



Report
Title:

Phase 1, Geo- Environmental Desk Study

Project
Name:

Milksey Lane, Graveley



Report
Reference:

BRD3930-OR1-A

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BRD Environmental Ltd

Hawthorne Villa, 1 Old Parr Road,
Banbury, Oxfordshire, OX16 5HT
01295 272244 info@brduk.com
www.brduk.com

REPORT CONTROL SHEET

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BRD Environmental Limited

Geotechnical and Environmental Services

- Ground Investigation
- Japanese Knotweed Removal
- Soil, Water and Gas Testing
- Contamination Assessment
- Geotechnical Advice
- Remediation Solutions

Hawthorne Villa, 1 Old Parr Road, Banbury, Oxfordshire. OX16 5HT

T: 01295 272244

www.brduk.com

info@brduk.com

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Phase 1, Geo-Environmental Desk Study
Milksey Lane, Graveley
BRD3930-OR1-A DS

REPORT LAYOUT

This report is divided into the following four sections: Summary Report, Technical Report, Supporting Information and Appendices.

SUMMARY REPORT

This expanded executive summary provides the main findings of the work undertaken in brief non-technical language. This section provides an overview of the key outcomes for the benefit of non-specialists and concludes with the main recommendations. This section should only be relied upon in the context of the whole report and the Technical Report should be referred to with respect to any design decisions.

TECHNICAL REPORT

The main report section is intended to provide the technical detail of the investigation and is intended to provide the level of information required by current guidance documents and practice. The Technical Report is written in a language that, in part, assumes knowledge of subject matter so that it can be written in as concise a form as possible. Its intended audience is peers, regulators and other professionals in related disciplines.

1. INTRODUCTION TO TECHNICAL REPORT	1
1.1. CONTRACT DETAILS	1
1.2. SCOPE OF WORKS	1
1.3. REPORT LIMITATIONS	1
2. SITE CHARACTERISTICS	3
2.1. SITE SETTING	3
2.2. SITE DESCRIPTION	3
2.3. SITE HISTORY	4
2.4. GEOLOGY	5
2.5. RADON	6
2.6. HYDROGEOLOGY	6
2.7. HYDROLOGY	7
2.8. ENVIRONMENTAL ASPECTS	7
2.9. PREVIOUS GROUND INVESTIGATIONS	8
3. PRELIMINARY CONTAMINATION RISK ASSESSMENT	9
3.1. HAZARD IDENTIFICATION	9
3.2. RECEPTOR ASSESSMENT	11
3.3. INITIAL CONCEPTUAL MODEL	11
3.4. PRELIMINARY ASSESSMENT OF CONTAMINATION RISKS	11

3.5.	RECOMMENDATIONS	13
4.	IMPLICATIONS FOR CONSTRUCTION	14
4.1.	GEOTECHNICAL CONSIDERATIONS	14
4.2.	PRELIMINARY GEOTECHNICAL ASSESSMENT	15
4.3.	CONSTRUCTION CONSIDERATIONS	15
REFERENCES		
SUPPORTING INFORMATION		
This section of the report provides background details of a generic nature together with specific technical approaches adopted by BRD and details of the guidance documents that are commonly referenced in the report. The section also includes explanations of technical terms to assist non-specialist readers in understanding the Technical Report. It should be noted that not all the information within this section is necessarily applicable to this specific report.		
APPENDICES		
The final section of the report presents the factual data collected and employed as part of the investigation.		
APPENDIX 1	SITE PLANS & PHOTOGRAPHS	
	Site Location Plan	Ref. BRD3930-OP2-A
	Walkover Photographs	Ref. BRD3930-OP3-A
	Site Layout Plan	Ref. BRD3930-OP5-A
	Proposed Development Layout	‘Proposed Sketch Layout’, Woods Hardwick, ref. 18945/1000, dated July 2021.
	Initial Conceptual Site Model	Ref. BRD3930-OP4-A
APPENDIX 2	HISTORICAL PLANS	
	Order No. 280856870_1_1	23 x A3 pages
APPENDIX 3	ENVIROCHECK REPORT	
	Order No. 280856870_1_1	52 x A4 pages & 12 x A3 pages
APPENDIX 4	MINING AND GROUND STABILITY REPORT	
	Order No. 280856870_1_1	14 x A4 pages & 2 x A3 pages

SUMMARY REPORT

SUBJECT	COMMENTS
CURRENT SITE CONDITION	The site comprises a heavily overgrown field of irregular shape, which covers 1.77 hectares which consist of the former gardens and grounds of Graveley House. A variety of mature trees is found either on site or bordering the parcel. There are few soil stockpiles present on site which appear to contain demolition materials such as bricks, stones, timber and scrap metal.
PROPOSED DEVELOPMENT	It is proposed that the site will be developed as residential housing with private gardens, driveways and access road.
HISTORICAL SUMMARY	The site has been the former gardens and grounds of Graveley House and later an open field throughout its mapped history. The surrounding area has been predominately rural and agricultural, albeit with the A1 motorway 150m to the west of site from 1970s onwards. A gravel pit located some 40m east of the site appears to have been backfilled during the late 1960s and subsequently developed as residential properties and paddocks. By 2017-2018, some soils stockpiles appear to have been brought to site following the redevelopment of the residential properties located at 37-41, High Street, immediately east of the site.
PUBLISHED GEOLOGY	The western half of the site is shown to be underlain by superficial deposits comprising Glaciofluvial Deposits (clayey sands, sands and gravels). The eastern half of the site is shown to be underlain by superficial deposits comprising glacial Till (gravelly clays). These form part of a wider glacial channel beneath the site. The shallowest bedrock unit is shown to be the Holywell Nodular Chalk Formation and New Pit Chalk Formation (Undifferentiated) but is likely to be present at a reasonably depth beneath the site.
RADON GAS	Radon gas protection measures are not required.
HYDROGEOLOGY	The Glaciofluvial Deposits shown to be present across the western half of the site are classified as a Secondary A Aquifer. The glacial Till deposits shown to be present across the eastern half of the site are classified as a Secondary (Undifferentiated) aquifer. The chalk bedrock is classified as a Principal aquifer and the site is located within a groundwater Source Protection Zone 3 (Total Catchment).
HYDROLOGY	The closest surface water feature to the site is the Ash Brook, located some 100m southeast of the site. The nearest river is the River Beane (tributary of the River Lea) located some 6.5km east of the site, which flows south and southeast.
PREVIOUS GROUND REPORTS	BRD is not aware of any previous ground investigations having been conducted at the site.

PRELIMINARY CONTAMINATION RISK ASSESSMENT

The site offers a relatively low risk of contamination from both the residential gardens and grounds, the historical land use and the soils and rubble mounds present on site. There is a low risk that landfill gases released from the off site potentially backfilled gravel pit could migrate through granular strata and be emitted at the site.

The identified sources could potentially impact on the human health of future residents, groundwater and buried building materials and services.

PRELIMINARY GEOTECHNICAL ASSESSMENT

Traditional spread foundations could be feasible at the site, but these may need to be locally deepened in areas of clay soils due to the presence of trees, dependent on the plasticity. Alternatively, a piled foundation solution may be required.

Localised reinforcement may also be required in areas of variable ground conditions. Foundations may also need to be deepened in areas of ground disturbance from the demolition of the existing buildings.

Soakaways may be feasible in the western half of the site where granular soils are anticipated (subject to groundwater levels), but are unlikely to be feasible in the eastern half if extensive clays are encountered.

RECOMMENDATIONS

PHASE 2 CONTAMINATION ASSESSMENT

A Phase 2 contamination assessment is required at the site in order to confirm whether or not the identified potential contamination sources are valid.

GEOTECHNICAL GROUND INVESTIGATION

For any form of development, BRD recommend that an intrusive ground investigation is undertaken in order to confirm ground conditions and allow design of the new structures. An intrusive ground investigation incorporating a geotechnical assessment is being undertaken by BRD and shall be reported separately.

1. INTRODUCTION TO TECHNICAL REPORT

1.1. CONTRACT DETAILS

CLIENT	Gade Property Developments Ltd trading as Gade Homes.
SITE	Land situated at Milksey Lane in the village of Graveley.
CLIENT'S ADVISORS	BRD Environmental Limited (BRD) has been commissioned directly by the Client.
REPORT CONTEXT	It is understood that the Client intends to purchase the site and develop it for residential housing.
REPORT TYPE	Factual and interpretative geo-environmental desk study.
REPORT OBJECTIVES	The purpose of this report is to undertake a preliminary geo-environmental assessment of the site to supplement the pre-application for planning permission.

1.2. SCOPE OF WORKS

The agreed scope of works was:

- Desk based research through the purchase of an Envirocheck report, including:
 - Environmental database search.
 - Environment Agency data.
 - BGS radon maps.
 - Mining and natural cavities database search.
- Interpretation of the geological, hydrogeological and hydrology setting of the site from published sources.
- A site walkover will be undertaken to identify any potential sources of contamination or indication of other ground related hazards at the site and its surroundings.
- Prepare a Phase 1 desk study report including copies of the purchased information, interpretation of the collected data to identify and assess contamination hazards together with any other environmental/geotechnical issues. Report to be supplied in an electronic Adobe pdf format.

1.3. REPORT LIMITATIONS

Any site boundary lines depicted on plans included within this report are approximate only and do not imply legal ownership of land. Any observations of tree species, asbestos containing materials within structures or invasive weeds, does not constitute a formal survey of such features. The identification of such features is therefore tentative only. In the case of Japanese Knotweed, BRD can undertake separate surveys for this plant undertaken by a Property Care Association qualified surveyor.

The report does not consider whether sensitive ecology or archaeology is present as these require consideration by professionals specialising in these matters. It should be recognised that the

collection of desk study information may not be exhaustive and that other information pertinent to the site may be available.

It is emphasised that a desk study and walkover can only indicate the potential for contamination on the site. This study aims to highlight potential pollutant linkages in line with current guidance. The plausibility of these linkages can only be proved by an intrusive ground investigation.

It should be noted that a desk study and walkover can only reveal the potential for certain types of ground conditions and geotechnical hazards. For any form development an intrusive ground investigation is recommended. The scope of this investigation excludes a formal slope stability study and any observations made regarding slopes are for information only.

2. SITE CHARACTERISTICS

2.1. SITE SETTING

SITE ADDRESS AND POST CODE	Land off Milksey Lane, Graveley, Hitchin, Hertfordshire, SG4 7LA.
NATIONAL GRID REFERENCE	Approximately centred at: 523010E, 228050N

2.2. SITE DESCRIPTION

INSPECTION DATE	16 th June 2021.
CURRENT USE	The site comprises a heavily overgrown field with a variety of mature trees dotted around and within the site. The site comprise the former gardens and grounds of the residential properties located immediately adjacent to the east of the site.
AREA	Approximately 1.77 hectares.
SHAPE	Irregular shape.
ACCESS	Access is via a track off driveway access to Nos. 37-41, High Street.
BOUNDARIES	The northern boundary of the site is delineated by Milksey Lane. A wire fence and vegetation define the west and south boundaries of the site. Wooden fence set the boundary with the residential properties located to the east. A wire fence and an embankment delineates the northeast part of the site and the access driveway to 37-41 High Street.
TOPOGRAPHY	The site generally slopes down towards the southeast and east. There are two steeper embankments, one to the north towards Milksey Lane and the second one to the east to the access driveway to 37-41 High Street.
SURFACING	The site all comprises soft cover associated with the former garden grounds.
BUILDINGS	No buildings are present on site.
VEGETATION	The site is currently heavily overgrown with nettles and thistles. A variety of mature trees are found either on site or bordering the parcel, including Oak, Copper Beech, Cherry, Ash, Field Maple, Apple and Yew among others.
NOTABLE FEATURES AND OBSERVATIONS	Some tree stumps and felled trees were observed in the central area of the site. Soils stockpiles present in the central area of the site covering an area of approximately 1,250m² and were found to contain demolition materials such as bricks, stones, timber and metal scrap. The stockpiles appear to have been placed on site when the adjacent homes east of the site where redeveloped.

