



Phase I Geo-Environmental Desk Study

76 Commerce Street
Melbourne
Derbyshire
DE73 8GP

Prepared for:

The Loughborough Building Society
6 High Street,
Loughborough
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EPS Project Reference: UK15.1832

Date Issued: 16th April 2015

Report Status: Final

76 COMMERCE STREET, MELBOURNE

NON TECHNICAL SUMMARY

This report presents the findings of a Phase I Geo-Environmental Desk Study which was carried out to identify potential contamination from previous or current uses of the site and the surrounding area and to provide an initial assessment of geological and geotechnical aspects of the site and how the proposed development or surrounding environment might be affected.

- The site currently comprises a large disused building with various units that have recently been used for a number of purposes by Executive Linen and Advance Lighting and also includes office space and manufacturing work. A basement underlies the entire building. No proposed development plan has been supplied however it is understood that it may comprise up to ten residential properties.
- Ground conditions are indicated to comprise Rough Rock which may have some groundwater resource potential which combined with the sites historic usage makes the site environmentally sensitive.
- Historic mapping suggests that the site has historically been used as a boot and shoe factory and has been developed since the early 19th century. More recently the site has been used by Executive Linen and Advance lighting for the combined purpose of manufacturing work and office space.
- It has not been possible to discount potential contamination risks to human receptors, flora and controlled waters associated with the sites previous historic use as a boot and shoe factory and its more recent uses which have included manufacturing work. It has therefore been recommended that an intrusive investigation is undertaken to assess the nature and quality of shallow soils.
- It is recommended that a copy of this report is forwarded to South Derbyshire District Council for inclusion in their land quality records.

By their very nature, the above bullet points represent a simplified summary of our work and should not be relied upon to form the basis for key decisions for the proposed development. A full picture is provided in the following report, or alternatively give us a call and we'll talk you through it.

Project Reference:	UK15.1832	
Title:	Phase I Geo-Environmental Desk Study 76 Commerce Street, Melbourne	
Client:	The Loughborough Building Society	
Date:	16 th April 2015	
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Status:	Final	

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The report has been written, reviewed and authorised by the persons listed above. It has also undergone EPS' in house quality management inspection. Should you require any further assistance regarding the information provided within the report, please do not hesitate to contact us.

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1 INTRODUCTION

In February 2015, Environmental Protection Strategies Ltd (EPS) was commissioned by The Loughborough Building Society to complete a Phase I Geo-Environmental Desk Study at the site of the former 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP ('the site'); see Figure 1.

The work was commissioned in order to fulfil pre-planning requirements for the construction of up to ten residential properties, although no proposed development plan has been provided.

This report presents the findings, conclusions, and recommendations of the Phase I Desk Study undertaken for the site as instructed.

1.1 Background

A Desk Study comprises the first stage of any geo-environmental assessment, the purpose of which is to determine what potentially contaminative activities may have occurred at the property or the surrounding area which may pose an environmental or geological risk to site users, the surrounding environment or proposed development, either at present or in the future.

The method used in this investigation to assess the environmental risk posed is based on the concept of 'contaminant linkage', which considers the following three factors:

Source	The location from which an environmentally hazardous / contaminative substance is, (or was,) derived.
Receptor	An environmentally sensitive object or condition e.g. person, property, controlled water, or ecological system, which may be present now or in future.
Pathway	A route or mechanism via which a source could come into contact with a receptor to cause significant harm.

If all three factors are identified, there is the potential for a 'contaminant linkage' to be active, which could result in significant harm being caused to the environment or human health.

1.2 Objectives

The purpose of this desk study is to evaluate the potential contaminant linkages that may be active at the site in its current condition, or could become active in future, and to determine if any action is required to investigate them further or to break them to ensure the site is safe and suitable for its proposed end use.

This is achieved by carrying out the following activities:

- Examining the site history - late 1800s to present day, through collection of historical maps of the area, site records, records held by relevant local authorities, the Environment Agency and review of other information databases.
- Characterising the sites environmental and geological sensitivity through examination of existing geological, hydrogeological, topographical, and historical maps and aerial photographs of the area.

- c) Identifying Potential Areas of Concern (PAOCs) through a combination of historical map and data review and site inspection together with interview of key site personnel.
- d) Consideration of any future plans for the site and the effects any proposed changes may have on contaminant linkages over time.
- e) Development of a site conceptual model and contaminant linkage assessment to determine the potential risks posed by the site and make recommendations for any further work that may be required and to ensure suitability for use and safe development in accordance with the *Model Procedures for the Management of Land Contamination* - Contaminated Land Report 11 and the *National Planning Policy Framework (2012)*.

1.3 Project Limitations and Constraints

The purpose of this report is to present the findings of a Phase I Geo-Environmental Desk Study conducted at the location(s) specified. When examining the data collected from the investigations made during the assessment, EPS makes the following statements:

This report does not include specific investigation for the presence of either Potential Asbestos Containing Material (PACM) or Japanese Knotweed at the subject site however, if obvious evidence of either is identified, details will be provided in this report. Specialist contractors should be commissioned to make detailed assessments and recommendations if these materials are suspected.

2 GEO-ENVIRONMENTAL SETTING

The following section provides a summary of the information collected in relation to the site location and history.

2.1 Site Location and Description

Detail	Description
Location	The site comprises an almost rectangular shaped plot of land on the western outskirts of Melbourne, which is situated around 10km south of the centre of Derby.
National Grid Reference	NGR 438056, 325460
Topographic Elevation	The area lies at an approximate topographic elevation of 86m Above Ordnance Datum (AOD).
Topographic Gradient	Site is slightly higher (88m) in the south with a gradual fall to the north (85m).
Description of Site	The site comprises a piece of land roughly rectangular in shape and covering an approximate surface area of 280m² (0.28ha). It has recently comprised a number of different uses including a manufacturing unit, a workshop unit, office units and a T-Mobile mast as well as areas for car parking. Photograph 1 of Appendix A is a layout of the building when last in use. The building itself consists of three-storeys, including a maisonette office on the first floor and a basement beneath the entirety of the building. It has pitched roofs on its south section with corrugated roof sheets which have the potential to be asbestos containing materials (ACM's). On the ground floor two separate areas of office and meeting spaces exist. Five separate industrial units are present on the ground floor which most recently were split between two businesses called Advance Lighting and Executive Linen. Executive Linen appears to have used two units although these are now large open areas without evidence of the machinery used. However, it was noted that there was a strong smell of washing powder within Unit 3. Advance Lighting appear to have used the remainder of the building including units for Goods In, Goods Out, a Workshop and a Manufacturing unit on the ground floor and a Testing Laboratory within part of the basement. However, like the Executive Linen units, these units have all been stripped back so there is no evidence of machinery or use of the units except for signs upon the walls. There are large stairs leading to the basement and although a small section appeared to be in use by Advance Lighting the majority of it appeared disused. However, in one small section reached by stairs in the south east of the building there was storage of wooden boards and what appeared to be an old fashioned manual shoe-shining machine.

Detail	Description
Surrounding Land Use	The immediate surrounding land use is predominantly made up of residential land. Residential properties lie adjacent to the site in all directions. Slightly further to the west begins a large area of agricultural land which continues to spread west, whilst the town of Melbourne dominates the land to the east.

A plan showing the site location is provided as Figure 1, the current site layout is detailed on Figure 2 and an aerial photograph is included as Figure 3. Selected site photographs are included as Appendix A, and relevant extracts of a Landmark Envirocheck report as Appendix B.

2.2 Environmental Setting

Detail	Description	
Geology	Geological maps of the area indicate the ground conditions to consist of a bedrock of Rough Rock (sandstone), although Morridge Formation (sandstone) may protrude onto the southwest corner. Two areas of infilled ground are noted approximately 600m southeast and 950m northeast. Information on the sites geological context is included as Appendix C.	
Historic Borehole Log	An historic borehole log was acquired from the British Geological Survey (BGS) for a location approximately 80m to the northwest and reports a thin layer of topsoil and sand before 13.5m of Sandstone. Beneath the Sandstone there is around 4m of Clay which overlies a second band of Sandstone to 30m. The remaining 2m of borehole consisted of a blue clay. Groundwater was noted to rest at approximately 26.5m bgl. A copy of the historic trial pit log is included within Appendix C.	
Geological Hazards	Hazard	On Site Risk
	Mining	Might not be affected / rare
	Collapsible Ground	Very Low
	Compressible Ground	No Hazard
	Ground Dissolution	No Hazard
	Running Sand	Moderate
	Landslide	Low
	Shrinking / Swelling Clay	No Hazard
	Radon	Low (see below)
Radon	The BGS and Health Protection Agency (HPA) report entitled ‘ <i>Indicative Atlas of Radon in England and Wales</i> ’ (November 2007) shows the site to lie within a 1km grid section where the percentage of homes above the radon action level is between 0% and 1%. The joint Building Research Establishment Ltd (BRE) report entitled: ‘ <i>Radon: Guidance on Protective Measures for New Buildings - 2007</i> ’ reports that the site does not lie within an area where basic radon protection methods will need to be employed.	

Detail	Description		
Hydrogeology	Groundwater vulnerability maps for the area show that the underlying geology, is classified as a secondary aquifer. The site does not lie within a Source Protection Zone (SPZ) for local groundwater abstraction. However, a Zone III (Total Catchment) is located only 10m north west. Groundwater vulnerability maps are included as Appendix D.		
Hydrology	The closest surface water feature is a pond, which is approximately 270m north west. Further from the site a number of small drains and ponds are located within the surrounding area. Around 900m south there is a large mill-pond known as Melbourne Pool.		
	Review of the Environment Agency (EA) flood zone map for the area indicates that the site lies within Flood Zone 1 as defined within Table 1 of the Technical Guidance document to the National Planning Policy Framework (NPPF) which is the area regarded to have the lowest potential risk of flooding from fluvial or tidal sources. As the site is less than 1ha, a Flood Risk Assessment is not specifically required according to the NPPF technical guidance, although it is advisable that some assessment of local considerations and sustainable design options should be considered to support planning requirements.		
	It should also be noted that the EA maps do not take into account flooding from other potential sources of flood water, such as from poor drainage, or groundwater.		
	No discharge consents are recorded within 500m.		
Landfill & Waste	One groundwater abstraction has been recorded within 500m, which relates to a well around 225m west which is used for agricultural spray irrigation.		
	There have been three recorded licensed waste management facilities within 1km. The closest is 360m south which is a waste for reclamation site and was issued in July 2011. The second site is a metal recycling centre located approximately 955m east which was issued in July 2013. The third is roughly 995m southwest and relates to a Household, Commercial and Industrial waste transfer station issued in November 1999 and last modified in January 2000.		
Licensed Industrial Activity	The EA public database lists no licensed industrial activities within 1km.		
Industrial Land Use	The Envirocheck report lists a number of industrial land uses in the area the most pertinent of which are summarised below.		
	Land Use	Distance (Direction)	Status
	Advance Lighting Ltd	On Site	Inactive
	Powercontinuity Systems	70m N	Active
	Lloyd Coils Europe (Manufacturers)	85m E	Active

Detail	Description		
	Land Use	Distance (Direction)	Status
	E V Dowsett (Blinds, Awnings & Canopies)	225m SE	Active
	UK-Shredder.com	230m W	Active
	Texaco (Petrol Filling Station)	480m SE	Active
Pollution Incidents	The EA public database lists one pollution incident within 1km. This incident relates to a significant impact to water from Organic chemicals and general biodegradable materials and wastes which took place in November 2009, 950m south east. The Envirocheck does not report any pollution incidents to controlled waters within 500m.		
Sensitive Land Use	The site is located within a Nitrate Vulnerable Zone where groundwater and surface waters are vulnerable to nitrates from agricultural farming.		

2.3 Site History

A summary of historical map data from 1887 to 2014 is provided below and copies of relevant historic maps and any others examined during the investigation are included in this report as Appendix E.

- In 1882, the site was undeveloped, with some trees present. By 1901, the southeast corner of the site comprises Mount Factory (boot and shoe) which expanded into the sites current layout by 1968.
- With regard to the surrounding area, land use has predominantly been residential and agricultural through the time period examined, however a number of exceptions have been noted. In 1885, another boot and shoe factory (Victoria Mill) can be seen roughly 250m east, whilst a gas works lies 800m east. In 1901, West End Factory lies 400m southeast. By 1924, old quarries are noted 800m and 900m south.
- Mapping from 1968 indicates the presence of an electricity sub-station 200m southeast, whilst in 1970, a works can be seen 375m east and a timber yard 700m east. In 1982, a depot lies 125m south.

3 ENVIRONMENTAL CONCEPTUAL MODEL

The following section provides a review of the contaminant linkages that may be active at the site through examination of the potential sources that may be present as a result of historic and / or current site activities and where potential interaction between these sources and the identified human / environmental receptors may occur.

3.1 Source Characterisation

The following potential contaminant sources have been identified at the site and in the surrounding area:

Potential Source	Source Description	Principal Contaminants of Concern
Current Site Use	In-fill material of unknown origin (Made Ground) used to level areas beneath existing / historic buildings and hardstanding.	PAH, Metals, ACM
Current & Historic Site Use	Historic site use as a Boot and Shoe Factory	Metals (incl. Chromium III), Pigments, Dyes, Chlorinated Organic Solvents, Non-chlorinated Organic Solvents, Sulphides, Sulphates
	Recent use of the site by Executive Linen and Advance Lighting (including manufacturing).	Metals, Pigments, Dyes, Chlorinated Organic Solvents, Non-chlorinated Organic Solvents, Detergents, PCB, Pesticides
Current and Historic Surrounding Land Use	Current / historic industrial land use of the surrounding area (incl. an active petrol filling station 480m southeast)	SVOC, VOC, TPH, Metals

Notes:

PAH	Polycyclic Aromatic Hydrocarbons	SVOC	Semi Volatile Organic Compounds
ACM	Asbestos Containing Material	VOC	Volatile Organic Compounds
PCB	Polychlorinated Biphenyl	TPH	Total Petroleum Hydrocarbons

3.2 Potential Receptors

A framework for the assessment of risks arising from the presence of contamination in soils has been produced by the Environment Agency and the Department for the Environment, Food and Rural Affairs (DEFRA) and is presented with the report: 'Using Science to Create A Better Place: Updated Technical Background to the CLEA Model – Science Report SC050021/SR3'. This guidance document defines a series of standard land-uses, which form a basis for the development of an Environmental Conceptual Model.

