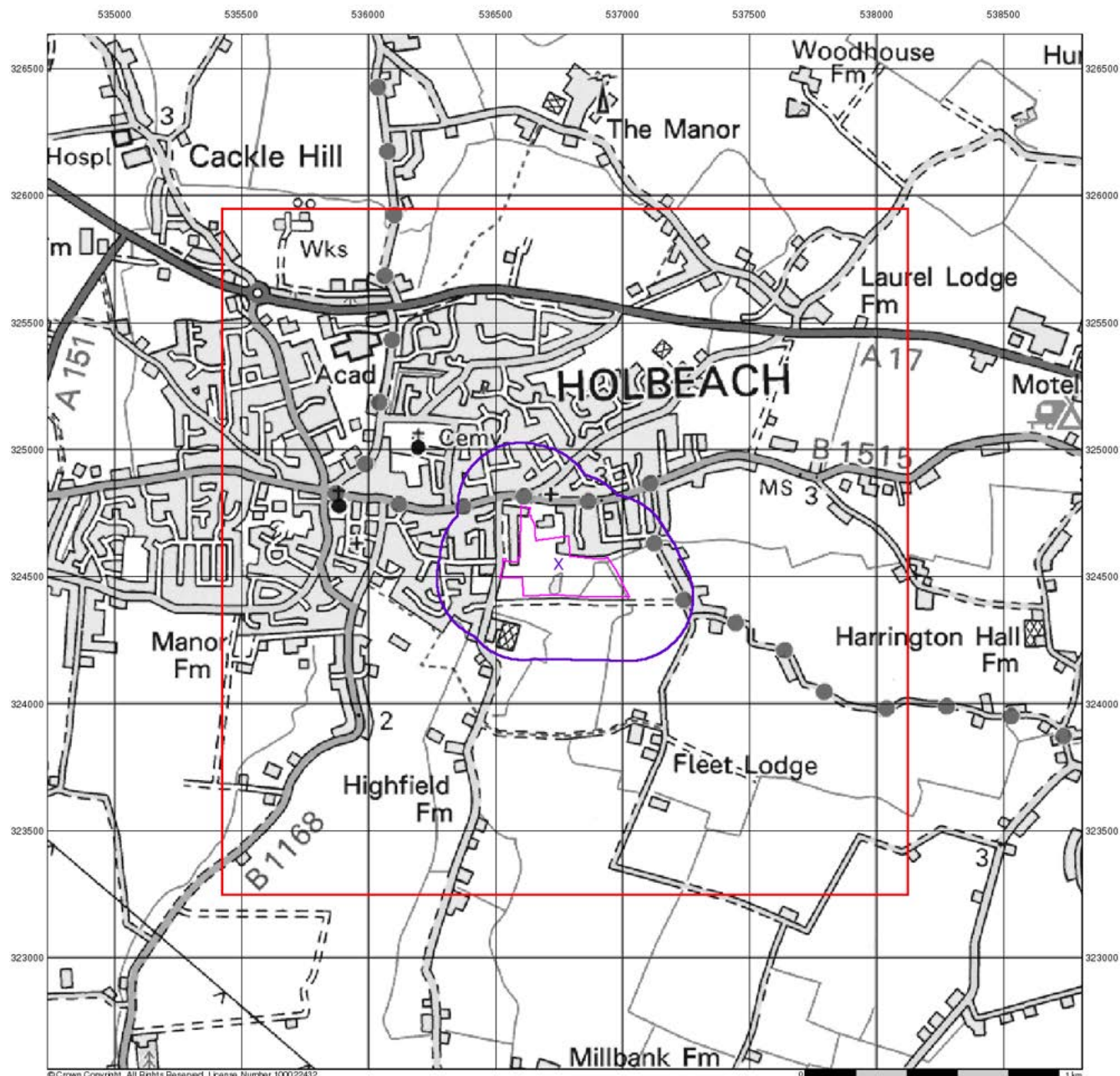
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 National Grid Reference: 536750, 324550
 Slice: A
 Site Area (Ha): 8.37
 Search Buffer (m): 250

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Source Protection Zones

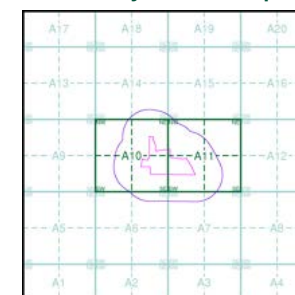
General

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

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



Order Details

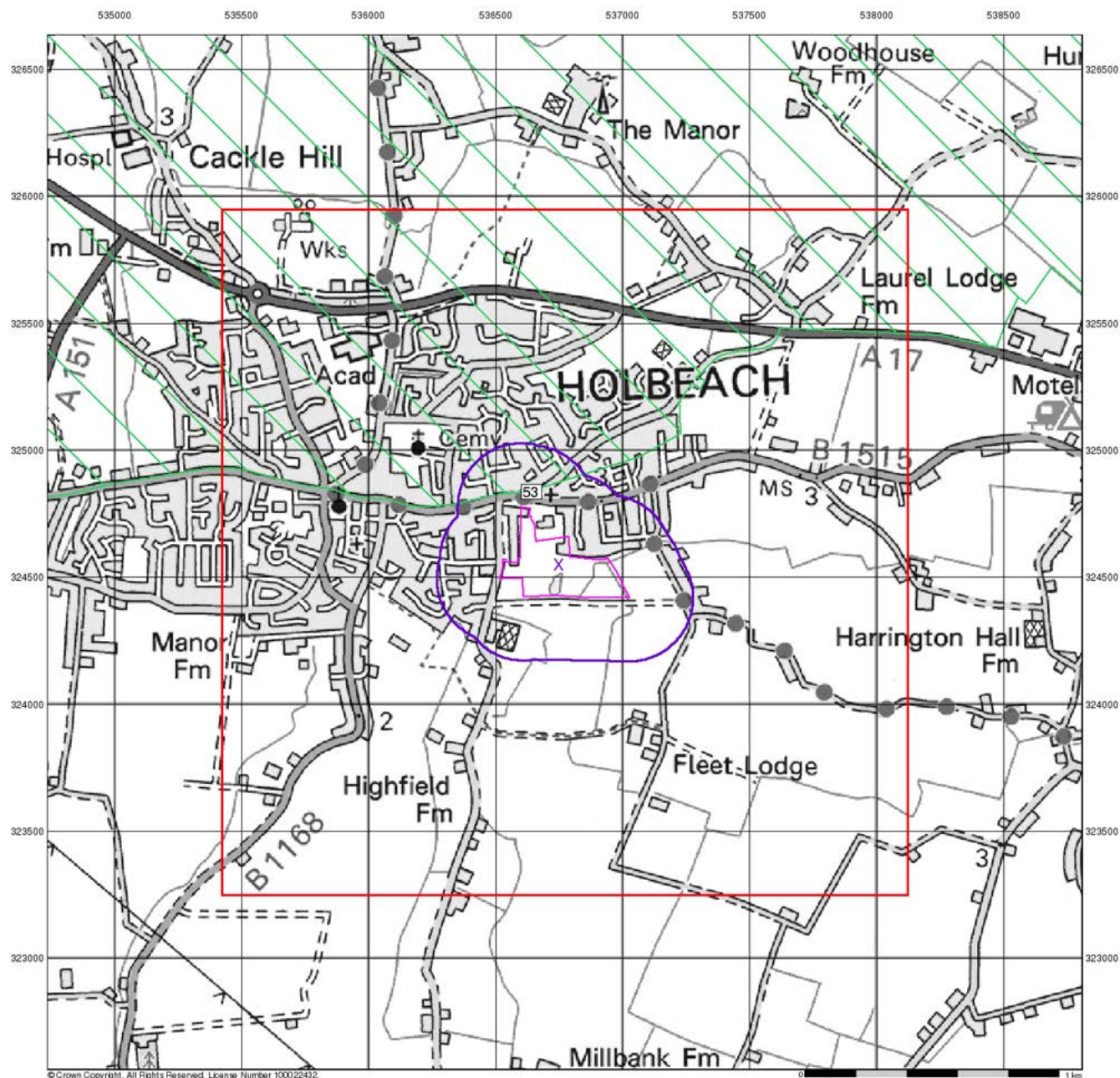
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 National Grid Reference: 536750, 324550
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 Site Area (Ha): 8.37
 Search Buffer (m): 250

Site Details

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GeoDyne

Sensitive Land Uses

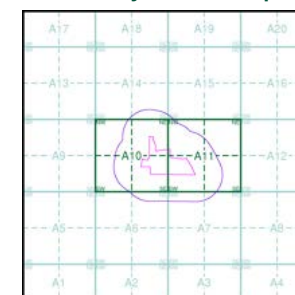
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A



Order Details

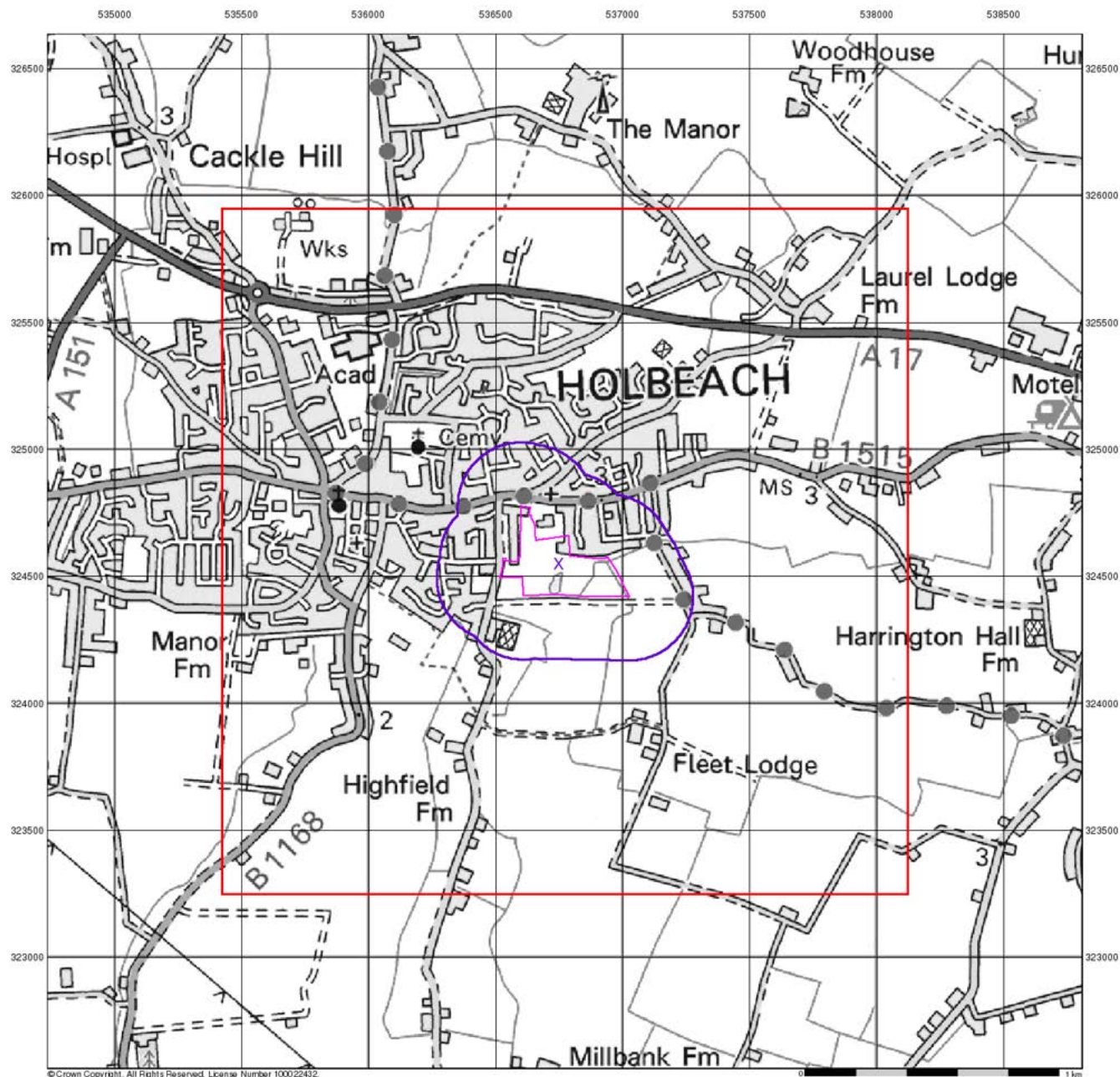
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 Slice: A
 Site Area (Ha): 8.37
 Search Buffer (m): 250

Site Details

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



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BGS Flood GFS Data

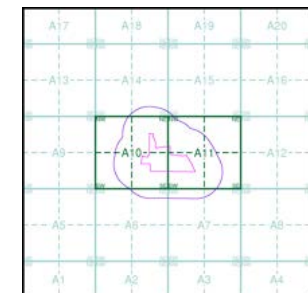
General

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

Agency and Hydrological (Flood)

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

Site Sensitivity Context Map - Slice A



Order Details

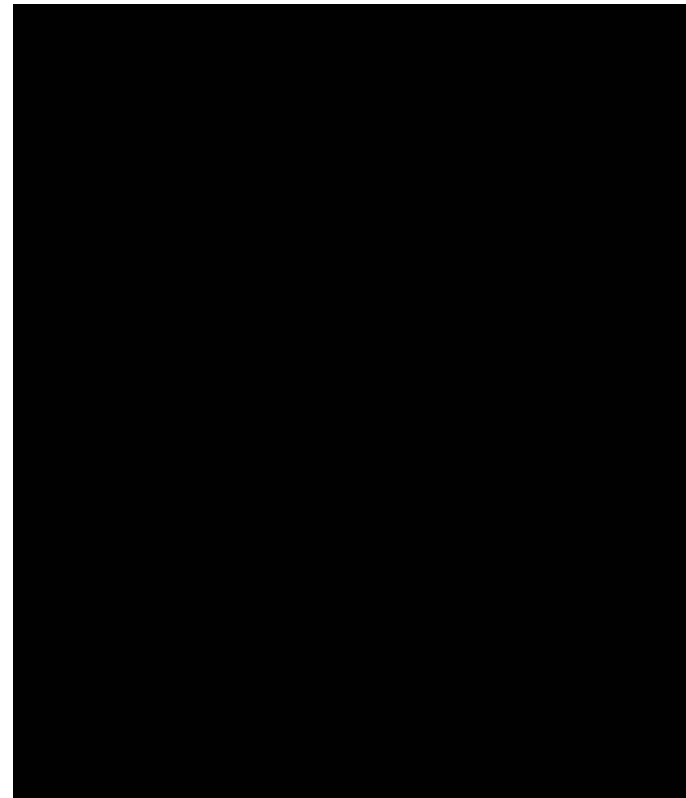
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Site Details

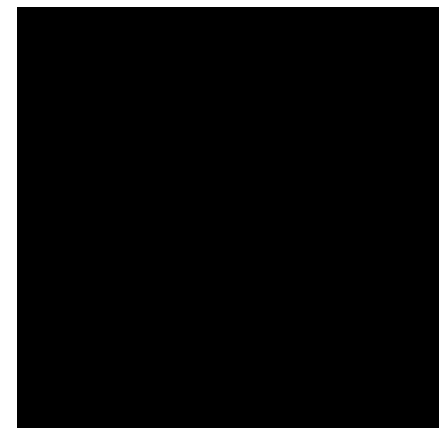
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 Fax: 0844 844 9951
 Web: www.envirocheck.co.uk



Estimated Soil Chemistry Arsenic - Slice A

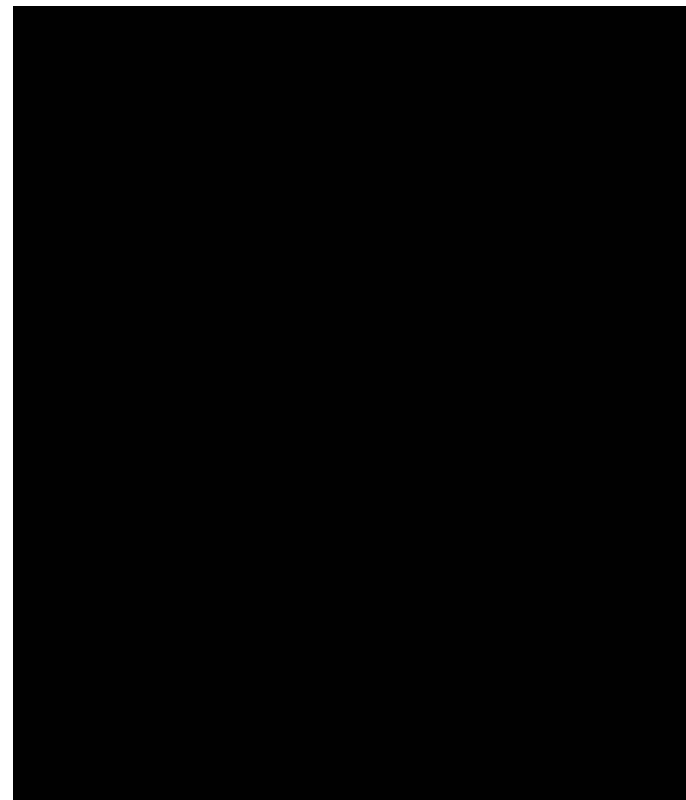


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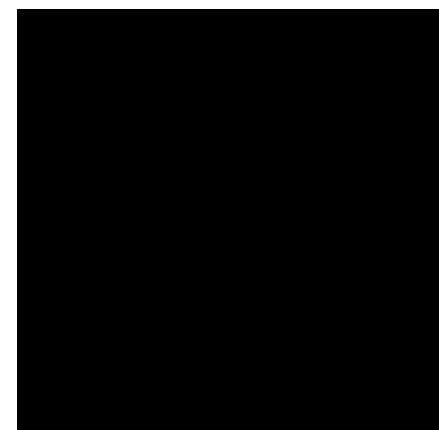
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National Grid Reference:	536750, 324550
Slice:	A
Site Area (Ha):	8.37
Search Buffer (m):	250

Site Details

Damgate, Holbeach



Estimated Soil Chemistry Cadmium - Slice A



Order Details

Order Details: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



Estimated Soil Chemistry Chromium - Slice A

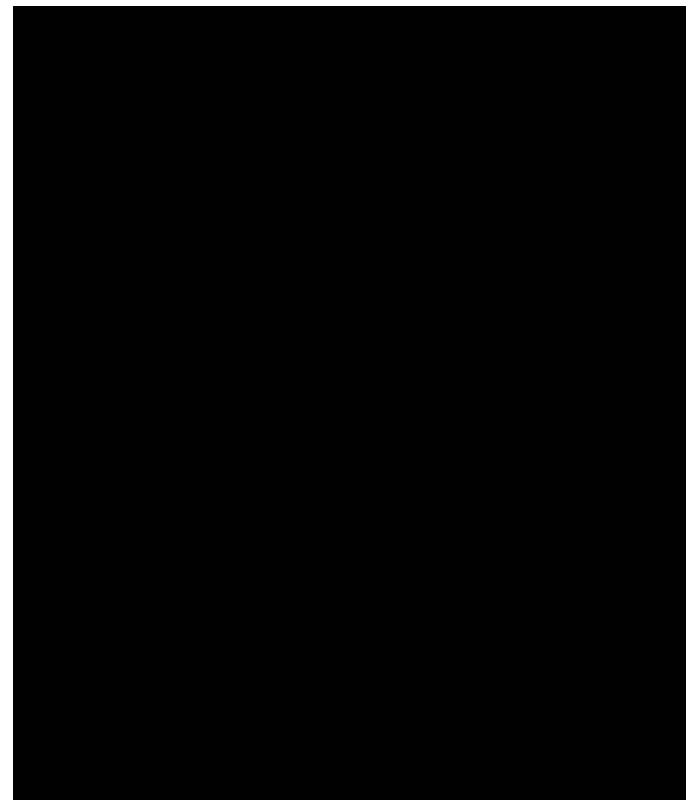


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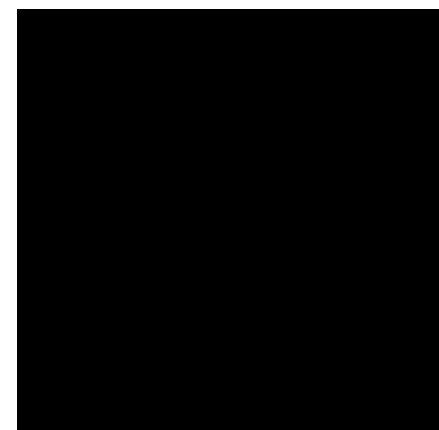
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Customer Ref: D38108
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Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



Estimated Soil Chemistry Lead - Slice A

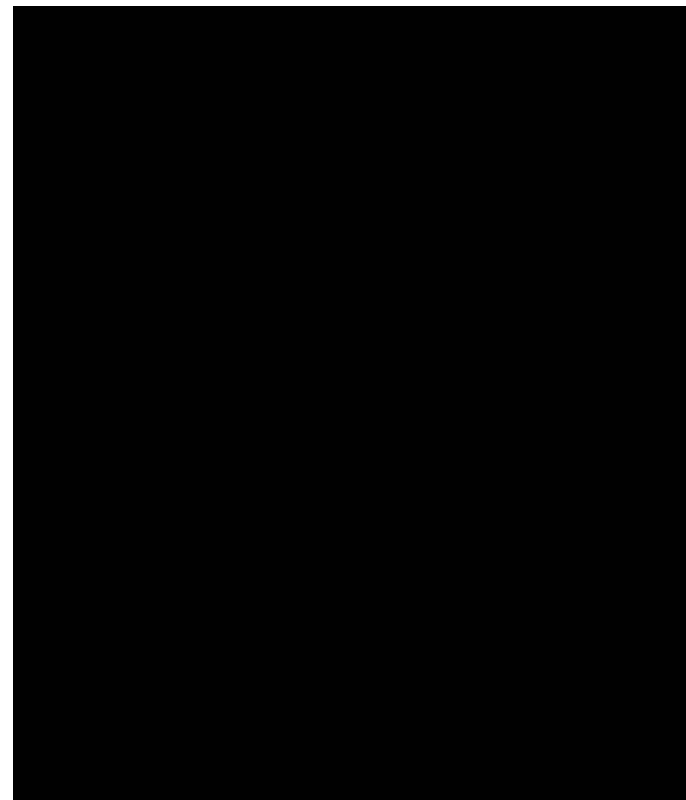


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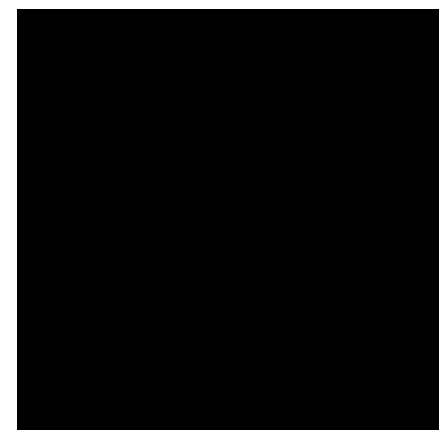
Order Details: 216516353_1_1
Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach



Estimated Soil Chemistry Nickel - Slice A



Order Details

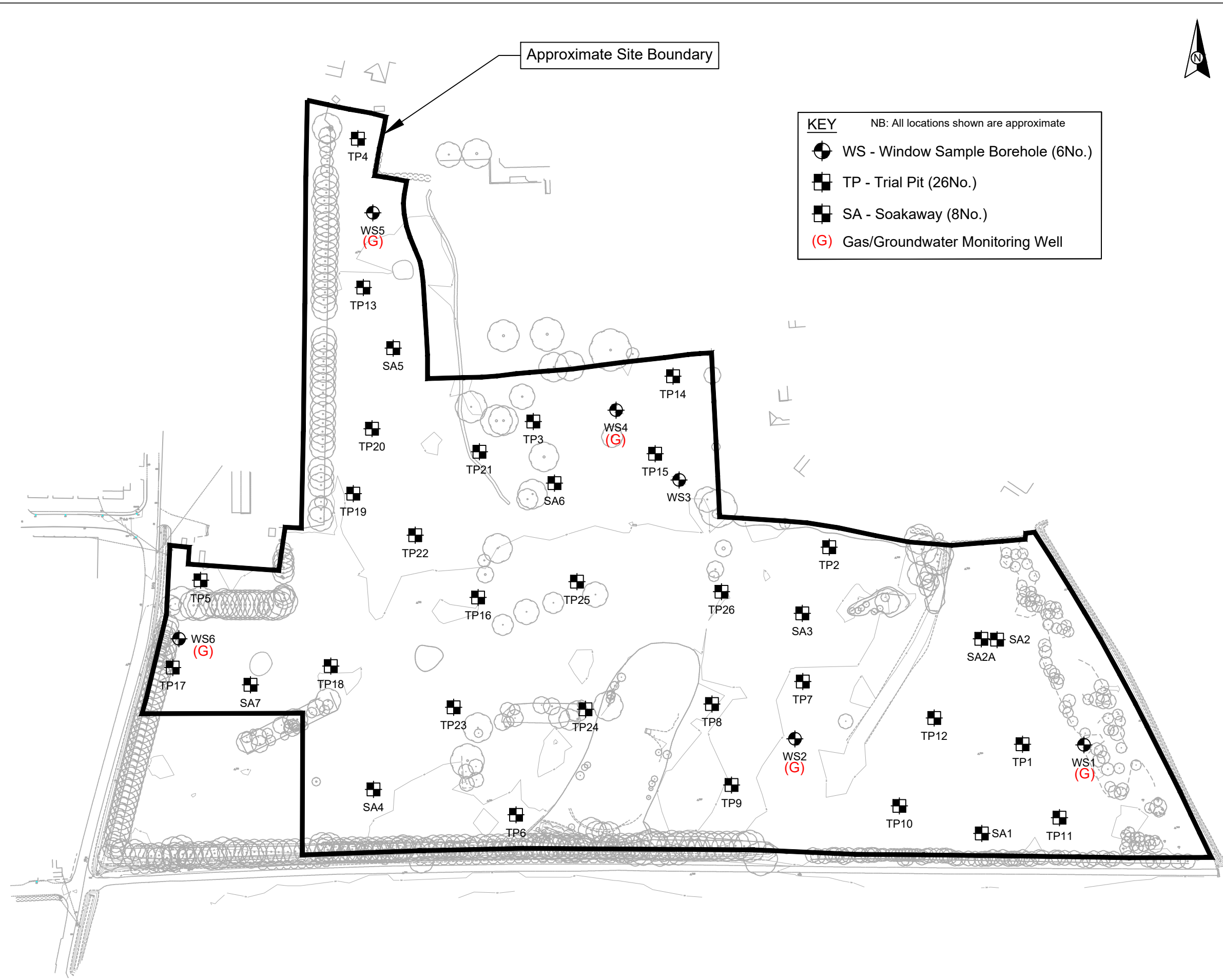
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Customer Ref: D38108
National Grid Reference: 536750, 324550
Slice: A
Site Area (Ha): 8.37
Search Buffer (m): 250

Site Details

Damgate, Holbeach

APPENDIX VII

**Exploratory Hole Location Plan
(Figure No. D38108/04)**



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Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Exploratory Hole Location Plan
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/04



Nottingham 0115 962 0001
Derby 01332 290 798
Warrington 01925 661739
info@geodyne.co.uk
www.geodyne.co.uk

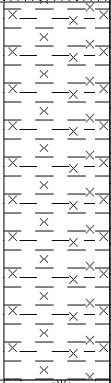
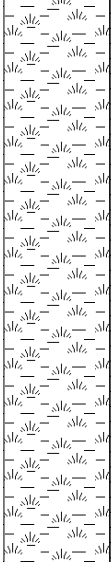
APPENDIX VIII

**Exploratory Hole Logs
(TP1 to TP26, SA1 to SA7, WS1 to WS6)**

**Project No: D38108**

Sheet 1 of 1

Remarks: 1.Sides collapsing to 1.30m when excavating below 2.80m. 2.No water encountered.				
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 ▽ = Water Strike (m) ▼ = Steady Water Level (m)				
Project: Dam Gate, Holbeach			Client: Ashwood Homes	
Logged: CB	Checked: DB	Field Book Ref: CB19/02	Plant: JCB 3CX	Drawing No. <div style="font-size: 2em; text-align: center;">TP1</div>
Date: 05/08/2019	Approved: PK		Scale: <div style="font-size: 1.5em; text-align: center;">1:25</div>	

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20	T2	D	In-Situ SV In-Situ SV	30 48 50 56 60 60	
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.25					
		0.70					
		0.80					
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		1.50			Ex-Situ SV	10 10 12	
		2.00					
End of Trial Pit at 3.40m		3.40					

Remarks:

- Sides generally stable.
- Slight water seepage at base of pit.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

05/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

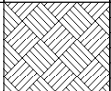
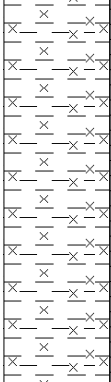
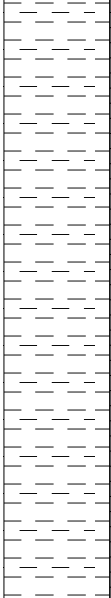
JCB 3CX

Scale:

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Drawing No.

TP2

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10	T3	D			
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.30					
		0.70			In-Situ SV	48 50 60	
		1.00			In-Situ SV	35 35 40	
Very soft dark grey CLAY (TIDAL FLAT DEPOSITS)		1.60			Ex-Situ SV	10 10 12	
		1.70					
							▼
End of Trial Pit at 3.60m		3.60					

Remarks:

- Sides generally stable.
- Slight water seepage at 2.00m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

05/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

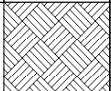
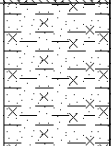
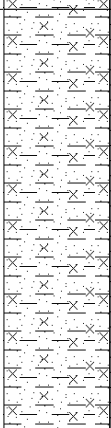
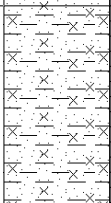
JCB 3CX

Scale:

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Drawing No.

TP3

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20 0.30	T4	D			
Firm brown very clayey sandy SILT (TIDAL FLAT DEPOSITS)		0.70 0.80 0.90			In-Situ SV	56 60 65	
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)					In-Situ SV	35 36 40	
Very soft grey silty sandy CLAY (TIDAL FLAT DEPOSITS)		2.20 2.30			Ex-Situ SV	10 14 14	
End of Trial Pit at 2.90m		2.90					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Scale:

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Drawing No.

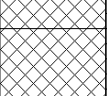
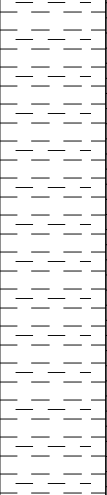
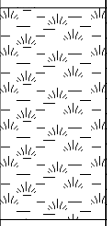
TP4

Date:

05/08/2019

Approved:

PK

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy slightly gravelly very clayey topsoil. Gravel is fine to coarse subrounded to subangular brick and quartzite (MADE GROUND - TOPSOIL)		0.10	T5	D			
Stiff brown silty gravelly clay with occasional tile fragments. Gravel is predominantly coarse clinker and brick (MADE GROUND)		0.40 0.50	T6	D			
Stiff grey mottled brown CLAY with occasional yellowish brown silty sand bands (TIDAL FLAT DEPOSITS)		0.70 1.00			In-Situ SV In-Situ SV	120+ 120+ 120+ 120+	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.20 2.30			Ex-Situ SV	18 20 25	
End of Trial Pit at 2.90m		2.90					

Remarks:

- Sides generally stable.
- Slight water seepage at 2.70m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

05/08/2019

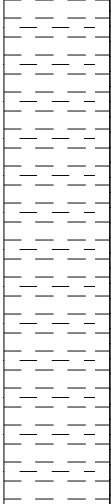
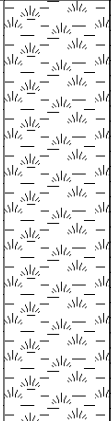
Approved:

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Scale:

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TP5

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10 0.20	T7	D			
Firm to stiff grey mottled brown CLAY with occasional yellowish brown silty sand bands (TIDAL FLAT DEPOSITS)		0.70 1.00			In-Situ SV In-Situ SV	68 72 74 70 73 76	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		1.90 2.10			Ex-Situ SV	12 16 32	
End of Trial Pit at 3.30m		3.30					

Remarks:

- Sides generally stable.
- Slight water seepage at 1.90m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

05/08/2019

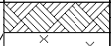
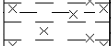
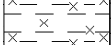
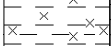
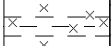
Approved:

PK

Scale:

1:25

TP6

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10					
Firm grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.40 - 0.90	LB2	LB			
...organic band with frequent shell fragments at 0.80m							
Very soft dark grey CLAY with frequent shelly fossils (TIDAL FLAT DEPOSITS)		2.10					▼
End of Trial Pit at 3.60m		3.60					

Remarks:

- Sides generally stable.
- Slight water seepage at 2.10m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

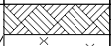
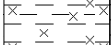
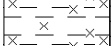
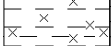
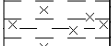
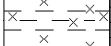
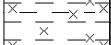
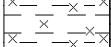
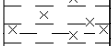
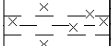
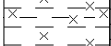
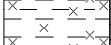
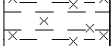
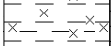
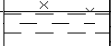
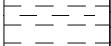
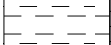
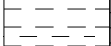
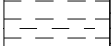
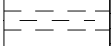
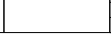
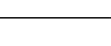
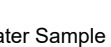
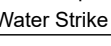
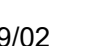
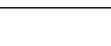
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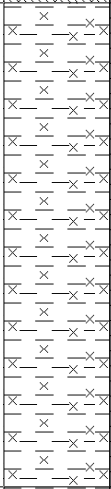
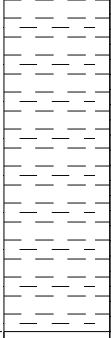
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Drawing No.

TP7

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10	T10	D			
Firm to stiff becoming stiff grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.70 - 1.20	B1	B	In-Situ SV	108 110 110	
		0.70					
		1.00			In-Situ SV	86 90 92	
...becoming less mottled with depth							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
							
					</		

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Stiff grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.60 - 1.10 0.70	LB3	LB	In-Situ SV	100 110 110	
		1.10 1.20 - 1.70	B2	B	In-Situ SV	100 84 85	
Soft grey mottled brown CLAY (TIDAL FLAT DEPOSITS)		1.80					
End of Trial Pit at 2.90m		2.90					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

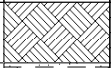
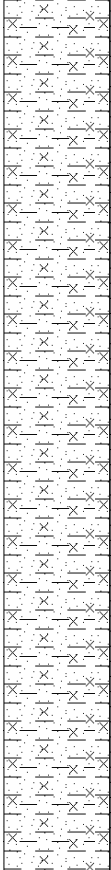
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Drawing No.

Scale:

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TP9

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		0.50 - 1.00	LB4	LB			
...becoming less clayey and greyish brown from 2.00m							
...becoming more sandy with depth							
End of Trial Pit at 3.10m		3.10					

Remarks:

- Sides collapsing to 1.20m when excavating below 2.80m.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

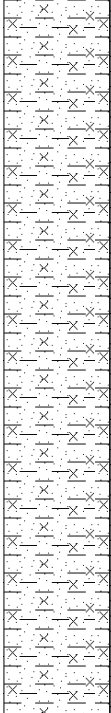
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Scale:

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Drawing No.

TP10

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		0.50 - 1.00	LB5	LB			
...becoming greyish brown from 1.30m							
...becoming less clayey with depth		2.00 - 2.50	B4	B			
End of Trial Pit at 2.60m		2.60					

Remarks:

- Sides collapsing to 1.30m when excavating below 2.50m.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

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Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

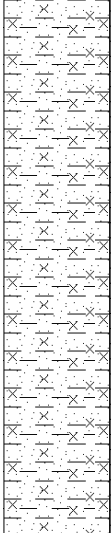
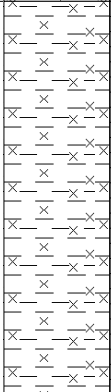
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Scale:

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Drawing No.

TP11

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		1.00 - 1.50	B3	B			
Soft grey silty CLAY with occasional shelly fossils (TIDAL FLAT DEPOSITS)		2.00					
End of Trial Pit at 3.30m		3.30					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

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Checked:

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Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

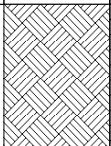
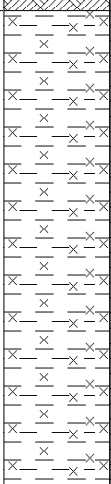
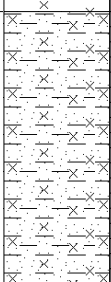
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Scale:

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Drawing No.

TP12

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)							
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.50 0.60 - 1.10 0.70	LB7	LB	In-Situ SV	44 45 48	
Very soft grey silty sandy CLAY (TIDAL FLAT DEPOSITS)		2.10 2.20	T11	D			
End of Trial Pit at 3.00m		3.00					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Scale:

1:25

Drawing No.

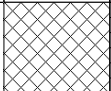
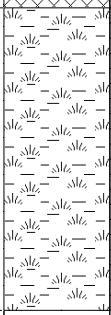
TP13

Date:

07/08/2019

Approved:

PK

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey topsoil (MADE GROUND - TOPSOIL)		0.10	T13	D	In-Situ SV	50 62 66	
Firm grey mottled brown slightly gravelly silty clay. Gravel is fine to coarse subrounded to angular brick (MADE GROUND) ...buried tree trunk in western face from 0.30m to 1.70m		0.30					
		0.70					
...pocket of made ground comprising slightly sandy slightly gravelly fibrous peat at 1.10m to 2.20m in western pit face. Gravel is fine to coarse subangular to angular brick, with occasional glass bottles, metal cans, wooden pieces and plastic sheeting		0.90 - 1.40	B6	B			
		2.00	T14	D			
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.20					
End of Trial Pit at 3.20m		3.20					

Remarks:

- Sides generally stable.
- Slight water seepage at 2.20m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

07/08/2019

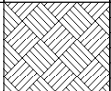
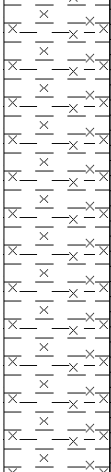
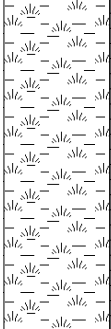
Approved:

PK

Scale:

1:25

TP14

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.30					
Soft to firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.60 - 1.10 0.70	LB8	LB	In-Situ SV	60	
		1.00			In-Situ SV	38 40 42	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		1.90 2.00			Ex-Situ SV	10 12 15	
End of Trial Pit at 3.00m		3.00					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

07/08/2019

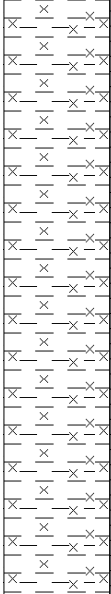
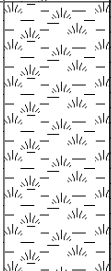
Approved:

PK

Scale:

1:25

TP15

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10 0.20	T15	D			
Firm becoming stiff grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.50 0.70 1.00 2.20	T16	D	In-Situ SV In-Situ SV	115 120+ 120+ 85 88 98	
Soft to firm dark grey and occasionally brown peaty CLAY (TIDAL FLAT DEPOSITS)		3.10					
End of Trial Pit at 3.10m							

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

07/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

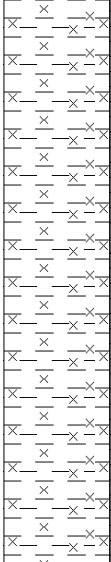
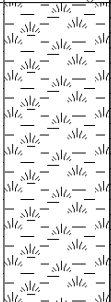
JCB 3CX

Drawing No.

Scale:

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TP16

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10 0.20	T17	D			
Stiff grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.60 - 1.10 0.70 1.00	LB9	LB	In-Situ SV In-Situ SV	120+ 120+ 120+	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.10 2.20			Ex-Situ SV	12 15 20	
End of Trial Pit at 3.10m		3.10					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

08/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

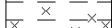
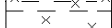
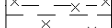
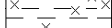
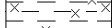
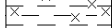
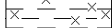
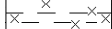
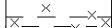
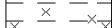
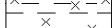
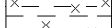
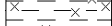
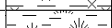
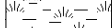
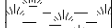
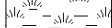
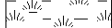
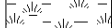
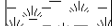
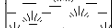
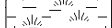
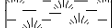
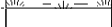
JCB 3CX

Scale:

1:25

Drawing No.

TP17

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)							
Firm to stiff becoming stiff grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.20	T18 LB10	D LB	In-Situ SV	65 70 80	
		0.40					
		0.50 - 1.00					
		0.70					
		1.00					
							
							
							
							
							
							
							
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.00					
							
							
							
							
							
							
							
							
							
							
							
End of Trial Pit at 3.10m		3.10					
							
							
							
							
							
							
							
							
							
							

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

TP18

Date:

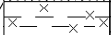
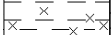
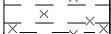
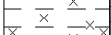
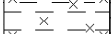
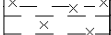
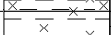
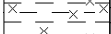
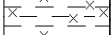
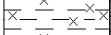
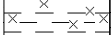
08/08/2019

Approved:

PK

Scale:

1:25

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10					
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)							
...becoming more silty with depth		0.70			In-Situ SV	65	
		0.80				70	
Firm grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		1.00			In-Situ SV	50	
						52	
						60	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.40 - 2.90	B7	B			
		2.40			Ex-Situ SV	18	
		2.50				20	
						22	
End of Trial Pit at 3.20m		3.20					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

TP19

Date:

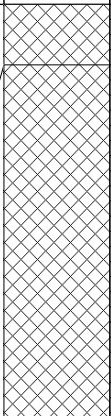
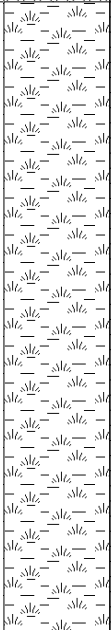
08/08/2019

Approved:

PK

Scale:

1:25

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy slightly gravelly very clayey topsoil. Gravel is fine to coarse subrounded to subangular brick and quartzite (MADE GROUND - TOPSOIL)		0.10	T19	D			
Firm brown slightly clayey silt (MADE GROUND)		0.20					
		0.50	T20	D			
		0.50 - 1.00	LB11	LB			
		0.70			In-Situ SV	30 32 32	
		1.00			In-Situ SV	38 40 40	
...~2.00m long metal pipe, frequent metal sheets and a piece of wood in a band at 1.20m to 1.40m							▼
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		1.40					
		1.50			Ex-Situ SV	12 16 20	
End of Trial Pit at 3.50m		3.50					

Remarks:

- Sides generally stable.
- Moderate perched water seepage at 1.30m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

08/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

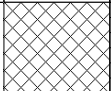
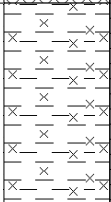
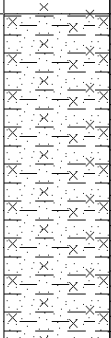
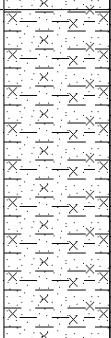
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Drawing No.