SURROUNDING LAND USE	The site is set in a mixed residential and agricultural area.
TO THE NORTH	Milksey Lane with open fields and paddocks beyond.
TO THE EAST	Gravelly House and two modern dwelling area present immediately to the east with High Street beyond.
TO THE SOUTH	A coppice, gardens and residential properties.
TO THE WEST	A public footpath, agricultural fields and the A1 motorway beyond.

2.3. SITE HISTORY

MAPPED HISTORY		
DATE RANGE	SITE	SURROUNDING AREA
1881-1972	The site is part of 3No. smalls fields and 3No. gardens. Trees (possible orchard) and 2No. small structures/buildings are shown to be present on site. Milksey Lane is shown as the northern boundary of the site following its current alignment. The western boundary of the site is a farm track. By the 1923 map edition the centre south part of the site is shown to have been divided in 3No. smaller elongated fields. A copse is shown in the northwest corner of the site. An access track to the east of the site from Milksey Lane is shown to have been built.	The site is located at the north western edge of the Village of Graveley, largely surrounded by rural residential proprieties, orchards and open fields. The alignment of the road labelled as Roman Road to the east of the site is shown to be broadly similar to the current High Street. The 1881 map edition shows a gravel pit some 40m east of the site. The pit is shown labelled as 'old gravel pit' in the 1898 map edition although it seems to have been extended to the north in the 1923 maps. A smithy is shown some 125m southeast of the site. The 1923 map edition shows limited residential development of Graveley. The 1964 map is the first available maps showing the development of the A1 motorway south of Graveley.

MAPPED HISTORY		
DATE RANGE	SITE	SURROUNDING AREA
1972-2021	The site is shown as a large open field/garden associated with Graveley House. No buildings or structures are shown to be present on site. The site remains mainly unchanged.	By the 1970s map edition the gravel pit east of the site appears to have been backfilled and the land developed with residential proprieties and paddocks. The A1 motorway is shown some 150m west of the site. Further residential development of Graveley, to the south of the site, is shown in the 1970s map editions. New properties area shown immediately to the east of the site by the 2021 map.

AERIAL IMAGERY	Google Earth imagery from 2000 onwards show the site to comprise gardens and an open field with trees and very similar to present day conditions. The 2017-2018 imagery show the site becoming overgrown and some soils stockpiles that appear to have been brought to site following the redevelopment of the residential proprieties located at 37-41, High Street, immediately east of the site.
INTERNET SEARCH	No information specific to the site was identified.
ANECDOTAL	The soils and rubble mound present on site were dumped following the redevelopment of residential properties at 37-41, High Street.

2.4. GEOLOGY

GEOLOGICAL CONTEXT	Within the region of the site, the bedrock comprises chalk rocks formed during the Cretaceous Period in warm shallow chalk seas. However, there is a deep Quaternary Glaciogenic channel running north to south across the area. This will result in the presence of a mixture of sediments including clays, silts, sands and gravels likely being extending to a significant depth.
SUPERFICIAL DEPOSITS	The site is shown to be underlain by sediments formed up to 2 million years ago in the Quaternary Period in local environment previously dominated by ice age conditions. The western part of the site is shown to be covered by Glaciofluvial Deposits, generally detrital, comprising silts, clays and fine sands. The eastern part of the site is shown to be underlain by the Lowestoft Formation - Diamicton that generally is found as a chalky till, together with outwash sands and gravels, silts and clays. The chalky till is characterised by its chalk and flint content.

BEDROCK GEOLOGY	The underlying bedrock unit is shown to be the Holywell Nodular Chalk Formation And New Pit Chalk Formation (undifferentiated) which is typically described as 'white chalk with some flint and marl seams'.
BGS BOREHOLE RECORDS	There are several publically available British Geological Survey (BGS) borehole records located some 150m west of the site within the A1 (M) road alignment. Below a thin layer of Topsoil, till clays were found in all the boreholes up to the maximum depth of investigation (~29.00m bgl). The clays were generally described as 'firm, stiff occasionally very stiff with depth, brown to dark grey, gravelly, sandy, silty CLAY. Gravel of fine to medium, subrounded flint, chalk and limestone'. Occasional interbedded gravel and sand layers were found.
GROUND DISSOLUTION HAZARDS	A Mining and Ground Stability Report has been obtained for the site. Chalk Formations predominantly comprise calcium carbonate and are therefore susceptible to solution particularly during cold glacial or periglacial periods. Should solution occur over an extended period of time, this may lead to significant chalk dissolution features remaining in the ground. The desk study information indicates the site is over an area of low potential risk for ground dissolution stability hazards. There are also no known recorded natural chalk dissolution features within 500m of the site.
MAN MADE MINING CAVITIES	The site is indicated to be over an area of rare non-coal mining activities. There is one recorded historical gravel pit located 40m east of the site.
SOIL GEOCHEMISTRY	The site is not situated in an area where the natural background concentrations of metals is elevated.

2.5. RADON

The site is not situated within an area where radon gas protection measures are required in new buildings.

2.6. HYDROGEOLOGY

SUPERFICIAL AQUIFER	The Glaciofluvial Deposits shown to be present across the western half of the site are designated as Secondary A aquifer. The Lowestoft Formation - Diamicton deposits shown to be present across the eastern part of the site are designated as Secondary (Undifferentiated) aquifer.
BEDROCK AQUIFER	Principal aquifer.

AQUIFER PROPERTIES	BGS hydrogeology maps indicate the groundwater in the chalk to be at approximately between 60-70m above ordnance datum (AOD). The site is at a level of approximately 100m AOD. Therefore, it would be anticipated that the groundwater in the chalk would be at a depth of around 30-40m. There is also the potential for perched groundwater to be present at various depths within the superficial deposits in any sand and/or gravel layers.
LICENSED GROUNDWATER ABSTRACTIONS	None within 250m from the site.
GROUNDWATER SOURCE PROTECTION ZONE (SPZ)	Zone 3 (Total Catchment). This zone is defined as the total area needed to support the abstraction or discharge from the protected groundwater source.

2.7. HYDROLOGY

SITE DRAINAGE CHARACTERISTICS	The site consists mainly of open ground and therefore any surface rainwater will infiltrate directly into the underlying soil and/or run off down the slope to the south and south east.
SURFACE WATER FEATURES	The closest surface water feature to the site is the Ash Brook, located some 100m southeast of the site. The nearest river is the River Beane (tributary of the River Lea) located some 6.5km east of the site, which flows south and southeast.
SURFACE WATER ABSTRACTIONS	None within 250m from the site.
DISCHARGE CONSENTS	None relevant to consideration of the site.
FLOODING	Zone 1 area and is highly unlikely to be affected by flooding. As the site is greater than one hectare in area, a Flood Risk Assessment will still have to be undertaken for the site.

2.8. ENVIRONMENTAL ASPECTS

LANDFILL	There are no recorded landfill sites within 250m of the site, however an old gravel pit located some 40m to the east of the site appears to have been backfilled during the 1960s.
CONTEMPORARY TRADE DIRECTORY ENTRIES	Southeast of the site at some 125m, there is one entry for an inactive car dealer (former car garage services).

REGISTERED HAZARDOUS SITES	None within 250m of the site.
POLLUTION INCIDENTS TO CONTROLLED WATERS	There have been no recorded pollution incidents within 250m of the site.
ECOLOGICALLY SENSITIVE LAND USE	None identified within 250m.

2.9. PREVIOUS GROUND INVESTIGATIONS

BRD is not aware of any previous ground investigation at the site.

3. PRELIMINARY CONTAMINATION RISK ASSESSMENT

3.1. HAZARD IDENTIFICATION

INVALID CONTAMINATION SOURCES	
HISTORIC LAND USE	DISCUSSION AS TO WHY THE HISTORICAL USE IS NOT CONSIDERED TO PRESENT A PLAUSIBLE HAZARD
Garage (former smithy) located 125m southeast of the site.	Any contaminants would have to be mobilised to the site via groundwater. Given the expected superficial geology beneath the site wider region and that the area slopes down to the south it is thought that the potential for contaminants to migrate any considerable distance beneath the site is considered to be negligible.

POTENTIAL ON SITE SOURCES		
HISTORIC LAND USE	DESCRIPTION OF POTENTIAL CONTAMINATION HAZARD	POTENTIAL CONTAMINANTS OF CONCERN
Graveley House gardens	Given the historical presence of gardens associated with Graveley House during the Victorian era, it is unlikely to be significantly contaminated. However, the burning of domestic or garden waste in bonfires along with the spread of coal ashes, historically used as soil improver, has the potential to cause contamination by metals and Polycyclic Aromatic Hydrocarbons. Part of site has been the subject of changes within the years including the demolition of former small garden buildings. Therefore, there is the potential for the presence of Made Ground which may contain waste material or surplus soils left over from redevelopment of the site. If waste material was used various contaminants may be present in the soils.	Metals. Polycyclic Aromatic Hydrocarbons (PAH).
Soils and rubble stockpiles.	Several stockpile of soils and rubble have been recorded on site. Such disposal activities may also be a cause of soil contamination hazards.	Metals. Petroleum hydrocarbons (diesel, lubricating oils, greases and/or petrol). Polycyclic Aromatic Hydrocarbons (PAH). Asbestos containing materials (e.g. cement asbestos building products).

POTENTIAL OFF SITE SOURCES		
HISTORIC LAND USE	DESCRIPTION OF POTENTIAL CONTAMINATION HAZARD	POTENTIAL CONTAMINANTS OF CONCERN
Backfilled gravel pit.	A historical gravel pit which appears to have been infilled in the 1960s and redeveloped with a house and paddocks is located some 40m east of the site. Historically it was common to backfill old mineral workings with waste materials. Organic rich wastes degrade to form hazardous gases under anaerobic conditions and the landfill gases could be migrating from the pit to the site.	Landfill gases (mainly carbon dioxide and methane).

3.2. RECEPTOR ASSESSMENT

CONTEXT	
ASSESSMENT LAND USE CATEGORY	Residential.
DESCRIPTION OF PROPOSED LAND USE	The proposed end use of the site is for residential properties with associated private gardens, private access road and open space areas.

RECEPTORS	
RECEPTOR	DISCUSSION
HUMAN HEALTH	Residents with zero to 6 year old child most sensitive receptor.
CONTROLLED WATERS GROUNDWATER	Principal and Secondary aquifers.
CONTROLLED WATERS SURFACE WATER	Not considered to be a valid receptor as no nearby surface water bodies. The closer water body is Ash Brook, located some 100m south east of the site.
BUILDING MATERIALS AND SERVICES	Water service pipes. Buried concrete.

3.3. INITIAL CONCEPTUAL MODEL

POLLUTANT LINKAGES	The pollutant linkages are best presented in a diagrammatic form and therefore the initial conceptual site model plan is presented in Appendix 1. The individual pollutant linkages as numbered on the plan are described further in Section 3.4.
INVALID POLLUTANT LINKAGES	Although the groundwater may act as a pathway for offsite contamination to migrate beneath the site, the risk to the groundwater from these off site receptors is not the concern of this report. Pathways will therefore be limited to gas and/or groundwater migration or cross boundary contamination. Information from nearby BGS boreholes show a cover of clay-rich till deposits up to 30m in thickness overlying the chalk bedrock. Therefore it is considered that the risk of contamination of the chalk principal aquifer from any potential subsurface contamination present on site is negligible.
LIMITATIONS AND UNCERTAINTIES	The preliminary conceptual model has been developed based solely on desk based research and assessment. The only way to conclusively determine the presence or absence of contamination is with intrusive site investigation.

3.4. PRELIMINARY ASSESSMENT OF CONTAMINATION RISKS

The following table identifies the potential risks that exist to the receptors through each of the identified pollutant linkages in the conceptual site model. It should be noted that the numbers referred to for each of the pathways refers to the numbered pollutant linkages from the Initial Conceptual Site Model Plan, as presented in Appendix 1.