The proposed development plan for the site includes the Erection of 10 residential properties and therefore this proposed future land use, as defined within Science Report SC050021/SR3, has been considered as:

- Residential

In view of the environmental setting, current and potential future land use of the site and surrounding sites, the potential receptors for any contaminant impact are discussed in the table on the following page.

Receptor	Site Specific Description
Human	Future site users, site workers involved in the redevelopment, and those working and living in the surrounding area have the potential to be at risk from exposure to potential contaminants of concern (CoCs).
Groundwater	The site is reported to be underlain by Rough Rock and potentially some Morridge Formation, both of which are defined by the EA as a secondary aquifer, although the historic borehole log does not indicate that shallow groundwater is likely to be present. Whilst the site does not lie within a SPZ for nearby groundwater abstraction, the underlying geology does have some resource potential and therefore groundwater should be considered as a potential receptor to site derived contaminants.
Surface Water	The nearest surface watercourse is a pond which is located around 270m north west. The primary concern for this site should be considered as the groundwater within the underlying secondary aquifer however, if significant impacts to groundwater were to be encountered then further consideration should be given to the associated risk posed to nearby surface waters via lateral migration of contaminants in the subsurface.
Flora and Fauna	The proposed development may include some landscaped areas. Some of the identified contaminants of concern are known to be phytotoxic and as such the potential for this impact should be considered.
Buildings & Infrastructure	Subsurface structures are likely to be required that may be adversely affected by the potential presence of the identified contaminants of concern. These include concrete used in building foundations, buried potable water supply pipes and other service lines and pipes.
Adjacent Land	Adjacent properties including private residential dwellings could also be at risk from potential contaminants found at the site.

3.3 Potential Pathways

Where contaminants may be present in soil, there are a number of potential pathways that enable human receptors to come into contact with or be exposed to them. The most direct pathways, considered under current UK legislation, can be summarised as follows:

- Direct ingestion of contaminated soil
- Ingestion of household dust
- Ingestion of contaminated vegetables
- Ingestion of soil attached to vegetables
- Dermal contact with contaminated soil
- Dermal contact with household dust
- Inhalation of fugitive soil dust
- Inhalation of fugitive household dust
- Inhalation of vapours outdoors
- Inhalation of vapours indoors

Clearly, not all of these potential pathways apply for every standard land-use; the simplest example for exclusions being a commercial / industrial site which is covered by concrete hardstanding. The concrete precludes the direct exposure of humans working at the site to any contaminated soils.

However in addition to direct exposure pathways, a number of physical transport mechanisms / pathways may also exist at a site that allow remote or less accessible contaminants in soil or groundwater to reach human or environmental receptors both at a site and beyond the site boundary. These include the following:

- Downward and lateral movement of contaminants in soil either by gravity or through being 'leached' by percolating rainwater.
- Lateral migration of contaminants dissolved in groundwater.
- Direct seepage or leaching of contaminants from soil into subsurface drains or supply pipework.
- Volatilisation of contaminants from groundwater or unsaturated soils into buildings or outdoor air.

Through examination of the standard land use and environmental setting at each site, the presence of pathways and transport mechanisms described above must be considered when assessing whether a contaminant linkage may plausibly be active, and therefore be included in the conceptual site model.

3.4 Summary of Contaminant Linkages

Considering the site use and environmental setting, and the proposed land use; the plausible contaminant linkages that require further investigation are summarised in the following table:

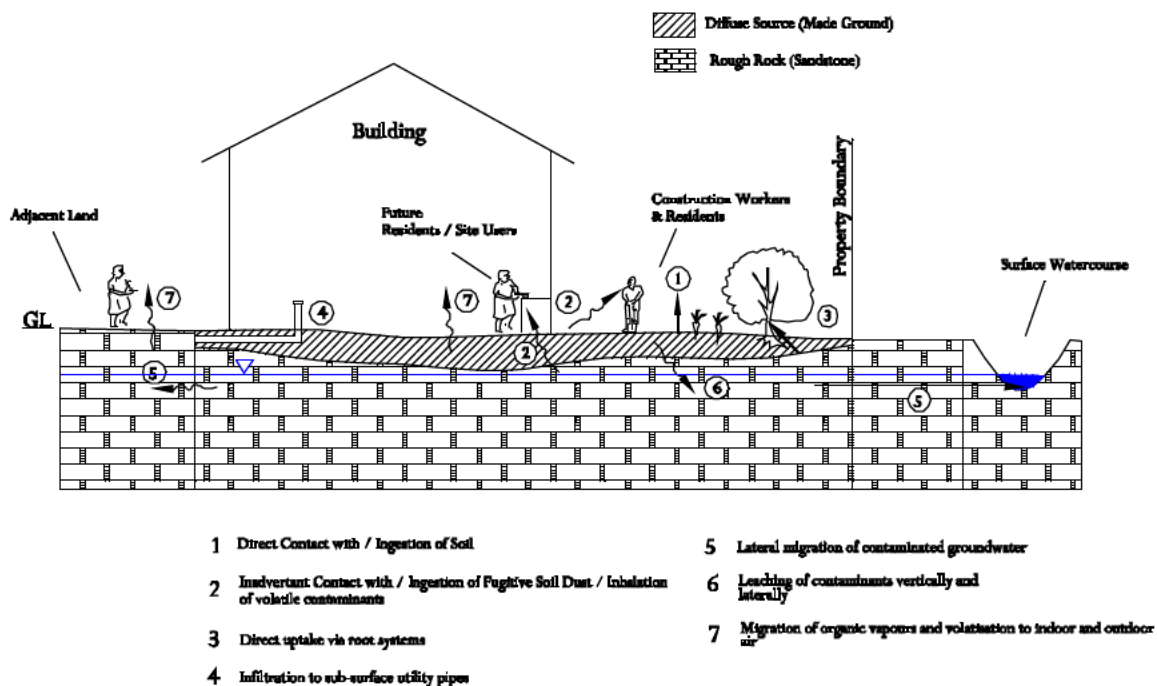
Source	Pathway	Receptor
Contaminated soil	Direct contact and inadvertent ingestion by eating or smoking with dirty hands	Site Users & Construction Workers during redevelopment
	Inhalation of fugitive dusts	Site users
	Direct uptake and / or adherence of contaminated soil to vegetation and subsequent ingestion	Site users
	Ingress / diffusion through permeable potable water supply pipes	Site users
	Leaching of contaminants vertically through unsaturated soils	Groundwater
	Direct uptake via root systems	Plants
Contaminated soil / groundwater	Lateral migration of contaminants in soil or groundwater.	Surface waters
	Volatilisation of organic compounds to indoor and outdoor air.	Site users
	Off-site migration of organic vapours	Adjacent Site Users

The following comments are made with respect to contaminant linkages which have been considered through development of the conceptual model, but have not been concluded as 'plausible' – i.e. through which a significant possibility of significant harm could occur to an identified receptor:

- A number of commercial and industrial sites are located in the surrounding area (including a petrol filling station 480m southeast), however these are all either located down hydrological gradient of the site, at a significant distance or not considered high risk, and therefore risks are not considered to be present associated with the on-site migration of organic compounds in groundwater.
- Whilst the majority of relatively modern electrical transformers do not contain insulation oils containing PCBs, the historic electricity sub-station identified nearby to the site does represent a potential off-site source that could contain PCBs. However, given the distance of this sub-station and limited mobility of PCBs in the environment, this source is not considered to pose a significant risk to the proposed development.

The following diagram provides an illustration of the plausible contaminant linkages that may be active at the site and which may need further investigation or control to ensure safe development:

76 Commerce Street, Melbourne– Illustrative Conceptual Site Model



4 GEOTECHNICAL GROUND MODEL

Geological records indicate the underlying ground conditions to comprise superficial deposits comprising Rough Rock (Sandstone) and possibly some Morridge Formation (Sandstone). A conceptual geotechnical ground model is provided in the table below which assesses design elements, anticipated strata and ground conditions:

Element	Anticipated Strata	Parameter(s)	Anticipated Conditions
Foundations	Made Ground	Allowable Bearing Pressure	Not appropriate as a bearing strata
		Settlement	High sensitivity
		Volume Change	Depends upon the soil composition
	Rough Rock / Morridge Formation	Allowable Bearing Pressure	>150kN/m ²
		Settlement	Low
		Volume Change	Low / No volume change potential
Drainage	Made Ground	Permeability	Not suitable for infiltration drainage
	Rough Rock / Morridge Formation		May be suitable for infiltration drainage
Concrete Grade	Made Ground	Grade	Low to moderate risk of high sulphate levels
	Rough Rock / Morridge Formation		Low risk of high sulphate levels

5 CONCLUSIONS & RECOMMENDATIONS

This Phase I Desk Study has identified that a number of plausible contaminant linkages have the potential to become active as a result of the historic use of the site as a boot and shoe factory, as well as more recent usage by a lighting company and a linen company.

The contaminant linkages which carry the greatest potential risks at this site comprise the following:

- Human health risks associated with interaction between future residents and potentially contaminated shallow soils, especially within domestic garden areas.
- Volatilisation of organic compounds to indoor and outdoor air.
- Potential exposure of site workers to contaminated soils during the proposed redevelopment.
- Risks to controlled waters from site derived contaminants of concern.

In accordance with the Model Procedures for Management of Land Contamination (Contaminated Land Report 11) the risks identified by this work will require further assessment in order to determine the most appropriate action for this site. A summary of the approach outlined in CLR11, marking the work already completed under the risk assessment phase, is presented as a flow diagram in Figure 4 of this report.

It is therefore recommended that, initially, the identified plausible contaminant linkages should be further investigated by means of exploratory intrusive investigation. This is likely to include the drilling of a series of shallow boreholes in order to assess the nature and quality of shallow ground conditions as well as help inform future foundation design. Standpipes may also need to be installed to monitor for hazardous gases and volatile organic compounds. A proposed scope and costing for this work can be provided upon request and, where appropriate discussed and agreed with the local authority prior to commencement.

Any impacts to soil quality by source contaminants which are identified by the exploratory investigation may require further targeted intrusive investigations in order to delineate the contaminants found and quantitatively evaluate the risks posed.

A copy of this report should be provided to the Environmental Health department of South Derbyshire District Council so that the information may be used to support planning proposals for the site.

FIGURES



Approximate Site Location

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Title: Site Location Plan

Project: 76 Commerce Street, Melbourn,
Derbyshire, DE73 8GP

Client: The Loughborough Building Society

Fig No: 1

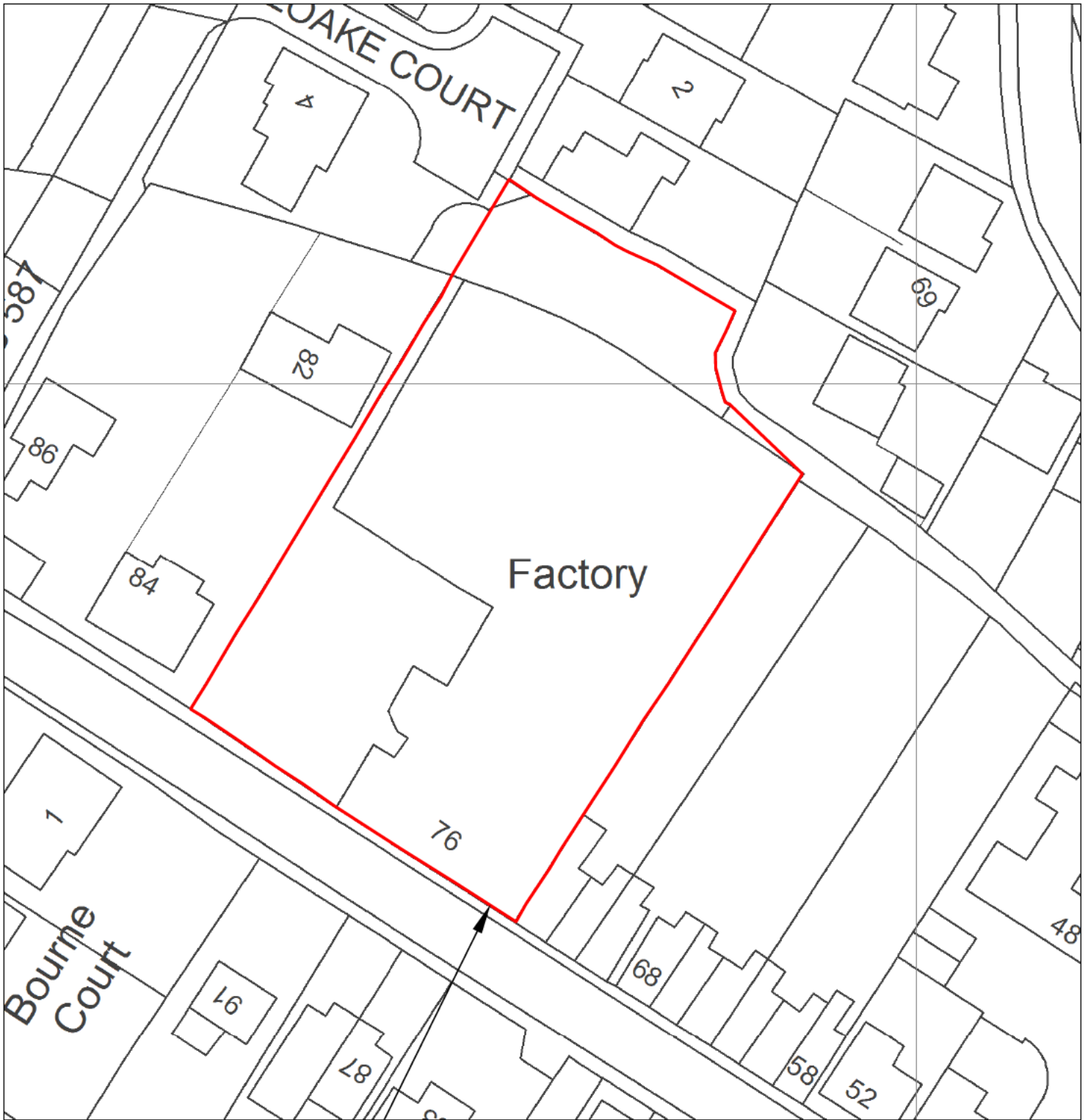
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Drawn By: KH **Approved By:** SB