TP20

Scale:

1:25

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown sandy silty very clayey topsoil with occasional brick fragments (MADE GROUND - TOPSOIL)		0.10	T21	D			
Firm grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.30					
...becoming more silty with depth		0.60 - 1.00	LB12	LB	In-Situ SV	45 48 50	
Soft to firm grey mottled orange slightly sandy very silty CLAY (TIDAL FLAT DEPOSITS)		0.70			In-Situ SV	40 40 42	
		1.00					
Very soft grey silty sandy CLAY (TIDAL FLAT DEPOSITS)		2.10 2.20			Ex-Situ SV	15 20 30	
End of Trial Pit at 3.20m		3.20					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

08/08/2019

Approved:

PK

Scale:

1:25

TP21



9 Brunel Parkway, Pride Park, Derby DE24 8HR
Tel: 01332 290798
email: info@geodyne.co.uk

TP22

Project No: D38108

Sheet 1 of 1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.30	LB13	LB	In-Situ SV	55 60 60	
Firm grey mottled brown very silty CLAY (TIDAL FLAT DEPOSITS)		0.50 - 1.00					
		0.70					
		1.00			In-Situ SV	42 50 50	
		1.40 1.50			Ex-Situ SV	30 30 32	
Very soft dark grey CLAY (TIDAL FLAT DEPOSITS)		2.70					
End of Trial Pit at 2.70m							

Remarks:

- Sides generally stable.
- No water encountered.

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 = Water Strike (m) = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

08/08/2019

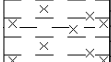
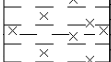
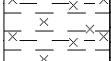
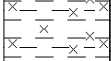
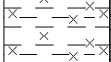
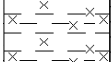
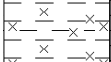
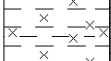
Approved:

PK

Scale:

1:25

TP22

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.70			In-Situ SV	52	
...becoming softer with depth		0.80			In-Situ SV	55	
...frequent shell fragments from 1.20m		1.20 - 1.70	B8	B		60	
		1.40			Ex-Situ SV	58	
						62	
						64	
Very soft grey very peaty CLAY (TIDAL FLAT DEPOSITS)		2.00					
		2.10			Ex-Situ SV	18	
						20	
						22	
End of Trial Pit at 3.60m		3.60					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

08/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

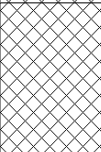
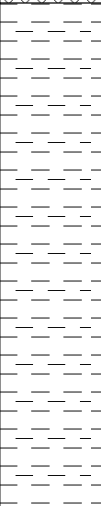
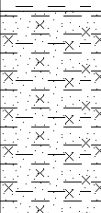
JCB 3CX

Drawing No.

TP23

Scale:

1:25

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy slightly gravelly very clayey topsoil. Gravel is fine to coarse subrounded to subangular brick and quartzite (MADE GROUND - TOPSOIL)		0.10 0.20	T22	D			
Firm grey mottled brown silty clay with occasional fine to medium subangular to angular brick fragments (MADE GROUND)		0.40 0.40 - 0.70 0.60 0.70 0.80	LB14 T23	D LB	In-Situ SV In-Situ SV	26 28 30 68 70 72	
Firm grey mottled brown CLAY with occasional yellowish brown silty sand bands (TIDAL FLAT DEPOSITS)							
Very soft grey silty sandy CLAY (TIDAL FLAT DEPOSITS)		2.40 2.50			Ex-Situ SV	10 12 18	
End of Trial Pit at 3.10m		3.10					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

08/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

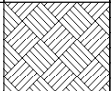
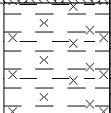
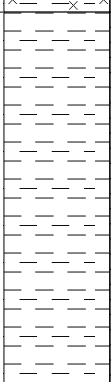
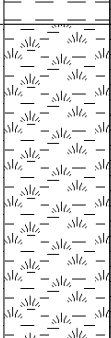
JCB 3CX

Scale:

1:25

Drawing No.

TP24

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.30 - 0.70	LB15	LB			
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.30					
Firm to stiff grey mottled brown CLAY with occasional yellowish brown silty sand bands (TIDAL FLAT DEPOSITS)		0.70			In-Situ SV	50 58 62	
		1.00			In-Situ SV	60 64 72	
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.00 2.10			Ex-Situ SV	12 16 20	
End of Trial Pit at 3.10m		3.10					▼

Remarks:

- Sides generally stable.
- Very slight water seepage at 2.90m.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Drawing No.

Date:

08/08/2019

Approved:

PK

Scale:

1:25

TP25



Project No: D38108

Sheet 1 of 1

Remarks:

- 1.Sides generally stable.
- 2.Slight water seepage at 2.20m.

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 ▽ = Water Strike (m) ▼ = Steady Water Level (m)

TP26

**Project No:** D38108

Sheet 1 of 1

Remarks:

1.Sides generally stable.

2.No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

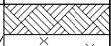
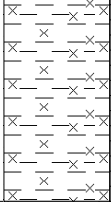
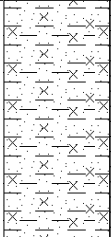
Logged: CB	Checked: DB
Date: 06/08/2019	Approved: PK

CB19/02

Plant:	JCB 3CX
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Scale: 1:25

SA1

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10					
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.80					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		1.60					
End of Trial Pit at 1.60m							

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

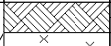
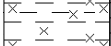
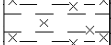
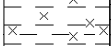
JCB 3CX

Scale:

1:25

Drawing No.

SA2

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.10	LB1	LB			
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.50 - 0.80					
...becoming more silty with depth		0.80					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		2.10					
End of Trial Pit at 2.10m							

Remarks:

- Sides collapsing to 1.40m when excavating below 1.90m.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

06/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

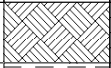
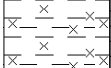
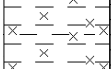
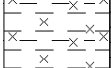
JCB 3CX

Scale:

1:25

Drawing No.

SA2A

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20	T9	D	In-Situ SV	40 44 50	
Firm brown and grey very silty CLAY (TIDAL FLAT DEPOSITS)		0.50					
		0.80					
		0.90					
End of Trial Pit at 0.90m							

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Plant:

JCB 3CX

Scale:

1:25

Drawing No.

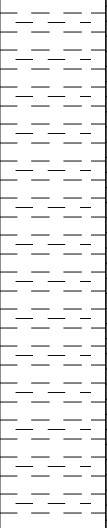
SA3

Date:

06/08/2019

Approved:

PK

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Stiff grey mottled brown CLAY with occasional yellowish brown silty sand bands (TIDAL FLAT DEPOSITS)		0.50 - 1.00	LB6	LB			
Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.00					▼
End of Trial Pit at 2.20m		2.20					

Remarks:

- Sides generally stable.
- Slight water seepage at 2.10m.

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  = Water Strike (m)  = Steady Water Level (m)

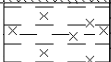
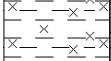
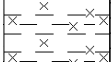
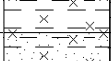
Project:

Dam Gate, Holbeach

Client:

Ashwood Homes

Logged: CB	Checked: DB	Field Book Ref: CB19/02	Plant: JCB 3CX	Drawing No. SA4
Date: 07/08/2019	Approved: PK		Scale: 1:25	

Description of Strata	Legend	Depth (m)	Sample Ref	Sample Type	Field Test Type	Field Test Result	Ground-water
Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20					
Firm grey mottled brown silty CLAY (TIDAL FLAT DEPOSITS)		0.70					
Firm brown slightly clayey very sandy SILT (TIDAL FLAT DEPOSITS)		0.90					
		1.50 - 2.00	B5	B	In-Situ SV	42 45 48	
End of Trial Pit at 2.00m		2.00					

Remarks:

- Sides generally stable.
- No water encountered.

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  = Water Strike (m)  = Steady Water Level (m)

Project:

Dam Gate, Holbeach

Logged:

CB

Checked:

DB

Field Book Ref:

CB19/02

Date:

07/08/2019

Approved:

PK

Client:

Ashwood Homes

Plant:

JCB 3CX

Scale:

1:25

Drawing No.

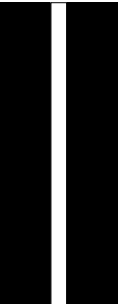
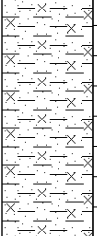
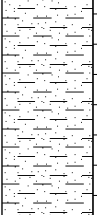
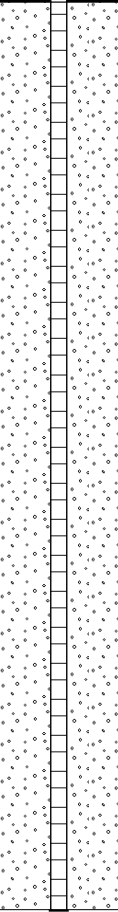
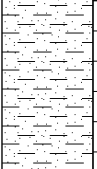
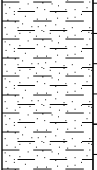
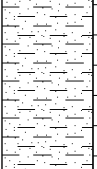
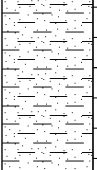
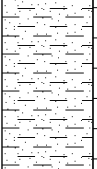
SA5

**Project No:** D38108

Sheet 1 of 1

Remarks: 1.Sides generally stable. 2.No water encountered.				
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 ▽ = Water Strike (m) ▼ = Steady Water Level (m)				
Project: Dam Gate, Holbeach			Client: Ashwood Homes	
Logged: CB	Checked: DB	Field Book Ref: CB19/02	Plant: JCB 3CX	Drawing No. SA6
Date: 07/08/2019	Approved: PK		Scale: 1:25	

SA7

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.70 - 1.00	B	B10	10	Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20			
				Firm brown clayey slightly sandy SILT (TIDAL FLAT DEPOSITS)		(0.80)			
				...becoming less clayey with depth		1.00			
1.00 - 1.45 1.10	C D	T24	5	Firm brown damp sandy SILT. Sand is predominantly fine grained (TIDAL FLAT DEPOSITS)					
2.00 - 2.45	C								
				...becoming grey and very soft from 2.50m					
3.00 - 3.45	C		0			(4.00)			
4.00 - 4.45	C		1	...becoming more sandy with depth; very silty fine SAND from 4.00m					
5.00 - 5.45	C		15						
				End of Borehole at 5.00m		5.00			

Remarks

1. Borehole cased to 4.00m. Sides generally stable.
2. Slight water seepage at 1.40m and 2.00m.
3. Plain pipe installed from ground level to 1.00m in a bentonite surround. Slotted pipe installed from 1.00m to 4.00m in a gravel surround.
4. Bung, valve and lockable cover installed.

Key

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample

S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
 = Water Strike (m)
 = Steady Water Level (m)

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref:

Plant: Competitor Rig

Drawing Ref:

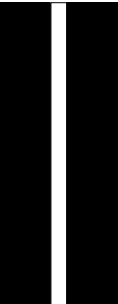
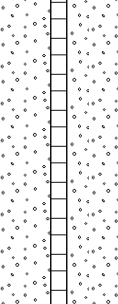
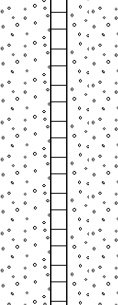
Date: 12/08/2019

Approved: PK

CB19/02

Scale: 1:25

WS1

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
1.00 - 1.45	C	T25	7	Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		0.20	2.00		
				Firm brown mottled grey slightly sandy slightly silty CLAY (TIDAL FLAT DEPOSITS)					
2.00	D								
2.00 - 2.45	C		0	...becoming softer with depth		(2.20)			
3.00 - 3.45	C		0	Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.40			
4.00 - 4.45	C		0			(2.60)			
5.00 - 5.45	C		4						
				End of Borehole at 5.00m		5.00			

Remarks

1.Borehole cased to 2.00m. Sides generally stable.
2.No water encountered.
3.Plain pipe installed from ground level to 1.00m in a bentonite surround. Slotted pipe installed from 1.00m to 5.00m in a gravel surround.
4.Bung, valve and lockable cover installed.

Key

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample

S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
 = Water Strike (m)
 = Steady Water Level (m)

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref:

Plant: Competitor Rig

Drawing Ref:

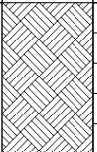
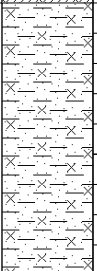
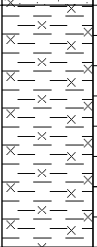
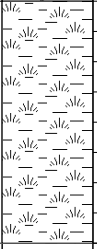
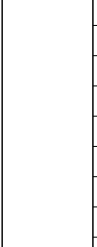
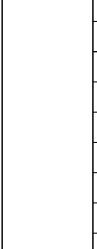
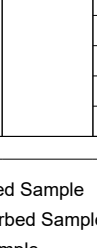
Date: 12/08/2019

Approved: PK

CB19/02

Scale: 1:25

WS2

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.30	D	T26		Brown slightly silty slightly sandy gravelly very clayey TOPSOIL. Gravel is fine to coarse subrounded to subangular quartzite (TOPSOIL)		(0.50)			
0.60	D	T27		Firm brown mottled grey slightly sandy slightly silty CLAY (TIDAL FLAT DEPOSITS)		0.50			
				...very silty between 1.00m and 1.40m		(0.90)			
				Firm brown mottled grey slightly silty CLAY (TIDAL FLAT DEPOSITS)		1.40			
						(0.80)			
				Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.20			
						(0.80)			
				End of Borehole at 3.00m		3.00			

Remarks

1.Sides generally stable.
2.No water encountered.

Key

D = Disturbed Sample
U = Undisturbed Sample
B = Bulk Sample
J = Jar Sample
V = Vial Sample
W = Water Sample

S = Standard Penetration Test (Split Spoon)
C = Standard Penetration Test (Cone)
 = Water Strike (m)
 = Steady Water Level (m)

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref:

Plant: Competitor Rig

Drawing Ref:

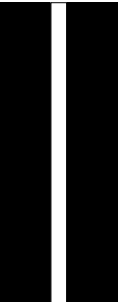
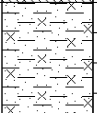
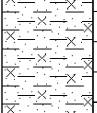
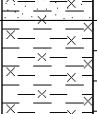
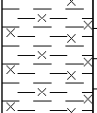
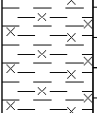
Date: 12/08/2019

Approved: PK

CB19/02

Scale: 1:25

WS3

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
1.00 - 1.45	C	B11	3	Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		(0.30)	2.00		
				Firm brown mottled grey slightly sandy slightly silty CLAY (TIDAL FLAT DEPOSITS)		0.30			
						(0.80)			
2.00 - 2.45	C	B11	0	... becoming softer with depth		1.10			
2.20 - 2.70	B					(1.60)			
2.50	D	T28	0	Very soft dark grey peaty CLAY (TIDAL FLAT DEPOSITS)		2.70			
3.00 - 3.45	C					(2.30)			
4.00 - 4.45	C		0	...grey from 4.40m					
				...very silty from 4.80m					
End of Borehole at 5.00m						5.00			

Remarks

1.Borehole cased to 2.00m. Sides generally stable.
2.No water encountered.
3.Plain pipe installed from ground level to 1.00m in a bentonite surround. Slotted pipe installed from 1.00m to 5.00m in a gravel surround.
4.Bung, valve and lockable cover installed.

Key

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

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref: CB19/02

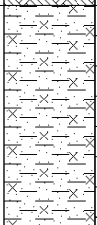
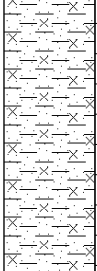
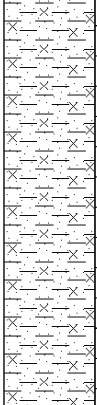
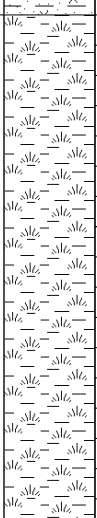
Plant: Competitor Rig

Drawing Ref: WS4

Date: 12/08/2019

Approved: PK

Scale: 1:25

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation	
Depth (m)	Type	Sample Ref	SPT "N" Value							
1.00 1.00 - 1.45	D C	T29	5	Brown slightly sandy silty very clayey TOPSOIL (TOPSOIL)		(0.30)				
				Firm brown slightly sandy very silty CLAY (TIDAL FLAT DEPOSITS)		0.30				
2.00 - 2.45	C		0	...occasionally very clayey silt		(3.00)	3.00			
				...becoming very silty and sandy from 2.00m						
3.00 - 3.45	C		0	...becoming soft and grey from 2.50m		3.30				
				Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		(1.70)				
4.00 - 4.45	C		0							
End of Borehole at 5.00m						5.00				

Remarks

1.Borehole cased to 3.00m. Sides generally stable.
2.No water encountered.
3.Plain pipe installed from ground level to 1.00m in a bentonite surround. Slotted pipe installed from 1.00m to 5.00m in a gravel surround.
4.Bung, valve and lockable cover installed.

Key

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

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref:

Plant: Competitor Rig

Drawing Ref:

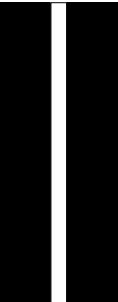
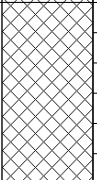
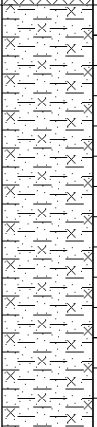
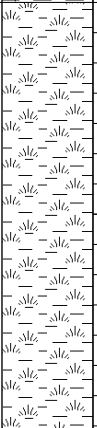
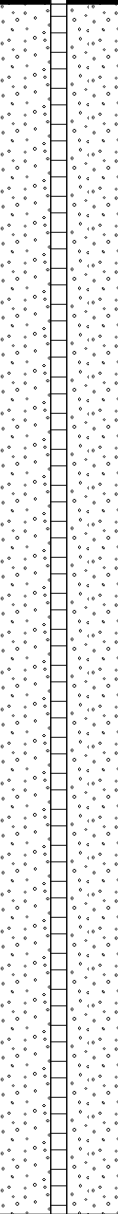
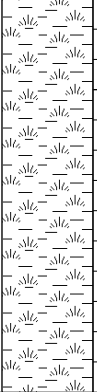
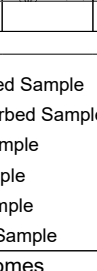
Date: 12/08/2019

Approved: PK

CB19/02

Scale: 1:25

WS5

Samples and Tests				Description of Strata	Legend	Depth & (Thickness) (m)	Casing (m)	Ground-water	Installation
Depth (m)	Type	Sample Ref	SPT "N" Value						
0.20	D	T30		Brown slightly sandy slightly gravelly very clayey topsoil. Gravel is fine to coarse subrounded to subangular brick and quartzite (MADE GROUND - TOPSOIL)		(0.30)			
0.60	D	T31		Stiff brown slightly sandy slightly gravelly silty sandy topsoil mixed with brown sandy silt. Gravel is fine to coarse subrounded to subangular brick and quartzite (MADE GROUND)		0.30 (0.60)			
1.00 - 1.45 1.00 - 1.50	C B	B12	6	Firm brown slightly sandy silty CLAY with occasional grey silty sand bands (TIDAL FLAT DEPOSITS)		0.90 (1.40)			
2.00 - 2.45	C		4	...becoming less silty with depth		2.30			
3.00 - 3.45	C		0	Very soft grey peaty CLAY (TIDAL FLAT DEPOSITS)		(2.70)		▼	
4.00 - 4.45	C		1	...becoming very silty from 4.70m		4.00		▼	
5.00 - 5.45	C		0	End of Borehole at 5.00m		5.00			

Remarks

1. Borehole cased to 4.00m. Sides generally stable.
2. Slight water seepages at 3.00m and 4.00m.
3. Plain pipe installed from ground level to 1.00m in a bentonite surround. Slotted pipe installed from 1.00m to 5.00m in a gravel surround.
4. Bung, valve and lockable cover installed.