POTENTIAL SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	HAZARD SEVERITY	PROBABILITY OF OCCURRENCE	POTENTIAL RISK
<u>On site:</u> Graveley House gardens. - Polycyclic Aromatic Hydrocarbons (PAH). Metals.	Direct contact	Future residents	Human health effects [Medium]	Only residual levels of contaminants are likely to be present. [Low likelihood]	Medium/Low risk
	Ingestion Inhalation of dusts Consumption of home grown produce (1)				
	Direct contact (2)	Building materials and services	Minor degradation of sub-surface materials [Mild]	Contaminants not likely to be in leachable form. [Unlikely]	Low risk
	Horizontal & vertical migration (3)	Groundwater and surface water	Contamination of secondary aquifers [Medium]		Low risk
<u>On site:</u> Soil and rubble stockpiles: -Metals -Petroleum hydrocarbons -PAH. -Asbestos	Direct contact	Future residents	Human health effects [Medium]	No evidence that any waste soils have been mixed with the surface soils. [Unlikely]	Low risk
	Ingestion Inhalation of dusts Consumption of home grown produce (4)				
	Horizontal & vertical migration (5)	Groundwater and surface water	Contamination of secondary aquifers [Medium]	Contaminants not likely to be in leachable form. [Unlikely]	Low risk
	Direct contact	Building materials and services	Degradation of water supply pipes [Mild]	Contamination is unlikely to be at a depth that will impact on water supply pipes [Unlikely]	Negligible

POTENTIAL SOURCES AND CONTAMINANTS	PATHWAYS (REFERENCE FROM MODEL)	RECEPTORS	HAZARD SEVERITY	PROBABILITY OF OCCURRENCE	POTENTIAL RISK
<u>Off site:</u> Backfilled gravel pit 40m east of the site. - Landfill gases (mainly carbon dioxide and methane).	Migration of landfill gases and build up in buildings (6)	Residents.	Human health effects [Medium]	The gases emitted from the off site backfilled gravel pit can migrate through granular strata but given the expected general low permeability of the soils in the area, this is considered unlikely. [Unlikely]	Low risk

3.5. RECOMMENDATIONS

Potential contamination risks have been identified by this Phase 1 Desk Study and therefore a Phase 2 Contamination Assessment is recommended to assess the significance of these potential pollutant linkages. An intrusive ground investigation incorporating a Phase 2 Contamination Assessment is being undertaken by BRD and shall be reported separately.

4. IMPLICATIONS FOR CONSTRUCTION

4.1. GEOTECHNICAL CONSIDERATIONS

The following is a checklist summary of geotechnical hazards and their likelihood to have an impact on the proposed development of the site.

GEOTECHNICAL HAZARD	LIKELY TO AFFECT SITE?	COMMENT
Removal of existing sub-structures affecting new foundations.	✗	
Deep Made Ground.	✗	
Historic wells.	✗	
Soft or compressible natural deposits such as Alluvium or Peat.	✗	
Changes in ground conditions within short distances.	✓	Glaciofluvial and glacial till deposits can contain various lithologies. This may complicate the design and construction of foundations.
Fine soils that have a volume change capacity.	✓	The site is likely to be underlain in part by clayey soils, which can have an increased volume change potential. This will likely impact on foundation design and depths. Existing and proposed trees will further complicate foundations particularly where new buildings are proposed over or close to trees.
Dissolution features or 'swallow holes'.	✗	Due to the anticipated depth of the chalk, the present of solution features is considered to be unlikely.
Cambering of valley sides with possibility of 'gulls'.	✗	
Risk of slope instability.	✗	
Shallow groundwater.	✓	If encountered, shallow groundwater within the granular soils could present construction difficulties and have implications for the design of subsurface structures.
Underground mining.	✗	
Geological faults.	✗	

GEOTECHNICAL HAZARD	LIKELY TO AFFECT SITE?	COMMENT
Aggressive chemical environment for concrete e.g. expansive slag or high sulphate soils.	✓	Potential for high sulphate soils in the clay strata which may affect the design and construction of sub-surface structures.

4.2. PRELIMINARY GEOTECHNICAL ASSESSMENT

Subject to a site wide ground investigation, it is considered that conventional strip / trench fill footings founding into the clayey soils of the Lowestoft Formation (till) or Glaciofluvial Deposits could be suitable for the proposed development in areas outside of the influence of trees. Some restrictions to bearing properties may apply for the Glaciofluvial Deposits due to their variable nature and the presence of any shallow groundwater.

The presence of existing and former trees on site and around the periphery means that foundation depths may locally have to be deepened in these areas if clay soils are proven to be present.

However, if the bearing properties for the Glaciofluvial Deposits are found to be insufficient for the proposed loads imposed by the planned development, then it may be necessary to use piled foundations. This would also avoid potential problems associated with any high water demand trees in the vicinity of the proposed buildings.

Soakaways may be feasible in the western half of the site where predominately granular soils are anticipated (subject to any shallow groundwater), but are unlikely to be feasible in the eastern half of the site if extensive clays are encountered.

For any form of development, BRD recommend that an intrusive ground investigation is undertaken in order to confirm ground conditions and allow design of the new structures. An intrusive ground investigation incorporating a geotechnical assessment is being undertaken by BRD and shall be reported separately.

4.3. CONSTRUCTION CONSIDERATIONS

As with any construction site, if any anomalous material is encountered during the redevelopment then expert environmental advice should be sought.

REPORT SPECIFIC REFERENCES

- British Geological Survey sheet 221 “Hitchin” Solid and Drift edition (1:50,000) published 1995.
- British Geological Survey sheet 14 “Cambridge and Maidenhead” Hydrogeological Map of the area between Cambridge and Maidenhead edition (1:100,000) published 1984.

SUPPORTING INFORMATION

SITE CHARACTERISTICS

The site characteristics are collated from various information sources, including but not limited to Ordnance Survey, British Geological Survey (BGS), Environment Agency (EA) and local authorities.

BRD generally commission the Landmark Information Group to produce an Envirocheck Report for study sites and where employed this is included in the Appendices. It should be noted that some of the data provided in the Envirocheck report is not considered within BRD's interpretation for the site characteristics as it is not relevant. Examples of this are:

- Nitrate Sensitive Zones and Nitrate Vulnerable Zones are ignored as these are only applicable to agricultural activities relating to the application of manure and fertilisers to land.*
- River Quality is ignored as at this preliminary stage of risk assessment as all surface water bodies are considered equally sensitive to contamination risks.*

In assessing site characteristics, BRD also consider the area within a surrounding 250m buffer zone extending from the site boundary.

HISTORY

Mapped History

The site history summarises the changes in use or layout of the site over time and is largely developed from a study of available Ordnance Survey maps. It should be noted that changes to the site may have occurred between the editions of the maps employed to assess the history of the site. Historical information of relevance within the 250m surrounding the site is also discussed in a separate section. The historical plans referred to in the text are generally included in an Appendix.

Aerial photography

As a minimum, current and historical aerial images of the site and surrounding areas are studied from the Google Earth program. Where additional historic aerial photographs have been purchased then these are referenced within the technical report.

Internet Searches

A simple search of the internet for relevant material relating to the use or history of the site is made. Information obtained from internet searches has been accepted as fact without validation by BRD except for ensuring the source is reputable. It should be recognised that due to programme and budgetary constraints the search conducted may not have revealed all the information available.

GEOLOGY

The geology of the site is assessed by reference to the relevant British Geological Survey (BGS) 1:50,000 scale sheet in Bedrock and Superficial (historically Solid and Drift) edition. Many of these geological maps are relatively old with superseded terminology and descriptions. BRD therefore employ the BGS Open Geoscience website to determine current nomenclature of strata and to assist in determining geological boundaries against current topographic features. BRD also employ BGS Regional Geology Guides to assist in understanding the geological context of the site.



Ground Stability Hazards

Ground stability hazards caused by mining, ground dissolution, landslide potential, collapsible ground and natural cavities are identified by the Envirocheck database search of records held by The Coal Authority, British Geological Survey and studies completed by Ove Arup and Peter Brett Associates.

The Envirocheck database ground stability hazard entries for compressible ground, running sands and shrinking or swelling clays are not discussed directly. This is because these hazards are very common and are considered within the preliminary geotechnical assessment where necessary.

Radon

Radon is a naturally occurring colourless and odourless gas that is radioactive. It is formed by the radioactive decay of radium which in turn is derived from the radioactive decay of uranium, both of which are minerals that can be found in many soil types. Whilst it is recognised that the air inside every house contains radon, some houses built in certain defined areas of the country might have unacceptably high concentrations and require special precautions to be taken during construction to reduce this risk.

Radon can move through cracks and fissures in the soil into the atmosphere or into buildings via basements and/or underfloor voids. If radon enters the living space of buildings its concentration can potentially increase and provide a risk to human health as the inhalation of the radioactive decay products of radon gas can increase the risk of developing lung cancer.

The maps contained within ‘Radon: Guidance on protective measures for new buildings’ (2015) identify areas where no radon protection measures are necessary or where higher concentrations are present that either basic or full radon protection measures are required to be fitted to all new buildings together with supplementary advice concerning extensions, conversions and refurbishments. However, some local authorities have local bylaws, that BRD may not be aware of, that insist on radon protection to all new dwellings within their area regardless of the recommendations of the ‘Radon: Guidance on protective measures for new buildings’ (2015) report.

Basic radon protection measures comprise incorporation of a continuous gas resistant membrane sealed at joints and around service entries into the floor construction and extended across the cavity tray.

Full radon protection measures comprise incorporating a continuous gas resistant membrane into the floor construction together with a ventilated sub-floor void through either the use of suspended floor construction or a ‘radon sump’. The membrane is sealed at joints and around service entries into the floor and extended across the cavity tray.

‘Radon: Guidance on protective measures for new buildings’ (2015) should be referred to for detail on the construction of the protective measures.

HYDROGEOLOGY

Aquifer Designations

The Environment Agency's Groundwater Protection Policy uses designations that reflect the importance of aquifers in terms of groundwater as a drinking water resource, but also their role in supporting surface water flows and wetland ecosystems.

In defining groundwater vulnerability, both the superficial (drift) deposits and bedrock (solid) geology are considered separately with the following aquifer designations:

- *Principal Aquifers: These are layers of rock or drift deposits that have high intergranular and/or fracture permeability - meaning they usually provide a high level of water storage. They may support water supply and/or river base flow on a strategic scale.*
- *Secondary Aquifers: These include a wide range of rock layers or drift deposits with an equally wide range of water permeability and storage. Secondary aquifers are subdivided into two types:*
 - *Secondary A - permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers.*
 - *Secondary B - predominantly lower permeability layers which may store and yield limited amounts of groundwater due to localised features such as fissures, thin permeable horizons and weathering.*
- *Secondary Undifferentiated - has been assigned in cases where it has not been possible to attribute either category A or B to a rock type.*
- *Unproductive Strata: These are rock layers or drift deposits with low permeability that have negligible significance for water supply or river base flow.*

Source Protection Zones

The Environment Agency (EA) has defined Source Protection Zones for groundwater sources, such as boreholes and springs, that are used for public water supply. The EA uses the zones to target pollution prevention measures and monitor the activities of potential polluters within the affected area. There are three types Source Protection Zone:

- *Zone 1 (Inner Protection Zone) is the most sensitive area within which pollution could reach the borehole within 50 days. Alternatively it is defined by a minimum 50m radius around the borehole.*
- *Zone 2 (Outer Protection Zone) are defined by the area within which pollution could reach the borehole within 400 days or 25% of the total catchment area.*
- *Zone 3 (Total Catchment) are defined by the total area required to support the removal of water from the borehole.*

HYDROLOGY

Flooding

The Environment Agency has zoned England and Wales in respect of the risk from flooding from 'highly unlikely' in Zone 1 to 'likely' in Zone 3. The zones ignore the presence of flood defences or certain other manmade structures and channel improvements.

National Planning Policy Framework, Department for Communities and Local Government, dated March 2012 states "A site-specific flood risk assessment is required for proposals of 1 hectare or greater in Flood Zone 1; all proposals for new development (including minor development and change of use) in Flood Zones 2 and 3, or in an area within Flood Zone 1 which has critical drainage problems (as notified to the local planning authority by the Environment Agency); and where proposed development or a change of use to a more vulnerable class may be subject to other sources of flooding".

ENVIRONMENTAL ASPECTS

Landfill

The database of the Environment Agency of active and historic landfills is searched for all sites. Sometimes additional historic landfill data is available from the British Geological Society and local authorities to identify nearby landfill sites. It should be noted that landfill sites that closed prior to 1974 and unlicensed disposal activities will not necessarily be revealed by this search.

