



e3p

Phase I Geoenvironmental Site Assessment
Bamford, Norden

Reference: 14-785-R1
Date: June 2021



PHASE I GEOENVIRONMENTAL SITE ASSESSMENT

Bamford, Norden
Rochdale
OL11 5PW

Prepared for:



Report Ref: 14-785-R1
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Bamford, Norden

Phase I Geoenvironmental Site Assessment
June 2021

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EXECUTIVE SUMMARY

Site Address	Bamford Norden, Rochdale OL11 5PW	
Grid Reference	E 385974, N 413233	
Site Area	36.22 Ha.	
Proposed Development	Peel L&P Investments (North) Limited intent to develop the site for a low rise residential end use that will comprise the construction of between 150 to 200 dwellings in the initial phase with up to 400 dwellings in the future. The proposed masterplan will incorporate the improvement of existing sports facilities.	
Current Site Use	The subject site is an irregular shaped parcel of land located to the east of Jowkin Lane referred to as the Bamford/Norden Site, Rochdale OL11 5PW. The site is part of the Greater Manchester Green Belt, predominantly used as agricultural land. A former school, now apartments and private housing is one of the few structures onsite. Another house is located along the western border of the site along Jowkin Lane. Playing fields are located on site with a cricket club/pitch, tennis courts and football fields associated with Bridge JFC. The site is relatively flat in topography, covered by grassland and mature/semi mature trees which surround field boundaries. The Jowkin Lane and Norden Road border the majority of the site with housing located along the northern boundary. A series of pylons with overhead cables are located across the site.	
Site History	Historical Ordnance Survey Mapping indicates a long history of agricultural land uses on site. A reservoir along with springs and tanks were located on site which have now been removed or infilled. As well as agricultural land uses the site was also subject to industrial practices. Pre 1890 the Bamford Woollen Mills was located in the southern section of the site and the Pitfield Mills bordered the eastern boundary. Six pylons were constructed onsite pre 1976 with overhead electrical cables which intersect the site from north to south. No other significant developments occurred onsite excluding the school, now identified as apartments/residential houses built pre 1975.	
Environmental Setting	Drift Geology	Glacial Till – CLAY (north and central) Glaciofluvial Deposits – SAND and GRAVEL (south)
	Bedrock Geology	Pennine Lower Coal Measures – MUDSTONE, SILTSTONE, and SANDSTONE Old Lawrence Rock – SANDSTONE Riddle Scout Rock SANDSTONE
	Faults	There is one fault transecting the site, NW to SE within the north eastern sector of the site. The downthrow of the fault is to the north east.



Environmental Setting	Hydrogeology	Secondary A Aquifer underlies the Glaciofluvial deposits and a Secondary Undifferentiated Aquifer underlies the Glacial Till within the superficial deposits in the southern sector of the site. A Secondary A Aquifer underlies the bedrock geology. The closest active groundwater abstraction is located 223 m south west of the site. The James Swallow Ltd is utilised for general purposes.
	Hydrology	The closest surface water feature is the Naden Brook River located 199 m west of the site. The site is within a Flood Risk Zone 1, there is low risk of groundwater flooding. Sparse areas of the site are at risk to surface water flooding with a 1 in 30 year return period for flooding at a depth greater than 1.00 m. This is associated with the spring line inferred across the northern sector of the site.
	Flood Risk	The site is within a Flood Risk Zone 1 unaffected by flooding from rivers however, in heavy rainfall events there is a possibility of surface water flooding in certain areas.
Utility Locations	Six pylons with two separate overhead electrical cables intersect the site. Outdoor floodlighting surrounds a football field and tennis courts along the eastern boundary of the site. The Heywood Water Works pipeline was noted on historical Ordnance Survey mapping pre 1890. A formal drainage survey will need to be completed to determine the presence of the pipeline and its location.	
Landfill Sites and Ground Gases	A historic landfill site is located 42 m north of the site. The Clay Lane Water Treatment Works may contain underlying hazardous gases such as methane and carbon dioxide. Historically, two springs and a reservoir were located on site which are no longer present. This suggests the land was subject to infilling of potentially Made Ground, a source of ground gases.	
Radon	Less than 1% of houses above the 'Action Level' – no special precautions required.	
Coal Mining/Land Stability	The Arley sub crop is present to the north and south of the fault and dips in a southerly direction. An adit is indicated as present, which infers the potential for workings within the Arley coal seam. The area ~50m from the identified sub crop is identified as high risk in terms of unrecorded mine workings which, could consolidate inducing subsidence at the surface. The CA require exploratory holes to confirm the presence of the sub crop, the depth of rock and possibility for unrecorded workings. Exploratory boreholes will also be required to locate the adit, determine its conjectured location to inform the requirement for future consolidation of this feature.	
Hazardous Installations	No hazardous installations that could potentially prejudice the proposed construction of highly sensitive residential dwellings have been identified within the subject site. However, the electricity pylons across the site cannot be built under or adjacent to.	



Initial Conceptual Site Model	The following geotechnical assessment can be made based upon the information reviewed: ✳ The presence of Made Ground beneath developed areas including existing buildings, pylons and infilled ground may be a source of heavy metals such as ash, coal, hydrocarbons, and PAHs. ✳ Infilled springs, reservoirs and local landfill sites may be a source of Made Ground and hazardous gases such as methane and carbon dioxide. ✳ ACM may be present within the Made Ground, particularly in areas where historic buildings or industrial land uses were once situated on site. ✳ Volatile contaminants from potential fuel spills associated with the historical mills and agricultural machinery may be subject onsite. A heavy, long term use of fertilizers on site may be a source of potential contamination and migration. ✳ The historical landfill located north of the site may be a source of ground gases including methane and carbon dioxide, potentially migrating to the subject site. ✳ Nearby electrical substations may be a source of PCBs. Human Health: Given the undeveloped nature of the site, there is unlikely to be extensive sources of contamination that would pose a risk to human health of prejudice the future development of the site. However, Made Ground is likely to be in areas subject to anthropogenic activities and historic development. Controlled Waters: The low permeability Glacial Till will limit the vertical and lateral migration of any contaminants. As the site is within a Flood Risk Zone 1 and is unlikely to flood, the risk of potential contaminants migrating into nearby water networks is reduced. Ground Gas: The off site quarry may be a source of ground gas however, the risk will be reduced due to the low permeability drift deposits potentially causing the migration of contaminants. Infilled land where springs and a reservoir were once located are likely to contain hazardous gases that will pose a risk if disturbed.
Conclusion	No development of residential houses is planned beneath the overhead electrical cables and pylons. The future development plans intended to create and improve recreational areas above land at risk to contaminants. These areas include historical springs and the reservoir which are likely to contain infilled land and Made Ground. This will reduce the sensitivity to humans and remediation plans to remove/mitigate contaminants. A detailed Phase II intrusive Geo Environmental Ground Investigation should be undertaken in order to confirm the findings of the initial conceptual site model and value engineer a development solution.