Key

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

Project: Dam Gate, Holbeach

Client: Ashwood Homes

Logged: CB

Checked: DB

Field Book Ref: CB19/02

Plant: Competitor Rig

Drawing Ref: WS6

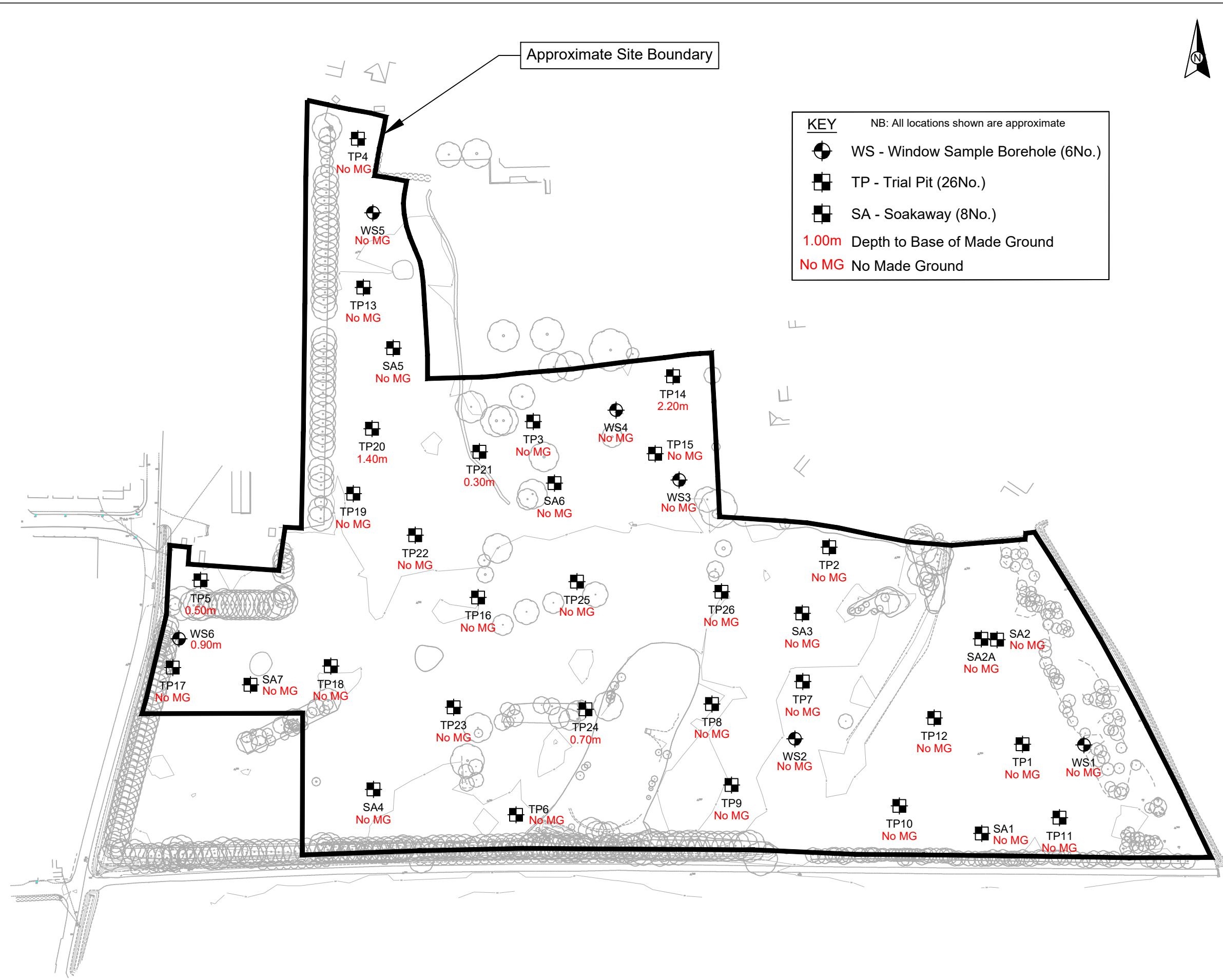
Date: 12/08/2019

Approved: PK

Scale: 1:25

APPENDIX IX

**Plan Showing Depth to Base of Made Ground
(Figure No. D38108/05)**



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Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Plan Showing Depth to Base of Made Ground
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/05



Nottingham 0115 962 0001
Derby 01332 290 798
Warrington 01925 661739
info@geodyne.co.uk
www.geodyne.co.uk

APPENDIX X

Plates



Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP1	Rev.	
		Plate No.	1





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP1	Rev.	
		Plate No.	2





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP2	Rev.	
		Plate No.	3





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP2	Rev.	
		Plate No.	4





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
		Rev.	
Title	Views of peaty clay from Trial Pit TP2	Plate No.	5





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP3	Rev.	
		Plate No.	6





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP3	Rev.	
		Plate No.	7





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP4	Rev.	
		Plate No.	8





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP4	Rev.	
		Plate No.	9





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP5	Rev.	
		Plate No.	10





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP5	Rev.	
		Plate No.	11





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP6	Rev.	
		Plate No.	12





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP6	Rev.	
		Plate No.	13





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP7	Rev.	
		Plate No.	14





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Arisings from Trial Pit TP7	Rev.	
		Plate No.	15





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP14	Rev.	
		Plate No.	16





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
		Rev.	
Title	View of peat Made Ground pocket from Trial Pit TP14 in western pit face	Plate No. 17	





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
		Rev.	
Title	Selected views of Made Ground from Trial Pit TP14	Plate No. 18	





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP20	Rev.	
		Plate No.	19





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
		Rev.	
Title	View of metal and wooden pieces from Made Ground within TP20	Plate No. 20	





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Trial Pit TP21	Rev.	
		Plate No.	21





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
		Rev.	
Title	Recovered Arisings from Trial Pit TP21	Plate No. 22	





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS1	Rev.	
		Plate No.	23





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	DB
		Approved	PK
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS2	Rev.	
		Plate No.	24





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS3	Rev.	
		Plate No.	25





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	DB
		Approved	PK
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS4	Rev.	
		Plate No.	26





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS5	Rev.	
		Plate No.	27





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Recovered Cores from Borehole WS6	Rev.	
		Plate No.	28





Project No.	D38108	Drawn	CB
Client	Ashwood Homes	Checked	<i>DB</i>
		Approved	<i>PK</i>
Project	Dam Gate Holbeach	Scale	NTS
		Date Drawn	19.09.19
Title	Soakaway Test Pit SA6 - During soakaway testing	Rev.	
		Plate No.	29



APPENDIX XI

Laboratory Soil Test Results



LABORATORY REPORT



4043

Contract Number: PSL19/5596

Report Date: 25 September 2019

Client's Reference: D38108

Client Name: Geodyne Derby
9 Brunel Parkway
Pride Park
Derby
DE24 8HR

For the attention of: Chris Bowley

Contract Title: Dam Gate, Holbeach

Date Received: 18/9/2019

Date Commenced: 18/9/2019

Date Completed: 25/9/2019

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 other than in full, without the prior written approval of the laboratory.

Checked and Approved Signatories:

R Gunson
(Director)

L Knight
(Senior Technician)

A Watkins
(Director)

S Eyre
(Senior Technician)

R Berriman
(Quality Manager)

S Royle
(Laboratory Manager)

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Page 1 of

SUMMARY OF LABORATORY SOIL DESCRIPTIONS

Hole Number	Sample Number	Sample Type	Top Depth m	Base Depth m	Description of Sample
SA2A	1	LB	0.50	0.80	Brown sandy CLAY.
TP7	2	LB	0.40	0.90	Brown sandy CLAY.
TP9	3	LB	0.60	1.10	Brown mottled grey sandy CLAY.
TP10	4	LB	0.50	1.00	Brown mottled grey slightly clayey SILT.
TP11	5	LB	0.50	1.00	Brown slightly clayey SILT.
SA4	6	LB	0.50	1.00	Brown slightly sandy CLAY.
TP13	7	LB	0.60	1.10	Brown CLAY.
TP15	8	LB	0.60	1.10	Brown slightly sandy CLAY.
TP17	9	LB	0.60	1.10	Brown sandy CLAY.
TP18	10	LB	0.50	1.00	Brown sandy CLAY.
TP20	11	LB	0.50	1.00	MADE GROUND brown slightly sandy clay.
TP21	12	LB	0.60	1.00	Brown slightly sandy CLAY.
TP22	13	LB	0.50	1.00	Brown sandy CLAY.
TP24	14	LB	0.40	0.70	MADE GROUND brown mottled grey slightly gravelly clay.
TP25	15	LB	0.30	0.70	Brown mottled grey sandy CLAY.
TP26	16	LB	0.40	0.80	Brown mottled grey CLAY.
TP8	1	B	0.70	1.20	Brown sandy CLAY.
TP12	3	B	1.00	1.50	Brown very sandy slightly clayey SILT.
TP11	4	B	2.00	2.50	Brown slightly clayey very silty SAND.



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SUMMARY OF LABORATORY SOIL DESCRIPTIONS

[illegible]

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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
TP8	1	B	0.70	1.20	21			46	22	24	100	Intermediate plasticity CI.
TP12	3	B	1.00	1.50	28				NP			
TP11	4	B	2.00	2.50	30				NP			
SA5	5	B	1.50	2.00	30			39	23	16	100	Intermediate plasticity CI.
TP14	6	B	0.90	1.40	31			51	25	26	100	High plasticity CH.
TP19	7	B	2.40	2.90	76			103	39	64	100	Extremely high plasticity CE.
TP23	8	B	1.20	1.70	45			61	27	34	98	High plasticity CH.
TP26	9	B	0.90	1.40	36			57	25	32	96	High plasticity CH.
WS6	12	B	1.00	1.50	24			37	20	17	100	Intermediate plasticity CI.
WS5	29	T	0.80	1.00	27				NP			

SYMBOLS : NP : Non Plastic

* : Liquid Limit and Plastic Limit Wet Sieved.



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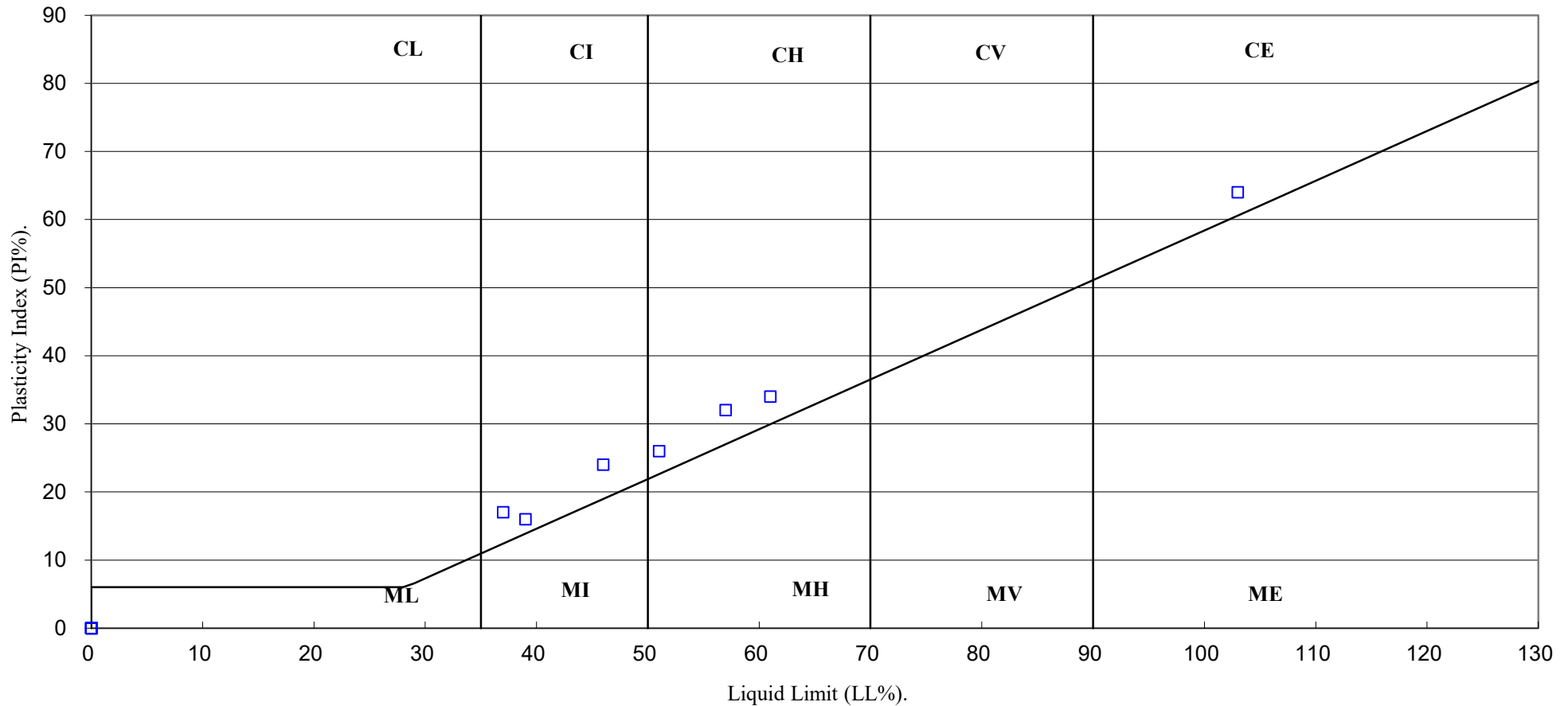
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PLASTICITY CHART FOR CASAGRANDE CLASSIFICATION.



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

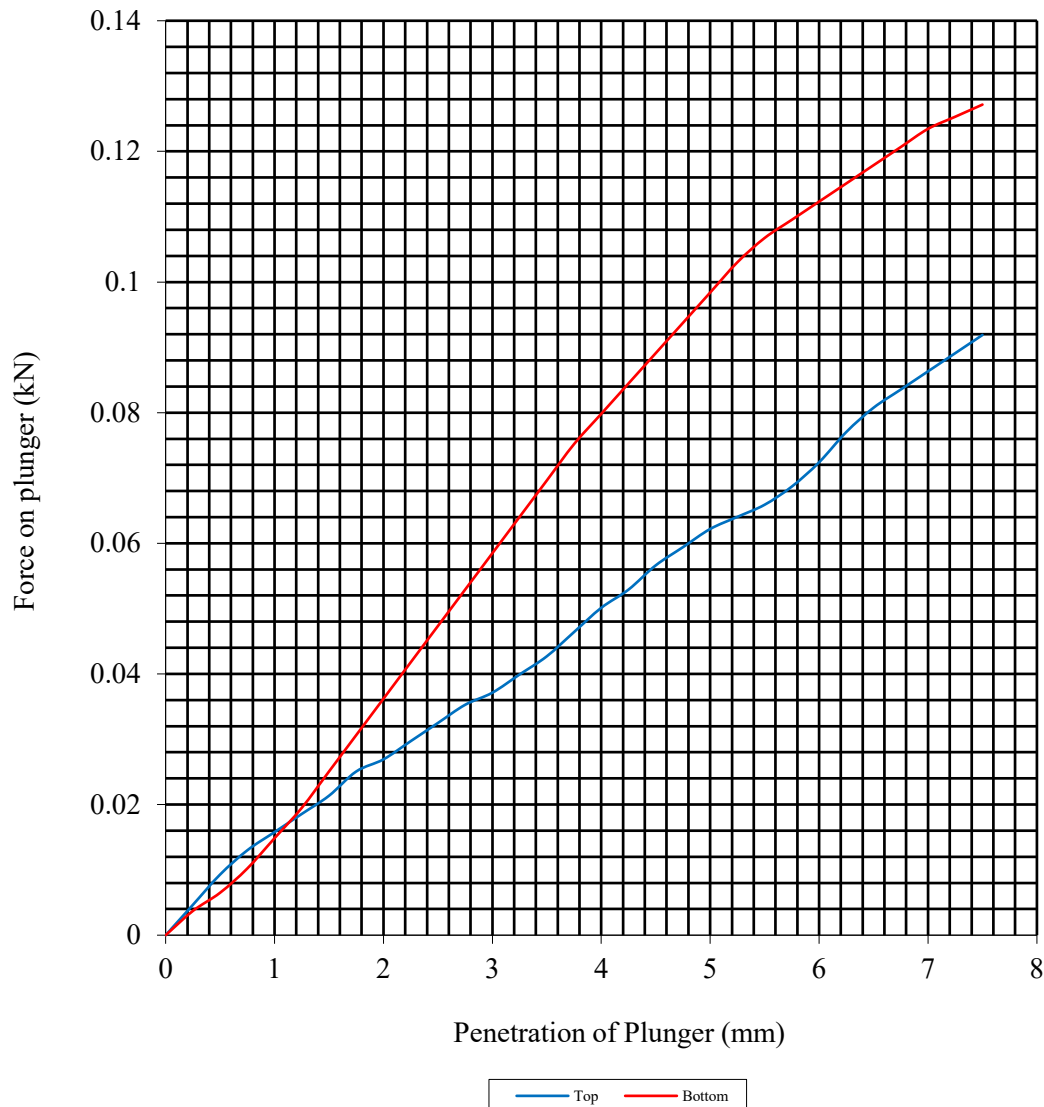
Hole Number: SA2A

Top Depth (m): 0.50

Sample Number: 1

Base Depth (m): 0.80

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	26	Sample Top	0.3
Bulk Density Mg/m3:	1.92	Soaking Time hrs	96	Sample Bottom	25	Sample Bottom	0.5
Dry Density Mg/m3:	1.55	Swelling mm:	0.07	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

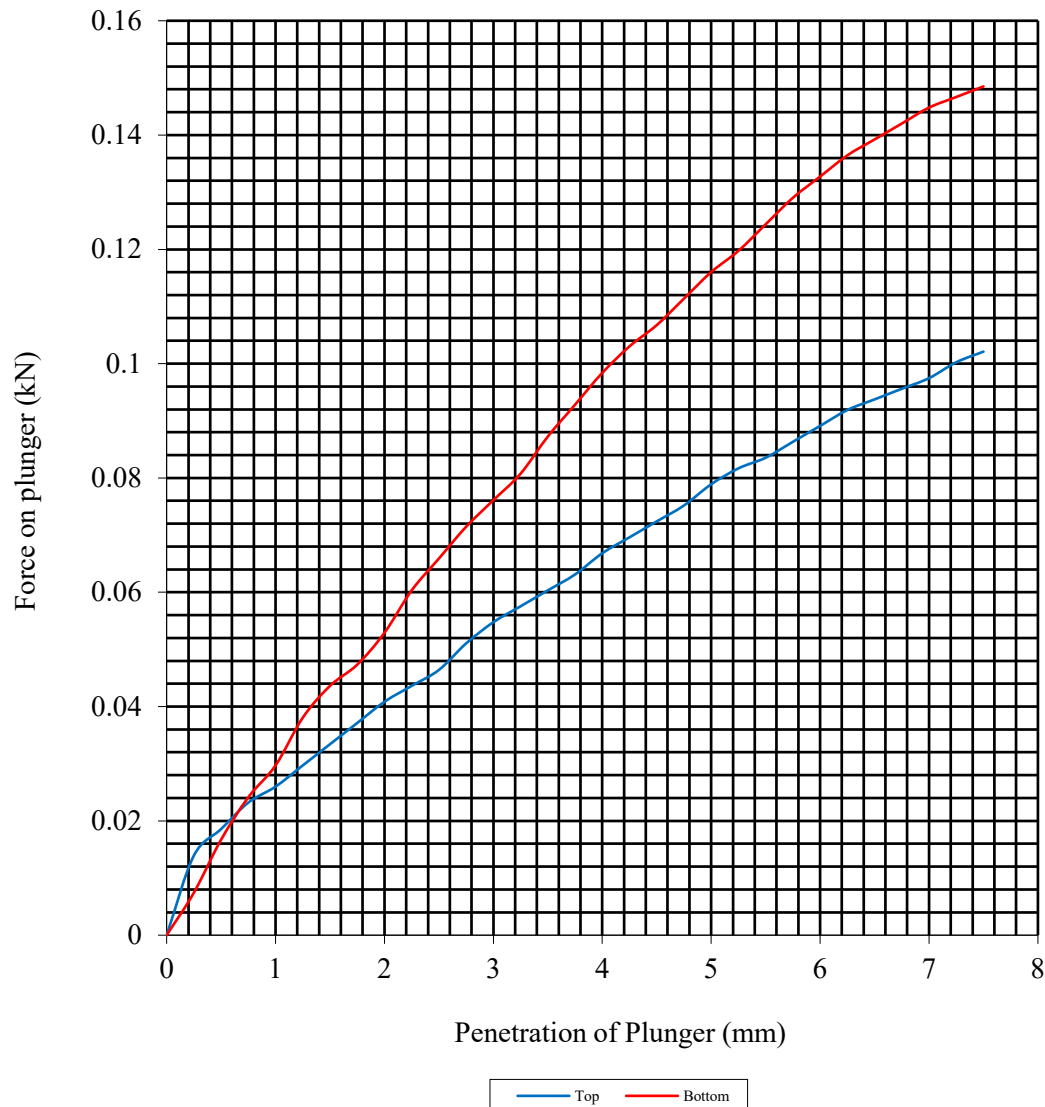
Hole Number: SA4

Top Depth (m): 0.50

Sample Number: 6

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	26	Surcharge Kg:	4.20	Sample Top	36	Sample Top	0.4
Bulk Density Mg/m3:	1.81	Soaking Time hrs	96	Sample Bottom	34	Sample Bottom	0.6
Dry Density Mg/m3:	1.44	Swelling mm:	0.08	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

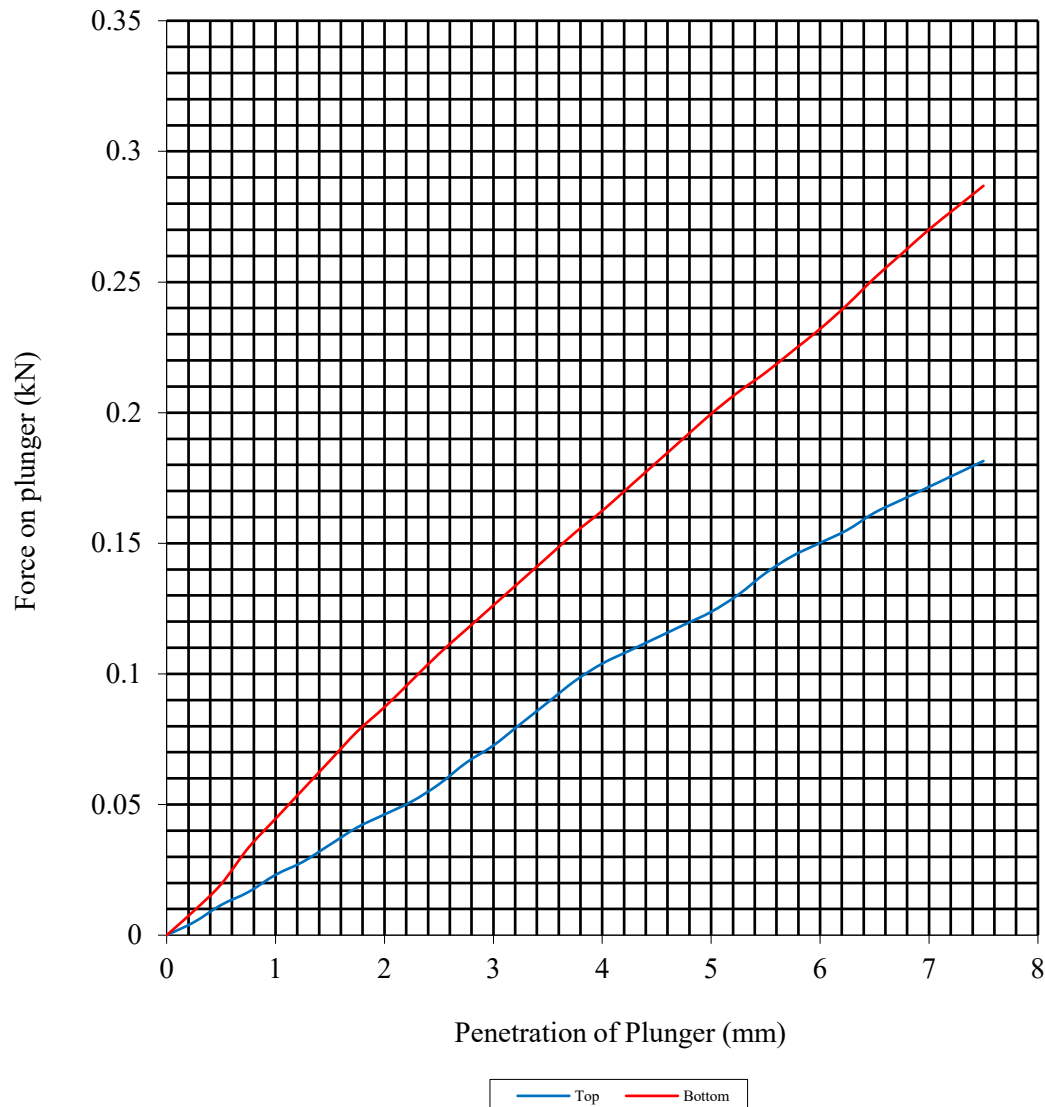
Hole Number: TP7

Top Depth (m): 0.40

Sample Number: 2

Base Depth (m): 0.90

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	25	Sample Top	0.6
Bulk Density Mg/m3:	1.97	Soaking Time hrs	96	Sample Bottom	24	Sample Bottom	1.0
Dry Density Mg/m3:	1.60	Swelling mm:	0.05	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

