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consulting engineers

Land West of Bilsham Road

Land Quality Statement



For:

Landlink Estates Ltd

Project Number:

13684

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[redacted]

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EXECUTIVE SUMMARY

SITE LOCATION AND PROPOSED DEVELOPMENT	Site is situated just south of Yapton, West Sussex centred on National Grid Reference (NGR) SU 67516 02428. The nearest post code to site is BN18 0LA and covers approximately 7.7ha. The site is proposed to be developed for residential use, representing a **High** end user sensitivity.
CURRENT USE AND HISTORY	The site has comprised agricultural land from the earliest historical maps (1876). A drainage ditch borders the western boundary running roughly NE to SW.
ENVIRONMENTAL SETTING	The site lies at approximately 6m Above Ordnance Datum (AOD) with the general elevation reducing towards the ditch roughly falling towards the southwest. The site is underlain by a Secondary A aquifer (superficial deposits) and Principal Aquifer (Chalk). • Hydrogeology: **High** sensitivity • Hydrology: **High** sensitivity
GROUND CONDITIONS	The site strata comprises a cover of topsoil, underlain by firm (locally soft)gravelly sandy clays and loose to medium dense clayey fine to coarse sands over weathered structureless chalk (Grade Dm). High groundwater was encountered across the site.
GEOTECHNICAL HAZARDS	• Compressible ground • Shallow / perched groundwater • Soils susceptible to frost heave • Chalk dissolution features • Volume change potential soils • Low permeability soils • Aggressive conditions to buried concrete • Obstructions (i.e. flint bands)
CONTAMINATION ISSUES	The site has limited identified sources of contamination and the ground investigation did not identify Made Ground or contamination of concern on the site. Generally risks associated with contamination on the site were identified to be **VERY LOW.** Ground gas monitoring on the site indicates that ground gas protection measures are not required.
GEOTECHNICAL RECOMMENDATIONS	**Dissolution Features** No evidence of dissolution features was encountered during the ground investigations. However, the presence of such features cannot be fully ruled out. The presence of shallow groundwater across the site should be acknowledged, suitably controlled and measures should be in place to ensure drainage is not susceptible to damage. **Excavations** Difficulties in excavating the swales and foundations are not anticipated due to the soft nature of the superficial deposits. Owing to the high groundwater, measures should be in place to pump water and accommodate the high water table. Support or battering of the excavation faces may be required where man entry is necessary. **Foundations** Should shallow traditional foundations be considered additional investigation work is recommended to further evaluate the risk of chalk dissolution features on site and variability of superficial deposits. Issues with trench instability, groundwater ingress, heave and soil softening would also need to be addressed. Piled foundations may be required for some areas of site. The piles will need to consider the potential for chalk dissolution and pile locations should be suitably investigated for potential dissolution features. Additional investigative work will also be required should piled foundations be the chosen solution. **Drainage** Soakaway and percolation testing indicates the superficial material is not suitable for infiltration drainage.

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	Drainage infrastructure should be protected from the occurrence of settlement with flexible service connections and should be designed to mitigate against damage to prevent the egress of water into the chalk thereby forming dissolution features. Drainage should be wrapped in geotextiles to prevent the ingress of fines and silting up. **Floor slabs** Suspended floor slabs are recommended. **Road Pavements** A preliminary CBR of 2% is recommended where pavements is constructed in areas of soft and compressible material. The sub-grade for any pavement should be inspected prior to construction. **Buried Concrete** Buried concrete should be designed to Design Sulphate Class DS-1 and AC-1. **Further Investigation** Further investigation is recommended, this should include; further exploratory holes into the chalk to reach sufficient depth to enable pile design and better delineate the weathering profile of the bedrock across site, large scale infiltration, sulphate testing of soils and water samples for buried concrete assessment, and TRL DCP testing and/or remoulded CBR testing.
ENVIRONMENTAL RECOMMENDATIONS	Remediation works and gas protection measures are not required. A watching brief for hitherto unforeseen ground conditions should be maintained throughout future phases of work and any potential contamination encountered should be assessed in accordance with Land Contamination: Risk Management online guidance. Any re-use of soils on the site should be conducted under a Materials Management Plan (MMP), or appropriate waste exemption.

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1.0 INTRODUCTION

1.1. Appointment and Scope

1.1.1. This report has been produced by Campbell Reith Hill LLP (CampbellReith) on behalf of Landlink Estates Ltd (the Client) to summarise environmental and geotechnical information relating to Land West of Bilsham Road (hereafter referred to as the site). The references and limitations associated with this report follow the main text.

1.1.2. Figures showing the location of the site, site layout and exploratory hole location plan are included in Appendix A.

1.1.3. The report has been produced in general accordance with the procedures for ground investigation, interpretation and reporting set out in the Land Contamination: Risk Management online guidance, BS 5930:2015 (+A1:2020), BS 10175:2011 (+A2:2017) and BS EN 1997 (Eurocode 7).

1.1.4. The objective of the report is to collate and interpret Phase 1 Desk Study information and Phase 2 exploratory data in order to provide:

a) A conceptual model for the site ground conditions (soil, water and gas);

b) A generic quantitative risk assessment (human health, controlled waters and gas);

c) Outline recommendations for land contamination issues;

d) A geotechnical evaluation; and,

e) Preliminary geotechnical design recommendations.

1.1.5. This assessment considers the objectives of the National Planning Policy Framework which requires information to demonstrate that a site is suitable for its new use (taking account of ground conditions and land instability) and not capable of being determined as contaminated land under Part IIA of the Environmental Protection Act 1990 (after remediation). The NPPF requires adequate site investigation information, prepared by a competent person, with the minimum requirement comprising a desk study and site reconnaissance.

1.1.6. The geotechnical appraisal has been carried out in accordance with BS 5930:2015 (+A1 2020), and BS EN 1997 (Eurocode 7) to summarise geotechnical information relating to the site.

1.1.7. Preliminary geotechnical recommendations are presented in Section 12 and these should be verified in a Geotechnical Design Report once structural details of the proposed development are confirmed.

1.1.8. It should be recognised that further appraisals, investigations, specification and validation may be required to accord with the recommendations stated herein. It is noted that these appraisals do not consider wider development issues, with cost implications, such as waste classification.

1.1.9. A Phase 1 Report has not previously been conducted for the site and therefore a review of desk study information is included within this report along with the recent ground investigation commissioned for this project. The desk study information is presented in Appendix B. The site investigation report produced by Harrison Group Environmental Ltd in June 2021, is contained in Appendix C.

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1.2. Previous Investigations

1.2.1. No previous site investigation work has been undertaken at the site.

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2.0 SITE DESCRIPTION AND ENVIRONMENTAL SETTING

2.1. Site Location

2.1.1. The site location is presented as Figure 1 in Appendix A.

2.1.2. The site is located in a rural setting south of the town of Yapton, West Sussex, and centred on National Grid Reference (NGR) 497556 102384. The nearest post code to site is BN18 0LA and the site covers approximately 7.7 hectares (ha).

2.2. Site Layout

2.2.1. A site layout plan is presented as Figure 2 in Appendix A.

2.2.2. The site is rectangular in shape and comprises an agricultural field oriented northeast to southwest.

2.2.3. Access to the site is via the B2132 that runs along the eastern boundary of site.

2.3. Site Topography

2.3.1. The site is within a low lying area at approximately 6m Above Ordnance Datum (AOD). The general elevation of the area reduces towards the ditch on the western boundary reducing to approximately 2.0m AOD in the south-western corner.

2.3.2. A LiDAR Elevation plan of the site is presented as Figure 3.

2.4. Surrounding Land Use

2.4.1. The site is situated in a rural setting with the surrounding land use predominantly agricultural. Fields lie directly south, west and north of site. The village of Yapton is situated to the north/northeast largely comprising housing estates.

2.4.2. The B2132 runs adjacent to the sites' eastern boundary with a housing estate and allotments situated on the opposite side. Bilsham Farm is present to the south of site with a solar farm just beyond.

2.4.3. Due to the area being relatively flat and low lying there are numerous drains and streams in proximity to the site. An area of standing water (possibly a small reservoir) is located roughly 500m west of site and the Ryebank Rife is roughly 500m to the south/southwest. The southern coastline is situated just 3km from site.

2.5. Redevelopment Proposal

2.5.1. The site is proposed to be developed for residential use. The proposed layout plan is shown in Figure 4.

2.5.2. For the purposes of the current assessment consideration has been given to houses with private gardens, representing a **High** end user sensitivity.

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3.0 DESK STUDY RESEARCH AND ENVIRONMENTAL SETTING

3.1. Geology

3.1.1. The British Geological Survey (BGS) map sheet 317/332 for Chichester and Bognor indicates the site comprises superficial deposits of Aeolian Brickearth over the Upper Chalk Formation [2]. The Aeolian Brickearth deposits as described as comprising 'mainly silt in part contaminated with gravel'.

3.1.2. The BGS Geo Index Onshore mapping data suggests the site comprises River Terrace Gravels of sand, silt and clay over 'Upper Chalk' [3].

3.1.3. A borehole record just southwest of site (REF: SU90SE30) encountered Brickearth of brown mottled grey silty clay to 2.4m below ground level (m bgl) overlying 1.6m of raised beach deposits comprising very sandy chalk silt with chalk and some flint pebbles. The chalk bedrock was encountered at 4.0m bgl [4]. Two other borehole records roughly 750m northwest (REF: SU90SE29) and 1km west (REF: SU90SE26) recorded similar strata with chalk bedrock from 4.0m at both locations.

3.1.4. No groundwater was recorded during the excavation of this borehole.

3.1.5. The nearby geology as established from the available information is summarised in Table 3.1.

Table 3.1: Summary of Anticipated Geology

Strata	Depth to Base (m bgl)	Depth to base (m AOD)	Thickness (m)	Typical Description
Aeolian Brickearth	≈2.5	2.5	2.0	Silt/clays with occasional gravel
Raised Beach Deposits/ River Terrace Deposits	≈4.0	1.0	1.5	Very clayey sandy gravel of flint/ very sandy and chalk silt
Upper Chalk Formation	-	-	≈275	Soft chalk with nodular flints, weathered at top

3.1.6. A plan of the site geology is shown in Figure 5, included in Appendix A.

3.1.7. <u>Structural Geology</u>

3.1.8. There are no faults on or within the vicinity of the site. The Littlehampton anticline is approximately 1km northwest of the site and trends generally east to west. The Chichester syncline is approximate 3km north of the site with a similar trend. The bedrock beneath the site is gently dipping 1° to 5° to the south [2].

3.2. Preliminary Chalk Dissolution Risk Assessment

3.2.1. The Groundsure report suggests the site is within a **VERY LOW** risk zone for natural ground subsidence [1] and problems are unlikely except with considerable surface or subsurface water flow.

3.2.2. A Solution Feature Assessment identified the nearest recorded chalk feature to be over 1km from site.

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3.2.3. The potential presence of dissolution feature(s) occurring on site cannot be ruled out.

3.3. Natural Ground Subsidence Hazards

3.3.1. A summary of the Hazard Ratings for natural ground subsidence hazards from the Groundsure Report [1] are presented in Table 3.2 and assessed against available information on ground conditions to provide updated hazards ratings.

Table 3.2: Summary of Natural Ground Subsidence Hazards

Hazard	Groundsure Hazard Rating	Comment
Ground Dissolution of Soluble Rocks	Very Low	Soluble rocks are present within the ground. Few dissolution features are likely to be present.
Compressible Natural Deposits	Negligible	Compressible strata are not thought to occur.
Running Sands	Low	Running sand conditions may be present.
Landslides	Very Low	Slope instability problems are not likely to occur. Site situated in relatively flat low lying area.
Shrink Swell Clays	Low	Ground conditions predominantly medium plasticity. Near surface soils anticipated to comprise clays and silts.
Collapsible deposits	Low	Deposits with potential to collapse when loaded and saturated are possible present in places.

3.4. Historical Mining

3.4.1. The only records of mining within 2km of site are for surface ground workings, the nearest being an historical pond 135m south of site [1].

3.5. Seismicity

The national forward to BS EN 1998-1:2004+A1:2013 'Eurocode 8: Design of Structures for Earthquake Resistance – Part 1' states there are no requirements in the UK to consider seismic loading, and the whole of the UK may be considered an area of very low seismicity in which the provisions of EN 1998 need not apply.

3.6. Hydrogeology

3.6.1. The site hydrogeology is summarised in Table 3.3 and the associated references listed at the rear of the report.

Table 3.3: Summary of Hydrogeology

Type	Description	Ref
Superficial Strata: River Terrace Deposits/ Aeolian Deposits	Secondary A aquifer: permeable layers capable of supporting water supplies at a local rather than strategic scale. High groundwater vulnerability	[1]

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Type	Description	Ref
Bedrock: White Chalk Subgroup	Principal aquifer: geology of high intergranular and/or fracture permeability, usually providing a high level of water storage and may support water supply / river base flow on a strategic scale. Medium groundwater vulnerability	[1]
Soil Leaching Potential	High	[1]
Source Protection Zone	The site is not within 500m of a Source Protection Zone	[1]
Groundwater Abstractions	There are no groundwater abstractions located on or within 500m of the site.	[1]

3.6.2. The site is considered to have a **High** Sensitivity with respect to hydrogeology. The sensitivity is based upon the definitions provided in NHBC R&D66[1], as amended to include the requirements of the Water Framework Directive and the EA's River Basin Catchment Plans.

3.7. Hydrology

3.7.1. The site hydrology is summarised in Table 3.4 and the associated references listed at the rear of the report.

Table 3.4: Summary of Hydrology

Type	Distance	Description	Ref
Surface Waters	On site	Several records of 'Inland river on the ground surface containing water year round'	[1]
Surface water body catchments	On site	The site is within the water body catchment of the Ryebank Rife.	[1]
Surface Water Abstractions	n/a	There are no surface water abstractions located on or within 500m of the site.	[1]
Groundwater bodies	On site	The site is within the Littlehampton Anticline West groundwater body.	[1]
Flooding	On site	A high risk of flooding is present in proximity to the ditch on the western side of the site. However, this is largely limited to the extent of the watercourse. The majority of site is not within a flood risk zone.	[1]

3.7.2. The site is considered to have a **High** Sensitivity with respect to hydrology. The sensitivity is based upon the definitions provided in NHBC R&D66, as amended to include the requirements of the Water framework Directive and the EA's River Basin Catchment Plans.

3.8. Radon

3.8.1. The site is located in an area where <1% of homes are above the action level for radon [1].

3.8.2. As such the associated risk to any structures and buildings proposed in the area is considered to be **VERY LOW**, where radon protection measures are not required for new buildings.

3.8.3. If basements are proposed, radon risk should be reconsidered.

[1] Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH)

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4.0 SITE HISTORY AND INDUSTRIAL SETTING

4.1. Site History

4.1.1. Information relating to the site history and the adjacent site history (generally within 500m of the site boundary) is summarised in Tables 4.1 and 4.2 from historic maps and factual data [1].

Table 4.1: Site History

Date	Development
1876	Site comprises a field with a ditch/stream trending roughly NE to SW along the western boundary.
1896	The ditch no longer runs the full length of site.
1991	Footpaths shown along part of the northwest and southwest boundaries.
2001 - 2021	No significant changes.

Table 4.2: Adjacent Land History

Date	Development
1876 -1910	Surrounding area largely comprising fields with numerous streams/ditches flowing into the river 'Ryebank Rife' situated approximately 500m south of site. A road runs adjacent to the sites' SE boundary leading to the small village of Yapton 750m north and to the hamlet of Bilsham 100m south of site. Several farms are present in the surrounding area, the nearest being Morners Farm and Bilsham farm (later renamed Hobbs Farm) east and southeast of site respectively. Chichester and Arun canal, trending roughly E-W, and brick works are located 570m north of site. Wells are marked adjacent to the north east corner of the site, 370m north east and 215m southwest of the site. Two ponds are marked 175m and 240m south of the site.
1950 - 1966	Expansion of Yapton includes construction of a small housing estate just north of site and redevelopment of brickworks into houses. Chichester and Arun canal marked as disused with sections appearing to have been backfilled.
1980	Further expansion of Yapton with more houses constructed to the north of site. A tank is marked 220m south west of the site.
1991 - 2010	Morners farm, east of the site is now an industrial estate.
2012*	Industrial estate just east of site redeveloped into a small housing estate with allotments directly south. A small reservoir is 500m west of site.

* - Sourced from Google Earth satellite images [5].

4.1.2. The historic maps show the site has not previously been developed and the land use of the surrounding area is principally agricultural. Limited industrial use has been identified with the exception of the small industrial estate situated just off the east corner of site, constructed between 1980 and 1991 and later converted to a housing estate sometime between 2010 and 2012.

4.1.3. The satellite images suggest the industrial estate was relatively small possibly associated with Morners Farm.

4.2. Unexploded Ordnance (UXO)

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4.2.1. The Zetica Pre-Desk Study Assessment for UXO (unexploded ordnance) [6], indicates the site is located in an area of Low risk and a detailed desk study was not 'considered essential'.

4.2.2. This level of risk is considered appropriate to be addressed via toolbox talks during future phases of intrusive works.

4.3. Tunnels and Infrastructure

4.3.1. In reference to CampbellReith's online database GISSMO [7] there are no recorded tunnels underlying the site.

4.3.2. The stream running along the western boundary appears to be partially culverted at the north end possibly continuing northwards to the site north boundary. No other underground services are known to be present across site although a surface water pipe runs along Bilsham Road adjacent to the site.

4.3.3. A gas main runs east to west across the northern part of the site.

4.3.4. It should be noted that the above review does not constitute a formal review of all buried utilities that may be present at the site.

4.4. Current Industrial Setting

4.4.1. Table 4.3 summarises identified industrial features which may present a potential source of contamination to the site based upon the Groundsure Report [1] which should be consulted for further details. Unless otherwise stated, only those features that are within the stated review distances have been included.

Table 4.3: Industrial Setting

Type	Distance Reviewed	Distance from Site	Description
Historical industrial land uses	< 250m	1m SE 90/195m SW 290m E 460m SE	Industrial Estate (1991) Unspecified Tanks (1876/ 1991) Nursery (1991) Aerodrome (1978)
Recent Industrial Land Uses	< 150m	98m E	Electricity Substation
Historical Energy Features	< 150m	54m NE 89m E	Gas Valve House (1989 – 1992) Electricity Substation (1989 – 1992)
Garages	< 250m	-	None recorded
Landfill	< 250m	-	None recorded
Waste Transfer/Treatment Stations	<100m	-	No records
Pollution Incidents	< 50m	66 SE	Smoke - 2002
Contaminated land register entries and notices	<500m	-	No records
Surface Ground workings	< 250m	135-191m S	12 records for Pond(s) (1876 – 1991)
Licensed Discharges to controlled waters	< 250m	49m SE 85m SE 140m SE 227m SW	Misc. discharge – surface water (revoked 1991) Misc. discharge – surface water (revoked 1991) Misc. discharge – surface water (revoked 1991) Sewage discharge – (revoked 1991)

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Type	Distance Reviewed	Distance from Site	Description
Abstractions	<250m	-	No records

4.4.2. One pollutant incident record within 50m of site for smoke in 2002. Both the type of contaminant and age of the records it is unlikely to pose a contamination risk to site.

4.4.3. The current use of site as an agricultural field is considered to be a very low risk for any significant contamination.

4.4.4. Due to the rural location very limited industrial land uses have been present in proximity to site with the exception of a small industrial estate known to have been present near the northeast corner of site. Satellite images suggest it was relatively small and unlikely to have housed a large quantity of potentially polluting industries.

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5.0 PRELIMINARY CONCEPTUAL SITE MODEL AND QUALITATIVE RISK ASSESSMENT

5.1. Introduction

5.1.1. Current practice for land contamination evaluation involves classification of risk for each of the identified contaminant source-pathway-receptor pollutant linkages. These are summarised below, considering the desk study information obtained. This information has been utilised to design the site investigation considering the proposed end use.

5.2. Classification of Risk

5.2.1. Risk is defined by the combination of two factors: i) the probability of an occurrence (expressed as a likelihood); and ii) the consequence of it happening (expressed as a severity). The procedure for classifying risk is summarised in Table 5.1. The categories of risk have been based upon those defined in the Guidance for the Safe Development of Housing on Land Affected by Contamination, R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH). The categories are defined in the Environmental Risk Assessment Supporting Information section to the rear of this report, together with definitions of the classifications of probability and consequence.

Table 5.1: Classification of Risk

Probability (Likelihood)		Consequence			
		Severe	Medium	Mild	Minor
	High likelihood	Very high risk	High risk	Moderate risk	Low risk
	Likely	High risk	Moderate risk	Moderate/low risk	Low risk
	Low likelihood	Moderate risk	Moderate/low risk	Low risk	Very low risk
	Unlikely	Moderate/low risk	Low risk	Very low risk	Very low risk

5.3. Potential Sources of Contamination

5.3.1. Table 5.2 summarises the potential contamination sources that have been identified on or near the site. The potential contaminant types associated with these is then given based upon a review of CLR 11, industry profiles and anecdotal information.

Table 5.2: Potential Sources of Contamination

Feature on or near site	Potential Contaminant
On site: Previous use as agricultural land	Pesticides & herbicides
On site: Agricultural vehicle/ machine spillages	M, H, VOC
Adjacent site: Industrial Estate	M, H, VOC, GG
Notes: M – Metals. H – Hydrocarbons. VOC – Volatile Organic Compounds. ACM – Asbestos Containing Materials. GG – Ground Gases	

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5.4. Receptors and Exposure Pathways

5.4.1. Potential risks have been identified based on the proposed site use, the receptors and potential pathways by which the receptors may be exposed to the contaminant sources. These are presented in Table 5.3.

Table 5.3: Receptors and Exposure Pathways

Receptor	Pathway	Risk
End Users	Ingestion of soil/dust	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Inhalation of soil/dust	Low
Neighbours		Very Low
Construction Workers		Low
End Users	Dermal contact with soil/dust/water	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Inhalation of vapour from soil/dust	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Consumption of vegetables/plants	Very Low
End Users	Migration of soil gases to confined spaces/structures	Very Low
Construction Workers		Very Low
Building		Very Low
End Users	Inhalation of vapour from groundwater	Very Low
Neighbours		Very Low
Construction Workers		Very Low
Surface Waters	Migration of water borne contaminants from on site	Very Low
Groundwater Aquifer	Migration of contamination from surface and/or subsurface to groundwater	Very Low
Groundwater Aquifer	Migration of water borne contamination from off-site	Very Low
End Users	Movement of contaminants to engineered structures (water pipes)	Very Low
Sensitive Land Use (SSSI etc.)	Uptake by flora/fauna associated with sensitive land use	Very Low

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5.4.2. The initial qualitative risk rating for the site is generally considered to be **VERY LOW**, potentially increasing to **LOW** in any areas where any unexpected ground conditions (i.e. any isolated areas of Made Ground) which could contain a residuum of contamination are encountered. Based on the site history however these are considered unlikely to be present.

5.4.3. The findings of the intrusive investigation of the potential contaminant sources and pathways are reported herein. This has informed the Generic Quantitative Risk Assessment presented in Section 7.0 and the subsequent discussion of risk in Section 12.0.

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6.0 GROUND INVESTIGATION

6.1. Scope of Works

6.1.1. The ground investigation works were designed by CampbellReith and undertaken by Harrison Group Environmental Ltd on 18th and 19th May 2021. The associated Factual Ground Investigation Report is included in Appendix C.

6.1.2. Prior to the mobilisation of the ground investigation the tenant farmer planted crops across site and therefore the exploratory holes were limited to the edges of site. Consequently, a large central portion of the site was not surveyed.

6.1.3. The following sections are therefore based on a constrained ground investigation and further site works are considered necessary to further delineate the condition and engineering properties of the superficial and bedrock materials within the site.

6.1.4. The exploratory locations are shown on Figure 6 within Appendix A.

6.1.5. The scheduled works comprised of:

- 5 numbers. Window Sample holes to a maximum depth of 5.45m bgl.

6.1.6. WS02 was terminated at 1.7m bgl due to refusal and relocated to form WS02A. WS04 was undertaken to provide additional coverage of the site, and the information sourced from this exploratory hole is included in the interpretive information below.

6.2. Installations, Monitoring and Observations

6.2.1. Groundwater and gas monitoring installations were installed in WS01, WS02A, WS03 and WS04. Three return visits were undertaken to monitor groundwater levels and ground gas concentrations on the 25th May, 8th June and 15th June 2021.

6.2.2. The ground conditions encountered with respect to the monitoring installations are summarised in Table 6.1. The full installation details, including the response zones and monitoring results are presented in the Factual Ground Investigation Report included within Appendix C.

Table 6.1: Standpipe Summary

Exploratory Hole	Response Zone (m bgl)	Response Zone Strata	
WS01	1.00 – 3.00	1.00 – 2.60	Superficial deposits (clays and sands)
		2.60 – 3.00	Structureless Chalk
WS02A	1.00 – 4.20	1.00 – 4.20	Superficial deposits (clays and sands)
WS03	1.00 – 5.00	1.00 – 4.50	Superficial deposits (clays and sands)
		4.50 – 5.00	Structureless Chalk
WS04	1.00 – 4.00	1.00 – 4.00	Superficial deposits (clays and sands)

6.2.3. Water strikes observed during the site works and the results of the monitoring visits are summarised in Table 6.2 below.

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Table 6.2: Groundwater Observations

Exp. Hole	Standing Water Level During Monitoring							
	Struck		25/05/2021		08/06/2021		16/06/2021	
	m bgl	m AOD	m bgl	m AOD	m bgl	m AOD	m bgl	m AOD
WS01	2.00	-0.13	1.2	0.67	1.32	0.55	1.3	0.57
WS02A	3.50	1.44	2.27	2.67	2.33	2.61	2.38	2.56
WS03	1.90	4.18	2.33	3.75	2.39	3.69	2.41	3.67
WS04	1.60	2.69	1.58	2.71	1.68	2.61	1.84	2.45

6.2.4. The groundwater was struck within the superficial deposits in all locations (except WS02) and encountered at relatively shallow depths during the monitoring visits.

6.2.5. The details of installations, including response zones and return monitoring sheets are presented within the Factual Report included within Appendix C.

6.3. Soakaway Testing

6.3.1. One soakaway test was carried out in accordance with BRE Digest DG365:2016 [12]. The water depth did not change during the test indicating the site is not suitable for disposal of surface water runoff by infiltration drainage.

6.4. Percolation Testing

6.4.1. A single percolation test was undertaken in the south east corner of the site in accordance with BS 6297: 2007 + A1 2008. Due to the infiltration rate only two fills were undertaken. The results are included in Table 6.3.

Table 6.3: Percolation Test Results

Exploratory Hole	Elapsed time		Equivalent Infiltration Rate (m/s)
	Hrs/Mins/Secs	Seconds	
IT01	1 Hrs, 33 mins, 45 secs	5625	8.33 E -06
	2 Hrs, 36 mins, 48 secs	9408	5.19 E -06
		Average	6.76 E -06

6.5. Geotechnical Testing

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6.5.1. In-situ testing was undertaken for geotechnical purposes and samples were obtained for appropriate laboratory analysis. The laboratory testing was scheduled by CampbellReith and undertaken by Harrison Testing Services and i2 Analytical Ltd.

6.5.2. The tests and results are presented within the Factual Ground Investigation Report included in Appendix C.

6.6. Contamination Observations and Testing

6.6.1. Throughout the works only natural materials were observed, with no evidence of any Made Ground/anthropogenic inclusions and no olfactory and visual evidence of potential contamination.

6.6.2. Table 6.4 summarises the chemical suites that were analysed based upon the preliminary conceptual model and observed site conditions.

Table 6.4: Laboratory Tests (Environmental)

Test type	Number
SOIL	
S1.3: Asbestos in soil screening	4
S1.4: Total organic carbon	2
S1.6: As, Be, B, Cd, Cr, Cu, Ni, Pb, Hg, Se, V, Zn, Moisture Content, PAH (16 speciated), EPH Banded (C6-C8, C8-C10, C10-C12, C12-C16, C16-C21, >C21), Sulphate (total), Sulphide, Phenols (total), Cyanide (total), pH	4
WATER	
W1.1: As, Cd, Cr, Cu, Ni, Zn, Pb, Hg, B, Se, Hex Chromium, Total Cyanide, Free Cyanide, Soluble Sulphate, Sulphide, Free Sulphur, Speciated (16) PAHs, Phenols, Thiocyanate, Total TPH, pH	2

6.6.3. It is noted that pesticides and herbicides are identified as potential sources of contamination in Table 5.2.

6.6.4. Given the absence of visual evidence of pesticide and herbicide use, and the absence of stores where pesticides and herbicides may be stored, the associated potential for significant contamination of this nature was considered to be very low and as such testing for these compounds was not conducted.

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7.0 GENERIC QUANTITATIVE RISK ASSESSMENT

7.1. Assessment Framework

7.1.1. Subsequent to the identification and quantification of contaminant species in soils, waters and gases, it is necessary to select a method for assessing their significance in view of the current and proposed future use of the land.

7.1.2. The initial assessment comprises comparison of identified contaminant levels to generic screening values that have been prepared to assess the risk to human, controlled water and gas risk receptors. The guidance used to provide this initial screening is listed in Table 7.1.

7.1.3. With respect to Human Health Risk Assessment the screening values for a residential end use with plant uptake as defined in Environment Agency Guidance SR3[2] have been selected based upon the proposed development.

7.1.4. The assessment assumes a Soil Organic Matter (SOM) content of 1% based on site derived TOC (total organic carbon) data.

7.1.5. Controlled Water Risk Assessment has been undertaken using as available Environmental Quality Standards (EQS) for the protection of aquatic life based on the absence of potable abstraction and the presence of watercourses and surface water features in the surrounding area.

7.1.6. The specific legislation and/or guidance that dictate the water quality standards adopted are contaminant specific and these are referenced in the Summary of Water Analysis table. The water quality standards have been chosen in accordance with section 4.2 of the EA's Remedial Targets Methodology as informed by the EA's Groundwater Protection Guides (2017), and documents listed in Table 7.1[3].

7.1.7. For further detailed information on the current Regulations and selection of appropriate threshold values, please refer to the rear of this report text.

Table 7.1 Generic Quantitative Screening Values

	Key Guidance
Soil	LQM/CIEH S4ULs for Human Health Risk Assessment.*
	Defra Development of Category 4 Screening Levels Main Report and associated documents
	Environment Agency CLEA Version 1.06 software. Environment Agency Science Reports SC050021 SR2/SR3
	Generic Assessment Criteria based upon Environment Agency CLEA UK Beta Version 1.0.
Water	EA Groundwater Protection Guides, March 2017.
	The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
	Water Environment (Water Framework Directive) (England and Wales) (Amendment) Regulations 2015
	EC and UK Drinking Water Standards.
	WHO Drinking Water Standards.

[2] Updated Technical Background to the CLEA Model, Science Report SC050021/SR3
[3] https://www.gov.uk/government/collections/groundwater-protection

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	Key Guidance
	Background Water Quality.
	CIRIA C748, 'Guidance on the use of plastic membranes as VOC vapour barriers'.
	CIRIA C735, 'Good practice on the testing and verification of protection systems for buildings against hazardous ground gases'.
	BS 8576:2013, 'Guidance on investigations for ground gas – permanent gases and VOCs'
	CIRIA Report C665, 'Assessing Risks Posed by Hazardous Ground Gases to Buildings'
	CIRIA Report C682, 'VOCs Handbook: investigating, assessing and managing risks from inhalation of VOCs at land affected by contamination'
	British Standard BS:8485+A1:2019, 2015, 'Code of practice for the design of protective measures for methane and carbon dioxide ground gases for new buildings'.
	CIRIA Report 150 'Methane Investigation Strategies'.
	BRE 414 'Protective Measures for Housing on Gas Contaminated Land', 2001.
	The Building Regulations 2000, Approved Document C, Section 2. Updated 2004.
	BR211, 'Radon: Guidance on Protective Measures for New Buildings', 2015.
	Health Protection Agency Publication HPA RPD-033, 2007,' Indicative Atlas of Radon in England and Wales.

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7.2. Soil

7.2.1. The soil analysis results are summarised in Table 7.2.

7.2.2. Given the limited sampling undertaken, the Mean Value (95 percentile) and Maximum Value Tests have not been undertaken on the collected dataset.

Table 7.2: Summary of Soil Analysis

Contaminant	Units	Exceeding	Max	95th%ile	Tier 2 Screen
Heavy Metals/Metalloids					
Arsenic	mg/kg	0 / 4	9.5	-	37 [B]
Beryllium	mg/kg	0 / 4	0.83	-	1.7 [A]
Boron	mg/kg	0 / 4	1.2	-	530 [A]
Cadmium	mg/kg	0 / 4	<0.2	-	22 [B]
Chromium	mg/kg	0 / 4	26	-	910 [A]
Chromium VI	mg/kg	0 / 4	<4.0	-	21 [B]
Copper	mg/kg	0 / 4	19	-	2,900 [A]
Lead	mg/kg	0 / 4	21	-	200 [B]
Inorganic Mercury	mg/kg	0 / 4	<0.3	-	42 [A]
Nickel	mg/kg	0 / 4	16	-	140 [A]
Selenium	mg/kg	0 / 4	<1.0	-	270 [A]
Vanadium	mg/kg	0 / 4	35	-	480 [A]
Zinc	mg/kg	0 / 4	60	-	4,800 [A]
Cyanide	mg/kg	0 / 4	<1.0	-	24 [C]
Polycyclic Aromatic Hydrocarbons (PAHs)					
Naphthalene	mg/kg	0 / 4	<0.05	-	2.3 [A]

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Contaminant	Units	Exceeding	Max	95th%ile	Tier 2 Screen
Acenaphthylene	mg/kg	0 / 4	<0.05	-	190 [A]
Acenaphthene	mg/kg	0 / 4	<0.05	-	230 [A]
Fluorene	mg/kg	0 / 4	<0.05	-	180 [A]
Phenanthrene	mg/kg	0 / 4	<0.05	-	100 [A]
Anthracene	mg/kg	0 / 4	<0.05	-	2,600 [A]
Fluoranthene	mg/kg	0 / 4	<0.05	-	310 [A]
Pyrene	mg/kg	0 / 4	<0.05	-	670 [A]
Benzo(a)anthracene	mg/kg	0 / 4	<0.05	-	7.4 [A]
Chrysene	mg/kg	0 / 4	<0.05	-	16 [A]
Benzo(b)fluoranthene	mg/kg	0 / 4	<0.05	-	2.6 [A]
Benzo(k)fluoranthene	mg/kg	0 / 4	<0.05	-	78 [A]
Benzo(a)pyrene	mg/kg	0 / 4	<0.05	-	5 [B]
Indeno(1,2,3-cd)pyrene	mg/kg	0 / 4	<0.05	-	28 [A]
Dibenzo(ah)anthracene	mg/kg	0 / 4	<0.05	-	0.24 [A]
Benzo(ghi)perylene	mg/kg	0 / 4	<0.05	-	320 [A]
Total Petroleum Hydrocarbons					
TPH >C6-40	mg/kg	0 / 4	<10	-	27 [A]
EPH/TPH >C6-8	mg/kg	0 / 4	<0.1	-	81 [A]
EPH/TPH >C8-10	mg/kg	0 / 4	<10	-	27 [A]
EPH/TPH >C10-12	mg/kg	0 / 4	<1.0	-	81 [A]
EPH/TPH >C12-16	mg/kg	0 / 4	<4.0	-	160 [A]
EPH/TPH >C16-21	mg/kg	0 / 4	<10	-	290 [A]
EPH/TPH >C21-40	mg/kg	0 / 4	<10	-	1100 [A]
Other					
Phenol	mg/kg	0 / 4	1.4	-	130 [A]
Asbestos Screening	Detect/ Non-detect	0 / 4	Non-detect	N/A	N/A

Residential with Plant Uptake assuming 1.0% SOM Generic Assessment Criteria (GAC)
A LQM/CIEH Suitable for use Levels (S4UL). Copyright Land Quality Management Limited reproduced with permission; Publication Number S4UL 3026. All rights reserved. Top two consumption group applied.

B Defra Category 4 Screening Levels (C4SLs)

C Acute Risk GAC (SoBRA derived)

D GAC derived using CLEA v1.071

E GAC derived using CLEA v1.071 and SGV report spreadsheet
- Not calculated (fewer than 3 samples or no exceedances)

7.2.3. No exceedances of the adopted screening criteria have been identified and no asbestos has been encountered.

7.3. Water

7.3.1. Four samples of groundwater were obtained from the monitoring installations constructed at the site.

7.3.2. The results of the groundwater analyses have been compared to the values contained within the references detailed in Table 7.1 for water quality.

7.3.3. The selection of EQSs is considered appropriate given the absence of potable water abstraction in the surrounding area and the presence of watercourses on and near to the site.