Table of Contents

EXECUTIVE SUMMARY	1
1. INTRODUCTION	6
1.1. Background	6
1.2. Proposed Development	6
1.3. Objectives	8
1.4. Sources of Information	8
1.5. Limitations	8
1.6. Confidentiality	8
2. SITE SETTING	9
2.1. Site Details	9
2.2. Current Site Use	9
2.3. Surrounding Area	11
3. SITE HISTORY	12
3.1. On Site Historical Development	12
3.2. Off Site Historical Development	16
3.3. Planning History	16
4. ENVIRONMENTAL SETTING	17
4.1. Geology and Hydrogeology	17
4.2. Natural Landform and Geomorphology	18
4.3. Geotechnical Data	19
4.4. Coal Mining	20
4.5. Coal Mining Information	20
4.5.1. Coal Authority Plan	22
4.5.2. COAL MINING GEOLOGY	22
4.6. Coal Mining Risk Assessment	24
4.7. Radon Risk Potential	24
4.8. Preliminary Geotechnical Assessment	25
4.9. Hydrology	25
4.10. Industrial Land Uses	27
4.11. Sensitive Land Uses	27
4.12. Site Sensitivity Assessment	28
5. CONSULTATIONS	29
5.1. Landfill Sites and Waste Treatment Sites	29
5.2. Regulatory Database	29
5.1. Unexploded Ordnance	29
5.2. Initial Conceptual Site Model	31
5.3. Conceptual Site Model	32
6. CONCLUSIONS AND RECOMMENDATIONS	36
6.1. Site Summary	36
6.2. Contaminated Land Assessment	36
6.3. Coal Mining	37
6.4. Geotechnical Assessment	37



APPENDIX I LIMITATIONS.....	38
APPENDIX II GLOSSARY	40
APPENDIX III DRAWINGS	43
APPENDIX IV HISTORICAL MAPS	45
APPENDIX V COAL AUTHORITY REPORT AND MINE ABANDONMENT PLANS.....	46

DRAWING LIST

14 785 001 – Site Location Plan
14 785 002 – Proposed Development Plan
14 785 003 – Historical Features Plan
14 785 004 – Site Features Plan



1. INTRODUCTION

1.1. BACKGROUND

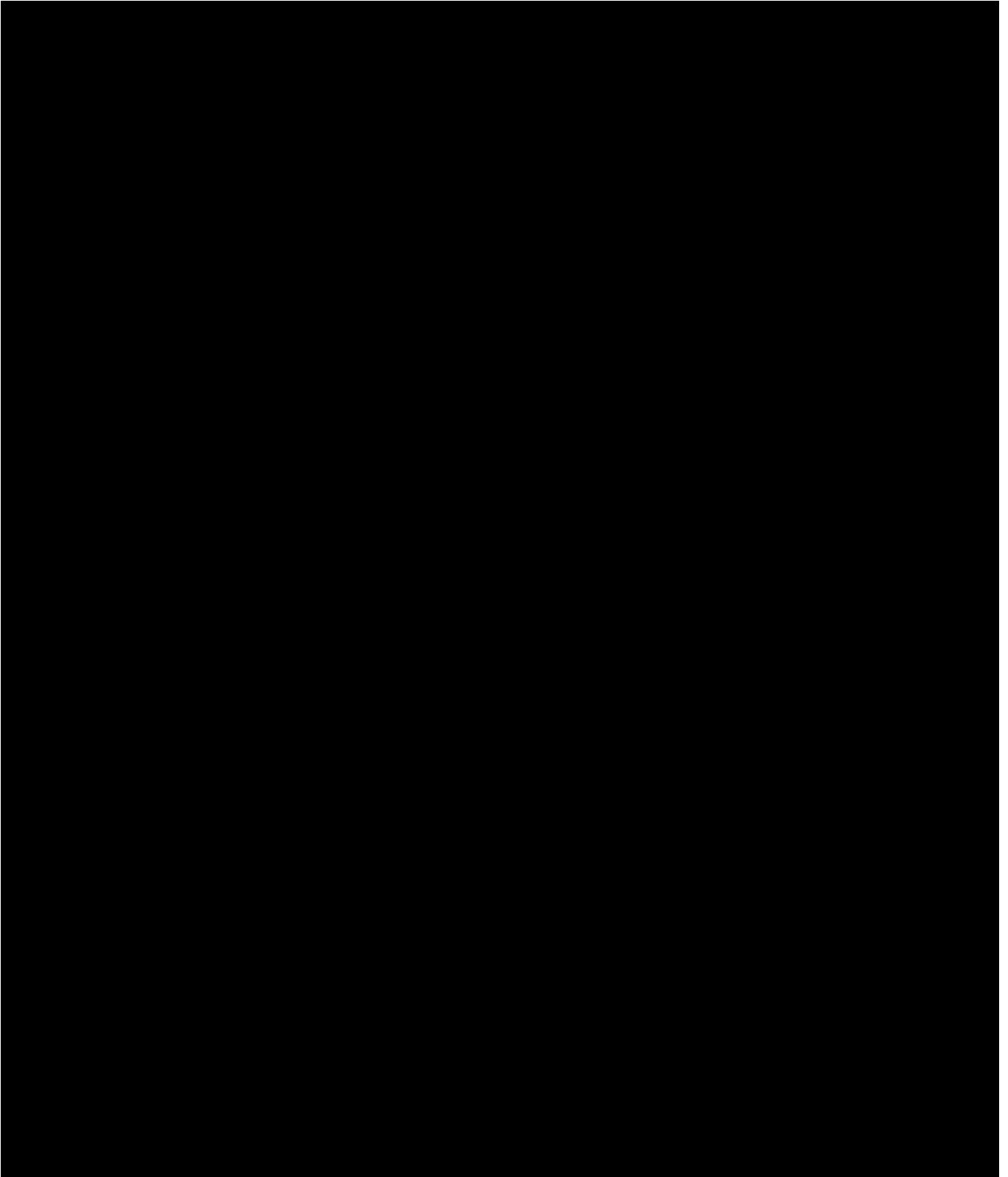
E3P Ltd has been commissioned by Peel L&P Investments (North) Limited to undertake a Phase I Geoenvironmental Site Assessment at land to the east of Jowkin Lane referred to as the Bamford/Norden Site.