Job No: UK15 1832

Dwg No: TLBS/76Commerce/0415/01

Date: April 2015



Approximate Site Boundary

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Title: Current Site Layout Plan

Project: 76 Commerce Street, Melbourne,
Derbyshire, DE73 8GP

Client: The Loughborough Building Society

Fig No: 2

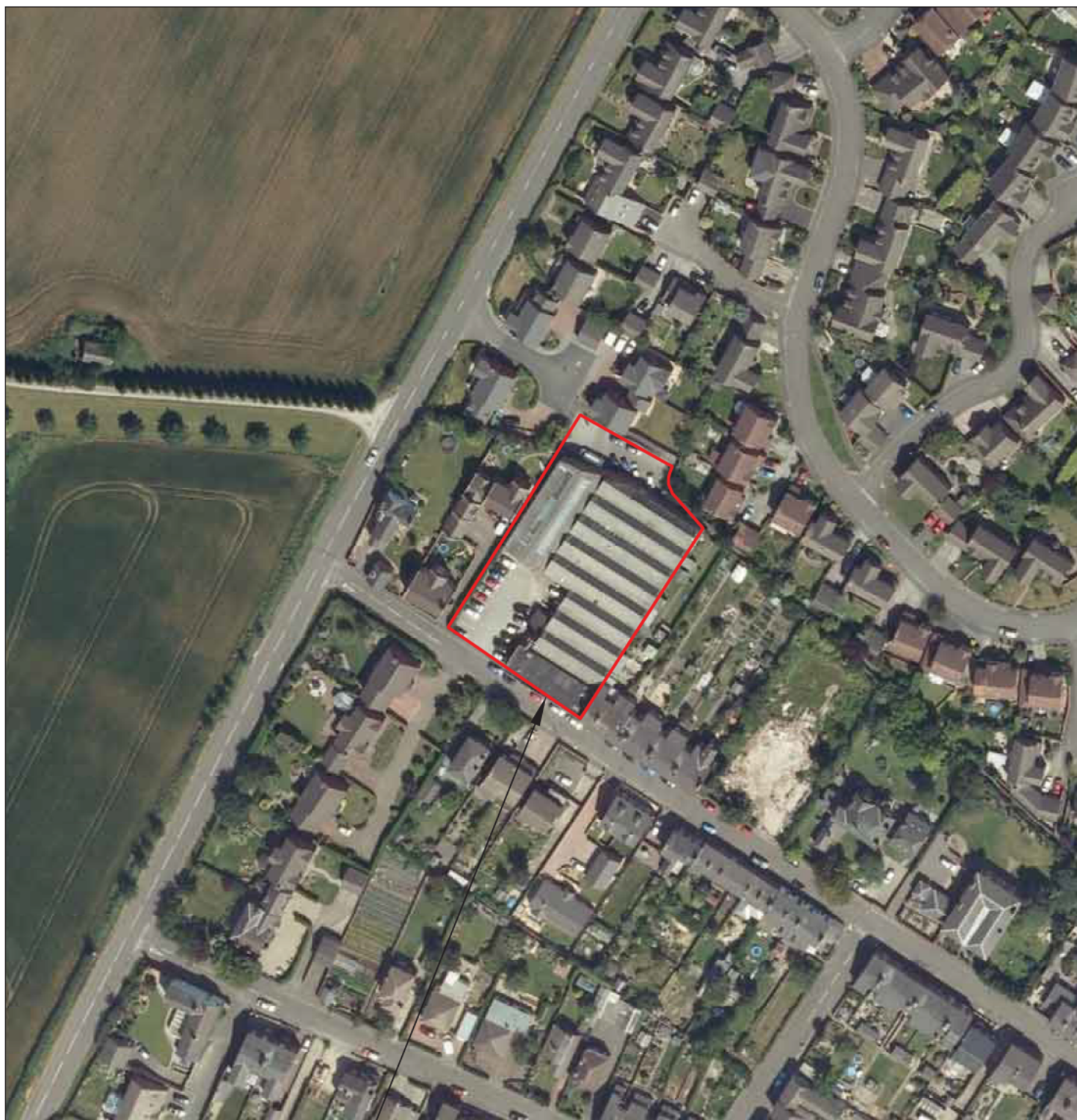
Scale NTS

Drawn By KH Approved By SB

Job No UK15 1832

Dwg No TLBS/76Commerce/0415/02

Date April 2015



Approximate Site Boundary

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Title: Aerial Photograph

Project: 76 Commerce Street, Melbourne,
Derbyshire, DE73 8GP

Client: The Loughborough Building Society

Fig No: 3

Scale NTS

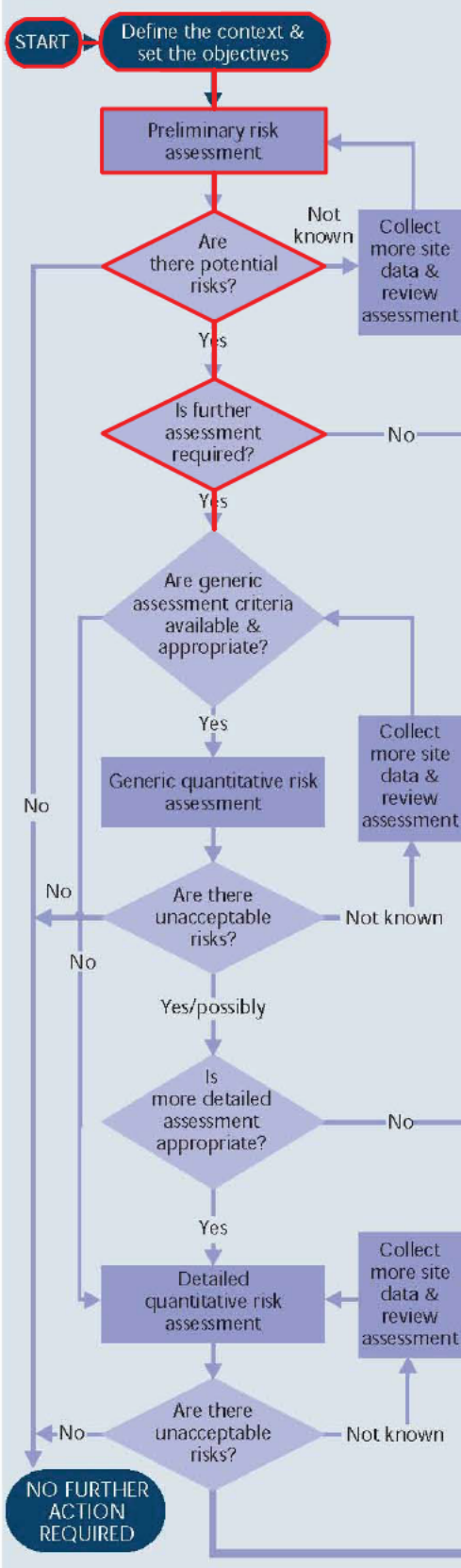
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Job No UK15 1832

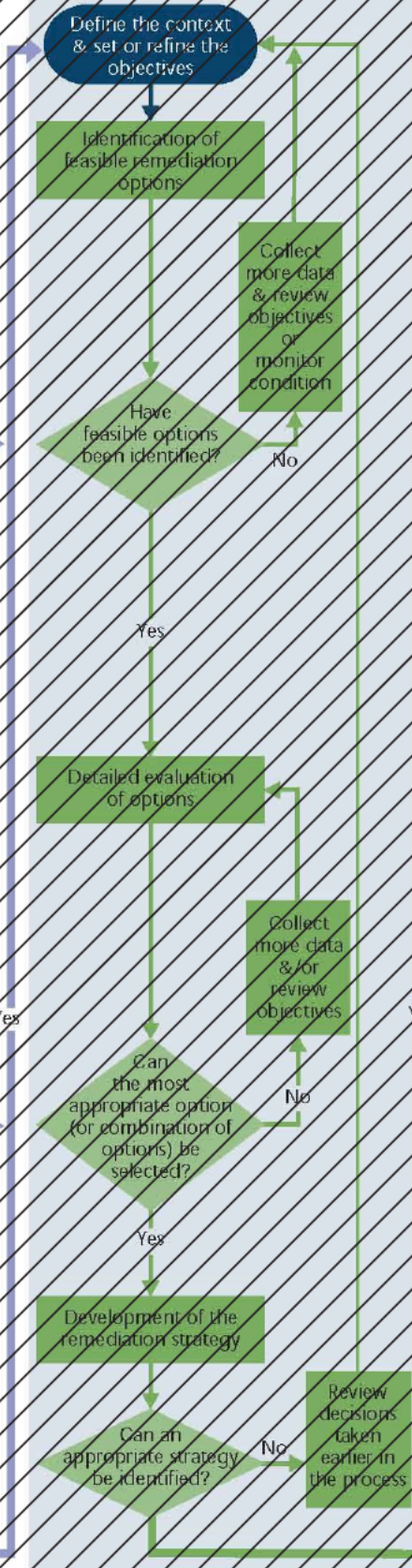
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Date April 2015

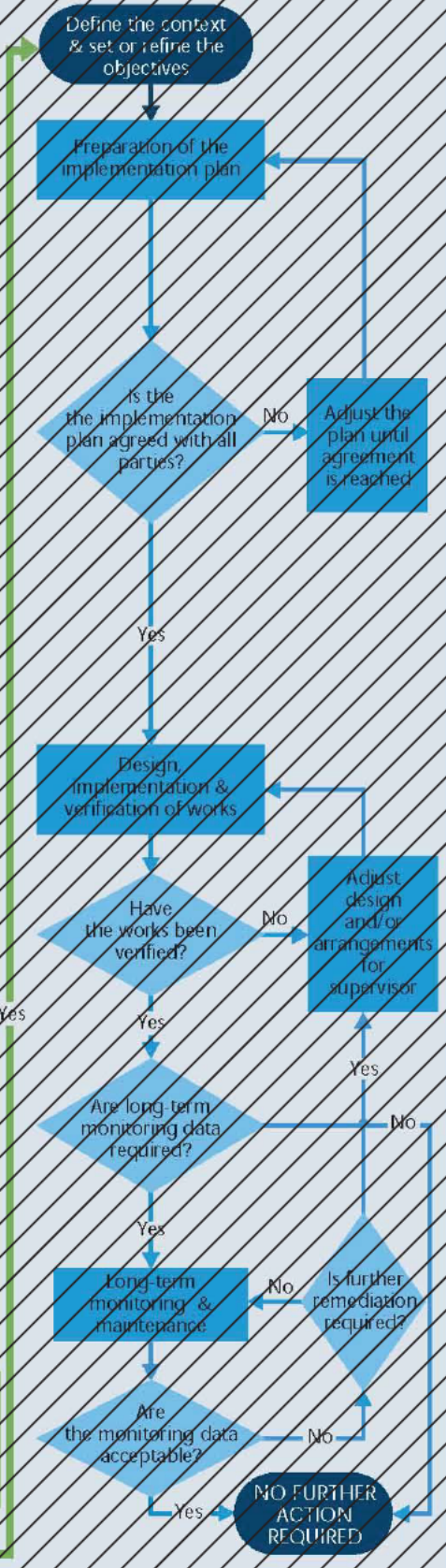
Risk Assessment



Options Appraisal



Implementation of the Remediation Strategy



Assessment Pathway for Site



Title: Site Context - CLR11

Project: 76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

Client: The Loughborough Building Society

Fig No: 4

Scale n/a

Drawn By MJ Approved By SB

Job No UK15 1827

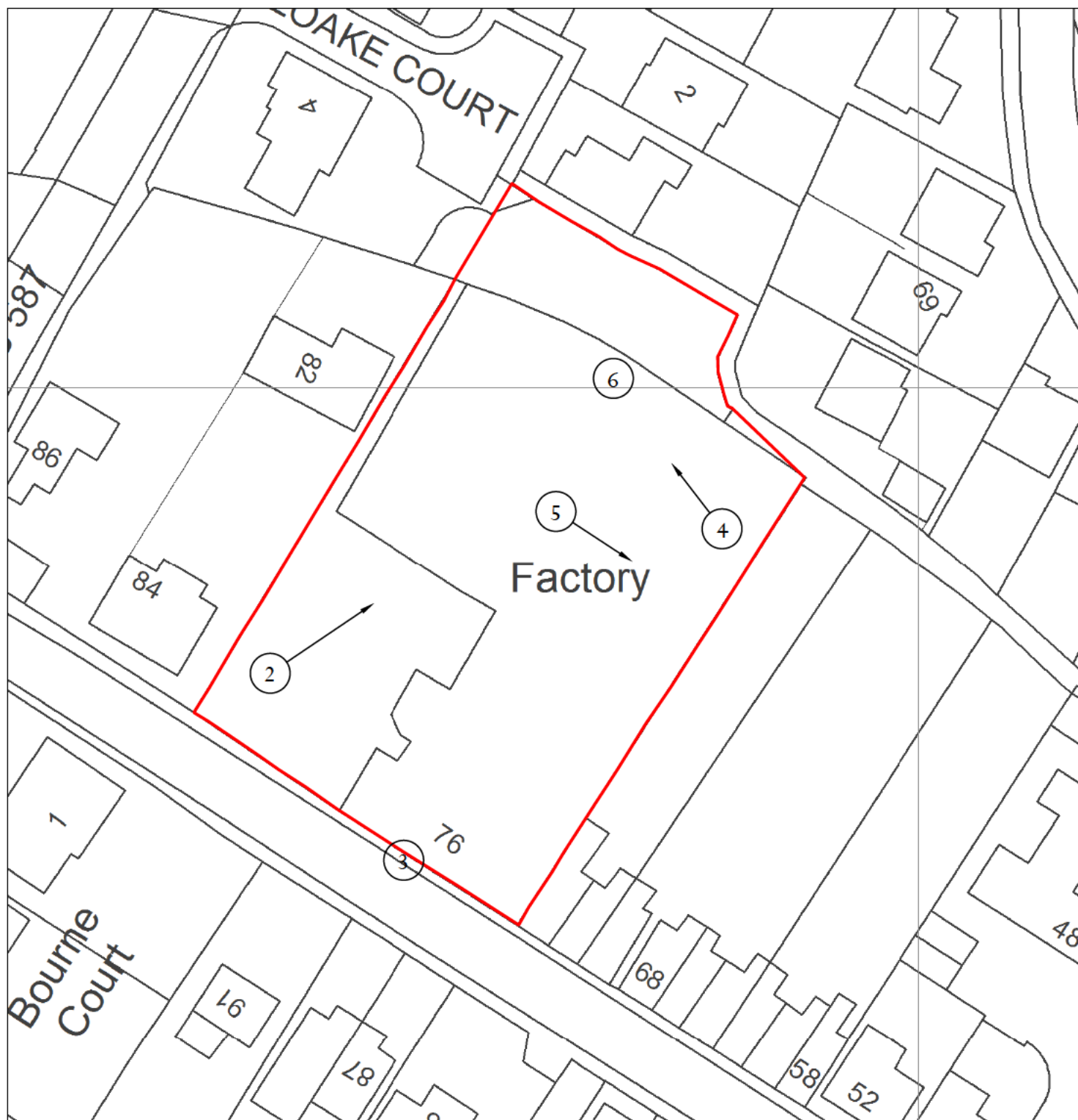
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Revision Date April 2015

