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Old Mill Lane, Barnsley

Land Quality Desk Study

September 2011

QUALITY MANAGEMENT

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CONFIDENTIALITY STATEMENT

This report is addressed to and may be relied upon by the following parties:-

Peel Holdings

The Peel Dome

The Trafford Centre

Manchester

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This assessment has been prepared for the sole use and reliance of the above named parties. This report shall not be relied upon or transferred to any other without the express written authorisation of WSP Environmental Limited. No responsibility will be accepted where this report is used, either in its entirety or in part, by any other party.

1 Introduction

1.1 AUTHORISATION

On the instruction of Peel Holdings (Peel) an Environmental Preliminary Risk Assessment has been carried out by WSP Environmental Limited (WSPE) on land at Old Mill Lane, Barnsley.

The site location is indicated in Appendix A - Figure 1.

1.2 AIMS AND OBJECTIVES

The main aim of the assessment is to identify potential environmental issues that may represent a constraint to the proposed sale of the site for commercial end use.

1.3 SCOPE OF WORKS

The assessment comprises a desk-based Environmental Preliminary Risk Assessment containing the following elements:

- Detailed site walkover including photographic record;
- Review of contemporary and historical Ordnance Survey publications;
- Consultations with regulatory authorities;
- Review of geological publications (including hydrology, hydrogeology and soil survey publications where appropriate);
- Obtaining and reviewing a Coal Authority Report;
- Review of the radon status of the site;
- An environmental database search;
- Review of existing reports for the site;
- Reporting including qualitative environmental risk assessment; and
- Recommendations for further work, where deemed necessary.

1.4 DEVELOPMENT PROPOSALS

The development plan at this stage includes the following to the South of the River:

- A retail food store with associated car parking and infrastructure, access will be provided by a new link road and bridge over the River Dearne which connects Burton Road and Old Mill Lane. It is intended that the store will be raised and based on 'stilts' with the retail on the first floor with car parking below.
- A second small retail unit is proposed to the north of the food store and is intended to be used as a kiosk for leisure/recreation associated with the river corridor.
- In addition to the two buildings, an area of landscaping is proposed along the river in order to improve the river corridor and to create a community park.

To the north of the River Dearne the following development is proposed:

- A petrol filling station (PFS) linked to the foodstore is proposed, access to the PFS will be provided from the new link road.
- A third retail unit with associated parking and service access is proposed to the north of the new link road. Access will be provided from the Wickes arm of the new roundabout built as part of the new link road.

In order to facilitate the development described above various preparation works will be required in the south of the site including the demolition of the decommissioned Gas Holder, Three exist retail warehouse units (Howdens, MFI, Plumb Centre, Comet, Powerhouse) and Twibell Street Depot (Construction Services). The former building to the north of the river have already been cleared.

1.5 INFORMATION PROVIDED – PREVIOUS REPORTS

The following previous reports have been prepared for the site and have been considered in the preparation of this report; a review of this information is provided in Section 3.

- White Young Green (WYGE), Groundwater Monitoring Interpretative Report, Old Mill Lane, Barnsley. Ref E7773-GWR-V2 (January 2010);
- WYGE, Factual Post Remediation Verification Report, Old Mill Lane, Barnsley. Ref E7773-PRF-V1 Final Validation Report (August 2008);
- WYGE, Supplementary Specification to National Grid Property Holdings Limited Core Specification (Rev I), Old Mill Lane, Barnsley. Report Ref: E7773-SS-V1 (September 2007);
- WYGE, Remediation Strategy Report, Old Mill Lane, Barnsley Ref: E7773RS-V3 (August 2007);
- WYGE, Detailed Quantitative Risk Assessment Report, Old Mill Lane, Barnsley Report Ref: E7773-DQRA-Issue 1 V2 (April 2007);
- WYGE, Ground Investigation 2007 Factual, Old Mill Lane, Barnsley Report ref: E7773- ADD207GIFACT-Issue 1 (August 2007);
- WYGE, Ground Investigation 2006 Factual Report, Old Mill Lane, Barnsley ref: E7773- GIFACT2006-Issue1 (Sept 2006);
- WYGE, Additional Ground Investigation - Remediation Phase Factual Report, Old Mill Lane, Barnsley Ref: E1297- AdditionalGIFACT-Issue 1 (October 2003);
- WYGE, Ground Investigation Factual Report, Old Mill Lane, Barnsley – Ref: 21306/GI/F (June 1998);
- WYGE, Ground Investigation Factual Report, Old Mill Lane, Barnsley (1996); and,
- British Gas East Midlands Scientific Services (BGEM) Site Investigation Report (1991).
- WSPE. Twibell Street Depot, Environmental Investigation, Barnsley, Ref 12111460, dated October 2007;
- Michael D Joyce Associates, Twibell Street Barnsley, Ref 2484, dated December 2003. Text only.

1.6 LIMITATIONS

The general limitations to the nature of the investigation are outlined in Appendix E.

2 Site Location and Setting

2.1 INTRODUCTION

Table 2.1 – Site Location and Setting

Site Address	Old Mill Lane, Barnsley, S71 1LN
National Grid Reference	435180 407200
Size	6 Hectares
Current Site Use	The site currently comprises an existing retail park containing existing retail warehouses and a depot / cash and carry. A decommissioned gas holder is present in the central area and the site to the north of the river comprises a cleared depot site and an area of open space.
Proposed Site Use	Retail Properties and Community Open Space
Surrounding Areas	North: Wickes Warehouse, residential properties South: Residential properties with gardens East: Dearne Valley Park (Nature Reserve) and Bookers Cash and Carry Warehouse West: Various retail and commercial properties

2.2 SITE INSPECTION

An external site walkover was undertaken by a representative of WSPE on 1 September 2011. Photographs taken during the walkover are presented at the rear of Appendix A. The River Dearne flows from west to east and mature trees are present along the line of the River. The river was noted to be fast flowing in places and no obvious signs of impact were recorded during the walkover.

The following environmentally pertinent observations were made during the site inspection:

Northern Area

- The site is open land, the previous buildings associated with the former gas works have been removed to ground level.
- The new link road is currently undergoing construction and was noted to be a sub base level during the inspection.
- The contractor office and compound area is located in the northwest corner of the site and comprised four porta cabins. An area storing machinery and equipment is also present. No fuel storage was noted, however, given that machinery is used on-site the present of fuel / oils cannot be fully discounted.
- A sub-station is present in southwest corner within a fenced compound, no access was gained to this area.

Southern Area

- The southern area is occupied by warehouses, a former gas holder (still present) and an area of land which has been subject to demolition.
- No access was gained into the former gas holder compound, it is understood that the gas holder will be decommissioned and removed from site prior to redevelopment.
- In the southeast corner of the site a former depot and warehouse is present, some of which has been demolished and demolition materials including metal remain in stockpiles. Three buildings remain in situ and have yet to be demolished, no access was gained to these buildings.

- The remainder of the site is occupied by three large commercial units, one of the units is occupied by Plumber Centre (western boundary) and one is occupied by Comet (on the southern boundary adjacent to Twibell Street). The central warehouse is currently vacant and was formerly occupied by Power House. Each of the commercial units has associated car parking and soft landscaping. No internal access was gained to the properties.

2.3 SITE HISTORY

A study of historical Ordnance Survey maps has been undertaken to identify potentially contaminative former land uses.

The following table provides a summary of the available map information relating to the site, extracts of which are presented in Appendix B.

Table 2.2 – Summary of Map Information Relating To the North of the River Dearne

Date	Land Use
Pre 1855 to Pre 1892	The site is shown as open undeveloped land.
Pre 19882 to Pre 1931	The Old Mill Lane Gas works is presence comprising three building and two gas holder located to the east and west. A railway embankment is present along the eastern edge of the site and railway tracks lead into the subject site over the River Dearne onto the Southern Area.
1931 to 1962	Map annotations show the present of a number of tanks and chimneys associated with the gas works.
1962	Evidence of cut or fill activities or stockpiling of materials in the eastern part of the site.
1973 to 1982	Eastern Gas Holder no longer shown. Removal of buildings and replacement with a Gas Board Depot building in the northwest corner.
1982 to 1993	Western gas holder no longer shown and gas board depot remains.
1993 to present	Gas depot remains and area to south of depot is labelled as a Gas Compound and the layout is similar to the present day.

Table 2.3 – Summary of Map Information Relating To the South of the River Dearne

Date	Land Use
1855 to 1892	The site is shown as open undeveloped land.
1892 to 1906	Part of a Tannery present inside the western boundary with possible water feature to the south of the building. Buildings which are labelled as a laundry house and Dearne Works are present within the eastern section.
1906 to 1931	The Laundry becomes a Saw Mill and is extended. The railway line leading from the Northern part of the site (Gas Works) is extended further south. Water features (possible ponds) are depicted to the south of the River.
1931 to 1962	Additional railway lines are depicted and much of the southern area is labelled as Allotment Gardens.
1962 to 1973	A further gas holder is present to the south of the River Dearne in a central position. The Saw Mill and the Tannery are labelled as a 'Works'.
1973 to 1982	The laundry is labelled as 'Cottages' and a sub-station is located on the southern boundary.

1982 to 1991	The former Tannery / Mill / works buildings are demolished and new warehouse style buildings are present.
1993	Further warehouse constructed on the southern boundary
1994 to present	The former Mill / Works is labelled as a depot and the site layout is similar to the present day.

The following table provides a summary of the available map information relating to the area surrounding the site.

Table 2.3 – Summary of Map Information Relating To the Area Surrounding Site (North and South Area)

Date	Land Use	Direction	Approximate Distance (m)
1855 to 1894	Mount Osbourne Colliery	South	200
1892 to 1993	Paper works later labelled as Paper Works	West	Adjacent
1892 to 1982	Old Mill Glass Works later labelled as 'Works'	South	100
1894	Quarries	Northeast and South	200 / 300
1931 to 1962	Part of Old Mill Gas Works (extended off subject site to the north)	North	Adjacent
1931 to 1962	Various tanks / sluices associated with sites present along the western boundary of the site	West	Adjacent
1931 to 1962	Mottram Wood Colliery	East	75 to 200
1932 to 1956	Dock Works	West	300
1973 to post 1994	Animal By Product Factory (with tanks), later becomes depot in 1980s.	East	150
1973 map	Garage	South	50
1982 to 1991	Land labelled as 'tip' becoming disused in 1993 and forming part of Dearne Valley Park	East	20

2.4 GEOLOGY

The following geological mapping has been consulted;

- British Geological Survey (BGS) sheet at 1:50,000 scale, Sheet 87; and,
- BGS online resource: Geology of Britain Viewer.

These show the site to be underlain by Alluvium deposits (Clay and Silt) in the vicinity of the River Dearne. The superficial deposits are shown to be underlain by the Carboniferous Coal Measures.

Several coal seams are identified to outcrop to the east of the site including the Two Foot, Abdy, and Top Beamshaw and Coal seams. The Low Beamshaw seam is identified to outcrop beneath the site trending north west to south east.

Two faults are shown to the north and south of the site, both faults trend in a northwest to southeast direction. The southern faults are shown to down throw to the north and the northern fault is shown to down throw to the south, which indicates that the site is located on a down thrown block.

A review of the available site investigation reports confirms the above records. Ground conditions were recorded as a variable thickness of Made Ground over Alluvial clay with many buried former process structures. Made ground

comprised a heterogeneous mix of ash, clinker, slag, rubble, masonry, clays and sands with occasional coke and coal. Tars and free phase hydrocarbons were noted on site.

2.5 COAL MINING

A Coal Authority Mining Report was commissioned for the site. This states that:

- The property is within the likely zone of influence from historical workings in 7 seams of coal at 80m to 410m depth, and last worked in 1986. The coal authority report that any ground movement from these coal workings should have stopped by now;
- Coal could be present at or close to the surface;
- There are no records of the site having been affected by subsidence or instability due to faulting;
- The Coal Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining;
- There are no known mine entries within, or within 20m of the boundary of the site;
- The property is not located within the geographical boundary of an opencast site from which coal has been extracted by opencast methods; and,
- The property does not lie within 800m of a geographical boundary of an opencast site within which coal is being extracted by opencast methods, or within 800m of an opencast site for which a license to extract coal by opencast methods is awaiting determination of has been granted.

A copy of The Coal Authority Report is provided in Appendix C.

2.6 RADON

According to the Radon Atlas of England and Wales (Health Protection Agency and British Geological Survey, 2007), the site is located within an area where less than 1% of homes are affected by levels of radon gas above the radon Action Level. BRE 211 guidance (2007) indicates that specific radon gas protective measures are not required for new structures (including residential, commercial or industrial) at the site.

2.7 HYDROGEOLOGY

The Environment Agency (EA) Groundwater Vulnerability mapping divides the underlying strata in England and Wales into Principal, Secondary A, Secondary B and Non Aquifers depending upon their potential for potable water supply.

According to the EA website, the majority of the site is underlain by a Secondary A Aquifers. Secondary A Aquifers are described as '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.'

The superficial alluvium deposits overlying the bedrock in the vicinity of the River Dearne are also defined by the EA as a Secondary A Aquifer.

The site is not located within a source protection zone as defined by the EA.

No active groundwater abstractions are identified within 1 km of the site.

The previous reports for the northern area of the site confirm that groundwater is draining toward the River Dearne and is expected to be in continuity with the River. Shallow perched groundwater also exists on the northern area of the site.

2.8 HYDROLOGY

Surface water features in the vicinity of the subject site are as follows:

Table 2.4 – Surface Water Features

Surface Water Feature	Water Quality Classification** ¹	Direction	Distance (m)
River Dearne	Quality D (Chemical) Biology not assessed Current Ecological status ² : Moderate Flow rate ³ <0.62 cumecs	On site	On site

* Grade Scale: Grade A (very good) - These rivers have natural ecosystems and make very good salmonid and cyprinid fisheries. They may be used for any type of water abstraction including potable supply. Grade F (bad) - These rivers have severely restricted ecosystems and are very polluted. These definitions are taken from the EA website.

¹ EA designated classification at New Lodge Old Mill approximately 200m east of the site as of 2009;

² As designated on the EA's website Surface water bodies - classification status and objectives for Water Framework Directive Cycle 1 (updated January 2011);

³ as stated in the Envirocheck report (obtained for Appendix 14.1) 208m east of the Site in 2000

A review of the Environment Agency website identifies the site does lie within the 1 in 100 year flood plain of the River River Dearne.

There are two licensed surface water abstractions within 1 km of the site, these are summarised in the following table.

Table 2.5 – Licensed Surface Water Abstractions

Licensee	Details	Direction	Distance (m)
Yorkshire Water	Non Specified	Northwest	350
Barnsley MBC	Make Up / Top Up Water	Southeast	480

The Phase 1 Geo Environmental Assessment (Appendix 14.1) states that there are active discharge consents on site for Yorkshire Water permitting sewage discharge (storm water overflow) into the River Dearne. Several other similar consents applicable to Yorkshire Water are present within 1km of the site.

The following pollution incidents to controlled waters are reported to have occurred on-site:

- Two Incidents on the northern boundary of the site relating to oils / surface water sewers in April 1990, the incident were classified as category 2 (minor) and 3 (significant).
- Three incidents occurred to the north of the former western gasholder in September 1991, May 1990 and July 1990. The incidents involved unknown pollution, sewage and foam and were classified as category 2 (minor) and 3 (significant).

A further 6 pollution incidents have been noted within 500m of the site. The closest of which occurred approximately 15m to the east of the site in the River Dearne involving the release of oils / diesel on February 1992, the incident was categorised as 2 (minor).

2.9 WASTE

The following historical waste sites within 500m of the site are identified in the environmental database search report:

Operator / Authority	Details	Direction	Distance (m)
East Midlands Gas	Inert waste from 1978 to 1884	On site	On site
Former Canal	Inert waste from 1982 to 1988	South / Southeast	50
BMBC	No Information	West	120

Operator / Authority	Details	Direction	Distance (m)
Star Paper Mill	Inert Waste and Liquid Sludge from 1978 to 1982	West	130
Mr A Hanson	Inert excavation waste from 1990 to 1994. Medium sized landfill.	West	180
Star Paper Mill	Inert waste from 1978 to 1990	West	220
Booth Excavations	Construction and demolition waste, deposited from 1981 to 1988. Described as a very large landfill.	North	470
White and Peace	Inert and commercial waste from 1984 to 1989. Described as a large landfill accepting between 75,000 and 250,000 tonnes per year.	Northwest	480

No active landfills have been identified within 500m of the subject site.