This report is required to determine potential contaminated land liabilities and geotechnical constraints as part of a proposed site redevelopment.

1.2. PROPOSED DEVELOPMENT

See Chapter 4 of the EIA Scoping Report for a description of the Proposed Scheme.





1.3. OBJECTIVES

- ✳ The objectives of the geoenvironmental investigation are as follows:
- ✳ Review historical plans, geology, hydrogeology, site sensitivity, floodplain issues, mining records and any local authority information available in order to complete a desk study in line with Environment Agency (EA) document Land Contamination: Risk Management (LC:RM) (2019).
- ✳ Assess the implications of any potential environmental risks, liabilities and development constraints associated with the site in relation to the future use of the site and in relation to off site receptors.
- ✳ Assess the desk study information and, where possible, provide preliminary recommendations in relation to foundations, pavement construction and floor slabs.
- ✳ Provide recommendations regarding future works required and undertake a preliminary pre construction cost appraisal.

1.4. SOURCES OF INFORMATION

Background information was sought from the following sources:

- ✳ Groundsure Search;
- ✳ Historical mapping dated 1851 to 2021. A selection of historical maps are reproduced in Appendix V;
- ✳ On line planning records held by Rochdale Metropolitan Borough Council;
- ✳ Consultations with representatives of Rochdale Metropolitan Borough Council;
- ✳ Magic Map Groundwater Vulnerability Map;
- ✳ Radon: Guidance on protective measures for new buildings (BRE Document BR 211, 2007);
- ✳ British Geological Survey Map;
- ✳ Groundsure IO database;
- ✳ <https://zeticauxo.com/downloads and resources/risk maps/>; and,
- ✳ <https://flood map for planning.service.gov.uk>.

1.5. LIMITATIONS

The limitations of this report are presented in Appendix I.

1.6. CONFIDENTIALITY

E3P 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 E3P; a charge may be levied against such approval.



2. SITE SETTING

2.1. SITE DETAILS

Site Address	Bamford Norden, Rochdale, OL11 5PW
National Grid Reference	E 385974 N 413233
Site Area	36.22Ha.

All acronyms used within this report are defined in the Glossary presented in Appendix II.

A site location map is presented in Appendix III as Drawing 14 785 001.

2.2. CURRENT SITE USE

E3P has undertaken a site walkover of the entire site and a description of the key findings is summarised in Table 2.1.

TABLE 2.1 SITE DESCRIPTION

Occupancy/Use	The subject site is an irregular shaped parcel of land located to the east of Jowkin Lane referred to as the Bamford/Norden Site, Rochdale. The site is part of the Merseyside and Greater Manchester Green Belt, predominantly used as agricultural land. A former school, now apartments and private housing is one of the few structures onsite. Another house is located along the western border of the site along Jowkin Lane. Playing fields are located on site with a cricket club/pitch, tennis courts and football fields associated with Bridge JFC. The site is flat in topography, covered by grassland and mature/semi mature trees which surround field boundaries. The Jowkin Lane and Norden Road border the majority of the site with housing located along the northern boundary. A series of pylons with overhead cables are located across the site.	
Surface Cover (%)	Buildings	5%
	Hardstand	5%
	Soft Cover	90%
Structures	The site is predominantly agricultural land with the only structures present appearing to be a residential dwelling along the western border and residential apartments along Bamford Mews, east of the site. Smaller structures and areas of hard standing ground are located in the southern section of the site associated with the cricket club and tennis pitches as well as localised areas beneath the pylons.	
Access	Vehicle and pedestrian access can be gained via the three roads that border the site. The Furban Road runs along the north west site boundary. The Jowkin Lane follows the south west boundary, and the Norden Road is located along the eastern boundary. A gateway with a track leading onto the site is accessible via Jowkin Lane.	



Slope	There are no major geological features located onsite that would influence the topography. LIDAR data shows a slight rise in topography in the northern section of the site. The data also appears to have a small trench or historic drainage ditch along the south west boundary, this is not shown in current mapping.
Retaining Structures	There are no retaining structures present on site.
Vegetation/Ecology	The site is predominantly covered by agricultural land with associated grasslands. The grass coverage is short due to livestock grazing or management by humans within the playing field areas. Sparse areas of rough vegetation are located on site, particularly in the south. Mature and semi mature trees are located along field boundaries and surround the site perimeter. A dense hedge line surrounds the cricket pitch and tennis court.
Hazardous Material Storage	No above ground storage tanks (ASTs) or underground storage tanks (USTs) were observed on site. Historic Ordnance Survey Mapping shows unspecified tanks which are no longer recorded on site. Tanks are a source of hazardous materials which may indicate possible contamination within the underlying ground.
Asbestos-Containing Material (ACM)	No evidence of ACM is noted on site. With the undeveloped nature of the site and no buildings that would need demolition there is unlikely to be ACM on site. However, a cotton mill and unspecified tanks were once located on site. Made Ground may be situated within the underlying ground of the historic industrial land uses. Asbestos may be contained within the Made Ground.
Polychlorinated Biphenyls (PCBs)	Six pylons are located on site which were built pre 1967, before the ban of PCBs in the UK. Pylons are not likely to contain PCBs however, the Rochdale Sub Station located north of the site may be a source of contamination. If this was the case, PCBs are unlikely to affect the site due to the immobile migration of the contaminant if it was subject to a spillage/leakage. Six outdoor floodlights surround the Bridge JFC football field as well as lighting around the tennis courts. Due to the recent development of the recreational facilities, PCBs will not be present.
Waste Storage	Potentially hazardous waste streams are unlikely to be generated at the site and none were observed during the preliminary site inspection.
Drainage	The Heywood Water Works pipeline was noted on historical Ordnance Survey mapping pre 1890. A formal drainage survey will need to be completed to determine the presence of the pipeline and its location.



2.3. SURROUNDING AREA

The surrounding area land uses are summarised in Table 2.2.

TABLE 2.2 SURROUNDING LAND USES

DIRECTION	LAND USE
North	Norden Residential Houses and Rochdale Sub Station.
East	Bamford Residential Houses, Restaurants and Shopping Facilities, Bamford Academy.
South	Bamford Residential Houses, Bamford Chapel and Norden URC.
West	Agricultural Land and Farms, Narden Brook River.



3. SITE HISTORY

3.1. ON-SITE HISTORICAL DEVELOPMENT

A review of historical mapping and historical aerial imagery pertinent to the site is summarised in Table 3.1.