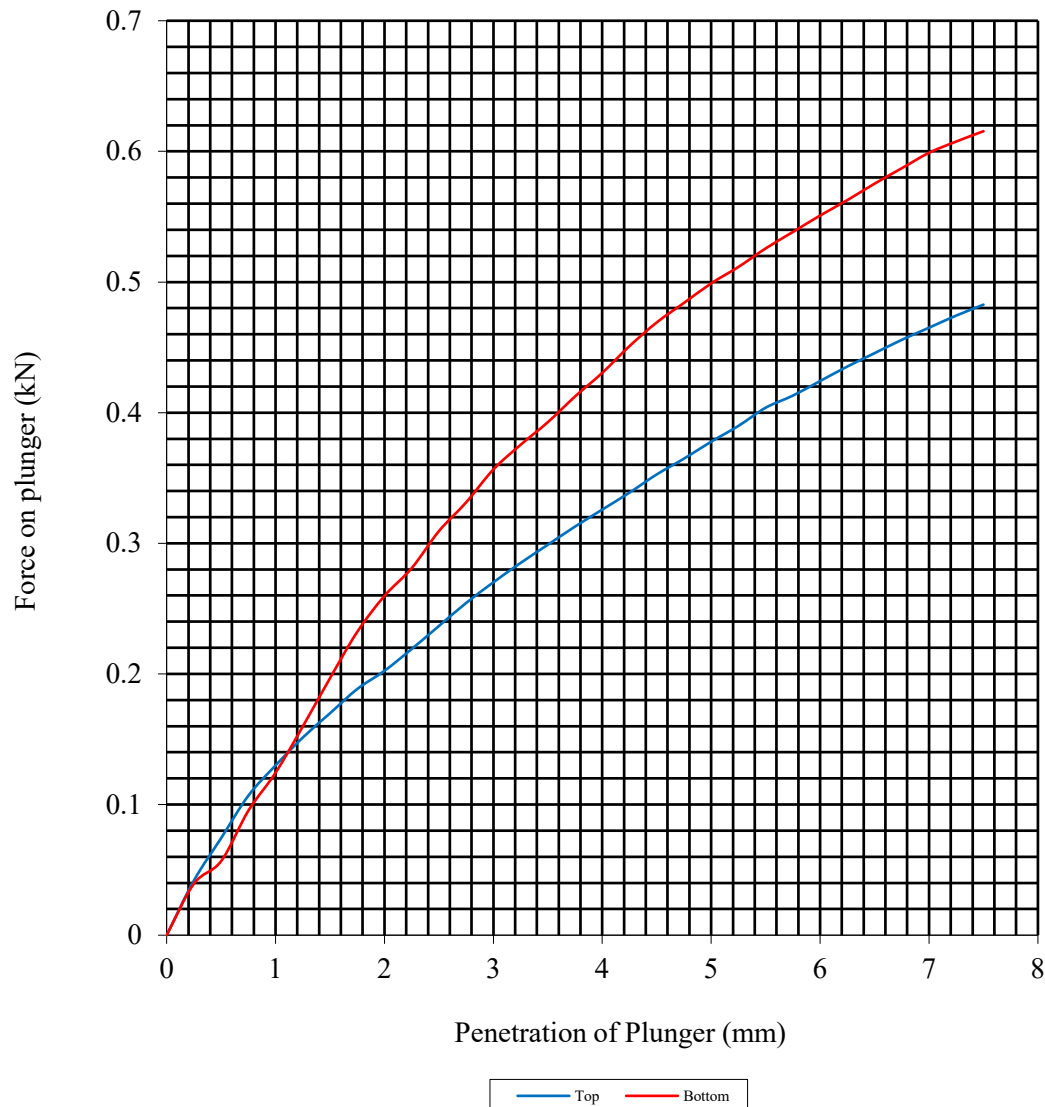
Hole Number: TP9

Top Depth (m): 0.60

Sample Number: 3

Base Depth (m): 1.10

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	24	Surcharge Kg:	4.20	Sample Top	27	Sample Top	1.9
Bulk Density Mg/m3:	1.96	Soaking Time hrs	96	Sample Bottom	26	Sample Bottom	2.5
Dry Density Mg/m3:	1.59	Swelling mm:	0.65	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

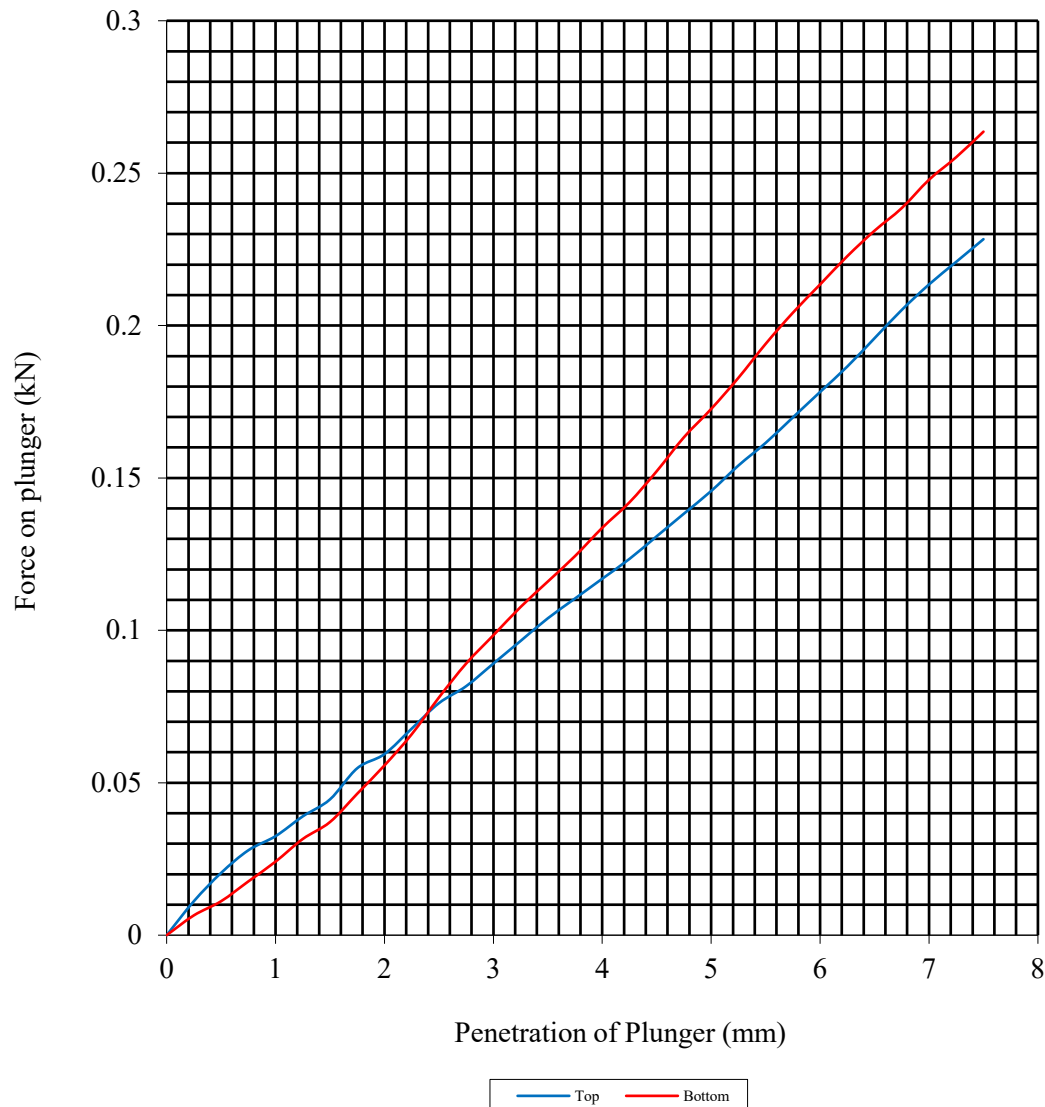
Hole Number: TP10

Top Depth (m): 0.50

Sample Number: 4

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	23	Surcharge Kg:	4.20	Sample Top	24	Sample Top	0.7
Bulk Density Mg/m3:	1.95	Soaking Time hrs	96	Sample Bottom	23	Sample Bottom	0.9
Dry Density Mg/m3:	1.59	Swelling mm:	0.14	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

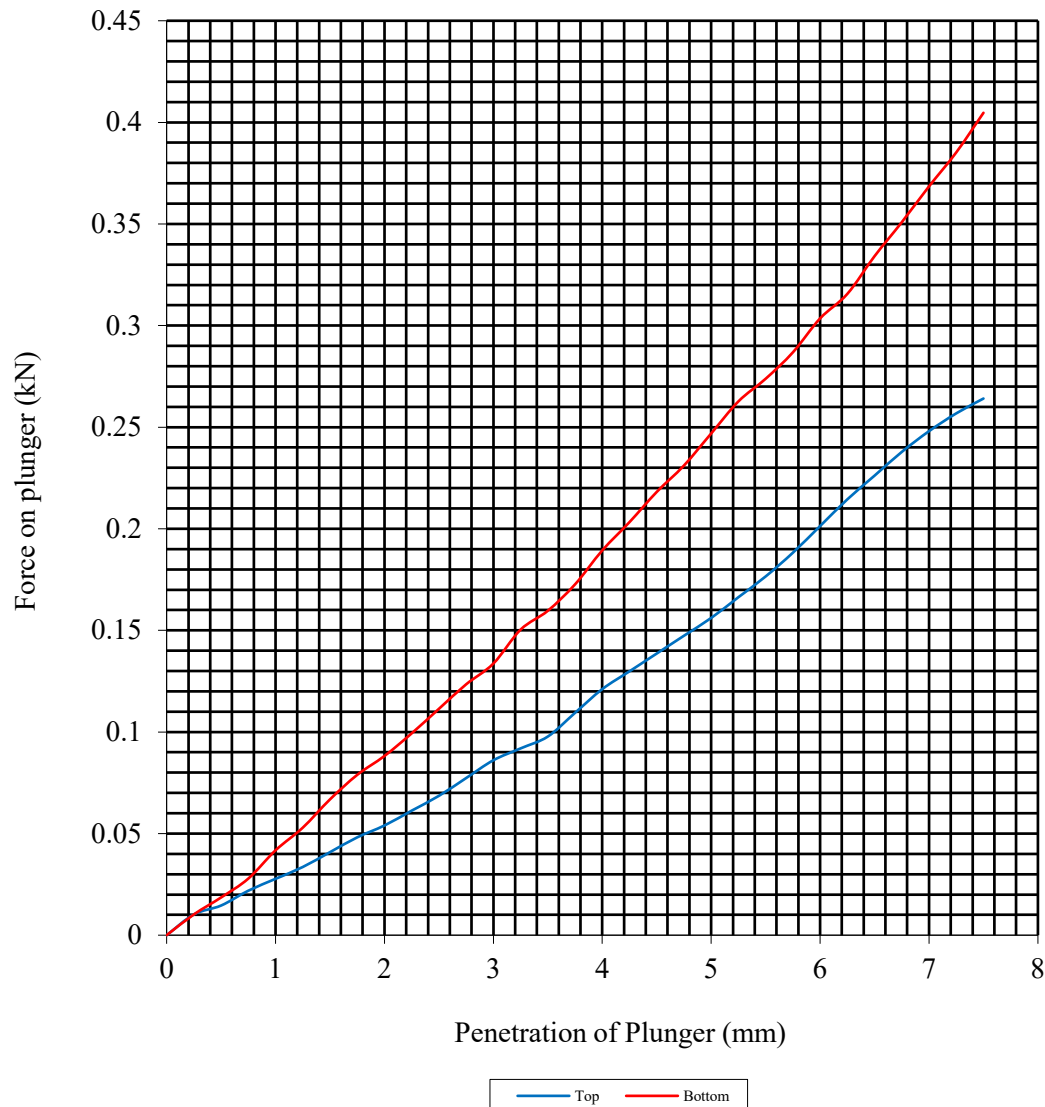
Hole Number: TP11

Top Depth (m): 0.50

Sample Number: 5

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	21	Surcharge Kg:	4.20	Sample Top	23	Sample Top	0.8
Bulk Density Mg/m3:	1.95	Soaking Time hrs	96	Sample Bottom	22	Sample Bottom	1.2
Dry Density Mg/m3:	1.62	Swelling mm:	0.91	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

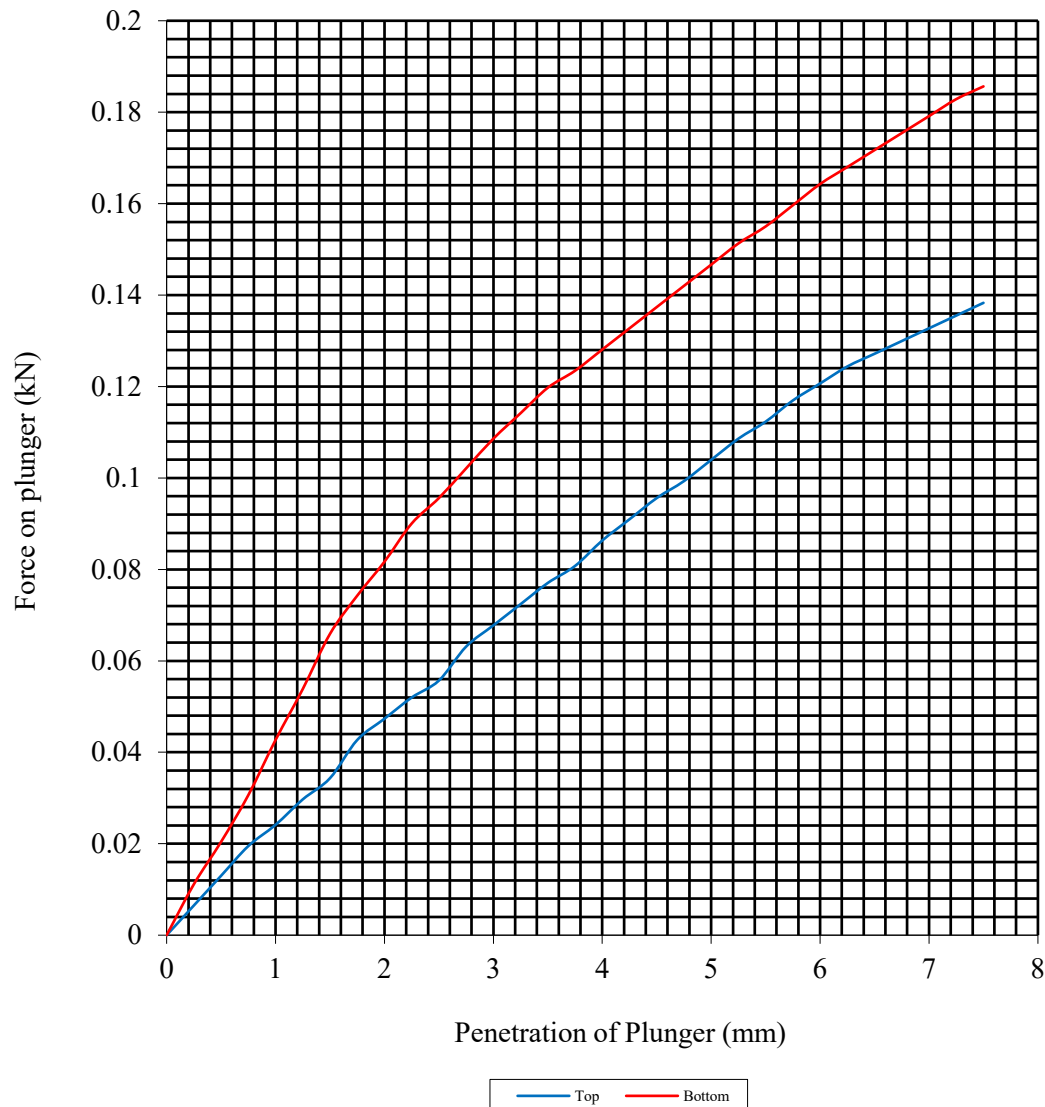
Hole Number: TP13

Top Depth (m): 0.60

Sample Number: 7

Base Depth (m): 1.10

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	32	Surcharge Kg:	4.20	Sample Top	34	Sample Top	0.5
Bulk Density Mg/m3:	1.86	Soaking Time hrs	96	Sample Bottom	33	Sample Bottom	0.7
Dry Density Mg/m3:	1.41	Swelling mm:	0.20	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

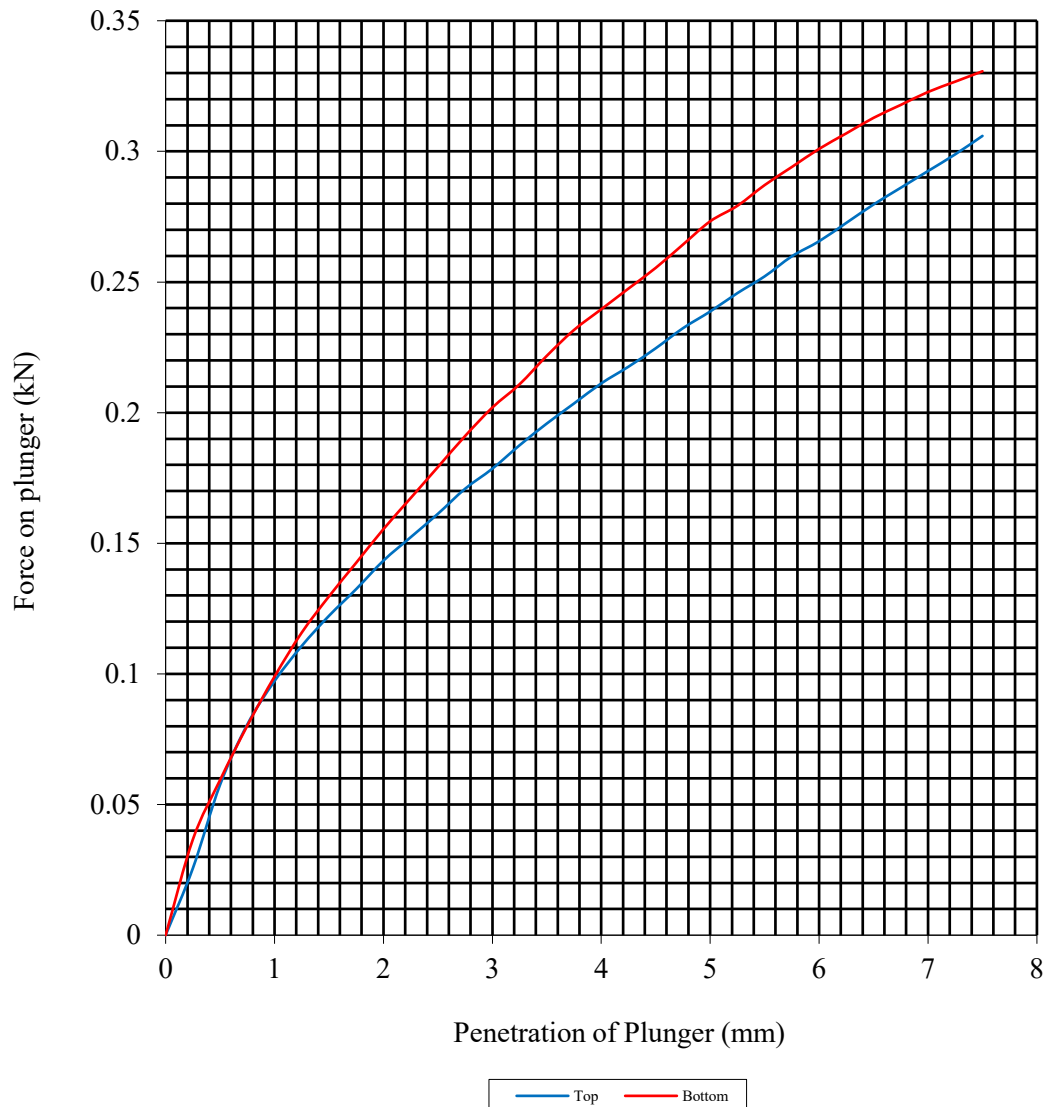
Hole Number: TP15

Top Depth (m): 0.60

Sample Number: 8

Base Depth (m): 1.10

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	31	Surcharge Kg:	4.20	Sample Top	32	Sample Top	1.2
Bulk Density Mg/m3:	1.94	Soaking Time hrs	96	Sample Bottom	31	Sample Bottom	1.4
Dry Density Mg/m3:	1.48	Swelling mm:	0.10	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