APPENDICES

APPENDIX A

Selected Site Photographs



Key:

- ① Approximate Photo Location
- Approximate Site Boundary

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Title: Photo Location Plan

Project: 76 Commerce Street, Melbourne,
Derbyshire, DE73 8GP

Client: The Loughborough Building Society

Appendix: A

Scale NTS

Drawn By MJ **Approved By** SB

Job No UK15 1832

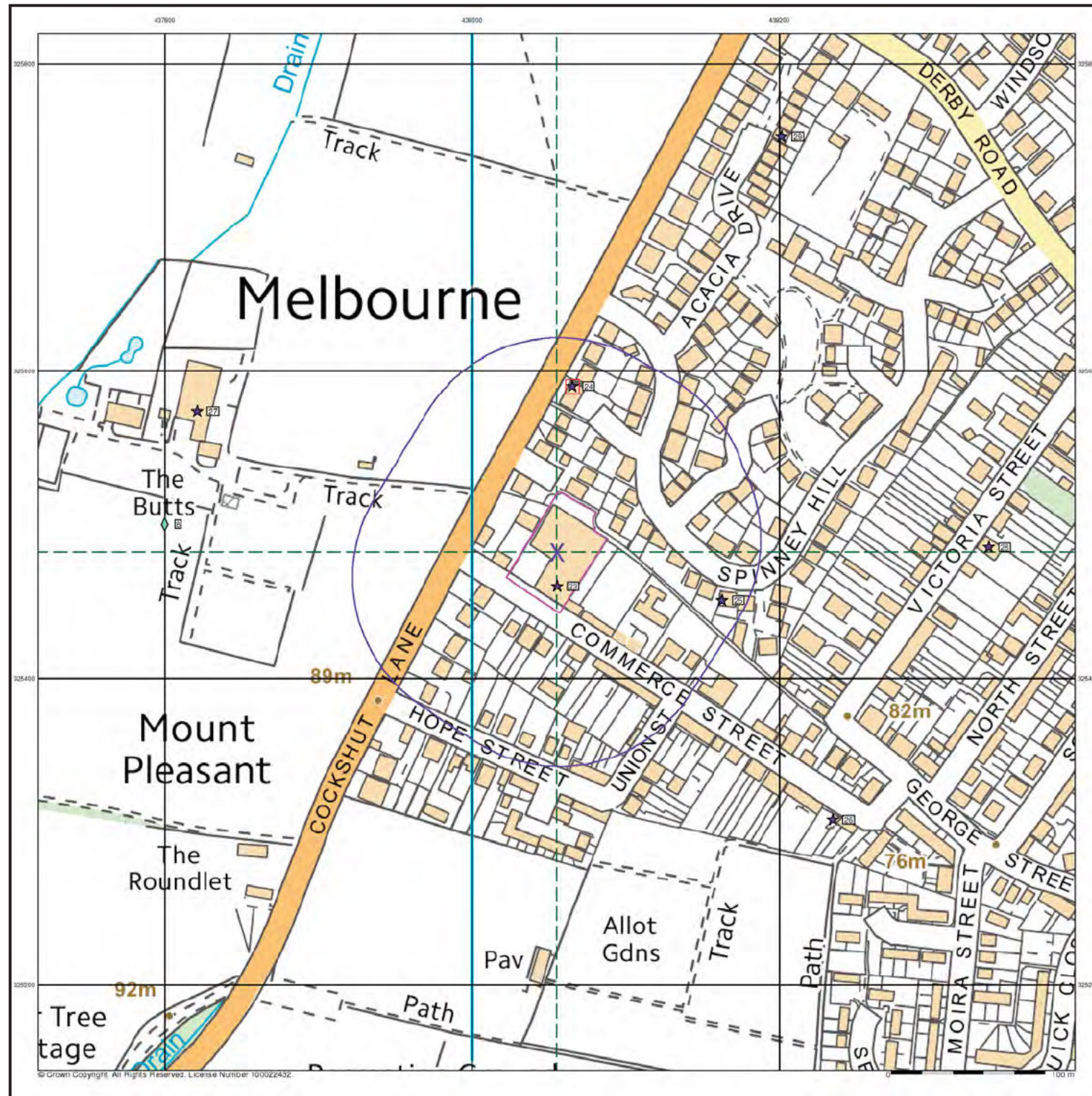
Dwg No TLBS/76Commerce/0415/A

Date April 2015

Photo 1: Current Site layout within building. 	Photo 2: Car park and entrance to reception. 
Photo 3: Sign showing previous usage as boot factory. 	Photo 4: Photograph of Unit 4. 
Photo 5: Photograph of Unit 3. 	Photo 6: Sign with basement of test laboratory. 

APPENDIX B

Surrounding Land Use



General

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

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Retention

Geological

- BGS Recorded Mineral Site

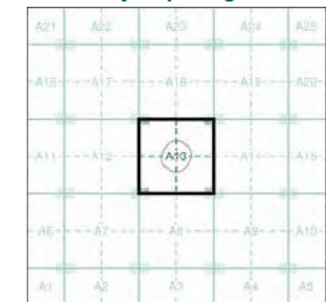
Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buried Pond)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Landfill Boundary)
- Licensed Waste Management Facility (Location)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Pave Buried to 100m)
- Registered Landfill Site (Pave Buried to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Hazardous Substances

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

Site Sensitivity Map - Segment A13



Order Details

Order Number: 65857358_1_1
 Customer Ref: UK15.1832
 National Grid Reference: 438060, 325480
 Slice: A
 Site Area (Ha): 0.28

Site Details

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General

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

Agency and Hydrological

- Contaminated Land Register Entry or Notice (Location)
- Contaminated Land Register Entry or Notice
- Discharge Consent
- Enforcement or Prohibition Notice
- Integrated Pollution Control
- Integrated Pollution Prevention Control
- Local Authority Integrated Pollution Prevention and Control
- Local Authority Pollution Prevention and Control Enforcement
- Pollution Incident to Controlled Waters
- Prosecution Relating to Authorised Processes
- Prosecution Relating to Controlled Waters
- Registered Radioactive Substance
- River Network or Water Feature
- River Quality Sampling Point
- Substantiated Pollution Incident Register
- Water Abstraction
- Water Industry Act Referral

Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry

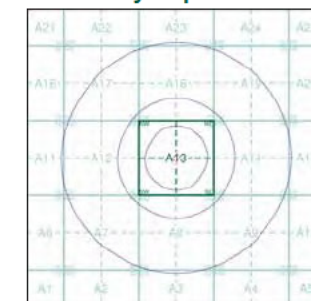
Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buried Pond)
- EA Historic Landfill (Polygon)
- Integrated Pollution Control Registered Waste Site
- Licensed Waste Management Facility (Location)
- Licensed Waste Management Facility (Landfill Boundary)
- Local Authority Recorded Landfill Site (Location)
- Local Authority Recorded Landfill Site
- Registered Landfill Site
- Registered Landfill Site (Location)
- Registered Landfill Site (Pore Buffer to 100m)
- Registered Landfill Site (Pore Buffer to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

Hazardous Substances

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

Site Sensitivity Map - Slice A



Order Details

Order Number: 65857358_1_1
Customer Ref: UK15.1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

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APPENDIX C

Geological Context

Geology 1:50,000 Maps Legends

Artificial Ground and Landslip

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

Superficial Geology

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	ALV	Alluvium	Clay, Silt, Sand and Gravel	Flandrian - Flandrian
	THT	THRUSS NGTON MEMBER	Diamicton	Anglian - Anglian
	ODT	Oadby Member	Diamicton	Anglian - Anglian
	GFDMP	Glaciofluvial Deposits, Mid Pleistocene	Sand and Gravel	Ipswichian - Cromerian
	HPSG	Holme Pierrepont Sand and Gravel Member	Sand and Gravel	Pleistocene - Pleistocene
	ETSG	Etwall Sand and Gravel Member	Sand and Gravel	Pleistocene - Pleistocene
	BSSG	Beeston Sand and Gravel Member	Sand and Gravel	Pleistocene - Pleistocene
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary
	HEAD	Head	Clay, Silt, Sand and Gravel	Quaternary - Quaternary

Bedrock and Faults

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
	DIS	DISEWORTH SANDSTONE	Sandstone	Ladinian - Ladinian
	GUN	Gunthorpe Member	Mudstone	Ladinian - Anisian
	GUN	Gunthorpe Member	Siltstone, Dolomitic	Ladinian - Anisian
	RDCF	Radcliffe Member	Mudstone and Siltstone	Anisian - Anisian
	TPSF	Tarporley Siltstone Formation	Siltstone, Mudstone and Sandstone	Anisian - Olenekian
	TPSF	Tarporley Siltstone Formation	Siltstone, Mudstone and	Anisian - Olenekian

Map Colour	Lex Code	Rock Name	Rock Type	Min and Max Age
			Sandstone	
	TPSF	Tarporley Siltstone Formation	Sandstone	Anisian - Olenekian
	BMS	Bromsgrove Sandstone Formation	Sandstone	Anisian - Early Triassic
	BMS	Bromsgrove Sandstone Formation	Mudstone	Anisian - Early Triassic
	BMS	Bromsgrove Sandstone Formation	Mudstone	Anisian - Early Triassic
	MOI	Moira Formation	Breccia	Anisian - Late Permian
	PLCM	Pennine Lower Coal Measures Formation	Mudstone, Siltstone and Sandstone	Langsettian - Langsettian
	PLCM	Pennine Lower Coal Measures Formation	Sandstone	Langsettian - Langsettian
	RR	Rough Rock	Sandstone	Yeadonian - Yeadonian
	MGCZ	Unnamed Sandstone of Marsdenian Age (In Millstone Grit Group)	Sandstone	Marsdenian - Marsdenian
	CHG	Chatsworth Grit	Sandstone	Marsdenian - Marsdenian
	ASG	Ashover Grit	Sandstone	Marsdenian - Marsdenian
	MGCK	Unnamed Sandstone of Kinderscoutian Age (In Millstone Grit Group)	Sandstone	Kinderscoutian - Kinderscoutian
	MORRI	Morridge Formation	Mudstone, Siltstone and Sandstone	Marsdenian - Pendleian
	TIL	Ticknall Limestone Formation	Limestone	Brigantian - Brigantian
	WDF	Widmerpool Formation	Limestone and Mudstone, Interbedded	Brigantian - Asbian
	BSG	Bowland Shale Formation	Mudstone	Yeadonian - Asbian
		Faults		



Geology 1:50,000 Maps

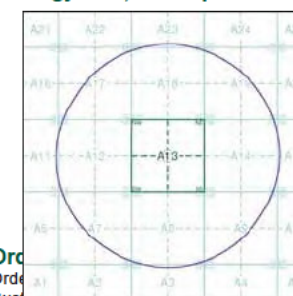
This report contains geological map extracts taken from the BGS Digital Geological map of Great Britain at 1:50,000 scale and is designed for users carrying out preliminary site assessments who require geological maps for the area around the site. This mapping may be more up to date than previously published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

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

Geology 1:50,000 Maps Coverage

Map ID:	1
Map Sheet No:	141
Map Name:	Loughborough
Map Date:	2006
Bedrock Geology:	Available
Superficial Geology:	Available
Artificial Geology:	Available
Faults:	Not Supplied
Landslip:	Available
Rock Segments:	Not Supplied

