

PHASE 1 & 2 SITE INVESTIGATION & REMEDIATION STRATEGY REPORT

23-23A HIGH STREET HORNSEY, LONDON. N8 7QB

Prepared for: **Chapman Development Ltd**

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The **Brownfield** Consultancy

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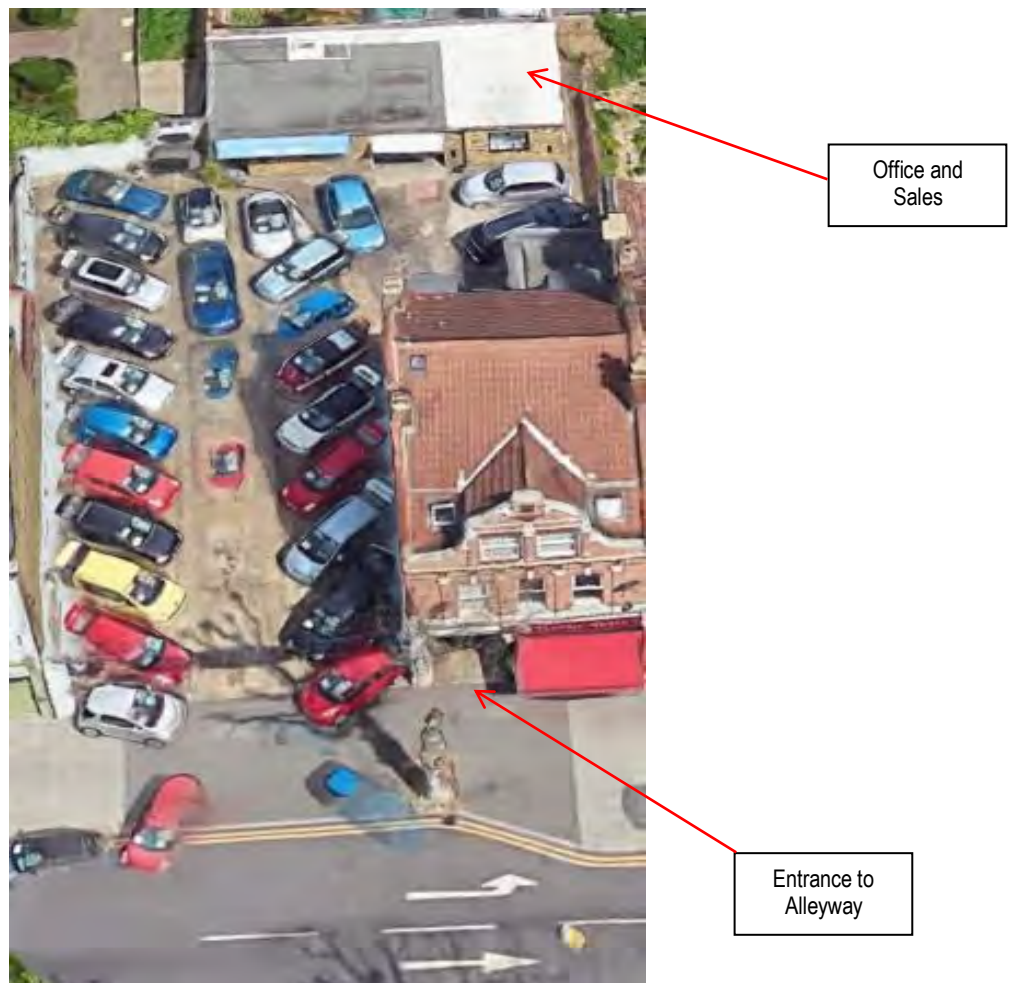
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1 INTRODUCTION

The Brownfield Consultancy was instructed by Chapman Development Ltd to carry out a Contaminated Land and Geotechnical Investigation at the above site.

The site is currently occupied by M B Autos (Car Dealership), comprising concrete surface car parking and a single storey office building at the rear (north) of the site. The site fronts onto High Street (A504) and is situated opposite Greig City Academy, approximately 0.4 miles of both Hornsey Railway Station (to the south east) and Alexandra Park (to the north west).

The site is roughly 'L-shaped', covering an area of 0.06ha. An overhead photograph, oriented north-south is presented below. As well as the main access entry from High Street, there is also an alleyway which leads directly to the rear.



Additional photographs of the site are presented in Appendix H. The current owner of the site has operated the site as Car Sales for just over 40 years.

The Site is bordered on the east and west by rows of two and three storeys in height terraced buildings with ground floor commercial space with residential above. To the north of the Site is a row of three-storey residential properties (Sackville House) and the Sainsbury's Supermarket and associated car parking.

Haringey Planning Service have granted planning permission for:-

Demolition of existing building and construction of a mixed-use scheme at part two and part three storeys in height (with accommodation in the roofspace) providing retail floorspace (Class A1) at ground floor level, together with 7 residential flats (Class C3) and 2 residential houses (Class C3), with associated cycle parking, landscaping and ancillary works. (Planning Ref: HGY/2020/0590).

Condition 16 of the planning permission requires a Contaminated Land Phase 1 and 2 Site Investigation.

The scheme includes private external amenity space in the form of private balconies and courtyards. Shared communal amenity space is also proposed to the rear the building on the ground floor totalling 132 sqm, together with a communal roof terrace totalling 70 sqm.

A proposed layout is presented in Appendix A.

The purpose of the site investigation is to provide an assessment of the likelihood of any soil contamination at the site and the geotechnical properties of the soil. Phase 1 includes a review of geological maps and historical Ordnance Survey maps and inspection and review of environmental data held by the Environment Agency, Local Authority and other statutory bodies. The information which is gathered is then used to construct a conceptual site model which includes an understanding of potential contaminant sources, pathways and receptors.

The investigation and report has been undertaken by a suitably qualified and competent professional in accordance with the following methodologies:-

- Environment Agency : Land Contamination Risk Assessment (LCRM).
- CLR 11 (Model Procedures for the Management of Land Contamination),
- Environment Agency Guidance for the Safe Development of Housing on Land Affected by Contamination (R&D Publication 66-2008)
- BS 10175 (Code of Practice for the Investigation of Potentially Contaminated Sites).
- CIRIA. (2007). C665, Assessing Risks Posed by hazardous ground gases to buildings.
- BS 8485 : 2015+A1:2019: Code of practice for the characterization and remediation from ground gas in affected developments.

This report is subject to limitations which are set out in Appendix H. This report is provided in the context of the stated development proposals and should not be used in a different context.

2 GEOLOGY, HYDROLOGY AND HYDROGEOLOGY

2.1 Geology

Reference to the online BGS Mapping Index indicates that the site is underlain by bedrock of the London Clay described as 'sand, silt and clay'. Superficial deposits are not denoted.

2.2 Hydrology

The nearest controlled water course is an inland river (New River) located 271m northeast of the site. There are no surface water abstractions within 1000m of the site.

2.3 Hydrogeology

The Groundwater Vulnerability map indicates that the London Clay is unproductive. There are 5No. groundwater abstraction boreholes within 1000m of the site all of which abstract water from the chalk. Proximal borehole logs indicate that the chalk is 50m+ below the site and is protected from pollution impacts by extensive thicknesses of 'clay' (London Clay and Lambeth Beds).

Thus, controlled waters are not considered at risk of impact from soil contamination at the site.

3 SITE HISTORY

The history of the site and the surrounding area has been determined from historical map extracts which are included in Appendix B. Large scale (e.g 1:2500) historical maps and aerial photographs dating between 1885 and present day were reviewed. The site outline shown on the maps is georeferenced to the current grid system; due to inaccuracies in mapping techniques the actual boundary on older maps may vary. Smaller scale (e.g. 1:10,000) maps were reviewed but did not provide further relevant historical information. Given the size of the larger scale maps, smaller scale maps are not appended to the report but are available separately. The historical land uses on site and in close proximity to the site are summarised as follows:-

The earliest historical map of 1850 denotes the site as part of a much larger area of unoccupied land. High Street is denoted to the immediate south. By 1894 structures are denoted at the front (south) of the site and at the rear. Eagle Works (Brass and Art Metal) is denoted 60m northeast of the site. In all other compass directions, the site is surrounded by residential houses. By 1935 Eagle Works has been replaced by a Refrigerator Works.

By 1955 the structures at the front of the site are no longer denoted. Small rectangular structures are denoted on the northern and north-eastern boundaries. The current owner of the site stated that these were 'lock-up' garages which were subsequently demolished. A Sheet Metal Works is denoted 120m northwest of the site and two Garages are denoted 95m and 110m northeast of the site. The 1979 map denotes a single square structure on the central western boundary, possibly another Lock Up Garage.

The 1999 aerial photograph shows a number of cars parked on the site and the offices at the rear of the site.

Scrutiny of Google Earth Imagery dating from 2002 to present day shows no further significant changes.

4 INFORMATION HELD BY STATUTORY AUTHORITIES

This section details any relevant information held in the registers maintained by statutory bodies as identified in the Envirocheck Report (Appendix C).

4.1 Waste Management Facilities and Potentially Infilled Land

The Envirocheck Report identifies no active or historic landfill sites within 1000m of the site. There are no active waste management facilities within 500m of the site. There are no infilled land or water entries within 250m of the site.

4.2 Pollution Control Permits

There are 13No. entries within 1000m of the site. The nearest is located 59m west and is a Dry Cleaners. The remaining 12 entries are located >500m from the site.

4.3 Contemporary Trade Directories

There are 312No. active and inactive directories within 1000m of the site. The nearest active entry is located 39m southwest of the site, described as 'Garage Services'.

4.4 Pollution Incidents

Records held by the Environment Agency identify four pollution incidents within 500m of the site. The nearest occurred in 1990, 58m east of the site and described as 'Oils-unknown'.

4.5 Discharge Consents

The Envirocheck Report identifies no active discharge consents within 150m of the site.

4.6 Fuel Sites

The nearest 'obsolete' entry is located 438m southeast of the site. The nearest active entry is located 614m southeast of the site.

4.7 Radon

The Envirocheck Report states that radon protection measures are not required.

5 UK CONTAMINATED LAND LEGISLATIVE FRAMEWORK

Part IIA of the Environmental Protection Act, 1990, enacted by Section 57 of the Environment Act 1995 and the associated Contaminated Land (England) Regulations 2000 (SI 2000/227) was introduced on 1 April 2000.

Part IIA provides a statutory definition of contaminated land:

"any land which appears to the Local Authority in whose area it is situated to be in such a condition by reason of substances in, on or under the land, that significant harm is being caused, or that there is a significant possibility of significant harm being caused, or that pollution of controlled waters is being or is likely to be caused".

Controlled waters are considered to be all groundwaters, inland surface waters and estuarine and coastal waters.

To determine whether land falls under the Part IIA definition of contaminated land the site should be evaluated in the context of a risk based framework. The assessment of contaminated land is typically a two-phase process which is initially based on a qualitative assessment of the likelihood of complete pollution linkages, with a quantitative element which seeks to determine the degree and the significance of the harm. Land is only defined as 'Contaminated Land' if a "significant pollutant linkage" is present.

A pollutant linkage must comprise of the following:-

Source - a contaminant or substance which is located in, on or under the land and has potential to cause harm to human health, water resources or the wider environment.

Pathway - the means or route by which a source can migrate;

Receptor - something which could come to harm, including human health, water resources, surface water courses or the wider environment.

The responsible authority then needs to consider whether the identified pollution linkage:

- is resulting in significant harm being caused to the receptor in the pollutant linkage;
- presents a significant possibility of significant harm being caused to that receptor;
- is resulting in the pollution of controlled waters, which constitute the receptor; or is likely to result in such pollution.

If a pollutant linkage is demonstrated, then Part IIA legislation provides powers for remedial action to be enforced by the Local Authority in whose area the contaminated land is situated.

6 CONCEPTUAL MODEL

6.1 General

This section provides a conceptual model and qualitative assessment of the potential risks posed to human health and environmental receptors from potential on-site and off-site sources of contamination. The assessment is presented as a 'source-pathway-receptor'.

The conceptual model has been developed assuming that the site will be redeveloped for a residential end use with green amenity.

6.2 Potential Sources of Contamination

Potential On-site Sources of Contamination

- The site has been occupied by Car Sales for at least 40 years and prior to that, lock-up Garages were located on the northern and north-eastern boundaries. This is a source of hydrocarbons and detergents.
- Structures were present in the north and south of the site, prior to the 'lock-up' garages being constructed. The garages were subsequently removed. Demolition Fill is a source of hydrocarbons, metals, asbestos and ground gas.