2.10 RECORDED MINERAL SITE

It was identified from map evidence that a number of collieries are present in the vicinity of the site, this is confirmed by the information provided in the Envirocheck data from the British Geological Society. The closest mineral (Coal) extraction sites, is Mottram Wood Colliery which is located approximately 75m to the east.

2.11 POLLUTION CONTROLS

There is one active Local Authority Integrated Pollution Control within 500m of the site; following location was identified in the environmental database search report obtained for the project:

- Asda PFS: 180m to the west.

2.12 HAZARDOUS SUBSTANCES

One Lower Tier control of major accidents hazards (COMAH) site is identified as being active on-site and is operated by Transco. The site is also listed as an Installation handling Hazardous substances and is registered as holding a Planning Hazardous Substances Consent. The Hazardous substances recorded on site relate to liquefied flammable gas / natural gas.

2.13 REGULATORY ENQUIRIES

2.13.1 Contaminated Land

The local contaminated land office is aware of the history of the site including the remediation of the former gasworks, the current redevelopment of the road on the land to the north of the River Dearne, and the proposed redevelopment. We understand that the council is content with the nature of the site in its current site layout given the remediation works completed to date. We understand that, given the proposed layouts and increased access to Public Open Space (POS) to land on the north bank to the River Dearne, the council perceive and increased risk of exposure of residual contaminants on site to Human Health and will likely expect some additional remedial measures to address the pollutant linkages. A simple appropriately designed, installed and verified cover system may be sufficient.

2.13.2 Environment Agency

Based on correspondence received within the copies of the WYG reports completed for National Grid, the Environment Agency are aware of the history of the site including the remediation of the former gasworks. The Environment Agency have verbally confirmed that they agreed to discharge of planning conditions relating to the remediation of the site.

2.14 OTHER ISSUES

Other issues that could materially affect the overall environmental sensitivity of the area include the following:

- Dearne Valley Park to the north east of the site is a Nature Reserve;
- The site is located within a nitrate vulnerable area; and,
- The site is located within an area of adopted greenbelt land.

3 Report Review

The following reports produced by White Young Green are available for the former gasworks to the north of the River Dearne;

1. *British Gas East Midlands Scientific Services (BGEM) Site Survey, 1991 (included in WYG report 21306 from June 1998 see below)*

Site investigations by Scientifics in 1990 included 28 trial pits to the north of the River Dearne. This investigation identified “large amounts of spent oxide and coke/clinker/ash”; foundations of many of the former process buildings and in ground gasholder bases; and evidence of tar impacted materials was noted.

2. *White Young Consulting Engineers Ground Investigation Factual Report, Old Mill Lane, Barnsley – 1996 (included in WYG report 21306 from June 1998 see below)*

Site investigations by White Young Consulting Engineering in 1996 comprised 25 trial pits and 5 boreholes. Soils were analysed for a suite of typical gasworks contaminants. Details of findings are not provided.

- 3 *White Young Green Environmental (WYGE) Ground Investigation Factual Report, Old Mill Lane, Barnsley – Ref: 21306/GI/F (June 1998)*

This report provides a review of the History, Environmental Setting and Ground Conditions Encountered during this and previous phases of site investigation. Key facts are as follows:

The former gas works was constructed during the late 1860's until the early 1960's. By 1964 most of the gas plant had been demolished;

Historical plans show gas plant on site included three gas holders, a retort house, exhaustor house, engine house, two purifiers, above and below ground tar and liquor tanks, carburetted water gas plant, oxide shed, meter house, pump house, and petrol & diesel tanks associated with vehicle refuelling. Post demolition the site was later used as a Gas Board Depot; See Extracted Plan (EP) 1.

The site investigation included 37 trial pits and 5 boreholes with soil and groundwater sampling and analysis. The investigation assessed the structure of the tar well, gasholders 1 & 2 and the purifiers. Ground conditions were recorded as a variable thickness of Made Ground over Alluvial clay with many buried former process structures. Made ground comprised a heterogeneous mix of ash, clinker, slag, rubble, masonry, clays and sands with occasional coke and coal. Tars and free phase hydrocarbons were noted on site. Laboratory analysis reported substantially elevated concentrations of typical gasworks contaminants (PAHs, cyanides, sulphur, strongly acid and alkali ground, BTEX, phenols) in soils and groundwater.

4. *WYGE Additional Ground Investigation - Remediation Phase Factual Report, Old Mill Lane, Barnsley Ref: E1297- AdditionalGIFACT-Issue 1 (October 2003).*

Works were commissioned to update the existing information and provide information for design/cost planning purposes. Investigation comprised 25 trial pits, 12 boreholes permeability testing, river sampling; soil and groundwater sampling; and soil gas and groundwater elevation monitoring. Observations of contamination included spent oxide and oxide staining, tarry sheens and odours, hydrocarbon sheens and odours, strong creosote type odours. Laboratory analysis reported substantially elevated concentrations of typical gasworks contaminants (PAHs, cyanides, sulphur, BTEX, TPH, phenols) in soils and/or groundwater.

5. *WYGE Ground Investigation 2006 Factual Report, Old Mill Lane, Barnsley ref: E7773- GIFACT2006-Issue1 (Sept 2006)*

The report provides a summary report of previous site investigation locations within the footprint of the corridor of a proposed new road through the site with a strip 6m wide on either side of the road.

6. *WYGE Ground Investigation 2007 Factual, Old Mill Lane, Barnsley Report ref: E7773- ADD207GIFACT-Issue 1 (August 2007).*

Works were commissioned to provide site specific information relating to near surface and subsurface contamination and to install groundwater monitoring boreholes to assess the potential risk to the proposed commercial redevelopment of the site and to the River Dearne. Investigation comprised 10 trial pits, 7 boreholes; soil and

groundwater sampling; and soil gas and groundwater elevation monitoring. Observations of contamination included spent oxide staining and hydrocarbon sheens and odours. Laboratory analysis reported substantially elevated concentrations of typical gasworks contaminants (PAHs, cyanides, sulphur, BTEX, TPH, phenols) in soils and/or groundwater. See EP2 for summary of investigation positions.

7. *WYGE Detailed Quantitative Risk Assessment Report, Old Mill Lane, Barnsley Report Ref: E7773-DQRA-Issue 1 V2 (April 2007)*

The works were commissioned to assess the risks associated with the proposed redevelopment of the site with the A61 Quality Bus Corridor, and commercial area in the central and northern areas of the site (Zone A), with the southern and south western areas (Zone B) utilised as vegetated open space with access restricted and discouraged with a 'waist high fence'. See EP 3. The DQRA considered risks to Human Health, and to Controlled Waters (i.e. groundwater and more specifically the River Dearne as the most sensitive receptor).

The report concludes that for Human Health, given the proposed end use of Zone A, it was unlikely that significant pathways would exist such that site users would be impacted in this area and no remedial actions were required. For Zone B, given the proposed open space end use, a suitable capping layer would be required.

The report concludes that, in relation to impacts to Controlled Waters from Zone A, works would be required to address contamination within/around Gasholder 1 (soils impacted by PAHs with a down gradient plume in groundwater); contamination in shallow soils within/around the former Exhauster & Retort Houses (shallow soils impacted with Ammonia and PAHs); contamination within/around the former purifiers (cyanides in shallow soils).

The report concludes that in relation to impacts to Controlled Waters from Zone B, works would be required to address Gasholder 2 (hydrocarbons/ammonia/cyanide in groundwater posing a risk to the River); contamination within/around the former Scrubbers and Oil Tank (shallow soil and perched groundwater impacted with hydrocarbons); localised benzene impacts around BH103 (more delineation required); widespread moderate groundwater impacts (post remediation monitoring to assess if impacts to groundwater reduce).

8. *WYGE Remediation Strategy Report, Old Mill Lane, Barnsley Ref: E7773RS-V3 (August 2007)*

This document details a remediation strategy designed to address the potential for adverse impacts to the River Dearne from contamination in soils and groundwater on site. Remedial areas are shown on EP4. The main elements of proposed remediation are:

- Excavation and treatment/disposal for contaminated soils in Areas A1 to A8 and Area B2;
- Removal of contaminated perched groundwater from Areas A1 to A8 and Area B2;
- Localised removal of free phase hydrocarbons in BH201;
- Potentially localised remediation of groundwater in the vicinity of Bh103 (Area B3) where isolated Benzene impact was identified;
- Remediation of groundwater within Former Gasholder 2 (Area B1);
- Groundwater monitoring prior to, during and after source removal to determine if any natural attenuation trends can be identified to determine the residual risk to groundwater in the Alluvial River Terrace Gravels and to the River Dearne such that the need for further groundwater remediation works could be reviewed.

The report defines soil remediation target criteria for a range of hydrocarbons, phenols, BTEX, PAHs and ammonia for Zone A and Zone B.

Barnsley MBC confirmed their general agreement with the proposed Strategy in a letter dated 30 August 2007, though made requests for further information on a number of issues.

9. *WYGE Factual Post Remediation Verification Report, Old Mill Lane, Barnsley. Ref E7773-PRF-V1 Final Validation Report (August 2008)*

This report provides information on the remediation works undertaken in line with the remediation strategy above. It provides a summary and detail on works completed in each of the remediation areas (A1 to A8, B1-B3.). Works for each area generally comprised excavation of pre-classification trial pits to pre-classify materials for re-use or offsite disposal; selective excavation of contaminated Made Ground and underlying natural strata; dewatering and on site

treatment of perched groundwater with discharge under licence to foul sewer; confirmatory chemical and geotechnical testing of the material stockpiled for re-use; removal of tar pipes and drainage channels encountered; excavation of all visually impacted materials, validation sampling of the base and sides of remediation excavations with associated chemical analysis; and back filling of remediation voids. The report also details disposal routes and tonnages, environmental monitoring completed, infilling works completed and regulatory body involvement.

The report concludes that the works “generally achieved the Remediation Criteria within the remaining Made Ground and within the natural ground”. Exceptions to this are reported on two samples collected adjacent to the northern boundary in Area A3 and western boundary in Area A4 and in two samples from natural clay at depths of greater than 2mbgl in Area B2A and B2B. The report concludes that residual contamination may be present beneath the PRS compound and within the 3metre easement of the live gas main as excavation was not possible due to the presence of live gas plant. These areas are concluded in the report to be unlikely to represent a substantial risk as historical site investigation works and window sampling carried out around the PRS station did not indicate significant contamination in these areas.

The report states the site is suitable for the end uses defined in the document i.e. hard cover retail, hard cover road and soft cover public open space.

Development issues identified within the report include:

- Differential settlement of between areas of deep and shallow backfilled materials;
- Relic structures;
- Services;
- The operational PRS compound;
- A bat colony (Duabenton Bats) in the northern end of the culvert running down the western boundary of the site;
- The southern half of the eastern area of the site being subject to a Tree Preservation Order;
- A badger sett noted in the area of the site containing the TPO;
- Japanese Knotweed and Giant Hogweed present on site;

10. *WYGE Groundwater Monitoring Interpretative Report, Old Mill Lane, Barnsley. Ref E7773-GWR-V2 (January 2010)*

This report presents a review of groundwater monitoring undertaken prior to, during remediation and 12 rounds of post remediation monitoring. 9 pre-remediation 6 during remediation and 12 post-remediation groundwater sampling events were completed on site.

Groundwater contaminants were reported to be primarily in two separate plumes. One plume generally to the southeast of former gasholder 1, the other is located adjacent to Gasholder 2. Contaminants present within the plumes include Benzene, naphthalene, phenol, TPH Cyanide and Ammonium.

The report concludes that source removal works were completed in 2008 and the groundwater monitoring results have generally indicated the presence of stable contaminant plumes in groundwater. The report therefore states the remediation of the site is complete and no further monitoring is required.

WSPE. Twibell Street Depot, Environmental Investigation, Barnsley, Ref 12111460, dated October 2007

In October 2007 WSPE Completed a site investigation upon the Twibell Street Depot, at the time operated by Barnsley Metropolitan Council who used the site as a maintenance depot. Eight window sample boreholes were drilled to a maximum depth of 4.00m bgl at locations to provide general site coverage and to target sources of potential contamination. Made Ground was encountered often to approximately 1mbgl with a maximum depth of 3.5mbgl. A gravelly clay interpreted as weathered Middle Coal Measures was encountered at depths of 0.8mbgl to 4mbgl, above moderately weak to moderately strong thinly bedded Mudstone. No significant visual or olfactory indications of volatile, mobile (e.g. hydrocarbons) and / or physical (e.g. suspected asbestos) contamination were recorded during the fieldwork, though much ash and clinker was present in the made ground. No samples returned results in excess of Soil Guideline Values (SGVs) and CLEA Compliant Risk Based Generic Tier 1 Threshold Values (TTVs) in either Made Ground or Natural Ground.

Michael D Joyce Associates, Twibell Street Barnsley, Ref 2484, dated December 2003. Text only.

The site presents a desk study review of parts of the site to the south of the River Dearne and reports site investigation works completed. The report covered the areas of a northern unit housing The Plumb Centre and Howdens Joinery and a southern unit occupied by MFI Home Works and Powerhouse Electrical Store.

18 window sample holes were completed in November 2003. Ground conditions are reported to be 0.4 to 2.95 m of Made Ground, thickening to the north (i.e. towards the river), over Alluvial sandy gravelly clays to at least 4.5m thick, becoming thicker and softer towards the river. Several of the boreholes drilled along the northern boundary encountered very soft silty, slightly organic clays and clayey silts. They were reported as potentially representing an old course of the river. Beneath the higher southern half, weathered mudstone bedrock was encountered at shallow depths, especially where the alluvium is absent. Many of the boreholes encountered groundwater ingresses at depths of between 0.6m and 4m, especially those drilled in the central and northern sections. Standing water was reported at depths of 2.6m and 3.4m. The made ground materials were reported as appearing not to have been properly compacted outside the areas of the two buildings.

Testing included a suite of typical heavy metal contaminants, PAHs, Phenols, Cyclohexane extract and Mineral oil. The report states that made ground materials contain insignificant metallic and non-metallic compounds, that there was no discernible trend in the isolated contaminants between either pair of the retail units, and that *"Although there are a few isolated slightly elevated levels of organic compounds present, this made ground can be regarded as being essentially uncontaminated"*. The report further states *"Although the area around the tannery could be a possible source of potential contamination, the allotment gardens on its southeastern side are not expected to have created any pollution"*. Limited Ground gas monitoring reported *"zero methane, and near normal oxygen concentrations"*. Carbon dioxide levels were reported to be variable, with readings up to 1.4% in places. The report concludes that *"the site does not therefore appear to be adversely affected by landfill gases, either from internal or external sources"* and that *"there is no evidence to indicate that this site is at present giving rise to any environmental, contamination or pollution"*. No appendices were available for review.

4 Environmental Risk Assessment

4.1 INTRODUCTION

The presence of contaminated materials on a site is generally only of concern if an actual or potentially unacceptable risk exists. Within the context of current UK Legislation (i.e. Section 57 of the Environment Act 1995), the interpretation of a "significant risk" is termed to be one where:

- Significant harm is being caused or there is a significant possibility of such harm being caused, (where harm is defined as harm to health of living organisms or other interference with the ecological systems of which they form a part and, in the case of man, includes harm to his property); and / or,
- Pollution of controlled waters is being caused.

The potential for harm to occur requires three conditions to be satisfied:

- Presence of substances (potential contaminants/pollutants) that may cause harm (Source of Pollution);
- The presence of a receptor which may be harmed, e.g. the water environment or humans, buildings, fauna and flora (The Receptor); and,
- The existence of a linkage between the source and the receptor (The Pathway).

Therefore, the presence of measurable concentrations of pollution within the ground and subsurface environment does not automatically imply that a contamination problem exists, since contamination must be defined in terms of pollutant linkages and unacceptable risk of harm.

The nature and importance of both pathways and receptors, which are relevant to a particular site, will vary according to the intended use of the site, its characteristics and its surroundings.