Pollution Incidents

The Environment Agency ceased recording 'Pollution Incidents to Controlled Waters' in 2000, when they commenced the replacement 'Substantiated Pollution Incident Register'. BRD do not consider any 'Category 3 - Minor Incident' on the 'Pollution Incidents to Controlled Waters' database as relevant to assessing the site due to the time elapsed and the low level of impact that occurred. Again due to the time elapsed and the fact that remedial measures would have been undertaken at the time, 'Category 1 - Major Incident' and 'Category 2 - Significant Incident' are only considered relevant if the impacted controlled water was on or immediately adjacent to the site.

On the 'Substantiated Pollution Incident Register', BRD approach to this information in the following manner:

- Pollution incidents impacting 'air' only are not considered relevant.
- Pollution incidents to 'water' are only considered where the surface water impacted is either on, flows through or is immediately adjacent to the site.
- Pollution incidents to 'land' are only considered where these are on or immediately adjacent to the site unless there are grounds to consider that the incident had the potential to impact groundwater that may have migrated beneath the site.
- Category 4 potential pollutant incidents are recorded, but upon investigation were found to have had no impact and accordingly are not considered relevant.

Ecologically Sensitive Land Use

The land uses that are identified as ecologically sensitive are those identified as Sites of Special Scientific Interest (SSSI), Special Areas of Conservation, Special Protection Areas, Ramsar sites, Natural Parks, Natural Nature Reserves, Marine Nature Reserves, Local Nature Reserves, Green Belt, Forest Parks, Environmentally Sensitive Areas, or Areas of Outstanding Natural Beauty.



CONTAMINATION ASSESSMENT METHODOLOGY

UK Policy

The UK Government's policy in relation to land affected by historic contamination is based on a 'suitable for use' approach. The approach recognises that the risks presented by any given level of contamination will vary greatly according to the use of the land and a wide range of other factors, such as the underlying geology of the site. Contamination risks therefore need to be assessed on a site-by-site basis. The 'suitable for use' approach limits requirements for remediation to the work necessary to prevent unacceptable risks to human health or the environment in relation to either the current use or future use of the land.

The three main drivers for contamination assessment and remediation are:

- Voluntary action.*
- Development as part of the planning regime.*
- Regulatory action to mitigate unacceptable risks e.g. Part 2A of the Environmental Protection Act 1990.*

Pollutant Linkages

For a contamination risk to exist there must be a 'pollutant linkage' from the contaminant (source) via a pathway (the route from contaminant to receptor) to a receptor (the entity that could be harmed). The absence of a contaminant, pathway or receptor breaks the pollutant linkage and therefore no contamination risk exists.

Contamination is typically present at a site (in the ground and/or in the underlying groundwater) as a result of a historic or current industrial use, usually as a result of leaks, spills or disposal of residues, wastes and excess raw materials from the industrial processes. Contamination may also be present due to:

- The deliberate application of chemicals e.g. the spraying of herbicide/pesticide.*
- Migration of pollutants from adjacent land.*
- Naturally occurring processes e.g. elevated concentrations of particular heavy metals associated with specific geological strata.*

Conceptual Site Model

The conceptual site model can be defined as a textual or graphical representation of the identified pollutant linkages for a given site. The model forms the basis for designing the investigation as the aim will be to target all of the potential pollutant linkages to determine, through the subsequent phases of risk assessment, whether or not they pose an actual risk.

It is important that the conceptual site model is updated with new information as the various investigation, risk assessment and remediation works are completed.

Technical Guidance

The technical and legal framework for contamination assessment is complex. The process adopted through this report for assessing contamination risks is in general accordance with the following guidance, as listed below:

- 'Investigation of Potentially Contaminated Sites - Code of Practice - BS 10175: 2011', BSi, 2011.
- 'Model Procedures for the management of Land Contamination - CLR Document No. 11', Environment Agency, 2004.
- 'Guidance for the safe development of housing on land affected by contamination - R&D66: 2008', NHBC/Environment Agency, 2008.

Risk Assessment Methodology

In line with the technical guidance, the contamination risk assessment follows a series of phased stages for each particular site:

PHASE	DESCRIPTION	RISK ASSESSMENT STAGE
PHASE 1	Generally limited to desk based research and a site walkover survey to develop an initial conceptual site model and identify what risks, if any, are likely to be presented by the site.	Hazard Identification and Assessment A preliminary stage of risk assessment concerned with identifying and characterising the hazards that may be associated with a particular site and identifying potential pollutant linkages.
PHASE 2	This phase is concerned with establishing whether contamination is present, usually through intrusive ground investigation, and then evaluating the degree and magnitude of the associated risks.	Risk Estimation A stage concerned with estimating the likelihood that receptors will suffer adverse effects if they come into contact with, or are otherwise affected by, a hazardous substance or agent under defined conditions. Risk Evaluation A stage of risk assessment concerned with evaluating the acceptability of estimated risks, taking into account the nature and scale of the risk estimates, any uncertainties associated with the assessment and the broad costs and benefits of taking action to mitigate risks.
PHASE 3	The appraisal and selection of remediation techniques, their implementation and verification.	Risk Management The process whereby decisions are made to accept a known or assessed risk and/or the implementation of action to reduce the consequences or probabilities of occurrence.

Risk Classification

The objective of risk assessment is to identify the nature and magnitude of the potential risks and should be based on a consideration of both:

- The likelihood/probability of an event [taking into account both the presence of the hazard and receptor and the integrity of the pathway].
- The severity of the potential consequence [taking into account both the potential severity of the hazard and the sensitivity of the receptor].

There is a need for a logical, transparent and repeatable system in defining the categories of severity of consequence and likelihood as well as for the risk itself and therefore the following risk rating matrix is employed:

		SEVERITY OF CONSEQUENCE			
		SEVERE	MEDIUM	MILD	MINOR
PROBABILITY	HIGH LIKELIHOOD	Very High Risk	High Risk	Moderate Risk	Moderate/Low Risk
	LIKELY	High Risk	Moderate Risk	Moderate/Low Risk	Low Risk
	LOW LIKELIHOOD	Moderate Risk	Moderate/Low Risk	Low Risk	Negligible Risk
	UNLIKELY	Moderate/Low Risk	Low Risk	Negligible Risk	Negligible Risk

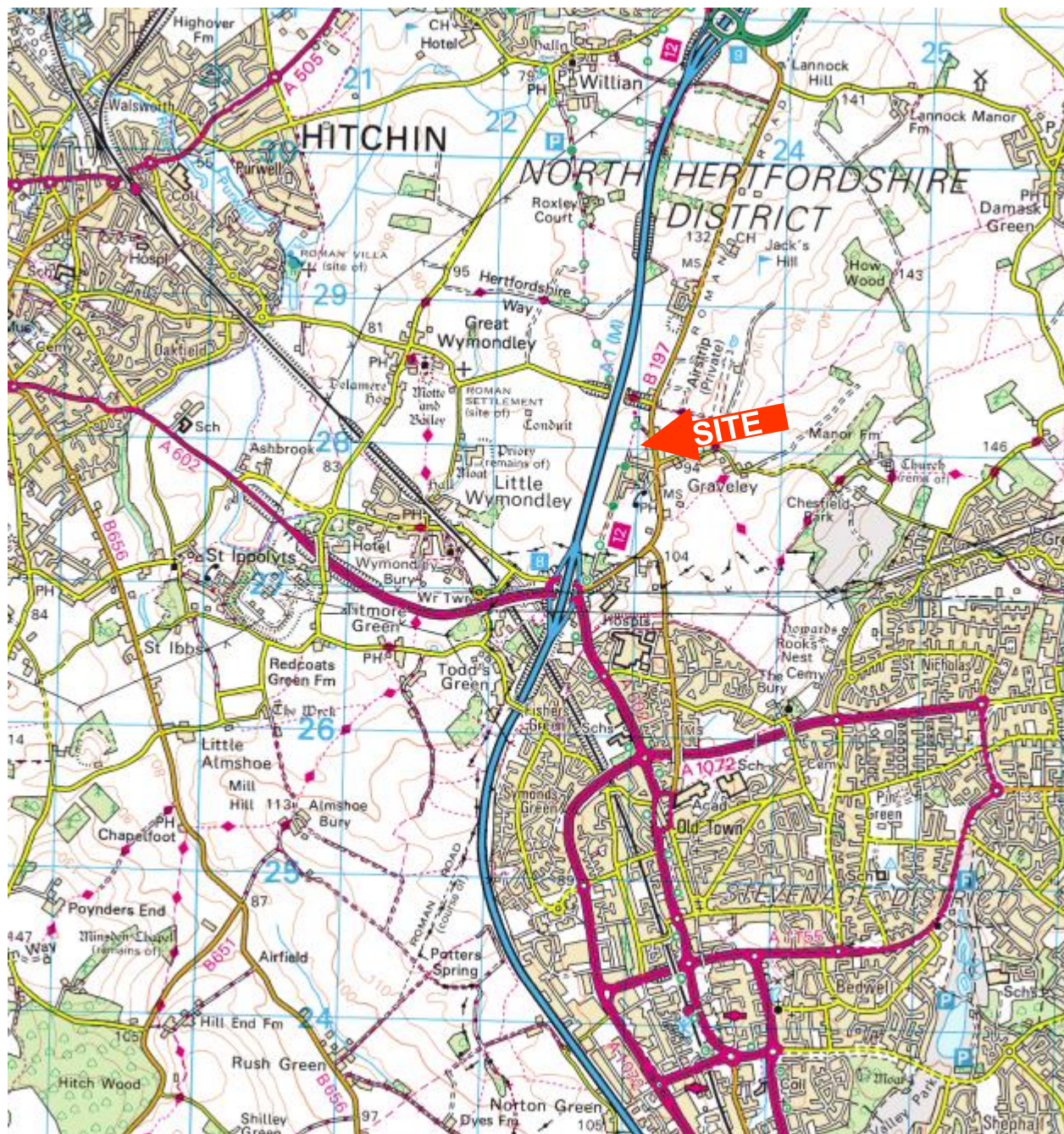
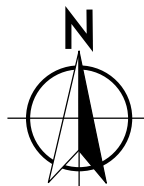
These risk classifications are defined as follows:

- **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 appropriate remediation action.
- **High Risk** - Harm is likely to arise to a designated receptor from an identified hazard at the site without appropriate remediation action.
- **Moderate Risk** - It is possible that without appropriate remediation action harm could arise to a designated receptor. It is relatively unlikely that any such harm would be severe, and if any harm were to occur it is more likely that such harm would be relatively mild.
- **Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. It is likely that, at worst if any harm was realised any effects would be mild.
- **Negligible Risk** - The presence of an identified hazard does not give rise to the potential to cause harm to a designated receptor.

This preliminary risk assessment matrix and classification system is based on guidance produced by Department for Environment, Food and Rural Affairs (Defra) and the Environment Agency in connection with contaminated land assessment.

APPENDIX 1

Site Location Plan



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Not to scale.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD3930-OP2-A
Date Issued: June 2021

Site Walkover Photographs



Plate 1: Site entrance of driveway to 37-42, High Street. Looking west.



Plate 2: Overgrown embankment towards driveway.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD3930-OP3-A
Date Issued: June 2021

Site Walkover Photographs



Plate 3: View of the fenced eastern boundary of the site looking south.



Plate 4: View of the southern part of the site.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD3930-OP3-A
Date Issued: June 2021

Site Walkover Photographs



Plate 5: View of the west of the site.



Plate 6: View of the north-western corner of the site.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD3930-OP3-A
Date Issued: June 2021

Site Walkover Photographs



Plate 7: View of stumps of recently felled trees looking northwest.



Plate 8: Detailed view of one of the mounds present on site showing rubble and mixed soils.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD3930-OP3-A
Date Issued: June 2021

Site Layout Plan



Key:



Site Boundary



Soils/rubble mounds (approximate location & extents)

Reproduced from Google Earth.

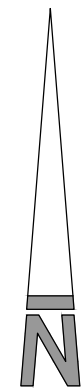
Not to scale.

All positions illustrative only.

Project Title: Milksey Lane, Graveley
Client: Gade Homes
BRD Reference: BRD930-OP5-A
Date Issued: June 2021



01295 272244
info@brduk.com



COUNTRY SIDE .



GRAVELEY HOUSE .