Potential Off-Site Sources of Contamination

- There are no potential off-site sources of contamination. The historical maps identified two Garages, denoted 95m and 110m northeast of the site. However, the underlying mantle of clay soil will have prevented any lateral migration of pollution from these potential sources.

6.3 Receptors

The site is to be redeveloped for residential apartments with a small area of communal landscaping. The site overlies an 'unproductive' aquifer and the nearest controlled surface water is located 271m distant. Thus controlled waters are not considered further.

The receptors considered to be potentially at risk from contamination are as follows:-

Human Health

- Construction workers during the redevelopment phase.
- Residential end users.

6.4 Pathways

Potential contaminant migration pathways considered relevant to the site are:-

Human Health

- Ingestion of contaminated soils and dust particles.
- Direct physical contact with near surface soils and contaminated dust particles.
- Inhalation of wind blown contaminated dust.
- Inhalation of vapours and gases, migrating vertically into the atmosphere.
- Inhalation of vapours and gases, migrating vertically into buildings and confined spaces.

Infrastructure

- Water supply pipework.

6.5 Pollutant Linkages

The following table summarises the significant pollutant linkages potentially active at the site:-

Potential Source-Pathway-Receptor Linkages for Human Health Risk Assessment

Source	Pathway	Receptor
Contaminated soils	Ingestion of soil	On site female child: 0 - 6 yrs old
		On site construction worker
	Ingestion of household dust	On site female child: 0 - 6 yrs old
	Dermal contact	On site female child: 0 - 6 yrs old
		On site construction worker
	Dermal contact with household dust	On site female child: 0 - 6 yrs old
	Inhalation of fugitive soil dust	On site construction worker
		On site female child: 0 - 6 yrs old
	Inhalation of fugitive household dust	On site female child: 0 - 6 yrs old
	Inhalation of vapours in outdoor air	On site female child: 0 - 6 yrs old
		On site construction worker
	Inhalation of vapours in indoor air	On site female child: 0 - 6 yrs old
	Contact with contaminated soils	Water supply pipework
Source	Pathway	Receptor
Ground Gas and hydrocarbon vapours	Vertical and Lateral Migration	End Users
		Residential Housing
		Services and Infrastructure

Based on the sites former and current use, the overall risk from land contamination at the site is considered to be 'Moderate'. The actual risks will be confirmed by ground investigation and assessment.

7 FIELDWORK

The intrusive fieldwork was carried out on 20th December 2022 and comprised 5No. dynamic windowless sampler boreholes (WS1-WS5), 4No. hand dug pits (HP1-HP4) and one cable percussion borehole.

The site work was supervised by J. Twaddle of The Brownfield Consultancy, with the ground investigation procedures and sample descriptions based on BS 5930 (2020) 'Code of Practice for Site Investigations' and BS 10175 2011+A2:2017 "Investigation of potentially contaminated sites - code of practice". The locations of the exploratory holes are shown on the drawing included in Appendix A. The exploratory hole records are presented in Appendix D. The full details of the fieldwork undertaken are summarised in the following sections.

7.1 Dynamic Sampler Boreholes

The boreholes were advanced to depths of 3.45m to 5.45m using the dynamic windowless sampling technique. The drilling technique utilises a lightweight tracked rig to advance the borehole in 1m lengths using 1m long steel sampler tubes containing plastic liners, into which the substrata deposits are driven, at diameters of 100mm reducing to 70mm. The soils are then recovered from each sampler tube as continuous core samples, which are then logged and sub-sampled on site. Standard Penetration Tests (SPTs) were undertaken in accordance with BS EN ISO 22476-3:2005+A1:2011.

Standpipes were installed in WS3 and WS5 to facilitate groundwater level and land-borne gas monitoring. The response zones were from 1.00m down to 4.00m.

7.2 Cable Percussion Boreholes

The cable percussion borehole, BH1 was advanced to a depth of 24.45m using light cable tool percussion boring techniques. Small disturbed tub samples (D), representative of the strata encountered, were obtained as appropriate and Standard Penetration Tests (SPTs) were undertaken in BH1 at 1.5m intervals. The SPTs were carried out in accordance with BS EN ISO 22476-3:2005+A1:2011.

7.3 Hand Dug Pits

The pits were excavated using hand tools to expose the foundations supporting the external walls to allow measurement and determine the composition of the bearing soil/rock. Drawings are presented in Appendix D.

8 LABORATORY TESTING

8.1 Environmental

A programme of chemical laboratory testing was scheduled on 14No. soil samples taken from near surface soils recovered from the exploratory holes. The samples were placed into suitable containers for the required chemical analysis. Where hydrocarbon contamination was suspected, soil samples would be scheduled for TPHCWG including BTEX and MTBE. Otherwise, samples would be scheduled for a reduced hydrocarbon suite (TPH Total or TPH Texas Banded).

All samples were transported to I2 in Watford which is accredited under UKAS and MCerts. The following table summarises the contaminants scheduled:-

Summary of Soil Chemical Laboratory Testing Suites

Determinant	No.
Metals and semi-metals (arsenic, cadmium, chromium, copper, lead, mercury, nickel, selenium and zinc)	11
Speciated polycyclic aromatic hydrocarbons (PAH)	8
Asbestos	8
TPH C10-C40	6
Waste Acceptance Criteria	1
TPHCWG and BTEX	2

The results are presented in Appendix F.

8.2 Geotechnical and Geochemical

A programme of laboratory testing was scheduled to determine the geotechnical properties of selected soil samples obtained from the investigation. The details of the geotechnical testing are summarised in the following table:-

Summary of Geotechnical and Geochemical Laboratory Testing Suites

Water soluble sulphate and pH: BRE Suite B	7
Atterberg Limits with moisture content determination	7
Undrained Unconsolidated Single Stage Triaxial Compression	5

The tests were carried out in accordance with BS1377 (1990) "Methods of test for Soils for Civil Engineering purposes" and Building Research Establishment Special Digest 1 "Concrete in Aggressive Ground". The results of the geotechnical and geochemical testing are presented in Appendix E.

9 GROUND AND GROUNDWATER CONDITIONS

9.1 Strata Encountered

As indicated on the BGS mapping, the site is underlain by deposits of London Clay. Made Ground and Superficial Deposits were also encountered.

9.2 Made Ground

Made Ground was encountered at all locations and, where proven, to depths of 1.00 – 2.00m.

All holes encountered a surfacing of concrete ranging from 0.05-0.20m in thickness. Underlying concrete, Made Ground comprised of GRAVEL (WS1 and WS2) or SAND (BH1). Gravel comprised flint, brick, burnt brick, clinker and slag. Ash was also observed in WS1 and WS2. In the remaining holes, the Made Ground was CLAY with varying quantities of sand and gravel of flint, brick, burnt brick, clinker and slag. The thickness of this deposit was 0.40 – 0.65m.

In the majority of holes, this upper unit of Made Ground was underlain by reworked clay with occasional gravel of red brick.

9.3 Superficial Deposits

Underlying Made Ground, superficial deposits were encountered in all exploratory holes with the exception of BH1. Materials comprised soft and firm CLAY with variable quantities of silt, sand and flint gravel. Thin units of flint GRAVEL were encountered at the base of the deposit in WS3 (1.70-1.75m), WS4 (2.80-2.85m) and WS5 (3.50-3.70m).

9.4 London Clay

The London Clay consisted of the typical profile of an upper weathered bed of soft becoming firm, becoming stiff, fissured, brown silty clay with patches of fine sand, over un-weathered, stiff, fissured grey silty clay at a depth of 7.10m. The clay became very stiff in BH1 at a depth of 21.00m.

Atterberg Limit testing on six samples of the London Clay indicated it to be a clay of high or very high plasticity (BS1377), and medium or high volume-change potential with respect to the NHBC Standards Chapter 4.2 classification.

9.5 Groundwater

Groundwater was not encountered during the investigation fieldwork.

During three return monitoring visits, the water level in WS3 ranged from 0.76 to 0.82m below ground level. In WS5 the readings ranged from 1.92m to 2.80m below ground level. Groundwater was not encountered during the investigation and thus we do not consider that the water in WS3 and WS5 represents a laterally continuous water table below the site; rather,

the boreholes are simply acting as 'sumps' for perched waters and seepages in Made Ground and/or Superficial Deposits.

9.6 Contamination

Visual and olfactory evidence of hydrocarbon contamination was recorded at the following locations:-

- HP1 (0.50-1.40m) described as '*Soft bluish grey silty CLAY with rare gravel of charcoal and brick. Slight hydrocarbon odour*'. (MADE GROUND)
- WS4 (1.60-2.00m) described as '*Firm dark grey and brown mottled black fissured silty CLAY. Moderately strong odour of hydrocarbons*'. (Probably MADE GROUND)

Clinker, ash, burnt brick and slag was encountered in shallow Made Ground in the majority of holes.

10 HUMAN HEALTH QUANTITATIVE RISK ASSESSMENT

Quantitative risk assessment is formally required to determine whether there is a 'significant possibility of significant harm being caused'. Part IIA of the Environmental Protection Act 1990 recommends that 'authoritative and scientifically based guideline values for concentrations of the potential pollutants in or under the land' be used to quantify the risk posed by contamination.

Under the Planning Regime a quantitative risk assessment can be used to decide whether the site is suitable for the proposed use. In addition, the National Planning Policy Framework (March 2012) also indicates that after remediation as a minimum land should not be capable of being determined as contaminated land under Part IIA.

10.1 Current UK Screening Values

The UK technical guidance for assessing risks to human health is issued from various UK bodies including the Environment Agency (EA), DEFRA, Contaminated Land: Applications in Real Environment (CL:AIRE), Chartered Institute of Environmental Health (CIEH) and Land Quality Management (LQM) Ltd (part of the University of Nottingham).

New and updated screening values in the form of provisional Category four Screening Levels (C4SL) (published in 2014) and Suitable for Use Levels (S4UL) (published 2015) have been produced by DEFRA and CIEH / LQM respectively using modified versions of the EA's Contaminated Land Exposure Assessment (CLEA) software.

10.2 C4SL

Provisional C4SL have been derived by CL:AIRE following guidance and as a tool to assist in applying the Part IIA Category 1- 4 classifications to a site. The purpose of the C4SL is to provide a simple test for deciding that land is suitable for use and 'definitely not' contaminated land under Part IIA. They describe a level of risk that is above minimal but is still low.

Six contaminants have been assigned provisional C4SL: arsenic; benzene; benzo[a]pyrene; cadmium; chromium VI and lead for the standard land uses (residential with and without plant uptake, allotments, commercial and public open space (parks and residential)).

The C4SL are also considered suitable to be used under the planning regime.

10.3 S4UL

The LQM / CIEH S4UL represent generic assessment criteria based on minimal or tolerable risk that are intended to be protective of human health. They represent values above which further assessment of the risks or remedial actions may be needed.

S4UL have been derived for a comprehensive list of organic and inorganic determinants.

11 SOIL CHEMISTRY

11.1 Results

We have compared the results of chemical testing of Made Ground and Natural Ground with the S4UL and C4SL for a 'residential housing without plant uptake' end use. These comparisons are summarised in the following table. Exceedances of the guideline values are highlighted in bold:-

Comparison of Soil Chemical Test Results with Guideline Values

Determinant	Maximum Measured Concentration (mg/kg)	LQM/CIEH S4UL Residential without Plant Uptake (mg/kg)	No. of tests carried out	No. of exceedances
Arsenic	45	40	8	1 exceedance
Cadmium	2.1	85	8	0
Chromium (total)	46	910	8	0
Mercury	2.1	1.2	8	4 exceedances
Lead	4600	330	8	7 exceedances
Nickel	76	180	8	0
Selenium	<dl	430	8	0
Copper	270	7100	8	0
Zinc	1200	40000	8	0
Naphthalene	0.36	2.3	8	0
Acenaphthylene	0.98	2900	8	0
Acenaphthene	0.38	3000	8	0
Fluorene	0.7	2800	8	0
Phenanthrene	12	1300	8	0
Anthracene	2.4	31000	8	0
Fluoranthene	29	1500	8	0
Pyrene	24	3700	8	0
Benzo(a)anthracene	16	11	8	1 exceedance
Chrysene	12	30	8	0
Benzo(b)fluoranthene	19	3.9	8	2 exceedances
Benzo(k)fluoranthene	5.8	110	8	0
Benzo(a)pyrene	14	3.2	8	1 exceedance
Indeno(1,2,3-c,d)pyrene	5.9	45	8	0
Dibenzo(a,h)anthracene	1.6	0.31	8	1 exceedance
Benzo(g,h,i)perylene	6.4	360	8	0

11.1 Metals

Exceedances of the guideline values for **lead** were recorded in WS1 (0.25m), WS1 (0.55m), BH1 (0.50m), WS2 (0.30m), WS3 (0.20m), WS4 (0.20m) and WS5 (0.40m). Concentrations ranged from 540mg/kg to 4600mg/kg.