In order to assess the contamination risk at the subject site the above rationale has been applied and is discussed below in the context of **Contamination Sources** and **Potential Pollutant Linkages**. These linkages have been further broken down in to the following categories;

- Human Health;
- Controlled Waters; and,
- Buildings, Services and the Natural Environment.

4.2 SOURCES

Based on the information reviewed in Section 3 and the findings of the site inspection, potential sources of contamination on the site are considered to be:

- Former Gas Works Land to the north of the River Dearne including two former gas holder bases though subject to remediation that has been accepted by the regulators as suitable for a commercial end use; Residual concentrations of hydrocarbons, phenols, cresols, Naphthalene, Anthracene, ammonium and cyanide compounds;
- Residual contamination associated with the gasholder to the south of the River Dearne may also be present.
- Potential contaminants associated with the former tannery and laundry in the southern part of the site include, hydrochloric acid, chloride, sulphide compounds, solvents, cyanide and dyes.
- Railway Land on the eastern edge of the property - Potential use of ash ballast (possibly containing metals, sulphates and Poly-aromatic Hydrocarbons) and clinker (in-combustible residue created during the combustion of coal). Hydrocarbons; diesel and lubricating oils associated with railway signals, points, engines and carriages. Possible Made Ground used as fill for embankments to raise ground level.
- Potential sources of volatile vapours or ground gas exist at the site.

4.3 POTENTIAL RECEPTORS

Based on the proposed redevelopment of the site for commercial end use, it is considered that the likely receptors will be present on both the land to the north and south of the River Dearne:

- Construction and development workers involved in ground works;
- Future site users (staff/customers/leisure users of the greenspace);
- Maintenance workers involved in excavations;
- Buildings and services;
- Adjacent residents; and
- The River Dearne.

4.4 EXPOSURE PATHWAYS

Given the proposed end use of the site, following pathway assumptions have been made and summarised below.

Table 3.1 – Exposure Pathways for Human Health

Pathway	Active (✓) / Inactive (✗)
Ingestion of soil	✓
Ingestion of household dust	✗
Dermal contact with soil (construction/ground workers only)	✓
Dermal contact with household dust	✗
Inhalation of fugitive soil dust	✓
Inhalation of fugitive household dust	✗
Given the proposed end use of the site all of these potential pollutant linkages would be active.	
Ingestion of contaminated vegetables	✗
Ingestion of soil adhering to vegetables	✗
Given the proposed end use of the site all of these potential pollutant linkages would be active.	
Inhalation of vapours outside	✗
Inhalation of vapours inside	✓
Given the proposed end use of the site, while considered relatively unlikely, given the former disposal of materials on the site, these pollutant linkages should be considered active until intrusive investigation has been completed.	

Given that remediation has occurred on the former Gasworks to the North of the River Dearne, the majority of pollutant linkages have been addressed. These pollutant linkages are relevant to the site to the south of the river.

Table 3.2 – Exposure Pathways for Controlled Waters

Pathway	Active (✓) / Inactive (✖)
Migration of potential contaminants in soils to groundwater (infiltration and leaching)	✓
Significant hard cover is not present on the surface of the site and so infiltration is likely to be significant.	
Migration of groundwater off site	✓
The potential exists for perched water and groundwater within the Minor Aquifer to migrate off site.	
Migration of contaminants via drainage to surface water receptors	✓
Following redevelopment of the site, the potential remains for drainage to act as a migration pathway to nearby water courses.	
Migration of contaminants via surface wash to surface water receptors	✓
Whilst the hard standing present on the site has the potential to retard surface wash, some areas of the site are not hard surfaced and the potential remains for migration of contaminants via surface wash.	

As the former gasworks to the north of the River Dearne has been remediated to address the risk to controlled waters, to the satisfaction of the regulators, these pollutant linkages are considered not relevant to that area of land. These linkages remain pertinent to the land to the south of the river.

Table 3.3 – Exposure Pathways for Buildings, services and the Natural Environment

Pathway	Active (✓) / Inactive (✖)
Uptake of contaminants by plants on site	✓
Potentially phytotoxic contaminants may be present on site.	
Surface contact with services	✓
This pollutant linkage should be considered active until intrusive investigation to the south of the river has been completed.	
Migration of ground gas on site into buildings causing risk of asphyxiation or explosion	✓
This pollutant linkage should be considered active until intrusive investigation to the south of the river has been completed.	

Given the potential for revised landscaping to both the north and south of the river and the redevelopment sites both sides of the river, these linkages remain pertinent to redevelopment both to the north and south of the river

4.5 POLLUTANT LINKAGE ASSESSMENT

Based on the environmental conditions at the site, as detailed in the preceding sections, it is considered that there are a number of plausible pollutant linkages that require further consideration. A Pollutant linkage assessment has been undertaken and is detailed in Appendix E. On this basis of this assessment, the following pollutant linkages are considered significant:

Pollutant Linkages Relating to Land North of the River Dearne

- Risk to health of Leisure Users of POS from contaminants within the made ground;

Pollutant Linkages Relating to Land South of the River Dearne

- Risk to human health from contaminants in soils and potential presence of volatile vapours;
- Risk to River Dearne and groundwater beneath the site from mobilisation of contaminants from made ground.

These are based on current site conditions in light of the proposed redevelopment and do not consider remedial options for the site. The terms describing Probability and Consequence are referenced from the CIRIA 552 document. Table 6.3, 6.4 and 6.5 from this report are provided for reference in Appendix E.

4.6 RISK CLASSIFICATION FOR THE SITE

Based on the completed Pollutant Linkage Assessment for the site, the following overall risk classifications have been determined;

- With respect to **Human Health** issues, the site is classified as **Moderate Risk** - It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
- With respect to **Controlled Waters** issues, the site is classified as **Moderate Risk** - It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
- With respect to **Buildings, Services and the Natural Environment** issues, the site is classified as **Moderate/Low Risk** - It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.

4.7 REQUIREMENTS FOR SITE INVESTIGATION

From the information reviewed in this desk study, it is considered that a number of pollutant linkages have been identified which require additional, up to date, investigation.

Site investigation is recommended on site and should have the following aims:

- To obtain information on ground strength to the north of the River Dearne;
- To obtain limited shallow soil sampling close to the north of the river to inform a revised risk assessment and Public Open Space design;
- To confirm the depth of Made Ground and obtain information on ground strength to the south of the River Dearne;
- To collect soil and groundwater samples to the south of the river and enable an up to date assessment of potential contamination in soils and groundwater;
- Assess potential for ground gas beneath the site.

5 Geotechnical Development Constraints

The following preliminary engineering assessment is based on desk study data only and any conclusions drawn will need to be confirmed by appropriate intrusive site investigation.

Ground conditions to the north of the River Dearne comprise a variable thickness of Made Ground up to 5m thick over superficial Alluvial Clays and Silts with bedrock at depth. To the south of the river made ground has been proven in the Twibell St Depot to depths of 3.5mbgl over clays and weathered Mudstone Bedrock at depths of between 0.8 and 3.5mbgl.

5.1 Foundations

Shallow spread foundations bearing on the made ground or Superficial Deposits are unlikely to be appropriate. Alternative foundation methods are likely to be maybe required for example rafts, vibro replacement stone columns or piles.

5.2 Obstructions/Relic Structures

Structures and significant below ground obstructions associated with the former gasworks are known to be present across much of the site to the north of the River Dearne and may also be present associated with historical structures to the south of the River. Areas of made ground may also contain larger items of demolition material which could present obstructions to foundation works.

5.3 Roads/Pavements

A CBR of less than 2% should be assumed for the design of roads and hard standings at this stage.

5.4 Aggressive Ground Conditions

Aggressive ground conditions have previously been identified to the north of the river. It is considered possible that the ground conditions will require concrete in excess of DS2.

5.5 Earthworks

Limited earthworks may be required to achieve suitable development platforms. Processing of made ground may be required to remove deleterious materials such as wood, and coarse demolition material. Earthworks will have to take account of the potential or likely presence of contamination and may need to be undertaken under the CLAIRE Code of Practice '*The Definition of Waste*' V2 and appropriate exemptions.

5.6 Slope Stability/Retaining Walls

The site to the south of the river is bounded by retaining walls to the west and south which support roads above the current level of the site. The site is also at a higher level than the River Dearne which runs through the middle of the site. While slope stability and retaining wall stability is unlikely to be a substantial concern, any earthworks completed on site will need to be suitably protective of the foundations of retaining walls on site and slopes at the edge of the site, and slopes created by earthworks to create development platforms should be designed to a suitable angle to ensure long term stability. It would also be prudent to confirm the stability of retaining walls through inspection by an appropriately qualified consultant.

6 Conclusions and Recommendations

6.1 ANTICIPATED GROUND CONDITIONS

To the North of the River Dearne.

Ground conditions over the majority of the site comprise a variable thickness of Made Ground up to 5m thick over superficial Alluvial Clays and Silts with bedrock at depth. Residual contamination is known to be present but the site is reported to have been remediated to a level suitable for commercial end use (with vacant green space near the river) and to a level suitably protective of controlled waters.

To the South of the River Dearne

Ground conditions are likely to comprise a variable thickness of Made Ground up to at least 3.5m thick over superficial Alluvial Clays and Silts (nearer the river) and weathered Mudstone bedrock at depths of between 0.8mbgl and at least 3.5mbgl.

6.2 ENVIRONMENTAL SETTING AND SENSITIVITY

The overall sensitivity of the site is thought to be medium order, this is based on the fact that the site is situated upon a Secondary A Aquifer, and the River Dearne flows east to west through the site.

The following pollutant linkages are considered significant:

Pollutant Linkages Relating to Land North of the River Dearne

- Risk to health of Leisure Users of POS from contaminants within the made ground;

Pollutant Linkages Relating to Land South of the River Dearne

- Risk to human health from contaminants in soils and potential presence of volatile vapours;
- Risk to River Dearne and groundwater beneath the site from mobilisation of contaminants from made ground.

6.3 RECOMMENDATIONS FOR FURTHER WORK

It is recommended that an intrusive investigation be undertaken in order to better determine the potential geotechnical constraints and environmental liabilities with the site. This intrusive investigation would be designed to provide information on the general ground, groundwater and ground gas conditions at the site together with information on potential contamination sources. To the north of the River Dearne, investigation is likely to be limited to the need to confirm geotechnical ground conditions. To the south of the river, exploratory holes would be required post demolition positioned to provide general coverage and, where possible, targeted at known or suspected contamination / sources of contamination. The location of exploratory holes would be controlled by the location of existing buildings/services and the need to maintain access for site vehicles. Site investigation should have the following aims:

- To obtain information on ground strength to the north of the River Dearne;
- To obtain limited shallow soil sampling close to the north of the river to inform a revised risk assessment and Public Open Space design;
- To confirm the depth of Made Ground and obtain information on ground strength to the south of the River Dearne;
- To collect soil and groundwater samples to the south of the river and enable an up to date assessment of potential contamination in soils and groundwater;
- Assess potential for ground gas beneath the site.

WSP Environmental Limited

Appendix A Figures



TITLE
20470 OLD MILL LANE
BARNSELY

FIGURE
FIGURE 1,

Map data ©2011 Tele Atlas

Plates



Plate 1: Commercial units on Southern Site



Plate 2: Gasholder on Southern Site



Plate 3: Showing the Commerical Unit and Adacent works for the new road being built on the former gasworks (Northern Site)



Plate 4: Showing the new road construction on the Northern Site



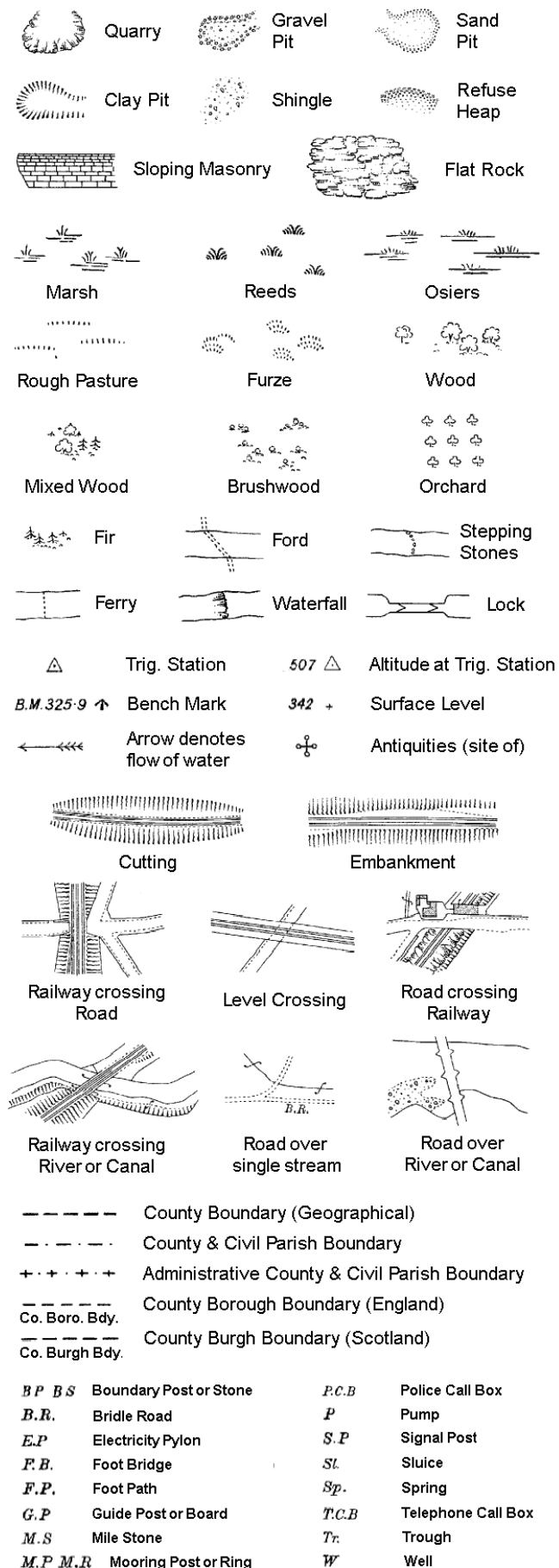
Plate 5: Showing the River Dearne recessed below the site.