0 5 10 15 25 50 75
SCALE 1:500

NOTES

1. Contractors must check all dimensions on site. Only figured dimensions are to be worked from. Discrepancies must be reported to the Architect or Engineer before proceeding.
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REV	DESCRIPTION	DRN	CHD	DATE	
☒	PRELIMINARY	☐	INFORMATION	☐	TENDER
☐	CONSTRUCTION	☐	AS BUILT		
SCALE	1:500 @ A2	DATE	July 2021		
DRAWN	AJS	CHK	JAL		
DRAWING NO.	18945/1000	REV	-		
TITLE	Land South Of Milksey Lane Graveley				
DETAILS	Proposed Sketch Layout				

 **Woods Hardwick**
Architecture | Engineering | Planning | Surveying

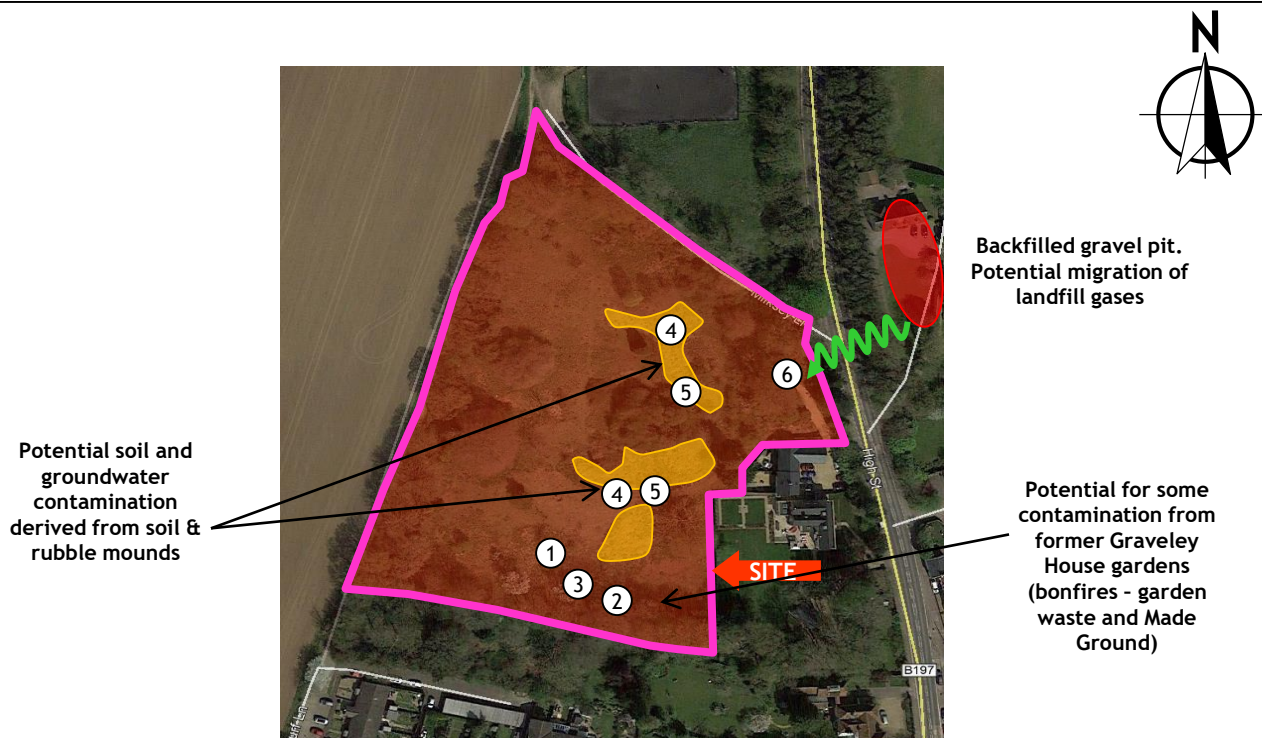
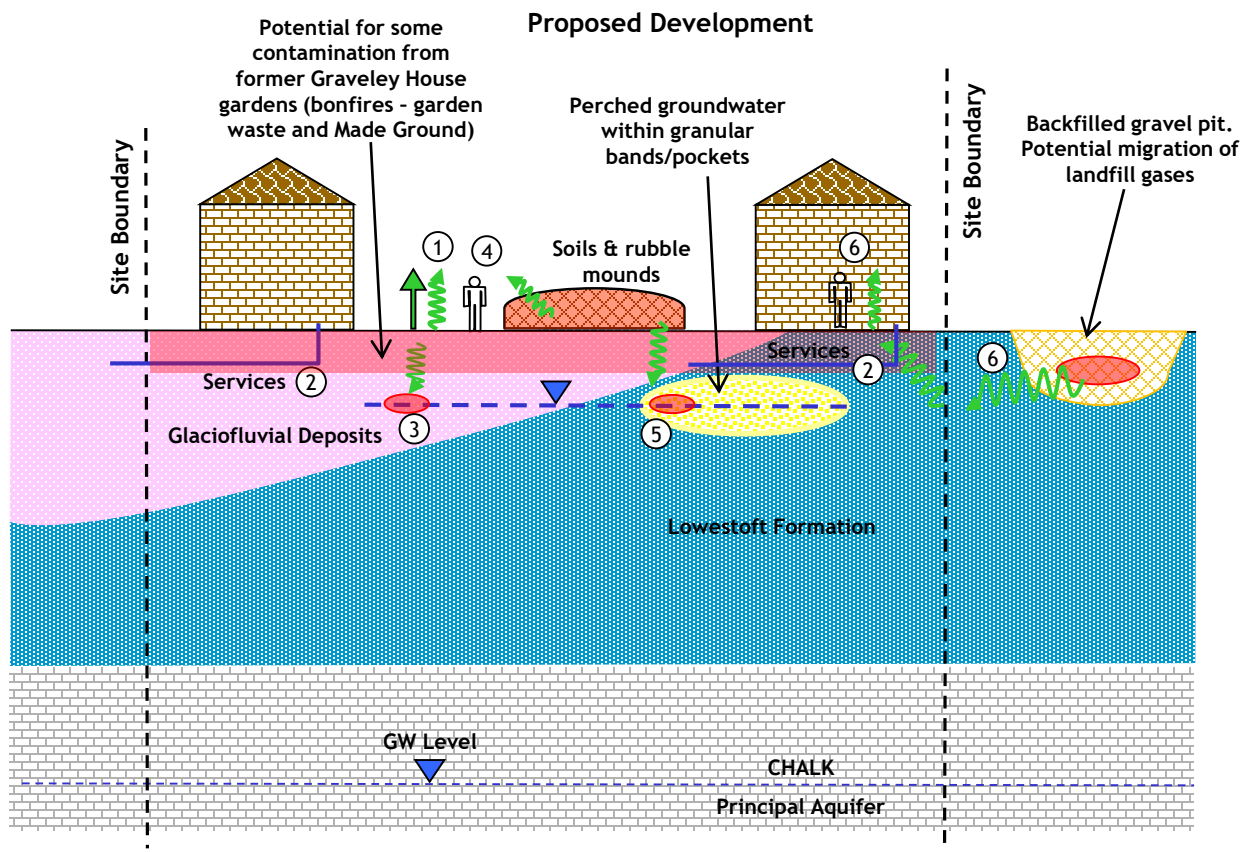
BEDFORD : HEAD OFFICE
15-17 Goldington Road
Bedford MK40 3NH
T: +44 (0) 1234 268862

BIRMINGHAM
Fort Dunlop, Fort Parkway
Birmingham B24 9FE
T: +44 (0) 121 6297784

ONLINE: mail@woodshardwick.com | woodshardwick.com

PLEASE CONSIDER THE ENVIRONMENT BEFORE PRINTING THIS DRAWING

Initial Conceptual Model

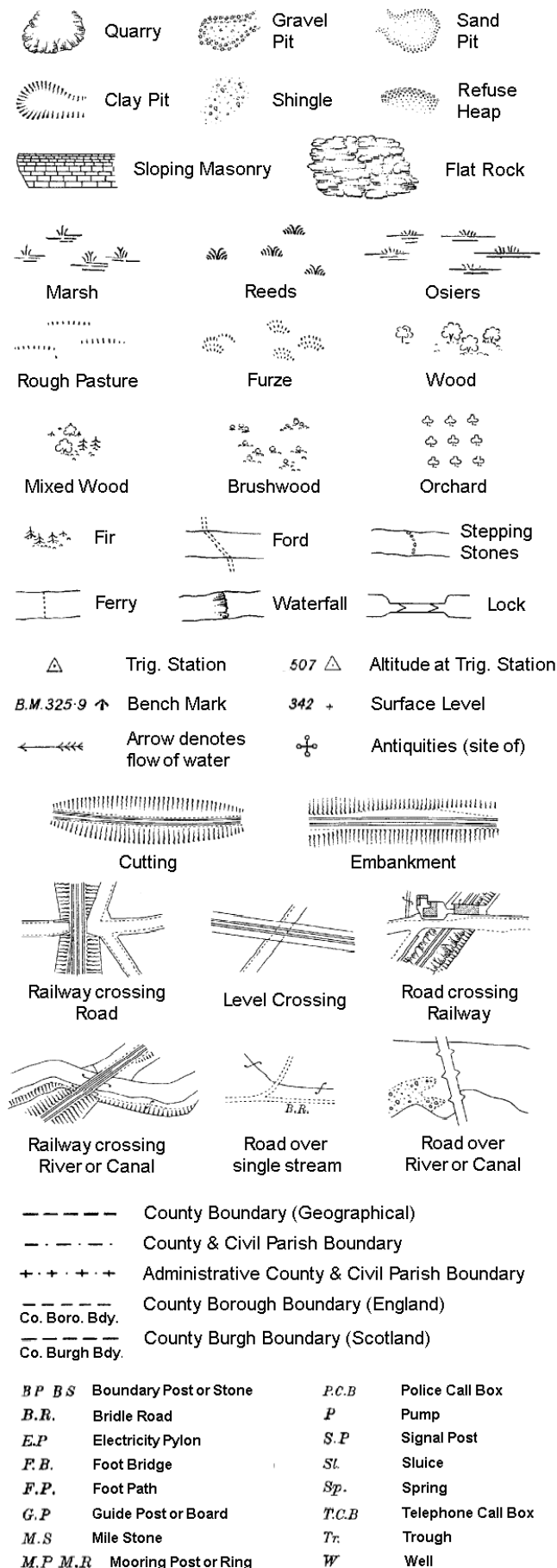


Project Title: Milksey Lane, Graveley
 Client: Gade Homes
 BRD Reference: BRD930-OP4-A
 Date Issued: June 2021