7.3.4. The statistics associated with groundwater analysis are summarised in Table 7.3.

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Table 7.3: Summary of Water Analysis

Contaminant	Units	Exceeding	Max	Tier 2 Screen and Source
Heavy Metals/Metalloids				
Arsenic	µg/l	0/ 2	0.42	50[B*]
Boron	µg/l	0/ 2	33	2000[C]
Cadmium	µg/l	0/ 2	0.02	0.08[B]
Chromium	µg/l	0/ 2	3.5	4.7[B]
Copper	µg/l	**2/ 2**	**2.8**	1[B#]
Lead	µg/l	0/ 2	0.3	1.2[B*#]
Mercury (dissolved)	µg/l	0/ 2	<0.05	0.07[B*]
Nickel	µg/l	**2/ 2**	**4.2**	4[B#]
Selenium	µg/l	0/ 2	0.8	7.5[A]
Zinc	µg/l	0/ 2	9.5	10.9[B#]
Polycyclic Aromatic Hydrocarbons				
Naphthalene	µg/l	0/ 2	<0.01	2[B]
Acenaphthylene	µg/l	0/ 2	<0.01	n/a
Acenaphthene	µg/l	0/ 2	<0.01	n/a
Fluorene	µg/l	0/ 2	<0.01	n/a
Phenanthrene	µg/l	0/ 2	<0.01	0.1[B*]
Anthracene	µg/l	0/ 2	<0.01	0.0063[B*]
Fluoranthene	µg/l	0/ 2	<0.01	n/a
Pyrene	µg/l	0/ 2	<0.01	n/a
Benzo(a)anthracene	µg/l	0/ 2	<0.01	n/a
Chrysene	µg/l	0/ 2	<0.01	n/a
Benzo(b)fluoranthene	µg/l	0/ 2	<0.01	n/a
Benzo(k)fluoranthene	µg/l	0/ 2	<0.01	0.00017[B*]
Benzo(a)pyrene	µg/l	0/ 2	<0.01	n/a
Indeno(1,2,3-cd)pyrene	µg/l	0/ 2	<0.01	n/a
Dibenzo(ah)anthracene	µg/l	0/ 2	<0.01	n/a
Benzo(ghi)perylene	µg/l	0/ 2	<0.01	2[B]
Total Petroleum Hydrocarbons				
TPH >C6-40	µg/l	0/ 2	<10	74[B]
Other				
Total Phenol	µg/l	0/ 2	<3.5	7.7[B]

EQS - rivers and lakes
A - River Basin Districts Typology, Standards and Groundwater threshold values (WFD) (England & Wales) Directions 2010
B - The Water Framework Directive (Standards and Classification) Directions (England and Wales) 2015
C - Supporting Guidance (WAT-SG-53), Environmental Quality Standards and Standards for Discharge to Surface Waters. V6.1, SEPA, Feb 2018
* hazardous substance (according to Groundwater Directive 2006/118/EC)
assumes 100% bioavailability

7.3.5. Some exceedances of the adopted EQS's were identified by the groundwater sampling undertaken for concentrations of copper and nickel.

7.3.6. Based on the ground conditions encountered during the ground investigation and the relatively minor water quality testing exceedances that have been observed, i.e. within an order of magnitude of the adopted EQS, these groundwater results are not considered to be indicative of a potentially significant risk to controlled waters receptors that would require specific groundwater remediation.

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7.4. Ground Gas

7.4.1. No notable potentially highly organic soils were encountered during the ground investigation.

7.4.2. Three rounds of monitoring have been undertaken on 25th May 2021, 8th June 2021 and 16st June 2021.

7.4.3. The notable pre-purge results, where carbon dioxide exceeded 1.5%, methane 1% and/or oxygen fell below 18%, are summarised in Table 7.4.

Table 7.4: Summary Gas Concentrations and Flow Rates

Borehole	Date	Gas Concentration (%)			Average Flow Rate (l/hr)
		CO_2	CH_4	O_2	
WS02A	25/05/2021	3.7	0.0	18.4	0.1
WS04	25/05/2021	2.2	0.0	19.2	-0.4
WS02A	08/06/2021	4.6	0.0	17.4	0.0
WS03	08/06/2021	2.4	0.0	18.1	0.0
WS04	08/06/2021	2.3	0.0	18.5	0.0
WS02A	16/06/2021	4.3	0.0	17.5	0.0
WS03	16/06/2021	2.8	0.0	17.9	0.0
WS04	16/06/2021	2.0	0.0	17.7	0.0

All percentage figures are by measurement of volume. Bracketed figures are post purge. [a]Gas sample obtained. [b] Results do not exceed thresholds. 'nr' Positive flow not recorded

7.4.4. Based upon the guidance presented in Table 7.1, an assessment has been made of the requirements for gas protection that consider sources of gas generation, potential exposure routes, and applicable, representative gas flows and concentrations.

7.4.5. This is summarised below:

- **Potential on-site source of generation**: No significant potential source identified. On site total organic carbon (TOC) testing identified soils on site to have a generally low carbon content, these being 1.5%.
- **Potential off-site Source of generation**: No significant potential sources identified.
- **Representative Concentrations and Gas Flows**: No detectable methane concentrations or positive gas flow rates identified. Generally low concentrations of carbon dioxide are considered likely to be representative of an anaerobic shallow sub-surface environment. The negative flow rates observed are not considered to be indicative of a potential risk on site, rather these are considered likely to have been generated by atmospheric pressure or temperature conditions generating effective negative pressure within the corresponding window samples.
- **Exposure Routes**: Any gas at the site would primarily presents a concern following ingress into confined spaces both during and after construction.

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7.4.6. Given the above, the Gas Screening Value (GSV) has been calculated using the observed worst case carbon dioxide concentration of 4.6% (v/v), and using a gas flow rate of 0.1l/hr, the lowest flow rate which may be observed by the monitoring equipment used.

7.4.1. The resultant calculated GSV of 0.0046 l/hr indicates the site is classified as a CIRIA Characteristic Situation 1 and as such, gas protection measures are not required at the site.

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8.0 GEOTECHNICAL EVALUATION

8.1. Ground Conditions

8.1.1. The ground conditions encountered during the site investigation generally consisted of an upper layer of low strength, compressible cohesive strata or fine to coarse sand, over weathered structureless chalk grade Dm as per Ciria C574.

8.1.2. The superficial strata encountered on site generally comprises firm (locally soft) slightly gravelly/ gravelly sandy clays and loose to medium dense clayey (locally gravelly) fine to coarse sands. The underlying chalk was encountered in all locations, except WS02 and WS04, and is described as structureless chalk of cream/off white slightly sandy slightly gravelly SILT (Grade Dm).

8.1.3. No Made Ground was logged in any of the exploratory holes.

8.1.4. A summary of the strata encountered is shown in Table 8.1.

Table 8.1: Summary of Soil Profile

Stratum	From (m bgl)	To (m bgl)	Thickness (m)
Topsoil	0.00	0.35 – 0.40	0.35 – 0.40
Superficial: Possibly River Deposits/ Brickearth	0.35 – 0.40	>1.7 – 5.15	1.3 - >4.75
Weathered Chalk	2.6 – 4.8	>5.00 - >5.45	>0.95 – >2.40

8.2. Topsoil

8.2.1. Topsoil was encountered in all exploratory holes with a range in thicknesses between 0.35m and 0.4m. The material was generally described as a firm friable brown gravelly very sandy CLAY. Gravel comprised sub angular to sub rounded fine to coarse flint.

8.2.2. No geotechnical testing was undertaken on samples from the Topsoil due to the minor thickness and inherent engineering variability.

8.3. Superficial Deposits

Superficial deposits were encountered across the site varying in thicknesses from 1.3m to over 4.75m. The superficial deposits generally compose of interbedded soft to firm gravelly sandy clays and slightly gravelly very clayey loose to medium dense, fine to coarse sands. Gravel typically comprises sub angular to sub rounded fine to coarse flint and chalk. Locally soft clays were encountered in WS02 at 1.2m bgl, WS02A at 1.2m bgl, WS03 at 2.9m bgl and WS04 at 1.9m bgl.

8.3.1. In WS03 and WS04 soft / soft to firm sandy clays were overlain by more competent strata (i.e. firm sandy gravelly clays and gravelly clayey sand).

8.3.2. Moisture content and Atterberg Limits

8.3.3. Ten moisture content tests were undertaken on samples of the material recording a moisture content range of 13% to 23%.

8.3.4. Eight Atterberg Tests were undertaken recording;

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- Liquid Limit 19 - 31%
- Plastic Limit 14 - 18%
- Plasticity Index 5 - 14
- Passing 425µm 76 - 100%
- Classification Low plasticity clay
- Modified PI 4 – 13% (low volume change potential [8])

A sample logged as sand was scheduled for moisture content and index properties owing to the large cohesive portion of the material (WS02A at 2.9m bgl). The results indicate the sample occurs just below the A-line indicating a silt of low plasticity material. The description on the plasticity chart indicates this material to be cohesive.

8.3.5. Standard Penetration Tests (SPT)

8.3.6. Sixteen SPT 'N' values were recorded in the material between 6 and 43 indicating a variable soft to stiff or loose to dense material. The SPT values show a general trend of increasing competency with depth specifically below 2m. However, a low N value of 10 is recorded at 3.0m bgl in clay and 4.0m bgl in sand in WS03 and WS02A respectively. From ground level to 2m bgl the SPT value average is 10 (soft-firm/ loose-medium dense) increasing to 26 below 2m bgl (Stiff to medium dense/ dense). However, note should be take on the lower values at 3.0m bgl and 4.0m bgl.

8.3.7. Particle Size Distribution (PSD)

8.3.8. Four Particle Size Distribution tests were undertaken in samples recording:

- Gravel 1 – 28%
- Sand 8 – 33%;
- Silt 42 – 71%;
- Clay 10 – 16%.

8.3.9. The tests indicate the material is largely a sandy, clayey silt.

8.3.10. No granular superficial material was recorded in the logging of WS03 which is located at the highest elevation on the eastern edge of the site.

8.4. Weathered Structureless Chalk

8.4.1. The chalk was encountered in WS01, WS02A and WS03 at depths of 2.6m, 5.0m and 5.45m bgl respectively. No chalk was recorded in WS04 while the chalk in WS01 was recorded at the shallowest depth of 2.6m bgl at the southern edge of the site. Owing to the general topography of the site and the reduction of elevation towards the south / south west the chalk deepens to the north where the material is recorded at 4.8m bgl in WS02A and 4.5m bgl in WS03. This is consistent with the recorded dip of the bedrock to the south.

8.4.2. The chalk was generally described as structureless chalk composed of sandy slightly gravelly SILT where gravel is of weak, low density, angular to sub rounded fine to coarse chalk. Occasional sub angular to sub rounded fine to coarse gravel of flint was encountered at 4.0m bgl in WS01. The chalk is grade Dm indicating a fine soil and a material that will behave in a cohesive manner [9].

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8.4.3. Moisture content and Atterberg Limits

8.4.4. Two moisture content tests were undertaken on samples of the chalk recording 20% to 24%.

8.4.5. Two Atterberg Tests were undertaken due to the samples not being suitable for saturated moisture content and Intact Dry Density testing;

- Liquid Limit 22 - 27%
- Plastic Limit 16 - 23%
- Plasticity Index 4 - 6
- Passing 425µm 69 - 74%
- Classification Low plasticity Silt
- Modified PI 3 – 4% (low volume change potential [8])

8.4.6. Standard Penetration Tests (SPT)

8.4.7. Four SPT 'N' values were recorded in the chalk between 8 and 15 indicating a firm material.

8.5. Soakaway Tests

8.5.1. A single soakaway test was undertaken in the centre of the site. Due to the prominence of cohesive material no infiltration rate was recorded.

8.6. Percolation Tests

8.6.1. A single percolation test recorded an average infiltration rate of 6.76×10^{-6} m/s. Due to the low infiltration rate only two fills were undertaken.

8.7. Groundwater Conditions

8.7.1. Groundwater observations during the field and the subsequent monitoring are described in Section 7 and are summarised in Table 7.2.

8.7.2. During the May 2021 site investigation groundwater was struck in all locations except WS02. During the return monitoring visits standing water was recorded in all of the exploratory holes installed with monitoring wells at depths between 1.2m bgl to 2.4m bgl.

8.7.3. It should be noted that these readings were undertaken during the summer and shallower groundwater levels should be anticipated during the autumn and winter months.

8.7.4. The response zones (summarised in Table 7.1) included both the chalk and overlying superficial deposits in WS01 and WS03. The response zone in WS02A and WS04 was only within the overlying superficial deposits.

8.7.5. Minimal variation was recorded in the groundwater levels during the monitoring that was carried out between May and June 2021.

8.8. Buried Concrete

8.8.1. Two BRE Suite A tests were undertaken on cohesive samples of the superficial material recording 6mg/l and 5.5mg/l of water soluble SO4 and pH values of 8.3 and 8.6 indicating a design sulphate class DS-1 and ACEC classification of AC-1 recommendation for concrete.

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9.0 GEOTECHNICAL HAZARDS

9.1.1. The anticipated geotechnical hazards associated with the site are summarised in the table below.

Table 9.1: Summary of Geotechnical Hazards

Hazard	Potential presence on site		Identified on site			Engineering Risk to Proposed Developments
	Yes	No	Yes	Locally	No	
Chalk Dissolution	☒	☐	☐	☐	☒	Review of the site investigation suggests the strata is generally consistent beneath the site and there are no clear indications of the presence of dissolution features within the site. However, due to restricted access to a large area of the site during the investigation the coverage of exploratory holes was limited. In addition, the top of the chalk bedrock was not encountered within WS04 (excavated to 5.15m bgl) Therefore, the presence of dissolution features in the form of pipes, swallow holes or sinkholes cannot be ruled out.
Compressible ground	☒	☐	☒	☐	☐	Present in the form of soft to firm gravelly sandy clay soils and, structureless chalk weathered to a residual firm cohesive material. Potential dissolution features may also be infilled with soft and compressible material.
Volume change potential soils	☒	☐	☒	☐	☐	On site soils are recorded to exhibit low volume change potential on changes in moisture content. The removal of large trees may result in significant heave in clay soils. Developments, including foundations and infrastructure, formed in materials with a volume change potential should be designed to relevant guidance, taking into account the presence of trees and shrubs (existing and proposed).
Shallow / perched groundwater	☒	☐	☒	☐	☐	Shallow groundwater was recorded across the site between 1.2m bgl to 2.4m bgl. Draining and/ or pumping equipment may be required during the excavation of any foundations or drainage excavations to control the presence of the high groundwater.
Variable ground conditions	☒	☐	☒	☐	☐	The strata encountered in the site investigation was generally consistent with soft to firm clays and loose to medium dense clayey sands over weathered chalk. However, some variability of the superficial thickness was recorded ranging from 2.25m to +5.15m.

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Hazard	Potential presence on site		Identified on site			Engineering Risk to Proposed Developments
	Yes	No	Yes	Locally	No	
Obstructions including Flint Bands	☒	☐	☐	☒	☐	One potential flint band was encountered at 4.0m bgl in WS01. Such bands may form obstructions which can result in delays to construction and further investigation work. No sub-surface structures are understood to be present within the site. The likelihood of sub-surface structures being present across site is low.
Soils susceptible to frost heave	☒	☐	☒	☐	☐	Strata susceptible to frost heave were encountered across site in the form of fine superficial deposits and weathered chalk. Their presence should be taken into account in future design.
Low Permeability soils / variable infiltration rates	☒	☐	☒	☐	☐	A single soakaway test indicated negligible infiltration rates due to the presence of near surface cohesive strata. A percolation test also indicated very low infiltration rates.
UXO	☐	☒	☐	☐	☒	The site and surrounding area is at low risk of unexploded ordnance. However, the risk should be suitably managed and mitigated during any future investigatory and development works.
Services	☒	☐	☐	☒	☐	The stream crossing site is partially culverted in the north section.

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10.0 REVISED CONCEPTUAL MODEL

10.1.1. Guidance for contaminated land advocates the assessment of risk by determining the presence of pollutant linkages and weighting the likelihood of harm occurring with the potential severity of that harm. The framework is set out in various publications by the DETR, Environment Agency, Institute for Environment and Health, NHBC and CIRIA.

10.1.2. Tables 5.2 and 5.3 indicate the potential contaminants, pollutant linkages and receptors that have been considered at the site. Following the investigation of these and Generic Quantitative Risk Assessment a Revised Conceptual Site Model is presented below in Table 7.1.

10.1.3. For the purpose of this assessment, the descriptions of risk presented in Table 5.1 have been used:

Table 10.1: Revised Conceptual Site Model

Receptor	Pathway	Risk
End Users	Ingestion of soil/dust	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Inhalation of soil/dust	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Dermal contact with soil/dust/water	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Inhalation of vapour from soil/dust	Very Low
Neighbours		Very Low
Construction Workers		Very Low
End Users	Migration of soil gases to confined spaces/structures	Very Low
Construction Workers		
Building		
End Users	Inhalation of vapour from groundwater	Very Low
Neighbours		Very Low
Construction Workers		Very Low
Surface Waters	Migration of water borne contaminants from onsite	Very Low
Groundwater Aquifer	Migration of contamination from surface and/or subsurface to groundwater	Very Low
Groundwater Aquifer	Migration of water borne contamination from off-site	Very Low
End Users	Movement of contaminants to engineered structures (water pipes)	Very Low

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11.0 GEOTECHNICAL CONCLUSIONS AND RECOMMENDATIONS

11.1. Introduction

11.1.1. The ground conditions encountered during the investigations generally comprised a sequence of Topsoil over superficial strata over weathered structureless fine grained chalk bedrock. The superficial strata comprises soft to firm gravelly sandy clays and loose to dense very clayey fine to coarse sands. The underlying chalk encountered was Grade Dm, generally described as sandy slightly gravelly SILT with gravel of weak, low density, angular to sub rounded fine to coarse chalk.

11.2. Shallow Foundations

11.2.1. Traditional shallow foundations may be viable across some of the site however, due to the limited information at the time of writing caution should be taken.

11.2.2. Weak superficial deposits were encountered across the site to depths of 2.6 to >5.15m bgl with variability present in some areas. Where shallow foundations are considered the potential for problems with trench instability and soil softening should be addressed.

11.2.3. Foundation strata should be carefully inspected to ensure the structures do not cross variable stratum to avoid differential settlement. Where foundations are likely to be crossing variable strata bespoke foundation design may be required which may incorporate reinforcement to provide additional stiffness to foundations. Further investigation is required to reduce the potential risk of chalk dissolution features within the site.

11.2.4. Foundation depths should be determined in accordance with Chapter 4.2 of the current NHBC Standards [8] based on low volume change potential soils. The depth of foundations should also factor in the presence of trees that are existing/ planned/ to be removed and the presence of any desiccated soils and live roots.

11.2.5. Where firm fine grained shallow strata are present an allowable bearing pressure of 75kPa could be considered. This, however, will need to be checked and the absence of significant weathering, dissolution or soft spots confirmed. Caution should also be taken when assessing suitable founding strata as softer clays may underlie them as seen in WS03 and WS04. Due to this it is strongly recommended additional ground investigation is completed to allow a more detailed ground model of the strata present across site.

11.2.6. The shallowest chalk recorded during the site investigation was encountered at the southern edge of the site in WS01 at 2.6m bgl. Further ground investigation is recommended owing to the constraints on the exploratory hole locations due to the presence of crops within the field.

11.2.7. Where chalk is encountered at shallow depths there is likely to be a significant weathering profile and potentially unrecorded dissolution features. Reinforcement of shallow foundations will be required due to the potential for dissolution features.

11.2.8. Shrink/swell and heave protection will be required on site in accordance with NHBC Standards [8] and should be designed based on the low volume change potential of the soils encountered.

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11.3. Excavations

11.3.1. WS01 and WS02A were terminated early due to hole collapse and a partial collapse was also recorded in WS04 from 4.0 to 4.7m bgl. Groundwater was struck in all exploratory holes (except WS02) from 1.6m to 3.5m bgl.

11.3.2. Groundwater ingress should be anticipated in all areas of excavation and provisions may need to be made for dewatering or pumping as required. In addition issues with excavation stability are likely to be encountered particularly in areas where loose sands and/or gravels are present. Support or battering of the excavation faces to a safe angle of repose will be required for all excavations where man entry is necessary, the nature and extent of which will need to be evaluated under CDM regulations [10].

11.3.3. Any proposed swales should be designed to accommodate for the high water table.

11.3.4. The need for breaking out equipment is not considered likely.

11.4. Dissolution Features

11.4.1. The presence of dissolution features was not identified in the information sourced for the site and the published information indicates the risk of such features is low. However, given the limited cover of the site investigation the possibility of near surface dissolution features cannot be ruled out.

11.5. Piles

11.5.1. Due to a thick cover of variable weak and compressible soils within the superficial deposits and the presence of high groundwater piles may be required for part or all of the site.

11.5.2. The advice of reputable piling specialists, experienced in the ground conditions considered here, should be sought. They should be responsible for the selection of appropriate piling equipment and the final design of the piles. Given below are some preliminary comments.

11.5.3. The piles will need to extend to a suitable depth within the underlying chalk bedrock and high bearing capacities will be achieved by bearing onto or rock-socketing into this formation.

11.5.4. Consideration is required regarding the presence of metastable materials and cavities which can be destabilised by disturbance during pile installation due to the vibration of the works and the use of flush water. The piling contractor should consider the potential for dissolution features and satisfy themselves that all potential risks are accounted for.

11.5.5. Flint gravels and bands of flint within the chalk formation may act as obstructions to the piling equipment. This may require consideration to be given to pre excavation/pre boring of such features. Given the potential presence of flint bands the site may be unamenable to the use of driven piles.

11.5.6. The ground conditions are likely to be amenable to either CFA or bored piles, taking into account the following comments.

11.5.7. Bored piles may require casing to support the pile installation through the superficial deposits, structureless chalk and any granular material that may be present.

11.5.8. CFA piles are generally limited to 25m for smaller diameter piles (<400mm) and 30m for larger diameters (>600mm), which should be taken into account when determining the number of piles

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under heavily loaded areas. CFA piles require good workmanship to ensure they are adequately constructed.

11.5.9. However, where there may be infilled dissolution features both CFA and driven cast-in-place piles may be unsuitable due to the potential presence of voids or loose material and the impact on the integrity of the pile shafts. Additionally CIRIA C574 indicates that solution features cannot be identified during the construction of CFA piles.

11.5.10. The piled foundations should be designed in accordance with CIRIA C574 [9] and PR86 [11] and must take into account the potential for dissolution and variable weathering profiles. The piles must extend a suitable distance past any zones of weakness into the competent chalk and beneath the base of any potential dissolution features.

11.5.11. If levels are to be raised pile design should also take into account the long term settlement or collapse of potential metastable materials, including associated negative skin friction.

11.5.12. The low volume change potential of the near surface clays should be taken into account by the pile designer, alongside the potential for desiccated soils. The low volume change potential of the Chalk Formation should also be taken into account. The requirements for void formers below ground beams, slabs and pile caps, and against the inside faces of external ground beams, slabs and pile caps, should be followed in accordance with NHBC Standards [8].

11.5.13. Whilst the specialist piling contractor would be responsible for detailed design, for preliminary guidance, indicative base resistances for CFA piles constructed from existing ground level are given in Table 11.1. These were undertaken in general accordance with C574 [9], however, may require consideration against appropriately factored design actions as detailed in EC7.

11.5.14. Table 11.1 below provides indicative total design resistances for individual piles, which require consideration against appropriately factored design actions as detailed in EC0 and EC7.

Table 11.1: Estimated Compressive Design resistances

Pile diameter	Total Compressive Design Resistances (kN*) Pile Toe Depth m bgl		
	10m	**15m**	**20m**
300mm	160	270	420
450mm	310	475	700
600mm	500	700	1020

* To be used in conjunction with ULS design actions for Combination 2 of Design Approach 1

11.5.15. Table 11.1 is based on the following assumptions:

- An existing site level of around 5.0m AOD;
- The chalk has a shaft resistance based on the relationship $\tau sf = \beta\sigma'_v$ where $\beta = 0.45$ and the angle of shear resistance = 45°;
- The self-weight of the pile and the weight of soil removed during pile construction cancel each other out;
- Pile spacing is at least 3x pile diameter.
- Groundwater level at 2.0m bgl.
- SPT N Value of 15 within chalk across full depth of pile.

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11.5.16. The above values are dependent on the crushing strength of the concrete.

11.5.17. The selection of pile will depend on the loads to be carried and the parameters adopted by the piling specialist should be verified by an experienced geotechnical engineer.

11.5.18. Where an SPT 'N' value of approximately 15 is encountered at 5m bgl and using the recommended ultimate base resistance of 200N a value of 3000kN/m2 can be derived for the chalk [9].

11.5.19. It should be noted that the possibility of groundwater strikes additional to those encountered during the ground investigation works cannot be ruled out.

11.5.20. The specialist piling contractor must satisfy themselves that all necessary information is available for their design. If the contractor requires additional ground investigation works to substantiate the already acquired data this will need to be procured as part of the works.

11.6. Ground Improvement

11.6.1. With respect to ground improvement options, the advice of reputable specialist contractors experienced in the ground conditions considered here should be sought. They should be responsible for the selection of appropriate equipment and the final design of the treatment.

11.6.2. Ground improvement could be considered on site to improve the load bearing capacity of shallow deposits should areas of the proposed development be suitable for founding on the upper portion of weaker superficial strata. Any ground improvements should take into account the potential for unrecorded dissolution features.

11.7. Drainage

11.7.1. Drainage and other services will be affected by any large total or differential settlements. Drainage should be laid with increased falls and flexible service connections will be required. It is not considered likely that drainage will have to be suspended, although this will depend on the magnitude of settlements that are expected once the design has been developed further.

11.7.2. Control of drainage is of key importance when building on chalk as the concentrated ingress of water can initiate new dissolution features and destabilised loose material within existing ones.

11.7.3. Flexible jointed pipes should be used wherever possible and particular care should be taken to avoid leaks in the water supply and drainage pipework.

11.7.4. Any proposed drainage and other services will likely be affected by heave resulting from the presence of low volume change potential of soils, which will be pronounced in areas of vegetation. Consequently, drainage should be laid with increased falls and flexible service connections.

11.7.5. As some soils on site may be frost susceptible, drainage should be placed at sufficient depth so as to avoid the impacts of frost heave.

11.7.6. Due to the presence on site of fine soils, drainage infrastructure should be wrapped in geotextile to prevent the ingress of fines and silting up of drainage systems. Scour protection should also be considered on site particularly within drainage channels, swales or ditches.

11.7.7. The design of drainage should take into account the shallow and variable groundwater levels on site and the likelihood for seasonal variations. Temporary dewatering measures may be required unless suitable water lowering measures are put in place pre-development of drainage e.g. land drains.

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11.7.8. Groundwater ingress should be anticipated in areas of excavation and it is recommended that measures are put in place to mitigate against issues with instability such as piping, scour and slope failure caused by groundwater. Such measures could include the use of land drains as a long term solution.

11.8. Soakaway Drainage

11.8.1. Infiltration testing in accordance with BRE 365 was attempted however, no infiltration was recorded owing the fine grained cohesive nature of the superficial materials. A percolation test also indicated very low infiltration rates. The use of infiltration drainage devices on site is therefore considered unfeasible.

11.8.2. As per CIRIA 574 any soakaways should be kept a suitable distance away from any foundations (at least 20m where dissolution features are prevalent). Currently no dissolution features have been identified within the site however, due to the nature of chalk all soakaways should be at least 10m away from any foundations.

11.8.3. CIRIA C574 indicates the local authority and Environment Agency should be consulted when proposing soakaway installations in areas of chalk.

11.9. Floor slabs

11.9.1. Floor slabs will need to be suspended on the foundations owing to the variable thickness of the compressible material across the site.

11.9.2. The void dimensions to accommodate the occurrence of heave associated with any suspended floor slabs should be determined in accordance with chapter 4.2 of the NHBC Standards [8].

11.10. Road Pavements

11.10.1. Due to the thickness of firm to soft gravelly sandy clays across the majority of site and the low volume change potential for soils at the site, pavement surfaces should be constructed in flexible materials such as bituminous compounds or block paving which are more easily able to accommodate ground movement and can be more easily repaired. The formation level should be rolled and inspected for any soft or loose material. These materials should be removed and replaced with granular fill placed and compacted in accordance with suitable specification.

11.10.2. The clay dominant soils are considered to be frost susceptible.

11.10.3. Chalk should not be utilised as a capping layer unless good drainage is present.

11.10.4. Assuming excavation formation soils to comprise soft to firm clays and based on the formation preparation outlined above, a provisional CBR value of 2% is recommended. Testing is advised to validate this preliminary figure.

11.10.5. If road pavement are to be constructed on fill it is recommended that such fill is placed and compacted in accordance with a suitable specification based on the Specification for Highway Works. Pavement surfaces should be constructed in flexible materials such as bituminous compounds or block paving. The CBR value to be adopted would depend on nature of the fill specification adopted and the as built quality of the fill. Additional testing of the fill just prior to road construction is recommended, so as to confirm matters.

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11.11. Buried Concrete

11.11.1. In the consideration of sulphate attack on buried concrete, reference has been made to BRE Special Digest 1 which classifies the site as a greenfield site with a mobile groundwater conditions. The results of the concrete classification tests received have indicated a DS-1 classification and ACEC AC-1 should be adopted [13].

11.12. General Construction Advice

11.12.1. It should be possible to use conventional excavators to form excavations in the soils encountered during the investigation. Obstructions such as; hard surfacing, old foundations, relict basement construction, may require the use of breaking apparatus, however their presence on site is considered unlikely.

11.12.2. For any load bearing formations, careful inspection should be undertaken to ensure placement in competent natural strata unless ground treatment has been carried out and properly validated. Any soft spots identified should be excavated and replaced with compacted granular fill or lean mix concrete. Concrete should be placed as soon as possible following excavation to avoid softening of the ground. A similar recommendation is also made for road pavement formations, although compacted granular fill could be used instead of concrete.

11.12.3. While there is no evidence for relic foundations or other subterranean structures beneath the footprint of the proposed buildings, such obstructions should be fully grubbed out. Such excavations should be surveyed and backfilled with an acceptable granular fill, placed and compacted to an engineering specification. The same recommendations are made for excavations that may be required to remove soil contamination.

11.12.4. In areas of road pavements and hard standing, any relic subterranean structures should be broken down to around 1m below finished site level to minimise the risk of differential settlement due to the presence of hard spots. In soft landscaped areas it may be possible to limit such operations to 0.50m bgl.

11.13. Recommendations for Further Work

11.13.1. Owing to the constraints posed by the crops within the site additional ground investigation work is recommended to fully quantify the risks on site and allow detailed design. Further investigation should comprise:

- Additional exploratory holes to delineate the sequence of strata beneath the proposed development to inform detailed design and preparation of an updated Interpretive Geotechnical Report. This should include further exploratory holes to a sufficient depth to enable pile design.
- Additional geotechnical testing is recommended to included; large scale infiltration to confirm the viability of soakaway drainage, and TRL DCP testing and/or remoulded CBR testing. Further geotechnical testing of the chalk, assuming deeper exploratory holes are undertaken, would also by advantageous.

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12.0 ENVIRONMENTAL CONCLUSIONS AND RECOMMENDATIONS

12.1. Summary of Risk

12.1.1. The site investigation commissioned by CampbellReith incorporated contamination testing of soil and groundwater and monitoring of ground gas across the site. In addition, available Desk Study information has been consulted.

12.1.2. The site is considered to lie in area of **High** environmental sensitivity with respect to Hydrogeology and Hydrology.

12.1.3. The proposed residential development with private gardens is considered to be of **High** end user sensitivity.

12.1.4. The site is currently considered to present a generally **VERY LOW** risk in relation to contamination issues.

12.2. Summary of Contamination

12.2.1. Desk study and subsequent site investigation and chemical analysis has identified the following key contamination issues at the site:

- **Soils:** The soil sampling undertaken has not identified any elevated contaminant concentrations or asbestos at the site. During the ground works no Made Ground or visual or olfactory evidence of potential contamination were encountered.
- **Groundwater:** The minor exceedances of adopted EQS values identified by the groundwater sampling undertaken is not considered to represent a potentially significant risk requiring further investigation, assessment or possibly remediation at this stage.
- **Ground gas:** No elevated methane concentrations or positive gas flow rates have been observed during monitoring. The elevated carbon dioxide concentrations observed are not considered to represent a potential risk requiring gas protection measures be included in proposed buildings.

12.2.2. A number of actions will be required to address land contamination issues at the site and these are described below. These relate to:

- Submission of documents to address planning conditions;
- Maintenance of a watching brief during future phases of intrusive ground works; and,
- Verification Documents.

12.3. Planning Submission

12.3.1. This report may be submitted to the Local Planning Authority to assist with the planning application process and to address potential land quality planning condition requirements.

12.4. Watching Brief

12.4.1. Notwithstanding the findings presented herein, allowance should still be made for hitherto unforeseen ground conditions to be encountered which could present a higher risk with regard to potential contamination issues.

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12.4.2. As such a watching brief should be maintained as standard by a suitably qualified and experience person throughout the groundworks phase of construction, such that any unexpected materials or materials of potential concern may be readily identified, assessed, and any identified risk managed accordingly.

12.4.3. Any such process should be undertaken in consultation with the Environmental Health Department of the Local planning Authority if required by planning.

12.5. Verification Control Documents

12.5.1. Following on from the recommendations made herein, in order to control works on site and facilitate the collection of records required for a Verification Report, a Groundworks Specification may be required.

12.5.2. The Specification should detail necessary requirement for inspections, record keeping, actions for unforeseen contamination, and detail the requirements for the control of any imported material and waste management.

12.5.3. The Specification may need to be submitted to the Local Authority for review and approval as part of the planning process, to fulfil the requirements of anticipated land quality planning conditions.

12.5.4. Once approved it will be the Contractor's obligation to fulfil the agreed requirements of the Specification.

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TECHNICAL REFERENCES

Reference	Reference Text	Type
1	Groundsure Report (Ref: CAR1-8016763), July 2021	Report
2	BGS Geological Survey of England and Wales 1:63,360/1:50,000 geological map series, New Series Sheet 317/332 Chichester and Bognor, 1996, Accessed July 2021 (https://webapps.bgs.ac.uk/data/maps)	Map Archive
3	BGS GeoIndex Onshore Mapping, Accessed July 2021 (https://www.bgs.ac.uk/map-viewers/geoindex-onshore/)	Online Archive
4	BGS Borehole log scans, Accessed June 2021 (http://mapapps2.bgs.ac.uk/geoindex/home.html)	Online Archive
5	Google Earth, Satellite Imagery, Accessed July 2021	Online Satellite Mapping
6	Zetica UXO Risk Maps, Accessed July 2021 (https://zeticauxo.com/downloads-and-resources/risk-maps/)	Online Map
7	CampbellReith, Online GIS Platform GISSMO, Accessed June 2021	GIS Platform
8	NHBC Standards, London, 2021	Regulations
9	C574 – Engineering in Chalk, CIRIA, London 2002	Guidance
10	Construction Design and Management Regulations, HSE, 2015	Regulations
11	Project Report 86 – Shaft friction of CFA piles in chalk, CIRIA London, 2003	Guidance
12	BRE Digest 365 Soakaway Design, BRE, 2016	Guidance
13	BRE Special Digest 1:2005 Concrete in aggressive ground, BRE, 2005	Guidance

** Note reference numbers continue from Table 1.1 if presented in Section 1 of the report*

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ENVIRONMENTAL RISK ASSESSMENT SUPPORTING INFORMATION

Soil Screening Values

The Environment Agency has published non statutory technical guidance for Regulators and their advisors to assess the chronic risk posed to human health from land contamination, known as the Contaminated Land Exposure Assessment (CLEA) Framework.

The CLEA Framework documents and associated risk assessment model are subject to ongoing technical review. In July 2008 guidance documents CLR7 to 10, which previously underpinned the CLEA Framework, were withdrawn. In January 2009 the Environment Agency published CLEA V1.04 risk assessment software and associated guidance documents[4] as a replacement to the previous CLEA UK Beta Version and documents CLR 7 to 10. Further revisions were made in September 2009 to CLEA V1.05 and October 2009 to CLEA 1.06 risk assessment software.

Soil Guideline Values (SGVs) were produced by Defra/EA and Generic Assessment Criteria (GACs) were produced by CampbellReith and others. These were based on the CLEA model and supporting guidance (SR2 and SR3) and where based on a minimal/tolerable level of risk.

In December 2014 DEFRA released final versions of the C4SLs (Category 4 Screening Levels) for 6 No. contaminants (As, benzene, BaP, Cd, Cr VI and Pb) together with a Policy Companion Document and an Erratum. These represent contaminant soil concentrations which present an acceptable (Low) level of risk, within the context of Part 2A, i.e. they are representative of Category 4 sites. In the Contaminated Land Statutory Guidance (April 2012), sites under Part 2A assessments are categorised 1 - 4, with Category 1 being definitely Part 2A and Category 4 definitely not Part 2A ('where there is no risk or the level of risk posed is low').

The C4SLs were produced using the CLEA model and follow the general approach of SR3, although, changes were made to exposure parameters and to the toxicological basis of the assessments. The C4SLs are based on a low level of toxicological concern (LLTC) and are, by definition, less conservative than Health Criteria Values (HCVs) which are the basis for assessments defined in SR2 and used in the generation of SGVs and GACs. They are, therefore, indicative of a low level of risk.

Since their release, DEFRA have confirmed that C4SLs can be used in the planning regime and DCLG (Department for Communities and Local Government) amended Planning Practice Guidance (PPG) on Land Affected by Contamination (12 June 2014)[5] which stated that C4SLs provide a simple test for deciding when land is suitable for use and definitely not contaminated land'. On 03 September 2014 the Secretary for the Environment, Lord de Mauley, issued a letter (attached) to all Local Authorities which references DCLG's PPG and confirms that C4SLs could be used in planning and provide a simple test for establishing when sites are suitable for use.

LQM/CIEH issued S4ULs in December 2014 for 89 contaminants (metals, BTEX, banded TPH, speciated PAH, chlorinated solvents, phenols, chlorophenols, chlorobenzenes, pesticides and a number of miscellaneous others). The S4ULs have generally adopted the revisions to the exposure modelling that were developed in the production of the C4SLs. Critically, however, they are based on HCVs to produce concentrations which are indicative of a minimal/tolerable level of risk.

S4ULs are therefore used as the preliminary stage of soil assessments since they are indicative of minimal/tolerable level of risk. If these are exceeded then the C4SLs are used (if available) to determine if the risk could be described as low.

Where CLEA compliant S4ULs or C4SLs are not available reference is made to Generic Assessment Criteria (GAC) derived using the CLEA UK model (beta version). These are currently used for cyanide. Where referred to, the non-compliant standing of these values is considered.

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[4] Environment Agency Report Ref: SC050021/SR2 - *Human Health Toxicological Assessment of Contaminants in Soil.* January 2009. Environment Agency Report Ref: SC050021/SR3 – *Updated background to the CLEA model.* January 2009.

[5] http://planningguidance.planningportal.gov.uk/blog/guidance/land-affected-by-contamination/land-affected-by-contamination-guidance/

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Selection of Appropriate [Tier 2] Soil Screening Values

The CLEA model is based upon defined exposure scenarios and six generic land uses have been established for the C4SLs and S4ULs. These set out a discrete set of circumstances where exposure may occur, including a source, the pathways, and the exposed population.

The three generic land use scenarios used in the development of SGVs are:

- **commercial/ Industrial;**
- **allotments; and,**
- **residential with plant uptake,**
- **residential without plant uptake,**
- **public open space (residential)**
- **public open space (parks)**

It is noted that the CLEA screening values are generic and not always applicable. Where the CLEA conceptual model is not appropriate it will be necessary to develop site specific Detailed Quantitative Risk Assessment screening values as a further stage of assessment.