Plate 6: Showing

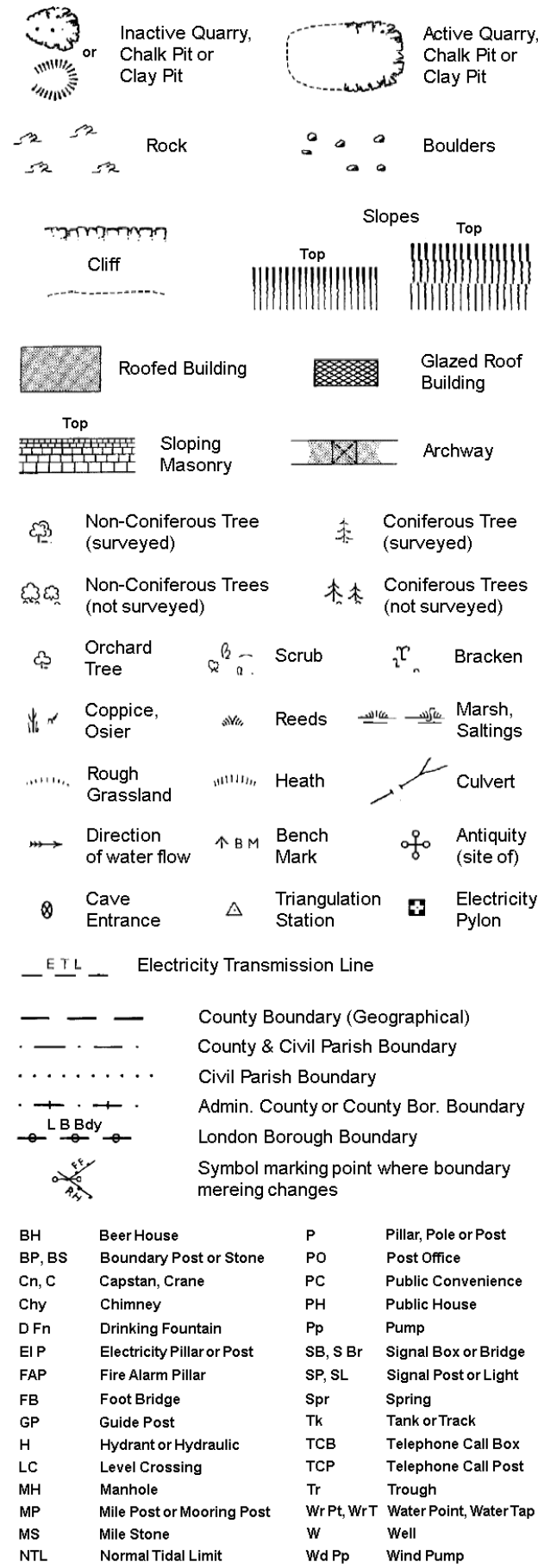
Appendix B Historical and Landmark Plans

Historical Mapping Legends

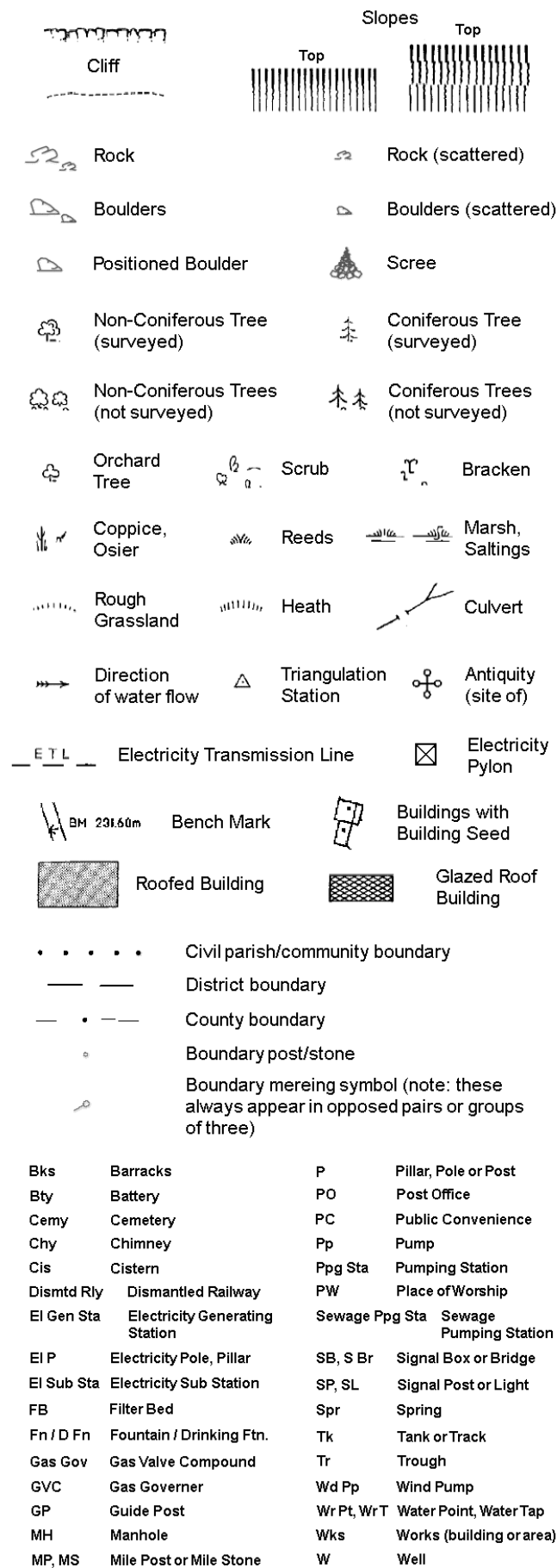
Ordnance Survey County Series and Ordnance Survey Plan 1:2,500



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



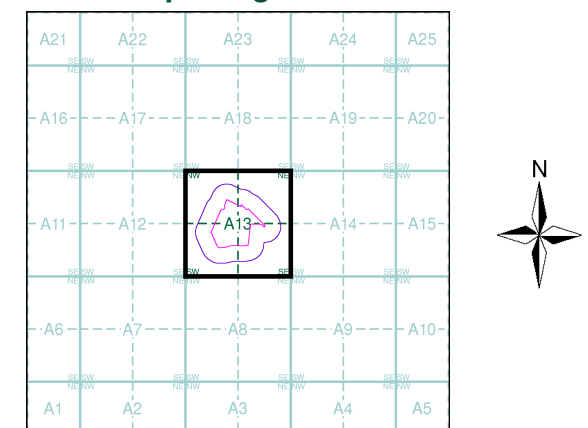
Large-Scale National Grid Data 1:2,500 and 1:1,250



Historical Mapping & Photography included:

Mapping Type	Scale	Date	Pg
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Yorkshire	1:2,500	1906	3
Yorkshire	1:2,500	1931	4
Ordnance Survey Plan	1:1,250	1960 - 1962	5
Ordnance Survey Plan	1:2,500	1962	6
Ordnance Survey Plan	1:1,250	1969 - 1977	7
Supply of Unpublished Survey Information	1:1,250	1973 - 1975	8
Ordnance Survey Plan	1:1,250	1975 - 1990	9
Additional SIMs	1:1,250	1977 - 1992	10
Additional SIMs	1:1,250	1982 - 1991	11
Additional SIMs	1:1,250	1988 - 1990	12
Additional SIMs	1:1,250	1991	13
Large-Scale National Grid Data	1:1,250	1993	14
Large-Scale National Grid Data	1:1,250	1994	15

Historical Map - Segment A13



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National Grid Reference: 435180, 407200
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Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

Asda Stores Ltd, Old Mill Lane, BARNSELY, South Yorkshire, S71 1LN





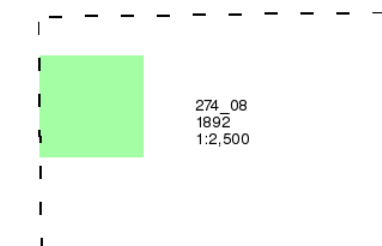
Yorkshire

Published 1892

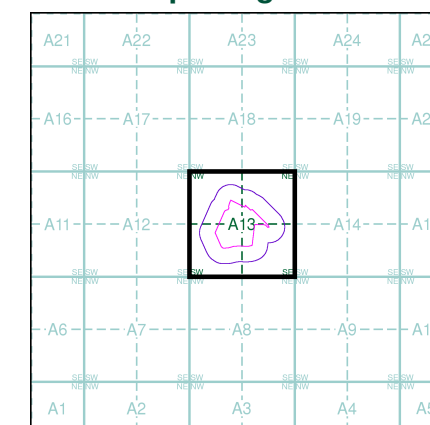
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Map Name(s) and Date(s)



Historical Map - Segment A13



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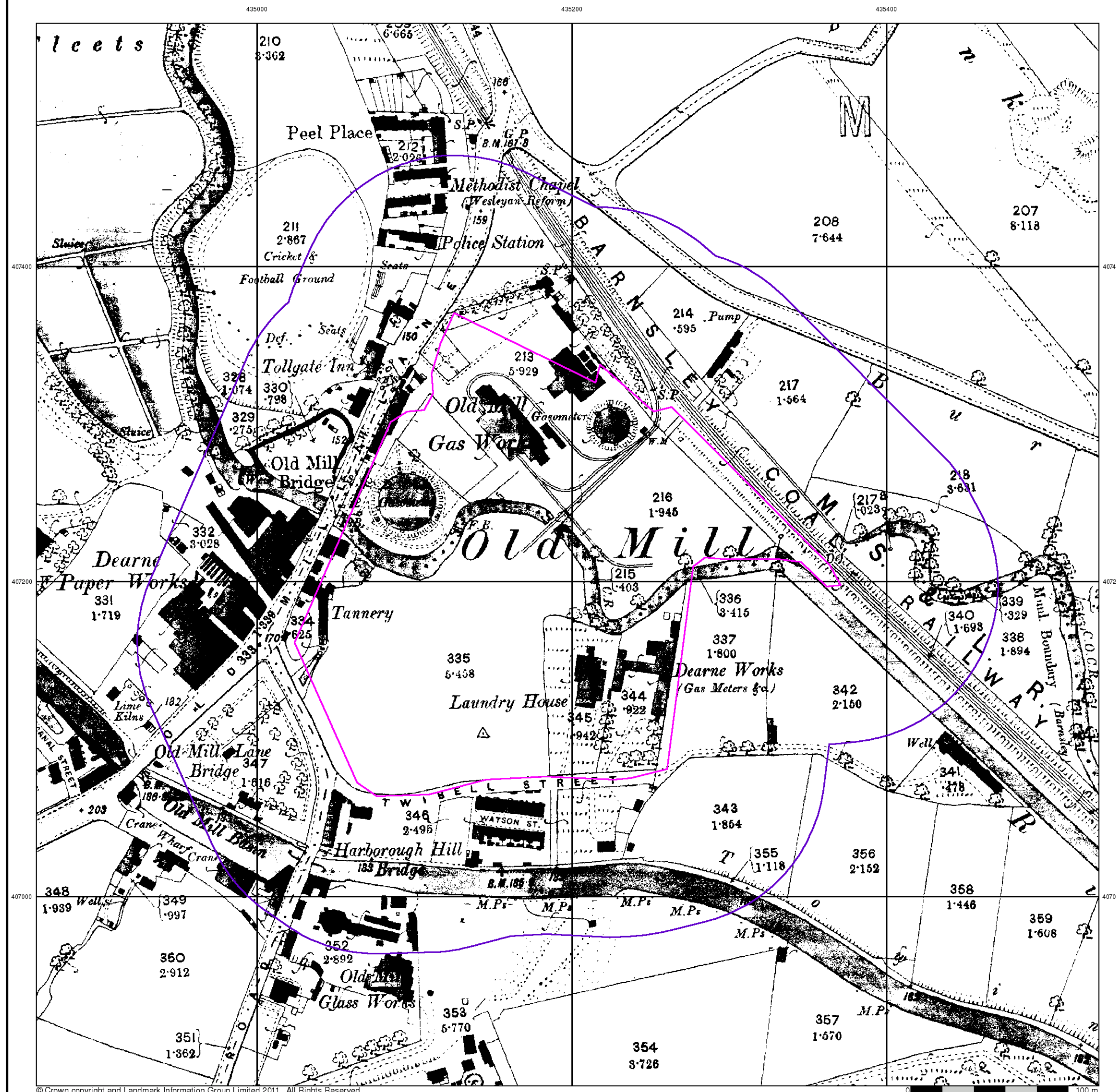
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Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

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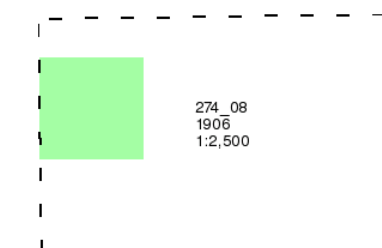
Yorkshire

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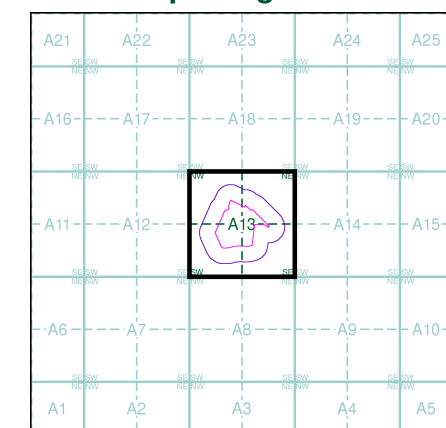
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Map Name(s) and Date(s)



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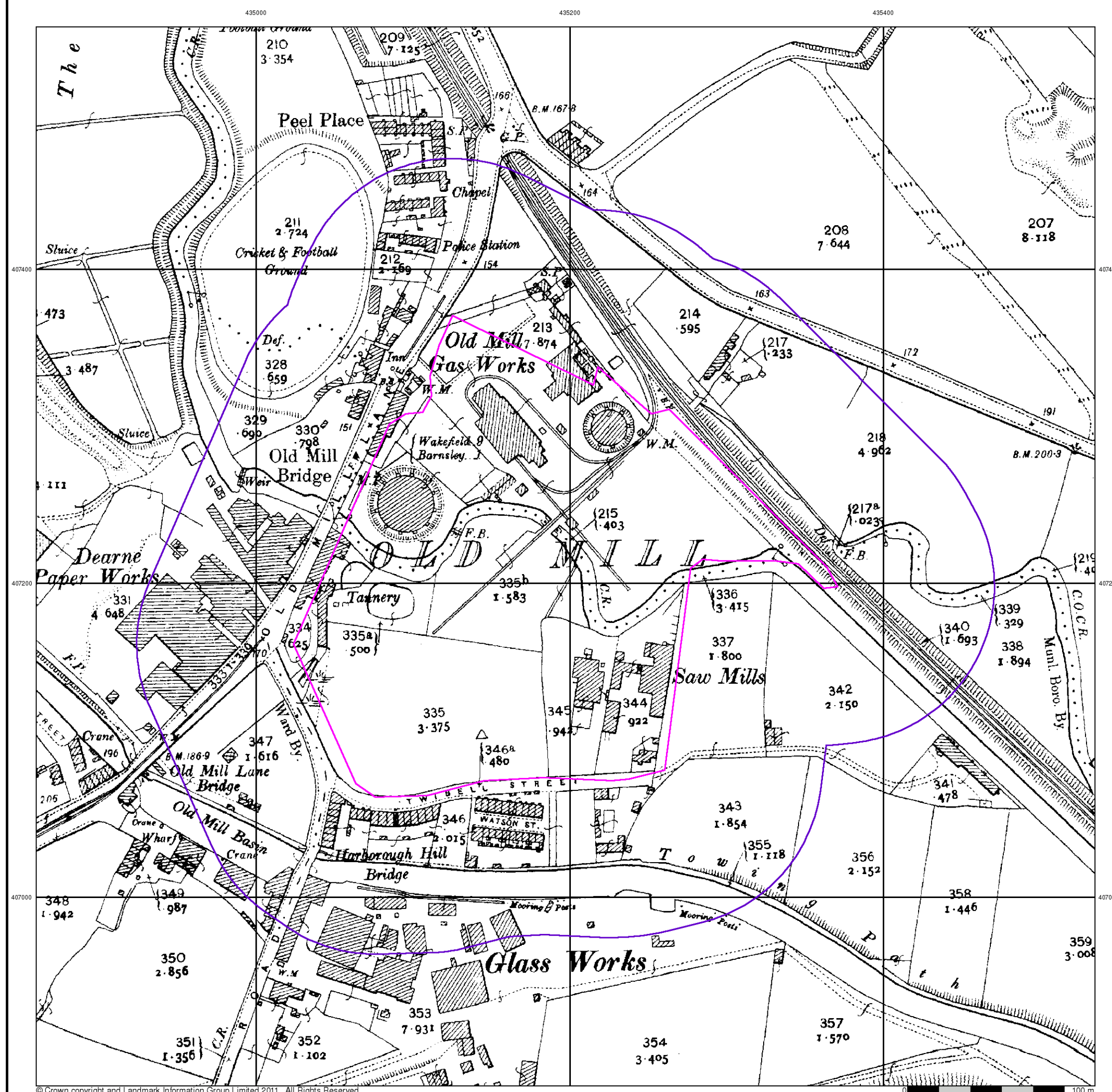
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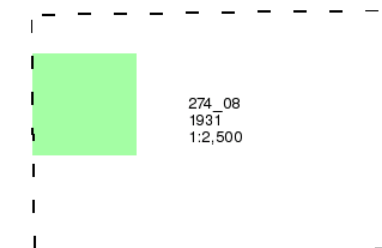
Yorkshire

Published 1931

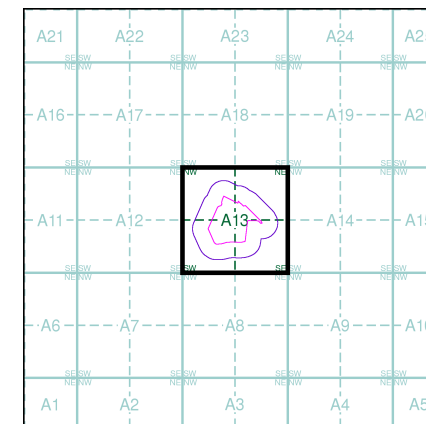
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Map Name(s) and Date(s)