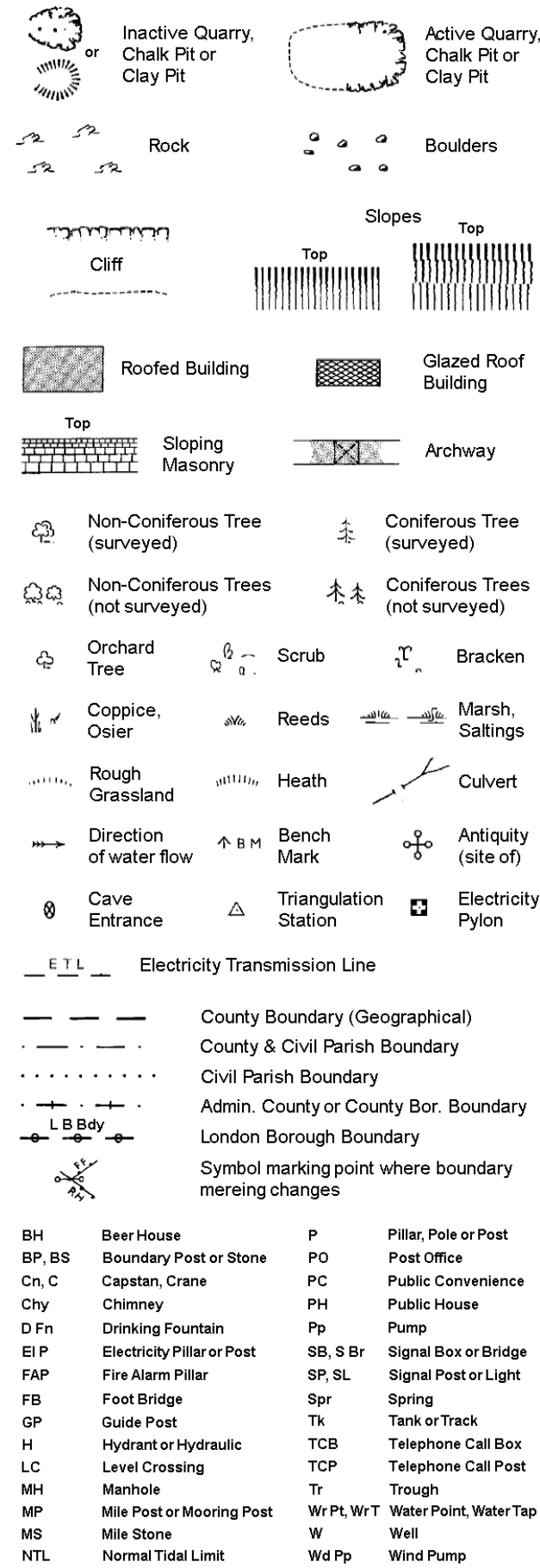
APPENDIX 2

Historical Mapping Legends

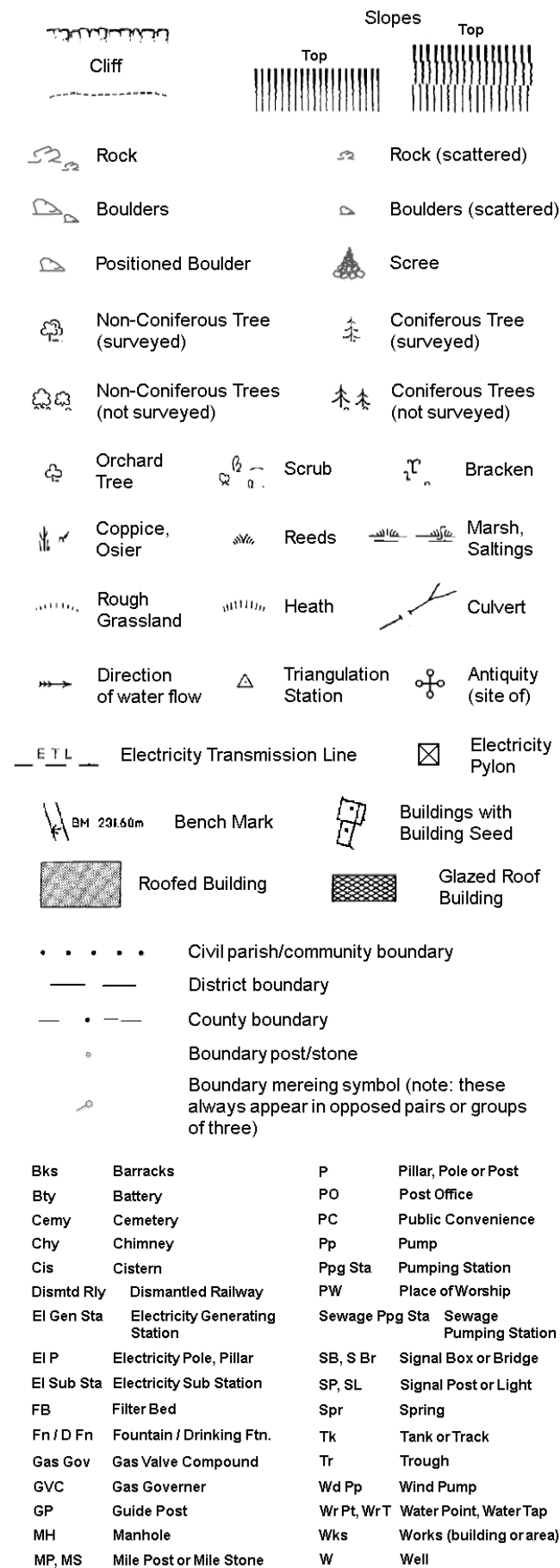
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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



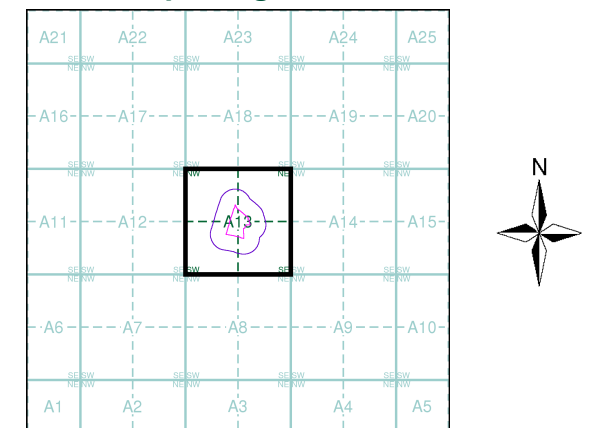
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
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Hertfordshire	1:2,500	1898	3
Hertfordshire	1:2,500	1923	4
Ordnance Survey Plan	1:2,500	1972 - 1974	5
Additional SIMs	1:2,500	1991 - 1992	6
Large-Scale National Grid Data	1:2,500	1993	7
Large-Scale National Grid Data	1:2,500	1993	8
Historical Aerial Photography	1:2,500	2000	9

Historical Map - Segment A13



Order Details

Order Number: 280856870_1_1
Customer Ref: BRD3930
National Grid Reference: 523010, 228050
Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

Site Details

Land at Milksey Lane/High Street, Graveley, Hitchin, SG4 7LA



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



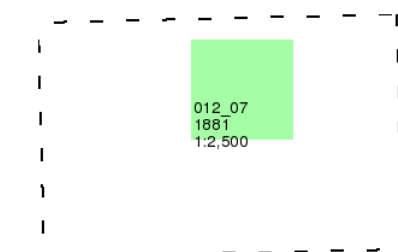
Hertfordshire

Published 1881

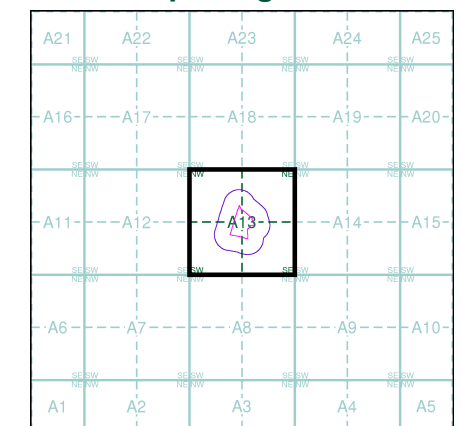
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The historical maps shown were reproduced from maps predominantly held at the scale adopted for England, Wales and Scotland in the 1840's. In 1854 the 1:2,500 scale was adopted for mapping urban areas and by 1896 it covered the whole of what were considered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

Map Name(s) and Date(s)



Historical Map - Segment A13



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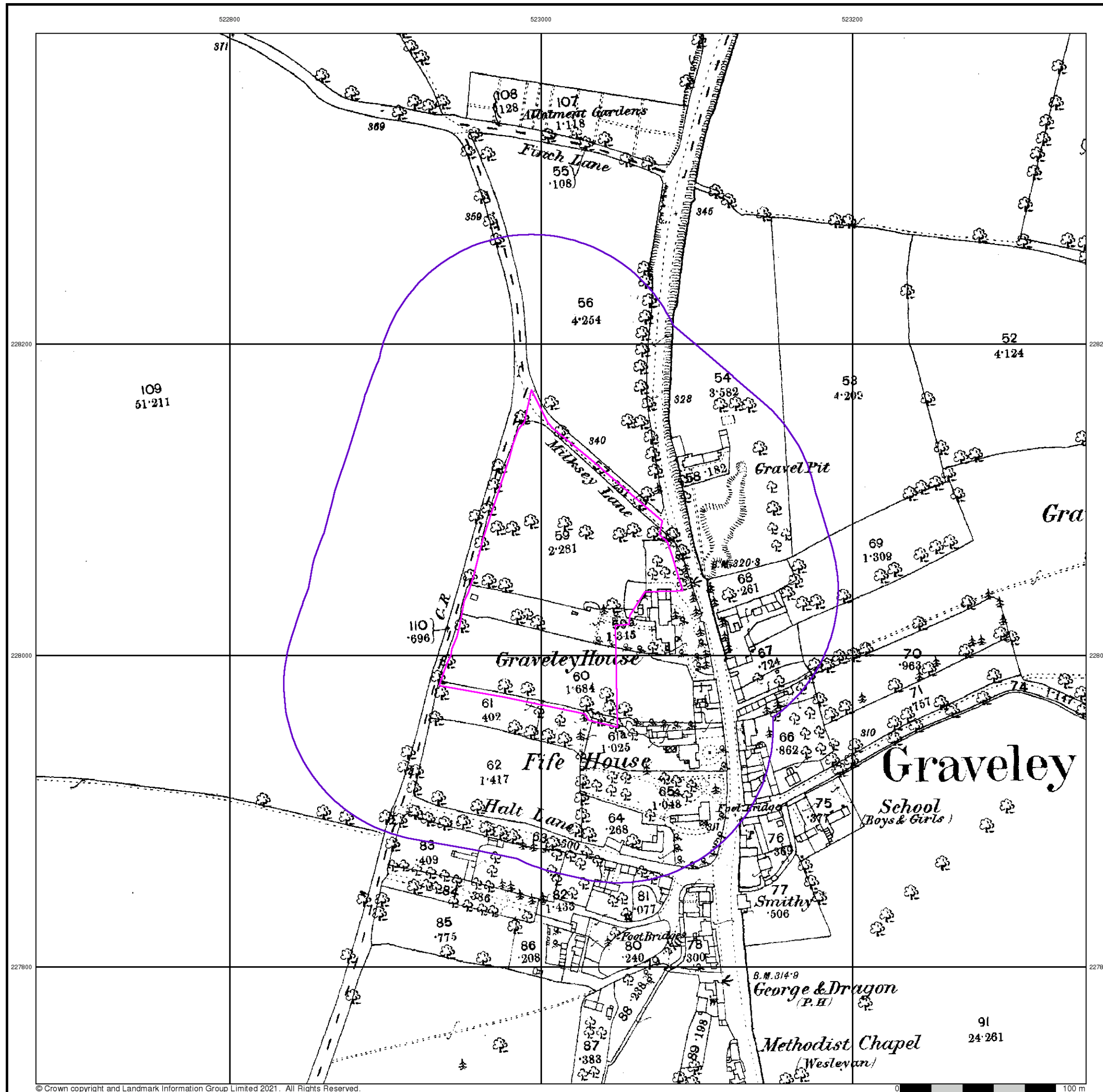
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Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

Site Details

Land at Milksey Lane/High Street, Graveley, Hitchin, SG4 7LA

Landmark
INFORMATION GROUP

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





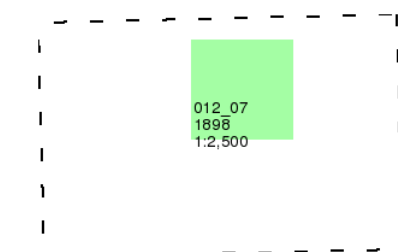
Hertfordshire

Published 1898

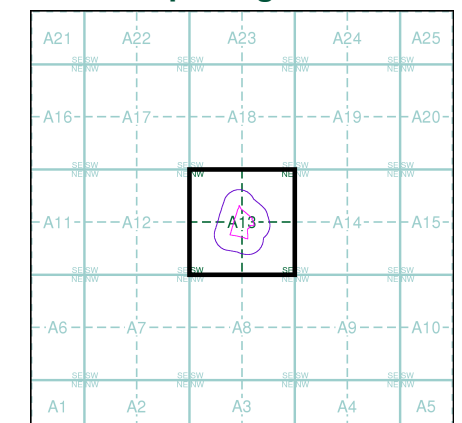
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Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