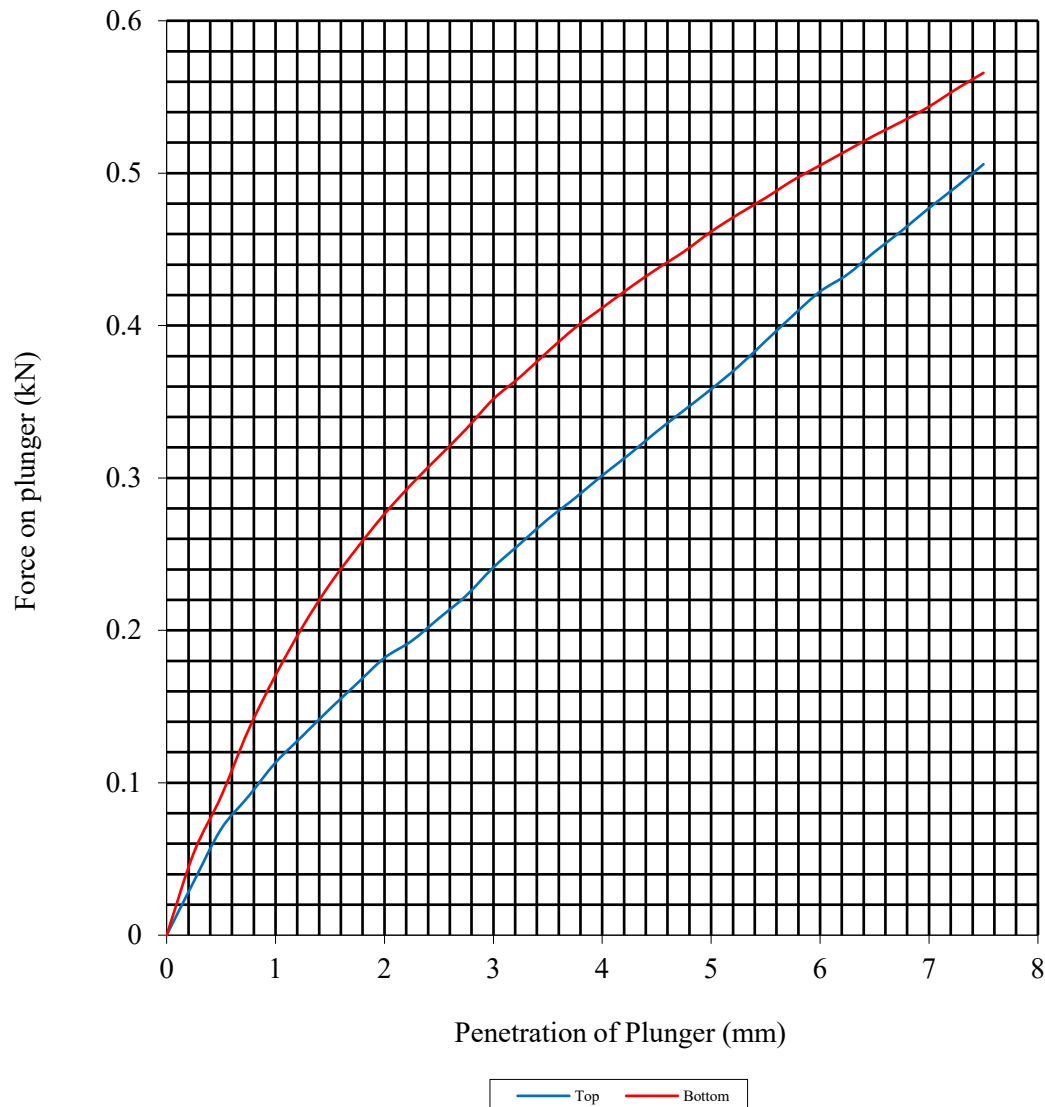
Hole Number: TP17

Top Depth (m): 0.60

Sample Number: 9

Base Depth (m): 1.10

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	22	Surcharge Kg:	4.20	Sample Top	25	Sample Top	1.8
Bulk Density Mg/m3:	1.98	Soaking Time hrs	96	Sample Bottom	24	Sample Bottom	2.4
Dry Density Mg/m3:	1.62	Swelling mm:	0.80	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

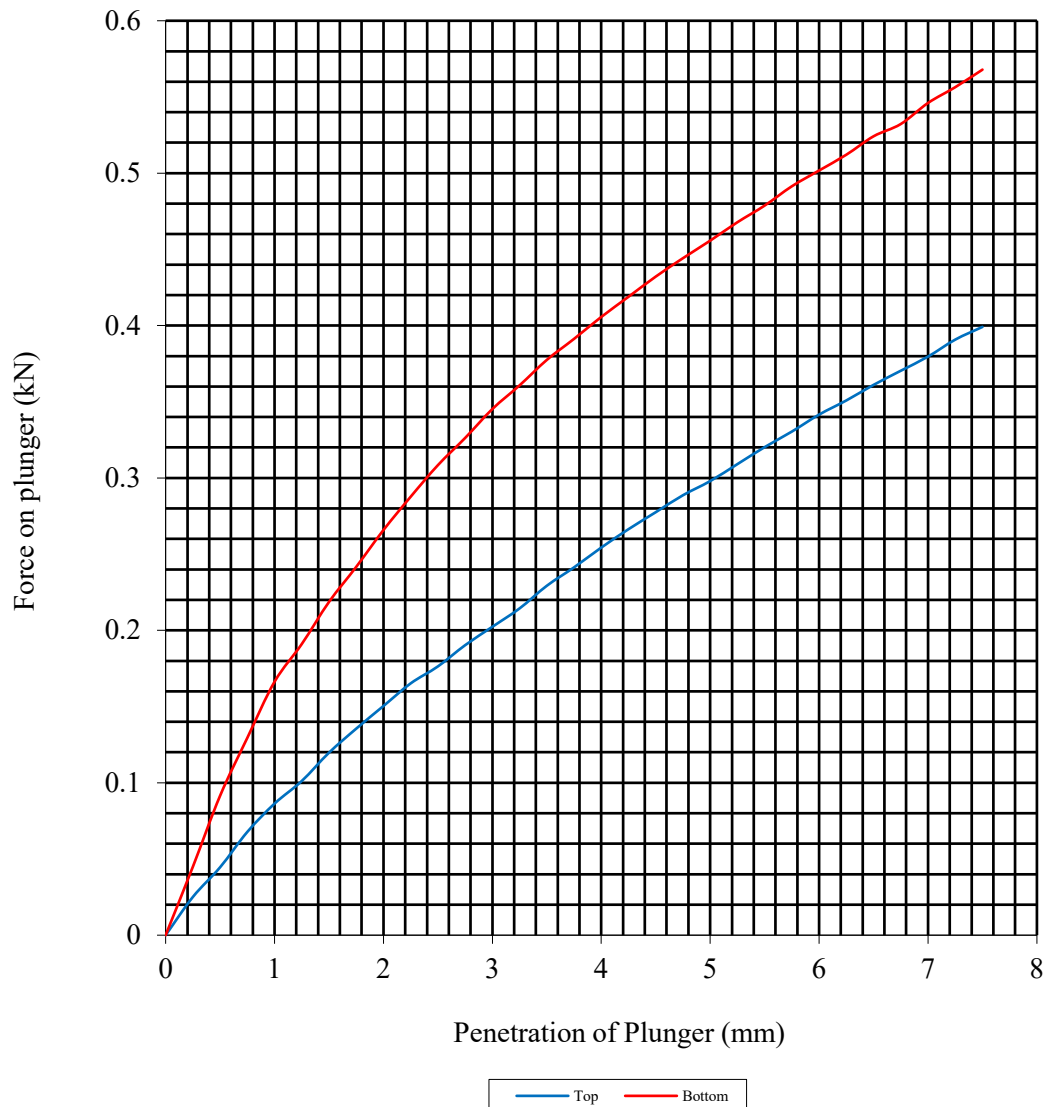
Hole Number: TP18

Top Depth (m): 0.50

Sample Number: 10

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	23	Surcharge Kg:	4.20	Sample Top	25	Sample Top	1.5
Bulk Density Mg/m3:	2.00	Soaking Time hrs	96	Sample Bottom	24	Sample Bottom	2.3
Dry Density Mg/m3:	1.63	Swelling mm:	0.20	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

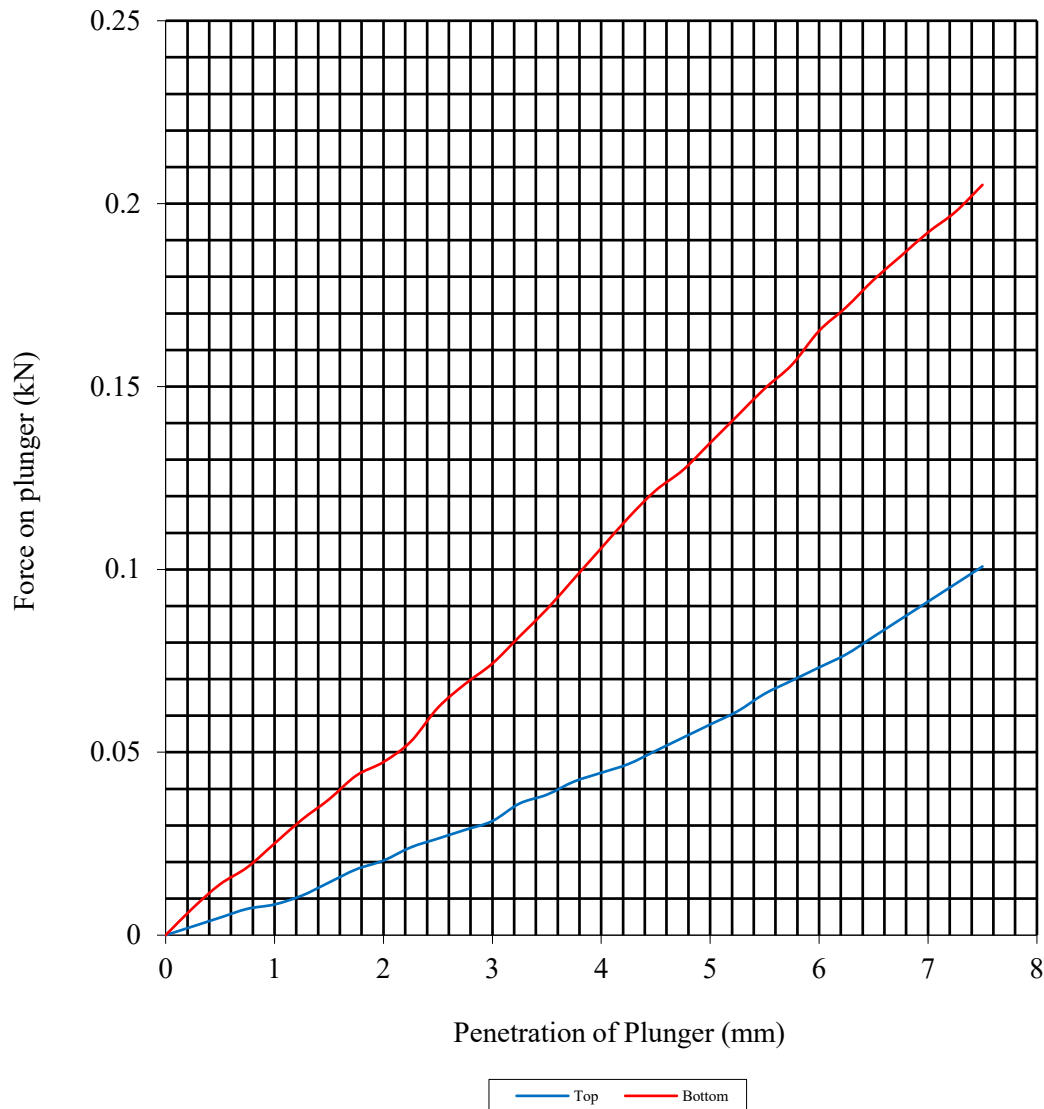
Hole Number: TP20

Top Depth (m): 0.50

Sample Number: 11

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	29	Surcharge Kg:	4.20	Sample Top	30	Sample Top	0.3
Bulk Density Mg/m3:	1.88	Soaking Time hrs	96	Sample Bottom	29	Sample Bottom	0.7
Dry Density Mg/m3:	1.46	Swelling mm:	0.22	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

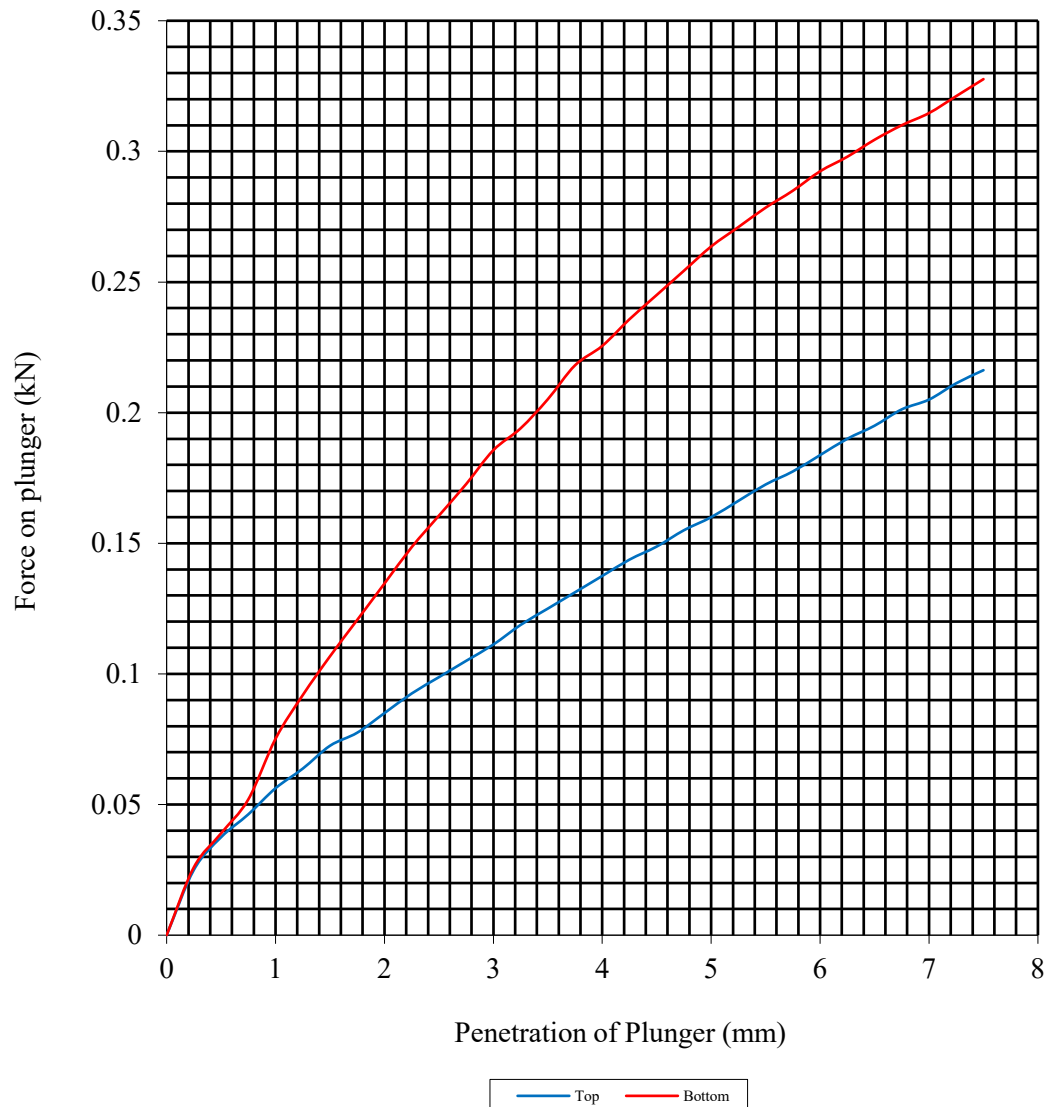
Hole Number: TP21

Top Depth (m): 0.60

Sample Number: 12

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	26	Surcharge Kg:	4.20	Sample Top	28	Sample Top	0.8
Bulk Density Mg/m3:	1.92	Soaking Time hrs	96	Sample Bottom	27	Sample Bottom	1.3
Dry Density Mg/m3:	1.52	Swelling mm:	0.10	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

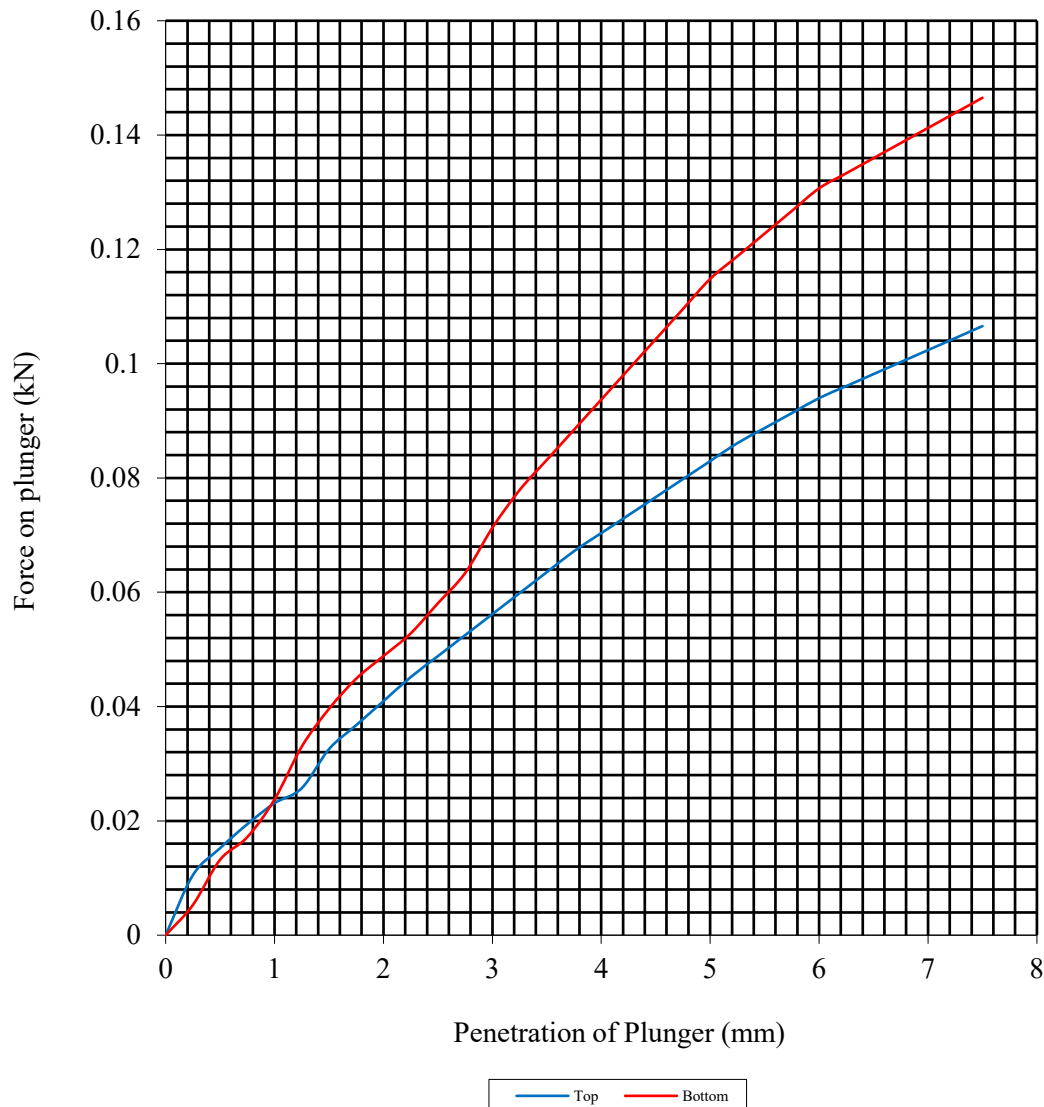
Hole Number: TP22

Top Depth (m): 0.50

Sample Number: 13

Base Depth (m): 1.00

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	22	Surcharge Kg:	4.20	Sample Top	24	Sample Top	0.4
Bulk Density Mg/m3:	1.97	Soaking Time hrs	96	Sample Bottom	24	Sample Bottom	0.6
Dry Density Mg/m3:	1.62	Swelling mm:	0.55	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