Historical Map - Segment A13



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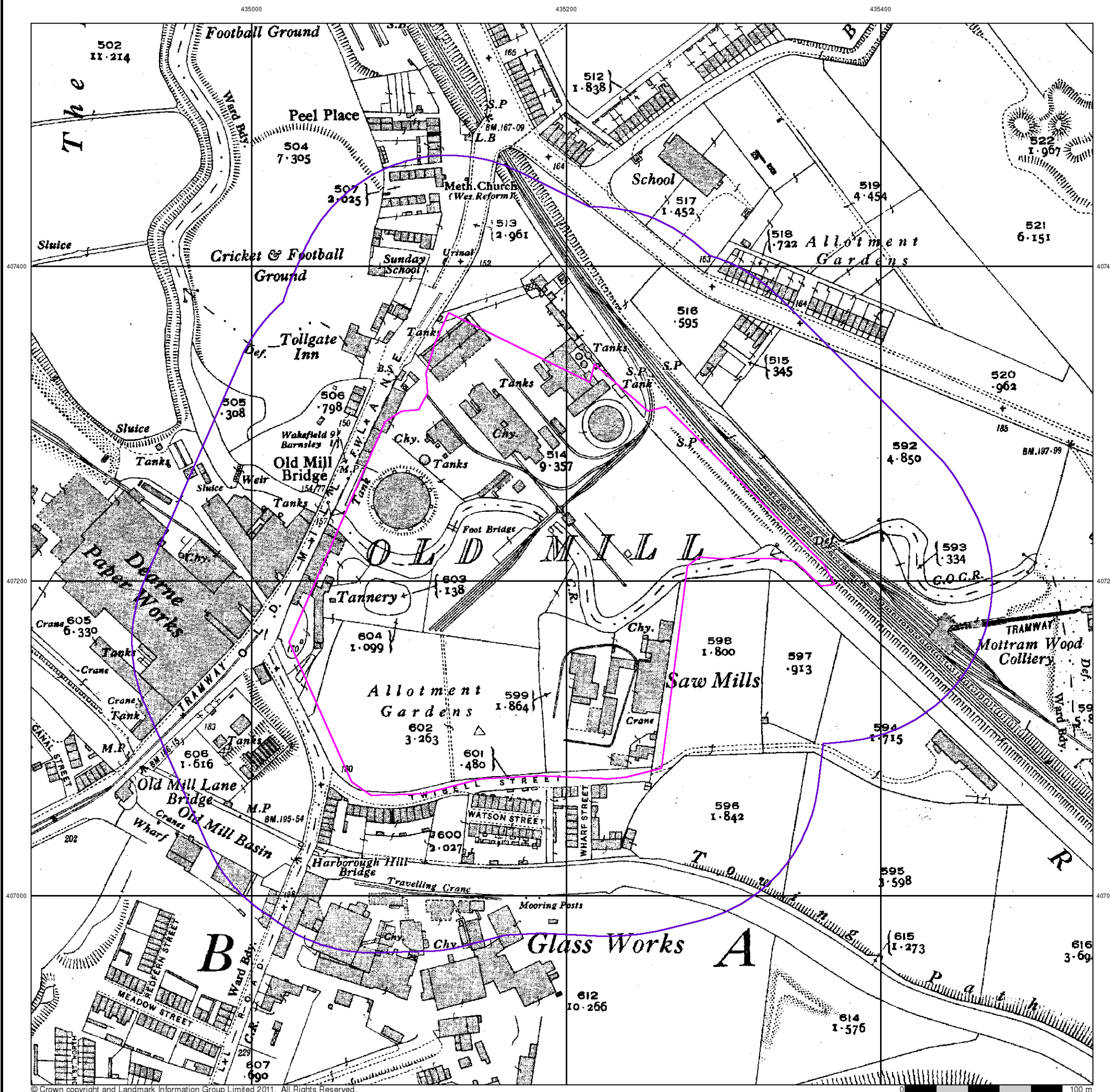
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Ordnance Survey Plan

Published 1960 - 1962

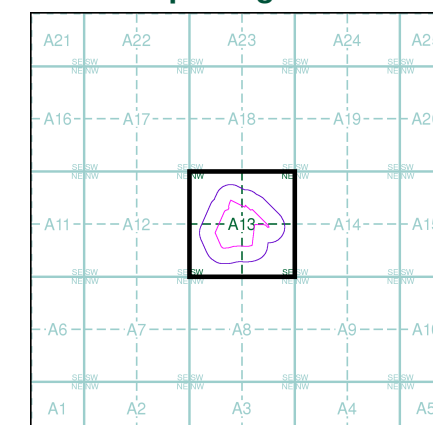
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Map Name(s) and Date(s)

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1960	1962	1962
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SE 3406 NE	SE 3506 NW	SE 3506 NE
1961	1961	1961
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Historical Map - Segment A13



Order Details

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Customer Ref: 20470 - Old Mill Lane, Barnsley
National Grid Reference: 435180, 407200
Slice: A
Site Area (Ha): 6.06
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Ordnance Survey Plan

Published 1962

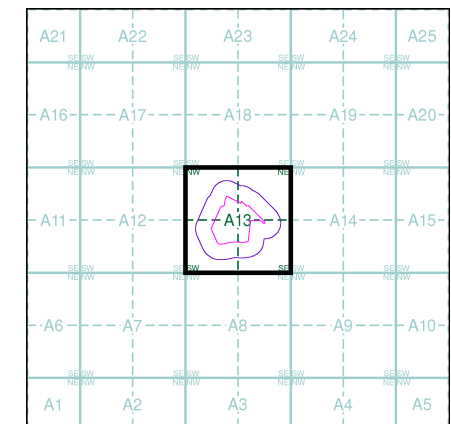
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Map Name(s) and Date(s)

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Historical Map - Segment A13



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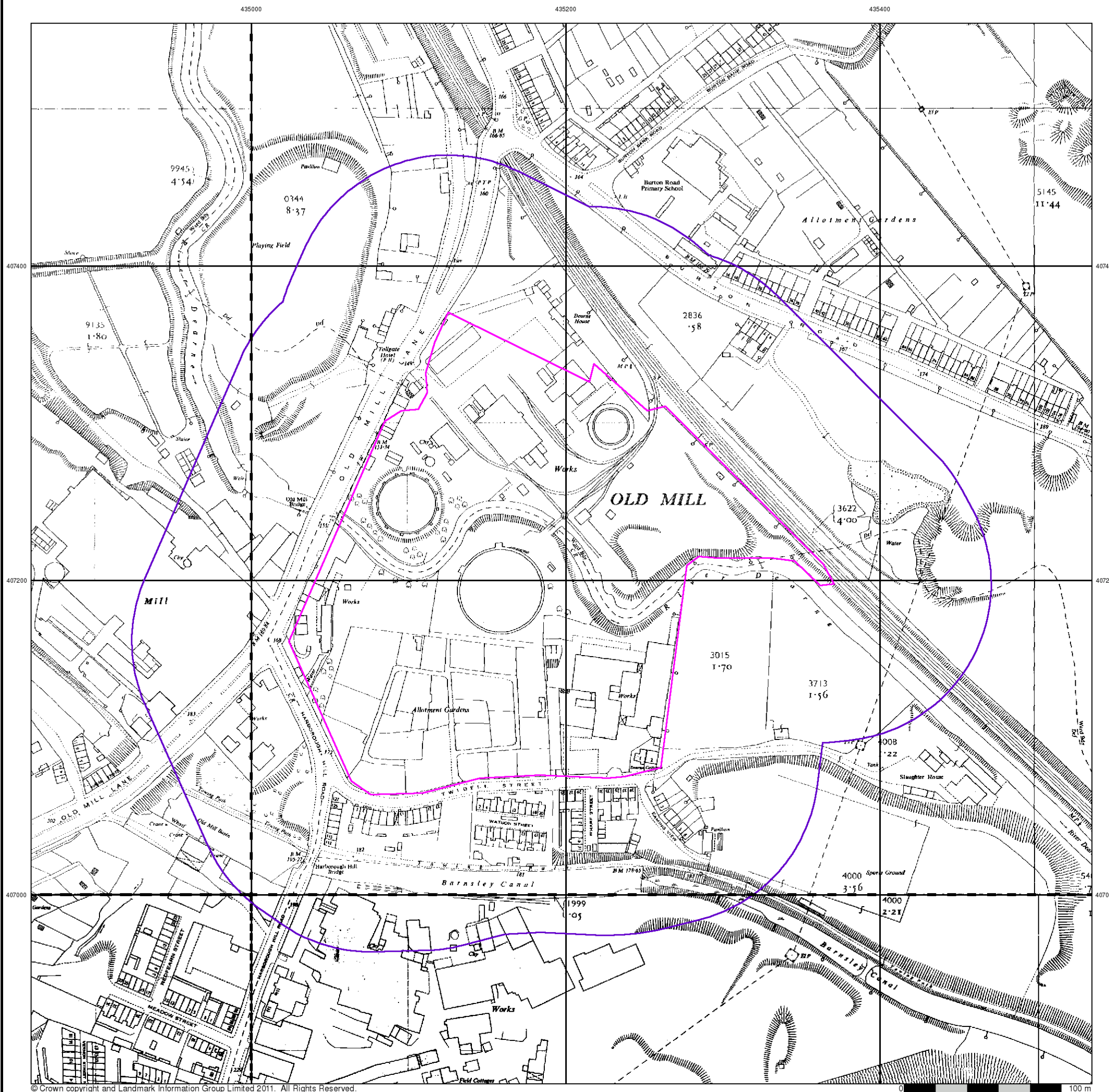
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Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

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Ordnance Survey Plan

Published 1969 - 1977

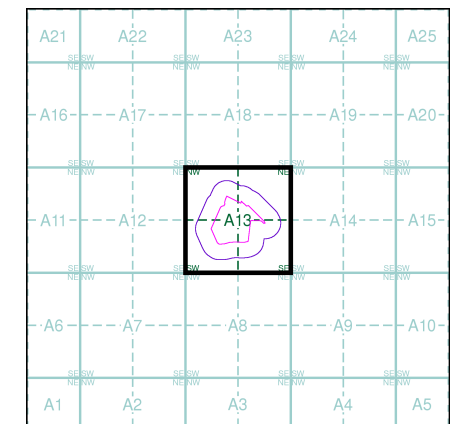
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Map Name(s) and Date(s)

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1970	1977	1969
1:1,250	1:1,250	1:1,250
SE 3407 SE	SE 3507 SW	SE 3507 SE
1970	1973	1969
1:1,250	1:1,250	1:1,250
SE 3406 NE		
1972		
1:1,250		

Historical Map - Segment A13



Order Details

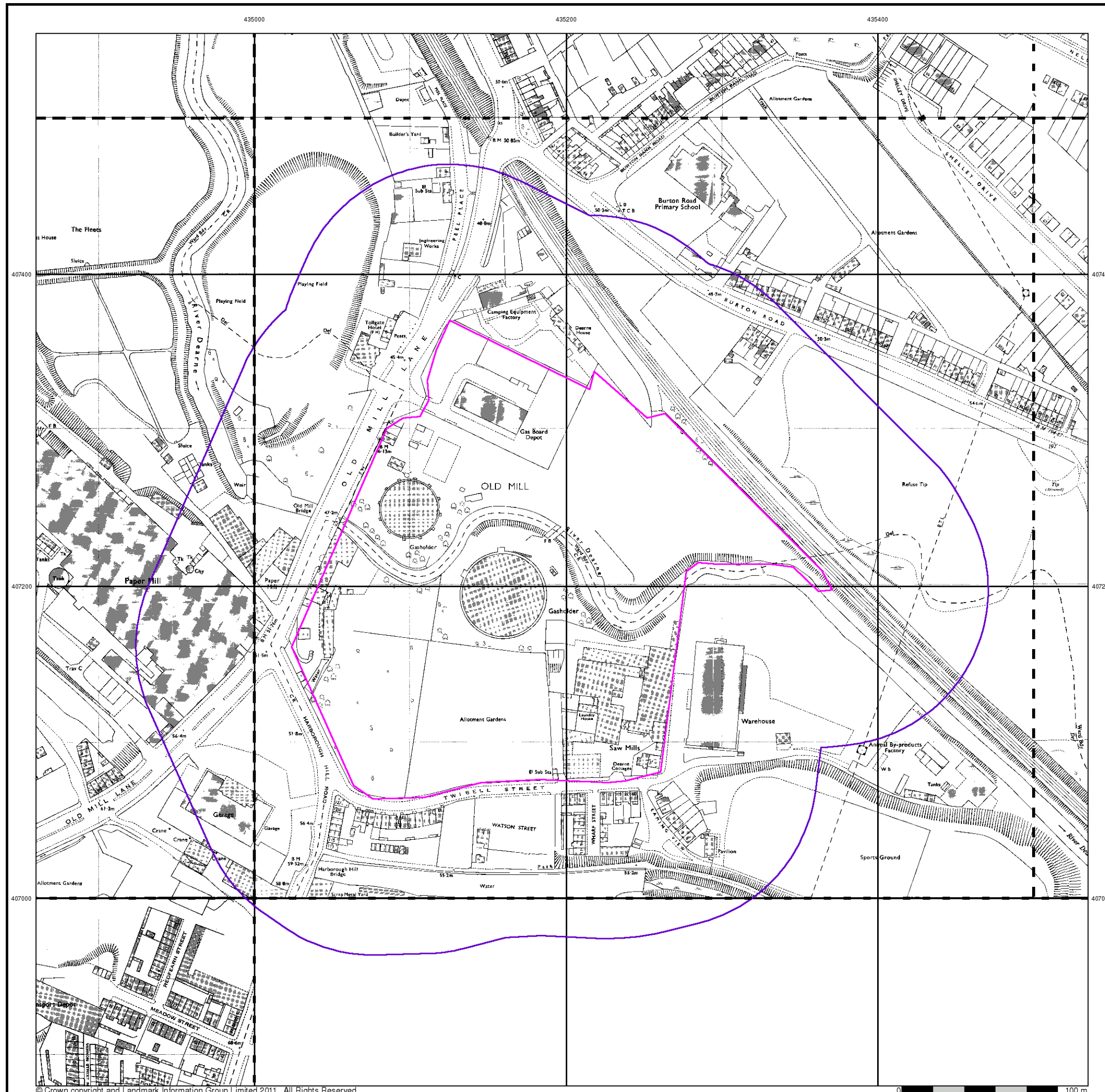
Order Number: 35804780_1_1
Customer Ref: 20470 - Old Mill Lane, Barnsley
National Grid Reference: 435180, 407200
Slice: A
Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

Asda Stores Ltd, Old Mill Lane, BARNSELY, South Yorkshire, S71 1LN



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Fax: 0844 844 9951
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Additional SIMs

Published 1977 - 1992

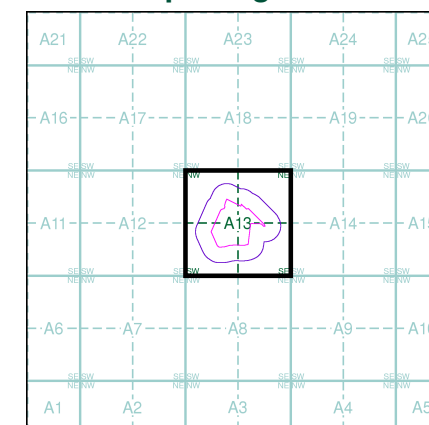
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

SE3407NESE3507NW	1990	1992
1:1,250	1:1,250	1:1,250
SE3407SESE3507SWSE3507SE	1979	1982
1:1,250	1:1,250	1:1,250
SE3406NESE3506NWSE3506NE	1977	1983
1:1,250	1:1,250	1:1,250

Historical Map - Segment A13



Order Details

Order Number: 35804780_1_1
Customer Ref: 20470 - Old Mill Lane, Barnsley
National Grid Reference: 435180, 407200
Slice: A
Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

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Published 1982 - 1991

Source map scale - 1:1.250

bE3407NE

Historical Map - Segments

A21	A22	A23	A24	A25
-----	-----	-----	-----	-----



Order Number:
Customer Ref:

Site Details

Asda Stores Ltd, Old Mill Lane, BARNSELY, South York
S71 1LN

STILLER





Large-Scale National Grid Data

Published 1993

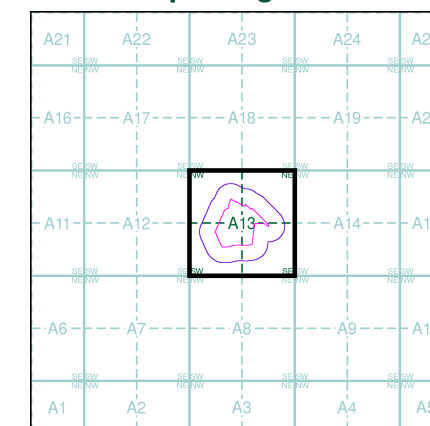
Source map scale - 1:1,250

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

Map Name(s) and Date(s)

SE3407NESE3507NWSE3507NE		
1993	1993	1993
1:1,250	1:1,250	1:1,250
SE3407SESE3507SWSE3507SE		
1993	1993	1993
1:1,250	1:1,250	1:1,250
SE3406NESE3506NWSE3506NE		
1993	1993	1993
1:1,250	1:1,250	1:1,250

Historical Map - Segment A13



Order Details

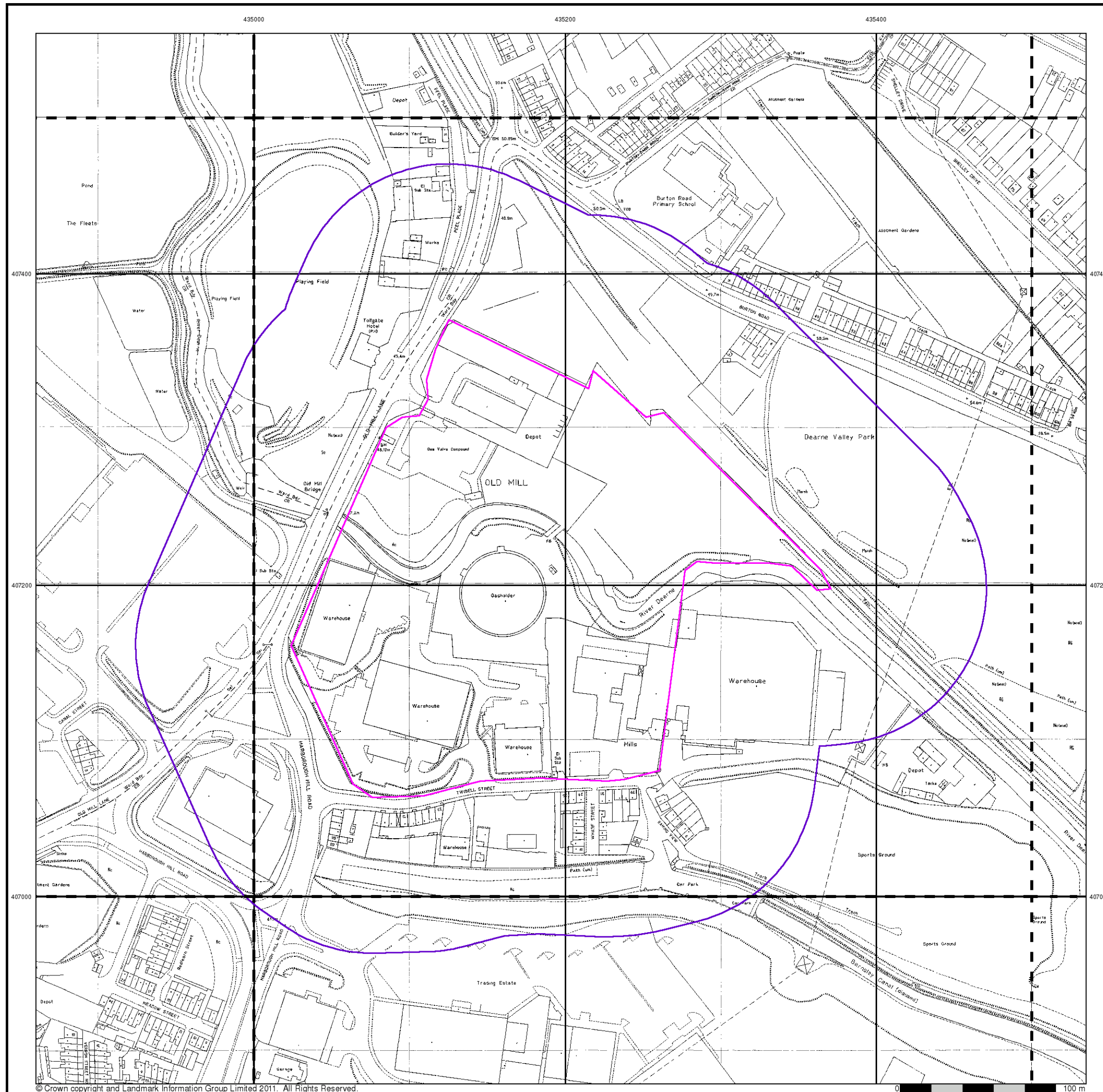
Order Number: 35804780_1_1
Customer Ref: 20470 - Old Mill Lane, Barnsley
National Grid Reference: 435180, 407200
Slice: A
Site Area (Ha): 6.06
Search Buffer (m): 100

Site Details

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General

- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Map ID
- Severals of Type at Location
- Pylon
- Overhead Transmission Line

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 Referral

Waste

- BGS Recorded Landfill Site (Location)
- BGS Recorded Landfill Site
- EA Historic Landfill (Buffered Point)
- 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 (Point Buffered to 100m)
- Registered Landfill Site (Point Buffered to 250m)
- Registered Waste Transfer Site (Location)
- Registered Waste Transfer Site
- Registered Waste Treatment or Disposal Site (Location)
- Registered Waste Treatment or Disposal Site

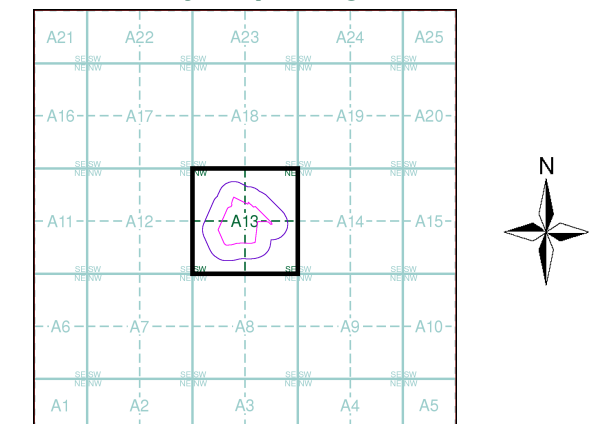
Geological

- BGS Recorded Mineral Site

Industrial Land Use

- Contemporary Trade Directory Entry
- Fuel Station Entry
- COMAH Site
- Explosive Site
- NIHHS Site
- Planning Hazardous Substance Consent
- Planning Hazardous Substance Enforcement

Site Sensitivity Map - Segment A13



Order Details

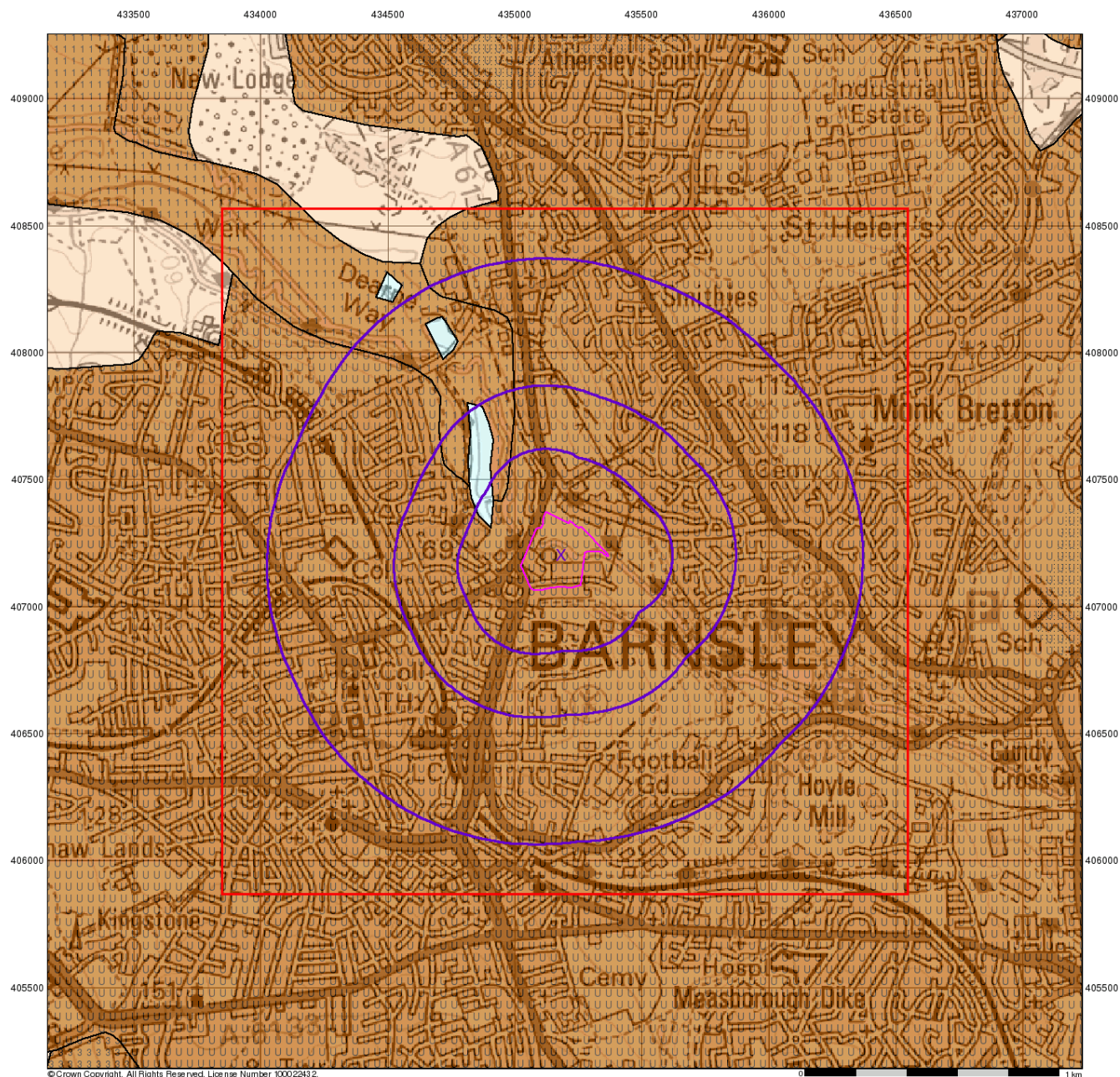
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Customer Ref: 20470 - Old Mill Lane, Barnsley
National Grid Reference: 435180, 407200
Slice: A
Site Area (Ha): 6.06
Plot Buffer (m): 100

Site Details

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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 (H) 1, 2, 3, U

Intermediate (I) 1, 2

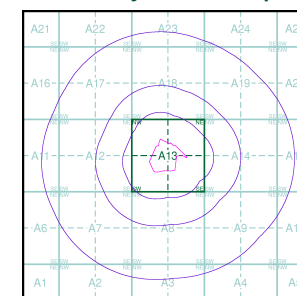
Low

High (H) 1, 2, 3, U

Intermediate (I) 1, 2

Low

Site Sensitivity Context Map - Slice A



Order Details

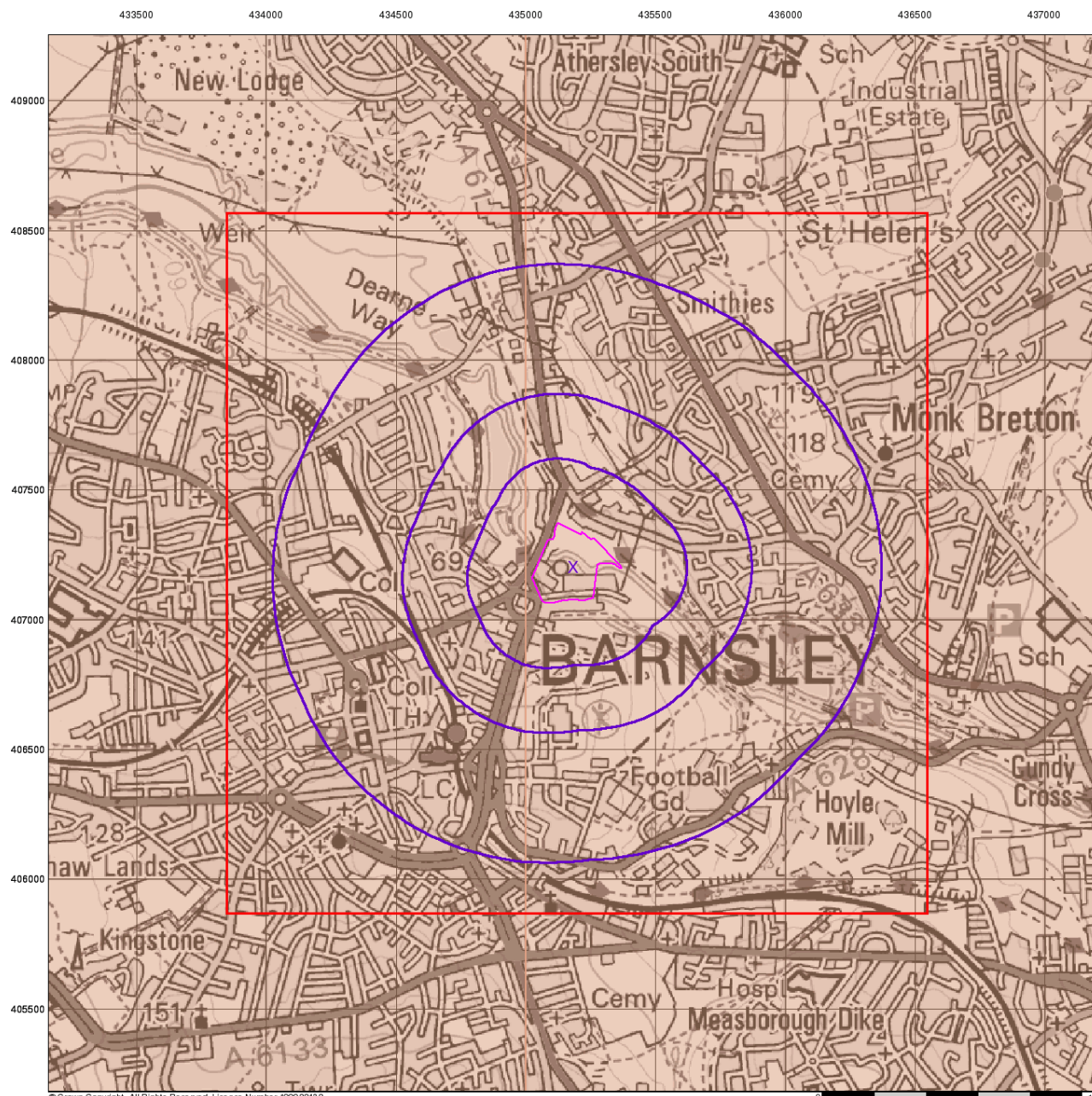
Order Number: 35804780 1 1
 Customer Ref: 20470 - Old Mill Lane, Barnsley
 National Grid Reference: 435180, 407200
 Slice: A
 Site Area (Ha): 6.06
 Search Buffer (m): 1000

Site Details

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Bedrock Aquifer Designation

General

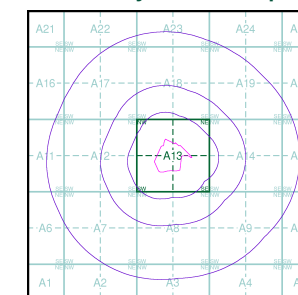
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