It is noted that the CLEA model does not consider risks from contaminated waters beneath the site to human health and the model also assumes that no free product is present. Should such conditions exist at the subject site the requirement for application of an alternative risk assessment model should be assessed. Alternatively, construction workers are potentially exposed to acute risk and therefore require separate consideration.

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Statistical Analysis of Soil Analytical Results

Statistical analysis of soil based analytical results has been undertaken in accordance with CL:AIRE Guidance on Comparing Soil Contamination Data with a Critical Concentration (May 2008). The use of the Mean Value Test and Maximum Value Test is still considered appropriate for site assessments. Although the guidance advocates use of the one - sample t test, this is a variation of the mean value test and establishes the confidence level at which the assessor can determine whether a particular screening level has/has not been succeeded. The mean value test used herein is set at the 95th percentile confidence limit in order to be risk conservative.

The Maximum Value Test is a statistical tool that is used to identify outlier values from a numerical distribution of results for a given determinant. These outlier values can be excluded and considered separately, and the remaining values are then used to calculate upper bound 95th percentile values ($95^{\%ile}$) (Mean Value Test) for comparison with the screening values.

The results are reviewed prior to any statistical analysis in order to determine if zoning of the soils is apparent and hence whether the site requires to be divided into averaging areas. Additional tables are presented where appropriate to reflect distinct ground characteristics relevant to the conceptual model.

Water Screening Values

This assessment considers potential risks to controlled waters (groundwater and surface waters) in relation to risks from any historical contamination. The most stringent test is that defined for Contaminated Land under Part 2A of the Environmental Protection Act, 1990. However, it should be recognised that a wider evaluation of risk is considered within the planning regime and CLR 11.

The Environment Agency has a wider policy agenda for the protection of controlled waters that will impinge upon judgements in relation to land contamination issues. This includes those for the Water Framework Directive and Groundwater Directive and wider legislation for both groundwater, surface water and associated elements (such as fisheries)[6].

The results of water analysis have been compared to screening values selected to assess the potential risk to the identified controlled water receptors in the Conceptual Model. The specific standards utilised for this purpose are considered in the assessment table footnotes and typically comprise: Environmental Quality Standards for the protection of aquatic life; Surface Water Standards; EC, UK and WHO Drinking Water Standards; or Background water quality (where no applicable standard exists).

The initial assessment considers the sensitivity of the receptor in the selection of the screening value. Advice for this purpose has been obtained principally from Environment Agency Technical Advice to Third Parties on Pollution of Controlled Waters for Part 2A of the Environmental Protection Act 1990, No 07/02, EA, 2002 (INFO-RA2-3e), as informed by the EA's GP3.

Where a viable pollutant linkage is considered to be present and the screening criteria exceeded, a Qualitative Risk Assessment is presented with associated recommendations. Depending on the specific objectives, policy and practice of the Environment Agency, discussion of water screening values may be subsequently required.

Definitions of Consequence, Probability and Risk

The following classification has been taken from Guidance for the Safe Development of Housing on Land Affected by Contamination R&D66: 2008 Volume 1 (Environment Agency, NHBC and CIEH.

The key to the classification is that the designation of risk is based upon the consideration of both:

a) **the magnitude of the potential consequence (i.e. severity).**

[takes into account both the potential severity of the hazard and the sensitivity of the receptor]

b) **the magnitude of probability (i.e. likelihood).**
[takes into account both the presence of the hazard and receptor and the integrity of the pathway]

[6] Refer to Environment Agency Publications for Groundwater Protection Policy and Practice (GP3)

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Classification of Consequence

Classification	Definition	Examples
Severe	Highly elevated concentrations **likely** to result in "significant harm" to human health as defined by the EPA 1990, Part 2A, if exposure occurs. Equivalent to EA **Category 1** pollution incident including persistent and/or extensive effects on water quality; leading to closure of a potable abstraction point; major impact on amenity value or major damage to agriculture or commerce. Major damage to aquatic or other ecosystems, which is likely to result in a substantial adverse change in its functioning or harm to a species of special interest that endangers the long-term maintenance of the population. Catastrophic damage to crops, buildings or property.	Significant harm to humans is defined in circular 01.2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Major fish kill in surface water from large spillage of contaminants from site. Highly elevated concentrations of List I and II substances present in groundwater close to small potable abstraction (high sensitivity). Explosion, causing building collapse (can also equate to immediate human health risk if buildings are occupied).
Medium	Elevated concentrations which could result in "significant harm" to human health as defined by the EPA 1990, Part 2A if exposure occurs. Equivalent to **EA Category 2** pollution incident including significant effect on water quality; notification required to abstractors; reduction in amenity value or significant damage to agriculture or commerce. Significant damage to aquatic or other ecosystems, which may result in a substantial adverse change in its functioning or harm to a species of special interest that may endanger the long-term maintenance of the population. Significant damage to crops, buildings or property.	Significant harm to humans is defined in circular 01/2006 as death, disease*, serious injury, genetic mutation, birth defects or the impairment of reproductive functions. Damage to building rendering it unsafe to occupy e.g. foundation damage resulting in instability. Ingress of contaminants through plastic potable water pipes.
Mild	Exposure to human health **unlikely** to lead to "significant harm". Equivalent to **EA Category 3** pollution incident including minimal or short lived effect on water quality; marginal effect on amenity value, agriculture or commerce. Minor or short lived damage to aquatic or other ecosystems, which is unlikely to result in a substantial adverse change in its functioning or harm to a species of special interest that would endanger the long-term maintenance of the population. Minor damage to crops, buildings or property.	Exposure could lead to slight short-term effects (e.g. mild skin rash). Surface spalling of concrete.

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Minor	No measurable effect on humans. Equivalent to insubstantial pollution incident with no observed effect on water quality or ecosystems. Repairable effects of damage to buildings, structures and services.	The loss of plants in a landscaping scheme. Discoloration of concrete.

Classification of Probability

Classification	Definition	Examples
High likelihood	There is pollutant linkage and an event would appear very likely in the short-term and almost inevitable over the long-term, or there is evidence at the receptor of harm or pollution.	*a) Elevated concentrations of toxic contaminants are present in soils in the top 0.5m in a residential garden.* *b) Ground/groundwater contamination could be present from chemical works, containing a number of USTs, having been in operation on the same site for over 50 years.*
Likely	There is pollutant linkage and all the elements are present and in the right place which means that it is probable that an event will occur. Circumstances are such that an event is not inevitable, but possible in the short-term and likely over the long-term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths of 0.5-1.0m in a residential garden, or the top 0.5m in public open space.* *b) Ground/groundwater contamination could be present from an industrial site containing a UST present between 1970 and 1990. The tank is known to be single skin. There is no evidence of leakage although there are no records of integrity tests.*
Low likelihood	There is pollutant linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a long period such an event would take place, and is less likely in the shorter term.	*a) Elevated concentrations of toxic contaminants are present in soils at depths > 1m in a residential garden, or 0.5-1.0m in public open space.* *b) Ground/groundwater contamination could be present on a light industrial unit constructed in the 1990s containing a UST in operation over the last 10 years – the tank is double skinned but there is no integrity testing or evidence of leakage.*
Unlikely	There is pollutant linkage but circumstances are such that it is improbable that an event would occur even in the very long-term.	*a) Elevated concentrations of toxic contaminants are present below hardstanding.* *b) Light industrial units < 10 yrs old containing a double-skinned UST with annual integrity testing results available.*

Note: A pollution linkage must first be established before probability is classified. If there is no pollution linkage then there is no potential risk. If there is no pollution linkage then there is no need to apply tests for probability and consequence.

For example if there is surface contamination and a principal aquifer is present at depth, but this principal aquifer is overlain by an aquiclude of significant thickness then there is no pollution linkage and the risks to the principal aquifer are not assessed. The report should identify both the source and the receptor but state that because there is no linkage there are no potential risks.

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Description of the classified risks

Very high risk
There is a high probability that severe harm could arise to a designated receptor from an identified hazard at the site without remediation action OR there is evidence that severe harm to a designated receptor is already occurring. Realisation of that risk is likely to present a substantial liability to be site owner/or occupier. Investigation is required as a matter of urgency and remediation works likely to follow in the short-term.

High risk
Harm is likely to arise to a designated receptor from an identified hazard at the site without remediation action. Realisation of the risk is likely to present a substantial liability to the site owner/or occupier. Investigation is required as a matter of urgency to clarify the risk. Remediation works may be necessary in the short-term and are likely over the longer term.

Moderate risk
It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely, that the harm would be relatively mild. Further investigative work is normally required to clarify the risk and to determine the potential liability to site owner/occupier. Some remediation works may be required in the longer term.

Low risk
It is possible that harm could arise to a designated receptor from identified hazard, but it is likely at worst, that this harm if realised would normally be mild. It is unlikely that the site owner/or occupier would face substantial liabilities from such a risk. Further investigative work (which is likely to be limited) to clarify the risk may be required. Any subsequent remediation works are likely to be relatively limited.

Very low risk
It is a low possibility that harm could arise to a designated receptor, but it is likely at worst, that the harm if realised would normally be mild or minor.

No potential risk
There is no potential risk if no pollution linkage has been established.

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LIMITATIONS

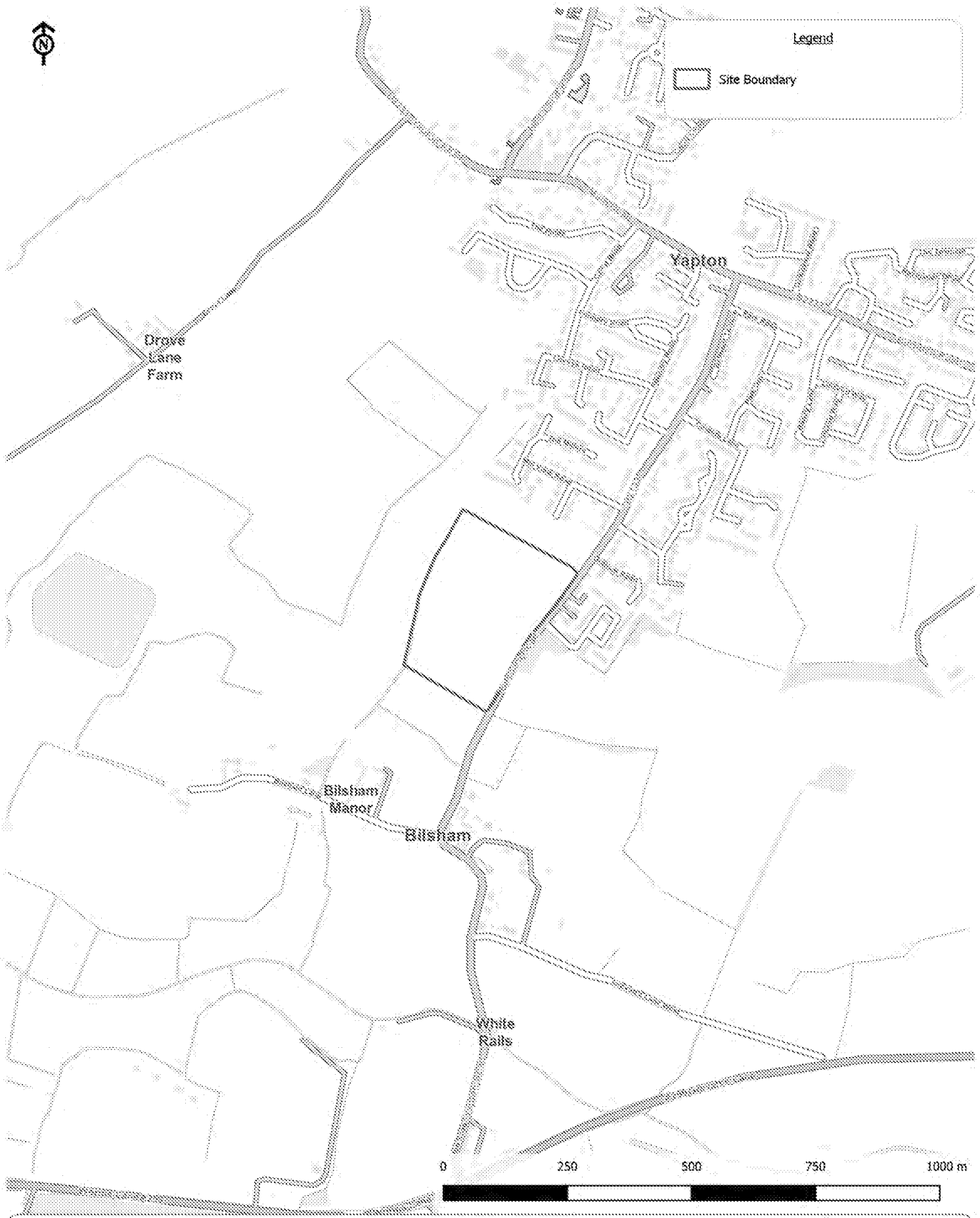
Environmental & Geotechnical Interpretative Reports

1. This report provides available factual data for the site obtained only from the sources described in the text and related to the site on the basis of the location information provided by the client.
2. Where any data or information supplied by the client or other external source, including that from previous studies, has been used, it has been assumed that the information is correct. No responsibility can be accepted by CampbellReith for inaccuracies within this data or information. In relation to historic maps the accuracy of maps cannot be guaranteed and it should be recognized that different conditions on site may have existed between and subsequent to the various map surveys.
3. This report is limited to those aspects of historical land use and enquiries related to environmental matters reported on and no liability is accepted for any other aspects. The opinions expressed cannot be absolute due to the limit of time and resources implicit within the agreed brief and the possibility of unrecorded previous uses of the site and adjacent land.
4. The material encountered and samples obtained during on-site investigations represent only a small proportion of the materials present on the site. There may be other conditions prevailing at the site which have not been revealed and which have therefore not been taken into account in this report. These risks can be minimised and reduced by additional investigations. If significant variations become evident, additional specialist advice should be sought to assess the implications of these few findings.
5. The generalised soil conditions described in the text are intended to convey trends in subsurface conditions. The boundaries between strata are approximate and have been developed on interpretations of the exploration locations and samples collected.
6. Water level and gas readings have been taken at times and under conditions stated on the exploration logs. It must be noted that fluctuations in the level of groundwater or gas may occur due to a variety of factors which may differ from those prevailing at the time the measurements were taken.
7. Please note that CampbellReith cannot accept any liability for observations or opinions expressed regarding the absence or presence of asbestos or on any product or waste that may contain asbestos. We recommend that an asbestos specialist, with appropriate professional indemnity insurance, is employed directly by the client in every case where asbestos may be present on the site or within the buildings or installations. Any comments made in this report with respect to asbestos, or asbestos containing materials, are only included to assist the client with the initial appraisal of the project and should not be relied upon in any way.
8. The findings and opinions expressed are relevant to those dates of the reported site work and should not be relied upon to represent conditions at substantially later dates.
9. This report is produced solely for the benefit of the client, and no liability is accepted for any reliance placed upon it by any other party unless specifically agreed in writing.

ARUN DISTRICT COUNCIL Y/3/22/OUT

Appendix A: Figures

ARUN DISTRICT COUNCIL Y/3/22/OUT



Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 1:
Site Location

Scale: 1:10000@A4
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Job Number: 13884
Drawn by - Checked by: RLF - RA/PW
Dwg No - Status/Revision: 13884-CRH-XX-XX-FG-G-7012 - P4
File location: \\ad-data1\gis-data\13500 - 13749\13884 P - Lamb Field\Project_Workspace\GIS (pdf in Outputs)
Date (Revision History): 01/12/2021 (P1, First Issue, 15/07/21, RLF, P2, Client Name, 22/07/21, RLF, P3, Client Logo, 29/07/21, RLF, P4, Site Boundary, 01/12/21, RLF)

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Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 2:
Site Layout

Scale: 1:2500@A3
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Job Number: 13684
Drawn by - Checked by: RLF - RA/PW
Drg No - Status/Revision: 13684-CRH-XX-XX-FG-G-7013 - P4
File location: \\red-data1\gis-data\13500 - 13749\13684 R - Lamb Field\Project_Workspaces\LQS (pdf in Outputs)
Date (Revision History): 01/12/2021 (P1, First Issue, 15/07/21, RLF; P2, Client Name, 22/07/21, RLF; P3, Client Logo, 29/07/21, RLF; P4, Site Boundary, 01/12/21, RLF)

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Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 3:
LiDAR Information

Scale: 1:4000@A3
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Job Number: 13684
Drawn by - Checked by: RLF - RA/PW
Dwg No - Status/Revision: 13684-CRH-XX-XX-FG-G-7014 - P4
File location: \\ved-data1\gis-data\13500 - 13749\13684 R - Larab Field\Project_Workspaces\LQS (pdf in Outputs)
Date (Revision History): 01/12/2021 (P1, First Issue, 15/07/21, RLF; P2, Client Name, 22/07/21, RLF; P3, Client Logo, 29/07/21, RLF; P4, Site Boundary, 01/12/21, RLF)

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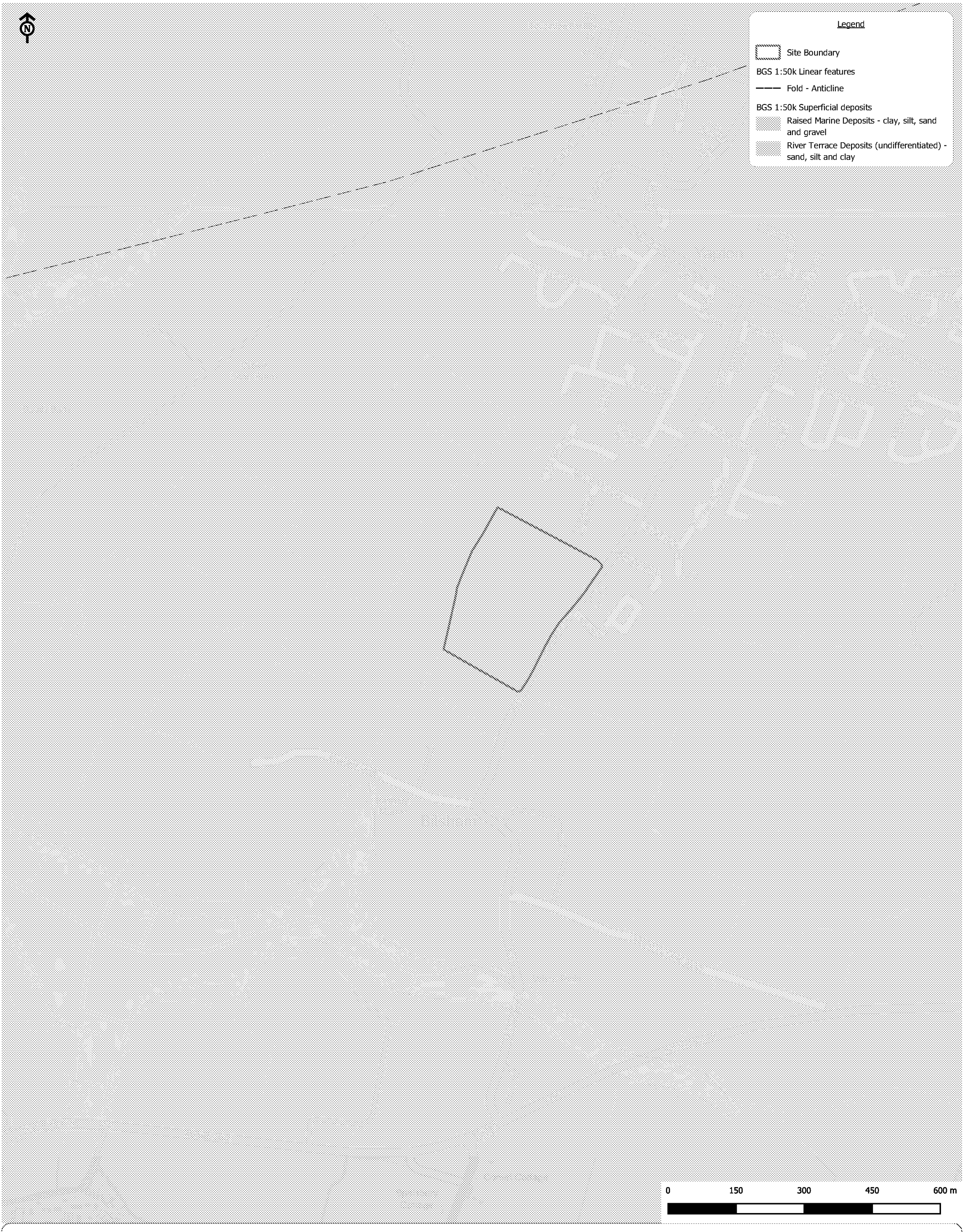
Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 4:
Proposed Development Plan

Scale:	1:2000@A3
CampbellReith OS Copyright:	© Crown copyright. All rights reserved. Licence number 100020027
Boyle and Summers - Design Concept:	21015-BSL-ZZ-XX-DR-A-14-01-DF-C (Jun 2021)
Job Number:	13684
Drawn by - Checked by:	RLF - RA/PW
Drg No - Status/Revision:	13684-CRH-XX-XX-FG-G-7015 - P4
File location:	\\red-data1\gis-data\13500 - 13749\13684 R - Lamb Field\Project_Workspaces\LQS (pdf in Outputs)
Date (Revision History):	01/12/2021 (P1, First Issue, 15/07/21, RLF; P2, Client Name, 22/07/21, RLF; P3, Client Logo, 29/07/21, RLF; P4, Site Boundary, 01/12/21, RLF)

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Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 5:
Geology

Scale: 1:7500@A3

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Drg No - Status/Revision: 13684-CRH-XX-XX-FG-G-7016 - P4
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Date (Revision History): 01/12/2021 (P1, First Issue, 15/07/21, RLF; P2, Client Name, 22/07/21, RLF; P3, Client Logo, 29/07/21, RLF; P4, Site Boundary, 01/12/21, RLF)

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Land west of Bilsham Road

Client: Landlink Estates Ltd

Figure 6:
Exploratory Hole Location Plan

Scale: 1:2500@A3
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Job Number: 13684
Drawn by - Checked by: RLF/RP - RA/PW
Drg No - Status/Revision: 13684-CRH-XX-XX-FG-G-7017 - P5
File location: \\red-data1\gis-data\13500 - 13749\13684 R - Lamb Field\Project_Workspaces\LQS (pdf in Outputs)
Date (Revision History): 01/12/2021 (P1, First Issue, 15/07/21, RLF; P2, Client Name, 29/07/21, RLF; P3, Client Logo, 29/07/21, RLF; P4, GI update, 17/09/21, RP; P5, Site Boundary, 01/12/21, RLF)

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Appendix B: Desk Study Information

Contents

ARUN DISTRICT COUNCIL Y/3/22/OUT

RE: PDSA Report - Yapton

Eleanor Chaston to RoseAshmore@campbellreith.com 15/07/2021 16:06
Cc "Uxo", "Research"

Good afternoon Rose

Please find the PDSA below as requested. Any further queries, don't hesitate to contact us.

zeticauxo

Pre-Desk Study Assessment	
Site:	Bilsham Cottage, Grevatts Lane West, Yapton, West Sussex
Client:	Campbell Reith
Contact:	Rose Ashmore
Date:	15th July 2021
Pre-WWI Military Activity on or Affecting the Site	None identified.
WWI Military Activity on or Affecting the Site	None identified.
WWI Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: 1. Transport infrastructure and public utilities. 2. Industries important to the war effort, including aircraft manufacturing. 3. Royal Flying Corps (RFC) Ford. 4. Military camps and training areas.
WWI Bombing	None identified on the Site.
Interwar Military Activity on or Affecting the Site	None identified.
WWII Military Activity on or Affecting the Site	None identified.
WWII Strategic Targets (within 5km of Site)	The following strategic targets were located in the vicinity of the Site: 1. Transport infrastructure and public utilities. 2. Industries important to the war effort, including chemical works. 3. Royal Air Force (RAF) Ford. 4. Military camps and training areas. 5. Anti-Aircraft (AA) and anti-invasion defences.
WWII Bombing Decoys (within 5km of Site)	2No. The nearest was located approximately 4.6km west-northwest of the Site.
WWII Bombing	During WWII the Site was located in the Rural District (RD) of Chichester, which officially recorded 1,221No. High Explosive (HE) bombs with a bombing density of 11.9 bombs per 405 hectares (ha). No readily available records have been found to indicate that the Site was bombed.
Post-WWII Military Activity on or Affecting the Site	None identified.
Recommendation	A detailed desk study, whilst always prudent, is not considered essential in this instance.

This summary is based on a cursory review of readily available records. Caution is advised if you plan to action work based on this summary.

[redacted]

Many thanks

Ellie

Ellie Chaston
Risk Assessor
Zetica Limited

[redacted]

From: Kim Pelling [redacted]
Sent: 08 July 2021 09:52
To: [redacted]
Cc: [redacted]
Subject: RE: PDSA Report - Yapton

Good morning Rose

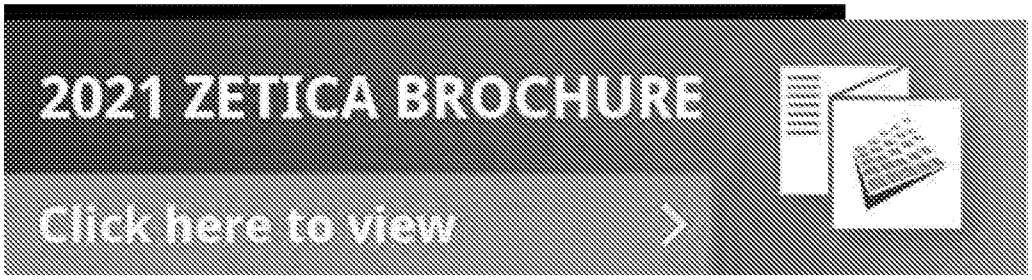
That's not a problem. We'll get a PDSA completed for you by the end of next week.

Many thanks

Kim

Kim Pelling
Risk Assessor
Zetica Limited

[redacted]



From: [redacted]
Sent: 08 July 2021 09:43
To: [redacted]
Subject: PDSA Report - Yapton

Morning,

Could I please request a PDSA report for a site near Yapton, West Sussex. Site layout attached.

Site Address: BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA
NG ref: 497516 102428

If possible could I get is before the end of next week. Any issues let me know.

Many thanks,

Rose Ashmore
Project Geotechnical Engineer

Raven House,
29 Linkfield Lane,
Redhill, Surrey
RH1 1SS

Tel +44 (0)1737 784500
www.campbellreith.com

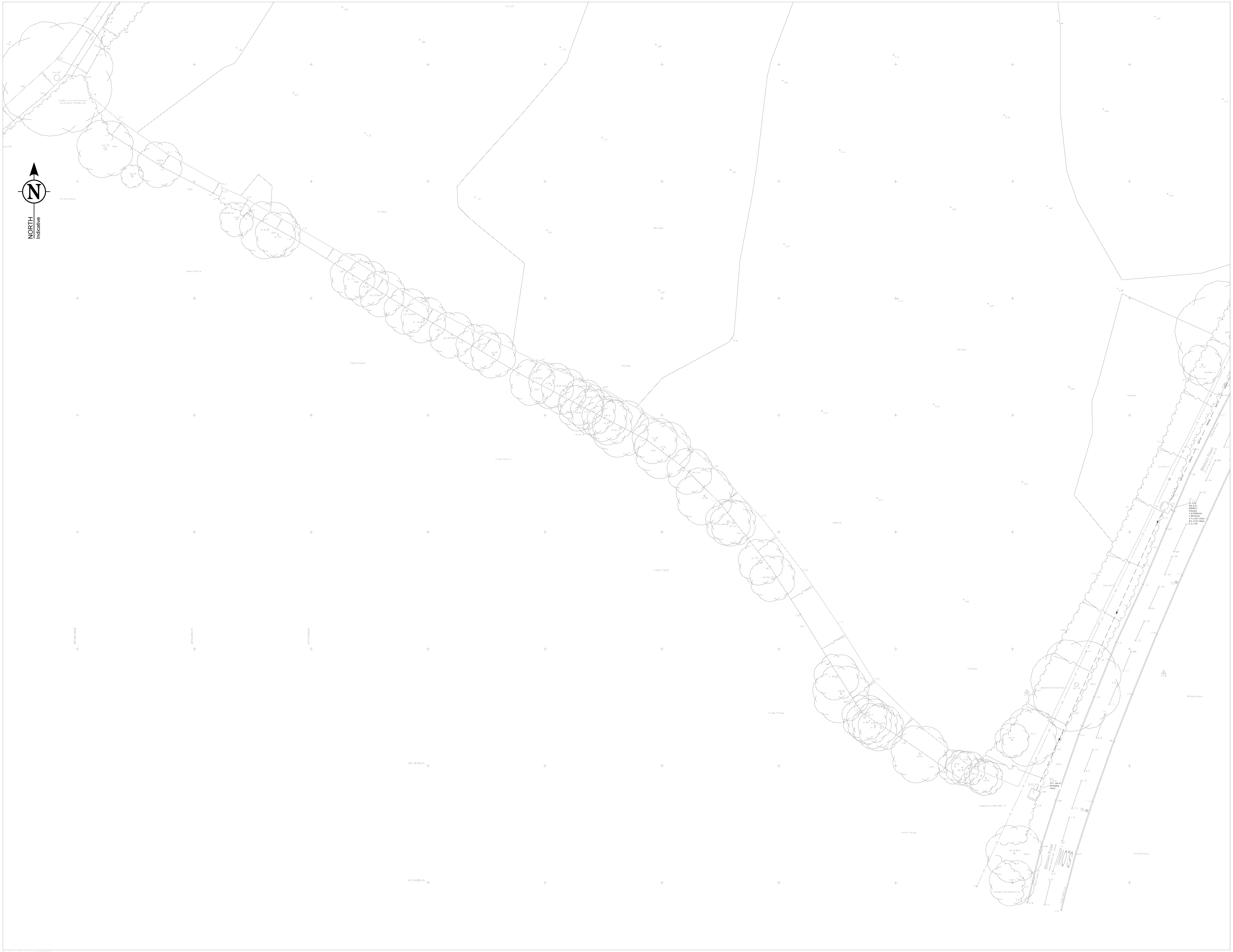
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UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

1D 5C	1 Duct 5 Cables	DCr	Depth To Crown	RBC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TFR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace ⟶	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outfall
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CrL	Crown Level	PDR	Poor Depth Response	UTT	Unable To Trace
CU	Camera Under Water ⟶	RB ●	Rest Bend	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBREOPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
VISIBLE SCARRING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC SIGNAL
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
RISING MAIN
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

NORTH
Indicative

Note: ...... UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE
CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

All below ground details shown have been identified from above ground without excavation. Survey Solution use electro-magnetic and/or ground penetrating radar (GPR) methods to investigate for underground utilities, services and features. Results using these methods are not infallible and we recommend trial excavations are carried out to confirm any identifications, positions and depths.

Any areas on the drawing where services or features have not been shown are not necessarily clear of services or features but are an indication that no items have been identified during our investigations. All reasonable care and normal good practice should still be employed during design and construction processes.

Certain types of services such as plastic or concrete pipes, some conduit and ducting where direct access can not be achieved for tracing may not be shown and alternative locating methods should be used.

Survey Solutions has used all reasonable care to research available service records but the completeness or use of the service records supplied to or by Survey Solutions cannot be guaranteed. Therefore Survey Solutions cannot be held responsible for any features annotated as 'taken from records' (TFR).

Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature, GPR depths to the top of a feature and drainage depth shown to inverts, unless otherwise indicated.

Drainage pipe sizes will be obtained without entering the chamber and therefore should be treated as approximate. Pipe dimensions which have not been obtained visually will be taken from records when available.

All services, drainage and utilities routes are assumed straight between access points, unless otherwise stated. The numbers of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated.

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Do not scale from this drawing.

AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

LAND SURVEYING
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UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.				
DRAWING DETAIL UTILITIES AND DRAINAGE SURVEY. SHEET 1 OF 10				
CLIENT LANDLINK ESTATES LTD				SCALE 1:200
SURVEYOR LJT	SURVEY DATE 21/04/2021	CHECKED BY SJH	APPROVED BY GSB	DWG STATUS FINAL
DRAWING NUMBER 31703BWUG-01			REVISION	ISSUE DATE 29/04/2021

RICS ices THE SURVEY ASSOCIATION

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Original Sheet Size A0H



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ARUN DISTRICT COUNCIL Y/3/22/OUT

Original Sheet Size A0H

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

1D 5C	1 Duct 5 Cables	DCr	Depth To Crown	RBC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TFR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outfall
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CrL	Crown Level	PDR	Poor Depth Response	UTT	Unable To Trace
CU	Camera Under Water	RB ●	Rest Bend	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBREOPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
VISIBLE SCARRING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC SIGNAL
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
RISING MAIN
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

NORTH Indicative

Note: ...... UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE
CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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Certain types of services such as plastic or concrete pipes, some conduit and ducting where direct access can not be achieved for tracing may not be shown and alternative locating methods should be used.

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

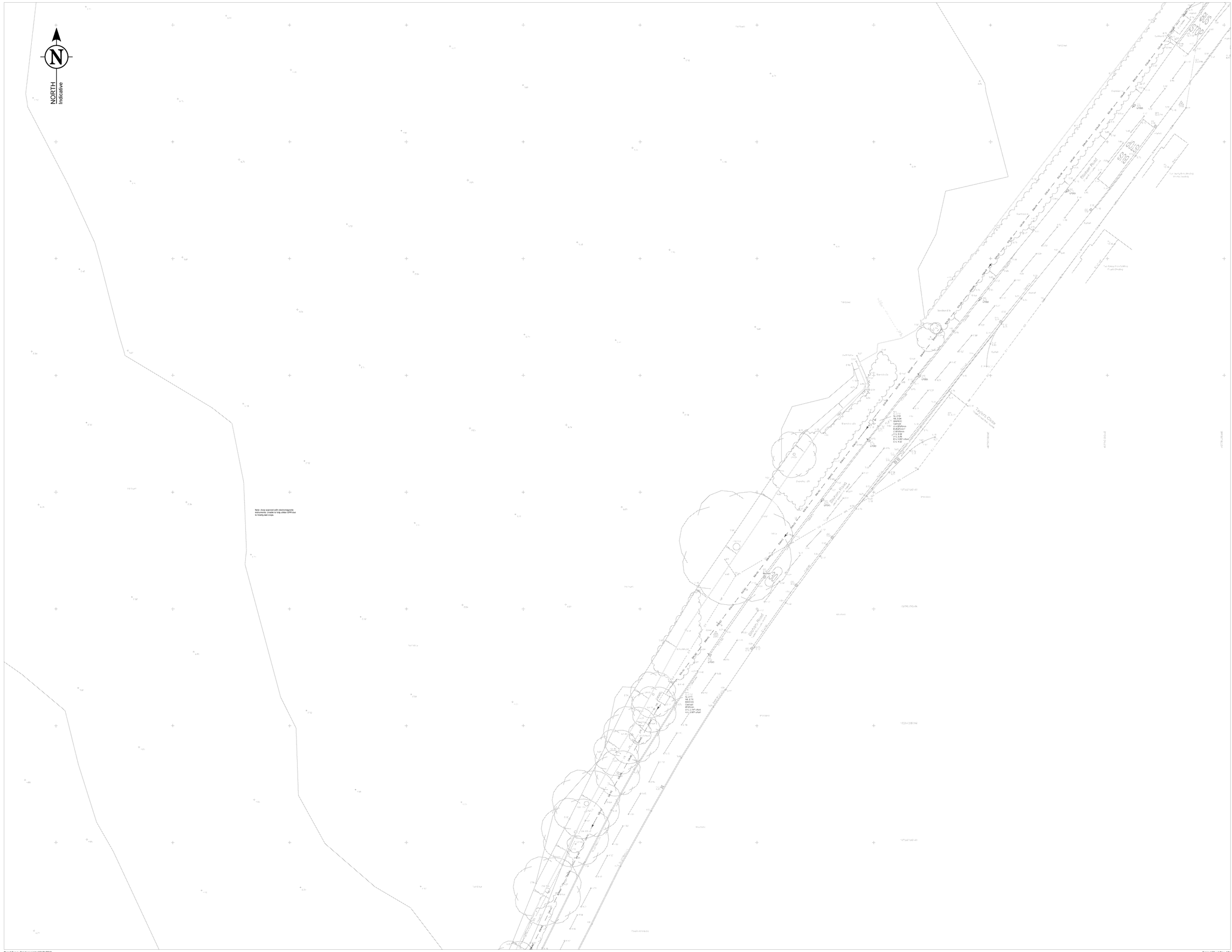
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MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.				
DRAWING DETAIL UTILITIES AND DRAINAGE SURVEY. SHEET 2 OF 10				
CLIENT LANDLINK ESTATES LTD				SCALE 1:200
SURVEYOR LJT	SURVEY DATE 21/04/2021	CHECKED BY SJH	APPROVED BY GSB	DWG STATUS FINAL
DRAWING NUMBER 31703BWUG-02			REVISION	ISSUE DATE 29/04/2021

RICS · ICES · THE SURVEY ASSOCIATION



UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10 SC	1 Duct 5 Cables	DCr	Depth To Crown	RSC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TPR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace → ●	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outlet
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CL	Crown Level	PDR	Pipe Depth Response	UTT	Unable To Trace
CU	Camera Under Water → ●	RB ●	Rod Bend	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT(S)
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBREOPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
SECURITY CABLING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC CABLE(S)
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
WATER TANK/TROUGH
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
SEWER MAIN
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

Note: UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE
CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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Do not scale from this drawing.

AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	NA
WATER MAIN	NO	NA
GAS MAIN	NO	NA
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	NA
ELECTRICITY	NO	NA
OIL PIPES	NO	NA
OTHER	NO	NA

REV.	DESCRIPTION	DRAWN	CHECKED	APPR.	SURVEY DATE

SURVEY SOLUTIONS

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SITE ENGINEERING
MONITORING

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survey-solutions.co.uk

IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE	BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.		
DRAWING DETAIL	UTILITIES AND DRAINAGE SURVEY. SHEET 3 OF 10		
CLIENT	LANDLINK ESTATES LTD		SCALE 1:200
SURVEYOR	CHECKED BY	APPROVED BY	DWG STATUS
LJT	SJH	GSB	FINAL
SURVEY DATE 21/04/2021			
DRAWING NUMBER 31703BWUG-03		REVISION	ISSUE DATE 29/04/2021

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ARUNDISTRICT COUNCIL Y/33/07/OUT
Original Sheet Size A0H

NORTH
Indicative

Note: Area scanned with electromagnetic instruments. Unable to fully utilise GPR due to heavily laid crops.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10 SC	10 Duct S Cables	DCr	Depth To Crown	RSC	Rectangular Brick Chamber
⌀	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TPR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace → ⇥	UTC	Unable To CCTV
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CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CrL	Crown Level	PDR	Poor Depth Response	UTT	Unable To Trace
CU	Camera Under Water → ⇥	RB	Rod Bend	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT(S)
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBRE/OPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
SECURITY WARNING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC CABLE(S)
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
WATER TANK/TOWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
SEWER
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

Note: UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE

CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

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SITE ENGINEERING
MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
BILSHAM ROAD, YAPTON, ARUNDEL,
WEST SUSSEX, BN18 0JT.

DRAWING DETAIL
UTILITIES AND DRAINAGE SURVEY.
SHEET 4 OF 10

CLIENT
LANDLINK ESTATES LTD

SCALE
1:200

SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
LJT	21/04/2021	SJH	GSB	FINAL

DRAWING NUMBER	REVISION	ISSUE DATE
31703BWUG-04		29/04/2021

NORTH
Indicative

Note: Area scanned with electromagnetic instruments. Unable to fully utilise GPR due to heavily laid crops.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10.5C	1 Duct 5 Cables	DCr	Depth To Crown	RSC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Ausible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
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CU	Camera Under Water ⟶	RS ●	Rest Bend	WL	Water Level

- BT CABLE(S)
- OVERHEAD BT CABLE(S)
- COMMUNICATIONS CABLE(S)
- CABLE TV CABLE(S)
- ELECTRIC
- ELECTRIC CABLE(S)
- OVERHEAD ELECTRIC CABLE(S)
- STREETLIGHT CABLE(S)
- FUEL PIPE(S)
- GAS MAIN
- GAS SERVICE
- GROUND PENETRATING RADAR (GPR) TRACE
- LIGHTING CIRCUIT
- LIGHTING CIRCUIT
- OIL PIPE(S)
- VISIBLE SCARRING
- SECURITY CABLING
- TELEPHONE CABLE(S)
- TRAFFIC SIGNAL
- UNIDENTIFIED SERVICE
- UNKNOWN SERVICE TRACE
- WATER MAIN
- WATER SERVICE
- COMBINED SEWER
- COMBINED WATER RISING MAIN
- FOUL SEWER
- FOUL SEWER
- FOUL WATER RISING MAIN
- RISING MAIN
- SURFACE WATER SEWER
- SURFACE WATER RISING MAIN
- INVESTIGATION EXTENTS

NORTH
Indicative

Note:

UTILITIES COMMENT BOX (GENERAL NOTES)

DEPTH TO SERVICE

CAMERA UNDER WATER

SERVICE ABOVE GROUND

SERVICE ASSUME ROUTE

SERVICE LOCATED WITH GPR

SERVICE OVERHEAD

SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
UNDERGROUND SURVEYING
SITE ENGINEERING
MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE: BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.				
DRAWING DETAIL: UTILITIES AND DRAINAGE SURVEY. SHEET 5 OF 10				
CLIENT: LANDLINK ESTATES LTD				SCALE: 1:200
SURVEYOR: LJT	SURVEY DATE: 21/04/2021	CHECKED BY: SJH	APPROVED BY: GSB	DWG STATUS: FINAL
DRAWING NUMBER: 31703BWUG-05			REVISION	ISSUE DATE: 29/04/2021

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Original Sheet Size A0H

ARUN DISTRICT COUNCIL Y/3/22/OUT



UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10 SC	1 Duct 0 Cables	DCr	Depth To Crown	RBC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Australia Connection	DS	Depth To Silt	RE	Rodding Eye
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CU	Camera Under Water →●	RS ◆	Rest Bend	WL	Water Level

ST CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
ELECTRIC
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
TRAFFIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
LIGHTING CABLE
LIGHTING CIRCUIT
OIL PIPE(S)
VISIBLE SCARRING
SECURITY CABLING
TRAFFIC SIGNAL(S)
TRAFFIC SIGNAL
UNIDENTIFIED SERVICE
UNKNOWN SERVICE TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
FOUL SEWER
FOUL SEWER
FOUL WATER RISING MAIN
RISING MAIN
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

NORTH Indicative

Note

UTILITIES COMMENT BOX (GENERAL NOTES)

DEPTH TO SERVICE

CAMERA UNDER WATER

SERVICE ABOVE GROUND

SERVICE ASSUME ROUTE

SERVICE LOCATED WITH GPR

SERVICE OVERHEAD

SERVICE TAKEN FROM RECORDS

DRAWING NOTES

All below ground details shown have been identified from above ground without excavation. Survey Solution use electro-magnetic and/or ground penetrating radar (GPR) methods to investigate for underground utilities, services and features. Results using these methods are not infallible and we recommend trial excavations are carried out to confirm any identifications, positions and depths.

Any areas on the drawing where services or features have not been shown are not necessarily clear of services or features but are an indication that no items have been identified during our investigations. All reasonable care and normal good practice should still be employed during design and construction processes.

Certain types of services such as plastic or concrete pipes, some conduit and ducting where direct access can not be achieved for tracing may not be shown and alternative locating methods should be used.

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Depths obtained using electro-magnetic or GPR are effected by ground conditions and should be treated as indicative only. Electro-magnetic depths to utilities and services are generally taken to the centre of a feature. GPR depths to the top of a feature and drainage depth shown to invests, unless otherwise indicated.

Drainage pipe sizes will be obtained without entering the chamber and therefore should be treated as approximate. Pipe dimensions which have not been obtained visually will be taken from records when available.

All services, drainage and utilities routes are assumed straight between access points, unless otherwise stated. The numbers of cables in runs will not be shown unless specifically requested. All services are below ground unless indicated.

Services, utilities and features may not have been surveyed if obstructed or not reasonably visible or accessible at the time of survey.

Survey Solutions accept no responsibility for the completeness or accuracy of either the topographical survey or base mapping on this project.

All critical dimensions and measurements should be checked and verified with any errors or discrepancies notified to Survey Solutions immediately. The accuracy of the digital data is the same as the plotting scale implies. All dimensions are in metres unless otherwise stated.

The contractor must check and verify all site and building dimensions, levels, utilities and drainage details and connections prior to commencing work.

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Do not scale from this drawing.

AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

LAND SURVEYING
BUILDING SURVEYING
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SITE ENGINEERING
MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE: BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.					
DRAWING DETAIL: UTILITIES AND DRAINAGE SURVEY. SHEET 6 OF 10					
CLIENT: LANDLINK ESTATES LTD					SCALE: 1:200
SURVEYOR: LJT	SURVEY DATE: 21/04/2021	CHECKED BY: SJH	APPROVED BY: GSB		DWG STATUS: FINAL
DRAWING NUMBER: 31703BWUG-06			REVISION		ISSUE DATE: 29/04/2021

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Original Sheet Size A0H

ARUN DISTRICT COUNCIL Y/33/20/OUT



UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

1/2 SC	1 Out 5 Cables	DCr	Depth To Crown	RSC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TFR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace → ●	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outlet
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CrL	Crown Level	PDR	Pipe Depth Response	UTT	Unable To Trace
CU	Camera Under Water → ●	RB ●	Rod Bend	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT(S)
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBREOPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
SECURITY CABLING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC CABLE(S)
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
SEWER
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

Note:
UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE
CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	NA
WATER MAIN	NO	NA
GAS MAIN	NO	NA
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	NA
ELECTRICITY	NO	NA
OIL PIPES	NO	NA
OTHER	NO	NA

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

LAND SURVEYING
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SITE ENGINEERING
MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.

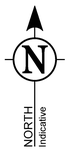
DRAWING DETAIL
UTILITIES AND DRAINAGE SURVEY.
SHEET 7 OF 10

CLIENT	SCALE
LANDLINK ESTATES LTD	1:200

SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
LJT	21/04/2021	SJH	GSB	FINAL

DRAWING NUMBER	REVISION	ISSUE DATE
31703BWUG-07		29/04/2021

Original Sheet Size A0H



Note: Area scanned with electromagnetic detection equipment. Refer to fully utilise GPR due to uneven ground

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

1/2 SC	1 Duct 5 Cables	DCr	Depth To Crown	RBC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Silt	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	EBD	External Backdrop	TPR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace → ●	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outlet
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
CPC	Circ Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CrL	Crown Level	PDR	Pipe Depth Response	UTT	Unable To Trace
CU	Camera Under Water → ●	RB	Rod Bend	WL	Water Level

- BT CABLE(S)
- OH BT OVERHEAD BT CABLE(S)
- COMMUNICATIONS CABLE(S)
- CTV CABLE TV CABLE(S)
- EMPTY DUCT(S)
- ELEC ELECTRIC CABLE(S)
- OH ELEC OVERHEAD ELECTRIC CABLE(S)
- FIBRE FIBREOPTIC CABLE(S)
- FUEL FUEL PIPE(S)
- GAS GAS MAIN
- GPR GROUND PENETRATING RADAR (GPR) TRACE
- HEC HOT WATER PIPE
- LC LIGHTING CIRCUIT
- OIL OIL PIPE(S)
- SC SECURITY CCTV WIRING
- SEC SECURITY CABLING
- TEL TELECOM CABLE(S)
- UNK UNKNOWN SERVICE
- UNIDENTIFIED UNIDENTIFIED TRACE
- 12in WATER MAIN
- W WATER SERVICE
- WW WASTE WATER SEWER
- CWRM COMBINED WATER RISING MAIN
- EW EFFLUENT WATER
- FS FOUL SEWER
- FWRM FOUL WATER RISING MAIN
- SS SURFACE WATER SEWER
- SWRM SURFACE WATER RISING MAIN
- INVESTIGATION EXTENTS

Note: UTILITIES COMMENT BOX (GENERAL NOTES)

DEPTH TO SERVICE

CAMERA UNDER WATER

SERVICE ABOVE GROUND

SERVICE ASSUME ROUTE

SERVICE LOCATED WITH GPR

SERVICE OVERHEAD

SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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Do not scale from this drawing.

AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV.	DESCRIPTION	DRAWN	CHECKED	APPR.	SURVEY DATE

SURVEY SOLUTIONS

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MONITORING

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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE: BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.			
DRAWING DETAIL: UTILITIES AND DRAINAGE SURVEY. SHEET 8 OF 10			
CLIENT: LANDLINK ESTATES LTD			SCALE: 1:200
SURVEYOR: LJT	SURVEY DATE: 21/04/2021	CHECKED BY: SJH	APPROVED BY: GSB	DWG STATUS: FINAL
DRAWING NUMBER: 31703BWUG-08		REVISION:	ISSUE DATE: 29/04/2021

RICS ices THE SURVEY ASSOCIATION

NORTH
Indicative

Note: Area scanned with electromagnetic detection equipment in fully utilise GPR due to uneven ground.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

1/2 SC	1 Duct 2 Cables	DCr	Depth To Crown	RBC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
AC	Audible Connection	DS	Depth To Sill	RE	Rodding Eye
AG	Above Ground	DTB	Depth To Base	SA	Survey Abandoned
AR	Assumed Route	DTW	Depth To Water	SL	Silt Level
BL	Base Level	DTS	Depth To Surcharge	SuL	Surcharge Level
CB	Concrete Benching	ESO	External Backdrop	TPR	Taken From Records
CBC	Circular Brick Chamber	EOT	End Of Trace	UTC	Unable To CCTV
CCC	Circular Conc Chamber	IBD	Internal Backdrop	UTDO	Unable To Determine Outlet
CL	Cover Level	IL	Invert Level	UTL	Unable To Lift
GPC	Grc Plastic Chamber	OH	Overhead	UTS	Unable To Survey
CL	Crown Level	PDR	Poor Depth Response	UTT	Unable To Trace
CJ	Camera Under Water	RS	Rod Send	WL	Water Level

BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
FIBREOPTIC CABLE(S)
FUEL PIPE(S)
GAS MAIN
GAS SERVICE
GROUND PENETRATING RADAR (GPR) TRACE
HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC CABLE(S)
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

Note: UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE

CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

DRAWING NOTES

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	N/A
WATER MAIN	NO	N/A
GAS MAIN	NO	N/A
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	N/A
ELECTRICITY	NO	N/A
OIL PIPES	NO	N/A
OTHER	NO	N/A

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

LAND SURVEYING
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IPSWICH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE
BILSHAM ROAD, YAPTON, ARUNDEL,
WEST SUSSEX, BN18 0JT.

DRAWING DETAIL
UTILITIES AND DRAINAGE SURVEY.
SHEET 9 OF 10

CLIENT				SCALE
LANDLINK ESTATES LTD				1:200
SURVEYOR	SURVEY DATE	CHECKED BY	APPROVED BY	DWG STATUS
LJT	21/04/2021	SJH	GSB	FINAL
DRAWING NUMBER			REVISION	ISSUE DATE
31703BWJG-09				29/04/2021

RICS ICES THE SURVEY ASSOCIATION

Original Sheet Size: A0

NORTH
Indicative

Note: Area scanned with electromagnetic instruments. Unable to fully utilise GPR due to uneven ground.

UTILITIES & UNDERGROUND INVESTIGATIONS

ABBREVIATIONS & SYMBOLS

10 SC	1 Duct 5 Cables	DCr	Depth To Crown	RSC	Rectangular Brick Chamber
Ø	Diameter	DI	Depth To Invert	RCC	Rectangular Conc Chamber
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BT CABLE(S)
OVERHEAD BT CABLE(S)
COMMUNICATIONS CABLE(S)
CABLE TV CABLE(S)
EMPTY DUCT(S)
ELECTRIC CABLE(S)
OVERHEAD ELECTRIC CABLE(S)
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HOT WATER PIPE
LIGHTING CIRCUIT
OIL PIPE(S)
SECURITY CCTV WIRING
SECURITY CABLING
TELECOM CABLE(S)
TRAFFIC CABLE(S)
UNIDENTIFIED SERVICE
UNIDENTIFIED TRACE
WATER MAIN
WATER SERVICE
COMBINED SEWER
COMBINED WATER RISING MAIN
EFFLUENT WATER
FOUL SEWER
FOUL WATER RISING MAIN
SEWER
SURFACE WATER SEWER
SURFACE WATER RISING MAIN
INVESTIGATION EXTENTS

Note: UTILITIES COMMENT BOX (GENERAL NOTES)
DEPTH TO SERVICE

CAMERA UNDER WATER
SERVICE ABOVE GROUND
SERVICE ASSUME ROUTE
SERVICE LOCATED WITH GPR
SERVICE OVERHEAD
SERVICE TAKEN FROM RECORDS

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AVAILABILITY OF UTILITY RECORD DRAWINGS

UTILITY	AVAILABILITY	UTILITY COMPANY PROVIDER
SEWER	NO	NA
WATER MAIN	NO	NA
GAS MAIN	NO	NA
TELECOM	PUBLIC	BRITISH TELECOMS
CABLE TV	NO	NA
ELECTRICITY	NO	NA
OIL PIPES	NO	NA
OTHER	NO	NA

REV	DESCRIPTION	DRAWN	CHECKED	APPR	SURVEY DATE

SURVEY SOLUTIONS

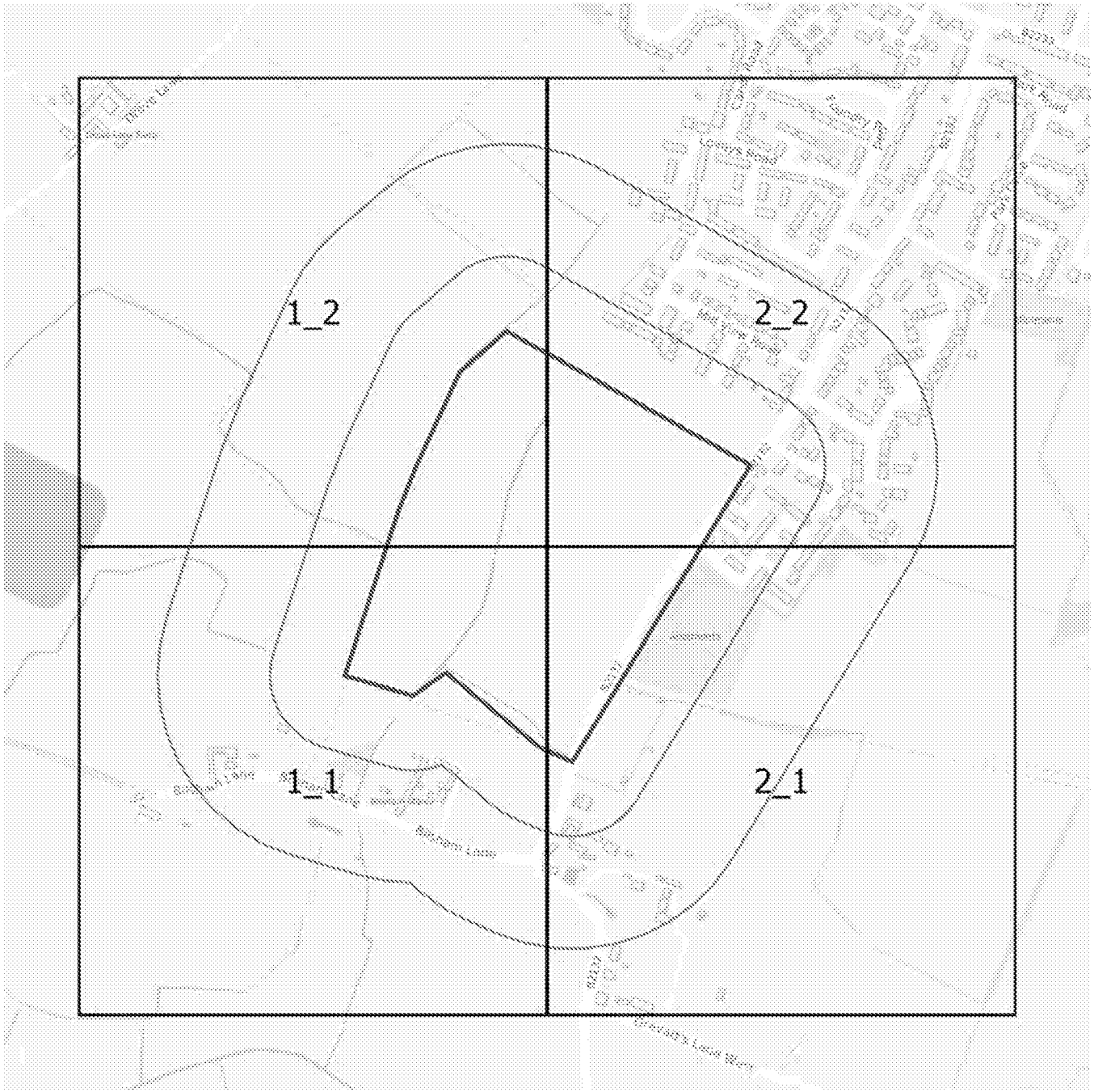
LAND SURVEYING
BUILDING SURVEYING
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SITE ENGINEERING
MONITORING

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PSWCH BRENTWOOD COVENTRY GLASGOW NORWICH NOTTINGHAM YEOVIL

PROJECT TITLE: BILSHAM ROAD, YAPTON, ARUNDEL, WEST SUSSEX, BN18 0JT.				
DRAWING DETAIL: UTILITIES AND DRAINAGE SURVEY. SHEET 10 OF 10				
CLIENT: LANDLINK ESTATES LTD				SCALE: 1:200
SURVEYOR: LJT	SURVEY DATE: 21/04/2021	CHECKED BY: SJH	APPROVED BY: GSB	DWG STATUS: FINAL
DRAWING NUMBER: 31703BWUG-10		REVISION:		ISSUE DATE: 29/04/2021

RICS ICES THE SURVEY ASSOCIATION



Groundsure
INSIGHTS

1:2,500 Scale Grid Index

N
W
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S

ARUN DISTRICT COUNCIL Y/3/22/OUT



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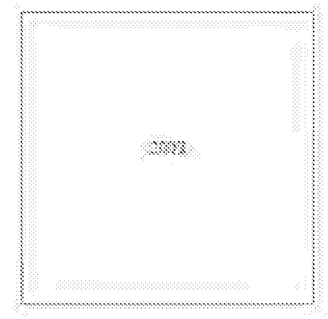
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BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_Landline_1_1
Grid Ref: 497363, 102242

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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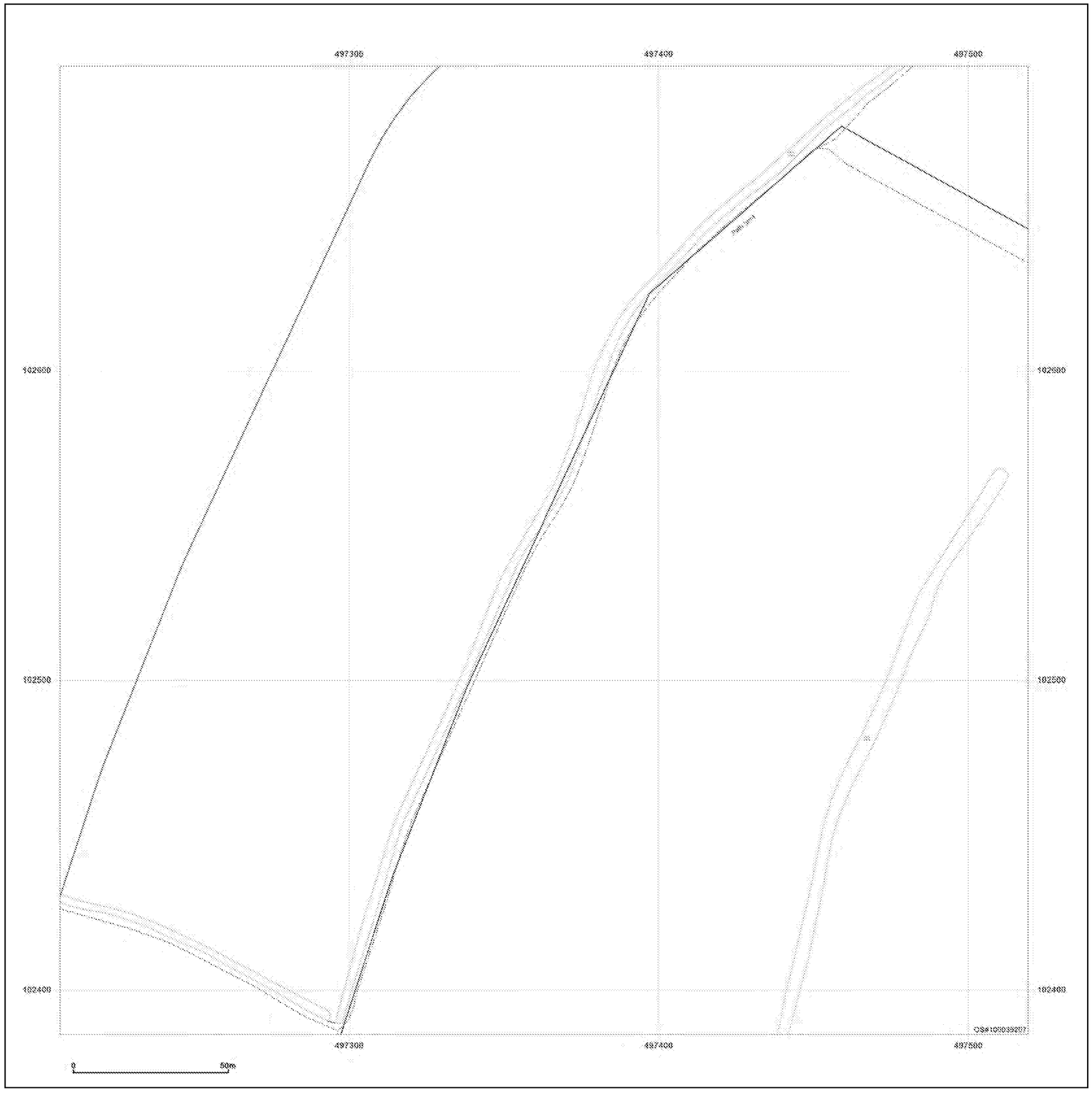
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_Landline_1_2
Grid Ref: 497363, 102542

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250



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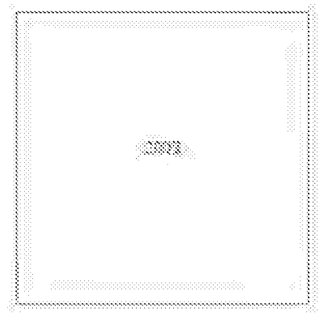
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Client Ref: 13684
Report Ref: CAR1-8016762_Landline_2_1
Grid Ref: 497663, 102242

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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Site Details:

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Client Ref: 13684
Report Ref: CAR1-8016762_Landline_2_2
Grid Ref: 497663, 102542

Map Name: LandLine
Map date: 2003
Scale: 1:1,250
Printed at: 1:1,250

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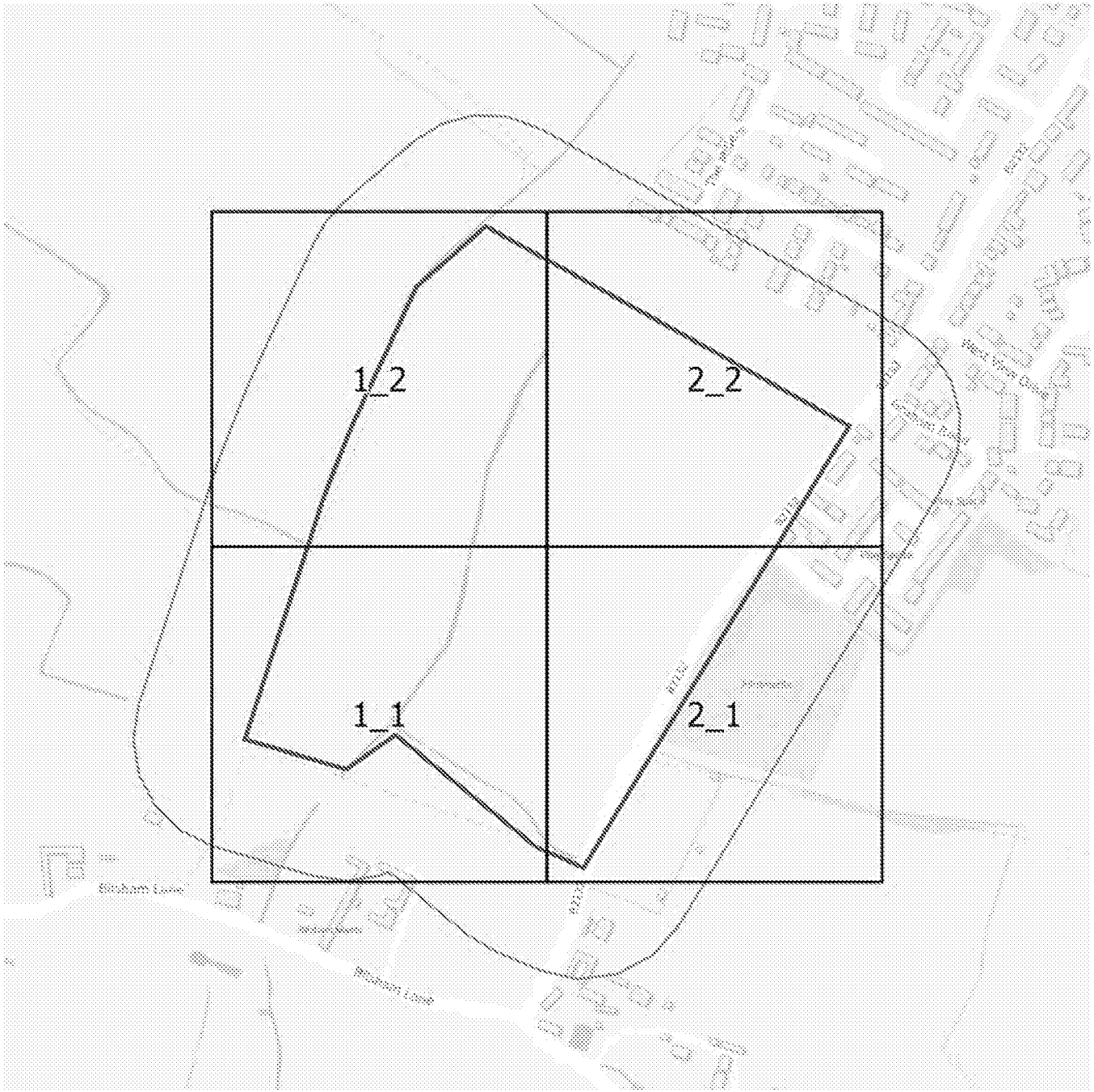
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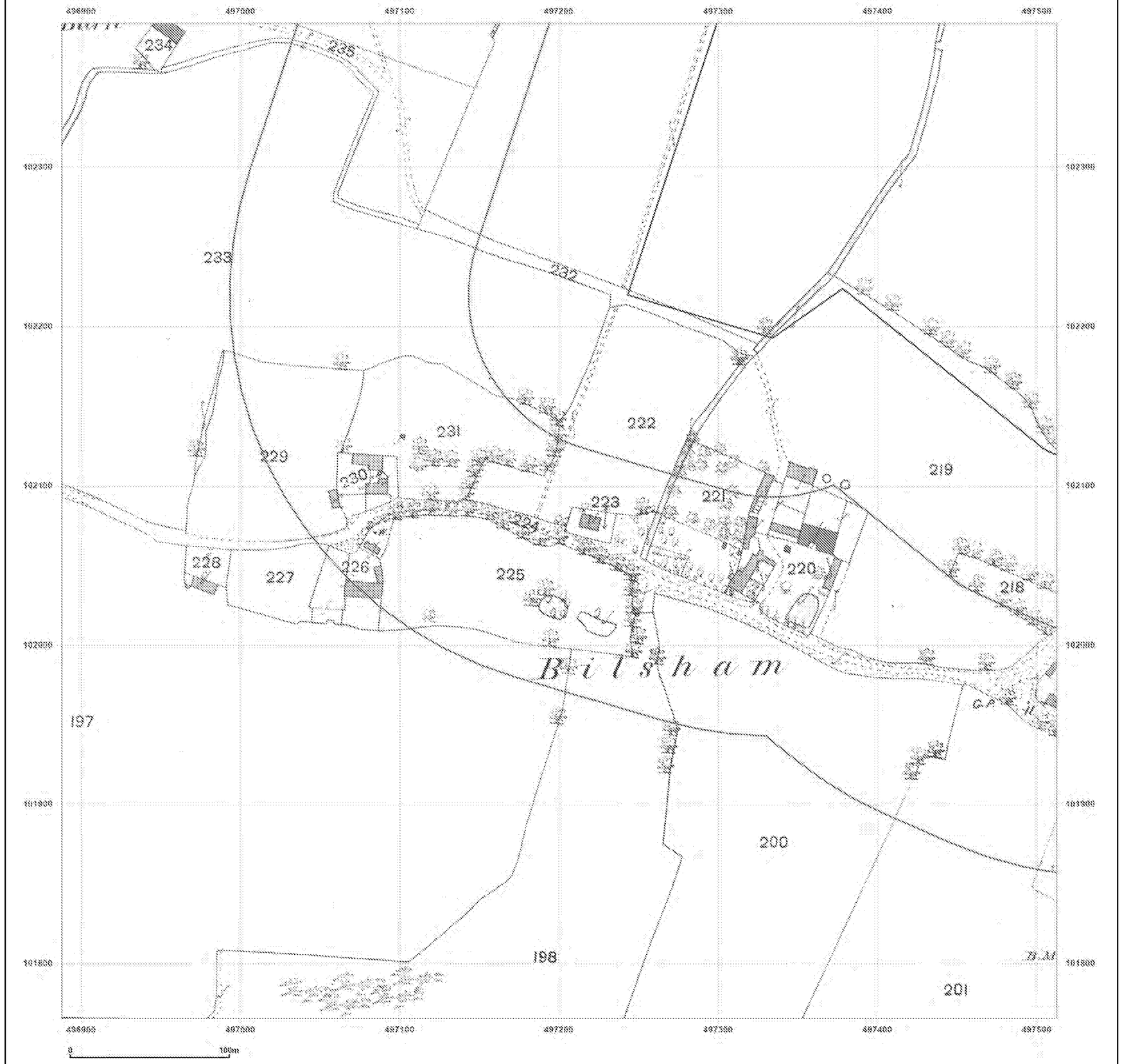


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Landline Scale Grid Index

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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: County Series

Map date: **1876**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1875
Revised 1875
Edition N/A
Copyright N/A
Levelled N/A

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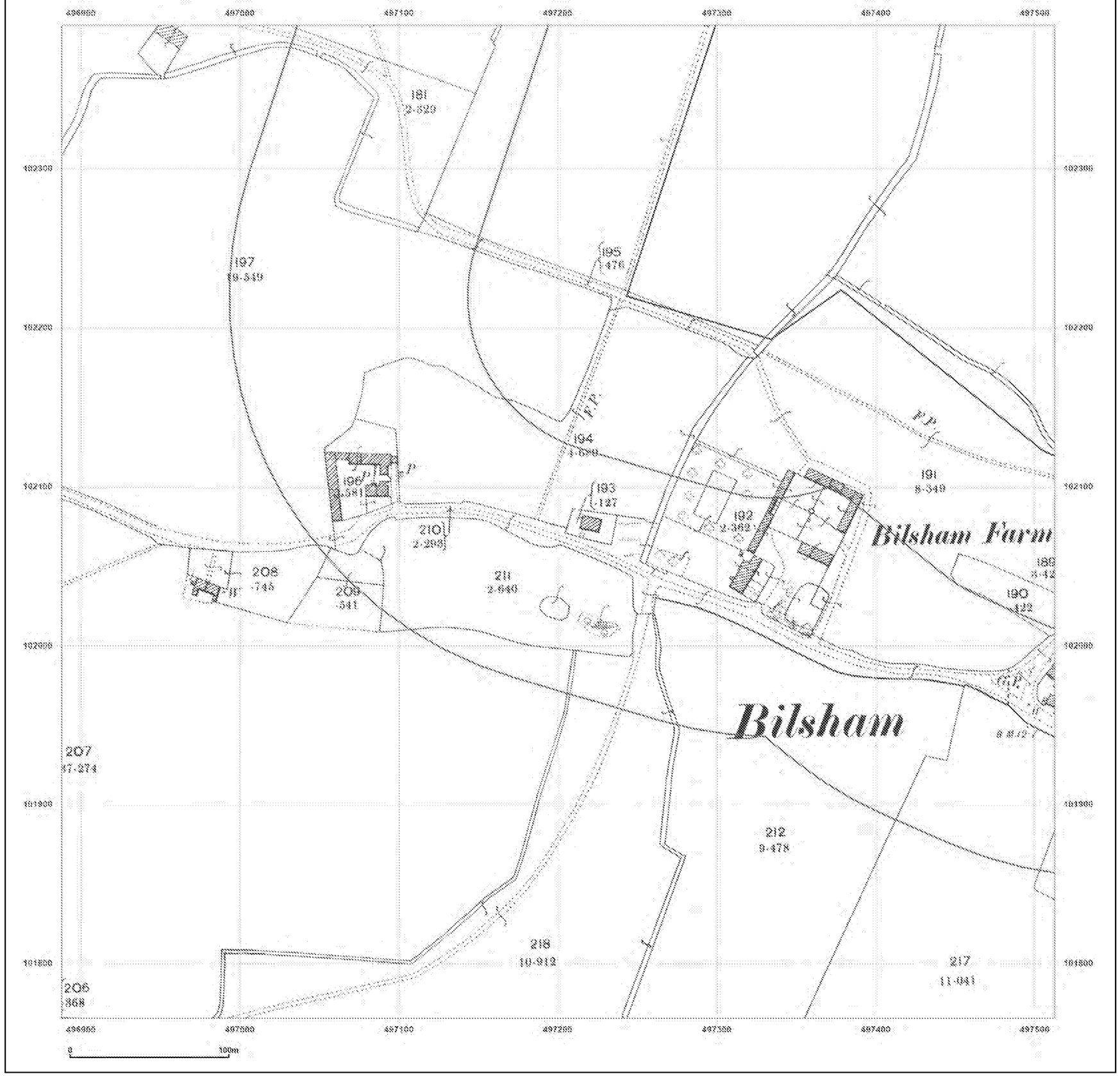
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: County Series
Map date: **1898**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1869
Revised 1866
Edition N/A
Copyright N/A
Levelled N/A