Exceedances of the guideline values for **mercury** were recorded in WS1 (0.25m), WS1 (0.55m), WS3 (0.20m) and WS5 (0.40m).

One marginal exceedance of the guideline value for **arsenic** was recorded in WS1 (0.25m) recording 45mg/kg.

All metal exceedances were recorded in the shallow layer of Made Ground directly underlying concrete hardstanding. The source of the metals is attributed to ash, clinker, slag and burnt brick.

11.2 Polycyclic Aromatic Hydrocarbons

Exceedances of individual PAH compounds were recorded in WS1 (0.25m) and WS3 (0.20m). The highest concentrations were recorded in WS1 (0.25m). Once again, the source of these elevated concentrations are attributed to ash, clinker, slag and burnt brick.

11.3 Total Petroleum Hydrocarbons

Referring to Section 9.6, visual and olfactory evidence of hydrocarbons were recorded in HP1 (0.50-1.40m) (slight hydrocarbon odour) and WS4 (1.60-2.00m) (moderately strong odour of hydrocarbons). Samples from both locations were submitted to TPHCWG and BTEX.

Concentrations in HP1 (0.55m) were recorded at less than the laboratory limit of detection whilst a maximum concentration of 178mg/kg Total TPH was recorded in WS4. A further six samples of near surface soil were submitted to 'TPH Total' and concentrations ranged from 'less than detection' to 310mg/kg. These concentrations are not considered to present a risk to the health of construction workers or residential end users.

WS2 was located below the former 'Lock-up' Garage Block in the north-east of the site and visual and olfactory evidence of hydrocarbons was not recorded.

11.4 Asbestos

8No. samples of Made Ground were submitted to an asbestos screen and asbestos was not recorded.

12 GAS PROTECTION REQUIREMENTS

12.1 Ground Gas

The Desk Top Study identified a 'very low' risk of land-borne gas at the site. The Envirocheck Report identifies no landfill sites, licensed waste management facilities or infilled land / water entries within 250m of the site. Sources of ground gas are demolition fill.

The current guidance on protecting buildings from ground gas hazards is contained in the document CIRIA C665 with updated risk assessment guidance contained within BS8485

(2015). It is proposed to construct a 6-storey apartment block in the centre of the site and a number of town houses and maisonettes in the northeast and northwest of the site.

On development sites where negligible sources of potential ground gas are present, the guidance does not stipulate a specific number of required gas monitoring visits. The Brownfield Consultancy adopt an iterative process based upon the ground conditions observed during the intrusive investigation and the recorded levels of ground gas after each visit. At this site we envisaged that a minimum of three visits would be required.

The level of gas protection is determined by comparing the following parameters to cut-off values prescribed within BS8485 (2015):

- “Typical Maximum Concentrations” for initial screening purposes.
- Risk based “Gas Screening Values” (GSV) for consideration where the typical maximum concentrations are exceeded.

The GSV is calculated using the following equation and the resulting GSV are compared to the Site Characteristic GSV given in Table 2 of BS8485 (2015).

Maximum gas concentration (%) x worst case borehole flow rate (l/h)

Gas monitoring was undertaken from WS3 and WS5 on 3No. occasions between 4th and 17th January 2023. Methane was not recorded during any of the visits. A maximum concentration of carbon dioxide of 1.6% and a maximum flow rate of 0.1l/h was recorded. A GSV of 0.0016l/h is calculated. Referring to Table 2 of BS8485 (2015), the site can be categorised as a Characteristic Situation 1 (CS1). Gas protection measures are not required. Further gas monitoring visits are not considered necessary.

The results of gas monitoring are presented in Appendix G.

13 GEOTECHNICAL ENGINEERING ASSESSMENT

13.1 Proposed Redevelopment

It is proposed to construct a mixed-use scheme at part two and part three storeys in height (with accommodation in the roofspace). A proposed layout is presented in Appendix A.

13.2 Summary of Ground Conditions

The exploratory holes have revealed a variable thickness of Made Ground (1.00-2.00m) overlying superficial deposits comprising soft and firm CLAY with variable quantities of silt, sand and flint gravel. Thin units of flint gravel were encountered at the base of the deposit in WS3 (1.70-1.75m), WS4 (2.80-2.85m) and WS5 (3.50-3.70m).

The London Clay was soft to depths of approximately 2.50m, becoming firm and stiff, fissured, brown silty clay, over unweathered, stiff, fissured, grey, silty clay at depths of 7.10m. The clay became very stiff at a depth of 21.00m.

Groundwater was not encountered during the investigation fieldwork.

13.3 Foundations

At the time of writing, foundation loads had not been provided. Conventional strip/trench fill foundations would need to be constructed at a depth of 2.50m in order to encounter 'firm' clay which may prove uneconomic, given the volumes of concrete, the concrete mix specification and the generated waste arisings. It will also be necessary to undertake a survey of existing trees to establish whether it will be required to deepen the foundations further, to avoid variations in the soil volume arising from tree root action. An allowable bearing pressure of 100kPa could be adopted at 2.50m below ground level. We would recommend that the base of the trenches are inspected by a Geotechnical Engineer to ensure that 'firm' clay is encountered.

For piled foundations, most types would be suitable in these ground conditions but for driven systems, an assessment will be necessary to determine both the noise impact and possible effects on adjacent structures through their percussive instalment methods. It is likely that bored piles, and particularly CFA piling methods, would be the optimum piling solution in this site setting. However, specialist piling contractors should be consulted as to the suitability and efficiency of their particular systems in these ground and site conditions.

Where piles are within the zone of influence of trees, they will require a slip membrane ('sleeving') through the potential desiccation zone of the soils to prevent the possible generation of excessive tensile forces through soil heave arising from rehydration of the soil following the death or felling of any trees.

13.4 Floor Slabs

In view of the depth of Made Ground and the underlying high VCP clay, fully suspended ground floor slabs are recommended.

13.5 Chemical Considerations for Buried Concrete

Sulphate concentration measured in 2:1 water/soil extracts fell into Class **DS-4** of the BRE Special Digest 1 2005, 'Concrete in Aggressive Ground'. Table C2 of the Digest indicated ACEC (Aggressive Chemical Environment for Concrete) site classifications of **AC-3s**. The classification given was determined using the 'static' groundwater case. The laboratory results are presented in Appendix E.

Concrete to be placed in contact with soil must be designed in accordance with the recommendations of Building Research Establishment Special Digest 1 2005, 'Concrete in Aggressive Ground' taking into account any possible exposure of potentially pyrite bearing natural ground and the pH of the soils.

13.6 Pavement Design

For the Made Ground in its existing state, it will be necessary to assume a CBR of 1% for pavement design, along with a recommendation for proof-rolling to highlight any excessively compressible zones. If the Superficial Deposits or London Clay will be at formation level, then a CBR of 2.0% is recommended.

14 CONCLUSIONS AND RECOMMENDATIONS

14.1 Contaminated Land and Remediation Recommendations

The Desk Top Study and subsequent contamination investigations have revealed the following:-

1. Underlying concrete, there is a 0.40 – 0.65m thick deposit of Made Ground which contains clinker, slag, burnt brick and ash. Chemically, the deposit contains elevated concentrations of mercury, lead and to a lesser extent arsenic. It would not be acceptable to leave this material below private gardens and soft (grassed) landscaping. Thus, we recommend that this material is removed in its entirety below private garden areas to a maximum depth of 0.60m and replaced with 0.60m of imported clean soil, underlain by a marker geotextile. For areas of communal soft landscaping, 0.45m of removal and replacement is acceptable.

Imported clean soil should be chemically validated as '*uncontaminated*' and conform to the acceptable guideline values in the table on Page 11 of this report. The soil should also be screened for asbestos. Source sampling prior to transit to the site should be undertaken. In-situ validation of the imported soil will be undertaken by the Brownfield Consultancy, comprising a series of hand dug pits to confirm the thickness of soils, with a photographic record with a measuring staff. Laboratory analysis of the placed soils should also be undertaken.

2. Waste Acceptance Criteria testing (Appendix F) of the 0.40 – 0.65m thick deposit of contaminated Made Ground indicates that the material will be classified as 'Stable non-reactive Hazardous Waste'. Waste hauliers should be furnished with this report and early consultation with them is recommended so that they can verify this classification. The contaminated material can be 're-used' under hardstanding provided it is considered geotechnically suitable. The reader is referred to Section 13.6.
3. We would recommend that water supply pipework protective of attack by hydrocarbons (Protectaline) is adopted for this development.
4. Gas and radon protection measures are not required for this development.
5. There may be areas of contamination not identified during the course of the investigation. Such occurrences may also be discovered during the demolition and construction phases for the redevelopment of the site. In the event of any discovery of potentially contaminated soils or materials, this discovery should be quarantined and reported to the most senior member of site staff or the designated responsible person at the site for action. The location, type and quantity must be recorded and the Local Authority, and a competent and appropriate third party Engineer/Environmental consultant notified immediately. An approval from the Local authority must be sought prior to implementing any proposed mitigation action.

14.2 Verification

A Verification Report will be produced on completion of the works for submission to the Local Authority to confirm that the site has been remediated in accordance with the recommendations detailed above. This will need to include the following:-

- Waste disposal details and records.
- A record of the Watching Brief.
- Laboratory results and photographic evidence of the recommended thickness of imported soil.
- Evidence that barrier pipe has been adopted for water supply.

We would recommend that this report is forwarded to the Local Environmental Health Department for their approval.

Prepared and approved by



JIM TWADDLE BSc (Hons) CGeol FGS
Director

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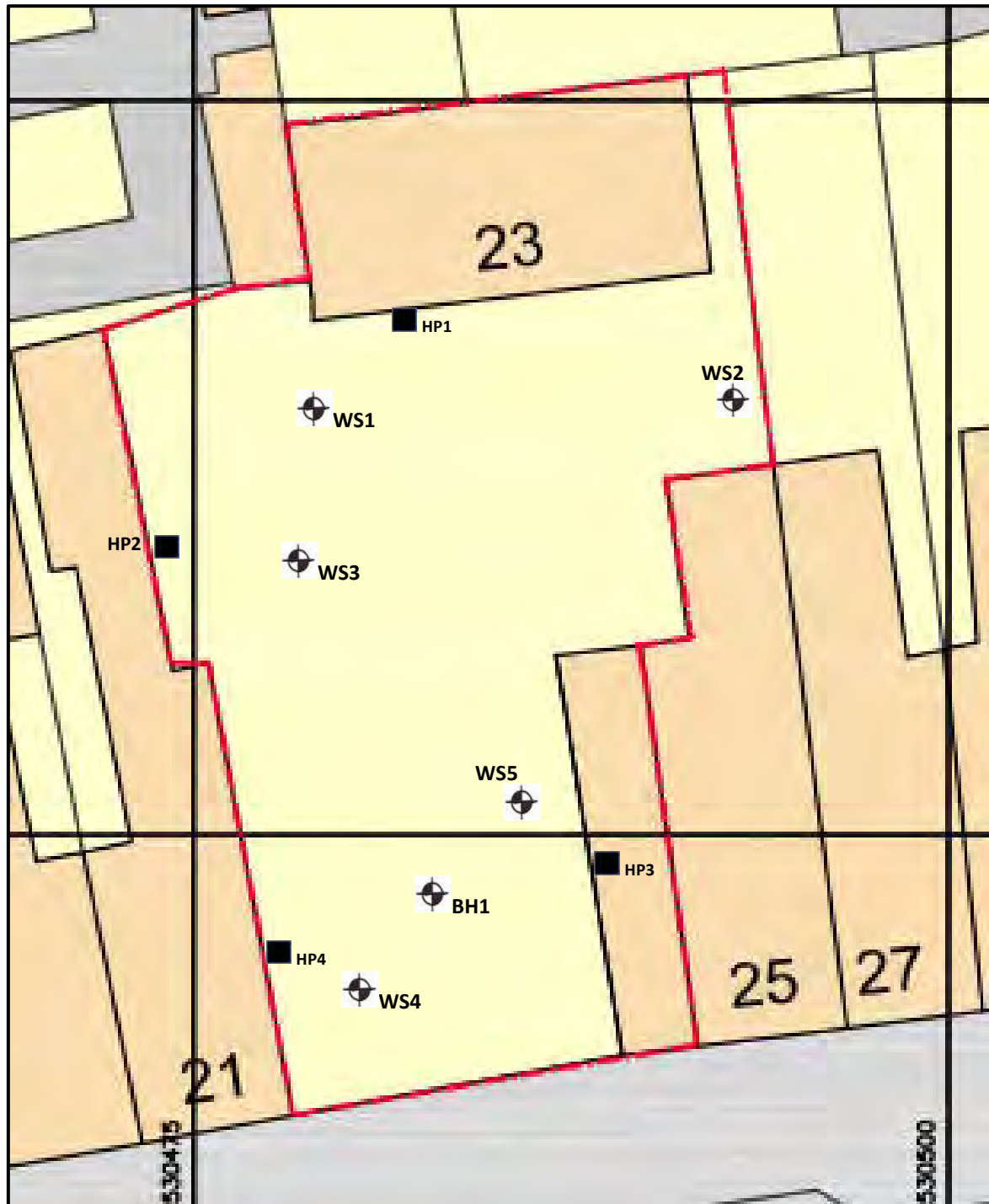
APPENDIX A