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

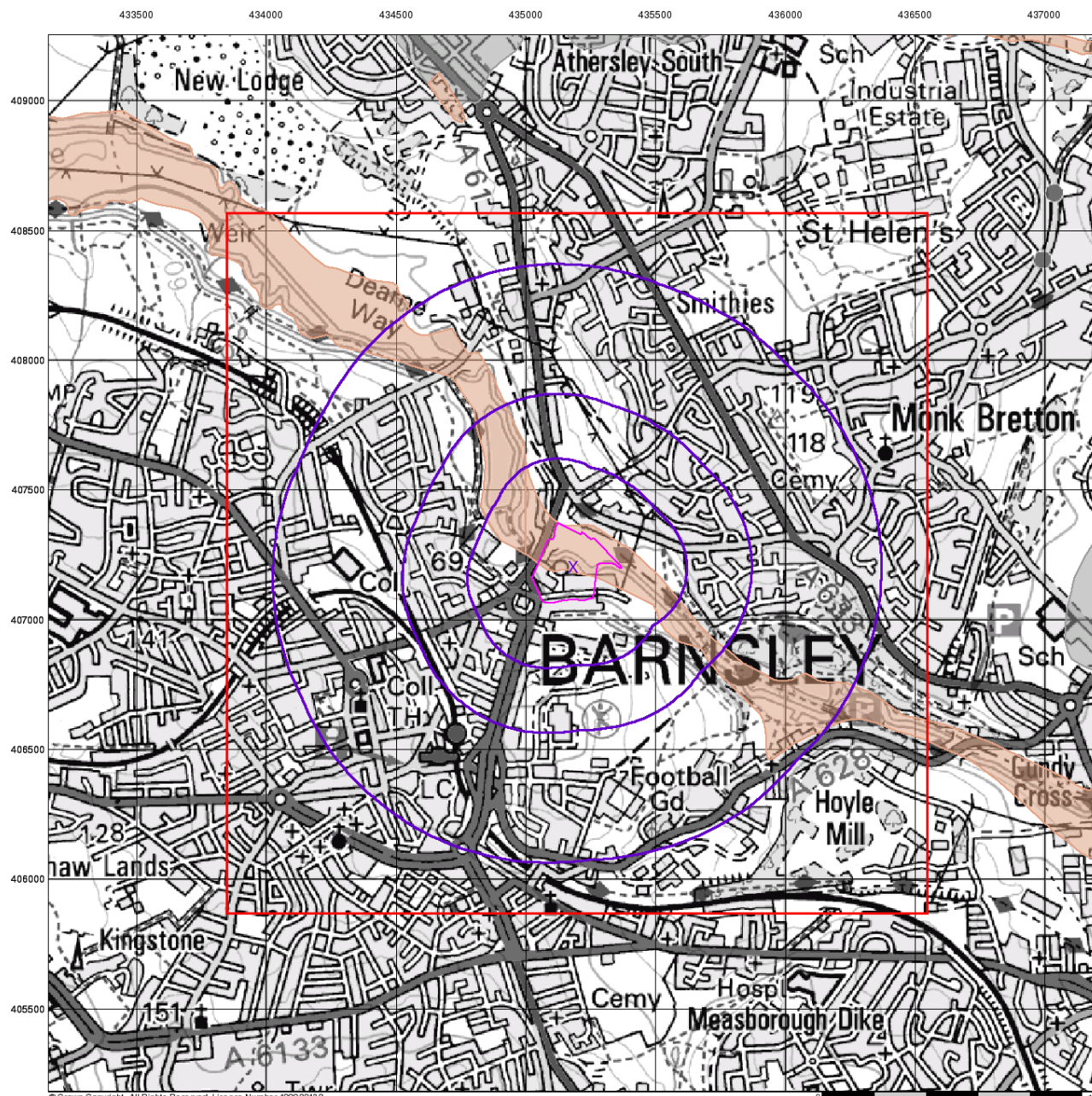
Order Number: 35804780 1 1
 Customer Ref: 20470 - Old Mill Lane, Barnsley
 National Grid Reference: 435180, 407200
 Slice: A
 Site Area (Ha): 6.06
 Search Buffer (m): 1000

Site Details

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Superficial Aquifer Designation

General

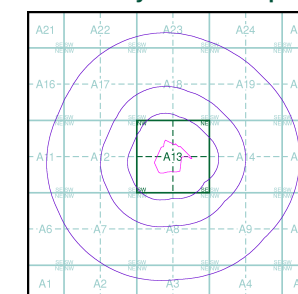
- Specified Site
- Specified Buffer(s)
- Bearing Reference Point
- Slice
- Map ID

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

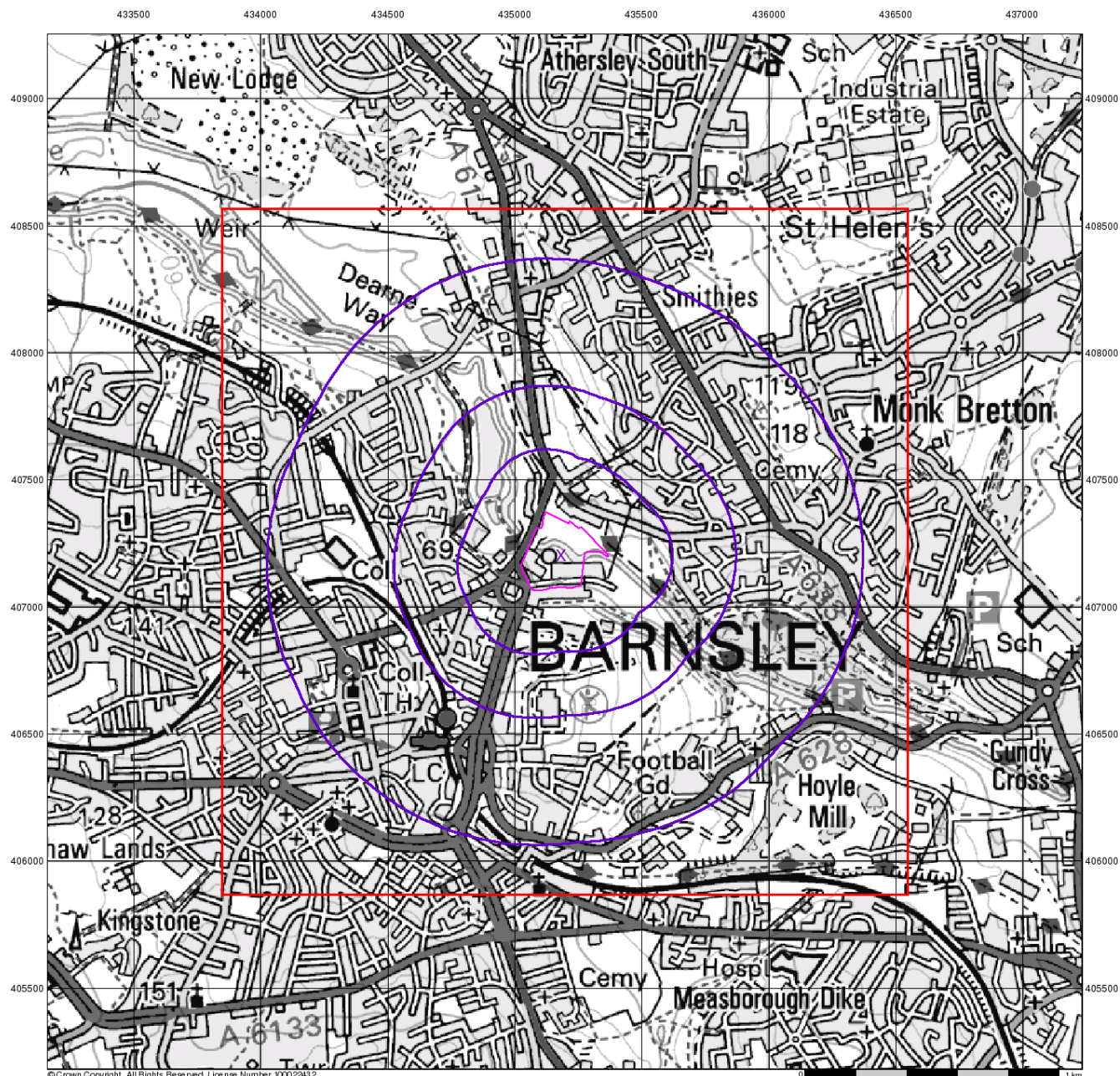
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 Customer Ref: 20470 - Old Mill Lane, Barnsley
 National Grid Reference: 435180, 407200
 Slice: A
 Site Area (Ha): 6.06
 Search Buffer (m): 1000

Site Details

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Source Protection Zones

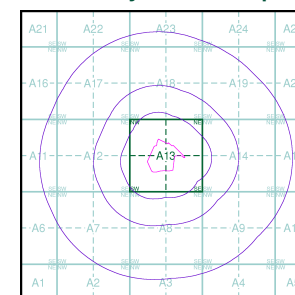
General

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

Agency and Hydrological

- Source Protection Zone I
- Source Protection Zone II
- Source Protection Zone III
- Zone of Special Interest
- Source Protection Zone Borehole

Site Sensitivity Context Map - Slice A



Order Details

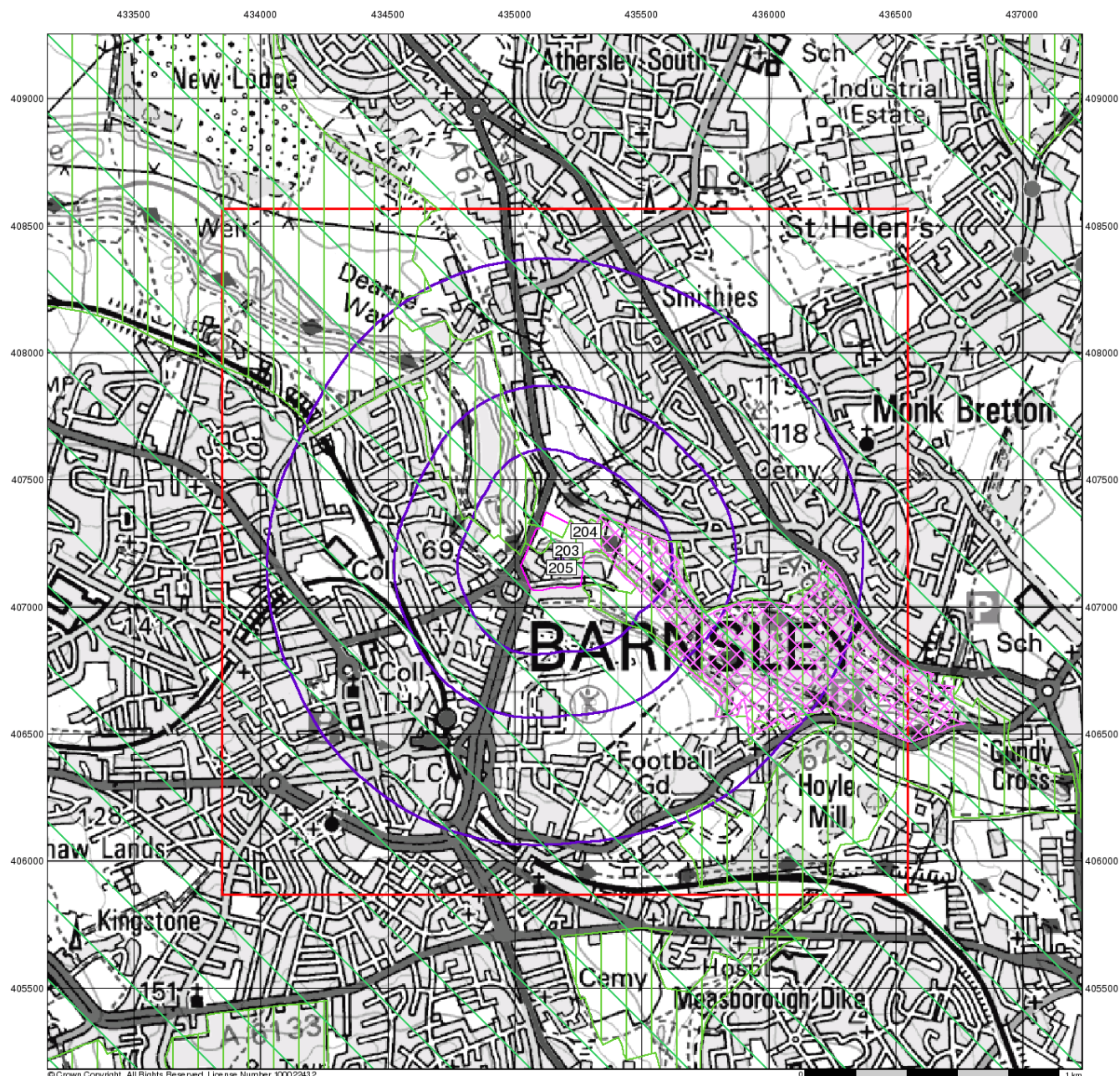
Order Number: 35804780 1 1
 Customer Ref: 20470 - Old Mill Lane, Barnsley
 National Grid Reference: 435180, 407200
 Slice: A
 Site Area (Ha): 6.06
 Search Buffer (m): 1000

Site Details

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Sensitive Land Uses

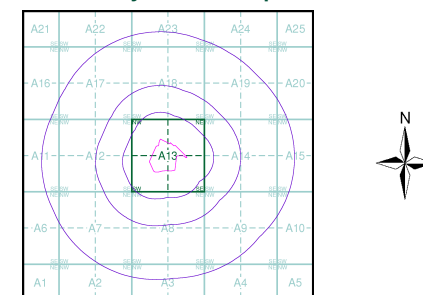
General

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

Sensitive Land Uses

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

Site Sensitivity Context Map - Slice A



Order Details

Order Number: 35804780 1 1
 Customer Ref: 20470 - Old Mill Lane, Barnsley
 National Grid Reference: 435180, 407200
 Slice: A
 Site Area (Ha): 6.06
 Search Buffer (m): 1000

Site Details

Asda Stores Ltd, Old Mill Lane, BARNSELEY, South Yorkshire, S71 1LN



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

Appendix C Coal Authority Report & Borehole Logs

Issued by:

The Coal Authority, Mining Reports Office, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire NG18 4RG
ON-Line Service: www.groundstability.com - Phone: 0845 762 6848 - DX 716176 MANSFIELD 5

CUSTOMER SERVICES,
LANDMARK INFORMATION GROUP LIMITED,
ABBAY COURT UNIT 5/7,
EAGLE WAY,
SOWTON INDUSTRIAL ESTATE,
EXETER,
DEVON,
EX2 7HY

Person dealing with this matter:	Keith Pennington
Our reference:	00050678-11
Your reference:	35804780
Electronic Ref:	EME_00016505580010_005
RRUID:	005.00016505580010
Date of your enquiry:	19 August 2011
Date we received your enquiry:	19 August 2011
Date of issue:	23 August 2011

This report is for the property described in the address below and the attached plan.

Non-Residential Coal and Brine Report

Site At, Asda Stores Ltd, Old Mill Lane, Barnsley, South Yorkshire

This report is based on and limited to the records held by, the Coal Authority, and the Cheshire Brine Subsidence Compensation Board's records, at the time we answer the search.

Coal mining	Yes
Brine Compensation District	No

Information from the Coal Authority

Underground Coal Mining

Past

The property is in the likely zone of influence from workings in 7 seams of coal at 80m to 410m depth, and last worked in 1986.

Any ground movement from these coal workings should have stopped by now.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past.

Present

The property is not in the likely zone of influence of any present underground coal workings.

Future

The property is not in an area for which the Coal Authority is determining whether to grant a licence to remove coal using underground methods.

The property is not in an area for which a licence has been granted to remove coal using underground methods.

The property is not in an area that is likely to be affected at the surface from any planned future workings.

However reserves of coal exist in the local area which could be worked at some time in the future.

No notice of the risk of the land being affected by subsidence has been given under section 46 of the Coal Mining Subsidence Act 1991.

Mine entries

There are no known coal mine entries within, or within 20 metres of, the boundary of the property.

Records may be incomplete. Consequently, there may exist in the local area mine entries of which the Coal Authority has no knowledge.

Coal-mining geology

The Authority is not aware of any evidence of damage arising due to geological faults or other lines of weakness that have been affected by coal mining.

Opencast Coal Mining

Past

The property is not within the boundary of an opencast site from which coal has been removed by opencast methods.

Present

The property does not lie within 200 metres of the boundary of an opencast site from which coal is being removed by opencast methods.

Future

The property is not within 800 metres of the boundary of an opencast site for which the Coal Authority is determining whether to grant a licence to remove coal by opencast methods.

The property is not within 800 metres of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

Coal-mining subsidence

The Coal Authority has not received a damage notice or claim for the property since 31 October 1994. There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Authority is not aware of any request having been made to carry out preventive works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991.

Mine gas

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property.