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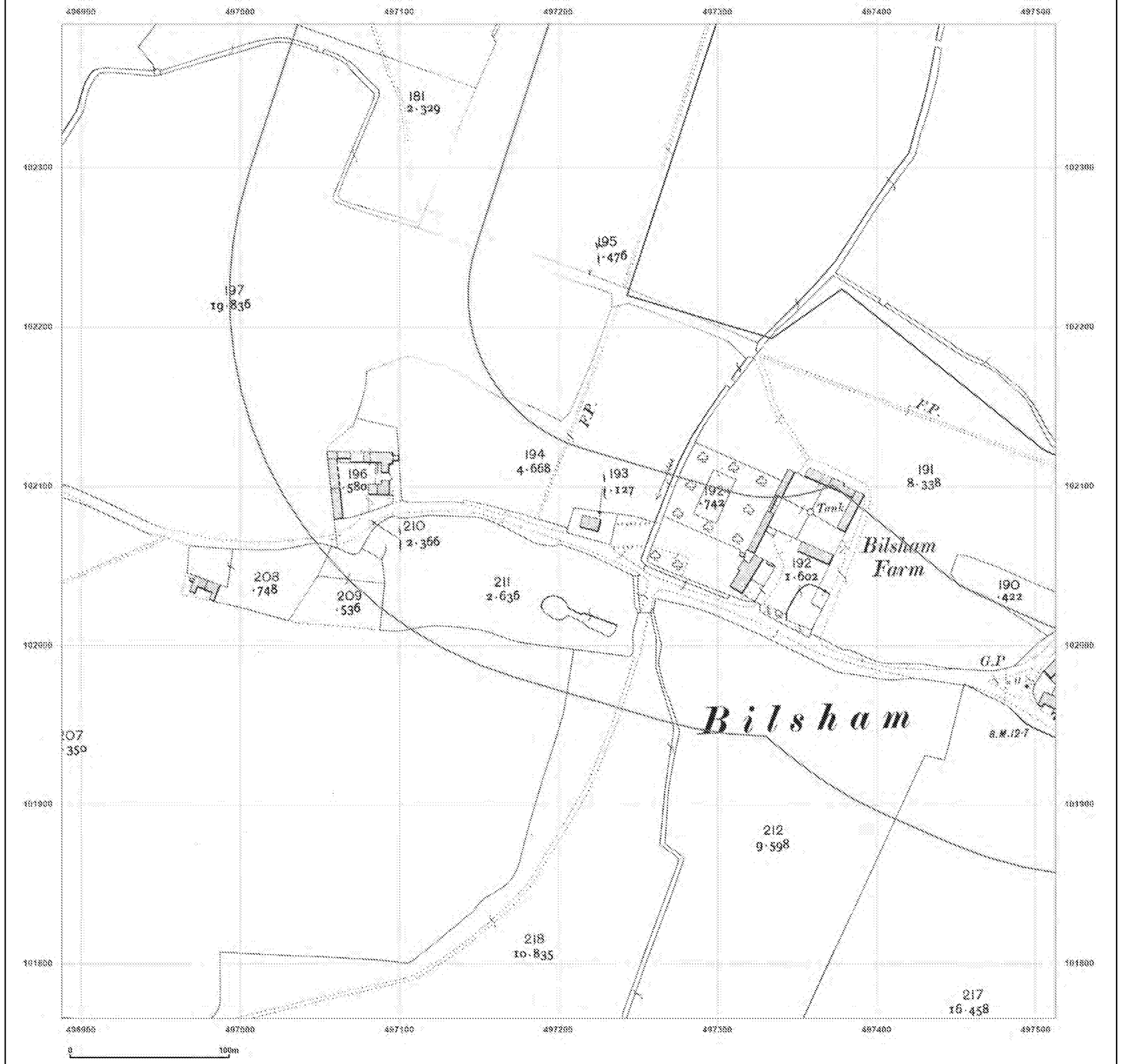
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Site Details:

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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: County Series

Map date: 1912

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1912
Revised 1912
Edition N/A
Copyright N/A
Levelled N/A

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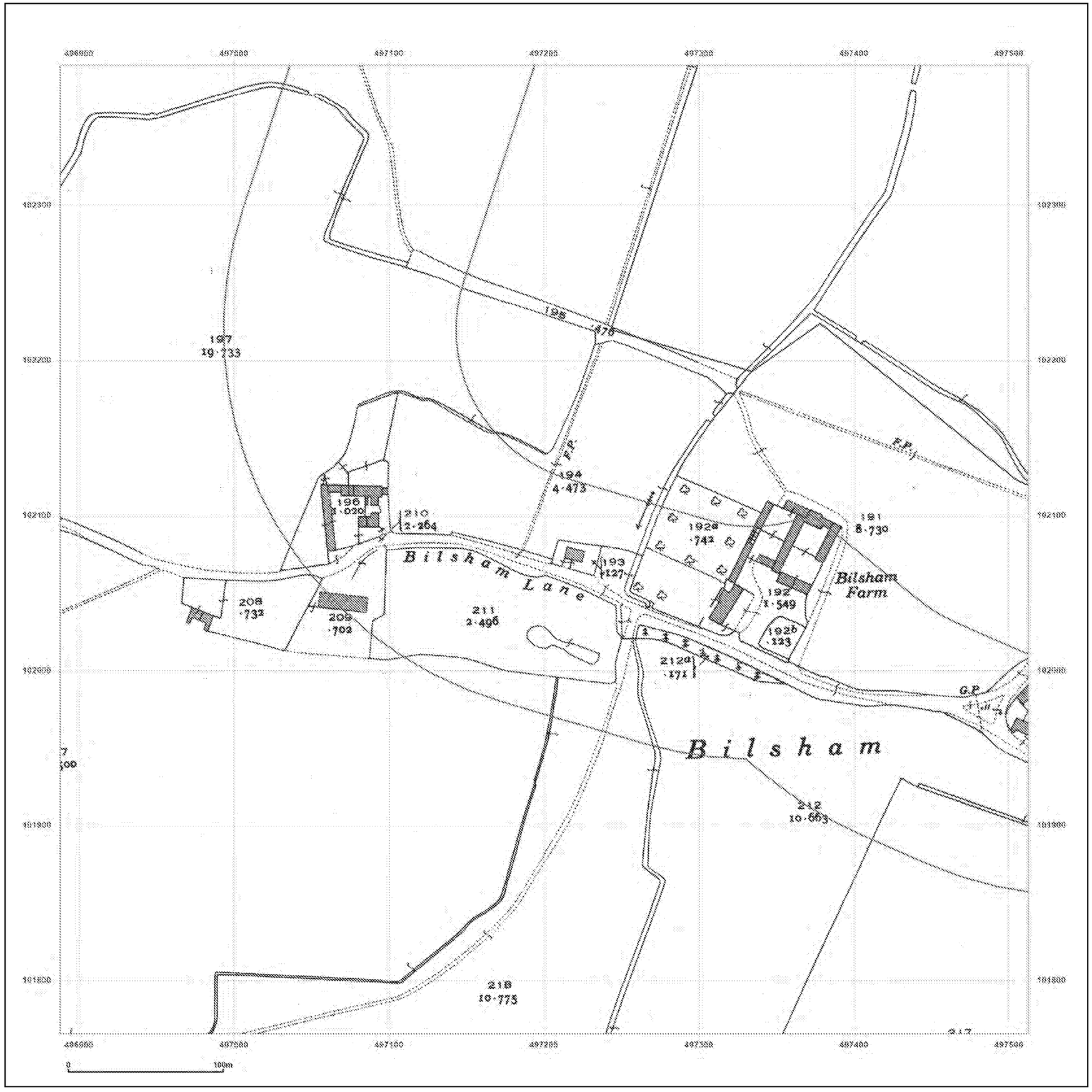
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: County Series
Map date: **1939**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1839
Revised 1839
Edition N/A
Copyright N/A
Levelled N/A

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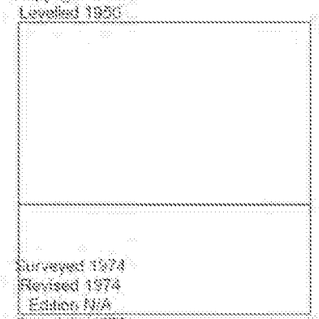
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: **1974**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1974
Revised 1974
Edition N/A
Copyright 1975
Levelled 1950



Surveyed 1974
Revised 1974
Edition N/A
Copyright 1977
Levelled 1958

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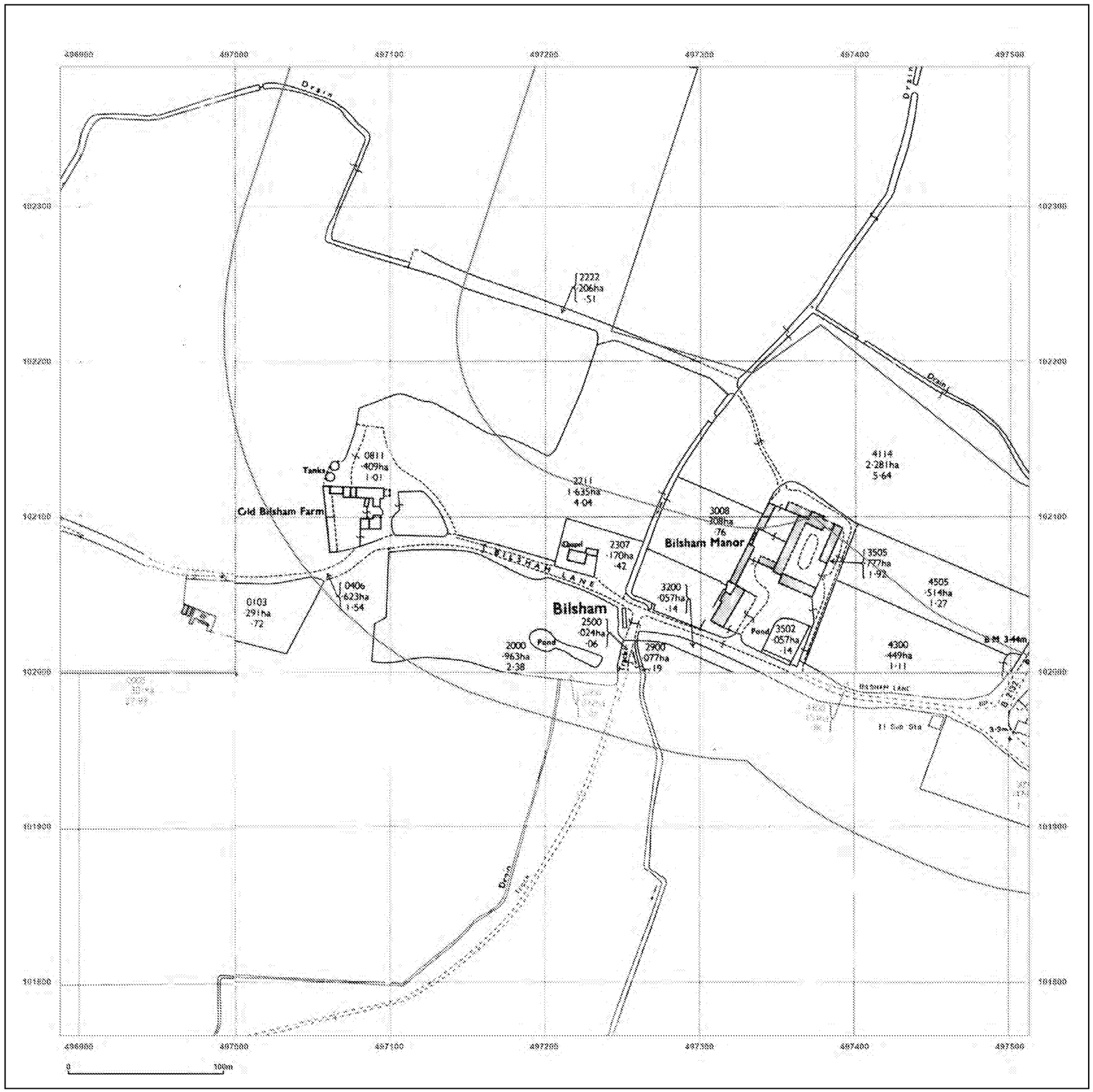
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

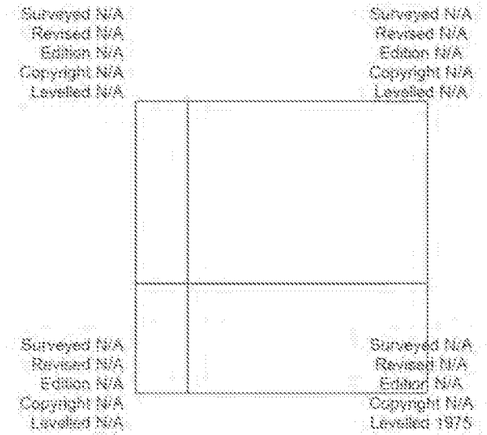
Map Name: National Grid

Map date: **1975-1978**

Scale: 1:2,500

Printed at: 1:2,500

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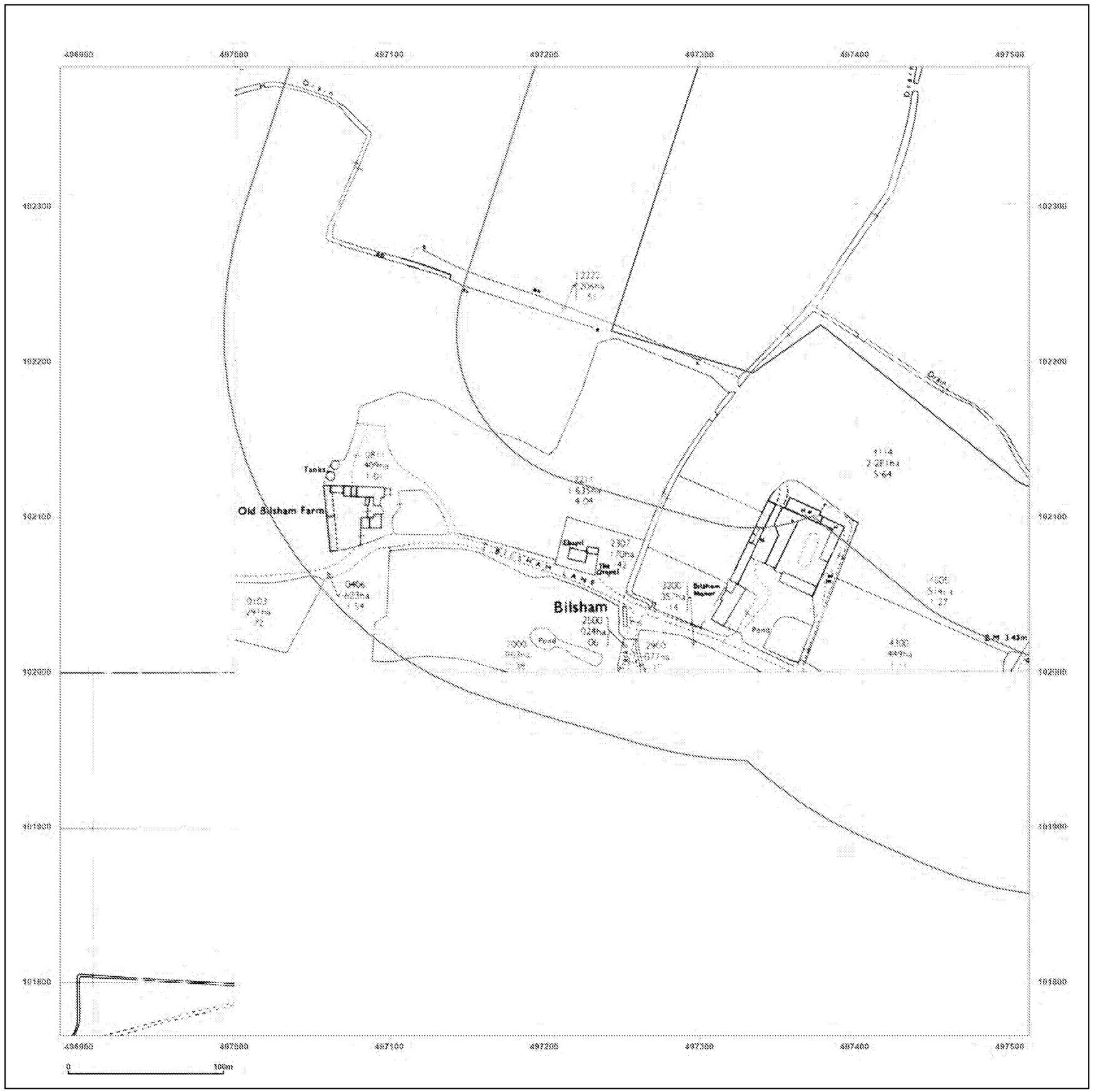
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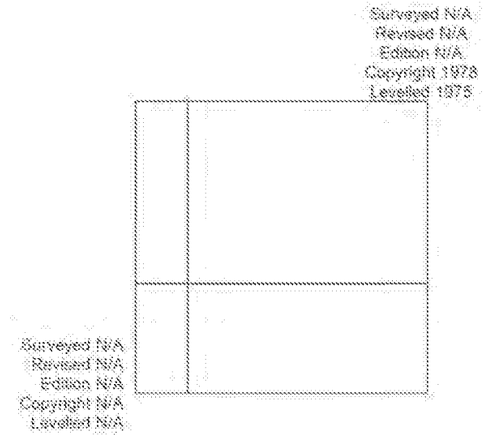
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: **1977-1978**
Scale: 1:2,500
Printed at: 1:2,500

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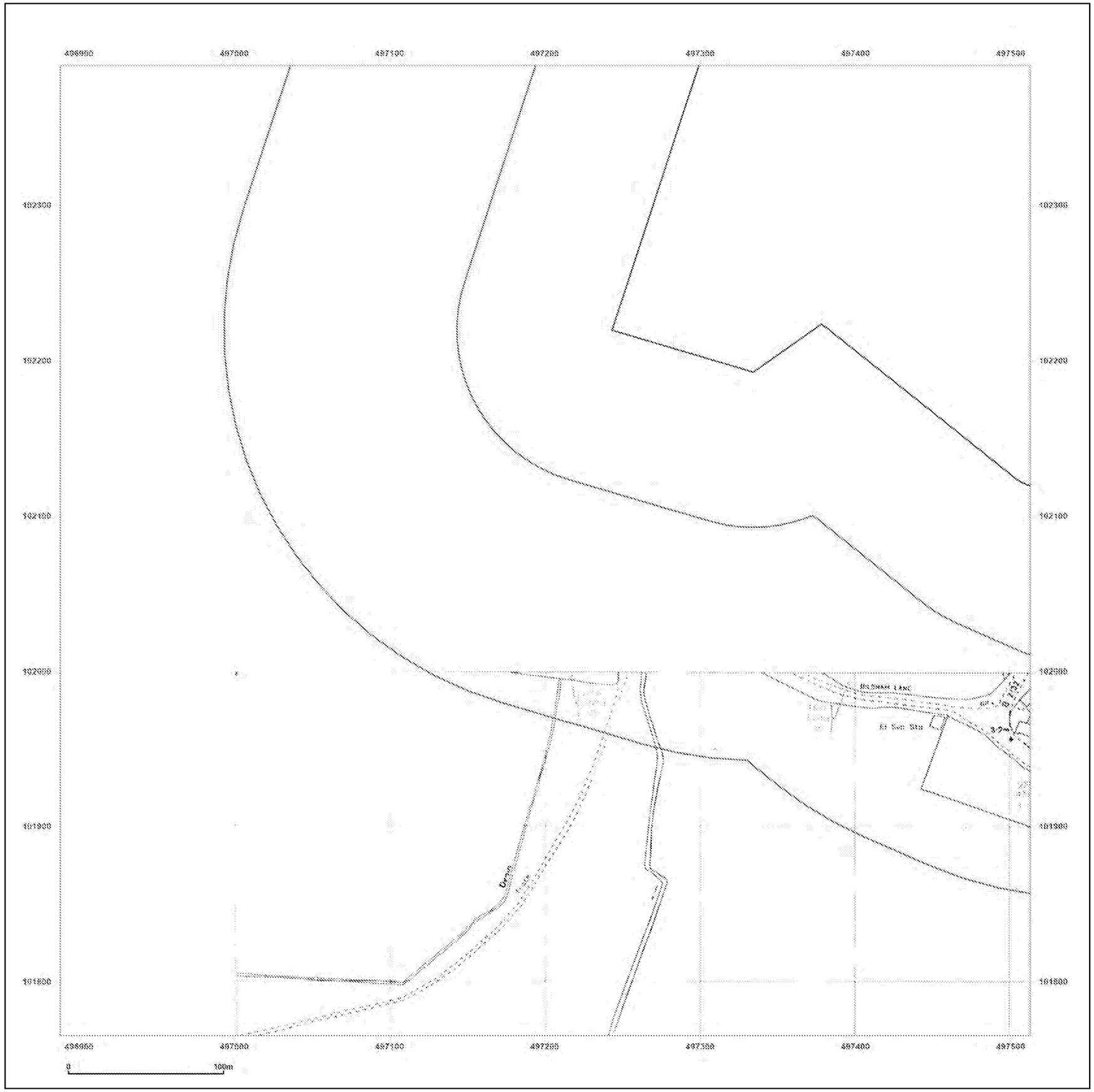
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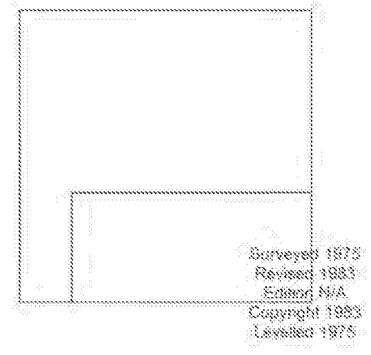
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: **1983**
Scale: 1:2,500
Printed at: 1:2,500

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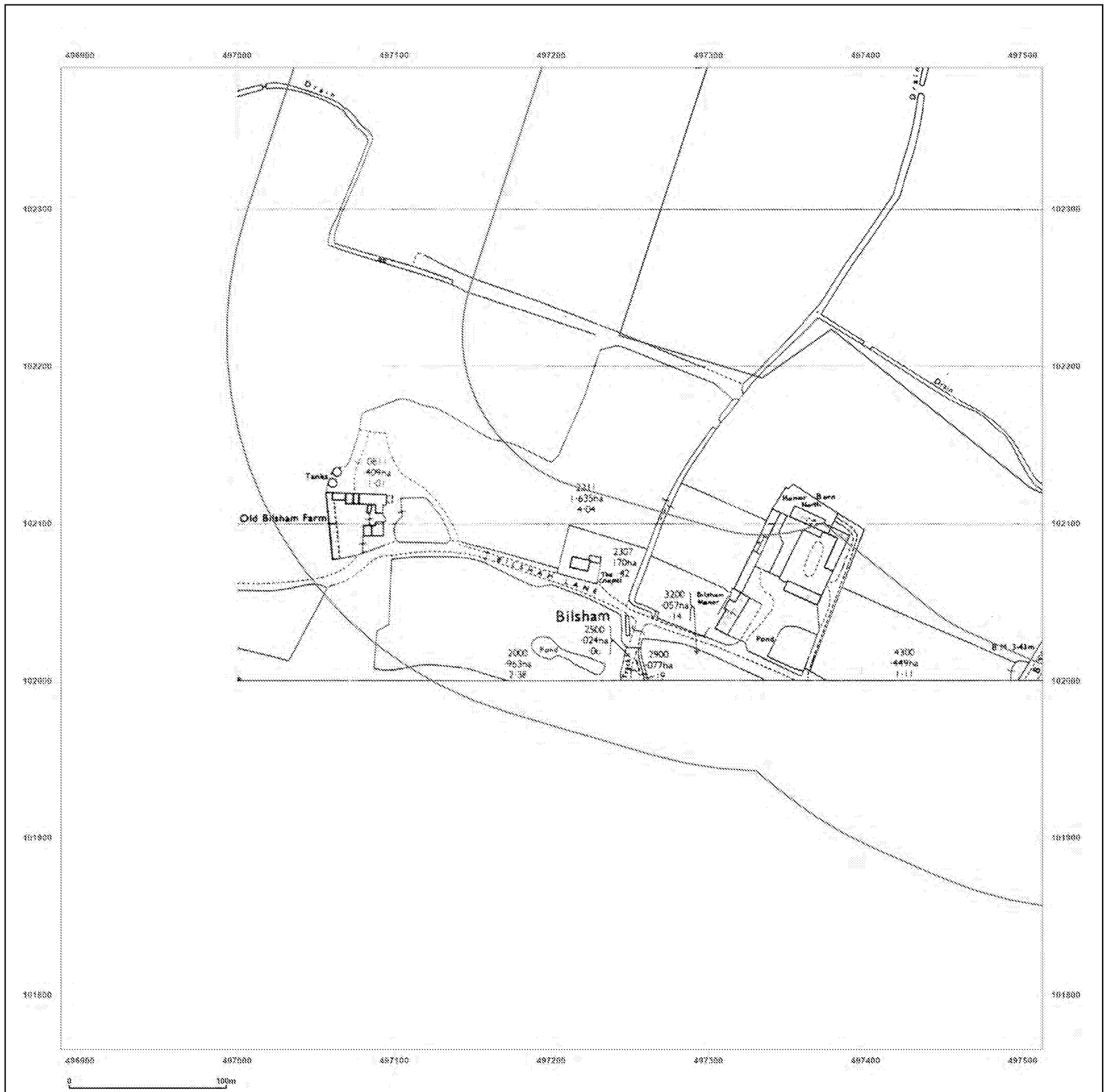
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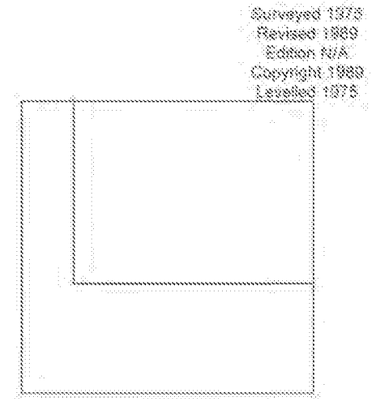
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: **1989**
Scale: 1:2,500
Printed at: 1:2,500

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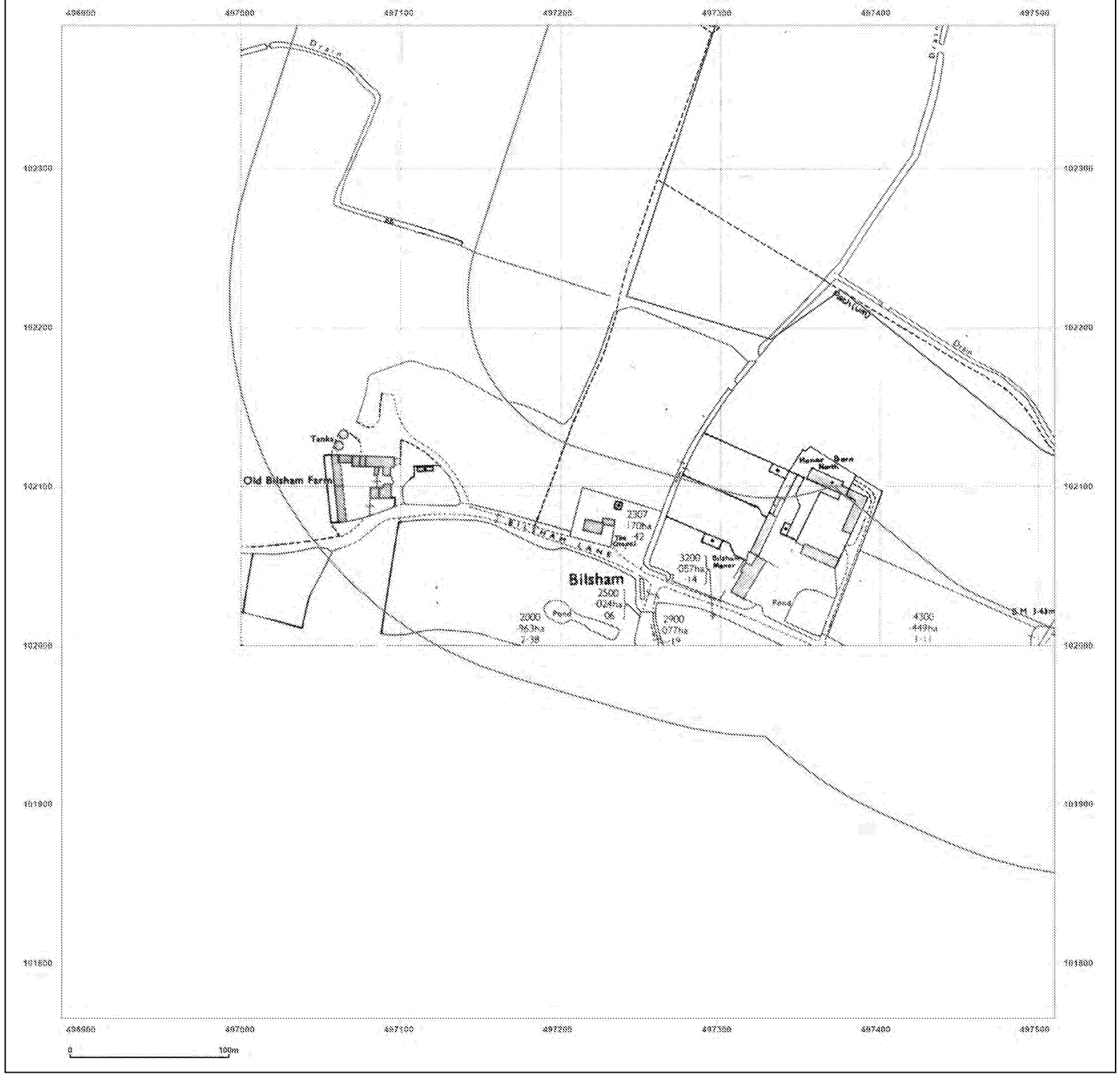
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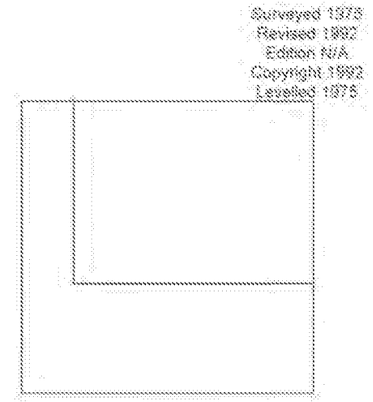
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: 1992
Scale: 1:2,500
Printed at: 1:2,500

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Client Ref: 13684
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Grid Ref: 497200, 102078

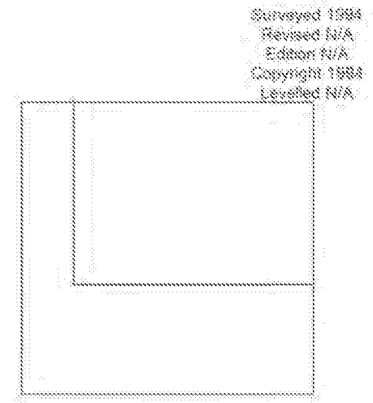
Map Name: National Grid

Map date: **1994**

Scale: 1:2,500

Printed at: 1:2,500

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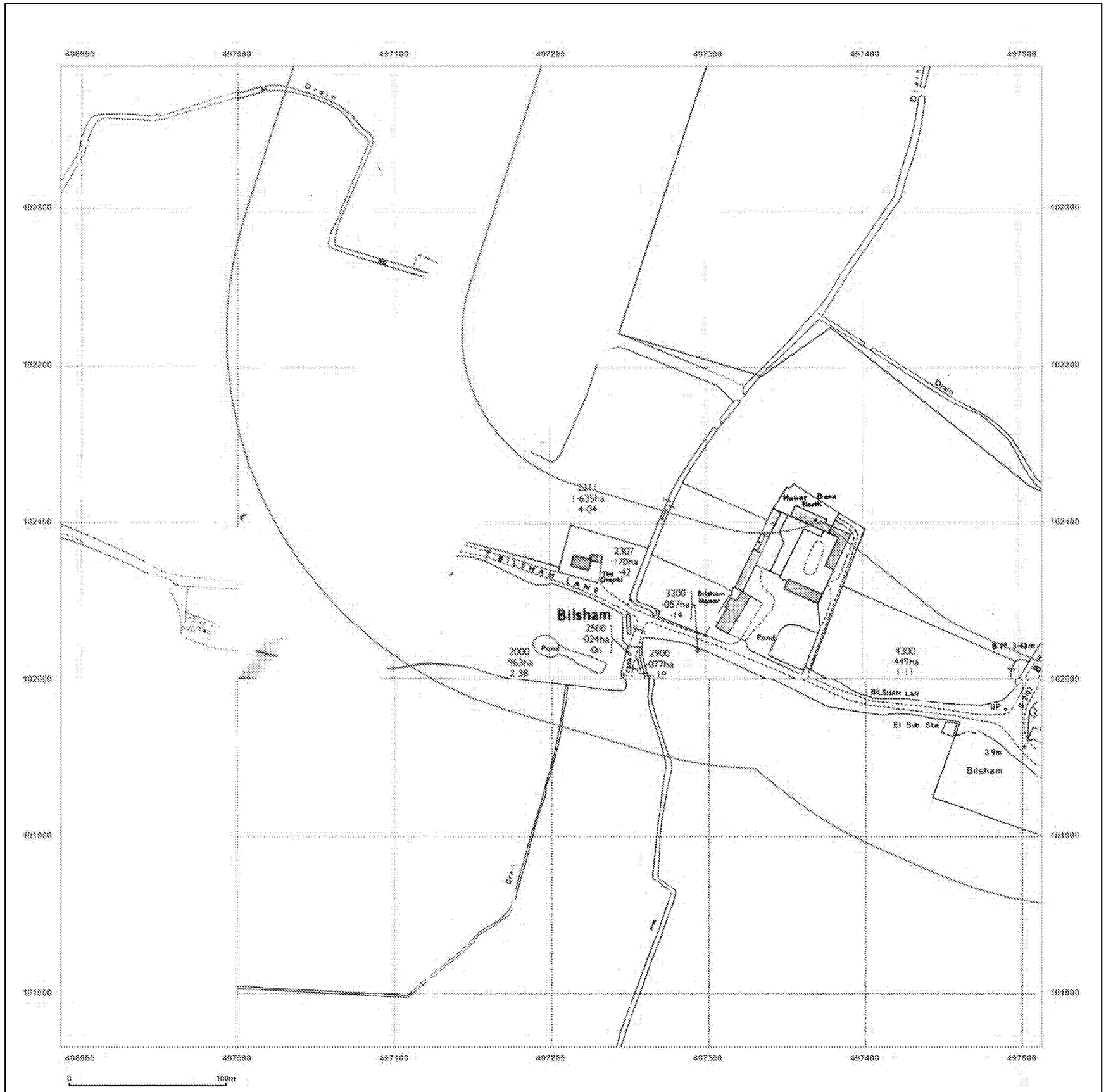
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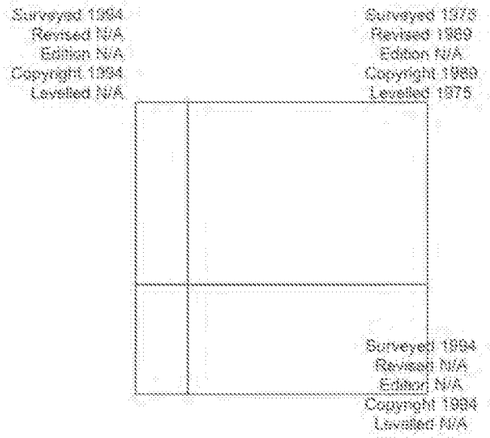
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_1
Grid Ref: 497200, 102078

Map Name: National Grid
Map date: **1989-1994**
Scale: 1:2,500
Printed at: 1:2,500

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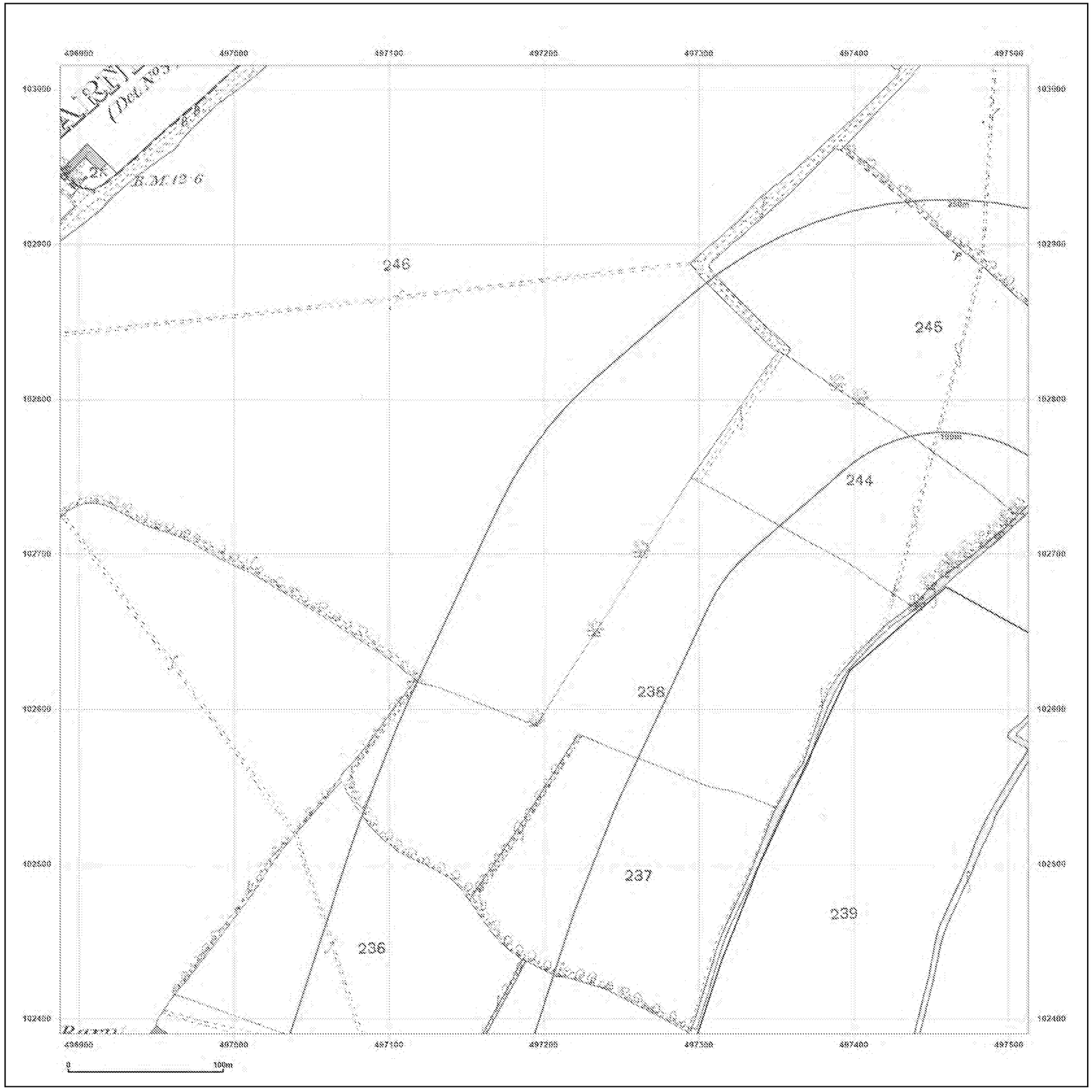
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: County Series
Map date: **1876**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1876
Revised 1876
Edition N/A
Copyright N/A
Levelled N/A