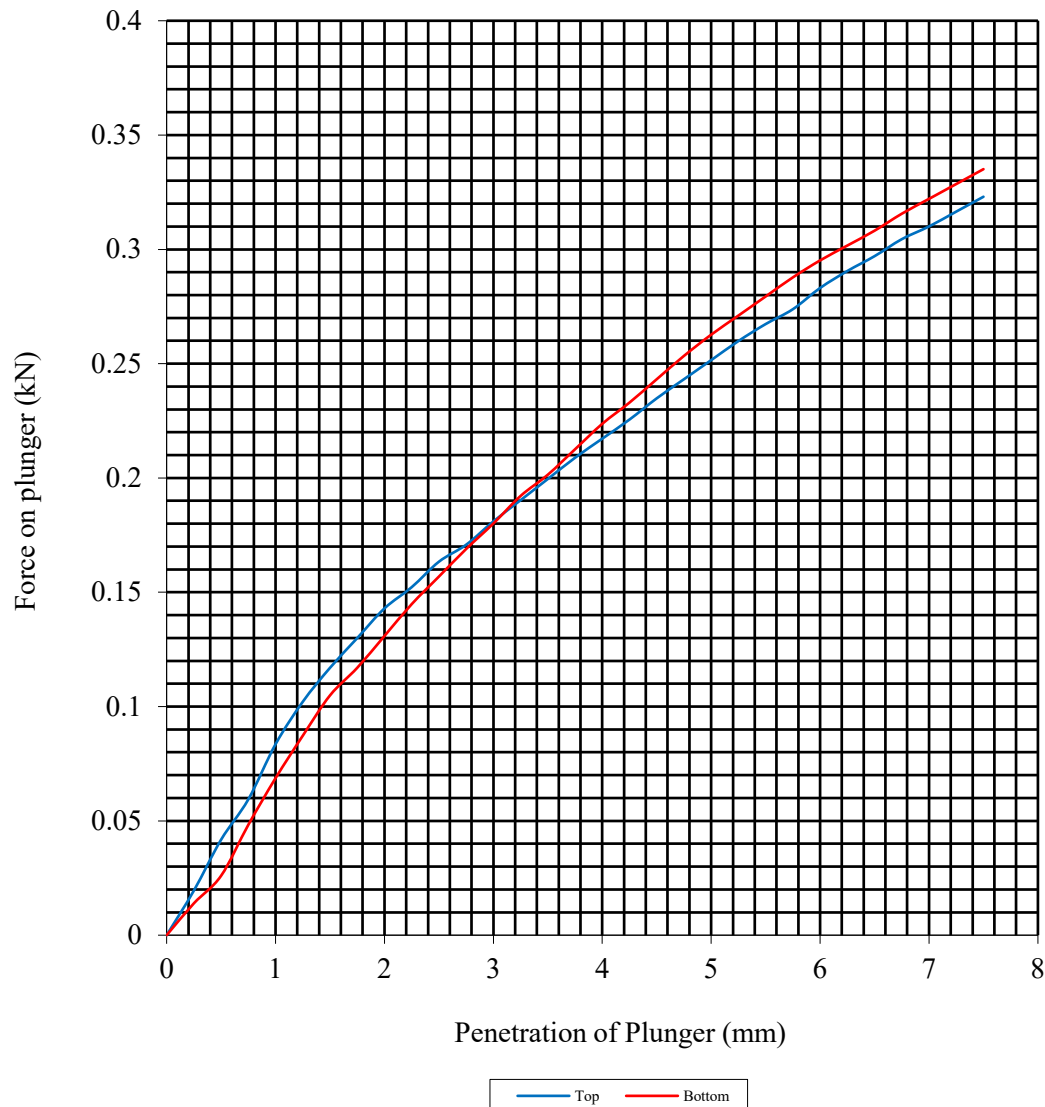
Hole Number: TP24

Top Depth (m): 0.40

Sample Number: 14

Base Depth (m): 0.70

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	29	Surcharge Kg:	4.20	Sample Top	33	Sample Top	1.3
Bulk Density Mg/m3:	1.83	Soaking Time hrs	96	Sample Bottom	32	Sample Bottom	1.3
Dry Density Mg/m3:	1.41	Swelling mm:	1.00	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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CALIFORNIA BEARING RATIO TEST

BS 1377 : Part 4 : 1990

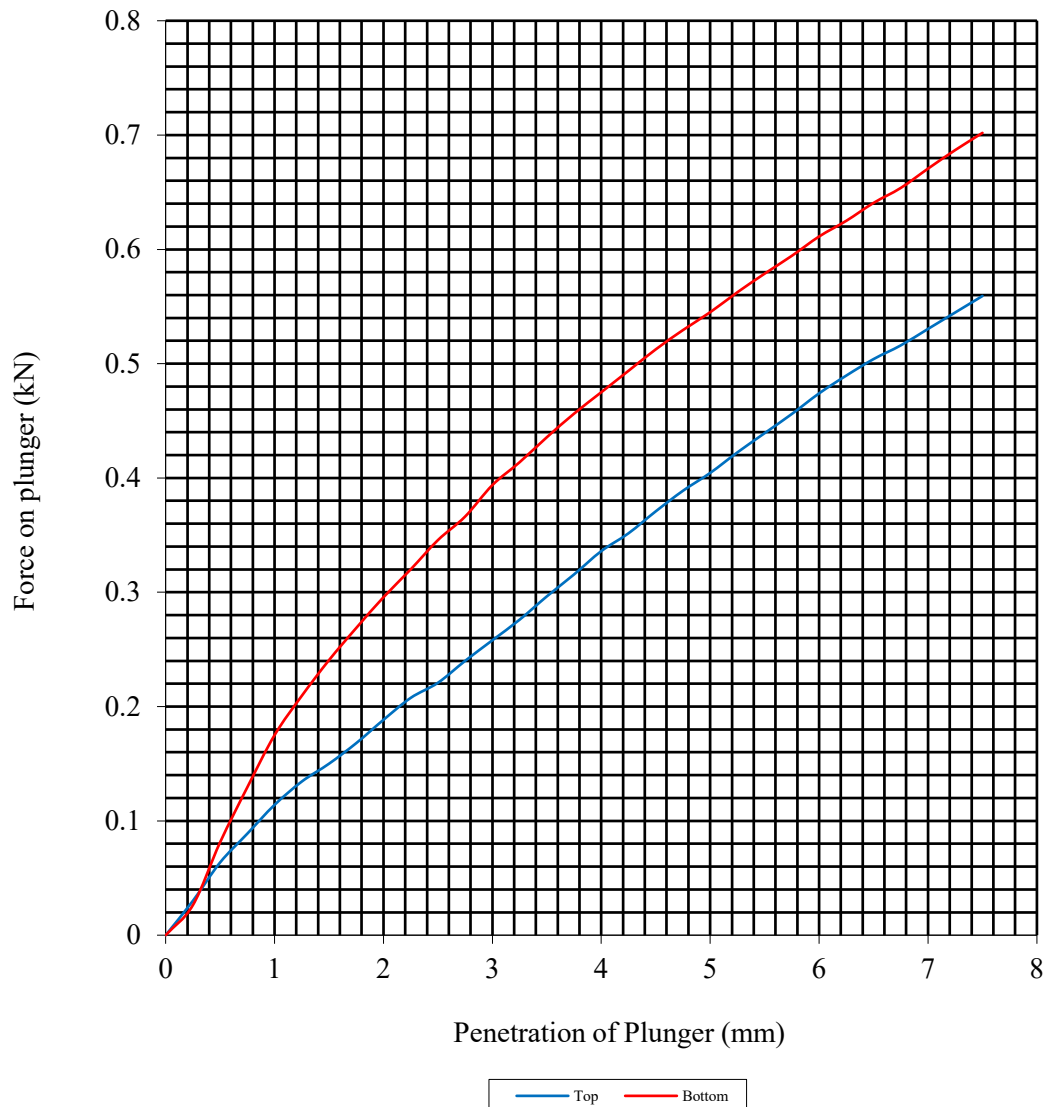
Hole Number: TP25

Top Depth (m): 0.30

Sample Number: 15

Base Depth (m): 0.70

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	23	Surcharge Kg:	4.20	Sample Top	25	Sample Top	2.0
Bulk Density Mg/m3:	1.99	Soaking Time hrs	96	Sample Bottom	24	Sample Bottom	2.7
Dry Density Mg/m3:	1.61	Swelling mm:	0.75	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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BS 1377 : Part 4 : 1990

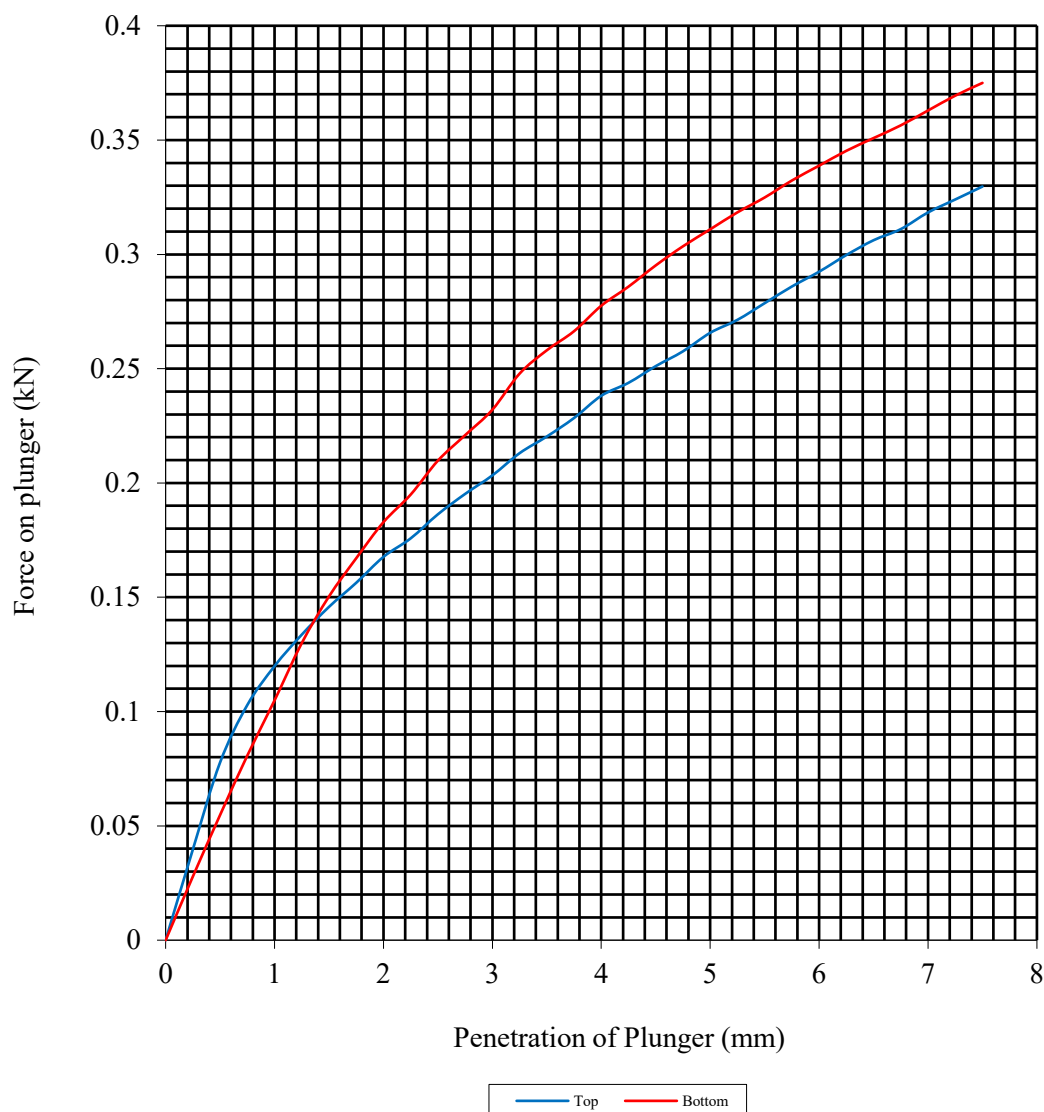
Hole Number: TP26

Top Depth (m): 0.40

Sample Number: 16

Base Depth (m): 0.80

Sample Type: LB



Initial Sample Conditions		Sample Preparation		Final Moisture Content %		C.B.R. Value %	
Moisture Content:	33	Surcharge Kg:	4.20	Sample Top	35	Sample Top	1.4
Bulk Density Mg/m3:	1.86	Soaking Time hrs	96	Sample Bottom	34	Sample Bottom	1.6
Dry Density Mg/m3:	1.40	Swelling mm:	0.30	Remarks : See Summary of Soil Descriptions.			
Percentage retained on 20mm BS test sieve:		0					
Compaction Conditions		2.5kg					



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FINAL ANALYTICAL TEST REPORT SUPPLEMENT TO TEST REPORT 19/07732/1

Amendments: Request for Additional Analysis

Envirolab Job Number: 19/07732
Issue Number: 2

Date: 17 September, 2019

Client: GeoDyne (Derby)
9 Brunel Parkway
Pride Park
Derby
Derbyshire
UK
DE24 8HR

Project Manager: Chris Bowley
Project Name: Dam Gate, Holbeach
Project Ref: D38108
Order No: D38108
Date Samples Received: 16/08/19
Date Instructions Received: 16/08/19
Date Analysis Completed: 17/09/19

Prepared by:



Melanie Marshall
Laboratory Coordinator

Approved by:



Richard Wong
Client Manager

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/1	19/07732/3	19/07732/4	19/07732/5	19/07732/6	19/07732/7	19/07732/9	Units	Limit of Detection	Method ref
Client Sample No	T1	T3	T4	T5	T6	T7	T9			
Client Sample ID	TP1	TP3	TP4	TP5	TP5	TP6	SA3			
Depth to Top	0.10	0.10	0.20	0.10	0.40	0.10	0.50			
Depth To Bottom										
Date Sampled	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	06-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	4A	5AE	6AE	6AE	5AE	6AE	5A			
% Stones >10mm _A	0.8	<0.1	<0.1	8.2	17.9	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	7.20	6.90	7.72	8.15	8.42	7.74	8.27	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	-	-	-	0.02	-	0.01	g/l	0.01	A-T-026s
Total Organic Carbon _D ^{M#}	1.48	2.78	1.42	2.59	1.31	6.26	-	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	7	5	5	12	12	5	-	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.9	1.1	0.9	1.7	1.6	1.1	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	11	12	7	22	11	14	-	mg/kg	1	A-T-024s
Chromium _D ^{M#}	23	29	25	25	21	35	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-040s
Chromium (trivalent)	23	29	25	25	21	35	-	mg/kg	1	Calc
Lead _D ^{M#}	20	35	19	28	26	18	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	<0.17	<0.17	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	15	20	17	21	20	24	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	<1	<1	<1	1	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	49	115	47	72	64	63	-	mg/kg	5	A-T-024s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/1	19/07732/3	19/07732/4	19/07732/5	19/07732/6	19/07732/7	19/07732/9	Units	Limit of Detection	Method ref
Client Sample No	T1	T3	T4	T5	T6	T7	T9			
Client Sample ID	TP1	TP3	TP4	TP5	TP5	TP6	SA3			
Depth to Top	0.10	0.10	0.20	0.10	0.40	0.10	0.50			
Depth To Bottom										
Date Sampled	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	05-Aug-19	06-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	4A	5AE	6AE	6AE	5AE	6AE	5A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	-	mg/kg	0.1	A-T-019s
Acenaphthylene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Anthracene _A ^{M#}	<0.1	<0.1	<0.1	0.1	0.6	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.1	<0.1	<0.1	0.7	1.9	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.1	<0.1	<0.1	0.7	1.9	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.1	<0.1	<0.1	0.7	1.9	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.1	<0.1	<0.1	0.4	1.4	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.1	<0.1	<0.1	0.2	0.7	<0.1	-	mg/kg	0.1	A-T-019s
Chrysene _A ^{M#}	<0.1	<0.1	<0.1	0.7	1.9	<0.1	-	mg/kg	0.1	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	0.3	<0.1	-	mg/kg	0.1	A-T-019s
Fluoranthene _A ^{M#}	<0.1	0.1	<0.1	1.3	4.3	<0.1	-	mg/kg	0.1	A-T-019s
Fluorene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	0.2	<0.1	-	mg/kg	0.1	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.1	<0.1	<0.1	0.6	1.6	<0.1	-	mg/kg	0.1	A-T-019s
Naphthalene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Phenanthrene _A ^{M#}	<0.1	<0.1	<0.1	0.6	2.0	<0.1	-	mg/kg	0.1	A-T-019s
Pyrene _A ^{M#}	<0.1	<0.1	<0.1	1.1	3.7	<0.1	-	mg/kg	0.1	A-T-019s
Total PAH-16MS _A ^{M#}	<0.1	0.1	<0.1	7.1	22.6	<0.1	-	mg/kg	0.1	A-T-019s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/10	19/07732/11	19/07732/12	19/07732/13	19/07732/14	19/07732/16	19/07732/17	Units	Limit of Detection	Method ref
Client Sample No	T10	T11	T12	T13	T14	T16	T17			
Client Sample ID	TP8	TP13	SA6	TP14	TP14	TP16	TP17			
Depth to Top	0.10	2.20	0.40	0.10	2.00	0.50	0.10			
Depth To Bottom										
Date Sampled	06-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	08-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6ABE	5A	5AE	6AE	6AE	5AE	5AE			
% Stones >10mm _A	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	48.4	% w/w	0.1	A-T-044
pH _D ^{M#}	7.03	7.61	8.30	8.00	7.64	8.19	7.44	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	0.32	<0.01	-	-	<0.01	-	g/l	0.01	A-T-026s
Loss on ignition (550degC) _D ^{M#}	-	-	-	-	27.9	4.9	-	% w/w	0.6	A-T-030s
Total Organic Carbon _D ^{M#}	2.69	-	-	3.33	9.99	-	1.26	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	8	-	-	7	11	-	4	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	1.3	-	-	0.8	1.2	-	0.6	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	11	-	-	9	30	-	5	mg/kg	1	A-T-024s
Chromium _D ^{M#}	33	-	-	17	39	-	14	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	-	-	<1	<1	-	<1	mg/kg	1	A-T-040s
Chromium (trivalent)	33	-	-	17	39	-	14	mg/kg	1	Calc
Lead _D ^{M#}	22	-	-	34	1040	-	9	mg/kg	1	A-T-024s
Mercury _D	<0.17	-	-	<0.17	<0.17	-	<0.17	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	25	-	-	14	18	-	11	mg/kg	1	A-T-024s
Selenium _D ^{M#}	1	-	-	<1	<1	-	<1	mg/kg	1	A-T-024s
Zinc _D ^{M#}	60	-	-	61	250	-	27	mg/kg	5	A-T-024s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/10	19/07732/11	19/07732/12	19/07732/13	19/07732/14	19/07732/16	19/07732/17	Units	Limit of Detection	Method ref
Client Sample No	T10	T11	T12	T13	T14	T16	T17			
Client Sample ID	TP8	TP13	SA6	TP14	TP14	TP16	TP17			
Depth to Top	0.10	2.20	0.40	0.10	2.00	0.50	0.10			
Depth To Bottom										
Date Sampled	06-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	08-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6ABE	5A	5AE	6AE	6AE	5AE	5AE			
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	-	-	-	NAD	-	-	-			A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	-	-	-	N/A	-	-	-			A-T-045

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/10	19/07732/11	19/07732/12	19/07732/13	19/07732/14	19/07732/16	19/07732/17	Units	Limit of Detection	Method ref
Client Sample No	T10	T11	T12	T13	T14	T16	T17			
Client Sample ID	TP8	TP13	SA6	TP14	TP14	TP16	TP17			
Depth to Top	0.10	2.20	0.40	0.10	2.00	0.50	0.10			
Depth To Bottom										
Date Sampled	06-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	07-Aug-19	08-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	6ABE	5A	5AE	6AE	6AE	5AE	5AE			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Acenaphthylene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Anthracene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.1	-	-	0.1	0.2	-	<0.1	mg/kg	0.1	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.1	-	-	0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Chrysene _A ^{M#}	<0.1	-	-	<0.1	0.2	-	<0.1	mg/kg	0.1	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Fluoranthene _A ^{M#}	<0.1	-	-	0.1	0.2	-	<0.1	mg/kg	0.1	A-T-019s
Fluorene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.1	-	-	0.1	0.2	-	<0.1	mg/kg	0.1	A-T-019s
Naphthalene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Phenanthrene _A ^{M#}	<0.1	-	-	<0.1	<0.1	-	<0.1	mg/kg	0.1	A-T-019s
Pyrene _A ^{M#}	<0.1	-	-	0.1	0.2	-	<0.1	mg/kg	0.1	A-T-019s
Total PAH-16MS _A ^{M#}	<0.1	-	-	0.5	1.0	-	<0.1	mg/kg	0.1	A-T-019s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/18	19/07732/19	19/07732/20	19/07732/22	19/07732/23	19/07732/24	19/07732/25	Units	Limit of Detection	Method ref
Client Sample No	T18	T19	T20	T22	T23	T24	T25			
Client Sample ID	TP18	TP20	TP20	TP24	TP24	WS1	WS2			
Depth to Top	0.40	0.10	0.50	0.10	0.40	1.10	2.00			
Depth To Bottom										
Date Sampled	08-Aug-19	08-Aug-19	08-Aug-19	08-Aug-19	08-Aug-19	12-Aug-19	12-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	5A	6AE	5A	6AE	5A	4A	5A			
% Stones >10mm _A	<0.1	3.5	<0.1	<0.1	<0.1	<0.1	<0.1	% w/w	0.1	A-T-044
pH _D ^{M#}	8.24	7.80	8.25	7.24	7.89	8.58	8.03	pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	<0.01	-	<0.01	-	0.06	<0.01	0.02	g/l	0.01	A-T-026s
Loss on ignition (550degC) _D ^{M#}	-	-	-	-	-	1.2	-	% w/w	0.6	A-T-030s
Total Organic Carbon _D ^{M#}	0.78	3.56	1.35	4.24	2.78	0.48	-	% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	11	5	7	7	10	3	-	mg/kg	1	A-T-024s
Cadmium _D ^{M#}	1.5	0.9	0.8	1.2	1.7	<0.5	-	mg/kg	0.5	A-T-024s
Copper _D ^{M#}	8	12	20	13	25	2	-	mg/kg	1	A-T-024s
Chromium _D ^{M#}	36	22	17	31	32	11	-	mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	<1	<1	<1	<1	-	mg/kg	1	A-T-040s
Chromium (trivalent)	36	22	17	31	32	11	-	mg/kg	1	Calc
Lead _D ^{M#}	15	20	15	21	44	5	-	mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	<0.17	<0.17	1.42	<0.17	-	mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	29	15	14	24	31	9	-	mg/kg	1	A-T-024s
Selenium _D ^{M#}	1	<1	<1	<1	2	<1	-	mg/kg	1	A-T-024s
Zinc _D ^{M#}	60	55	55	67	283	25	-	mg/kg	5	A-T-024s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/18	19/07732/19	19/07732/20	19/07732/22	19/07732/23	19/07732/24	19/07732/25	Units	Limit of Detection	Method ref
Client Sample No	T18	T19	T20	T22	T23	T24	T25			
Client Sample ID	TP18	TP20	TP20	TP24	TP24	WS1	WS2			
Depth to Top	0.40	0.10	0.50	0.10	0.40	1.10	2.00			
Depth To Bottom										
Date Sampled	08-Aug-19	08-Aug-19	08-Aug-19	08-Aug-19	08-Aug-19	12-Aug-19	12-Aug-19			
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D			
Sample Matrix Code	5A	6AE	5A	6AE	5A	4A	5A			
PAH-16MS										
Acenaphthene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Acenaphthylene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Anthracene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(a)anthracene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(a)pyrene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(ghi)perylene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Chrysene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Fluoranthene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Fluorene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Naphthalene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Phenanthrene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Pyrene _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s
Total PAH-16MS _A ^{M#}	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	-	mg/kg	0.1	A-T-019s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/26	19/07732/27	19/07732/28	19/07732/29	19/07732/30			Units	Limit of Detection	Method ref
Client Sample No	T26	T27	T28	T30	T31					
Client Sample ID	WS3	WS3	WS4	WS6	WS6					
Depth to Top	0.30	0.60	2.50	0.20	0.60					
Depth To Bottom										
Date Sampled	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	5AE	5A	5A	6AE	5AE					
% Stones >10mm _A	28.6	<0.1	<0.1	<0.1	<0.1			% w/w	0.1	A-T-044
pH _D ^{M#}	7.72	8.00	8.38	7.70	8.11			pH	0.01	A-T-031s
Sulphate (water sol 2:1) _D ^{M#}	-	-	0.11	-	0.02			g/l	0.01	A-T-026s
Loss on ignition (550degC) _D ^{M#}	-	-	8.4	-	-			% w/w	0.6	A-T-030s
Total Organic Carbon _D ^{M#}	2.75	1.95	-	4.15	0.90			% w/w	0.03	A-T-032s
Arsenic _D ^{M#}	6	6	-	8	7			mg/kg	1	A-T-024s
Cadmium _D ^{M#}	0.9	1.0	-	0.9	1.1			mg/kg	0.5	A-T-024s
Copper _D ^{M#}	24	15	-	23	8			mg/kg	1	A-T-024s
Chromium _D ^{M#}	15	24	-	18	24			mg/kg	1	A-T-024s
Chromium (hexavalent) _D	<1	<1	-	<1	<1			mg/kg	1	A-T-040s
Chromium (trivalent)	15	24	-	18	24			mg/kg	1	Calc
Lead _D ^{M#}	30	30	-	20	15			mg/kg	1	A-T-024s
Mercury _D	<0.17	<0.17	-	<0.17	<0.17			mg/kg	0.17	A-T-024s
Nickel _D ^{M#}	12	18	-	15	22			mg/kg	1	A-T-024s
Selenium _D ^{M#}	<1	<1	-	<1	1			mg/kg	1	A-T-024s
Zinc _D ^{M#}	154	101	-	51	50			mg/kg	5	A-T-024s