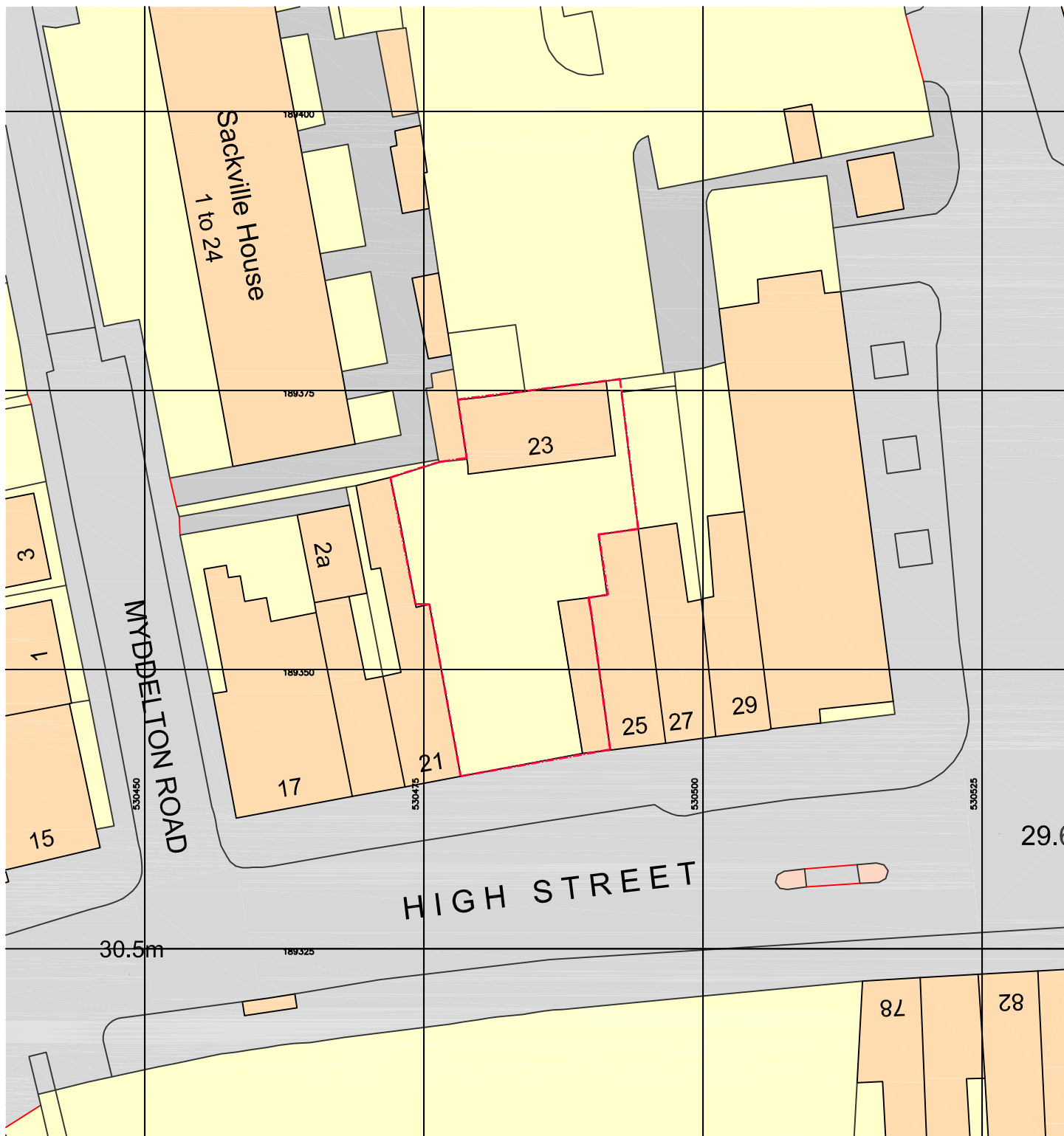
Exploratory Hole Location Plan

Site Proposals

NO.23 HIGH STREET, HORNSEY

EXPLORATORY HIOLE LOCATION PLAN





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CLIENT:
Mr M.Bedevinos
23 & 23A High street, Hornsey,
London, N8 7QB

PROJECT:
Site Redevelopment

ISSUE STATUS:
CLIENT INFORMATION

TITLE:
Site Plan

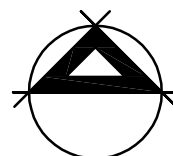
SCALE: 1:1250@A4
DATE: Feb '18

PROJECT No:
1718

DRAWN BY: DRW
CHECKED: AC

DWG No:
P 103

REV:
A



- 172a HIGH STREET - STEVENAGE -
- HERTFORDSHIRE - SG1 3LL -
- m: 07902 960 581 - t: 01438 234711 -
- e: drw@356architects.co.uk -

- PROPOSED REDEVELOPMENT - 23 & 23A HIGH STREET - HORNSEY -

SCHEDULE OF AREAS
Ground Floor Site Area 528m²
First, Second & Third Floor Site Area 493m² per Floor

BLOCK A
Front of Site 23 High Street
Ground Floor GEA 150m²
Ground Floor GIA 140m²
Retail units 95m²
Circulation 25m²
Bin Store 11.4m²

First Floor GEA 139m²
First Floor GIA 124m²
Studio Flat 41m²
2 Bed Flat 63.5m² (Balcony 6m²)
Circulation 15m²

Second Floor GEA 139m²
Second Floor GIA 124m²
Studio Flat 41m²
2 Bed Flat 63.5m² (Balcony 6m²)
Circulation 14m²

Third Floor GEA 92m²
Third Floor GIA 70m²
2 Bed Flat 83m² (Balcony 15m²)
Circulation 8.5m²

BLOCK B
Middle of Site 23 High Street
Ground Floor GEA 74m²
Ground Floor 2 bed Flat 63m² (Garden 18m²)
First Floor GEA 74m²
First Floor 2 Bed Flat 63m² (Balcony 6m²)
Roof Terrace GEA 75m²
Roof Terrace GIA 48m²

BLOCK C
Back of Site 23A High Street
Ground Floor GEA 93m²
Ground Floor House 1 - 38m² + (Garden 9m²)
Ground Floor House 2 - 38m² + (Garden 9m²)
First Floor GEA 97m²
First Floor House 1 - 40m² + (Balcony 5m²)
First Floor House 2 - 40m² + (Balcony 5m²)

COURTYARD
Courtyard common area 123m²

F 19.09.20 drw	Fire strategy information added and Bin
E 06.07.20 drw	Store door width increased.
D 02.06.20 drw	Block B windows enlarged
C 21.5.20 drw	Revised Planning
B 20.12.19 drw	Draft revision
A 20.12.19 drw	Planning Application
	Planning Application



- 172a HIGH STREET - STEVENAGE - HERTFORDSHIRE - SG1 3LL -
- m: 07902 960 581 - t: 01438 234711 - e: drw@356architects.co.uk -

CLIENT:

Mr. M Bedevinos

PROJECT:
Proposed redevelopment
23 & 23a High Street, Hornsey

TITLE:
Proposed Ground Floor / Site Plan

SCALE:	DATE:	DRAWN BY:	CHECKED:
1:100@A1	July'19	AC	DRW

PROJ No:	DWG No:	REV:
1718	P 310	F

- GROUND FLOOR / SITE PLAN -

APPENDIX B

Historical Map Extracts

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

	Quarry		Gravel Pit		Sand Pit
	Clay Pit		Shingle		Refuse Heap
	Sloping Masonry		Flat Rock		
	Marsh		Reeds		Osiers
	Rough Pasture		Furze		Wood
	Mixed Wood		Brushwood		Orchard
	Fir		Ford		Stepping Stones
	Ferry		Waterfall		Lock

	Trig. Station	507 	Altitude at Trig. Station
<i>B.M. 325-9</i> 	Bench Mark	342 +	Surface Level
	Arrow denotes flow of water		Antiquities (site of)



Cutting



Embankment

Railway crossing Road

Level Crossing

Road crossing Railway

Railway crossing
River or Canal

Road over
single stream

Road over
River or Canal

— — — — —	County Boundary (Geographical)
- . - . - . -	County & Civil Parish Boundary
+ . + . + . +	Administrative County & Civil Parish Boundary
— — — — —	County Borough Boundary (England)
Co. Boro. Bdy.	
— — — — —	County Burgh Boundary (Scotland)
Co. Burgh Bdy.	

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

	Inactive Quarry, Chalk Pit or Clay Pit		Active Quarry, Chalk Pit or Clay Pit
	Rock		Boulders
	Cliff		Slopes
	Roofed Building		Glazed Roof Building
	Sloping Masonry		Archway
	Non-Coniferous Tree (surveyed)		Coniferous Tree (surveyed)
	Non-Coniferous Trees (not surveyed)		Coniferous Trees (not surveyed)

	Orchard Tree		Scrub		Bracken
	Coppice, Osier		Reeds		Marsh, Saltings
	Rough Grassland		Heath		Culvert
	Direction of water flow		Bench Mark		Antiquity (site of)
	Cave Entrance		Triangulation Station		Electricity Pylon

	Electricity Transmission Line
	County Boundary (Geographical)
	County & Civil Parish Boundary
	Civil Parish Boundary
	Admin. County or County Bor. Boundary
	London Borough Boundary
	Symbol marking point where boundary merging changes

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

	Cliff		Slopes
	Rock		Rock (scattered)
	Boulders		Boulders (scattered)
	Positioned Boulder		Scree
	Non-Coniferous Tree (surveyed)		Coniferous Tree (surveyed)
	Non-Coniferous Trees (not surveyed)		Coniferous Trees (not surveyed)
	Orchard Tree		Scrub
	Coppice, Osier		Reeds
	Rough		Marsh, Saltings
	Heath		Culvert

 Direction of water flow
  Triangulation Station
  Antiquity (site of)

 Electricity Transmission Line
  Electricity Pylon

 BM 231.60m Bench Mark
  Buildings with Building Seed

 Roofed Building
  Glazed Roof Building

• • • • •	Civil parish/community boundary
— — — — —	District boundary
— • — — —	County boundary
○	Boundary post/stone
⌘	Boundary mereing symbol (note: these always appear in opposed pairs or groups of three)

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

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Mapping Type	Scale	Date	Pg
Middlesex	1:2,500	1863	2
London	1:2,500	1896	3
Middlesex	1:2,500	1914	4
Middlesex	1:2,500	1935	5
Ordnance Survey Plan	1:1,250	1955	6
Ordnance Survey Plan	1:2,500	1955	7
Additional SIMs	1:1,250	1955 - 1989	8
Ordnance Survey Plan	1:1,250	1964 - 1973	9
Ordnance Survey Plan	1:1,250	1971 - 1981	10
Supply of Unpublished Survey Information	1:1,250	1973	11
Additional SIMs	1:1,250	1979	12
Ordnance Survey Plan	1:1,250	1981	13
Additional SIMs	1:1,250	1989	14
Large-Scale National Grid Data	1:1,250	1991	15
Large-Scale National Grid Data	1:1,250	1992 - 1995	16
Large-Scale National Grid Data	1:1,250	1996	17
Historical Aerial Photography	1:2,500	1999	18

A 10x10 grid with columns labeled A1 through A5 (repeated twice) and rows labeled 1 through 10 (repeated twice). A 3x3 square is highlighted with a thick black border, centered at A3,3. The center cell A3,3 is also circled with a purple dashed line.