Geology 1:50,000 Maps - Slice A



Ord

Ord

Customer Reference: 0706-002

National Grid Reference: 438060, 325480

Slice: A

Site Area (Ha): 0.28

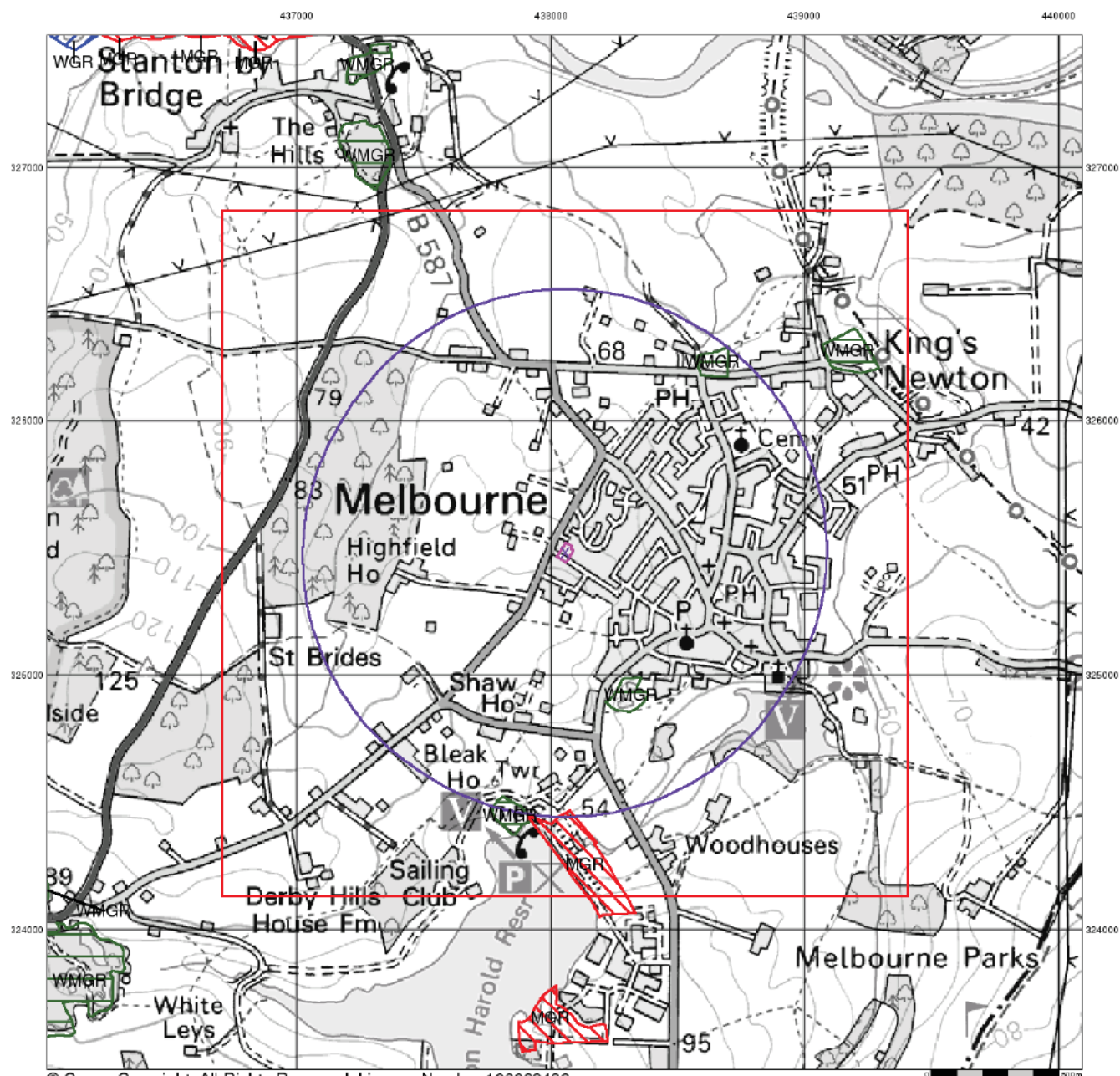
Search Buffer (m): 1000

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Artificial Ground and Landslip

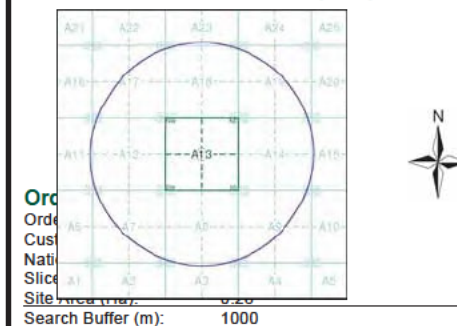
Artificial ground is a term used by BGS for those areas where the ground surface has been significantly modified by human activity. Information about previously developed ground is especially important, as it is often associated with potentially contaminated material, unpredictable engineering conditions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

Artificial ground includes:

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

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

Artificial Ground and Landslip Map - Slice A

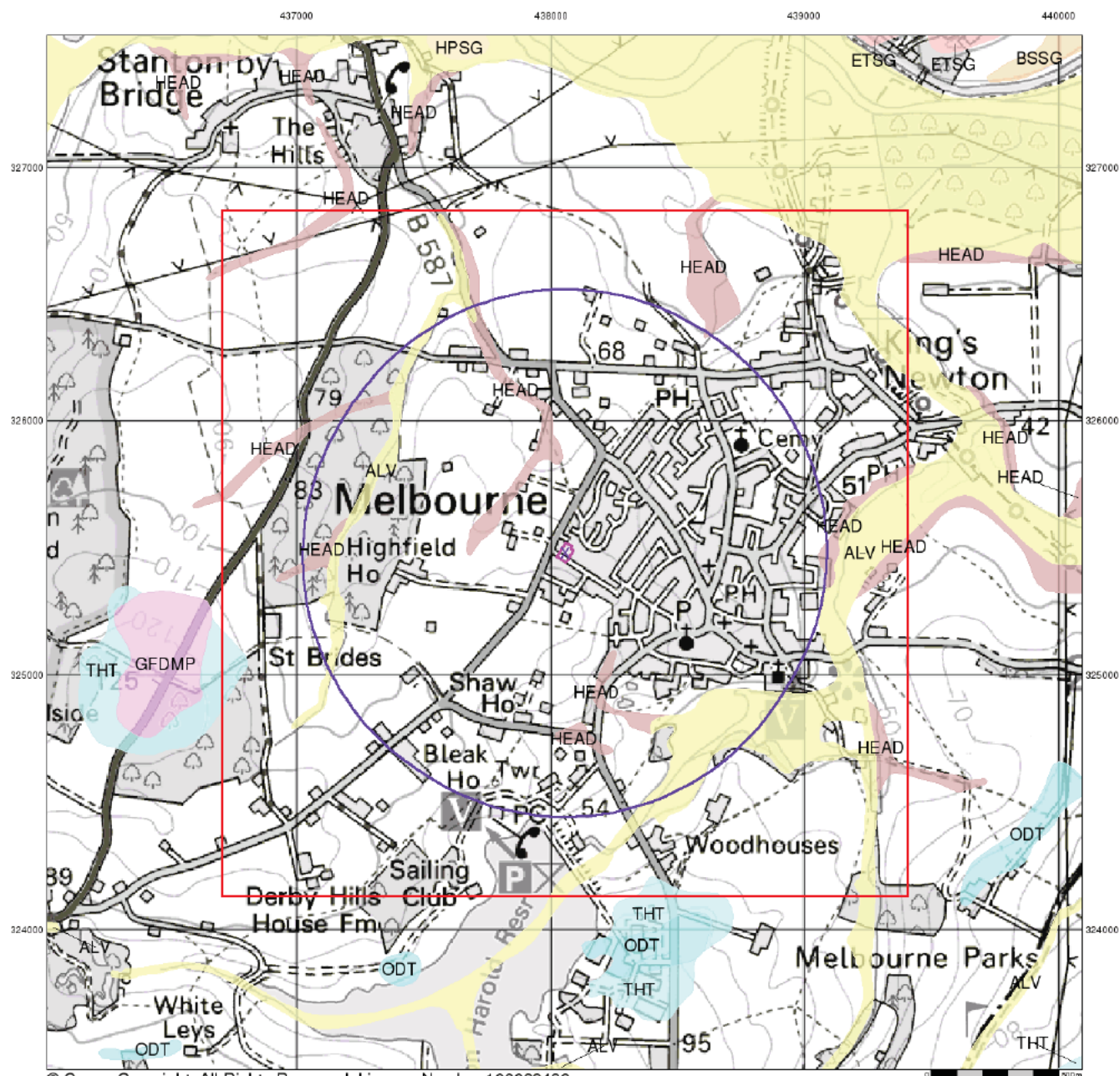


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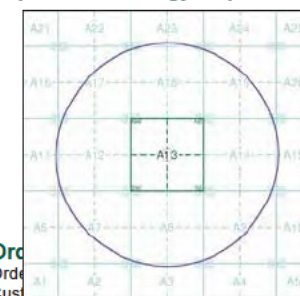
Superficial Geology

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

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

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

Superficial Geology Map - Slice A



Order
Order
Customer

National Grid Reference: 438060, 325480

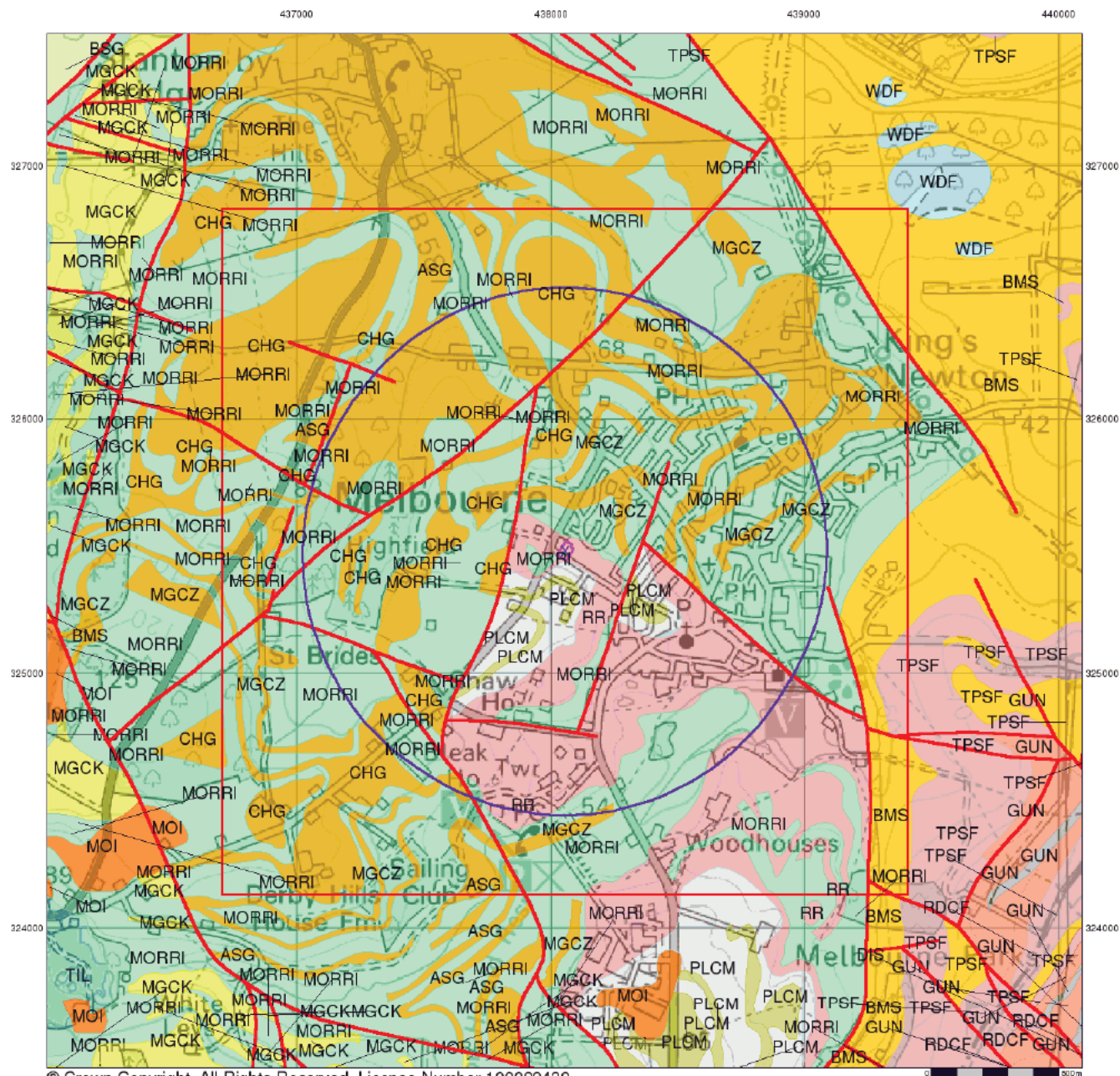
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details:

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Bedrock and Faults

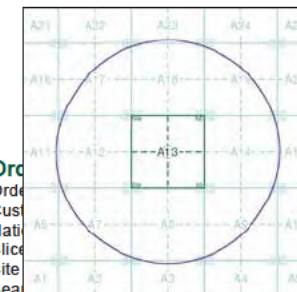
Bedrock geology is a term used for the main mass of rocks forming the Earth and are present everywhere, whether exposed at the surface in outcrops or concealed beneath superficial deposits or water.