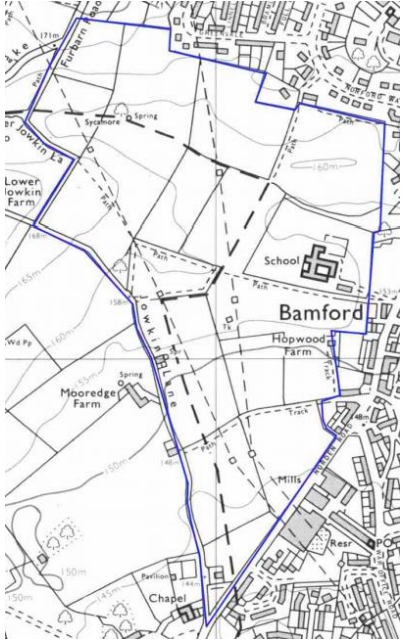
TABLE 3.1 HISTORICAL DEVELOPMENT

MAP EDITION	HISTORICAL LAND USE	HISTORICAL MAP EXCERPT
1851 1:10,560	The site is predominantly agricultural land with clear field boundaries. Mature trees and minor roads follow field boundaries. There are limited structures with three buildings located north west of the site following Jowkin Lane, as well as one building on the south east boundary and along the western boundary. A county and civil boundary intersects the northern section of the site from east to west with multiple foot bridges crossing the pathway. The main pipes of Heywood Water Works run directly through the middle of the site from north to south. A gasometer is located on the central eastern boundary. Contour lines indicate changes in topography.	
1890 1:10,560	The civil boundary is now recognised as the Union & L.B.D Boundary. The water works pipe is no longer present on the map. Field boundaries have increased in size with footpaths following boundaries. Only one building is located on site along the western boundary at Hopwood Farm. A reservoir is located onsite next to the eastern boundary. Other reservoirs are in close proximity to the eastern boundary. The southern section of the site is part of the Bamford Woollen Mills. The Pitfield Mills borders the eastern boundary.	



1928 1:10,560	Two tanks and two springs are recorded onsite. A tank and a spring are located on the western boundary. The second tank is located within the middle of the site. The second spring is located along the civil boundary, now recorded as the Parly Div. & U.D. Boundary. Mature tree coverage is sparce with one Sycamore recorded north west of the site.	
1967 – 1968 1:1,250	The Boro. Const. Boundary (North) and Co. Const. Boundary (South) has relocated. The boundary enters the site along the western border and exits at the south. Two electrical cables intersect the site from north to south feeding from a 'Works' located north of the site boundary. Pylons are located onsite, supporting the cables.	



1975 1:10,000	The reservoir is no longer recorded on site. A school has been developed within the north east section of the site. The surrounding area of the site, particularly to the north and east have been subject to development. Residential houses border the site (the west remains agricultural). There are no other significant changes to the site.	
2010 1:10,000	There are more buildings present on site, particularly in the east surrounding the school. The surrounding land is used as playing fields. The springs and tanks are no longer recorded on site.	



2021
1:10,000

The site is predominantly agricultural land. Mature and semi mature trees follow field boundaries.

Fields surrounding the school are used as playing fields, tennis courts and a cricket pitch with a clubhouse are located south of the school.

One building is located along the western boundary of the site, following Jowkin Lane.

Six pylons are located onsite with associated overhead electrical cables.



3.2. OFF-SITE HISTORICAL DEVELOPMENT

A review of potentially contaminative uses identified on historical Ordnance Survey maps within a 250 m radius of the site is summarised in Table 3.2.

TABLE 3.2 SURROUNDING HISTORICAL DEVELOPMENT

SURROUNDING FEATURE	DISTANCE	DATES	DIRECTION
Woollen Mills Then: named as Mill Then: no longer recorded	9 m	Pre 1890 – Pre 1938 Pre 1938 – Pre 2001 Pre 2001 – Present	South East
Pitfield Cotton Mill Then: no longer recorded	10 m	Pre 1851 – Pre 1956 Pre 1956 – Present	South East
Ashworth Mill Then: disused Then: no longer recorded	53 m	Pre 1851 – Pre 1908 Pre 1908 – Pre 1967 Pre 1967 – Present	North West
Hospital Then: no longer recorded	81 m	Pre 1968 – Pre 1992 Pre 1992 – Present	North
Pit Hole Then: no longer recorded	111 m	Pre 1890 – Pre 1967 Pre 1967 – Present	East
Shaft Then: named as old coal pit Then: no longer recorded	123 m	Pre 1851 – Pre 1890 Pre 1890 – Pre 1928 Pre 1928 – Present	North East
Works Then: no longer recorded	228m	Pre 1967 – Pre 2001 Pre 2001 – Present	North West
Electric Substation Then: no longer recorded	228 m	Pre 1975 – Pre 1987 Pre 1987 – Present	North West

3.3. PLANNING HISTORY

E3P has undertaken a review of online planning records held by Rochdale Metropolitan Borough Council and the following information has been obtained for the site, as shown in Table 3.3.

TABLE 3.3 PLANNING APPLICATION HISTORY

PLANNING APPLICATION	DETAILS	DATES	OUTCOME
98/D35973	Construction of 5 all weather tennis courts with floodlights and changing room extension to existing pavilion with car park extension	08 Jan 1999	Grant subject to conditions
05/D46193	Determination of prior approval for the installation of 3 telecommunications antennae and 2 dishes on existing 45 m pylon together with equipment cabinets	24 Nov 2005	Grant subject to conditions
89/D24045	Determination Two storey extension to side and rear of a row of three dwelling houses and erection of three private garages	18 Aug 1989	Grant subject to conditions



4. ENVIRONMENTAL SETTING

4.1. GEOLOGY AND HYDROGEOLOGY

The British Geological Survey (BGS) map for the site, (1:50,000, Solid and Drift editions) and online records indicate the site is underlain by the geological sequence presented in Table 4.1.