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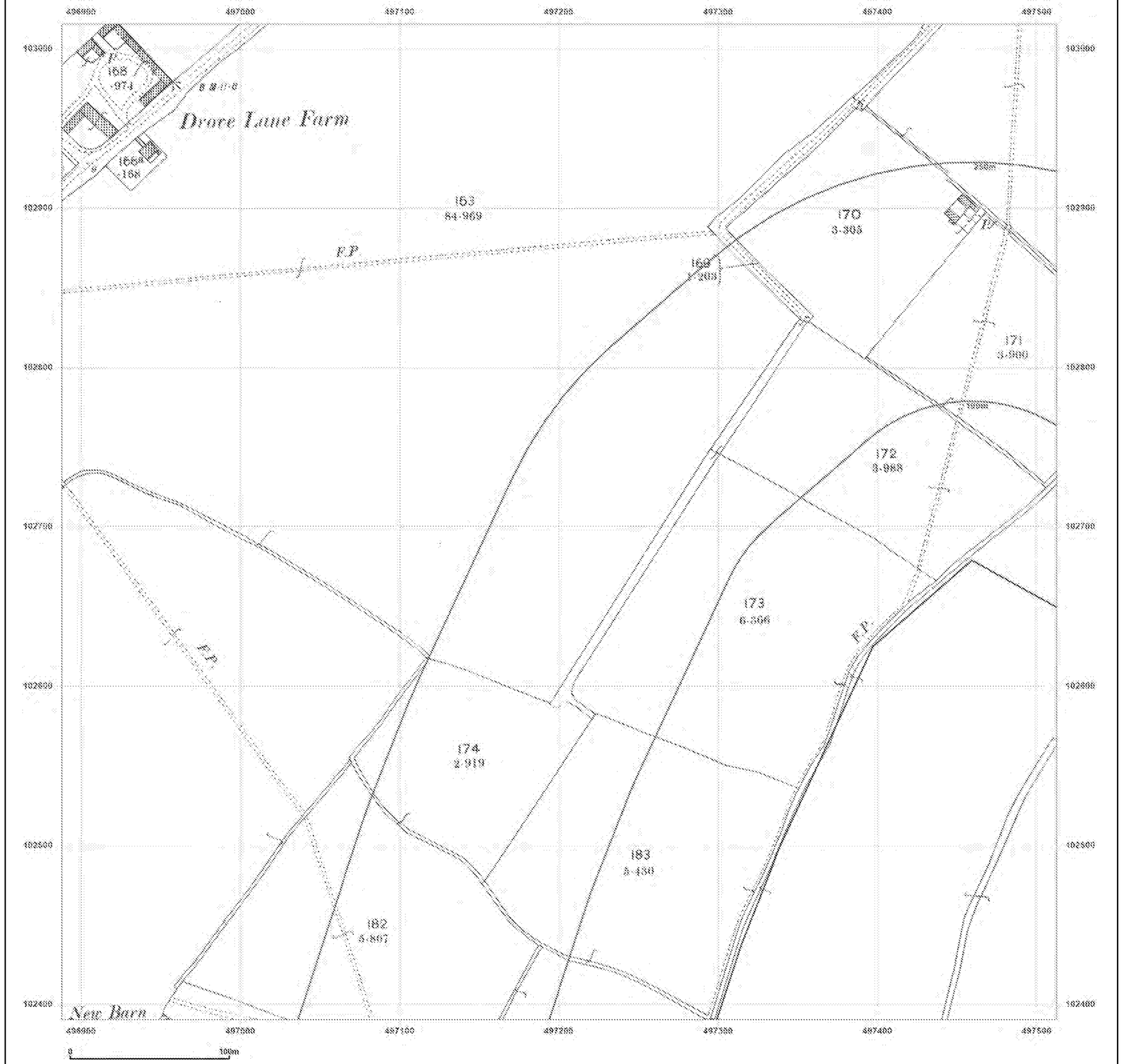
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: County Series
Map date: **1898**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1898
Revised 1898
Edition N/A
Copyright N/A
Levelled N/A

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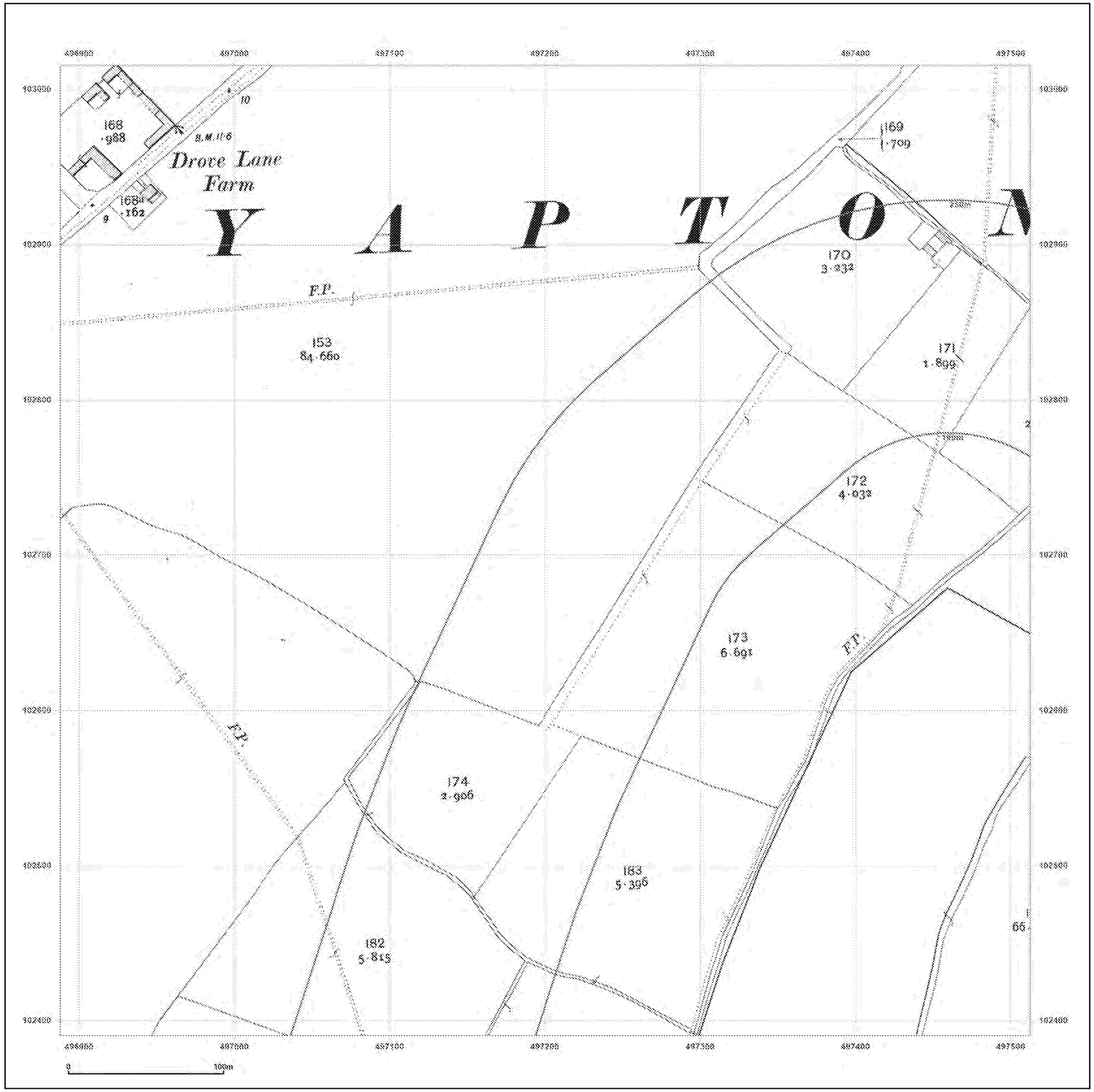
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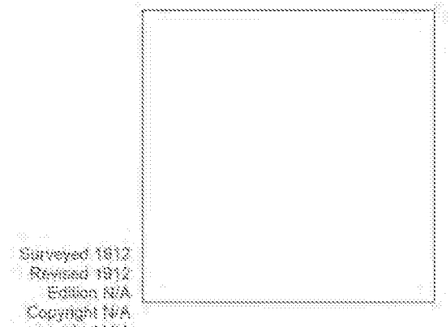
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: County Series
Map date: **1912**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1912
Revised 1912
Edition N/A
Copyright N/A
Levelled N/A

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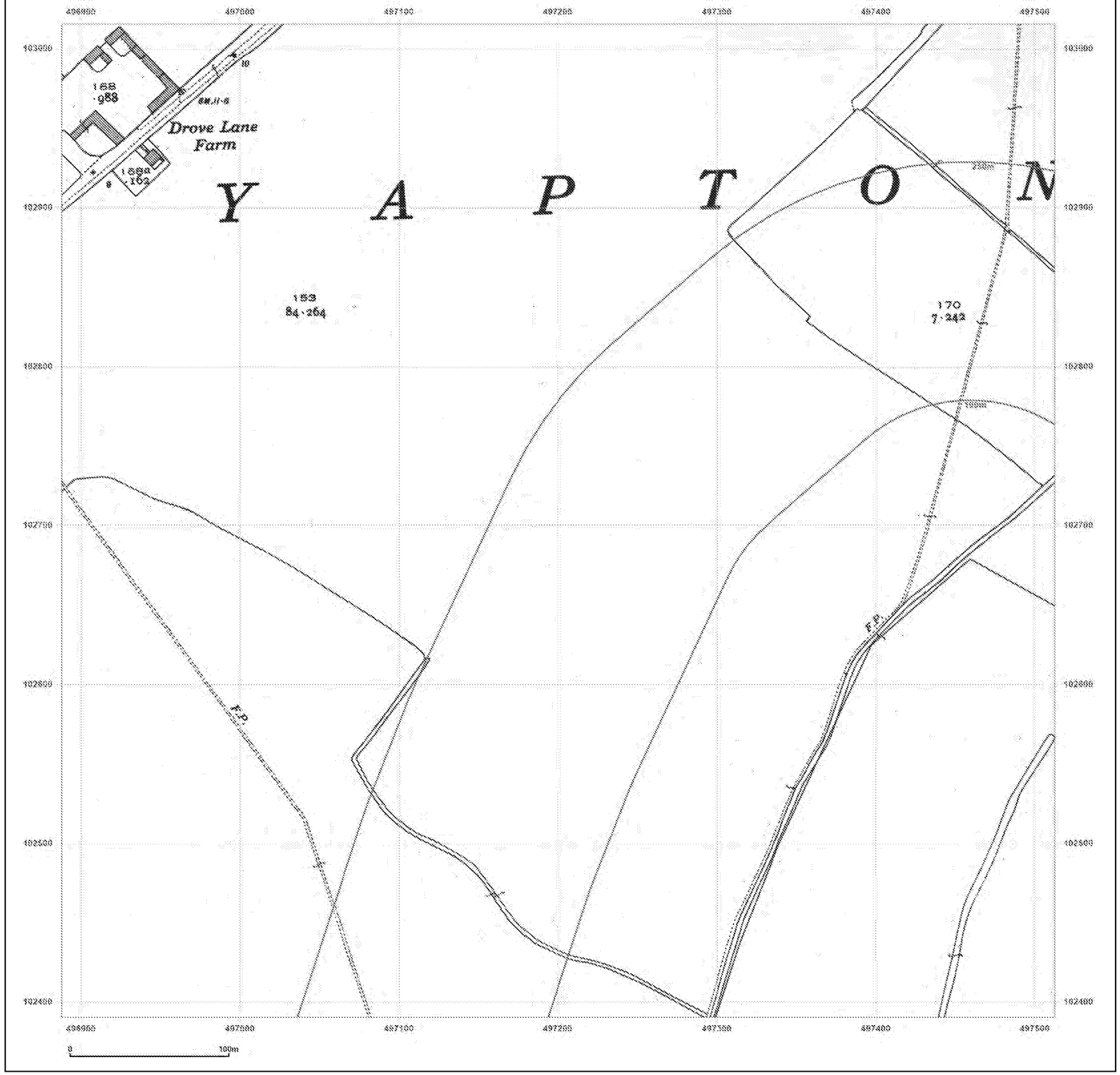
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: County Series
Map date: **1939**
Scale: 1:2,500
Printed at: 1:2,500

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Surveyed 1939
Revised 1939
Edition N/A
Copyright N/A
Levelled N/A

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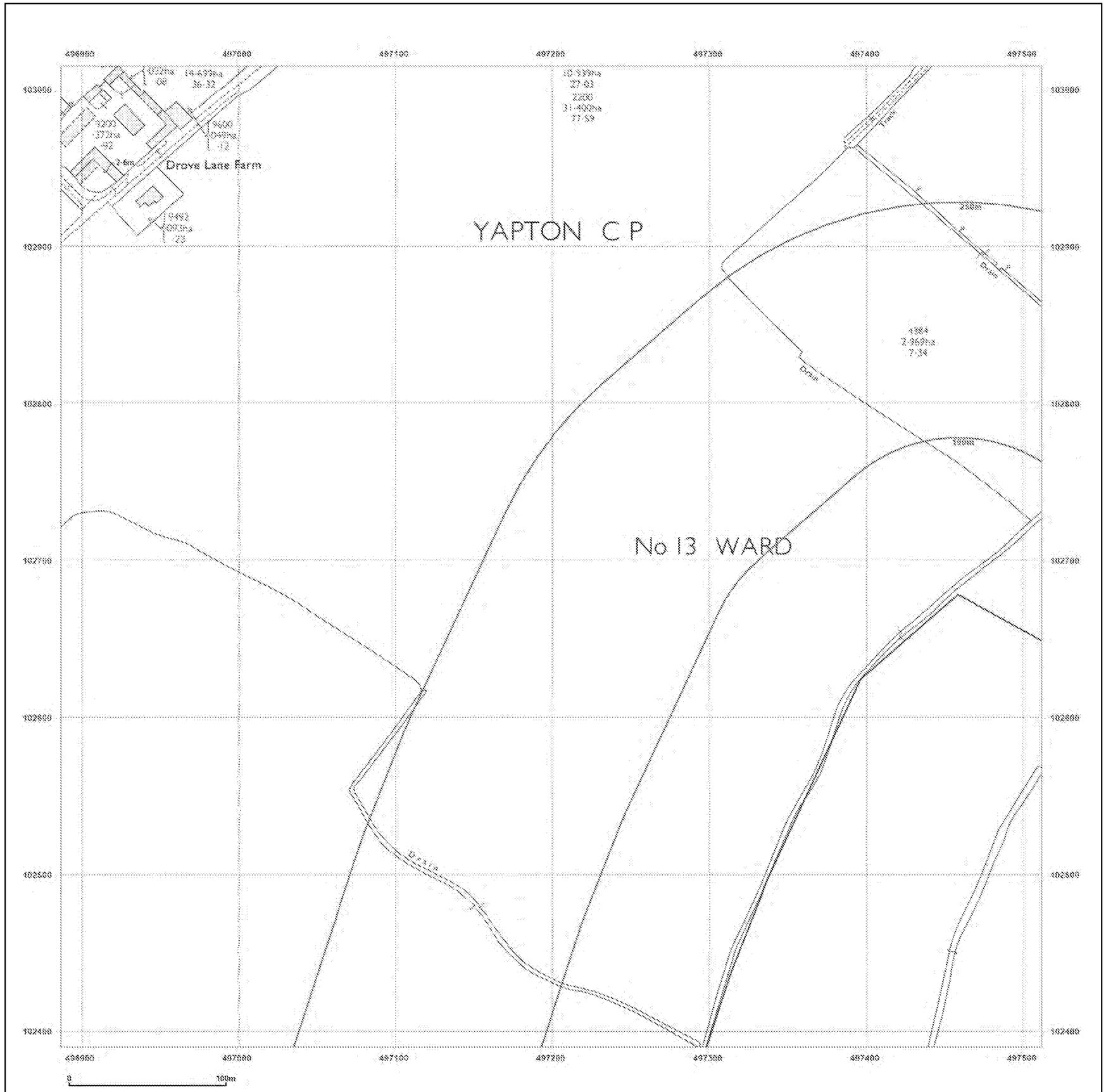
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: National Grid
Map date: **1974**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1974
Revised 1974
Edition N/A
Copyright 1975
Levelled 1950

Surveyed 1974
Revised 1974
Edition N/A
Copyright 1975
Levelled 1950

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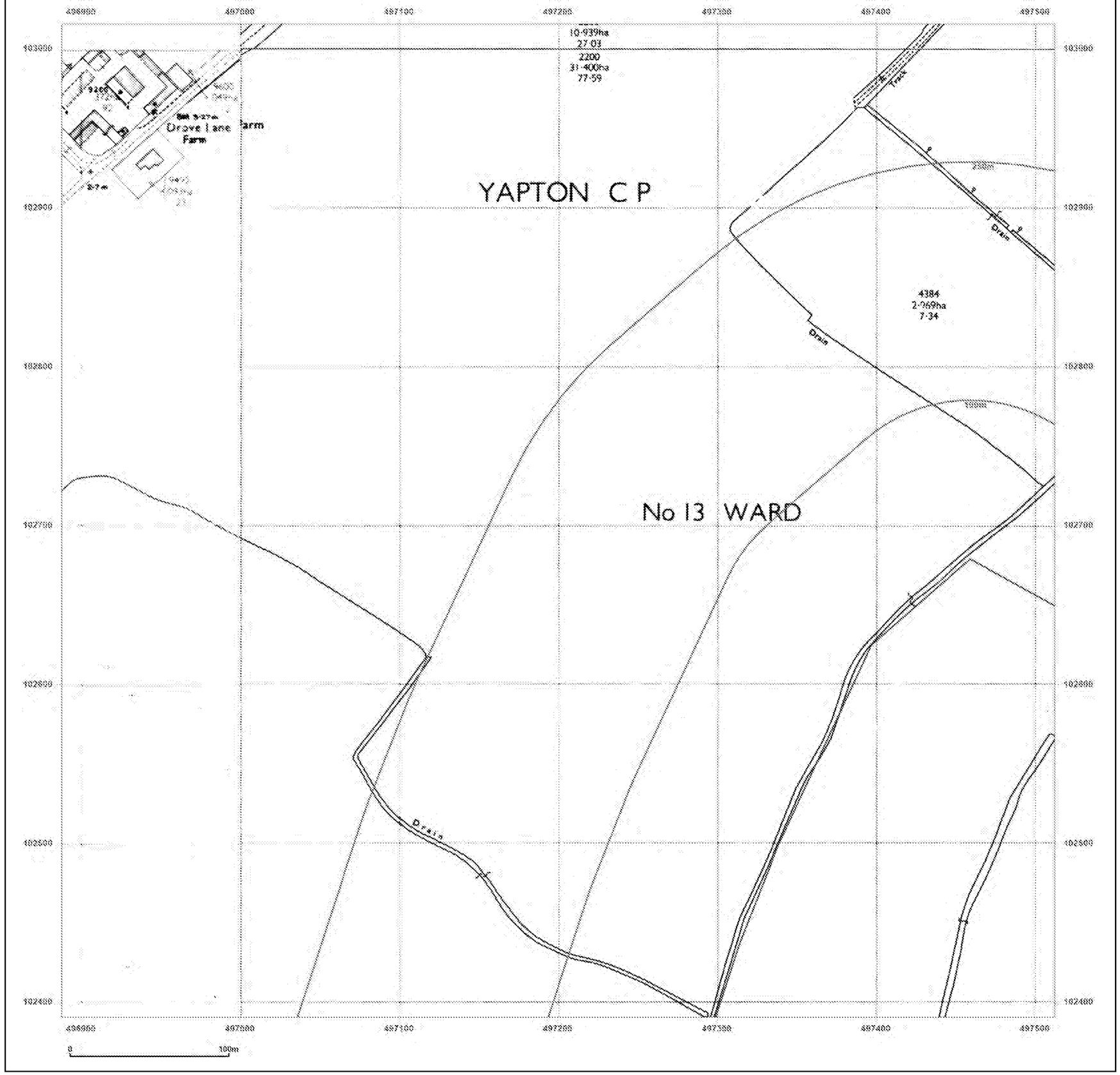
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

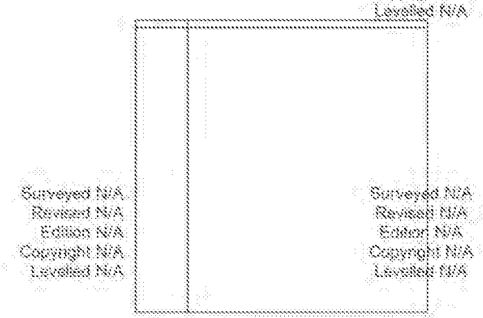
Map Name: National Grid

Map date: **1975-1978**

Scale: 1:2,500

Printed at: 1:2,500

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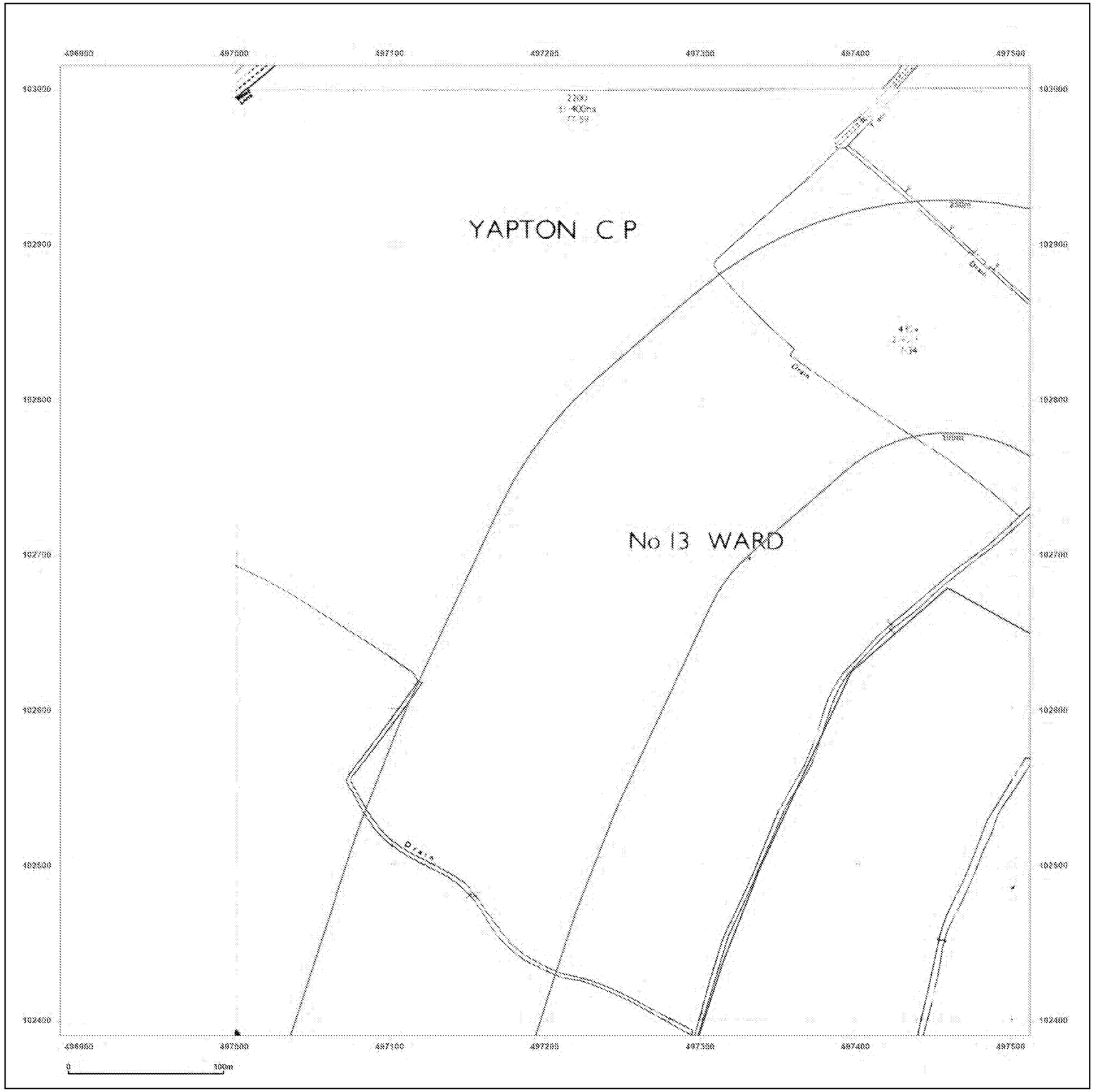
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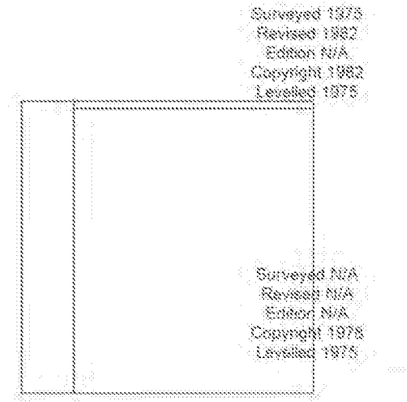
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: National Grid
Map date: **1978-1982**
Scale: 1:2,500
Printed at: 1:2,500

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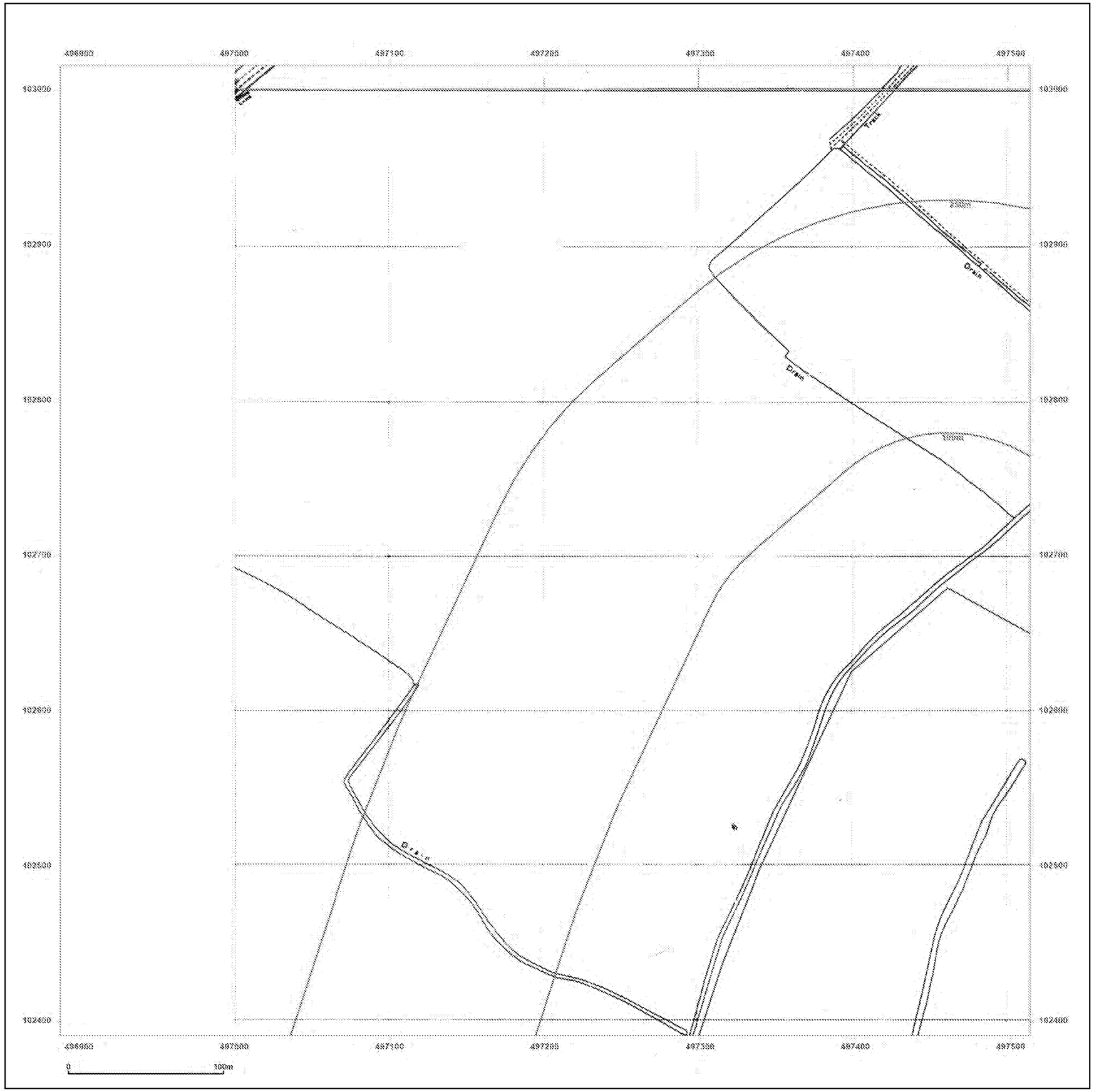
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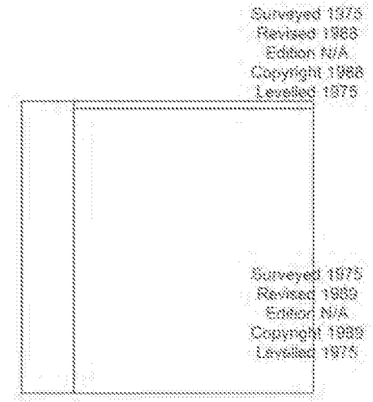
Site Details:

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Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: National Grid
Map date: **1988-1989**
Scale: 1:2,500
Printed at: 1:2,500

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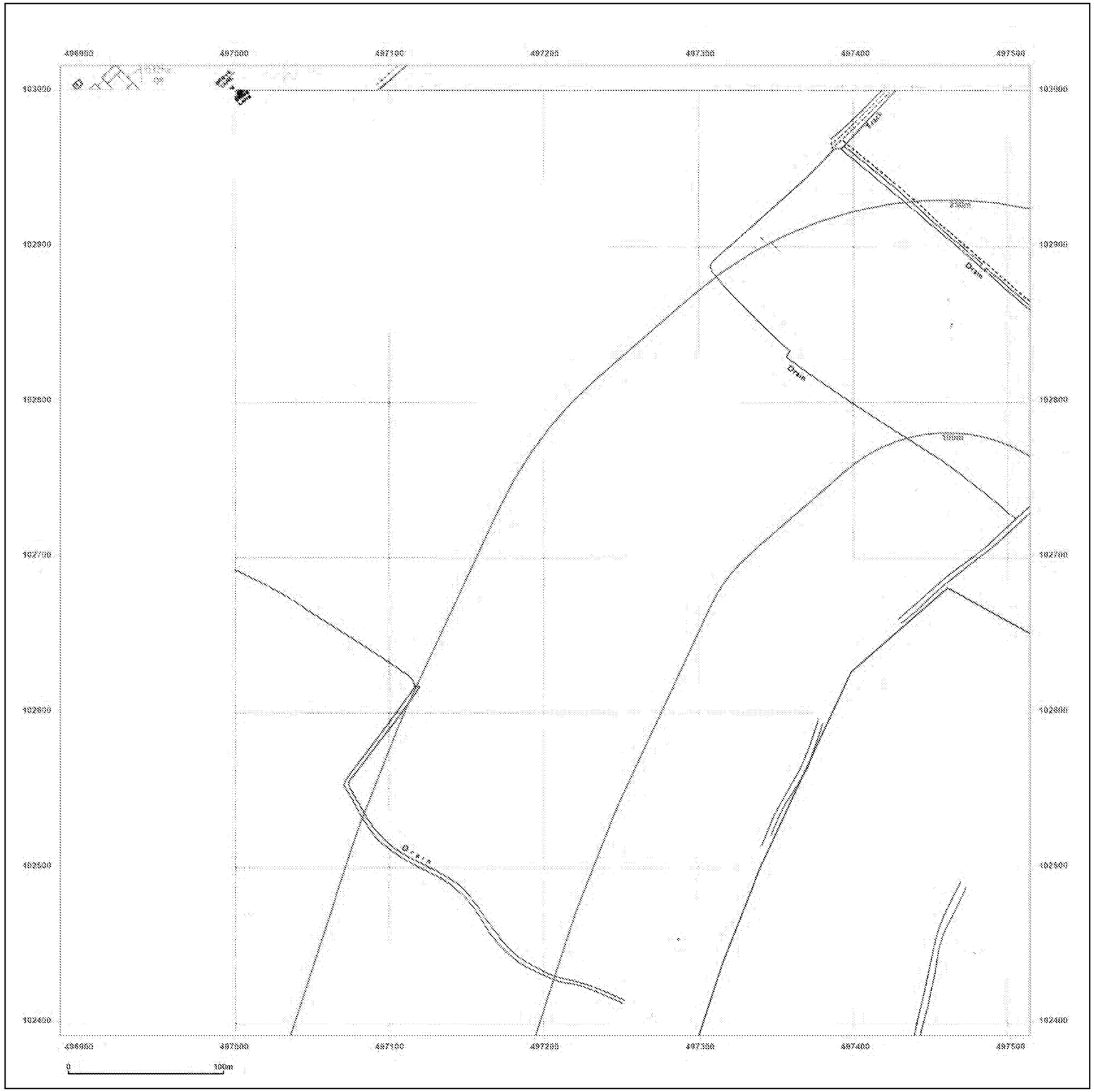
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

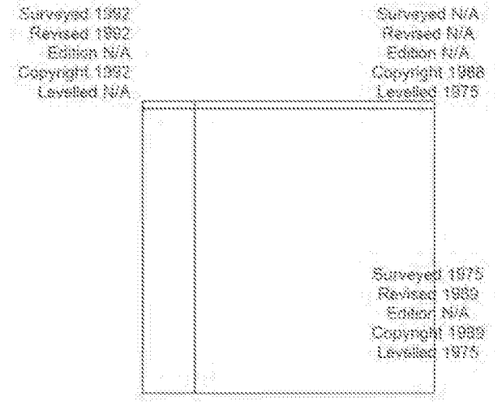
Map Name: National Grid

Map date: **1988-1992**

Scale: 1:2,500

Printed at: 1:2,500

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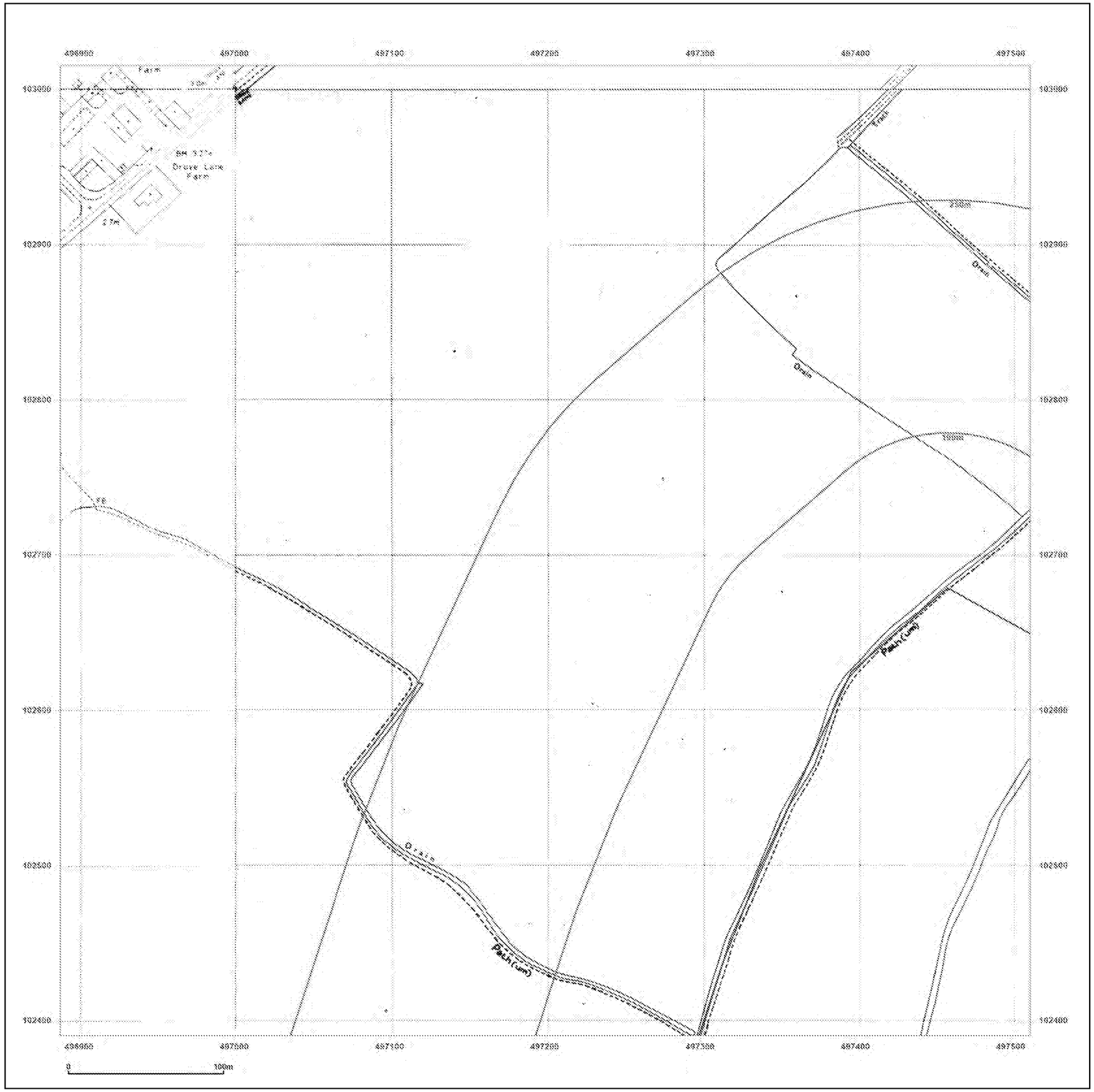
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: National Grid
Map date: **1989-1994**
Scale: 1:2,500
Printed at: 1:2,500

N
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Surveyed 1994
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1975
Revised 1989
Edition N/A
Copyright 1989
Levelled 1975