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

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

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

Bedrock and Faults Map - Slice A



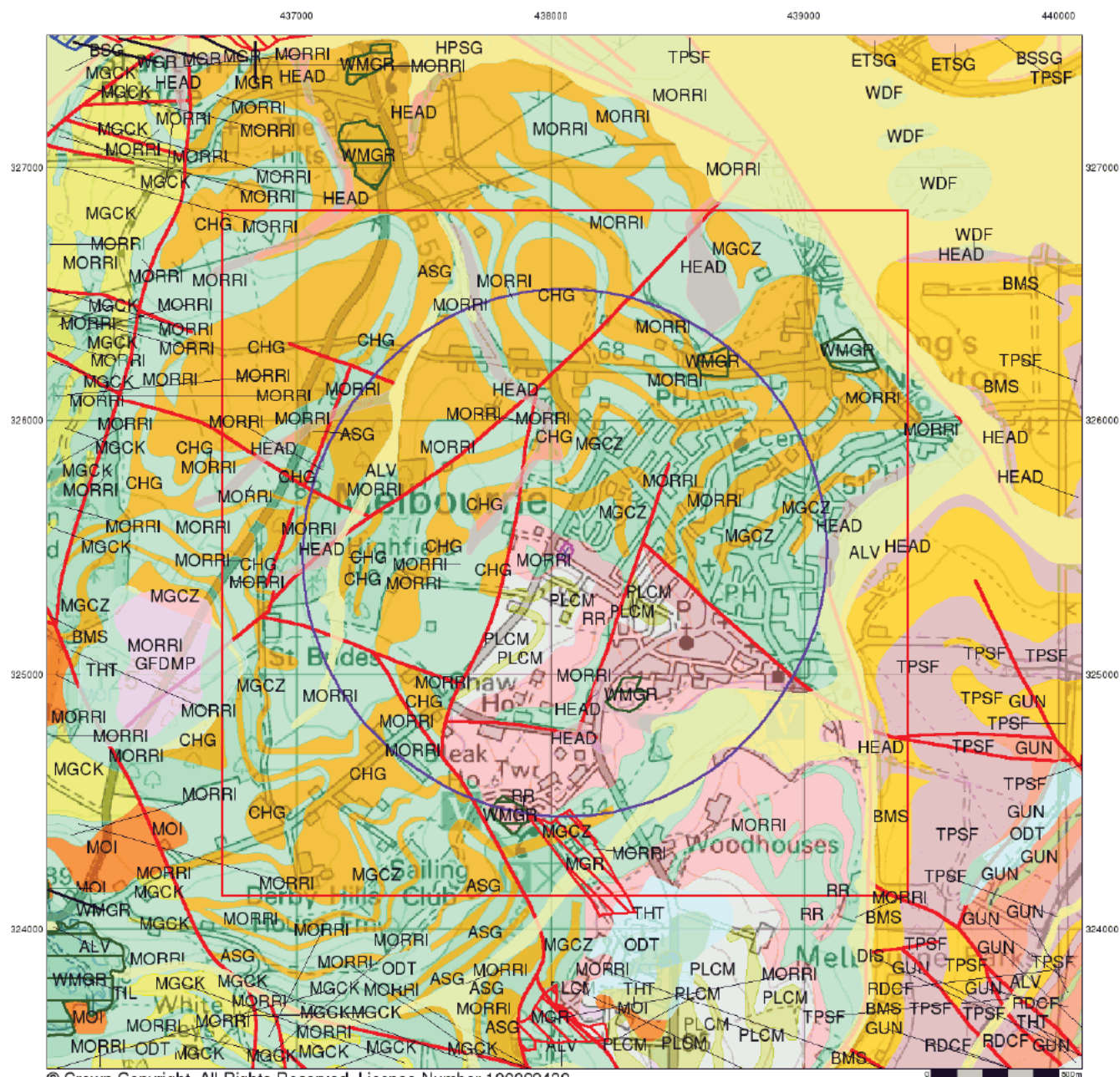
Order
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Customer
National
Site
Sea

Site Details:

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Combined Surface Geology

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

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

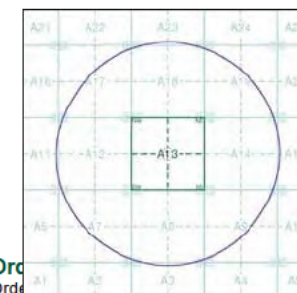
Additional Information

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

Contact

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

Combined Geology Map - Slice A



Order

Customer Reference: UK15:1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details:

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP



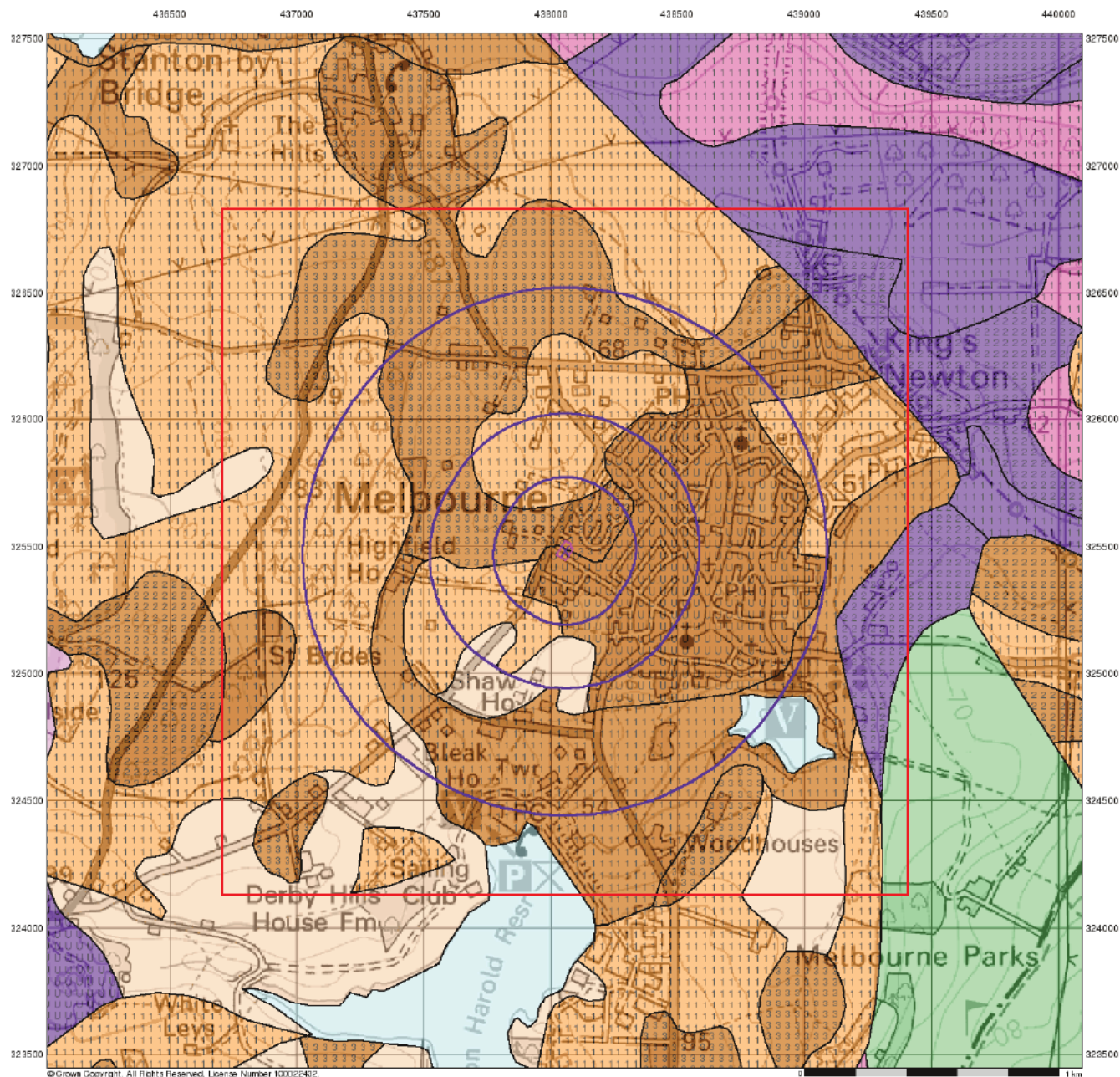
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(For Survey use only) GEOLOGICAL CLASSIFICATION	NATURE OF STRATA Describe the nature of the strata If measurements start below ground surface, state how far ..	THICKNESS		DEPTH	
		Feet	Inches	Feet	Inches
		..	..		
All the Mudstone & silt	TAP SOIL	2	0		
	SOFT SAND	3	0		
1st Silt	SANDSTONE (dry)	45	0	52	0
	RED CLAY	5	0	55	0
2nd Silt	SANDSTONE (dry)	6	0	61	0
	RED CLAY	9	0	70	0
3rd Silt	GRAY CLAY	5	0	75	0
	SANDSTONE (wet)	24	0	99	0
4th Silt	Blue clay	2	0	101	0
5th Silt					
6th Silt					
7th Silt					
8th Silt					
9th Silt					
10th Silt					
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98th Silt					
99th Silt					
100th Silt					

APPENDIX D

Groundwater Vulnerability Maps



Groundwater Vulnerability

General

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

Agency and Hydrological

Geological Classes

Major Aquifer (Highly Permeable)

Minor Aquifer (Variably Permeable)

Non Aquifer (Negligibly Permeable)

Water or Sea

Drift Deposit

Soil Classes

High (1, 2, 3, U)

Intermediate (1, 2)

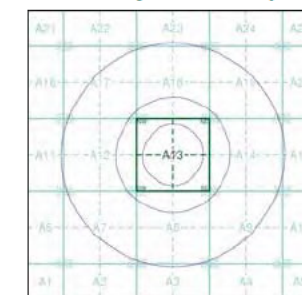
Low

High (1, 2, 3, U)

Intermediate (1, 2)

Low

Site Sensitivity Context Map - Slice A



Order Details

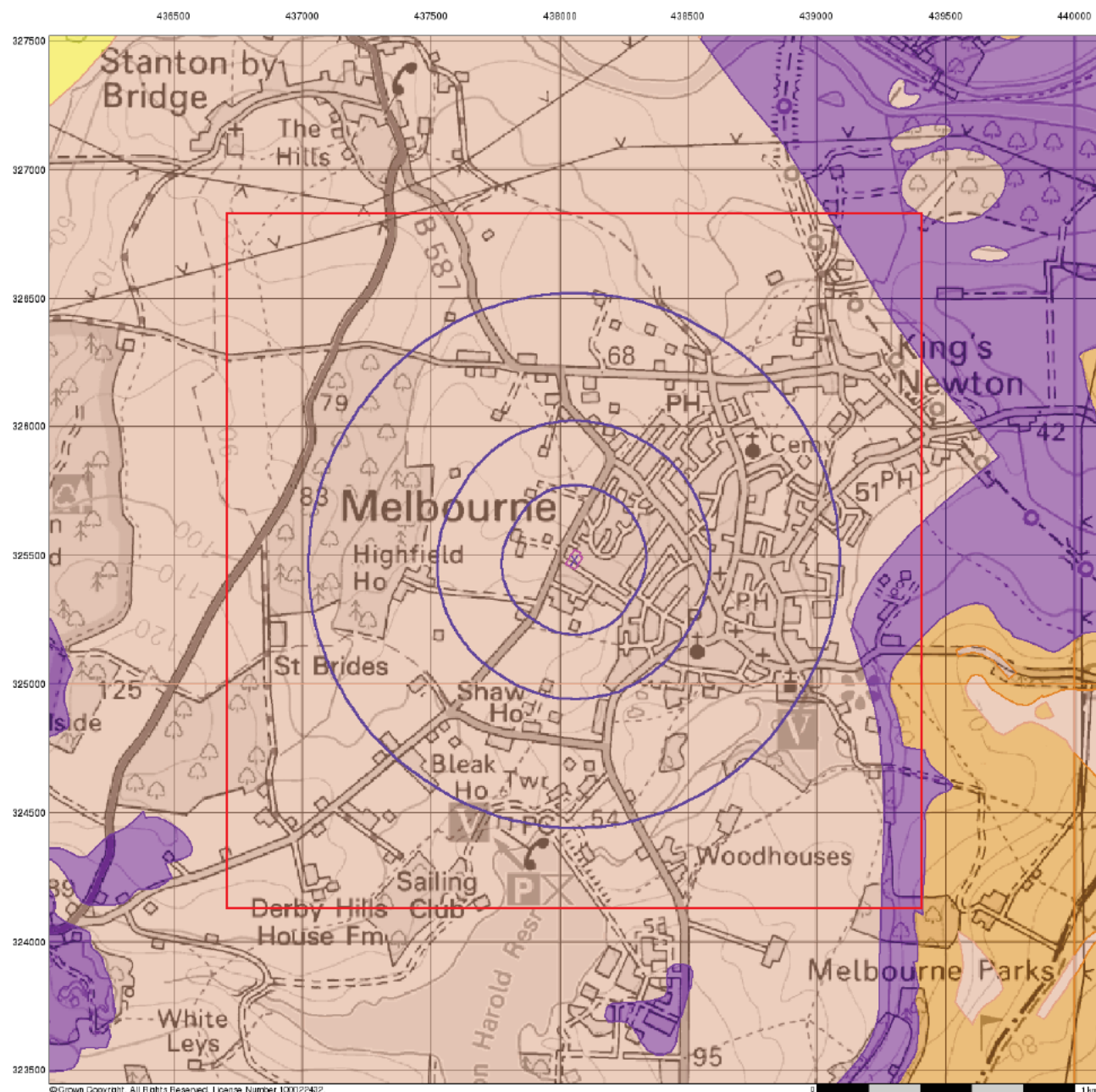
Order Number: 65857358_1_1
 Customer Ref: UK15.1832
 National Grid Reference: 438060, 325480
 Slice: A
 Site Area (Ha): 0.28
 Search Buffer (m): 1000

Site Details

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Bedrock Aquifer Designation

General

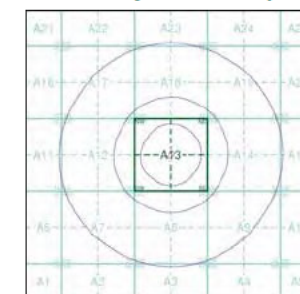
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