TABLE 4.1 SUMMARY OF UNDERLYING GEOLOGY

GEOLOGICAL UNIT	CLASSIFICATION	DESCRIPTION	AQUIFER CLASSIFICATION
Drift	Glacial Till	DIAMICTON	Secondary Undifferentiated Aquifer
	Glaciofluvial Deposits	SAND and GRAVEL	Secondary A Aquifer
Solid	Riddle Scout Rock	SANDSTONE	Secondary A Aquifer
	Pennine Lower Coal Measures Formation	MUDSTONE, SILTSTONE and SANDSTONE	
	Old Lawrence Rock	SANDSTONE	

FIGURE 4.1 DRIFT GEOLOGY (GROUNDSURE MAP EXTRACT)

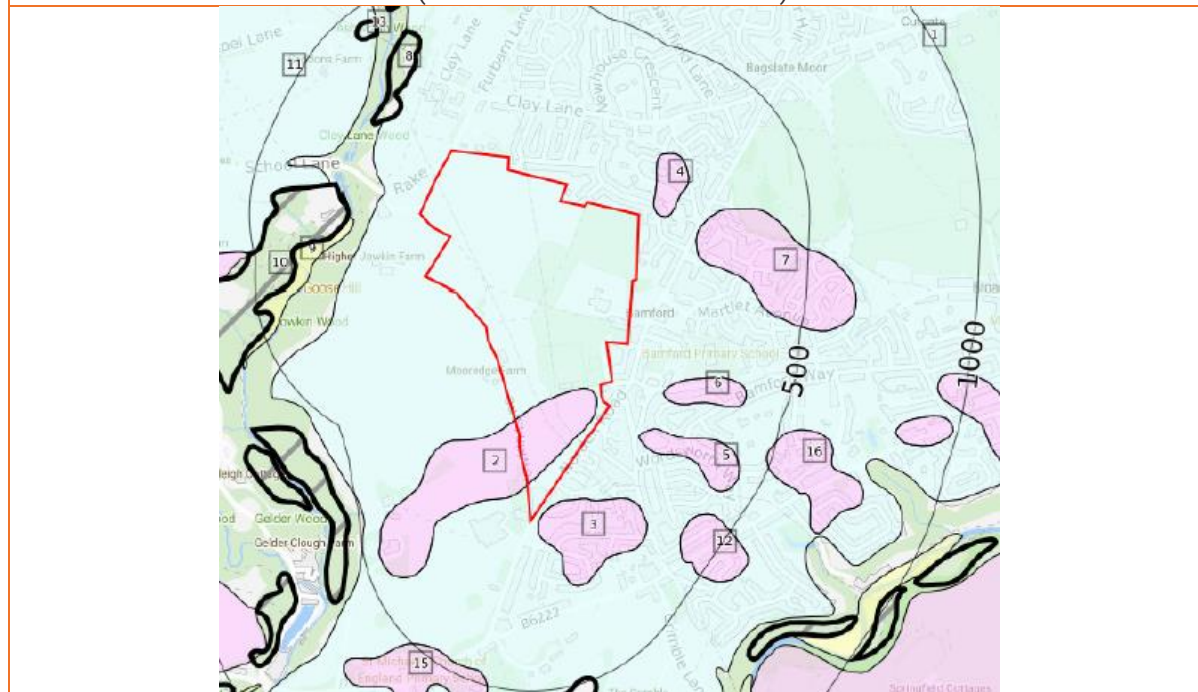


FIGURE 4.2 BEDROCK GEOLOGY (GROUNDSURE MAP EXTRACT)

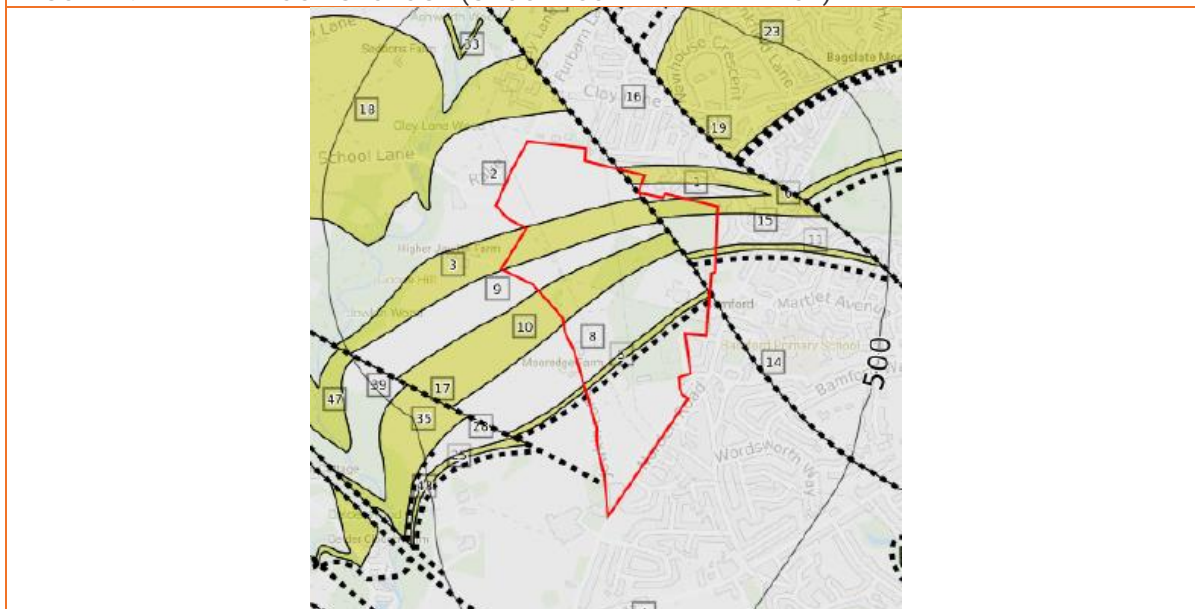


TABLE 4.2 SUMMARY OF BGS BOREHOLE RECORDS

LOCATION	DEPTH	MADE GROUND	DRIFT	SOLID
181 m SE	48.77 m	Not encountered	TOPSOIL and CLAY > 3.05 m	MUDSTONE AND SANDSTONE > 48.77 m
213m W	48.76 m	Not encountered	CLAY, GRAVEL, and SAND	Not encountered

TABLE 4.3 FAULTING

LOCATION	DESCRIPTION
On site	Fault, inferred
On site	Fault, inferred

4.2. NATURAL LANDFORM AND GEOMORPHOLOGY

Based on the initial geological assessment, a review of available topographic data and pertinent mapping, E3P has undertaken a preliminary geomorphological assessment of the landform and its possible mechanism for formation.

The subject site is underlain by glacial till and glaciofluvial deposits. This consists of deposits laid down by the deposition of the melting ice shelf during the most recent glaciation. The underlying rock formations are associated with the Pennine Lower Coal Measures, Riddle Scout Rock and Old Lawrence Rock formations.

The northern section of the site appears to be at a slightly higher level to the south. The site is predominantly flat with no significant geological features. Field boundaries can be recognised through vegetation coverage (mature trees) or by a slight change in topography following the outline of fields. The field boundary along the north east of the site may have been subject to infilling or anthropogenic activities associated with the development of houses north of the site boundary.

It is possible there was a historic water feature or drainage feature with a small trench located south west of the site. The feature may have been associated with the river valley located west of the site.