Surveyed 1994
Revised N/A
Edition N/A
Copyright 1994
Levelled N/A

Surveyed 1975
Revised 1982
Edition N/A
Copyright 1982
Levelled 1975

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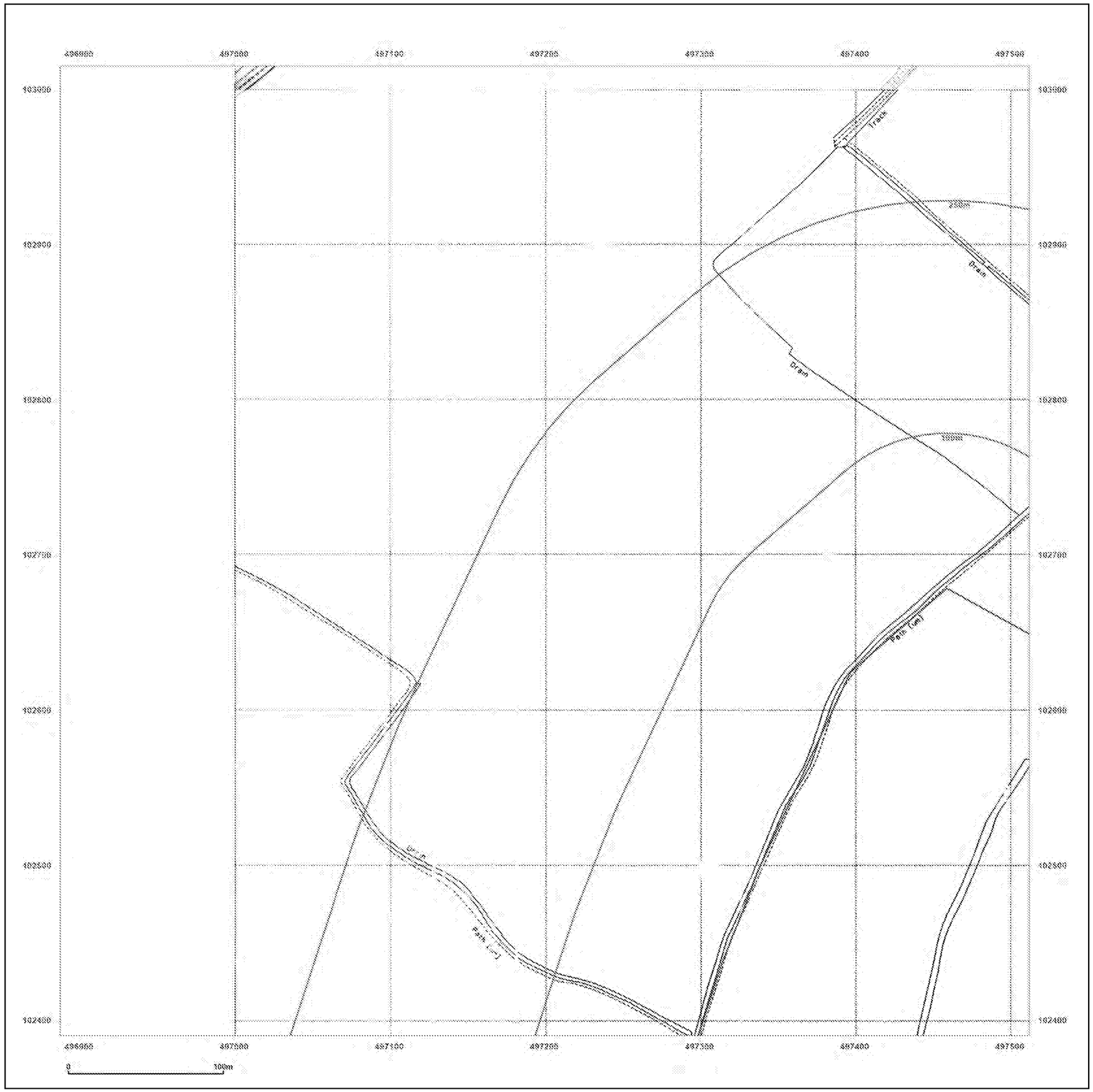
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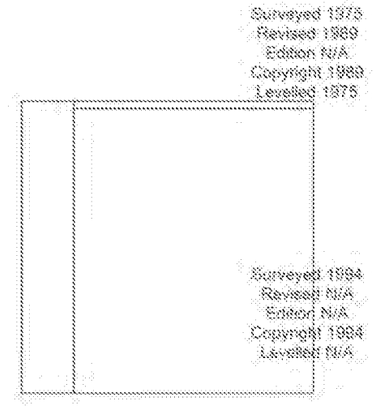
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_1_2
Grid Ref: 497200, 102703

Map Name: National Grid
Map date: **1989-1994**
Scale: 1:2,500
Printed at: 1:2,500

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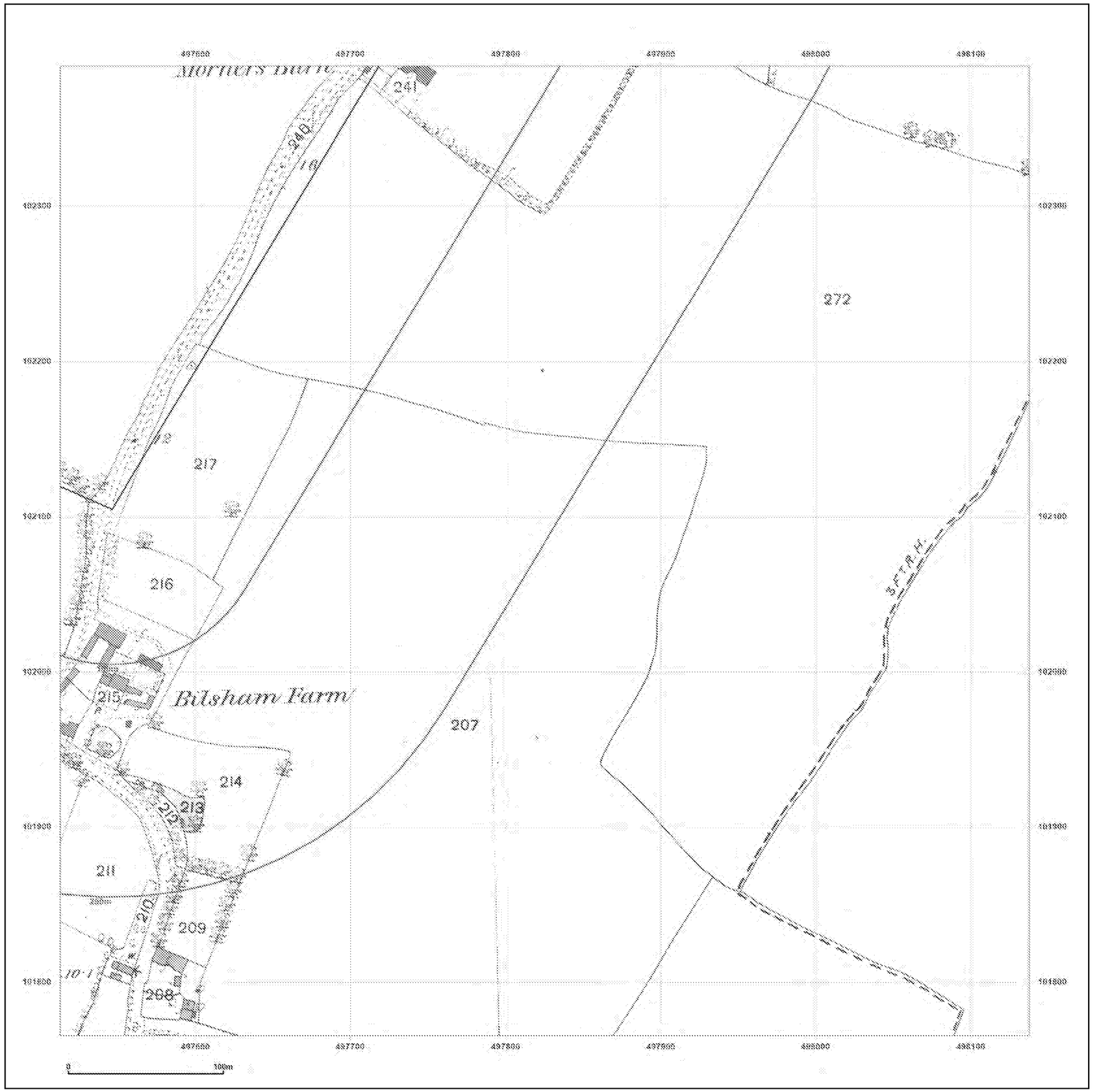
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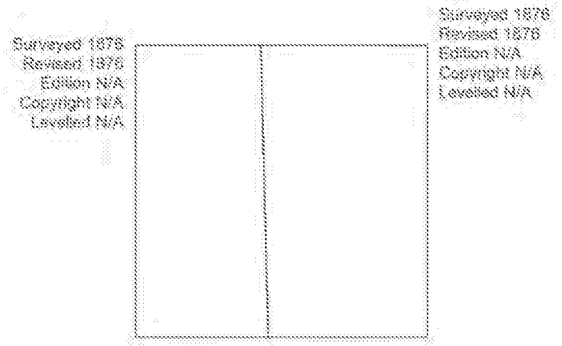
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: County Series
Map date: **1876**
Scale: 1:2,500
Printed at: 1:2,500

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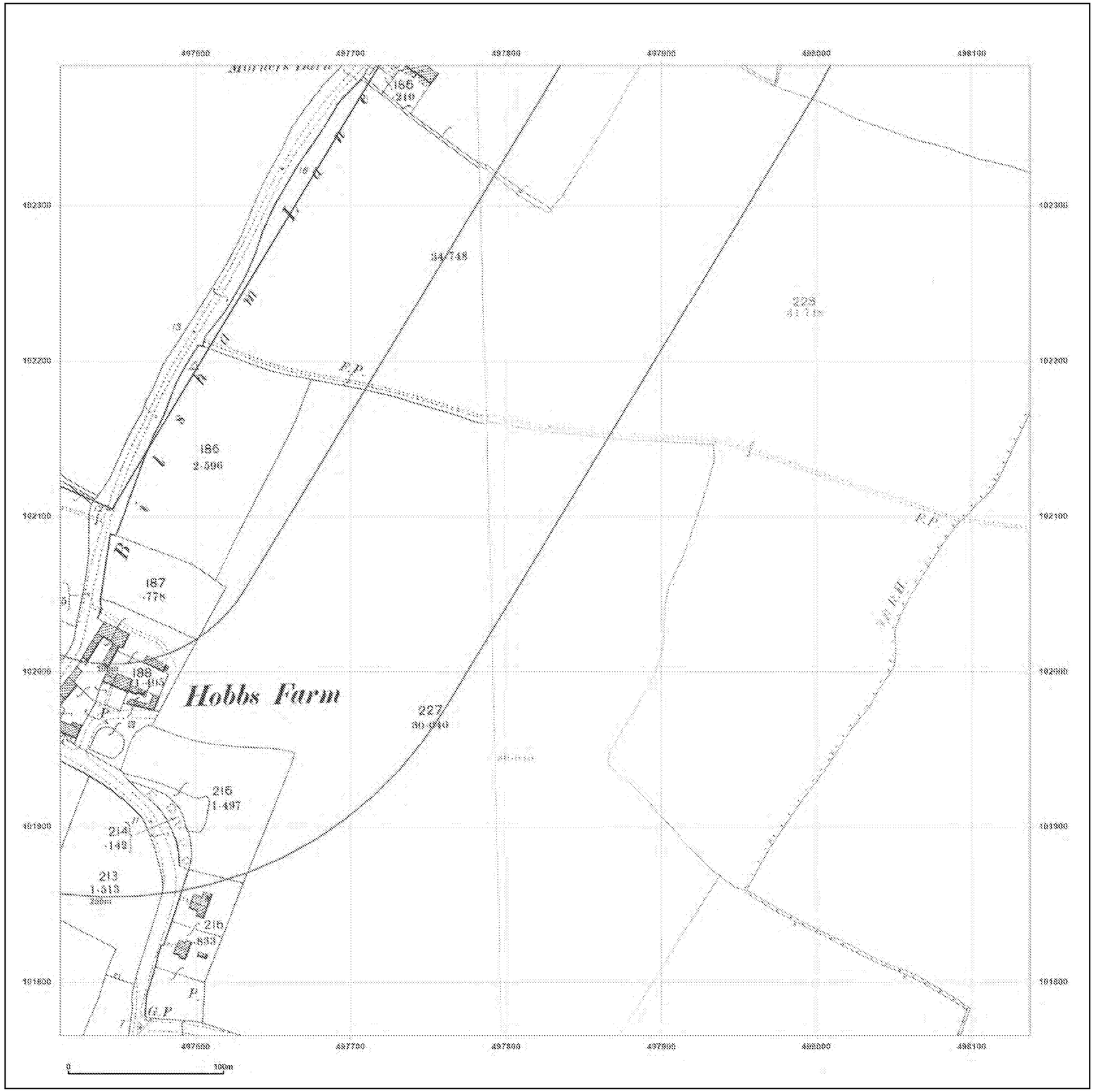
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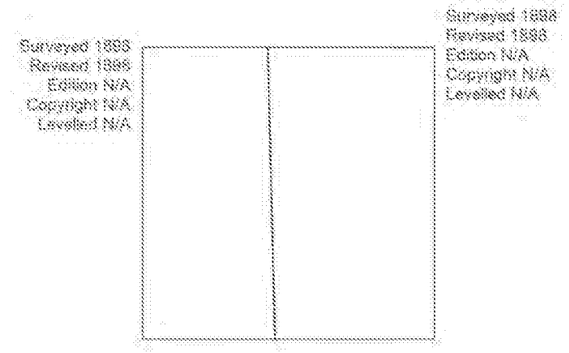
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: County Series
Map date: **1898**
Scale: 1:2,500
Printed at: 1:2,500

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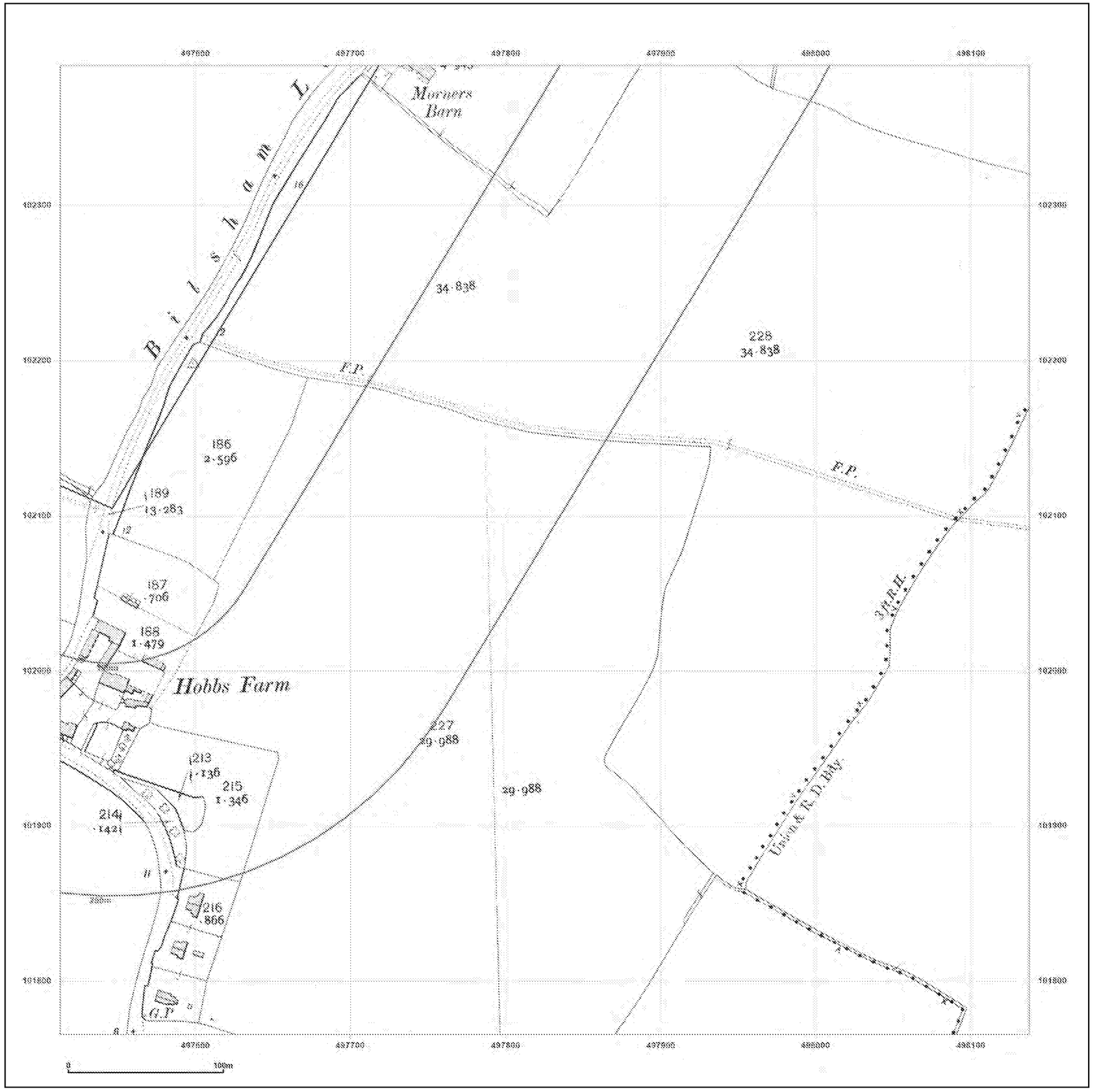
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

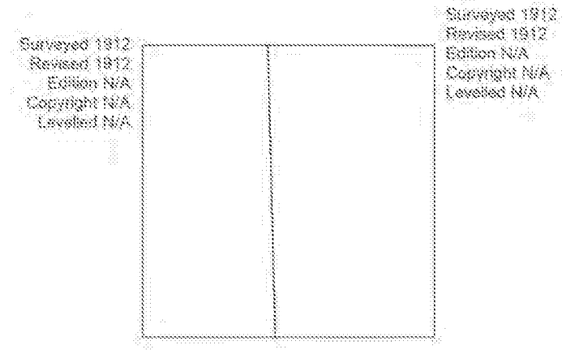
Map Name: County Series

Map date: **1912**

Scale: 1:2,500

Printed at: 1:2,500

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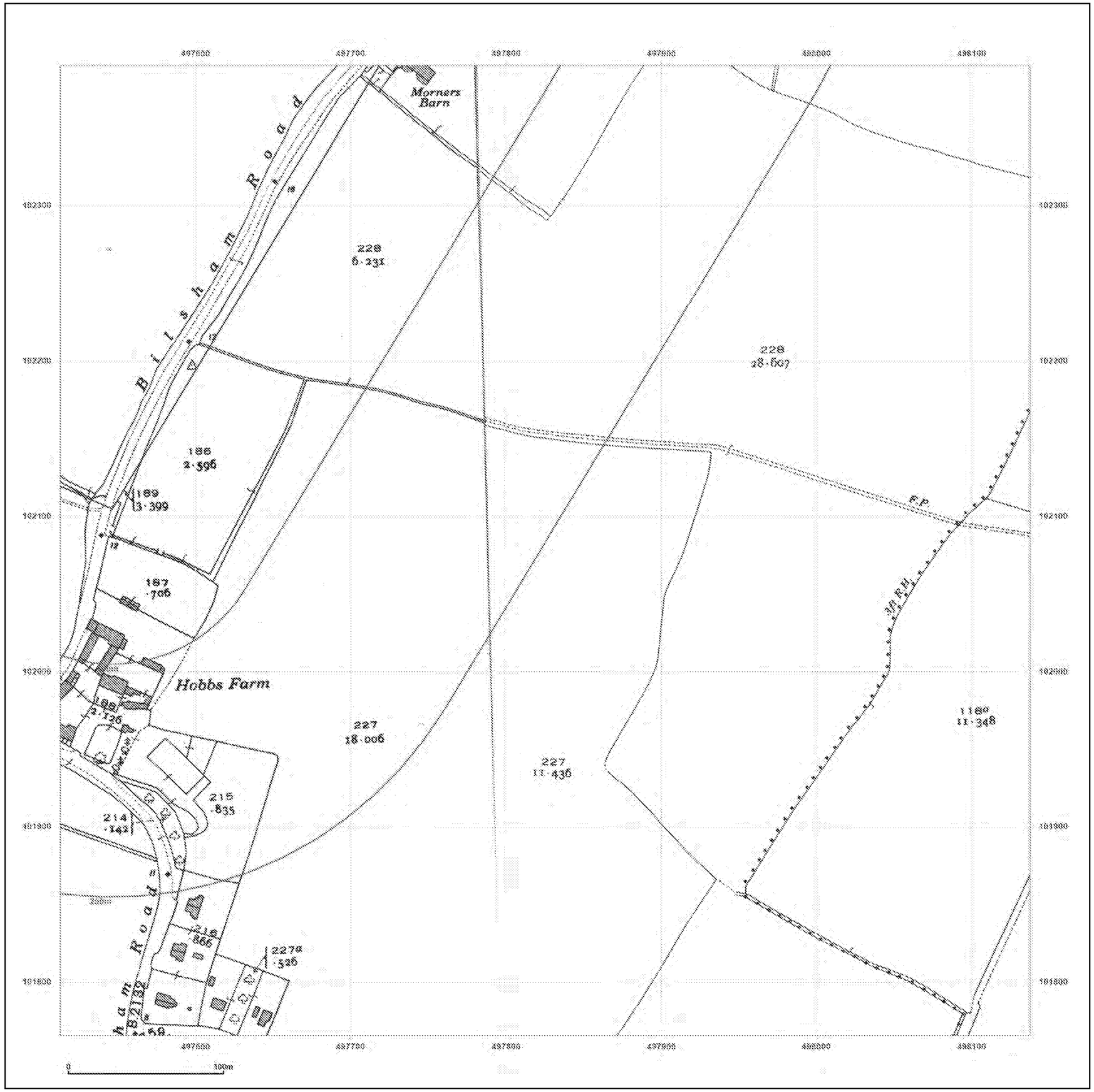
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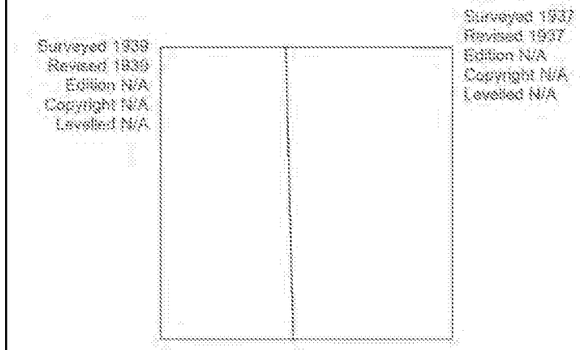
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: County Series
Map date: **1937-1939**
Scale: 1:2,500
Printed at: 1:2,500

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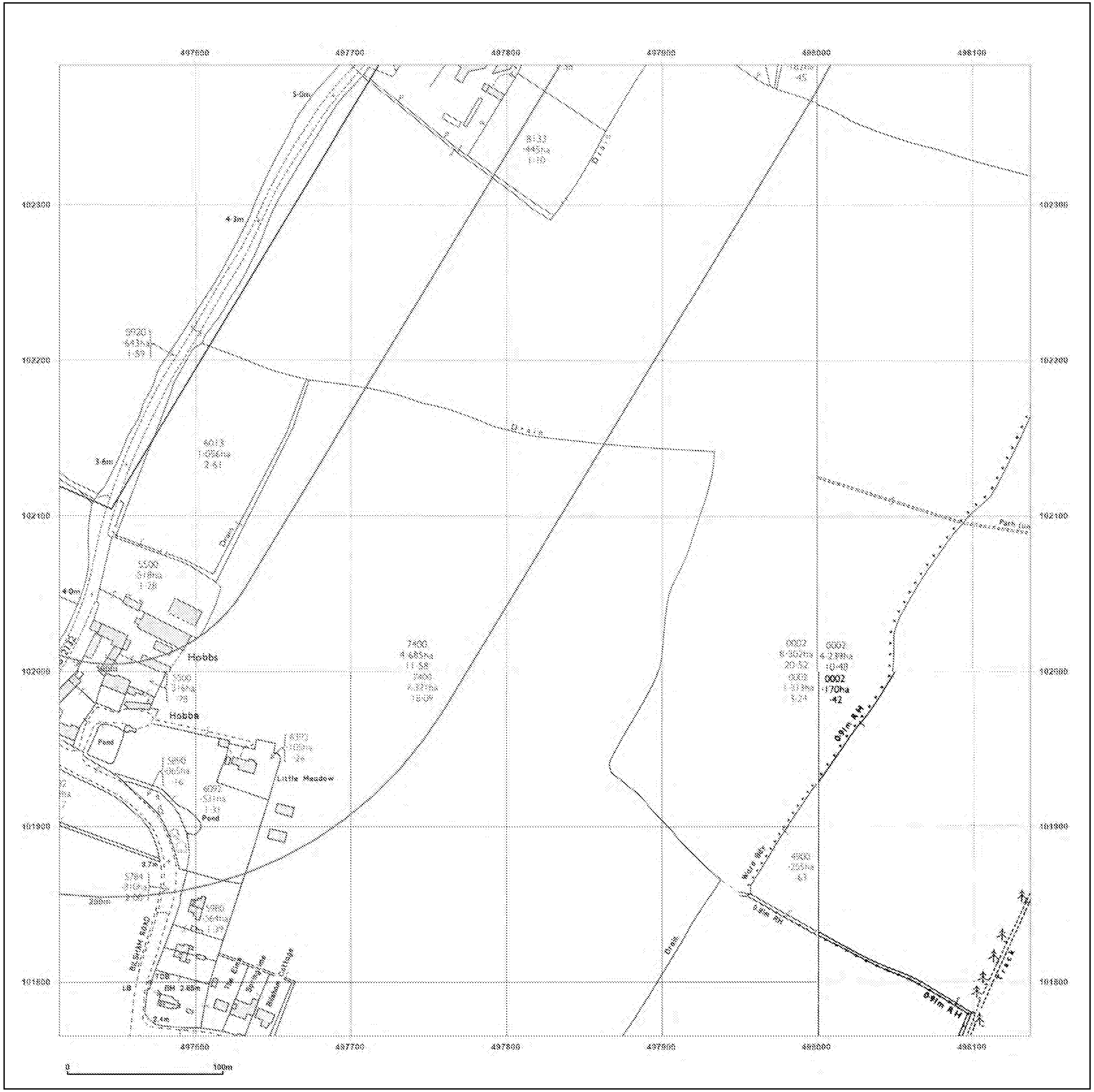
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid

Map date: **1973-1974**

Scale: 1:2,500

Printed at: 1:2,500

N
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Surveyed 1974
Revised 1974
Edition N/A
Copyright 1975
Levelled 1950

Surveyed 1973
Revised 1973
Edition N/A
Copyright 1975
Levelled 1950

Surveyed 1974
Revised 1974
Edition N/A
Copyright 1977
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Surveyed N/A
Revised N/A
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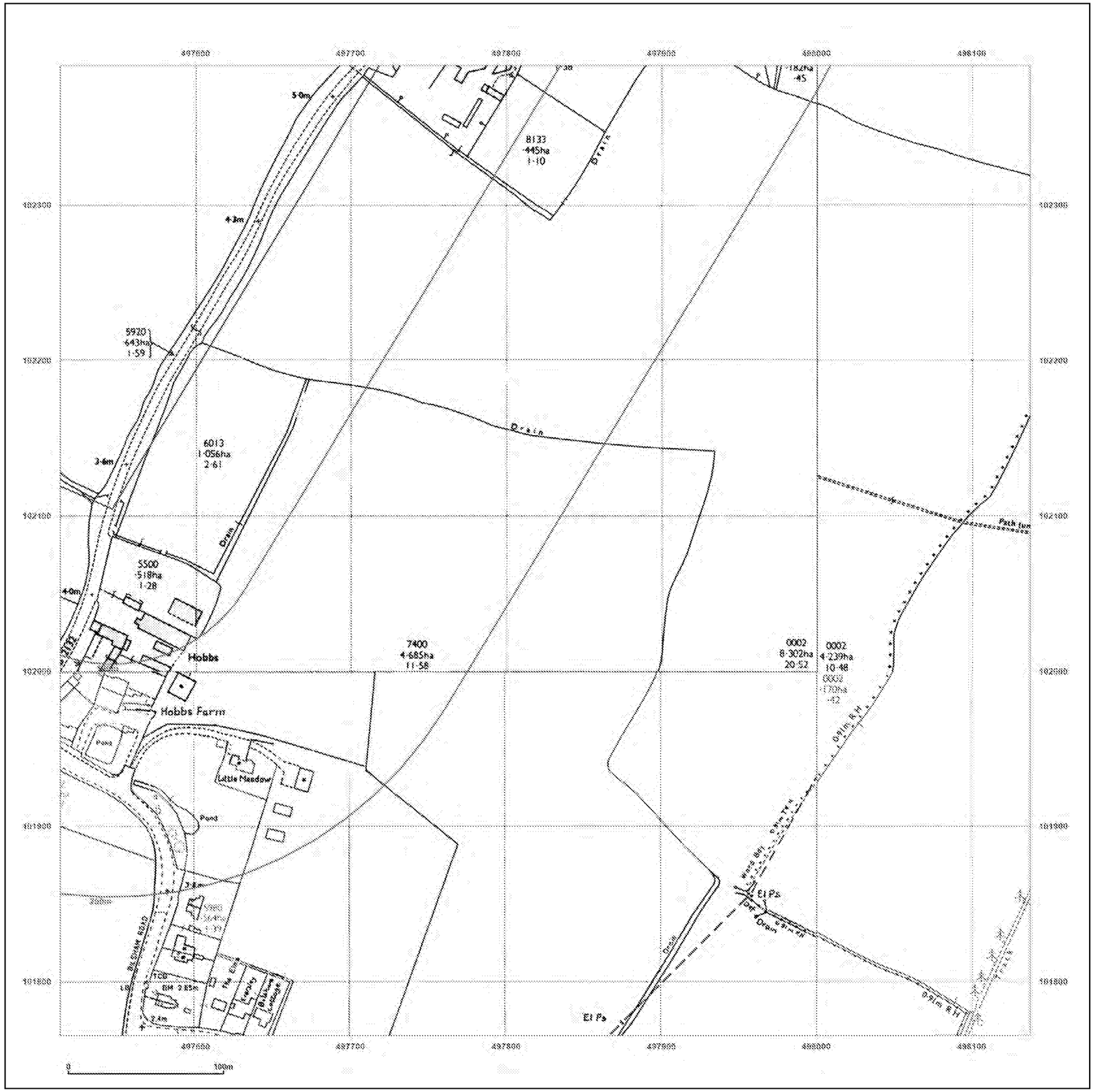
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid

Map date: **1974-1975**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled N/A

Surveyed N/A
Revised N/A
Edition N/A
Copyright N/A
Levelled 1975

Surveyed 1974
Revised 1974
Edition N/A
Copyright 1974
Levelled 1969

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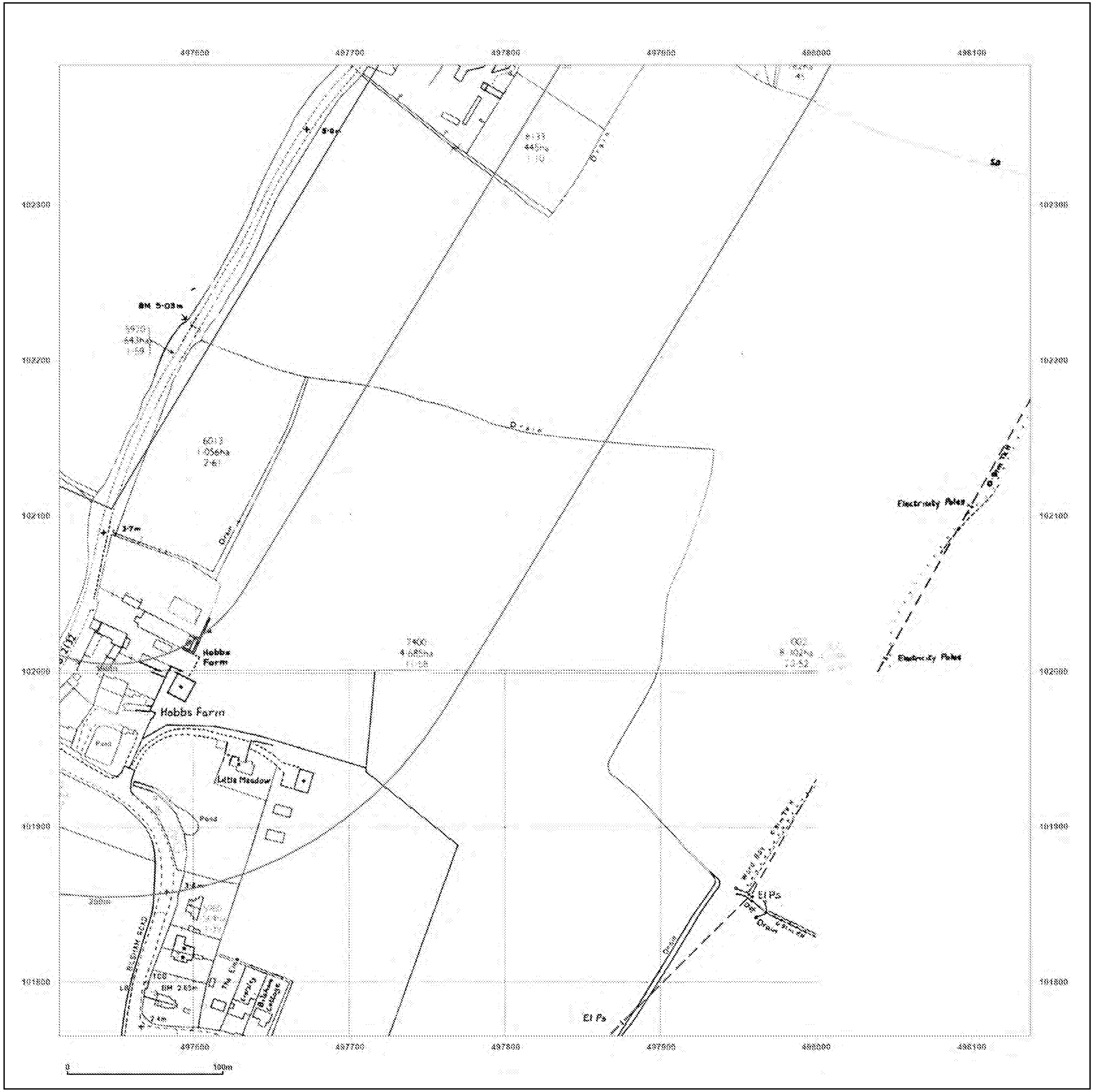
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid

Map date: **1978-1983**

Scale: 1:2,500

Printed at: 1:2,500

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W E
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Surveyed N/A
Revised N/A
Edition N/A
Copyright 1978
Levelled 1975

Surveyed N/A
Revised N/A
Edition N/A
Copyright 1978
Levelled 1975

Surveyed 1975
Revised 1983
Edition N/A
Copyright 1983
Levelled 1975

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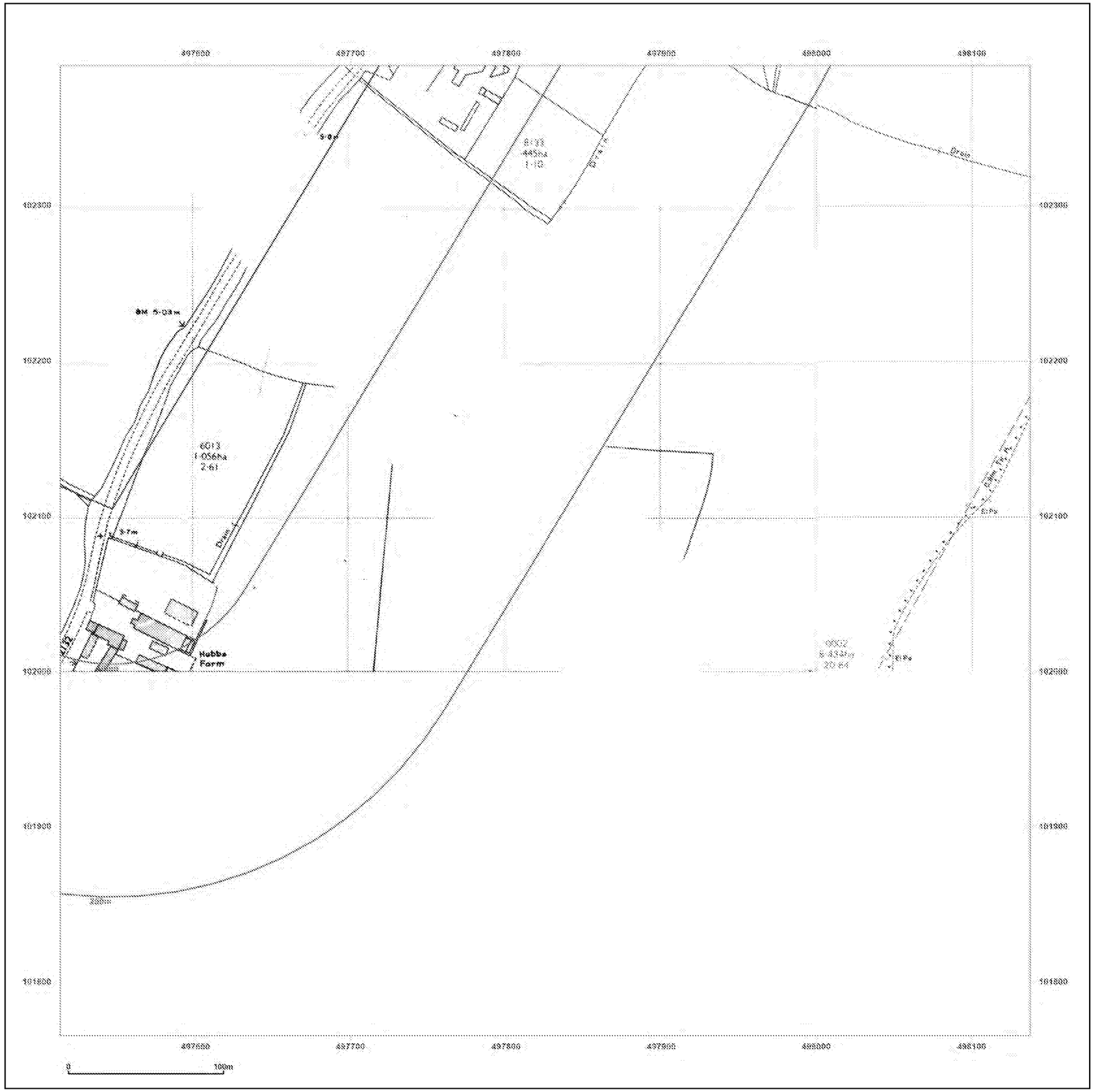
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid

Map date: **1984-1989**

Scale: 1:2,500

Printed at: 1:2,500

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Surveyed 1975
Revised 1989
Edition N/A
Copyright 1989
Levelled 1975

Surveyed 1983
Revised 1983
Edition N/A
Copyright 1984
Levelled 1975

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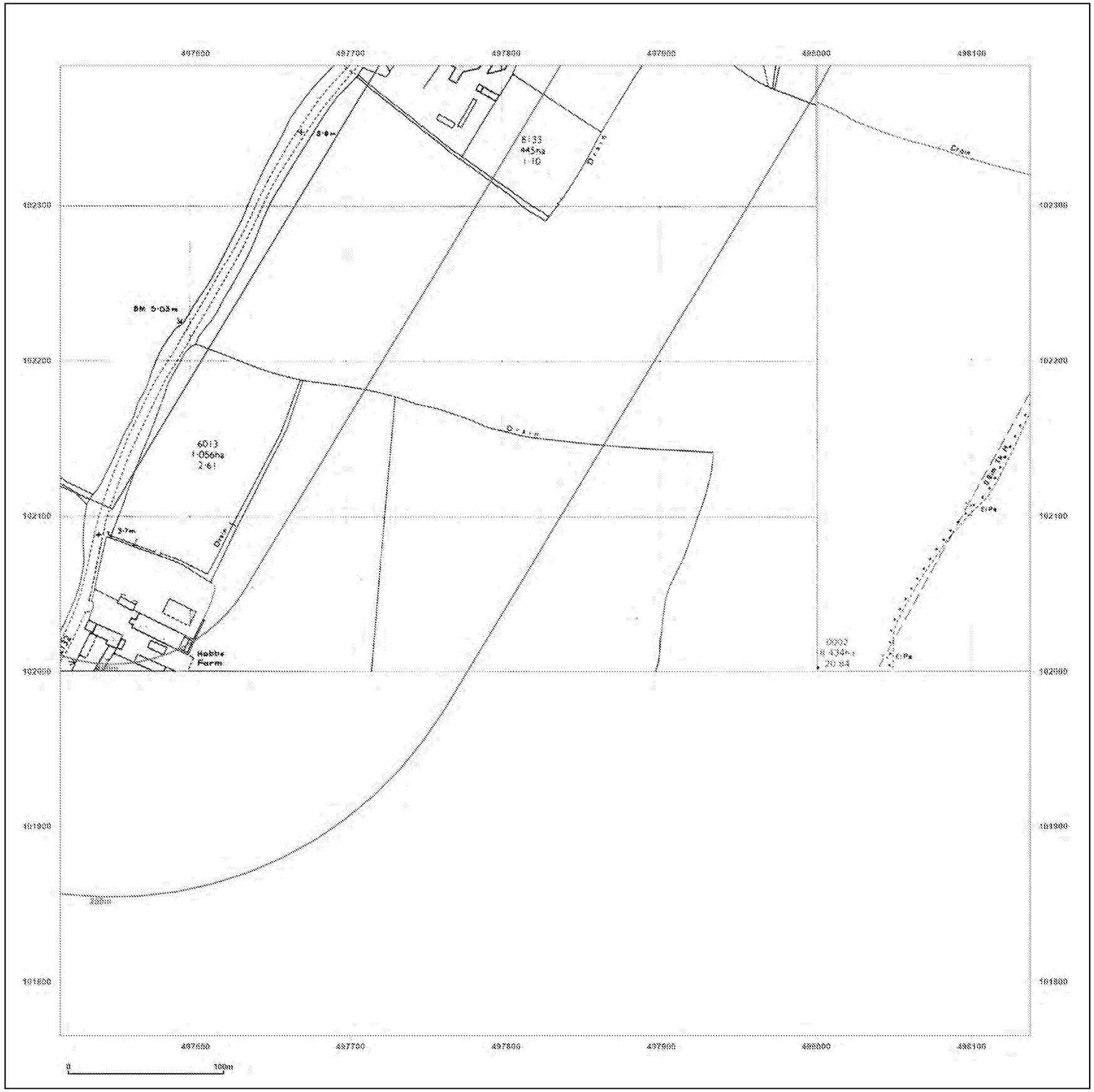
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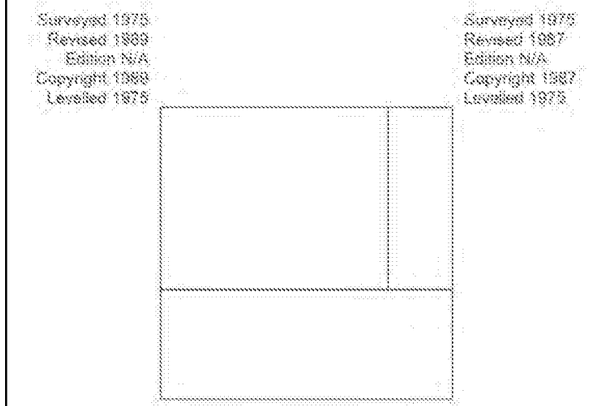
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid
Map date: **1987-1989**
Scale: 1:2,500
Printed at: 1:2,500

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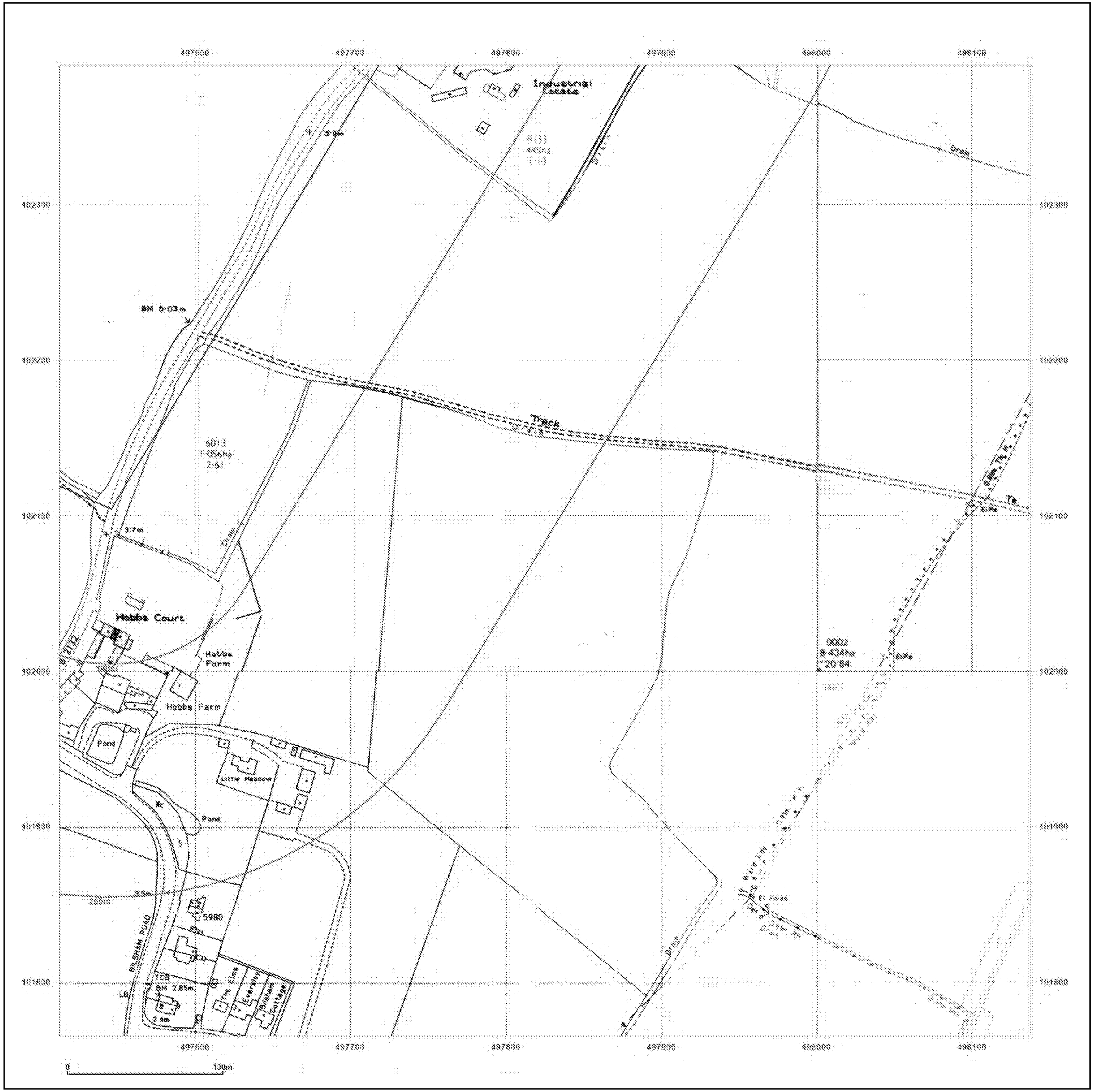
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Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

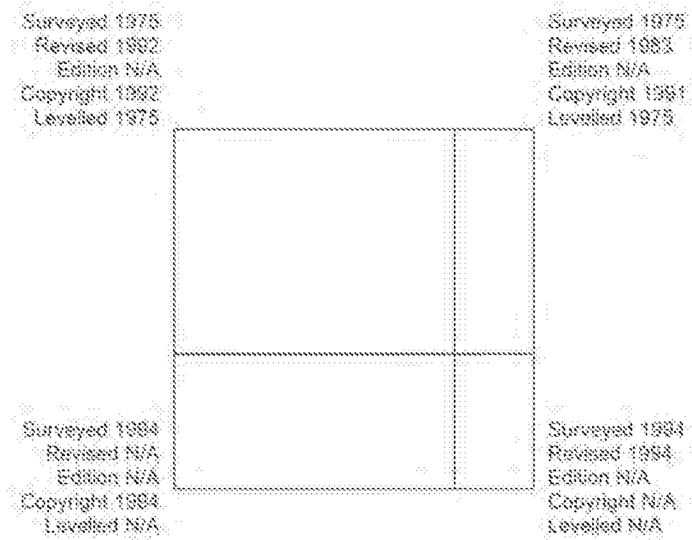
Map Name: National Grid

Map date: **1991-1994**

Scale: 1:2,500

Printed at: 1:2,500

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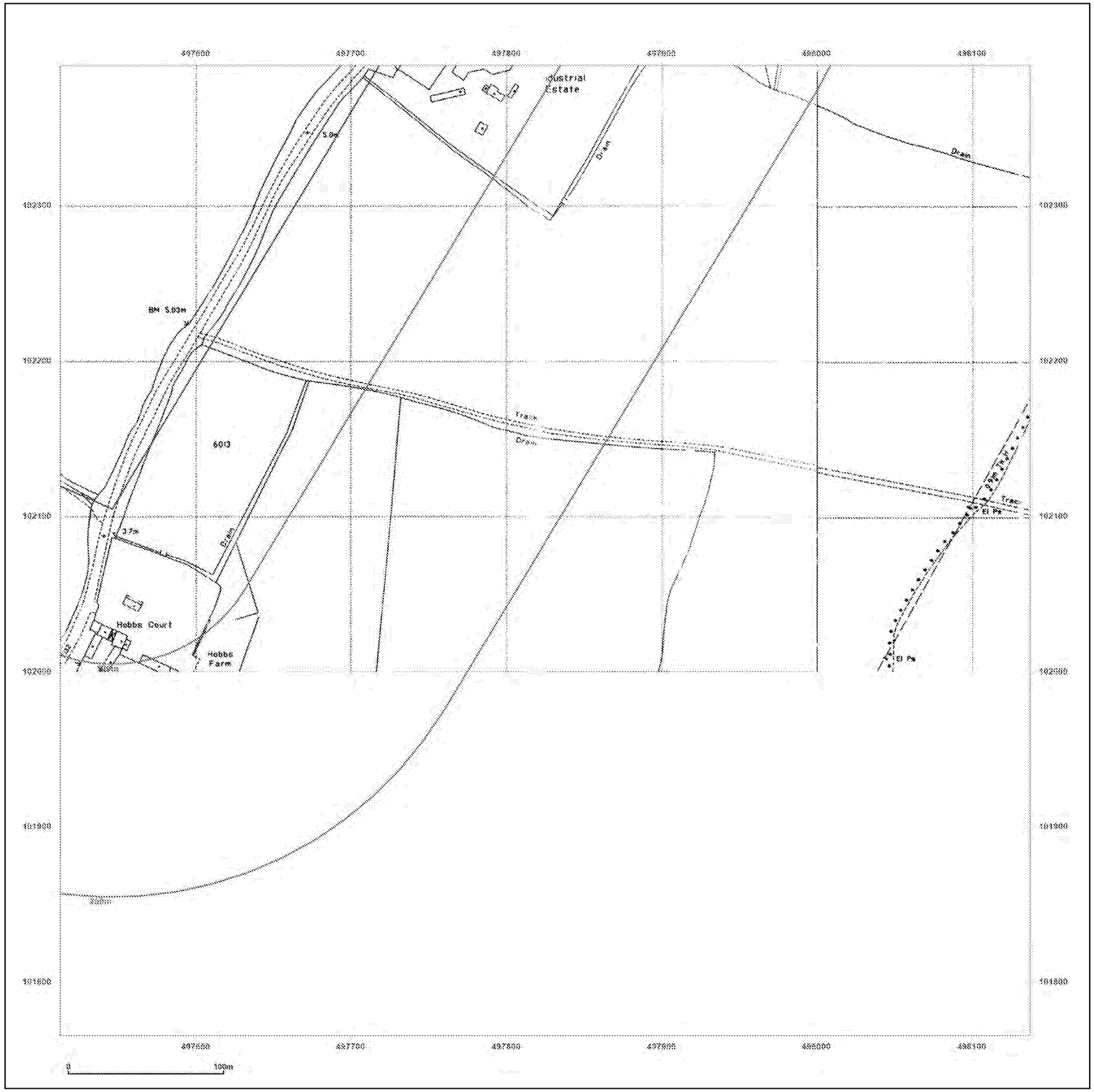
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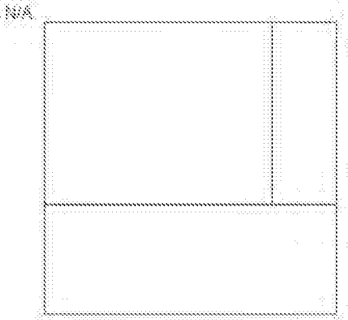
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Report Ref: CAR1-8016762_LS_2_1
Grid Ref: 497825, 102078

Map Name: National Grid
Map date: 1994
Scale: 1:2,500
Printed at: 1:2,500

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Revised N/A
Edition N/A
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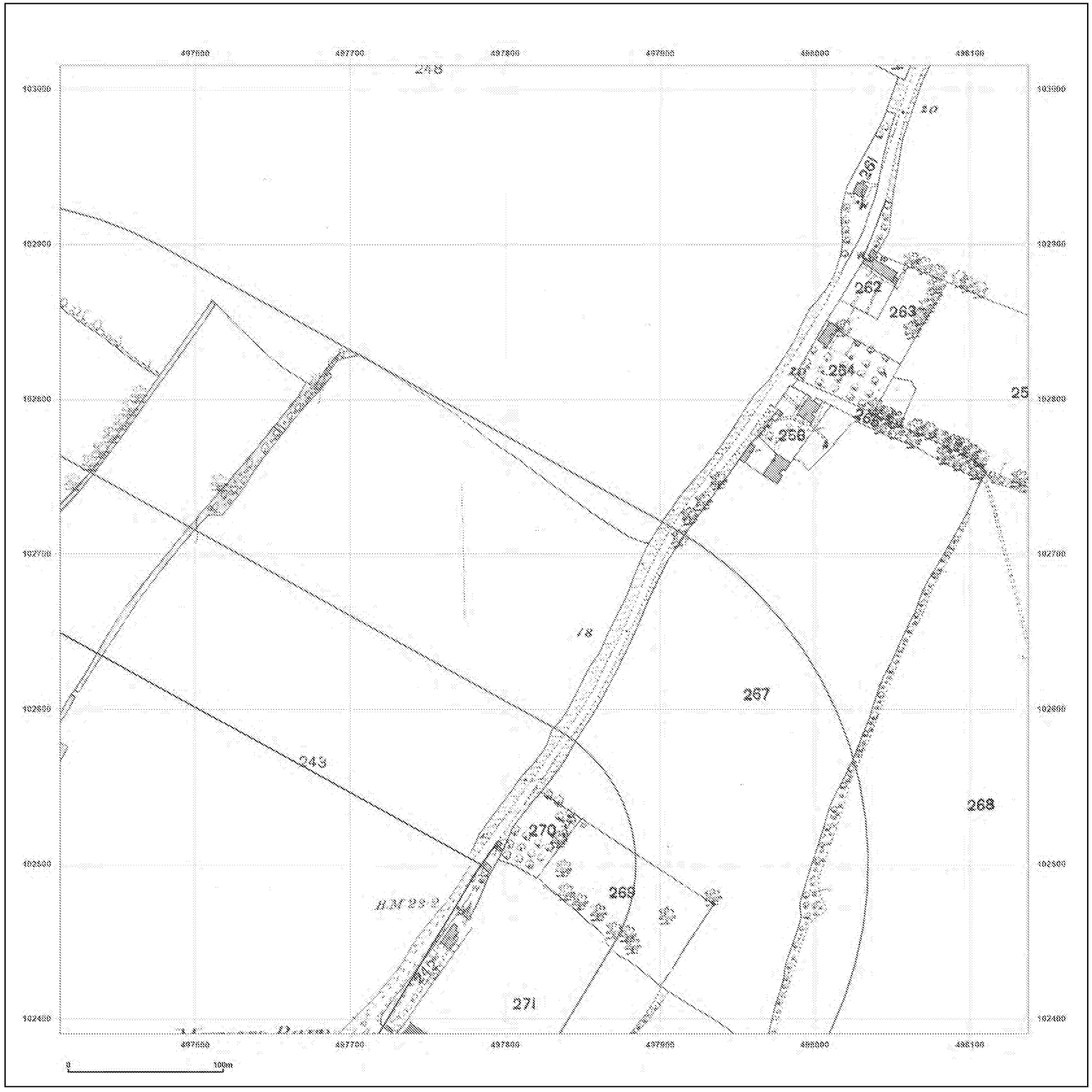
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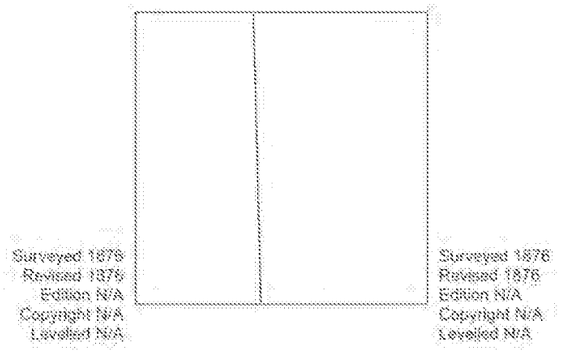
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: County Series
Map date: **1876**
Scale: 1:2,500
Printed at: 1:2,500

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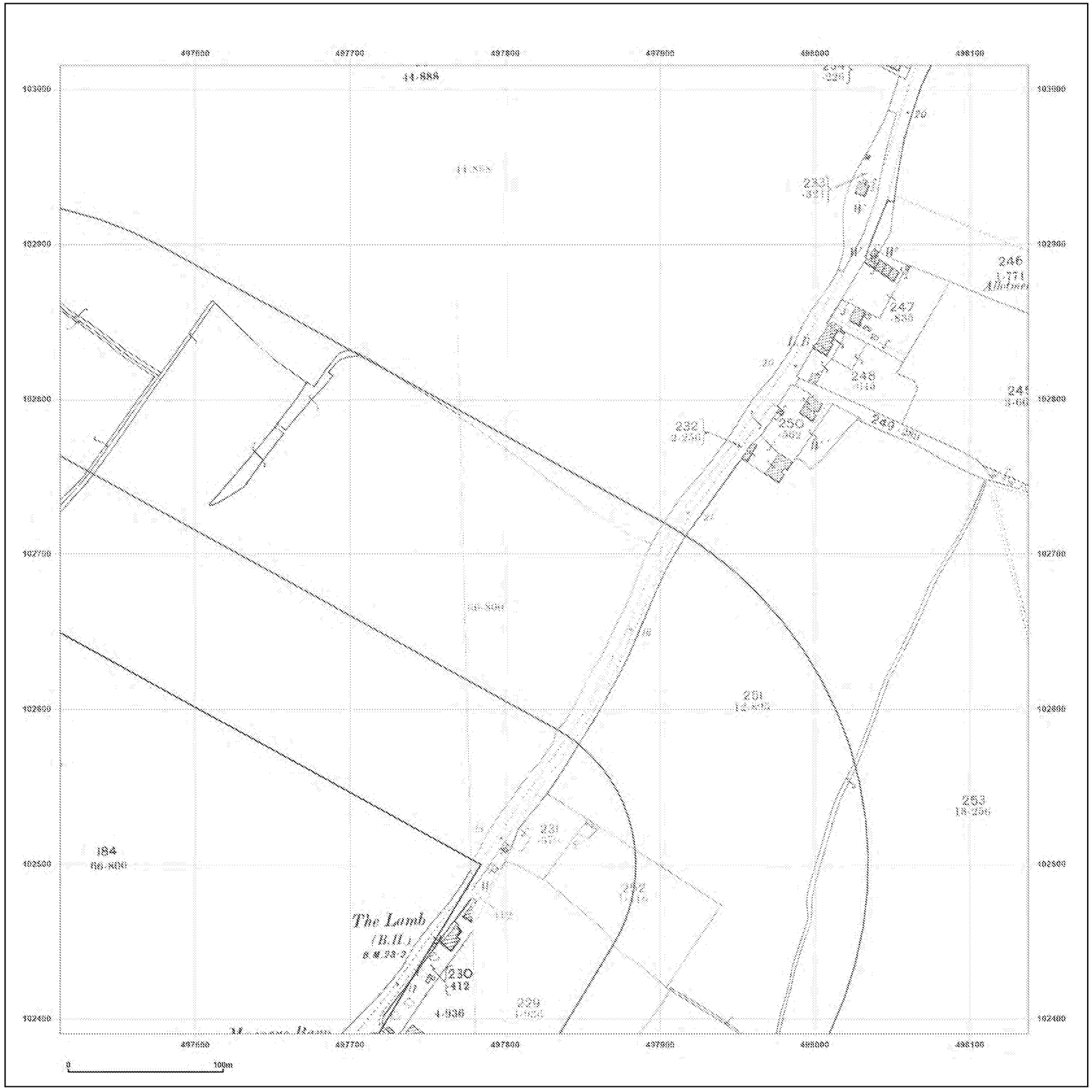
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

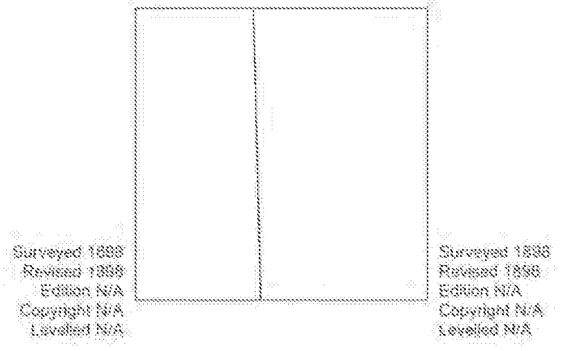
Map Name: County Series

Map date: **1898**

Scale: 1:2,500

Printed at: 1:2,500

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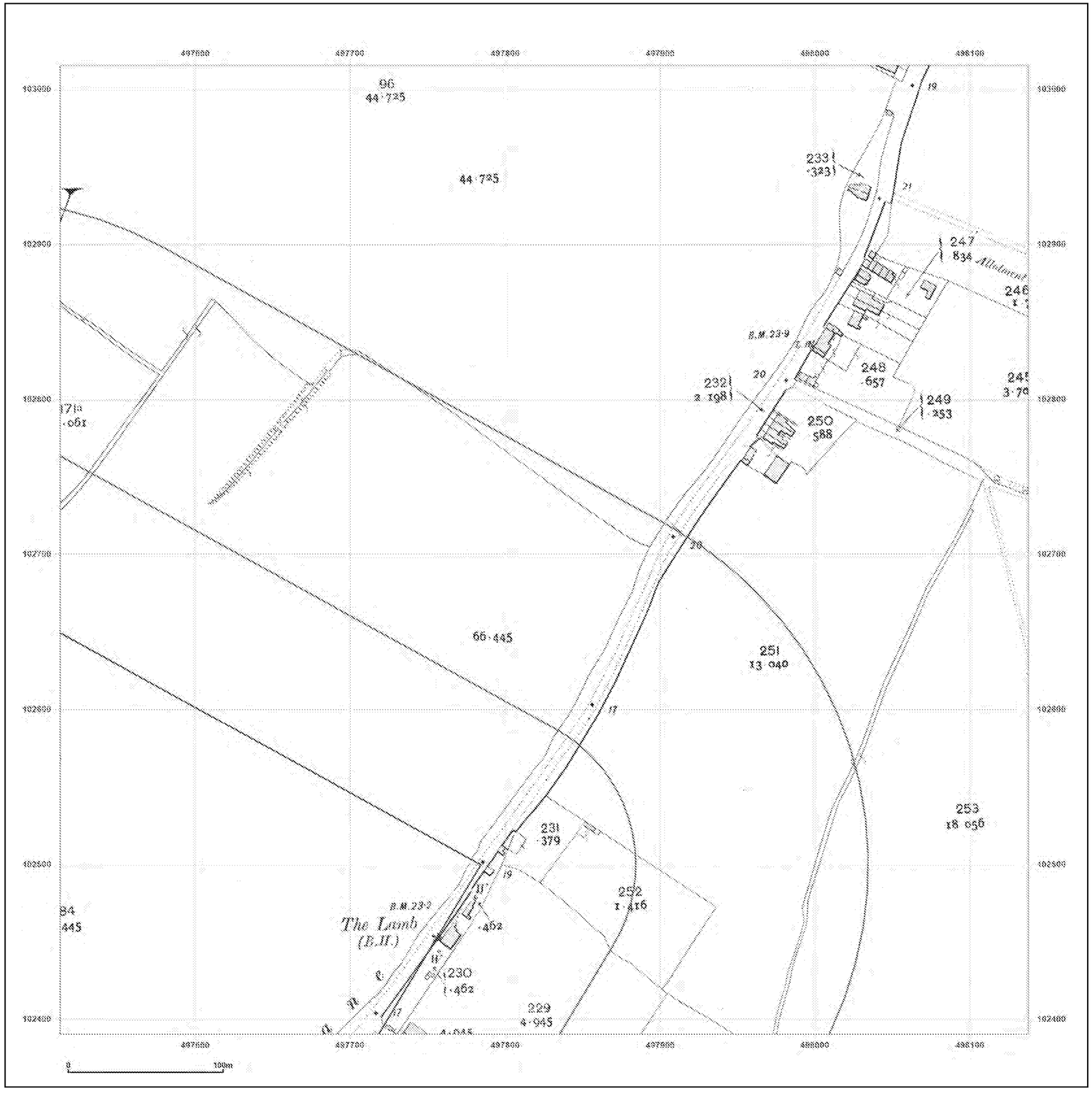
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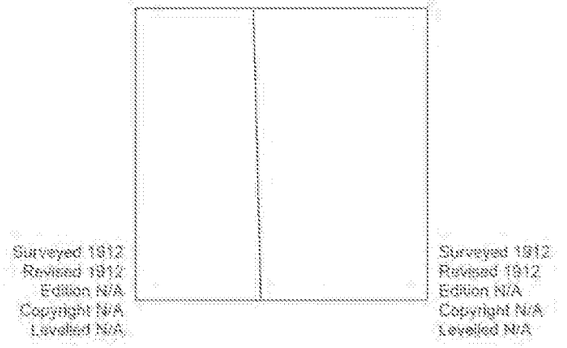
Site Details:

BILSHAM COTTAGE, GREVATTS LANE WEST, YAPTON, BN18 0LA

Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: County Series
Map date: **1912**
Scale: 1:2,500
Printed at: 1:2,500

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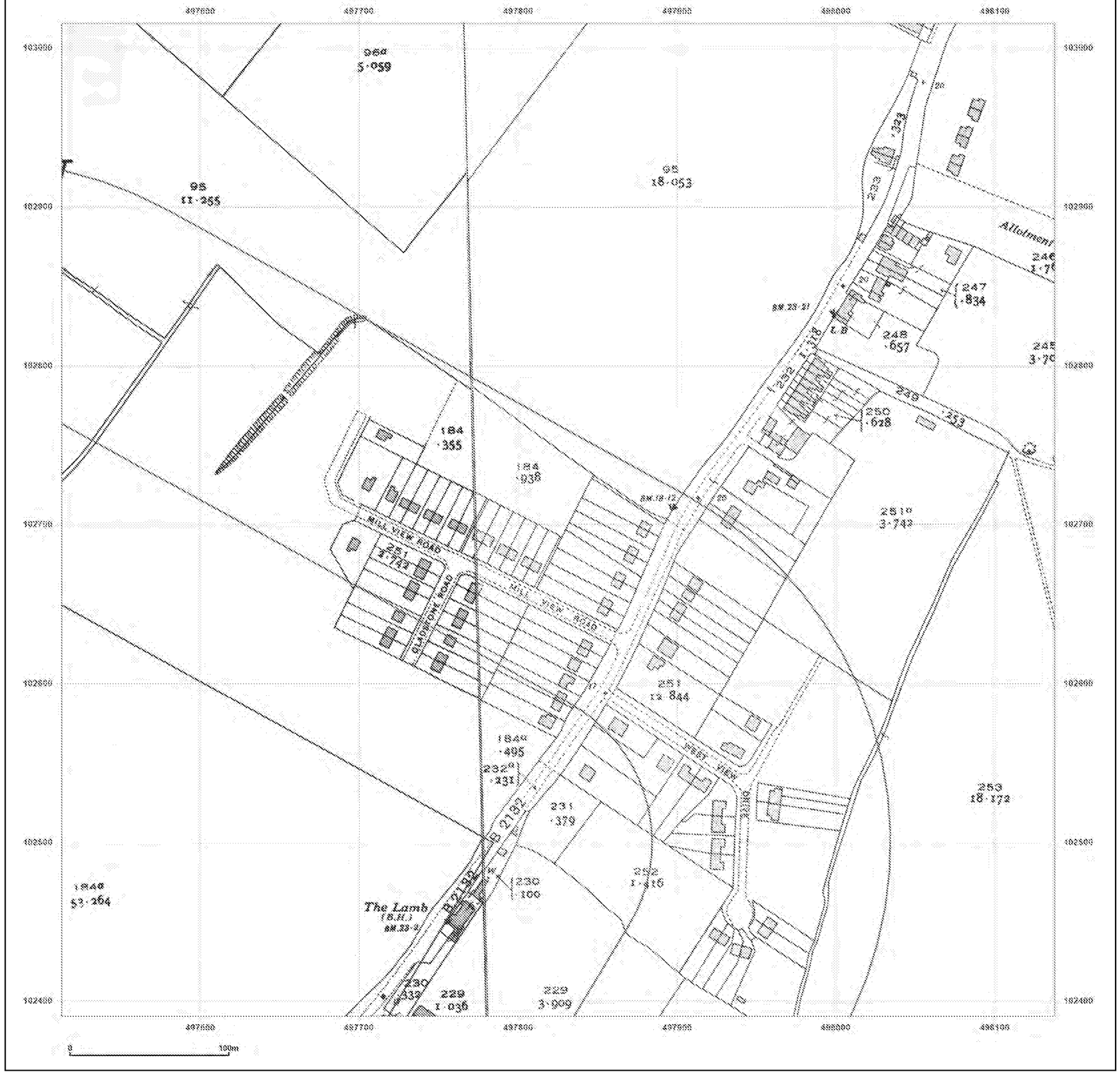
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

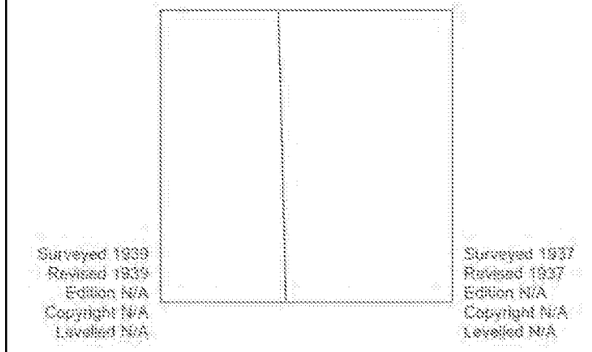
Map Name: County Series

Map date: **1937-1939**

Scale: 1:2,500

Printed at: 1:2,500

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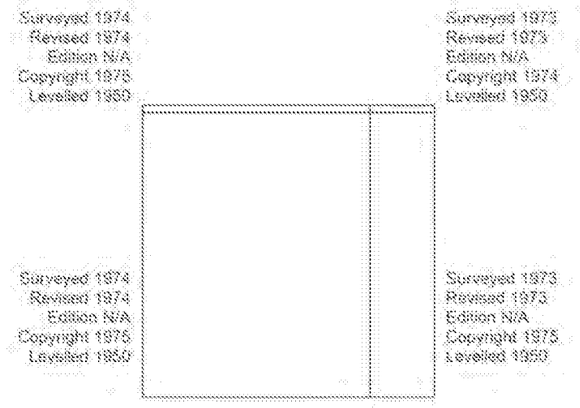
Site Details:

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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: National Grid
Map date: **1973-1974**
Scale: 1:2,500
Printed at: 1:2,500

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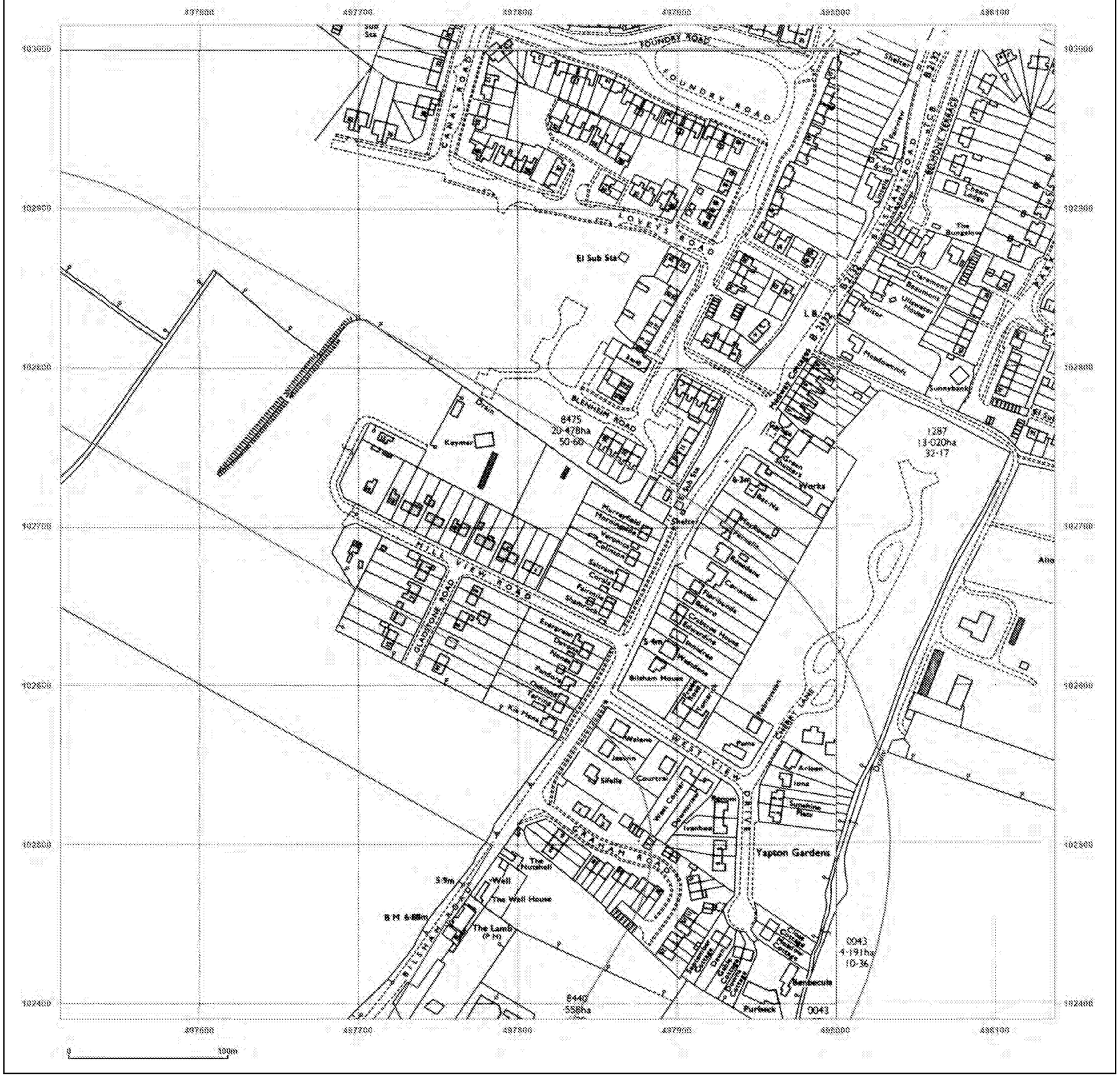
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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: National Grid

Map date: **1975-1978**

Scale: 1:2,500

Printed at: 1:2,500

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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: National Grid
Map date: **1978-1982**
Scale: 1:2,500
Printed at: 1:2,500

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Site Details:

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Client Ref: 13684
Report Ref: CAR1-8016762_LS_2_2
Grid Ref: 497825, 102703

Map Name: National Grid

Map date: **1984-1989**

Scale: 1:2,500

Printed at: 1:2,500

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