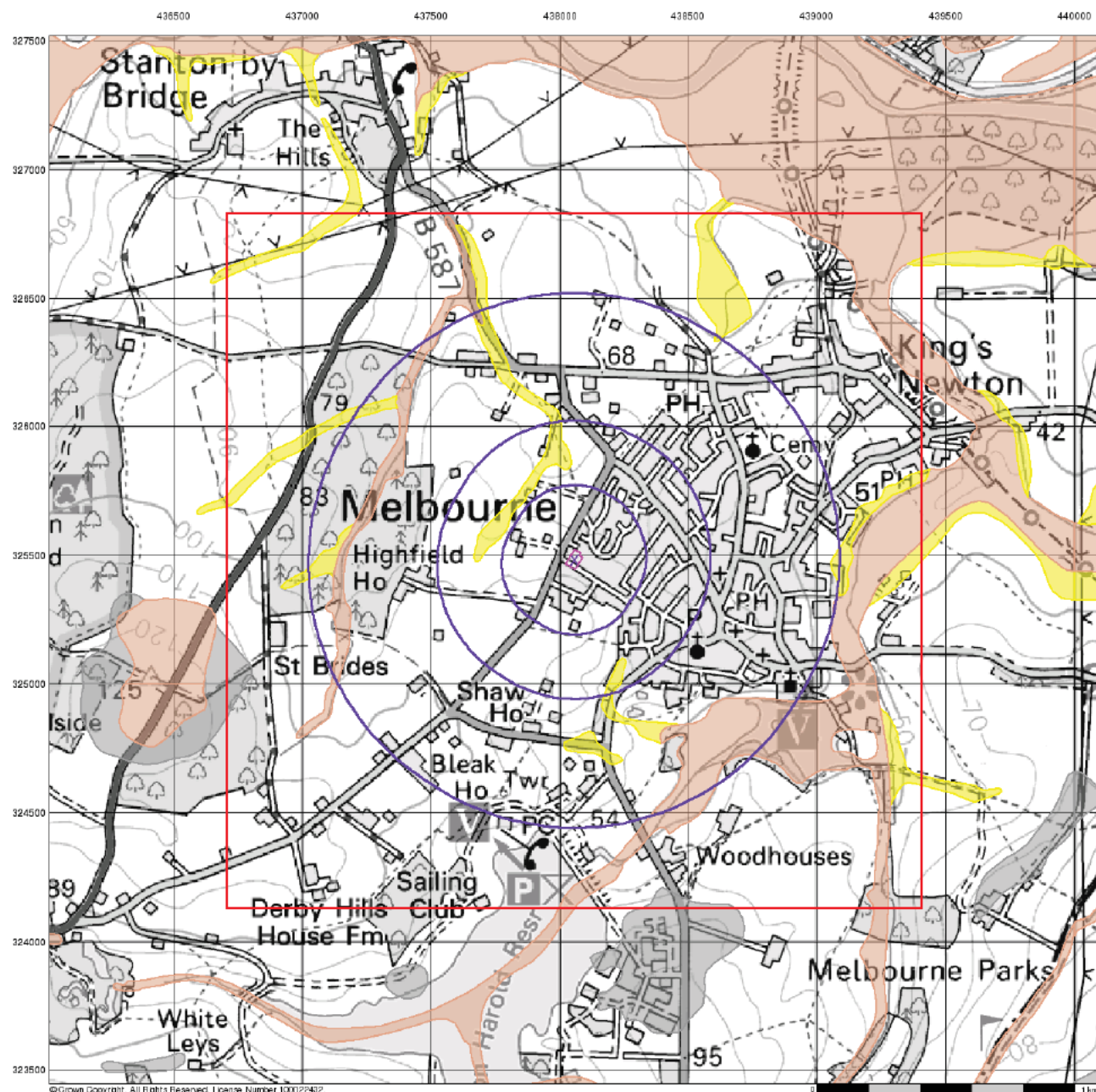
Order Number: 65857358_1_1
 Customer Ref: UK15.1832
 National Grid Reference: 438060, 325480
 Slice: A
 Site Area (Ha): 0.28
 Search Buffer (m): 1000

Site Details

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Superficial Aquifer Designation

General

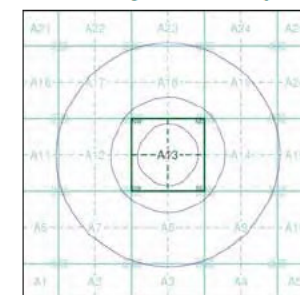
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

Agency and Hydrological

Geological Classes

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

Site Sensitivity Context Map - Slice A



Order Details

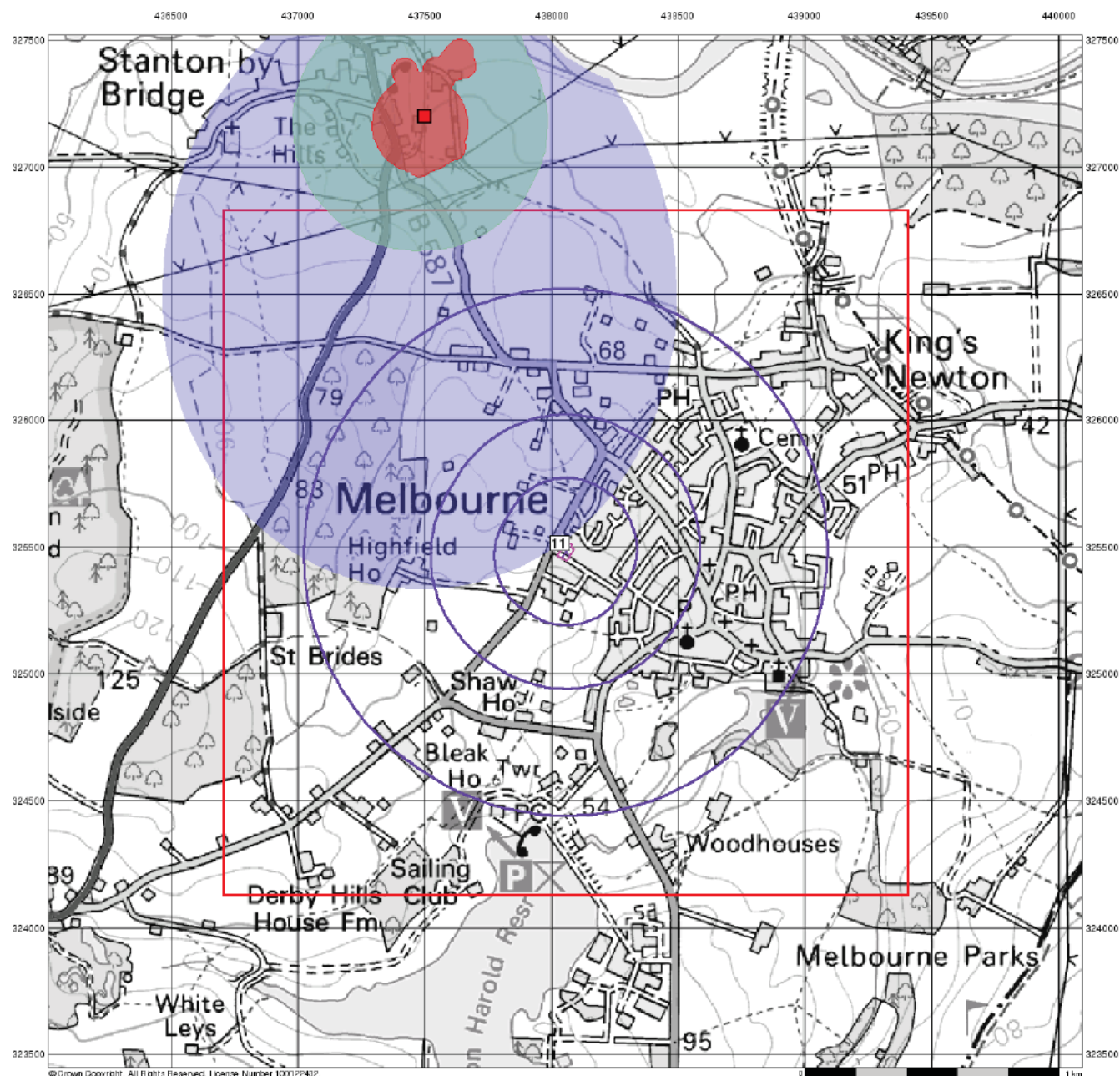
Order Number: 65857358_1_1
 Customer Ref: UK15.1832
 National Grid Reference: 438060, 325480
 Slice: A
 Site Area (Ha): 0.28
 Search Buffer (m): 1000

Site Details

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Source Protection Zones

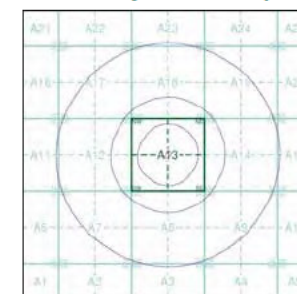
General

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

Agency and Hydrological

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

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 65857358_1_1
 Customer Ref: UK15.1832
 National Grid Reference: 438060, 325480
 Slice: A
 Site Area (Ha): 0.28
 Search Buffer (m): 1000

Site Details

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP



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



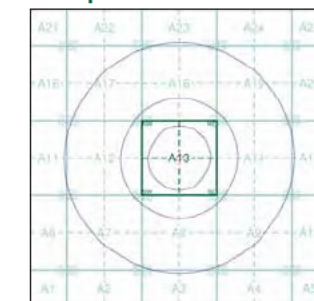
General

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

Agency and Hydrological (Flood)

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

Flood Map - Slice A



Order Details

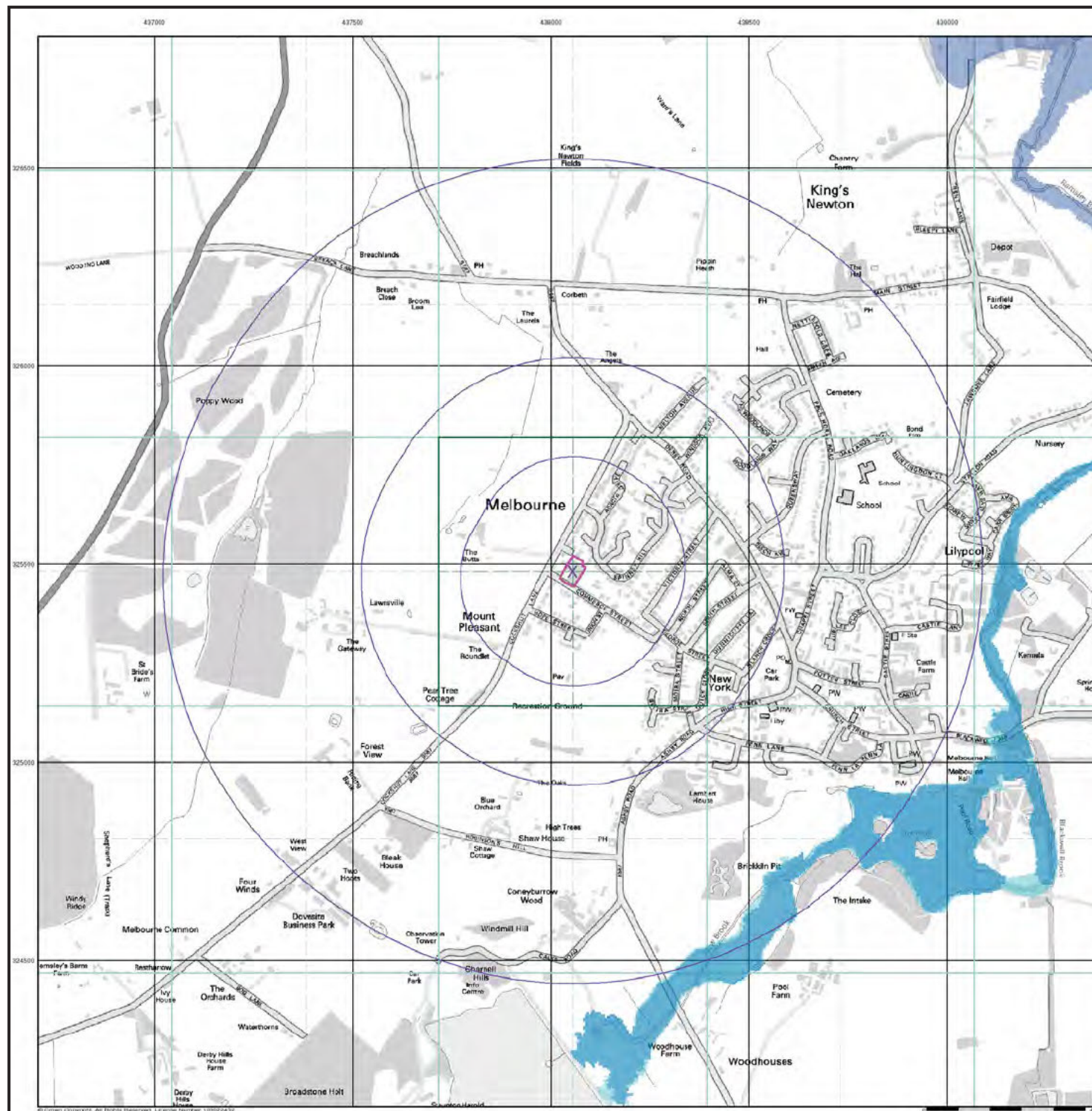
Order Number: 65857358_1_1
Customer Ref: UK15.1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP



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APPENDIX E

A Selection of Historic Maps



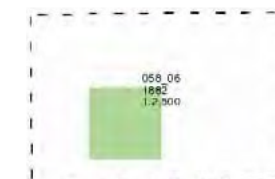
Derbyshire

Published 1882

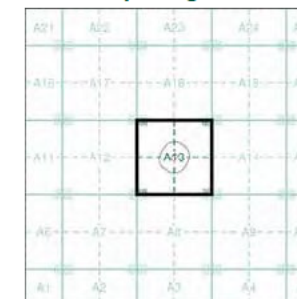
Source map scale - 1:2,500

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 1898 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