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/26	19/07732/27	19/07732/28	19/07732/29	19/07732/30			Units	Limit of Detection	Method ref
Client Sample No	T26	T27	T28	T30	T31					
Client Sample ID	WS3	WS3	WS4	WS6	WS6					
Depth to Top	0.30	0.60	2.50	0.20	0.60					
Depth To Bottom										
Date Sampled	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	5AE	5A	5A	6AE	5AE					
Asbestos in Soil (inc. matrix)										
Asbestos in soil [#]	NAD	-	-	-	-					A-T-045
Asbestos ACM - Suitable for Water Absorption Test? _D	N/A	-	-	-	-					A-T-045

Envirolab Job Number: 19/07732

Client Project Name: Dam Gate, Holbeach

Client Project Ref: D38108

Lab Sample ID	19/07732/26	19/07732/27	19/07732/28	19/07732/29	19/07732/30			Units	Limit of Detection	Method ref
Client Sample No	T26	T27	T28	T30	T31					
Client Sample ID	WS3	WS3	WS4	WS6	WS6					
Depth to Top	0.30	0.60	2.50	0.20	0.60					
Depth To Bottom										
Date Sampled	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19	12-Aug-19					
Sample Type	Soil - D	Soil - D	Soil - D	Soil - D	Soil - D					
Sample Matrix Code	5AE	5A	5A	6AE	5AE					
PAH-16MS										
Acenaphthene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Acenaphthylene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Anthracene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Benzo(a)anthracene _A ^{M#}	0.2	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Benzo(a)pyrene _A ^{M#}	0.3	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Benzo(b)fluoranthene _A ^{M#}	0.3	<0.1	-	<0.1	0.1			mg/kg	0.1	A-T-019s
Benzo(ghi)perylene _A ^{M#}	0.3	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Benzo(k)fluoranthene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Chrysene _A ^{M#}	0.3	<0.1	-	<0.1	0.1			mg/kg	0.1	A-T-019s
Dibenzo(ah)anthracene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Fluoranthene _A ^{M#}	0.4	<0.1	-	<0.1	0.2			mg/kg	0.1	A-T-019s
Fluorene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Indeno(123-cd)pyrene _A ^{M#}	0.3	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Naphthalene _A ^{M#}	<0.1	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Phenanthrene _A ^{M#}	0.4	<0.1	-	<0.1	<0.1			mg/kg	0.1	A-T-019s
Pyrene _A ^{M#}	0.4	<0.1	-	<0.1	0.2			mg/kg	0.1	A-T-019s
Total PAH-16MS _A ^{M#}	2.9	<0.1	-	<0.1	0.6			mg/kg	0.1	A-T-019s

REPORT NOTES

General

This report shall not be reproduced, except in full, without written approval from Envirolab.

The results reported herein relate only to the material supplied to the laboratory.

The residue of any samples contained within this report, and any received with the same delivery, will be disposed of six weeks after initial scheduling. For samples tested for Asbestos we will retain a portion of the dried sample for a minimum of six months after the initial Asbestos testing is completed.

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.

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.

The Client Sample No, Client Sample ID, Depth to Top, Depth to Bottom and Date Sampled were all provided by the client.

Soil chemical analysis:

All results are reported as dry weight (<40°C).

For samples with Matrix Codes 1 - 6 natural stones, brick and concrete fragments >10mm and any extraneous material (visible glass, metal or twigs) are removed and excluded from the sample prior to analysis and reported results corrected to a whole sample basis. This is reported as '% stones >10mm'.

For samples with Matrix Code 7 the whole sample is dried and crushed prior to analysis and this supersedes any "A" subscripts

All analysis is performed on the sample as received for soil samples which are positive for asbestos or the client has informed asbestos may be present and/or if they are from outside the European Union and this supersedes any "D" subscripts.

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.

Electrical Conductivity of water by Method A-T-037:

Results greater than 12900µS/cm @ 25°C / 11550µS/cm @ 20°C fall outside the calibration range and as such are unaccredited.

Asbestos:

Asbestos in soil analysis is performed on a dried aliquot of the submitted sample and cannot guarantee to identify asbestos if only present in small numbers as discrete fibres/fragments in the original sample.

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 & 8 are not predominantly a SAND/LOAM/CLAY mix and are not covered by our BSEN 17025 or MCERTS accreditations, with the exception of bulk asbestos which are BSEN 17025 accredited.

Secondary Matrix Codes:

A = contains stones, B = contains construction rubble, C = contains visible hydrocarbons, D = contains glass/metal,

E = contains roots/twigs.

Key:

IS indicates Insufficient Sample for analysis.

US indicates Unsuitable 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.

Superscript "M" indicates method accredited to MCERTS.

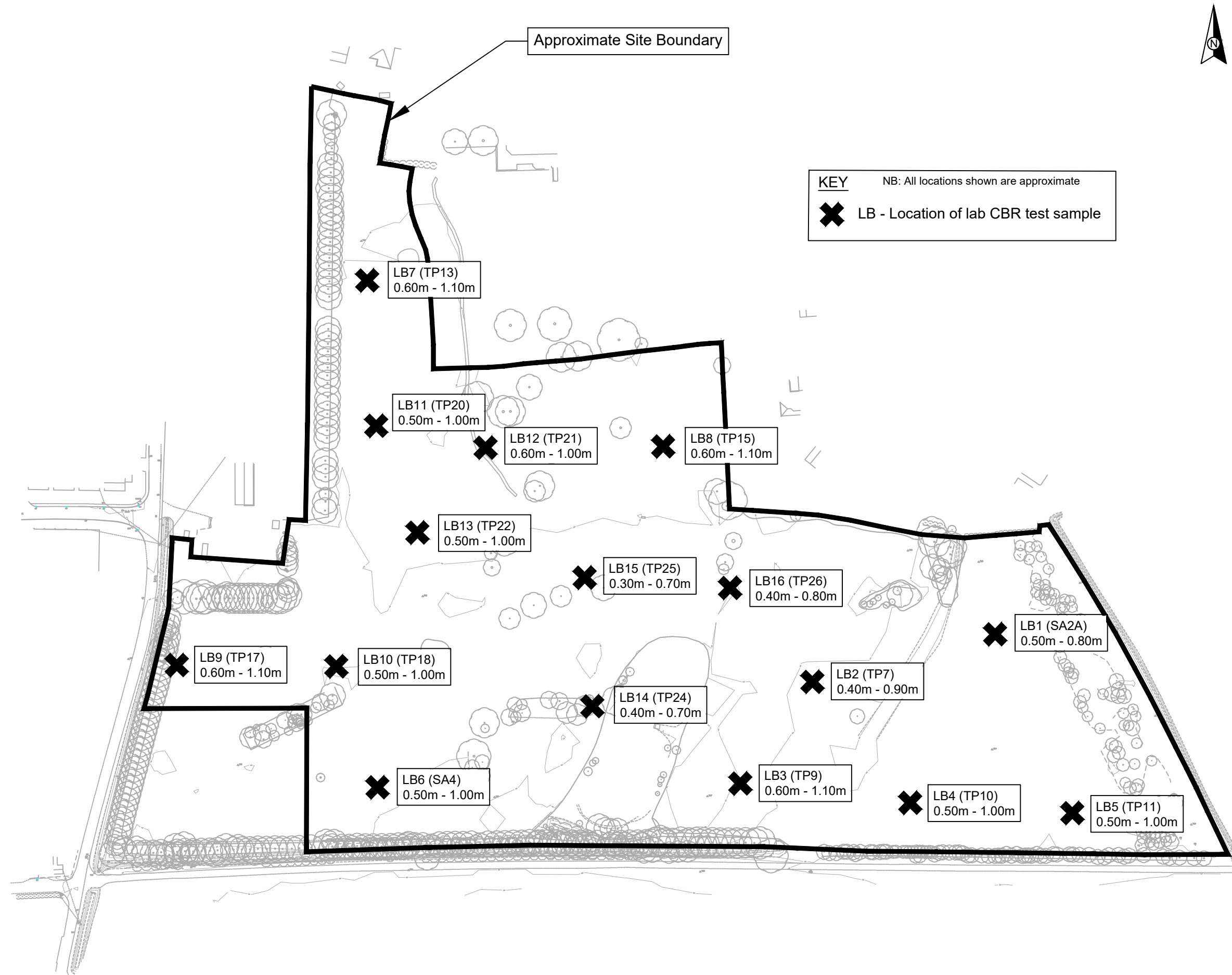
Subscript "A" indicates analysis performed on the sample as received.

Subscript "D" indicates analysis performed on the dried sample, crushed to pass a 2mm sieve

Please contact us if you need any further information.

APPENDIX XII

**Laboratory CBR Test Location Plan
(Figure No. D38108/06)**



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Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Laboratory CBR Test Location Plan
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/06



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APPENDIX XIII

Ground Gas & Water Level Monitoring Results

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	23-08-2019
Weather	Sunny with high cloud
Atmospheric Pressure Trend	Rise of 2mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	BP

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	11:50	1023	Peak	0.0	0.3	20.0	25	120	0.0	1.32	
			Steady	0.0	0.3	20.0			0.0		
WS2	NA	1023	Peak	NA	NA	NA	NA	NA	NA	NA	
			Steady	NA	NA	NA			NA		
WS4	NA	1023	Peak	NA	NA	NA	NA	NA	NA	NA	
			Steady	NA	NA	NA			NA		
WS5	12:02	1023	Peak	0.7	1.5	18.2	30	120	-3.9	1.16	
			Steady	0.7	1.5	18.2			0.0		
WS6	12:35	1023	Peak	0.0	5.9	13.5	30	120	0.0	3.31	
			Steady	0.0	5.9	13.5			0.0		
Ambient				0.0	0.0	20.5					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	30-08-2019
Weather	High Cloud
Atmospheric Pressure Trend	Atmospheric pressure steady around 1018mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	BP

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	11:50	1018	Peak	0.0	0.2	20.3	20	120	0.0	1.37	
			Steady	0.0	0.2	20.3			0.0		
WS2	NA	1018	Peak	NA	NA	NA	NA	NA	NA	NA	
			Steady	NA	NA	NA			NA		
WS4	NA	1018	Peak	NA	NA	NA	NA	NA	NA	NA	
			Steady	NA	NA	NA			NA		
WS5	12:02	1018	Peak	0.4	1.3	17.6	25	120	0.0	1.30	
			Steady	0.4	1.3	17.6			0.0		
WS6	12:35	1018	Peak	0.0	6.4	14.4	40	120	0.0	3.05	
			Steady	0.0	6.4	14.4			0.0		
Ambient				0.0	0.0	20.6					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	05-09-2019
Weather	Sunny and warm
Atmospheric Pressure Trend	Rise of 13mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	GH

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	10:05	1021	Peak	0.0	0.1	20.3	10	120	0.0	1.46	
			Steady	0.0	0.1	20.4			0.0		
WS2	09:50	1021	Peak	0.1	1.8	18.1	20	60	-12.3	1.09	Flow decreased over 25 seconds Flow warning at 60 seconds - monitoring stopped
			Steady	0.1	1.8	18.1			0.0		
WS4	10:45	1021	Peak	0.0	1.6	18.7	20	80	-3.6	1.15	Flow decreased over 25 seconds Flow warning at 80 seconds - monitoring stopped
			Steady	0.0	1.5	18.7			0.0		
WS5	10:30	1021	Peak	0.2	1.7	16.6	20	120	0.0	1.41	
			Steady	0.2	1.7	16.6			0.0		
WS6	10:20	1021	Peak	0.0	6.4	15.3	20	120	0.0	2.23	
			Steady	0.0	6.4	15.3			0.0		
Ambient				0.0	0.0	20.7					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	12-09-2019
Weather	Sunny and warm
Atmospheric Pressure Trend	Rise of 11mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	GH

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	10:45	1022	Peak	0.0	0.1	20.6	10	120	0.0	1.39	
			Steady	0.0	0.1	20.6			0.0		
WS2	10:30	1022	Peak	0.1	1.0	19.7	10	120	0.0	1.19	
			Steady	0.1	1.0	19.7			0.0		
WS4	11:25	1022	Peak	0.0	1.7	18.4	15	120	0.0	1.21	
			Steady	0.0	1.7	18.4			0.0		
WS5	11:10	1022	Peak	0.1	1.9	16.4	15	120	0.0	1.43	
			Steady	0.1	1.9	16.4			0.0		
WS6	11:01	1022	Peak	0.0	6.8	15.0	25	120	0.0	2.31	
			Steady	0.0	6.8	15.0			0.0		
Ambient				0.0	0.0	20.6					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	18-09-2019
Weather	Sunny and warm
Atmospheric Pressure Trend	Rise of 6mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	GH

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	09:05	1026	Peak	0.0	0.2	20.9	5	120	0.0	1.52	
			Steady	0.0	0.1	20.9			0.0		
WS2	08:50	1026	Peak	0.0	3.7	18.5	20	120	0.0	1.29	
			Steady	0.0	3.7	18.5			0.0		
WS4	09:45	1026	Peak	0.0	1.7	17.8	20	90	-9.3	1.19	Flow decreased over 30 seconds Flow warning at 90 seconds - monitoring stopped
			Steady	0.0	1.7	17.8			0.0		
WS5	09:30	1026	Peak	0.0	2.6	14.8	20	120	0.0	1.48	
			Steady	0.0	2.6	14.8			0.0		
WS6	09:20	1026	Peak	0.0	5.2	16.8	20	120	0.0	2.23	
			Steady	0.0	5.2	16.8			0.0		
Ambient				0.0	0.0	21.2					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

Project No.	D38108
Client	Ashwood Homes
Site Location	Dam Gate, Holbeach
Date	26-09-2019
Weather	Partly cloudy
Atmospheric Pressure Trend	Rise of 2mb in the 24hr period prior to monitoring
Equipment	GA2000 (GEO 11 = Derby) & Dipmeter
Operator	BP

MONITORING OF SOIL GASES AND GROUNDWATER - IN ACCORDANCE WITH CIRIA C665 / BS8485:2015											
Borehole No.	Time (00:00)	Ambient Pressure (mb)		Methane (% v/v)	Carbon Dioxide (% v/v)	Oxygen (% v/v)	Time to steady gas readings (secs)	Duration of gas monitoring (secs)	Gas Flow (l/hr)	Depth to groundwater (m begl)	Other Issues i.e. odour, condition of installation, etc
WS1	14:40	999	Peak	0.0	0.2	20.5	20	120	0.0	1.50	
			Steady	0.0	0.0	20.5			0.0		
WS2	14:32	999	Peak	0.0	4.2	17.7	35	120	0.0	1.36	
			Steady	0.0	4.2	17.7			0.0		
WS4	14:53	999	Peak	0.0	1.5	17.6	40	120	-1.2	1.19	
			Steady	0.0	1.5	17.6			0.0		
WS5	15:02	999	Peak	0.0	2.9	13.7	45	120	0.0	1.47	
			Steady	0.0	2.9	13.7			0.0		
WS6	15:15	999	Peak	0.0	4.4	17.2	40	120	0.0	2.25	
			Steady	0.0	4.4	17.2			0.0		
Ambient				0.0	0.0	20.6					

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)
3. Where Oxygen is below 16% (Coal Authority guidance)

Where cell is highlighted further consideration of the recorded value is required in accordance with the specified guidance documents

NA - Not Applicable/ Not Available

BOH - Bottom of Hole

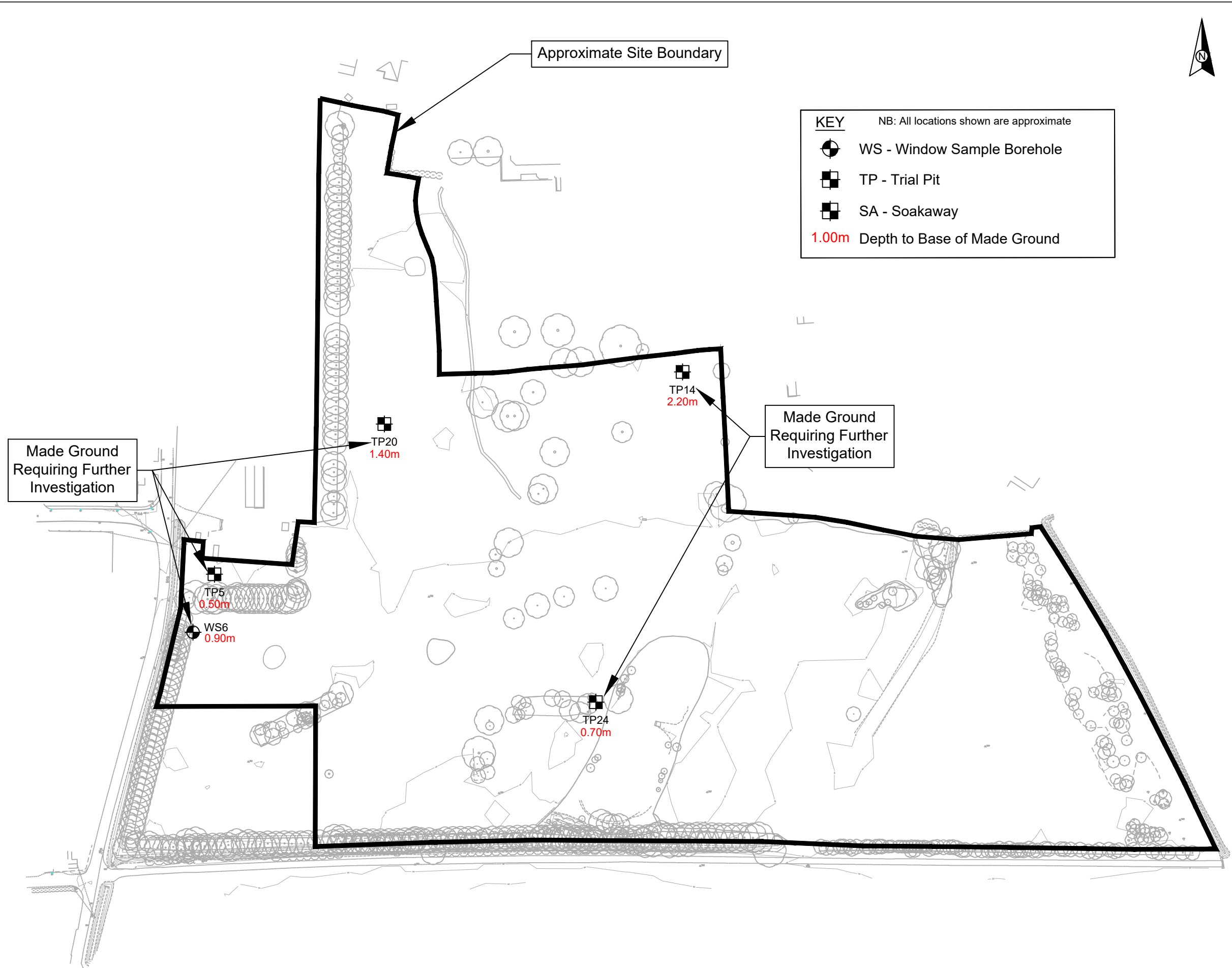
ND - Not Determined

NGW - No groundwater encountered

NR - None Recorded

APPENDIX XIV

**Plan Showing Areas of Made Ground Requiring Further Investigation
(Figure No. D38108/07)**



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Project No.	D38108
Client	Ashwood Homes
Project	Dam Gate Holbeach
Title	Plan Showing Areas of Made Ground Requiring Further Investigation
Drawn By	SJ
Checked By	CB
Approved By	PK
Scale	NTS
Date Drawn	20/09/2019
Revision	
Figure No.	D38108/07



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APPENDIX XV

Conditions & 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.