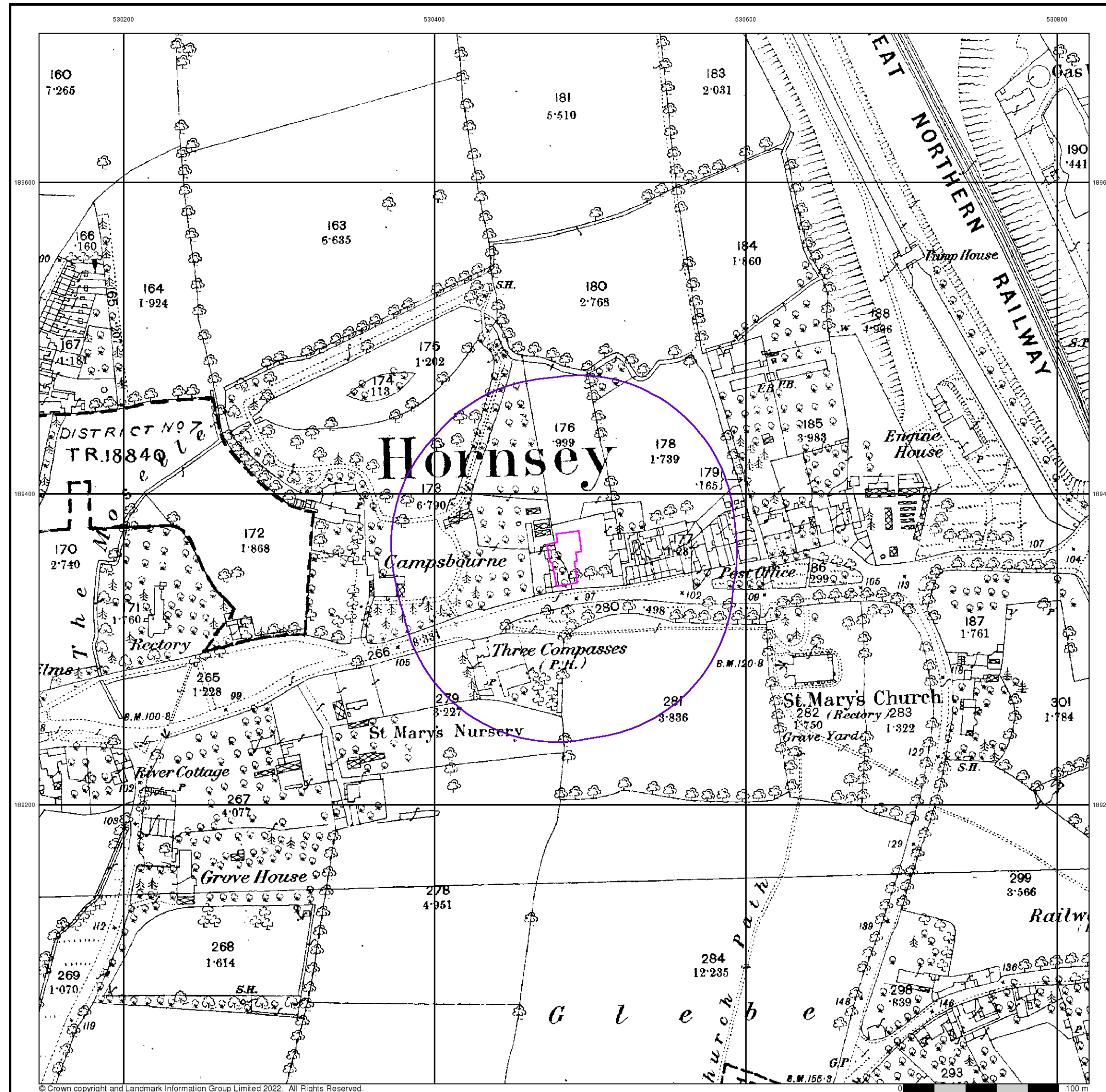


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Site Area (Ha):	0.06
Search Buffer (m):	100

Shop, 25, High Street, Hornsey, LONDON, N8 7QB

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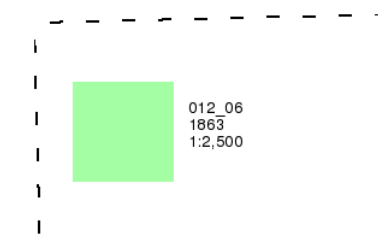
Middlesex

Published 1863

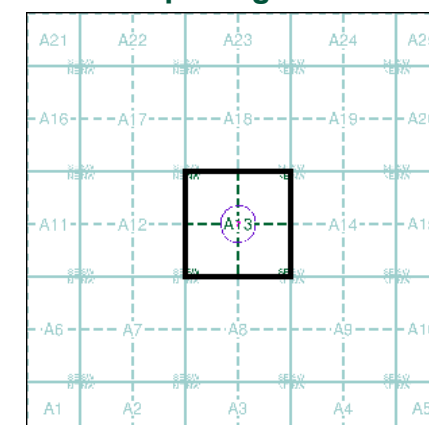
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

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Customer Ref:	BC646
National Grid Reference:	530480, 189360
Slice:	A
Site Area (Ha):	0.06
Search Buffer (m):	100

Site Details

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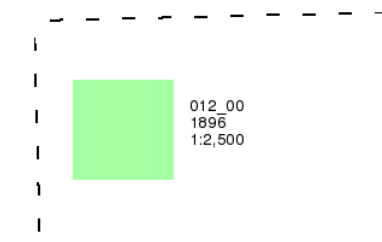
London

Published 1896

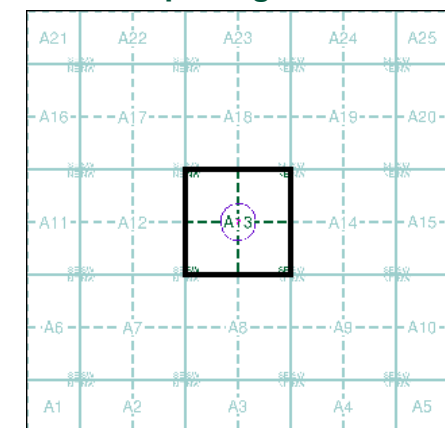
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

Order Number: 304207992_1_1
Customer Ref: BC646
National Grid Reference: 530480, 189360
Slice: A
Site Area (Ha): 0.06
Search Buffer (m): 100

Site Details

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Middlesex

Published 1914

Source map scale - 1:2,500

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Map Name(s) and Date(s)

012_06
1914
1:2,500

Historical Map - Segment A13

A21A22A23A24A25

A16A17A18A19A20

A11A12A13A14A15

A6A7A8A9A10

A1A2A3A4A5

N

Order Details

Order Number:304207992_1_1

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National Grid Reference:530480, 189360

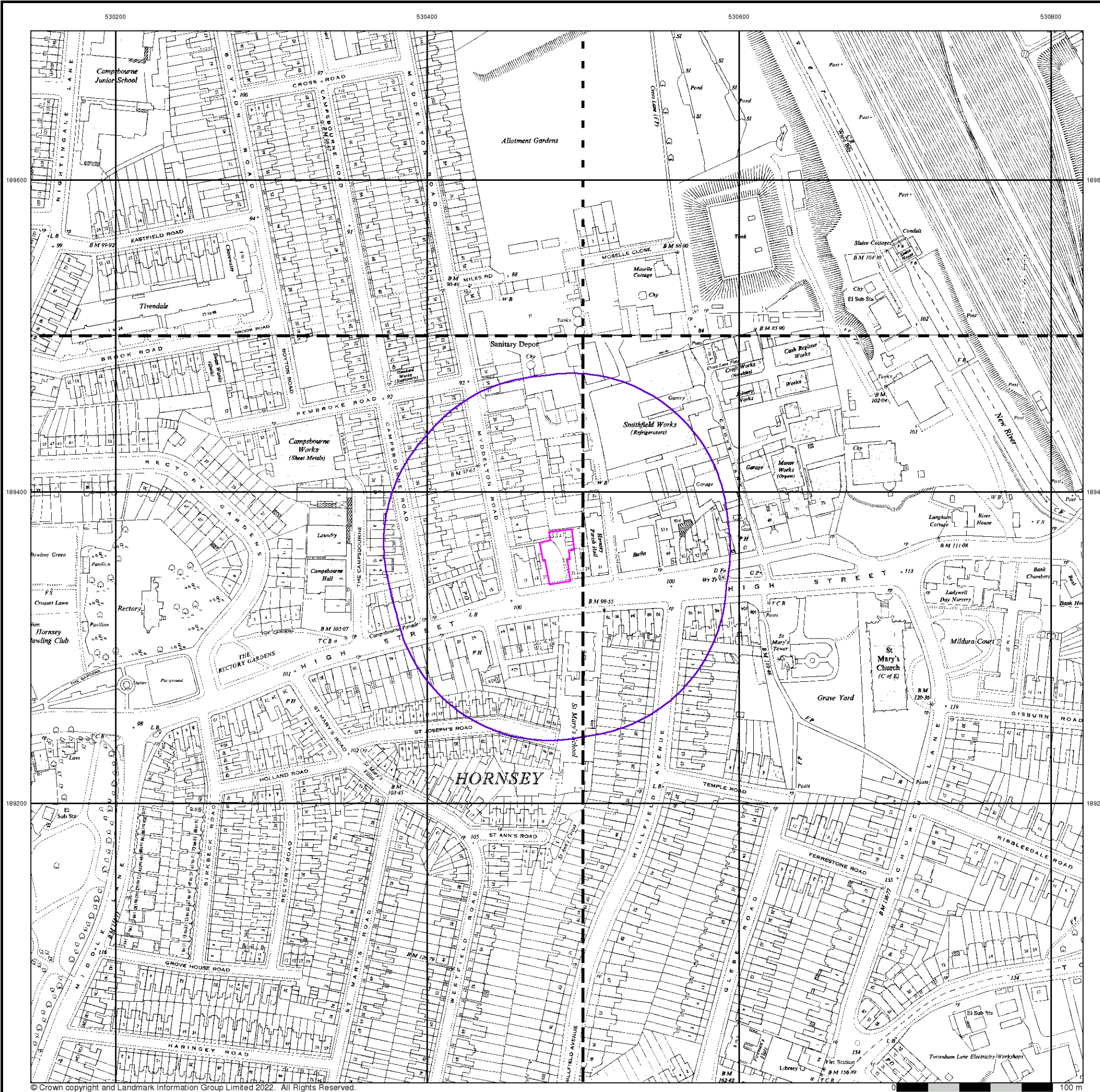
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Site Area (Ha):0.06

Search Buffer (m):100

Site Details

Shop, 25, High Street, Hornsey, LONDON, N8 7QB



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LANDMARK INFORMATION GROUP™

Ordnance Survey Plan

Published 1955

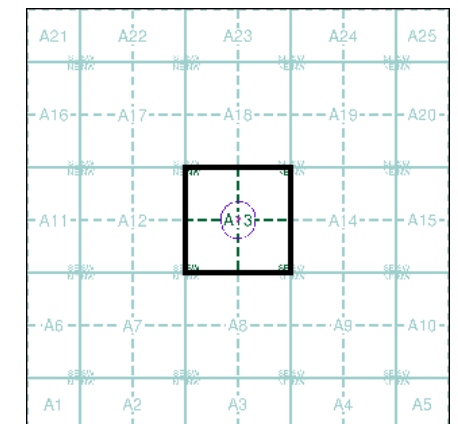
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Map Name(s) and Date(s)

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TQ3089SW 1955 1:1,250	TQ3089SE 1955 1:1,250