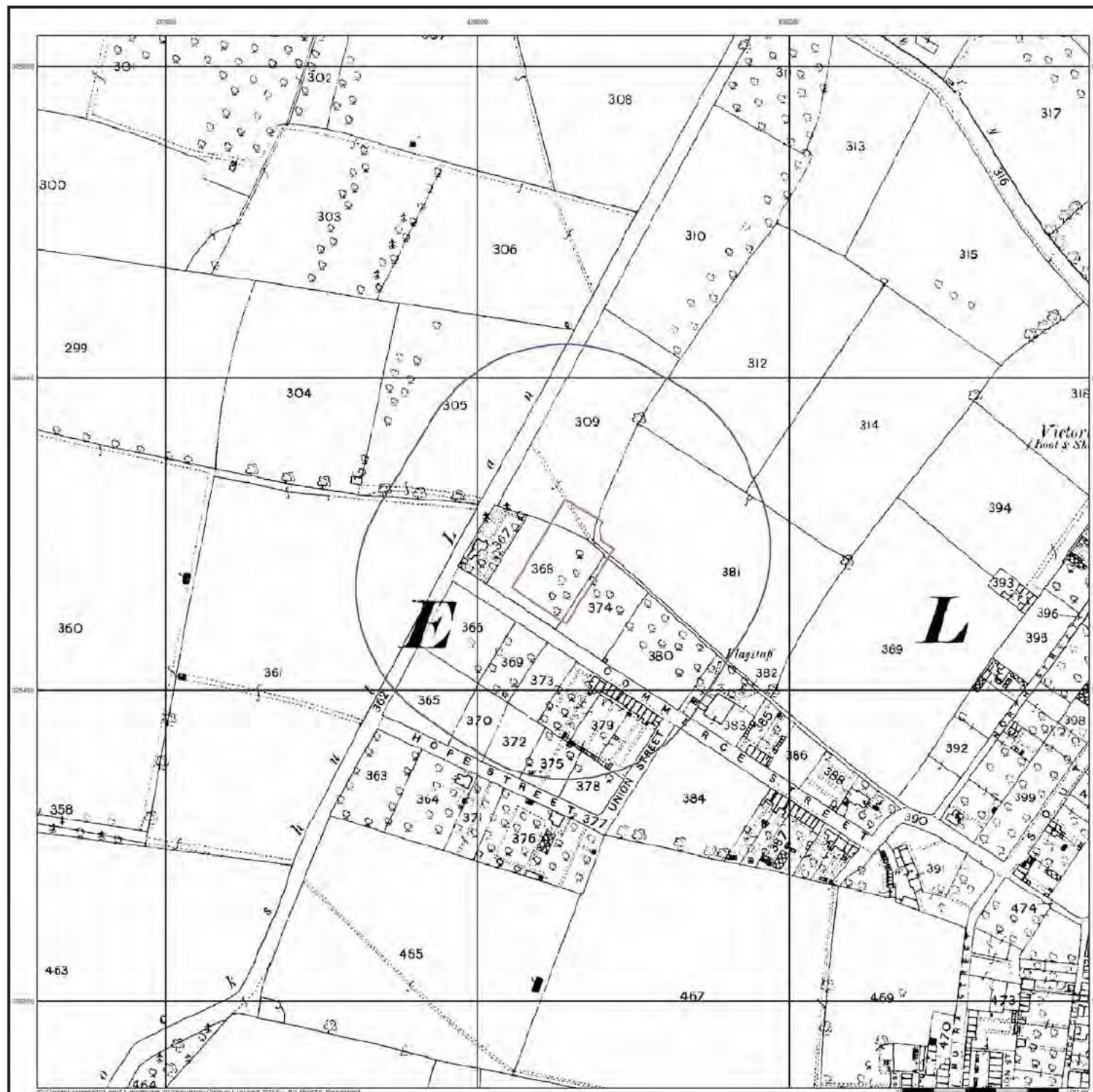
Order Number: 65857358_1_1
Customer Ref: UK15.1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 100

Site Details

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP



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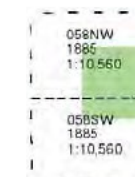
Derbyshire

Published 1885

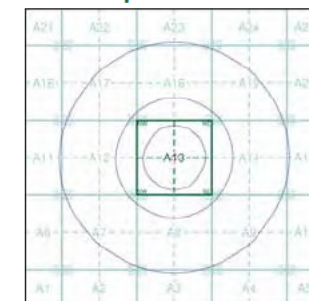
Source map scale - 1:10,560

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

Map Name(s) and Date(s)



Historical Map - Slice A



Order Details

Order Number: 65857358_1_1
Customer Ref: UK15.1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
Search Buffer (m): 1000

Site Details

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP



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



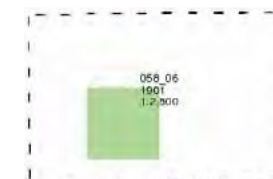
Derbyshire

Published 1901

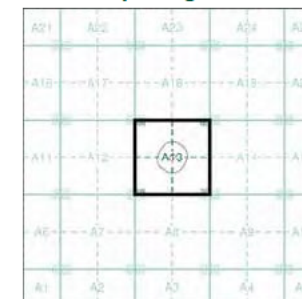
Source map scale - 1:2,500

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 1898 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

Map Name(s) and Date(s)



Historical Map - Segment A13



Order Details

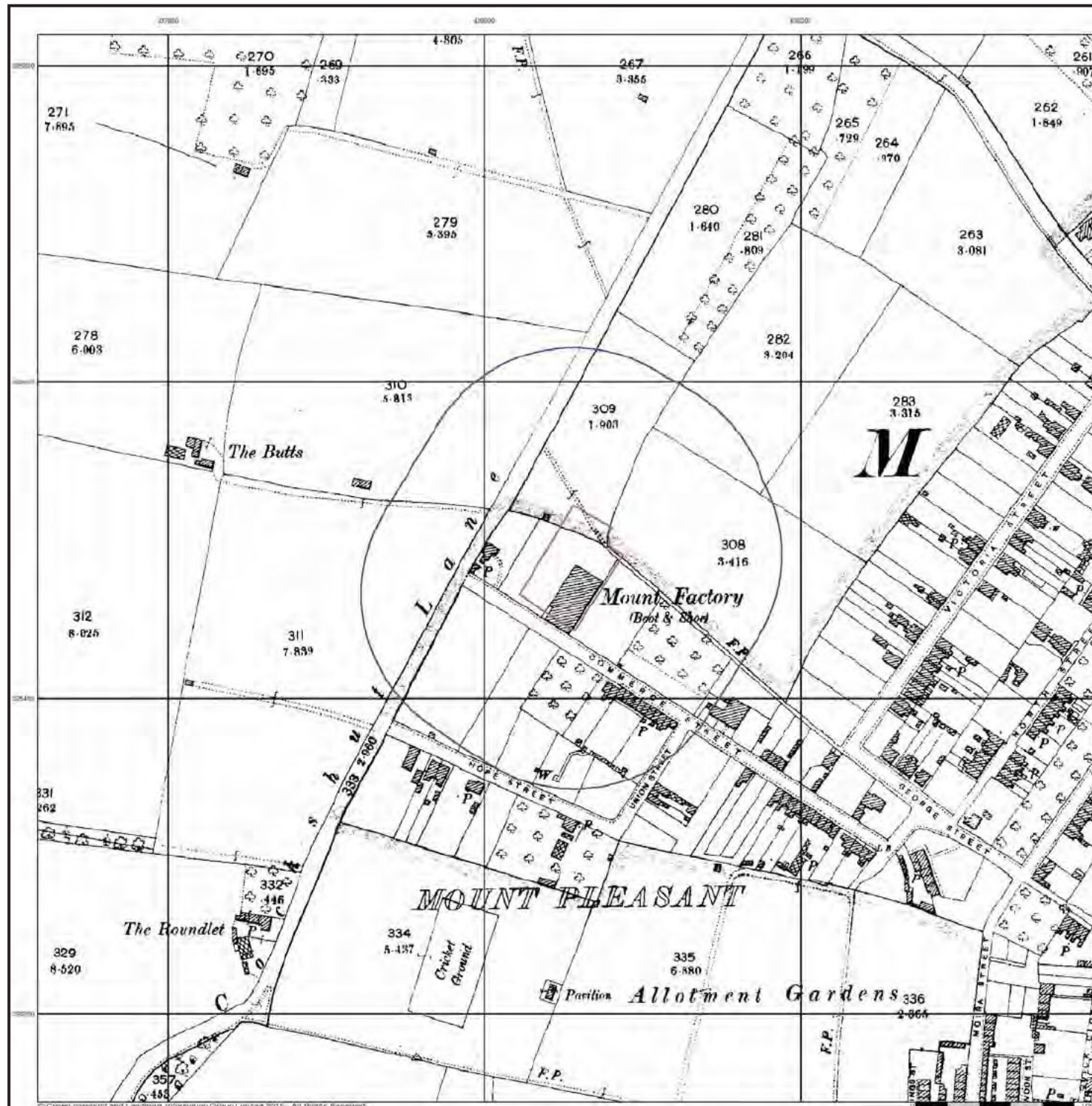
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Slice: A
Site Area (Ha): 0.28
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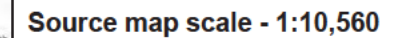
Site Details

76 Commerce Street, Melbourne, Derbyshire, DE73 8GP

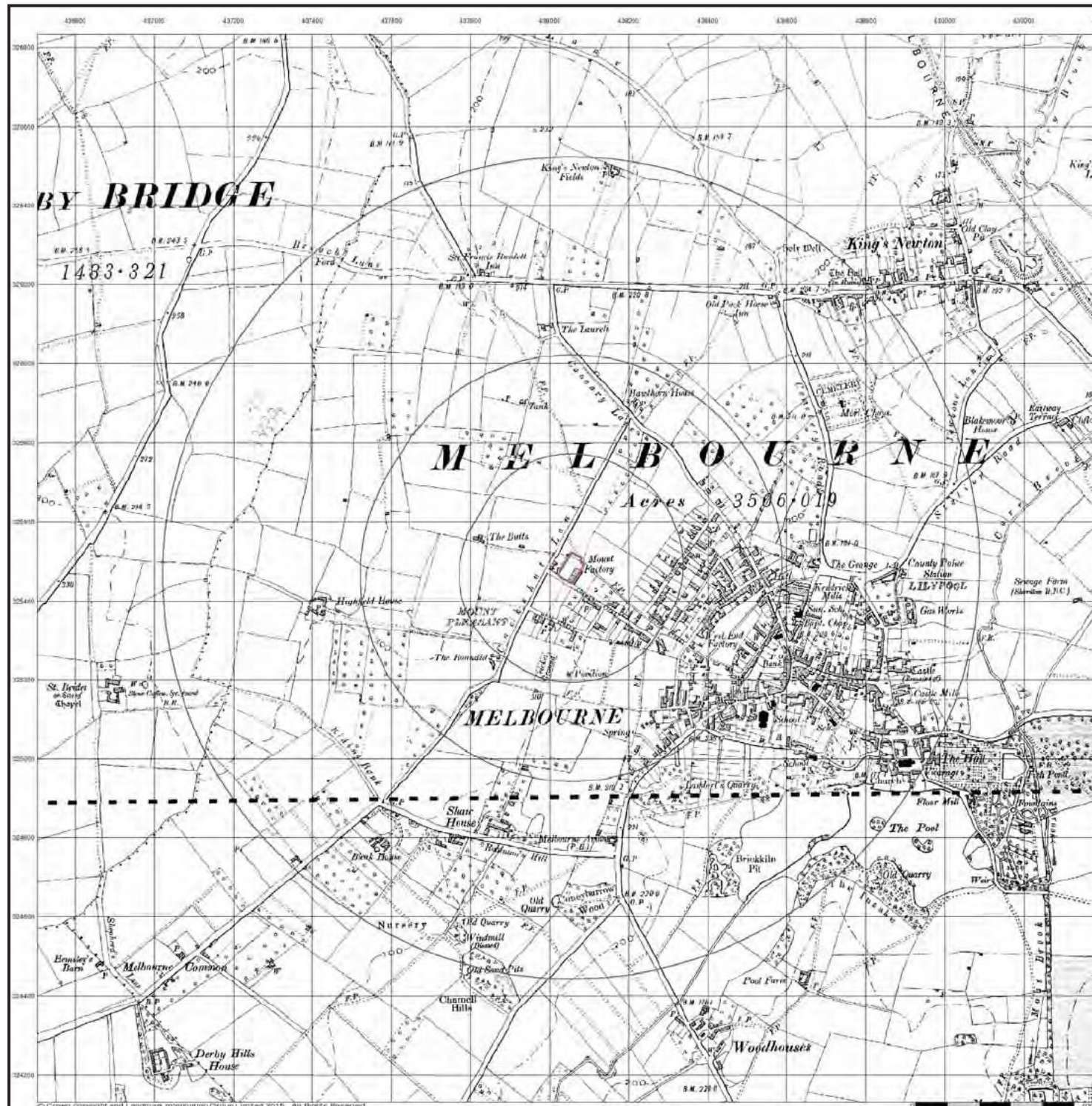


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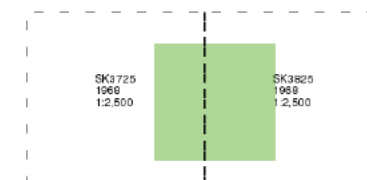
Ordnance Survey Plan

Published 1968

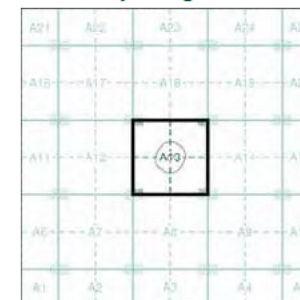
Source map scale - 1:2,500

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 1898 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: 65857358_1_1
Customer Ref: UK15.1832
National Grid Reference: 438060, 325480
Slice: A
Site Area (Ha): 0.28
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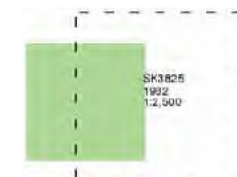
Ordnance Survey Plan

Published 1982

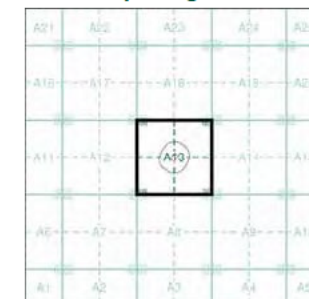
Source map scale - 1:2,500

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 1898 it covered the whole of what were considered to be the cultivated parts of Great Britain. The published date given below is often some years later than the surveyed date. Before 1938, all OS maps were based on the Cassini Projection, with independent surveys of a single county or group of counties, giving rise to significant inaccuracies in outlying areas.

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