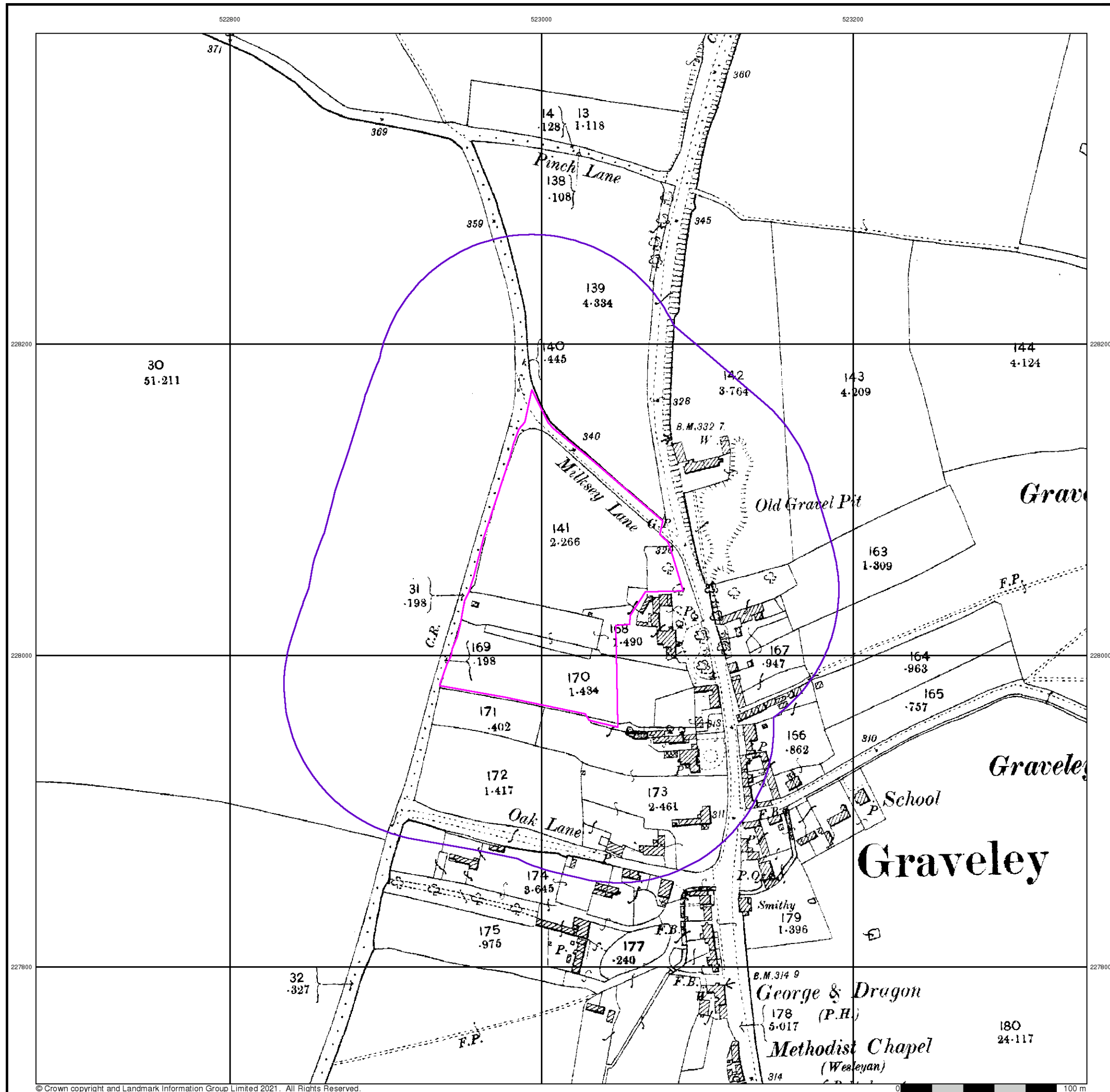
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Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

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Landmark
INFORMATION GROUP

Tel: 0844 844 9952
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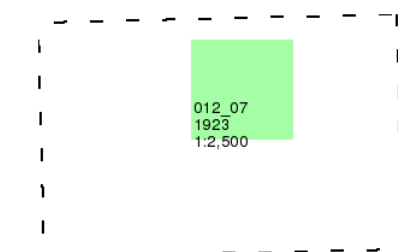
Hertfordshire

Published 1923

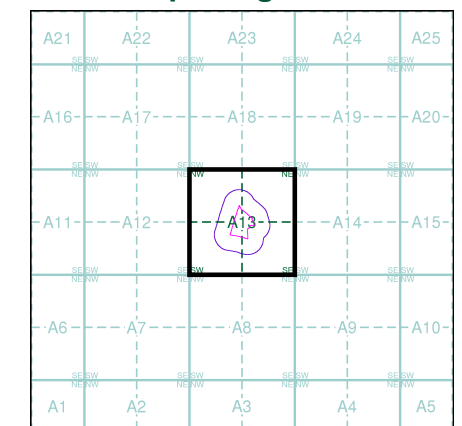
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Map Name(s) and Date(s)



Historical Map - Segment A13



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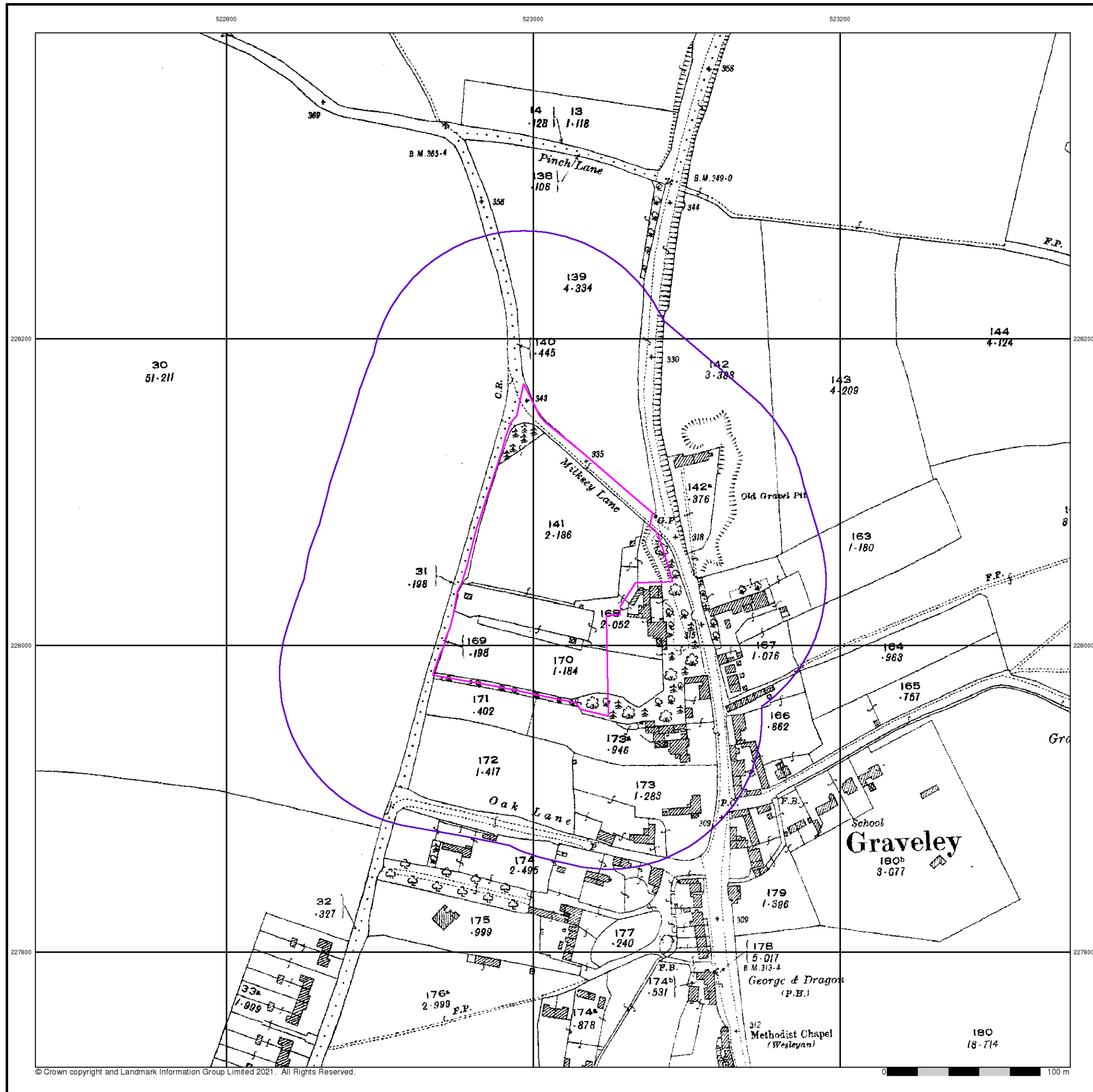
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National Grid Reference: 523010, 228050
Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

Site Details

Land at Milksey Lane/High Street, Graveley, Hitchin, SG4 7LA

Landmark
INFORMATION GROUP

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





Ordnance Survey Plan

Published 1972 - 1974

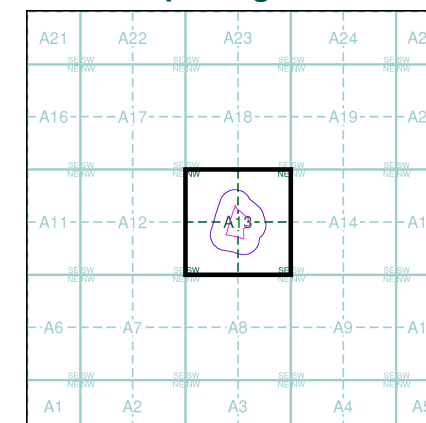
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Map Name(s) and Date(s)

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TL2227 1974 1:2,500	TL2327 1974 1:2,500

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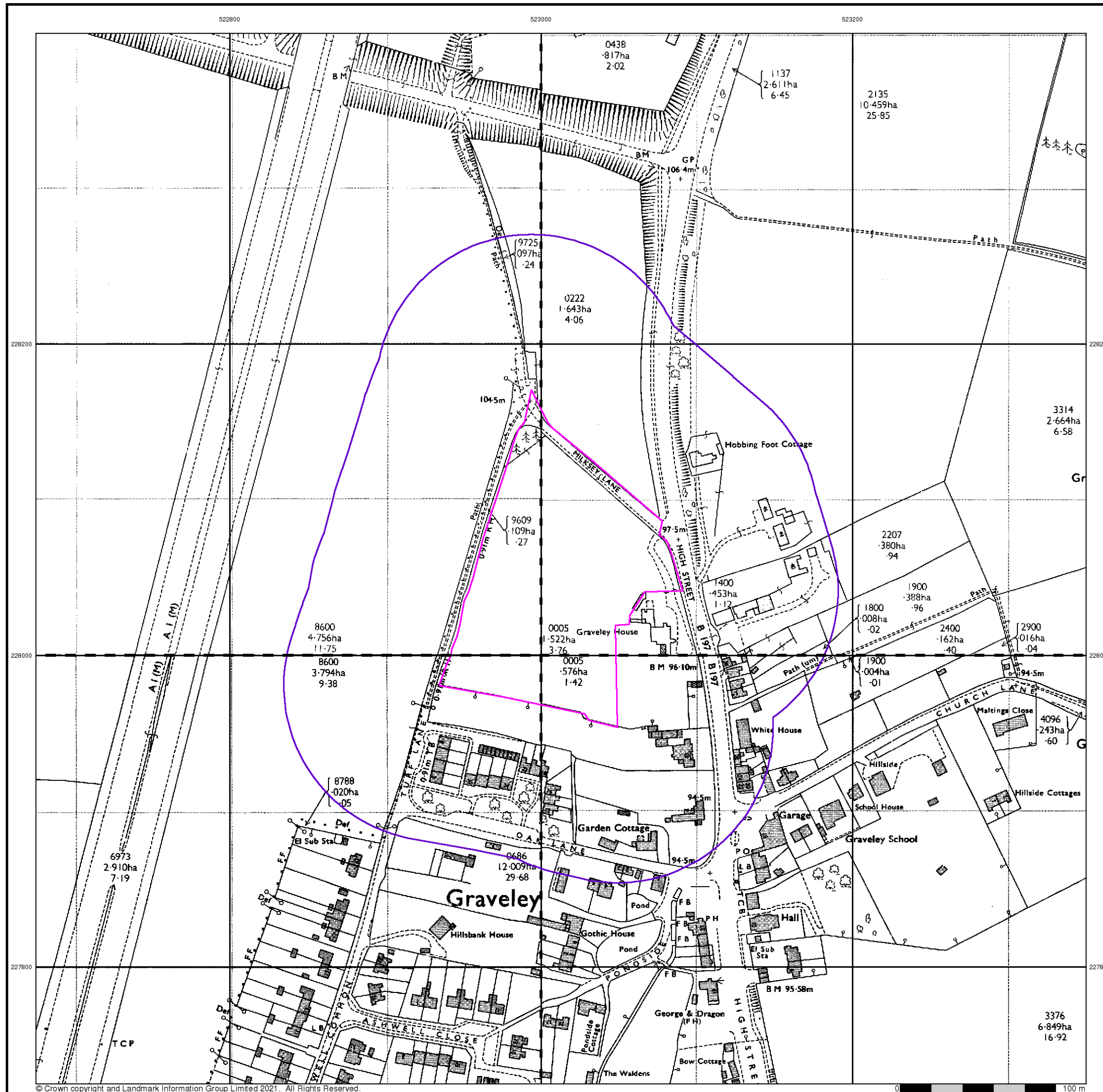
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Customer Ref: BRD3930
National Grid Reference: 523010, 228050
Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