FIGURE 4.3 SURFACE LIDAR DATA (GROUNDSURE IO)



4.3. GEOTECHNICAL DATA

Geotechnical data presented within a commercially available environmental database is summarised in Table 4.4.

TABLE 4.4 SUMMARY OF GEOTECHNICAL DATA

HAZARD	DESIGNATION
Shrink-Swell Clay	Negligible to very low risk
Landslides	Very low to low risk
Ground Dissolution	Negligible
Compressible Ground	Negligible
Collapseable Deposits	Very low risk
Running Sand	Very low risk



4.4. COAL MINING

The Groundsure report states the site is in an area that may be affected by coal mining.

A CA mining report was obtained (Ref: 51002536478001) dated 26th May 2021.

The CA operates a risk based approach to the assessment of potential instability issues associated with future development of land located within the predefined CA consultation areas. This risk based approach subdivides the potential risk into “low” and “high” risk categories.

The risk categories can be defined as:

Low-Risk Sites – Deemed to be land where coal mining has taken place, however it was at such depth not to pose a risk to new development and it therefore contains no known recorded risks and as such no further assessment is required.

For low risk sites, the CA categorically states:

If your proposed development is within the Development Low Risk Area there is no need for you to submit any coal mining information with your planning application and The Coal Authority will not be consulted by the LPA. The LPA will include our Standing Advice as an informative note within the decision notice.

High-Risk Sites – Deemed to be landholdings located within an area known to contain legacy risks that include:

- ✳ Mine entries (shaft or adit);
- ✳ Shallow coal workings (recorded and probable);
- ✳ Workable coal seam outcrops;
- ✳ Mine gas sites and areas;
- ✳ Recorded coal mining related hazards;
- ✳ Geological features (fissures and break lines); and
- ✳ Former surface mining sites (sometimes using historic opencast extraction methods).

4.5. COAL MINING INFORMATION

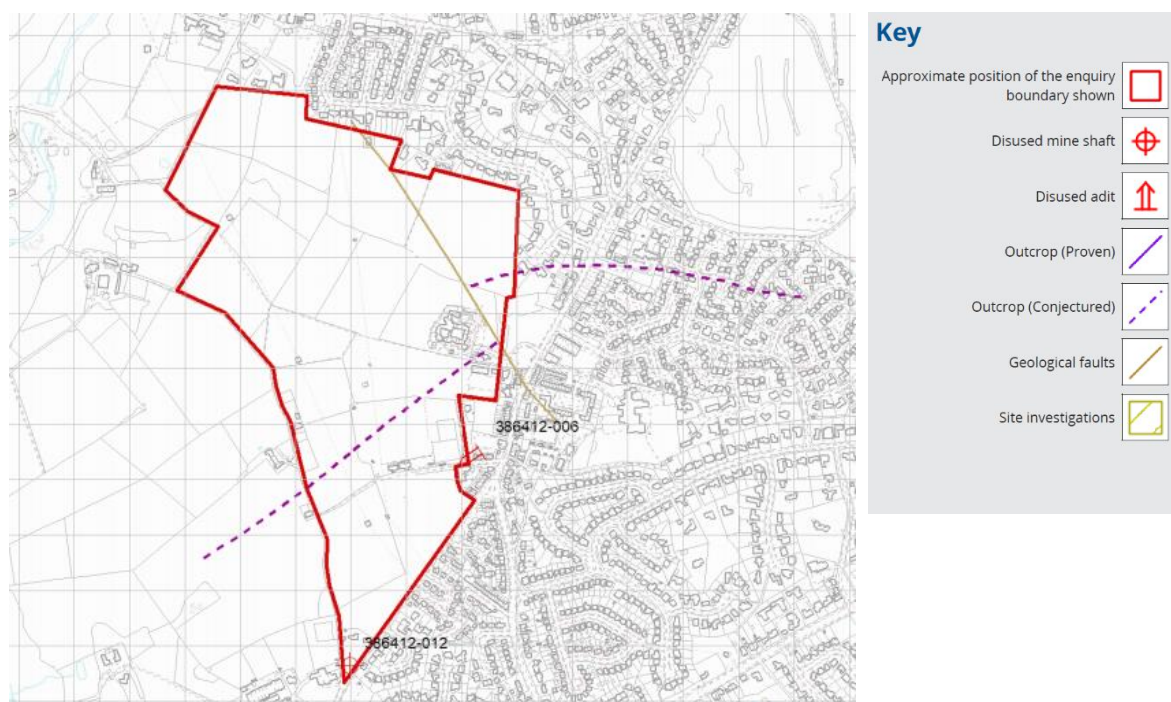
Prior to the enactment of the Coal Mines Regulation Act (1872), which came into force on the 1st January 1883, there was no statutory requirement to record the extent of abandoned mine workings and as such the CA has no knowledge of extensive workings throughout the UK Coal Fields where shallow workings are present at a depth that could result in a subsidence event in the future (through successive cavitation) associated with failure of support mechanism.

To determine if a site may have unrecorded or recorded coal mine workings requires the consideration of a wide range of information and E3P has completed a review of relevant information in relation to potential coal mining activities.

In the first instance, E3P has reviewed the Coal Authority Online Viewer and an excerpt of this is presented as Figure 4.4. This map shows that the site lies within a development high risk area. Furthermore, there are coal seams to the east and south, connecting to the geological fault.



FIGURE 4.4 EXCERPT OF THE COAL AUTHORITY ONLINE VIEWER



As the site is within an area affected by Coal Mining E3P have consulted with the Coal Authority who have provided a Consultant Coal Mining Report for the site (ref: 51002536478001).

Table 4.5 provides a summary of pertinent coal mining information with this report.

TABLE 4.5 COAL MINING INFORMATION

SOURCES OF INFORMATION	SUMMARY
Known Past Underground Mining	No past underground mining recorded.
Probable Unrecorded workings	Yes.
Spine Roadways at Shallow Depth	No spine roadway recorded at shallow depth.
Mine Entries within 100m of the site	Adit Grid Reference: 386234 412950 – Reference: 386412 006 – the adit is not located by the CA and is currently untreated. Shaft Grid Reference: 386000 412564– Reference: 386412 012
Mine Abandonment plans	Yes – 9 which may intersect with some, or all of the site.
Known outcrops	Seam Name: ARLEY. Workable: Yes
Faults / Fissures	YES – One geological fault intersecting the north east section of the site (North west to south east direction).
Opencast mines	None within 500 metres of the site boundary.