Historical Map - Segment A13



Order Details

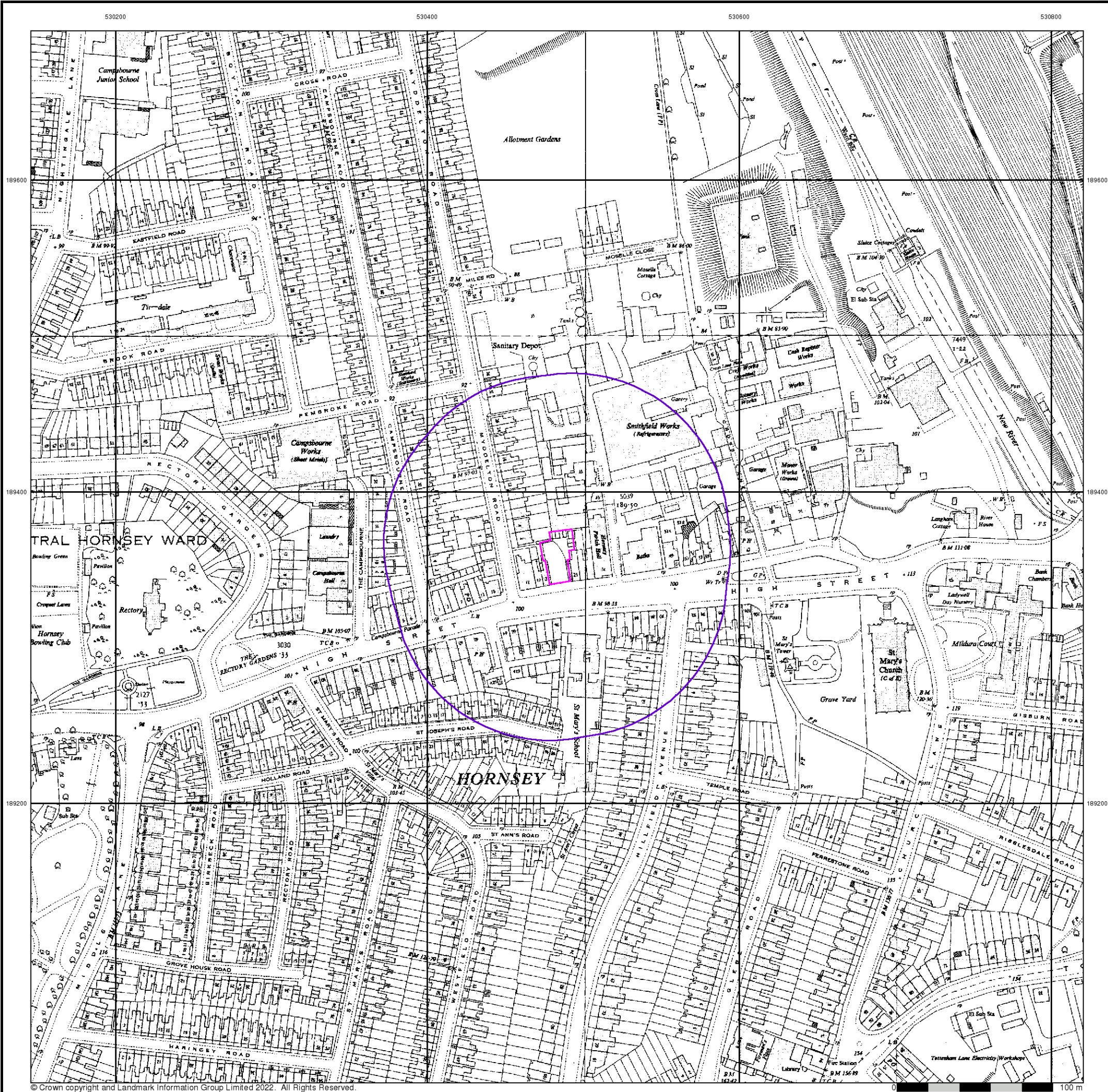
Order Number: 304207992_1_1
Customer Ref: BC646
National Grid Reference: 530480, 189360
Slice: A
Site Area (Ha): 0.06
Search Buffer (m): 100

Site Details

Shop, 25, High Street, Hornsey, LONDON, N8 7QB

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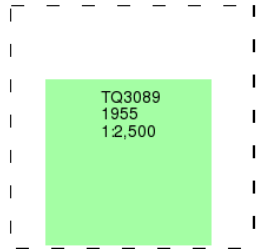
Ordnance Survey Plan

Published 1955

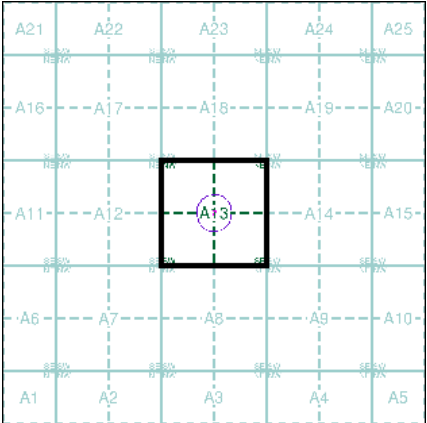
Source map scale - 1:2,500

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

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

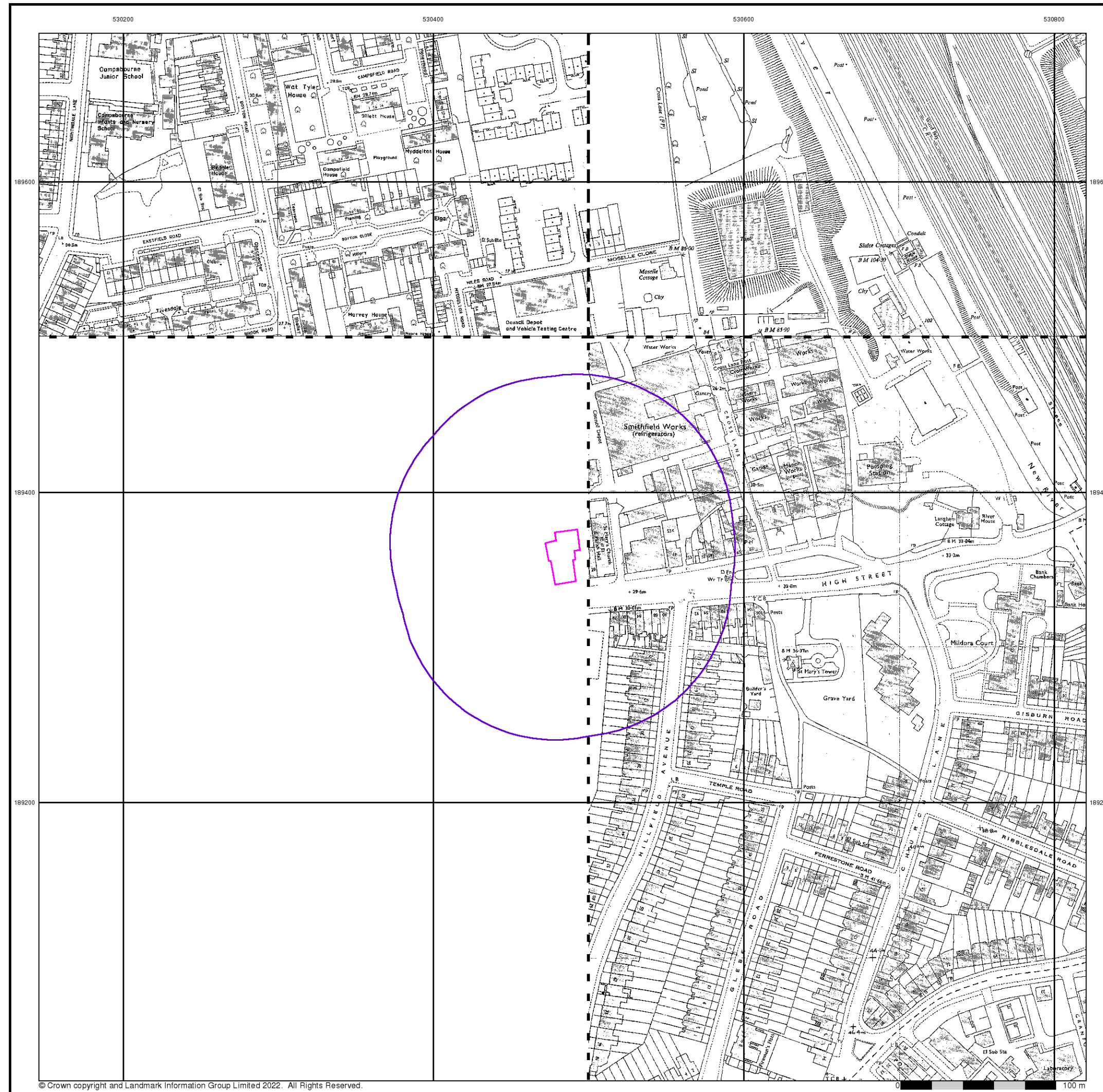
Order Number: 304207992_1_1
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National Grid Reference: 530480, 189360
Slice: A
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Additional SIMs

Published 1955 - 1989

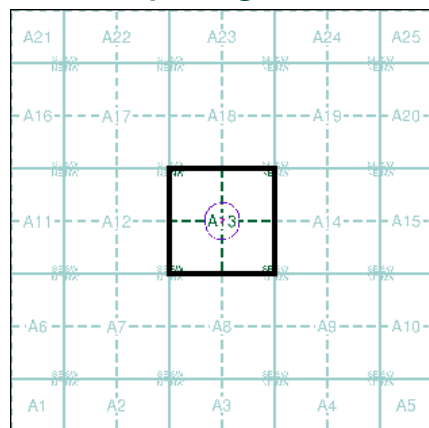
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

TQ3089NW	TQ3089NE
1989	1955
1:1,250	1:1,250
	TQ3089SE
	1979
	1:1,250

Historical Map - Segment A13

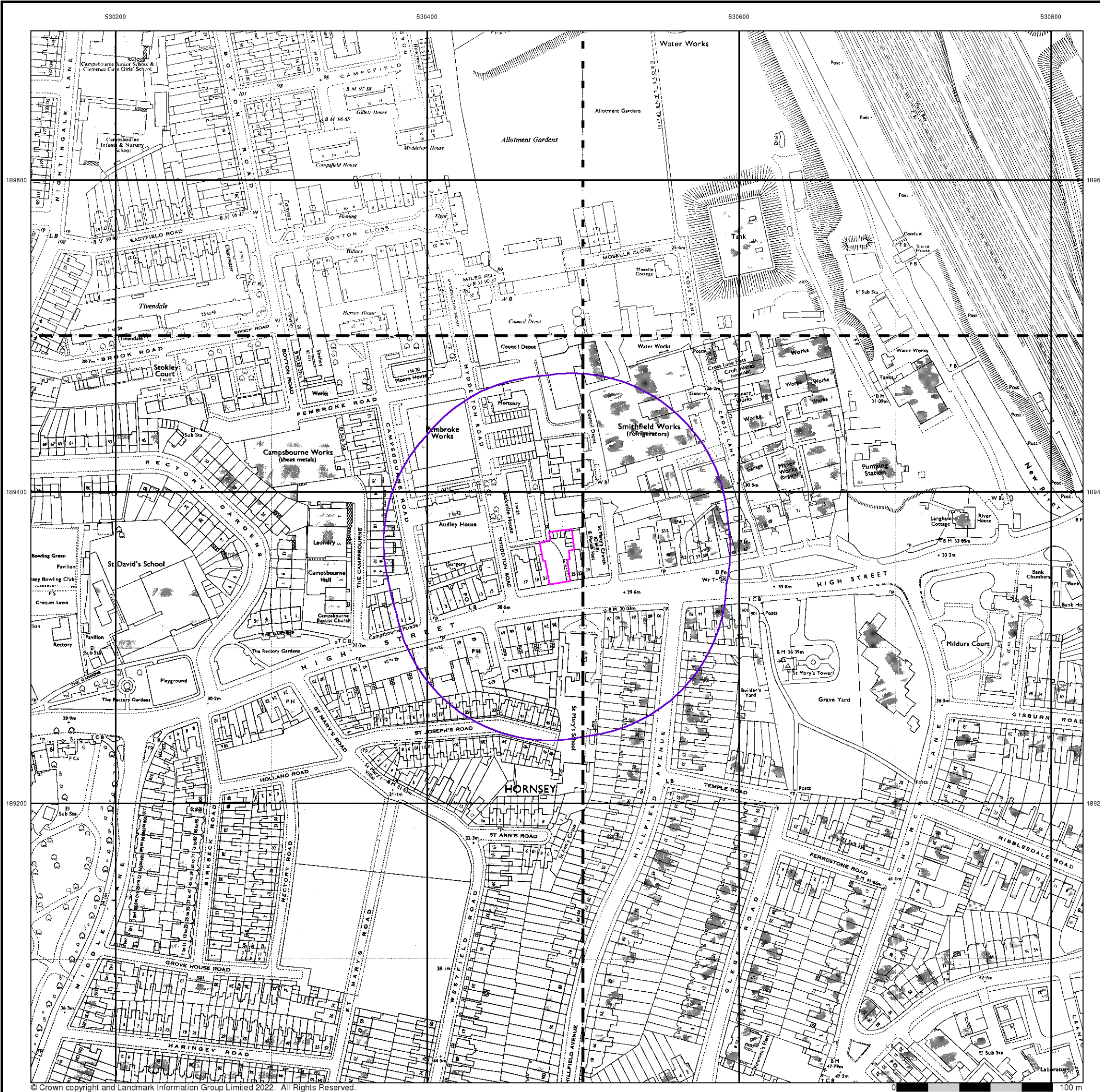


Order Details

Order Number: 304207992_1_1
Customer Ref: BC646
National Grid Reference: 530480, 189360
Slice: A
Site Area (Ha): 0.06
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Ordnance Survey Plan