Site Details

Land at Milksey Lane/High Street, Graveley, Hitchin, SG4 7LA

Landmark
INFORMATION GROUP

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





Additional SIMs

Published 1991 - 1992

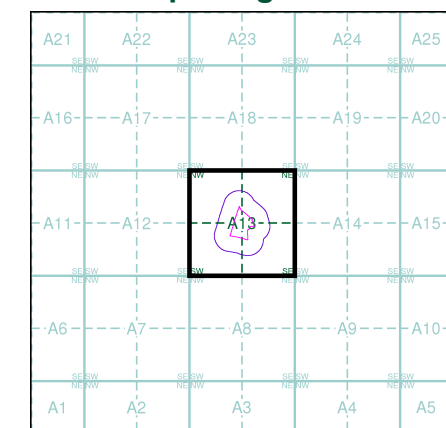
Source map scale - 1:2,500

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

Map Name(s) and Date(s)

TL2228	TL2328
1991	1992
12,500	12,500
TL2227	TL2327
1991	1991
12,500	12,500

Historical Map - Segment A13



Order Details

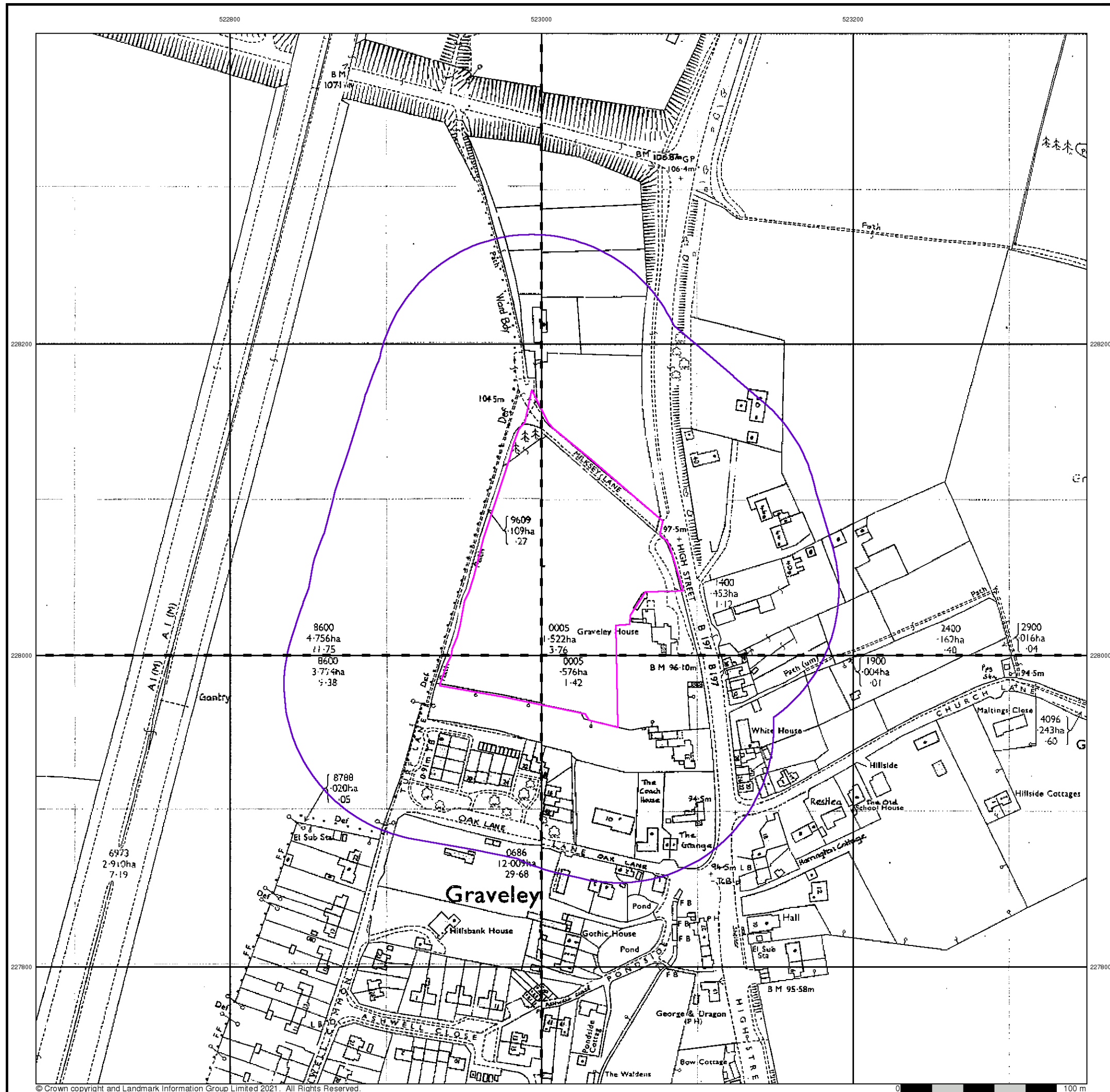
Order Number: 280856870_1_1
Customer Ref: BRD3930
National Grid Reference: 523010, 228050
Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

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Large-Scale National Grid Data

Published 1993

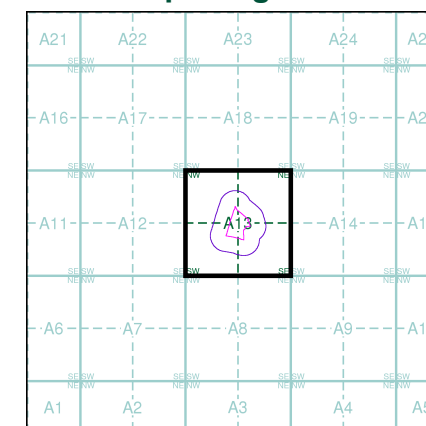
Source map scale - 1:2,500

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

Map Name(s) and Date(s)

TL2228 1993 12,500	TL2328 1993 12,500
	TL2327 1993 12,500

Historical Map - Segment A13



Order Details

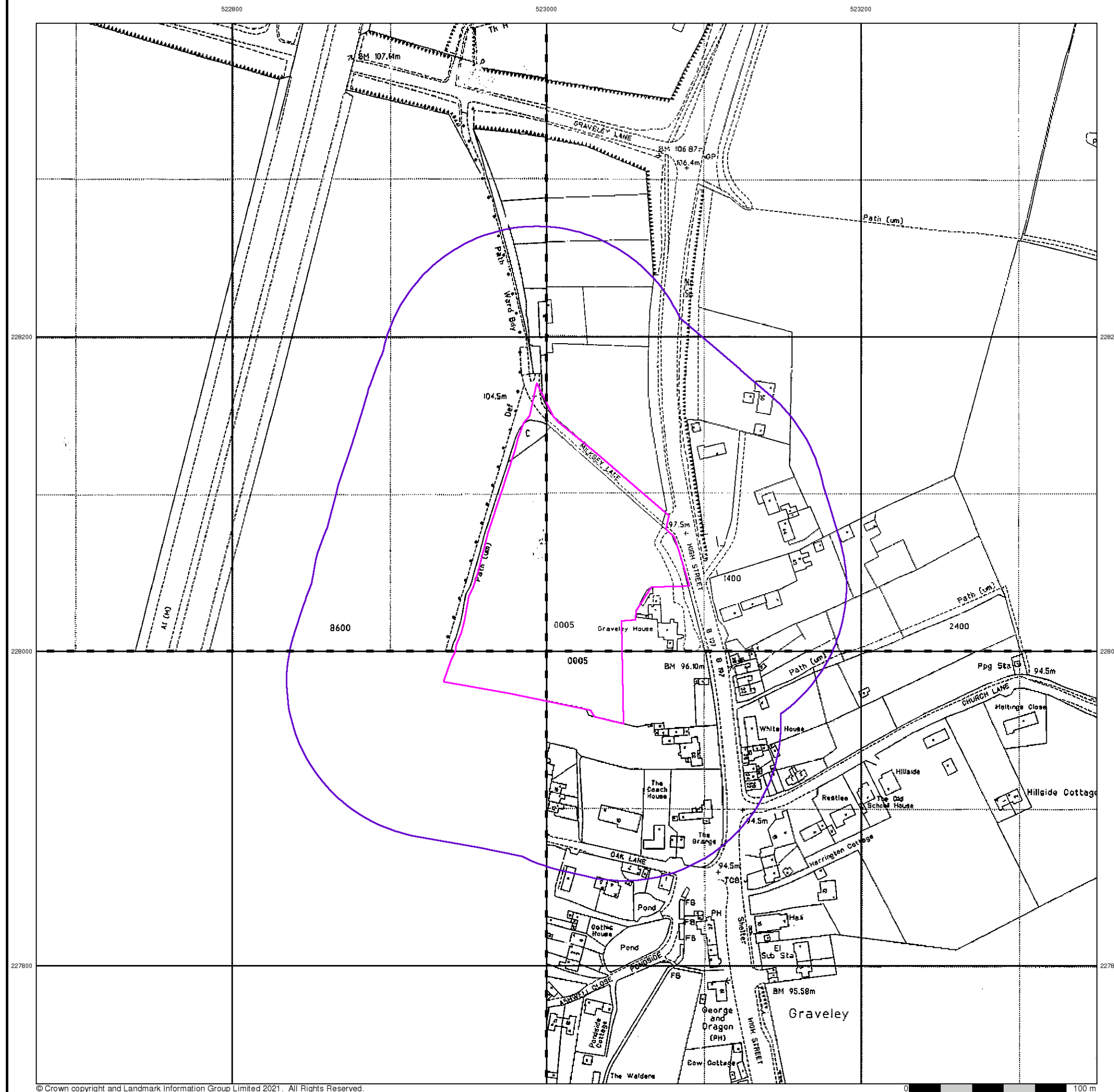
Order Number: 280856870_1_1
Customer Ref: BRD3930
National Grid Reference: 523010, 228050
Slice: A
Site Area (Ha): 1.77
Search Buffer (m): 100

Site Details

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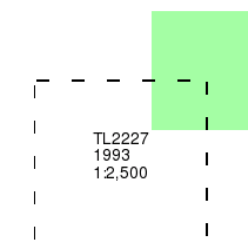
Large-Scale National Grid Data

Published 1993

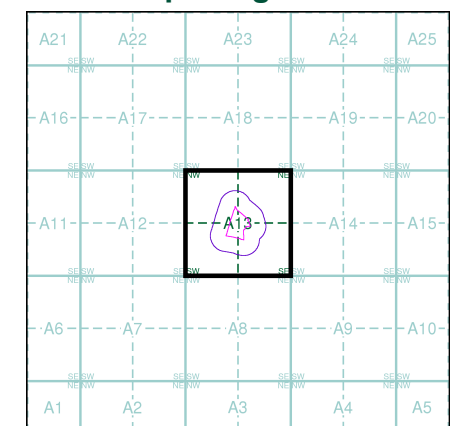
Source map scale - 1:2,500

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Map Name(s) and Date(s)



Historical Map - Segment A13



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Order Number: 280856870_1_1
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National Grid Reference: 523010, 228050
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