Hazards related to coal mining

The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

Withdrawal of Support

The property is in an area for which notices of entitlement to withdraw support were published in 1947, 1952, 1981.

The property is not in an area for which a notice has been given under section 41 of the Coal Industry Act 1994, revoking the entitlement to withdraw support.

Working Facilities Orders

The property is not in an area for which an Order has been made under the provisions of the Mines (Working Facilities and Support) Acts 1923 and 1966 or any statutory modification or amendment thereof.

Payments to Owners of Former Copyhold Land

The property is not in an area for which a relevant notice has been published under the Coal Industry Act 1975/Coal Industry Act 1994.

Comments on Coal Authority information

In view of the mining circumstances a prudent developer would seek appropriate technical advice before any works are undertaken.

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply good engineering practice developed for mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or mines of coal without the permission of the Coal Authority. Developers should be aware that the investigation of coal seams/ former mines of coal may have the potential to generate and/or displace underground gases and these risks both under and adjacent to the development should be fully considered in developing any proposals. The need for effective measures to prevent gases entering into public properties either during investigation or after development also needs to be assessed and properly addressed. This is necessary due to the public safety implications of any development in these circumstances.

Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Additional remarks

This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions 2006. The report is compliant with Home Information Pack requirements.

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Location map

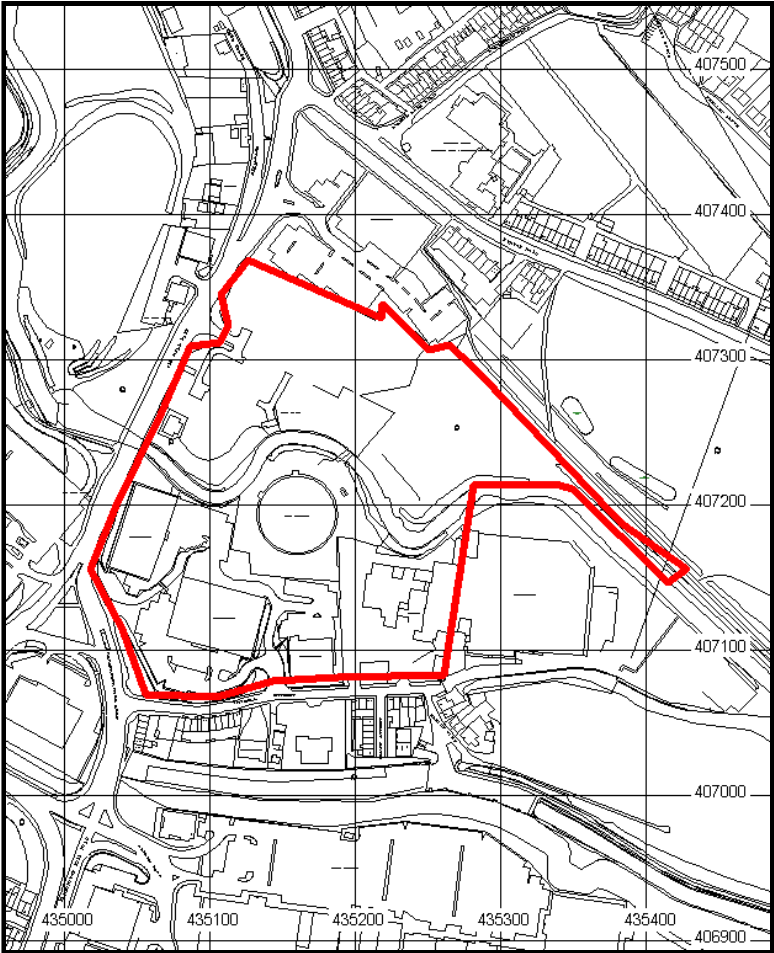

Approximate
position
of property



Enquiry boundary

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Key
Approximate position of enquiry boundary shown



Appendix D Pollutant Linkage Assessment

Table 6.3 Classification of consequence

Classification	Definition	Examples
Severe	Short-term (acute) risk to human health likely to result in "significant harm" as defined by the Environment Protection Act 1990, Part 11A. Short-term risk of pollution (note: Water Resources Act contains no scope for considering significance of pollution) of sensitive water resource. Catastrophic damage to buildings/property. A short-term risk to a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within the Draft Circular on Contaminated Land, DETR, 2000).	High concentrations of cyanide on the surface of an informal recreation area. Major spillage of contaminants from site into controlled water. Explosion, causing building collapse (can also equate to a short-term human health risk if buildings are occupied).
Medium	Chronic damage to Human Health ("significant harm" as defined in DETR, 2000). Pollution of sensitive water resources (note: Water Resources Act contains no scope for considering significance of pollution). A significant change in a particular ecosystem, or organism forming part of such ecosystem (note: the definitions of ecological systems within Draft Circular on Contaminated Land, DETR, 2000).	Concentrations of a contaminant from site exceed the generic, or site-specific assessment criteria. Leaching of contaminants from a site to a major or minor aquifer. Death of a species within a designated nature reserve.
Mild	Pollution of non-sensitive water resources. Significant damage to crops, buildings, structures and services ("significant harm" as defined in the Draft Circular on Contaminated Land, DETR, 2000). Damage to sensitive buildings/structures/services or the environment.	Pollution of non-classified groundwater. Damage to building rendering it unsafe to occupy (e.g. foundation damage resulting in instability).
Minor	Harm, although not necessarily significant harm, which may result in a financial loss, or expenditure to resolve. Non-permanent health effects to human health (easily prevented by means such as personal protective clothing etc.) Easily reparable effects of damage to buildings, structures and services.	The presence of contaminants at such concentrations that protective equipment is required during site works. The loss of plants in a landscaping scheme. Discoloration of concrete.

Table 6.4 Classification of probability

Classification	Definition
High Likelihood	There is a pollution linkage and an event that appears either very likely in the short term or almost inevitable over the long term, or there is evidence at the receptor of harm or pollution.
Likely	There is a pollution linkage and all the elements are present and in the right place, which means that it is probable that an event will occur Circumstances are such that an event is not inevitable, but possible in the short term and likely over the long term.
Low likelihood	There is a pollution linkage and circumstances are possible under which an event could occur. However, it is by no means certain that even over a longer period such event would take place, and is less likely in the shorter term.
Unlikely	There is pollution linkage but circumstances are such that it is improbable that an event would occur even in the long term.

Table 6.5 Comparison of consequence against probability

		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	Very low risk
	Unlikely	Moderate/ low risk	Low risk	Very low risk	Very low risk

Table 6.6 Description of the classified risks and likely action required

Very high risk	There is a high probability that severe harm could arise to a designated receptor from an identified hazard, OR, there is evidence that severe harm to a designated receptor is currently happening. This risk, if realised, is likely to result in a substantial liability. Urgent investigation (if not undertaken already) and remediation are likely to be required.
High risk	Harm is likely to arise to a designated receptor from an identified hazard. Realisation of the risk is likely to present a substantial liability. Urgent investigation (if not undertaken already) is required and remedial works may be necessary in the short term and are likely over the longer term.
Moderate risk	It is possible that harm could arise to a designated receptor from an identified hazard. However, it is either relatively unlikely that any such harm would be severe, or if any harm were to occur it is more likely that the harm would be relatively mild. Investigation (if not already undertaken) is normally required to clarify the risk and to determine the potential liability. Some remedial works may be required in the longer term.
Low risk	It is possible that harm could arise to a designated receptor from an identified hazard, but it is likely that this harm, if realised, would at worst normally be mild.
Very low risk	There is a low possibility that harm could arise to a receptor. In the event of such harm being realised it is not likely to be severe.

D J Rutland *et. al.*, *CIRIA Report C552, Contaminated Land Risk Assessment, A Guide to Good Practice*, London 2001.

Pollutant Linkages Relating to Land North of the River Dearne

Source	Exposure Pathway	Potential Receptor	Discussion of Pollutant Linkage, Probability and Consequence	Risk Rating
Residual Contaminants within soils beneath the proposed development (PAHs, asbestos, TPH, metals, cyanides)	Inhalation, Ingestion and Dermal Contact with soil,	Development or maintenance workers involved in excavations	Given the nature of the receptor, the probability of exposure as LIKELY. Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. This Pollutant linkage is therefore classified as MODERATE Risk However this probability would normally be addressed by suitable H&S controls and use of PPE on site, reducing the probability to UNLIKELY and the risk to LOW.	LOW
	Inhalation, Ingestion and Dermal Contact with Fugitive Dusts	End-users (Staff and customers)	Given that the site has been remediated such that it is suitable for a commercial end use, the probability of exposure is considered to be UNLIKELY Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. The risk to receptors is therefore considered to be LOW	LOW
	Inhalation, Ingestion and Dermal Contact with Contaminated Soils	Leisure Users of Green/Public Open Space	As the remediation to date presumes that access to land near the river will be limited by fencing/planting, and as the area will likely need regarding to create a useable Public Open Space (POS), there is the potential without further remedial actions (such as revised capping layers) for users to be exposed to contaminants. It is considered appropriate at this stage to assume that the probability of exposure is LIKELY Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. The risk to receptors is therefore considered to be MODERATE and as such will require appropriate mitigation in the design of the POS.	MODERATE

Source	Exposure Pathway	Potential Receptor	Discussion of Pollutant Linkage, Probability and Consequence	Risk Rating
	Potential contact with soil	Buildings and Services	Given the potential presence of residual contamination, there is the potential for newly installed services to be impacted. However as mobile hydrocarbon contaminants are considered unlikely to be present at shallow depth, substantial impact is considered of LOW LIKELYHOOD. Exposure of services to potential contaminants over an extended period could result in damage which could require expenditure to repair, in the context of CIRIA 552 this would be classified as a MILD consequence.	LOW
	Leaching or mobilisation of contaminants from soil	Secondary A Aquifer River Dearne	Remediation on the former gasworks to the north of the River Dearne has been designed and delivered to be protective of controlled waters. We understand regulatory approval has been achieved for the works. As such it is appropriate to conclude that risk to the River Dearne from this area of the site represents a Low Risk and that no further actions are required	LOW
Dissolved phase contaminants in groundwater beneath the proposed development	Migration of dissolved phase contaminants off-site.	Potable Water Supply (SPZII)		

Pollutant Linkages Relating to Land South of the River Dearne

Source	Exposure Pathway	Potential Receptor	Discussion of Pollutant Linkage, Probability and Consequence	Risk Rating
Contaminants potentially present within soils beneath the proposed development (PAHs, asbestos, TPH, metals, cyanides, solvents)	Inhalation, Ingestion and Dermal Contact with soil,	Development or maintenance workers involved in excavations	Given the nature of the receptor, and the history of the site, there is the potential for contamination to be present and without further investigation the probability of exposure should be presumed LIKELY. Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. This Pollutant linkage is therefore classified as MODERATE Risk However this probability would normally be addressed by suitable H&S controls and use of PPE on site, reducing the probability to UNLIKELY and the risk to LOW.	LOW
	Inhalation, Ingestion and Dermal Contact with Fugitive Dusts and Vapours indoors	End-users (Staff and customers)	Without investigation, the probability of exposure is considered to be LIKELY Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. The risk to receptors is therefore considered to be MODERATE	MODERATE
	Inhalation, Ingestion and Dermal Contact with Contaminated Soils	Leisure Users of Green Space	Without investigation it should be presumed that there is the potential for users to be exposed to contaminants. It is considered appropriate at this stage to assume that the probability of exposure is LIKELY Were exposure to residual contaminants to occur, given the nature of these contaminants such exposure is considered to be of MEDIUM consequence. The risk to receptors is therefore considered to be MODERATE and as such will require further investigation and, potentially, appropriate mitigation in the design of the POS.	MODERATE

Source	Exposure Pathway	Potential Receptor	Discussion of Pollutant Linkage, Probability and Consequence	Risk Rating
	Potential contact with soil	Buildings and Services	Given the potential presence of contamination, there is the potential for newly installed services to be impacted. Without further investigation this risk should be considered of LIKELY probability. Exposure of services to potential contaminants over an extended period could result in damage which could require expenditure to repair, in the context of CIRIA 552 this would be classified as a MILD consequence. The risk to receptors is therefore considered to be MODERATE/LOW and investigation is recommended to confirm the need, or otherwise to protect services and in ground structures (e.g. foundations).	MODERATE/LOW
	Leaching or mobilisation of contaminants from soil	Secondary A Aquifer The River Dearne	Given the potential presence of contamination, there is the potential for groundwater and the River Dearne to be impacted by mobile contaminants in soils. Without further investigation this risk should be considered of LIKELY probability. Impact to controlled waters should be considered of MEDIUM consequence. The risk to receptors is therefore considered to be MODERATE and investigation is recommended to further assess this potential risk.	MODERATE
Potential dissolved phase contaminants in groundwater beneath the proposed development	Migration of dissolved phase contaminants off-site.	Secondary A Aquifer The River Dearne	Given the potential presence of contamination, there is the potential for groundwater and the River Dearne to be impacted by dissolved phase contaminants in groundwater. Without further investigation this risk should be considered of LIKELY probability. Impact to controlled waters should be considered of MEDIUM consequence. The risk to receptors is therefore considered to be MODERATE and investigation is recommended to further assess this potential risk.	MODERATE

Appendix E Notes On Limitations WSPE

General

WSP Environmental Limited has prepared this report solely for the use of the Client and those parties with whom a warranty agreement has been executed, or with whom an assignment has been agreed. Should any third party wish to use or rely upon the contents of the report, written approval must be sought from WSP Environmental Limited; a charge may be levied against such approval.

WSP Environmental Limited accepts no responsibility or liability for:

- a) the consequences of this document being used for any purpose or project other than for which it was commissioned, and
- b) this document to any third party with whom an agreement has not been executed.

Phase I Environmental Audits

The work undertaken to provide the basis of this report comprised a study of available documented information from a variety of sources (including the Client), together with (where appropriate) a brief walk over inspection of the site and meetings and discussions with relevant authorities and other interested parties. The opinions given in this report have been dictated by the finite data on which they are based and are relevant only to the purpose for which the report was commissioned. The information reviewed should not be considered exhaustive and has been accepted in good faith as providing true and representative data pertaining to site conditions. Should additional information become available which may affect the opinions expressed in this report, WSP Environmental Limited reserves the right to review such information and, if warranted, to modify the opinions accordingly.

It should be noted that any risks identified in this report are perceived risks based on the information reviewed; actual risks can only be assessed following a physical investigation of the site.

Phase II Environmental Audits

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, and ground and groundwater conditions to allow a reasonable risk assessment to be made. The objectives of the investigation have been limited to establishing the risks associated with potential human targets, building materials, the environment (including adjacent land), and to surface and groundwater.

The amount of exploratory work and chemical testing undertaken has necessarily been restricted by the short timescale available, and the locations of exploratory holes have been restricted to the areas unoccupied by the building(s) on the site and by buried services. A more comprehensive investigation may be required if the site is to be redeveloped as, in addition to risk assessment, a number of important engineering and environmental issues may need to be resolved.

For these reasons if costs have been included in relation to site remediation these must be considered as tentative only and must, in any event, be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The number of sampling points and the methods of sampling and testing do not preclude the existence of localised "hotspots" of contamination where concentrations may be significantly higher than those actually encountered.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.

Geo-environmental Investigations

The investigation of the site has been carried out to provide sufficient information concerning the type and degree of contamination, geotechnical characteristics, and ground and groundwater conditions to provide a reasonable assessment of the environmental risks together with engineering and development implications.

If costs have been included in relation to site remediation these must be confirmed by a qualified quantity surveyor.

The exploratory holes undertaken, which investigate only a small volume of the ground in relation to the size of the site, can only provide a general indication of site conditions. The opinions provided and recommendations given in this report are based on the ground conditions apparent at the site of each of the exploratory holes. There may be exceptional ground conditions elsewhere on the site which have not been disclosed by this investigation and which have therefore not been taken into account in this report.

The comments made on groundwater conditions are based on observations made at the time that site work was carried out. It should be noted that groundwater levels will vary owing to seasonal, tidal and weather related effects.

The scope of the investigation was selected on the basis of the specific development proposed by the Client and may be inappropriate to another form of development or scheme.

The risk assessment and opinions provided, inter alia, take in to consideration currently available guidance values relating to acceptable contamination concentrations; no liability can be accepted for the retrospective effects of any future changes or amendments to these values.