Published 1964 - 1973

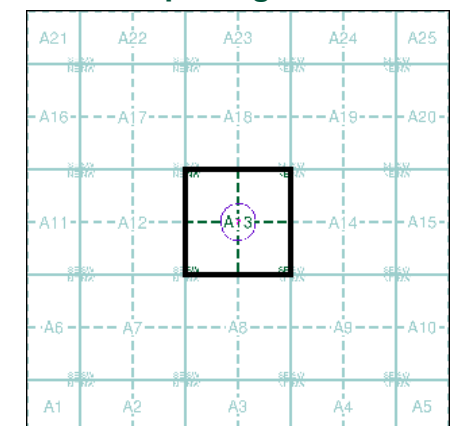
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TQ3089NW	TQ3089NE
1964	1973
1:1,250	1:1,250
TQ3089SW	TQ3089SE
1971	1971
1:1,250	1:1,250

Historical Map - Segment A13



Order Details

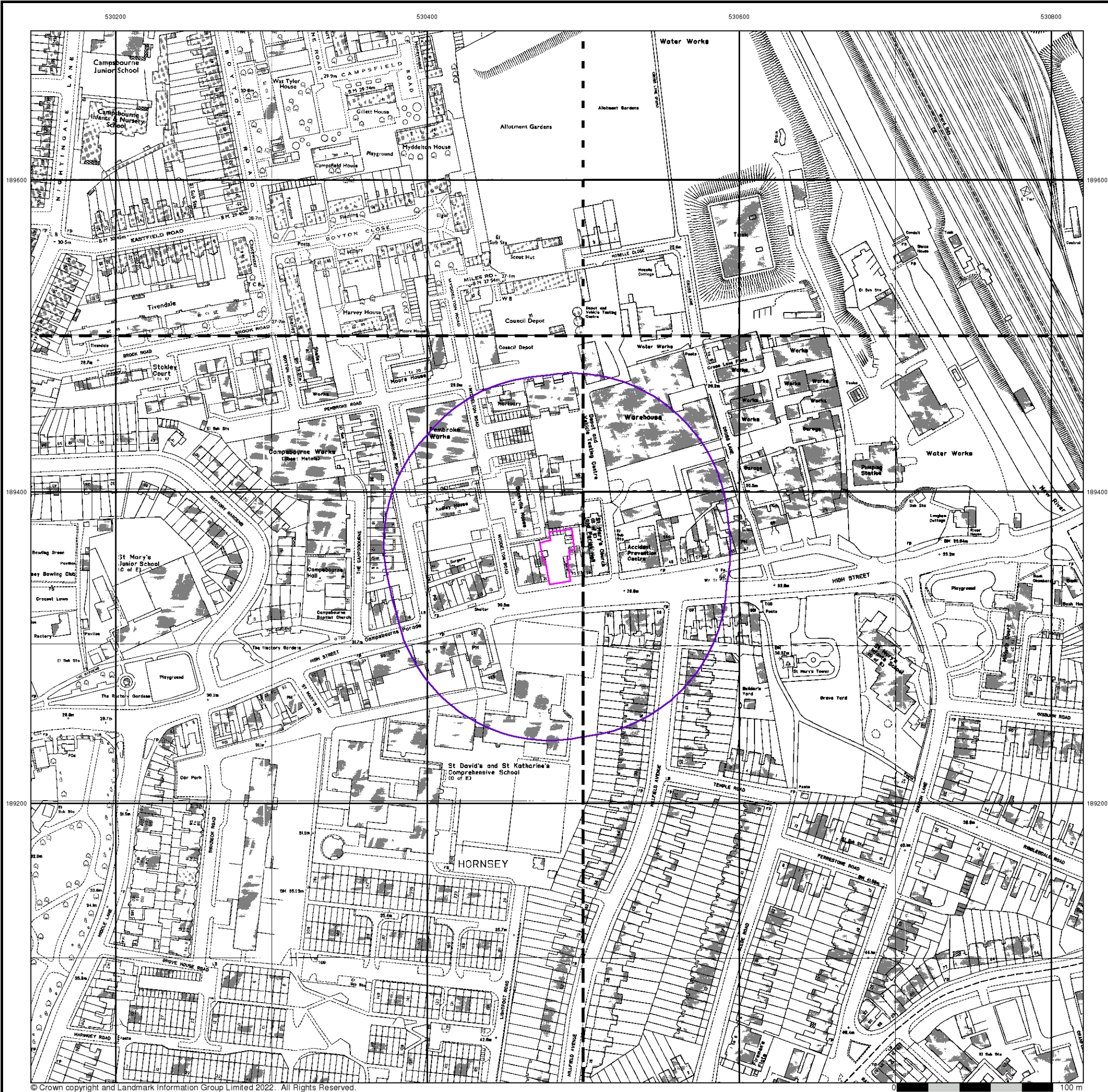
Order Number: 304207992_1_1
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National Grid Reference: 530480, 189360
Slice: A
Site Area (Ha): 0.06
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Ordnance Survey Plan

Published 1971 - 1981

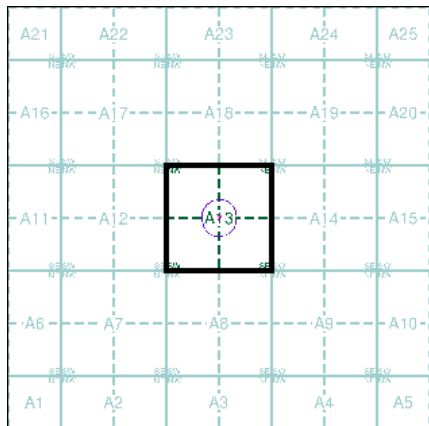
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TQ3089NW 1971 1:1,250	TQ3089NE 1981 1:1,250
TQ3089SW 1979 1:1,250	TQ3089SE 1981 1:1,250

Historical Map - Segment A13



Order Details

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Supply of Unpublished Survey Information

Published 1973

Source map scale - 1:1,250

SUSI maps (Supply of Unpublished Survey Information) were produced between 1972 and 1977, mainly for internal use at Ordnance Survey. These were more of a 'work-in-progress' plan as they showed updates of individual areas on a map. These maps were unpublished, and they do not represent a single moment in time. They were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

TQ3089NW
1973
1:1,250

TQ3089SE
1973
1:1,250

Historical Map - Segment A13

Order Details

Order Number:	304207992_1_1
Customer Ref:	BC646
National Grid Reference:	530480, 189360
Slice:	A
Site Area (Ha):	0.06
Search Buffer (m):	100

Site Details

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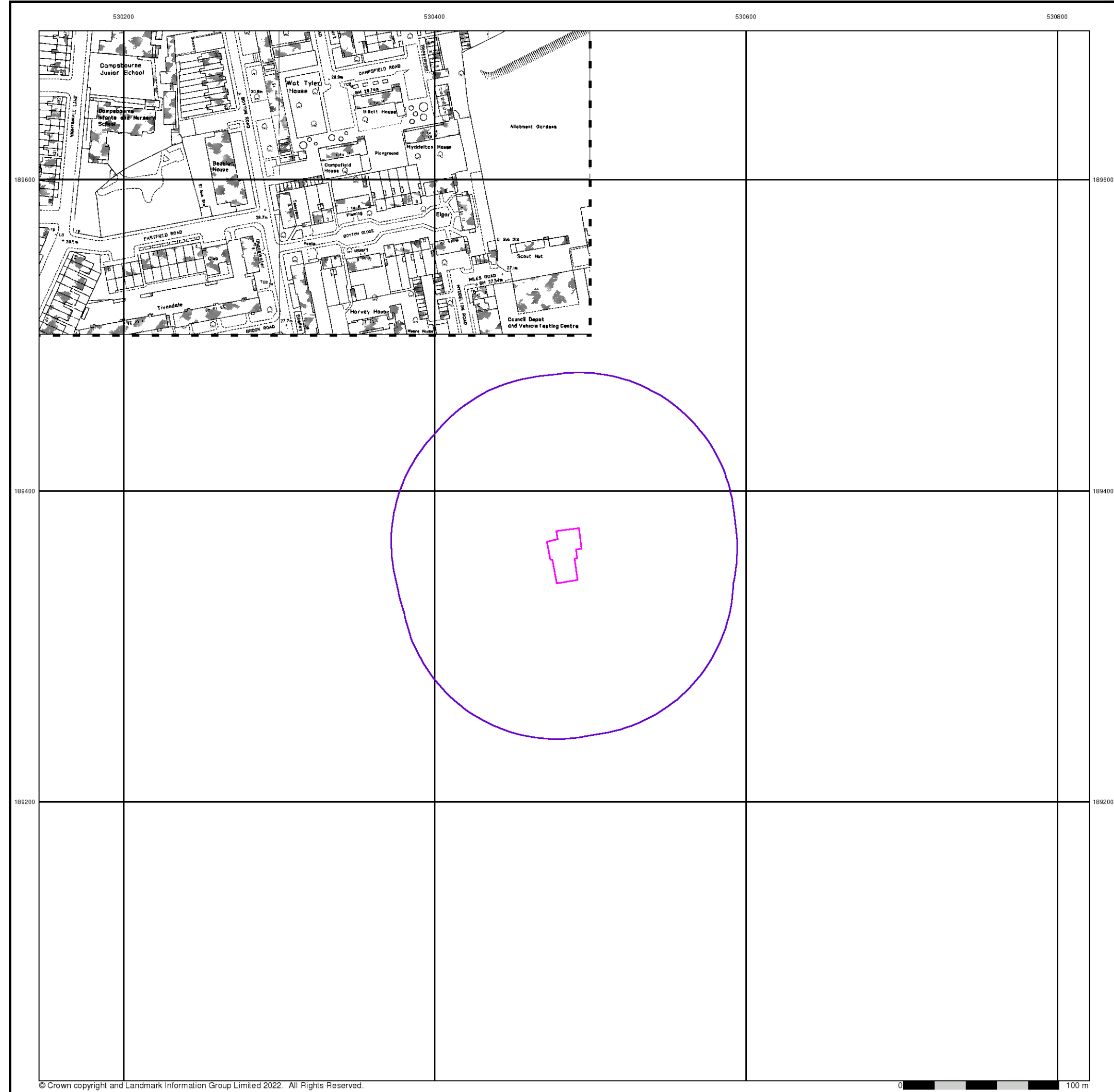
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Ordnance Survey Plan

Published 1981

Source map scale - 1:1,250

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Map Name(s) and Date(s)

TQ3089NW
1981
1:1,250

Historical Map - Segment A13

A21A22A23A24A25

A16A17A18A19A20

A11A12A13A14A15

A6A7A8A9A10

A1A2A3A4A5

N

Order Details

Order Number:	304207992_1_1
Customer Ref:	BC646
National Grid Reference:	530480, 189360
Slice:	A
Site Area (Ha):	0.06
Search Buffer (m):	100