SOURCES OF INFORMATION	SUMMARY
Coal Authority Managed Tips	None within 500 metres of the site boundary.
Remediated Sites	None within 50 metres of the site boundary.
Coal Mining Subsidence	None within 50 metres of the site boundary since October 1994.
Mine Gas	None within 500 metres of the site boundary.
Mine Water	None within 500 metres of the site boundary.
Future Underground Mining	None recorded.
Coal Authority Development Advice	NO
British Geological Survey Mapping	The BGS mapping for the area notes a geographical fault present in the north east corner of the site, two outcrop coal seams are located. The Arley seam associates with the Riddle Scout Rock within the bedrock geology.
Review of Coal Authority Archive	No CA archives/mine abandonment plans are made available.
Historical Ordnance Survey Mapping	A review of the 1:10,560 Ordnance Survey mapping from 1851 has identified no features relating to surface coal mining on or within 250m of the subject site. However, an Adit is recorded in the southern sector.
Historical Site Investigations	E3P has not been provided with any historic site investigation reports.

4.5.1. COAL AUTHORITY PLAN

The Coal Authority plan referenced: 51002536478001 shows the coal seams beneath the site along with the fault through the site and associated mine adit.

The mine shaft and adit are down dip (south) of the coal seams on either side of the fault showing that the seams have likely been worked from the shafts.

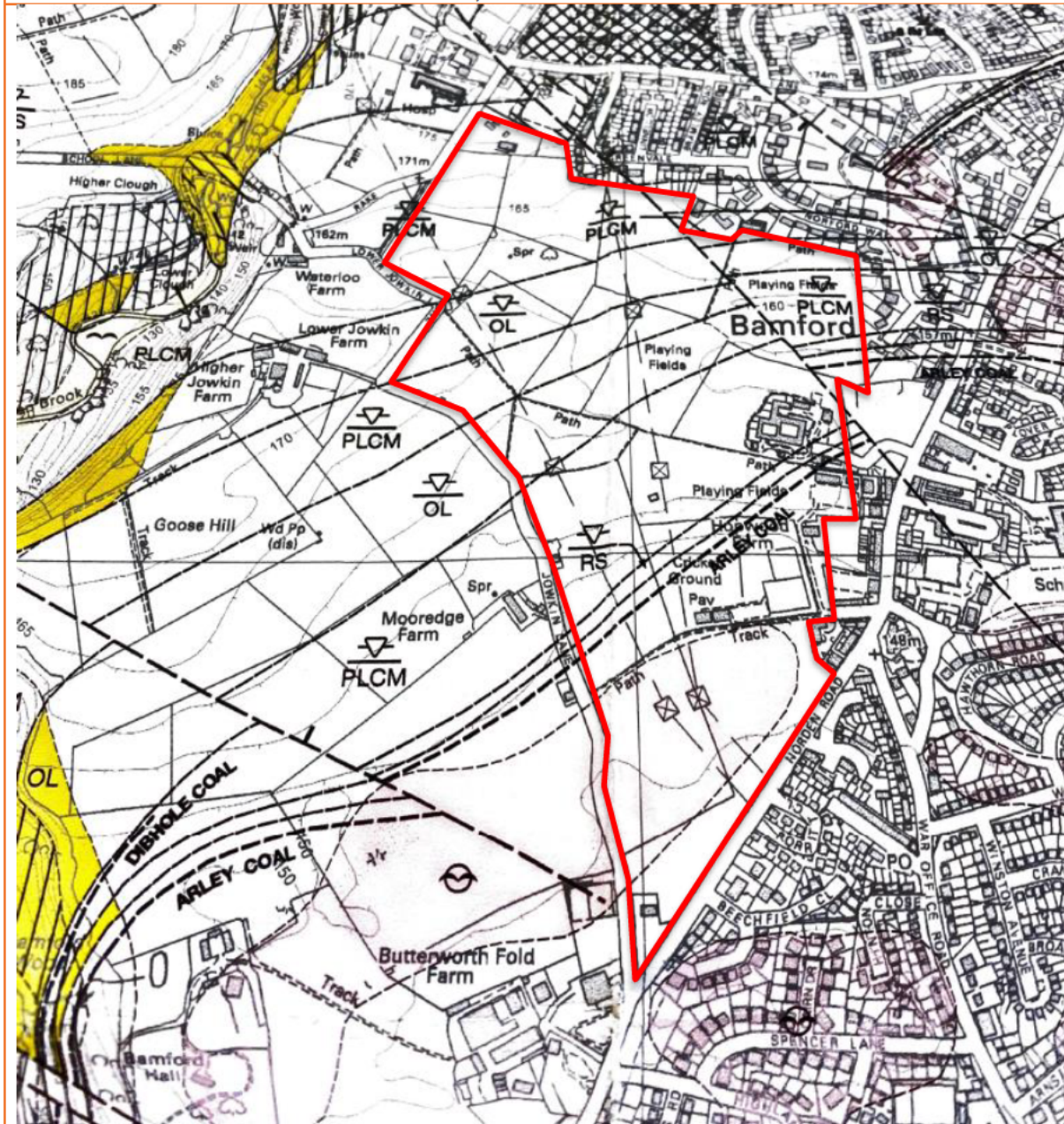
4.5.2. COAL MINING GEOLOGY

Figure 4.5 is a photograph of the 1:10,000 plan for the site which shows the Arley Coal Seam crosses the site in the centre.

A fault trends northwest to southeast through the north eastern corner of the site.



FIGURE 4.5 PHOTOGRAPH OF THE 1:10,000 PLAN FOR THE SITE



4.6. COAL MINING RISK ASSESSMENT

This risk assessment comprises a desk based review of all available information on coal mining issues that are relevant to the application site deemed to be located within a high risk area. This includes:

- ✳ Interpretation of information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact of issues;
- ✳ Setting out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- ✳ Demonstrating to the local planning authority that the application site is, or can be made, safe and stable to meet the requirements of national planning policy with regard to development on unstable land.

The coal mining risk assessment is summarised in Table 4.6.

TABLE 4.6 SUMMARY OF COAL MINING RISK ASSESSMENT

COAL MINING RISK ASSESSMENT	YES/NO	RISK ASSESSMENT
Recorded Underground Coal Mining at Shallow Depth (< 30 m)	No	Low
Recorded Underground Coal Mining at Shallow Depth (> 30 m)	No	Low
Evidence of Unrecorded Surface Extraction of Coal Outcrop	No	Low
Unrecorded Underground Coal Mining at Shallow Depth (< 30 m)	Yes	High
Mine Entries (Shaft/Adits)	Yes	High
Coal Mining Geology – Fractures/Fissures	Yes	High
Recorded Gas Emissions	No	Low
Recorded Mining Surface Hazard	No	Low
Surface Mining (Opencast)	No	Very Low/Low

The Arley sub crop is present to the north and south of the fault and dips in a southerly direction. An adit is indicated as present, which infers the potential for workings within the Arley coal seam. The area ~50m from the identified sub crop is identified as high risk in terms of unrecorded mine workings which, could consolidate inducing subsidence at the surface.