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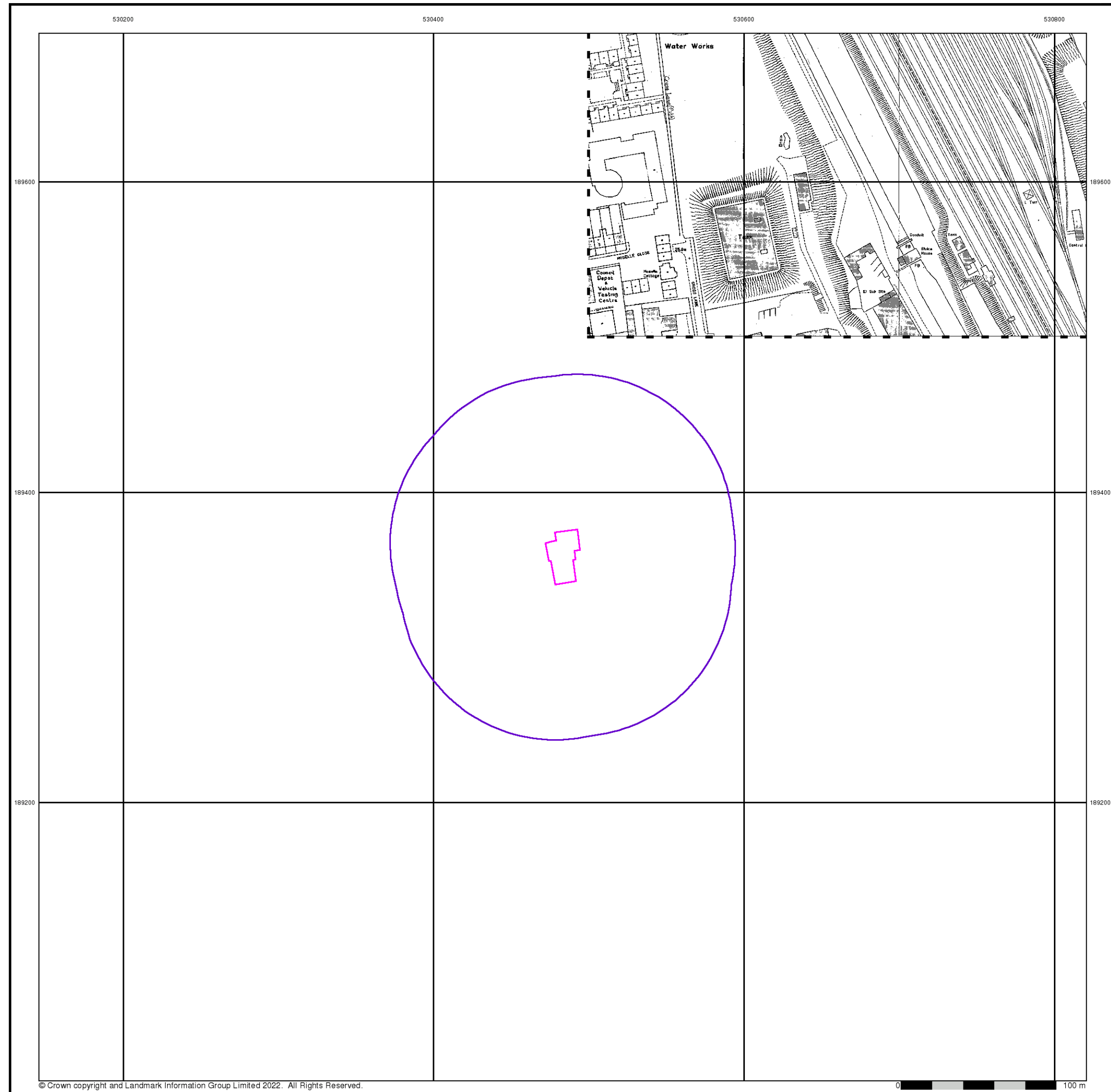
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Additional SIMs
Published 1989
Source map scale - 1:1,250

The SIM cards (Ordnance Survey's 'Survey of Information on Microfilm') are further, minor editions of mapping which were produced and published in between the main editions as an area was updated. They date from 1947 to 1994, and contain detailed information on buildings, roads and land-use. These maps were produced at both 1:2,500 and 1:1,250 scales.

Map Name(s) and Date(s)

TQ3089NE
1989
1:1,250

Historical Map - Segment A13

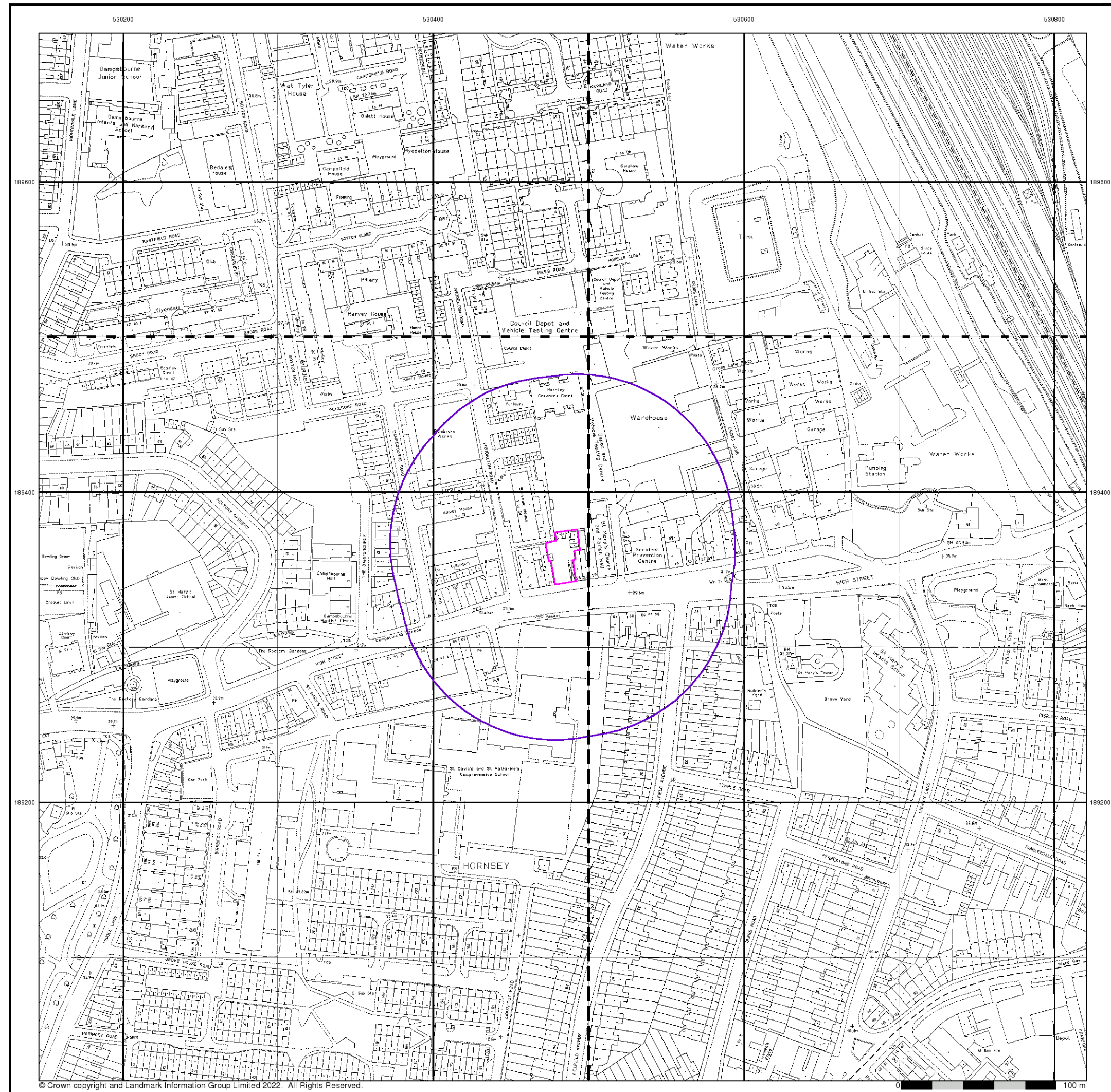
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N

Order Details

Order Number: 304207992_1_1
Customer Ref: BC646
National Grid Reference: 530480, 189360
Slice: A
Site Area (Ha): 0.06
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Large-Scale National Grid Data

Published 1991

Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TQ3089NW 1991 1:1,250	TQ3089NE 1991 1:1,250
TQ3089SW 1991 1:1,250	TQ3089SE 1991 1:1,250

Historical Map - Segment A13

Order Details

Order Number:	304207992_1_1
Customer Ref:	BC646
National Grid Reference:	530480, 189360
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Site Area (Ha):	0.06
Search Buffer (m):	100

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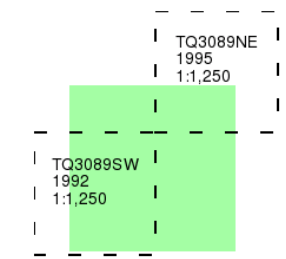
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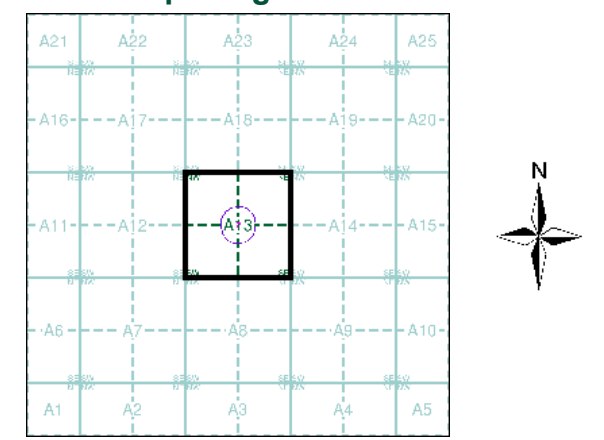
Large-Scale National Grid Data Published 1992 - 1995 Source map scale - 1:1,250

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

Map Name(s) and Date(s)



Historical Map - Segment A13

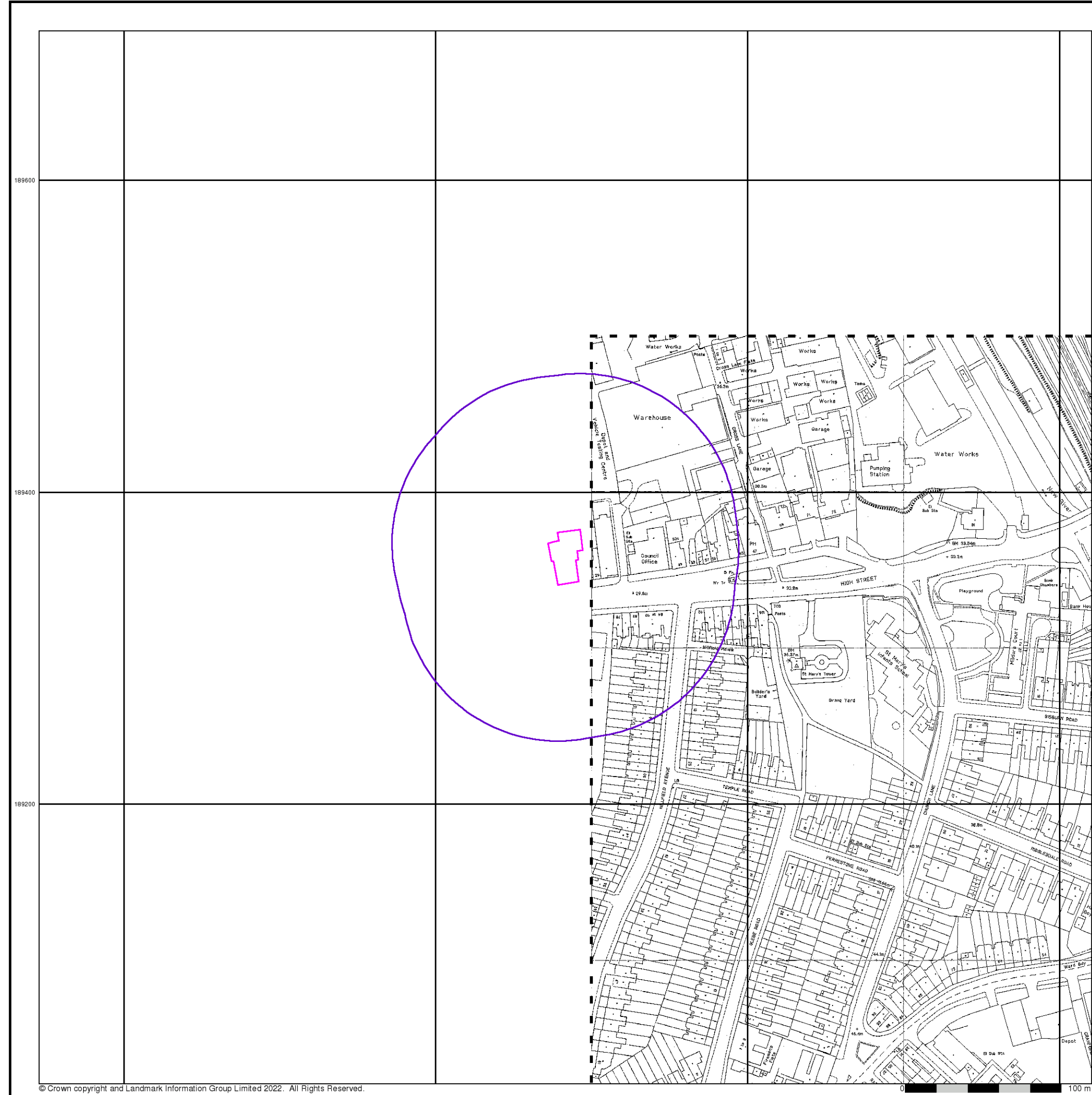


Order Details	
Order Number:	304207992_1_1
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National Grid Reference:	530480, 189360
Slice:	A
Site Area (Ha):	0.06
Search Buffer (m):	100

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189400
189200

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Large-Scale National Grid Data

Published 1996

Source map scale - 1:1,250

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

Map Name(s) and Date(s)

TQ3089SE
1996
1:1,250

Historical Map - Segment A13

N

Order Details

Order Number:	304207992_1_1
Customer Ref:	BC646
National Grid Reference:	530480, 189360
Slice:	A
Site Area (Ha):	0.06
Search Buffer (m):	100

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