The CA require exploratory holes to confirm the presence of the sub crop, the depth of rock and possibility for unrecorded workings. Exploratory boreholes will also be required to locate the adit, determine its conjectured location to inform the requirement for future consolidation of this feature.

4.7. RADON RISK POTENTIAL

The Groundsure report indicates the site is situated in an area where less than 1% of homes are above the “Action Level” and that the BGS reports that full radon protective measures are not necessary in the construction of new dwellings or extensions.



4.8. PRELIMINARY GEOTECHNICAL ASSESSMENT

Based on the desk study information, the following geotechnical assessment has been made:

- ✚ Given the predominantly undeveloped nature of the site, it is likely there will be limited Made Ground fill deposits and obstructions. Existing buildings/features may require demolition, with all relict foundations grubbing out, prior to the construction of the proposed development.
- ✚ A number of historically infilled ponds and a reservoir are present within the site boundary, which are potential sources of alluvial deposits, silts and possible organic peat deposits in addition to potential depths of Made Ground. Investigation will be required in order to assess these and undertake in situ geotechnical testing to determine the likely foundation solution for plots in these areas.
- ✚ In order to construct residential development, earthworks will be required to create a level developable platform.

4.9. HYDROLOGY

Surface water features within 250 m of the subject site are summarised in Table 4.7.

TABLE 4.7 SURFACE WATER FEATURES

SURFACE WATER FEATURE	QUALITY	DISTANCE (m)	DIRECTION
Naden Brook	–	199 m	West

The site is located within a currently defined “Flood Risk Zone 1”; defined as land assessed as having less than 1 in 1,000 annual probability of river or sea flooding (< 0.1%), and as such is considered to be unaffected by river flooding. In addition, the Groundsure report states there is a low to moderate potential for groundwater flooding to occur at the site. However, the site is partially subject to surface water flooding. Sparse areas of the site are within a 1 in 30 year return period for flooding at a depth greater than 1.00 m, these areas are within the dense vegetation coverage located in agricultural land. The Environment Agency (EA) Flood Risk Map for the site is presented as Figure 4.6.

The Groundsure report indicates that the site is not located within a groundwater source protection zone. However, there are abstraction points located within 1 km of the site. The closest groundwater abstraction located 223 m south west of the site is within the superficial glacial till deposits. BGS boreholes have indicated a presence of clay within the superficial deposits. Clay has a low permeability reducing the migration of contaminants.

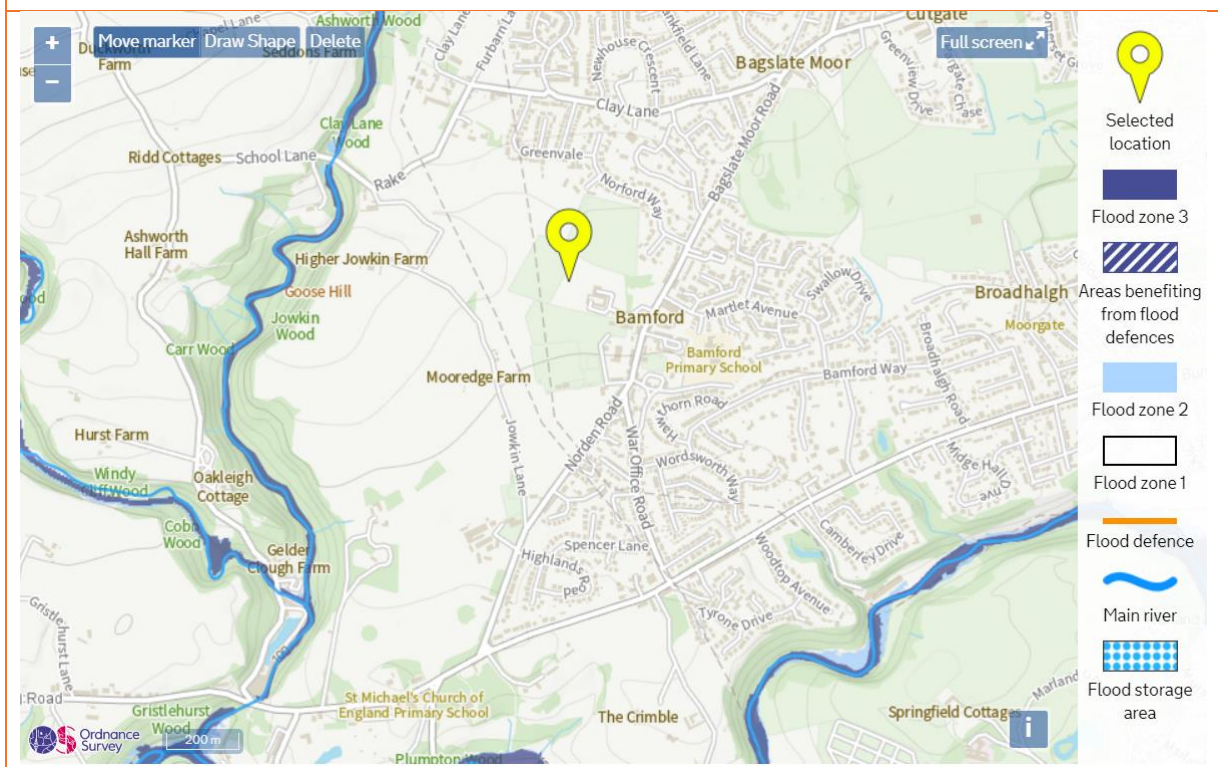
Two groundwater abstractions are located within 250 m off the site. There are two surface water abstractions within 1 km of the site and no potable abstractions located within 1 km of the site. The Groundsure report indicates a high superficial permeability and a high bedrock permeability which would suggest the movement of water from the ground surface through to the bedrock a high sensitivity to contamination. The distance of the abstraction points from the site and the presence of low permeability clay in the drift deposits (according to BGS boreholes) may reduce to sensitivity of the area and as a result the site is not in a groundwater source protection zone. There are boreholes located within a closer proximity to the site however, the data is unavailable.

Following a review of the historical and present day mapping, a significant number of springs and reservoirs are located on site and within a close proximity. There is no evidence of springs and reservoirs onsite suggesting potential infilling of land where they once situated.



Based on the local topography and the EA Flood Risk Map there is little evidence that would indicate flooding on site. A potential drainage ditch within the south west section of the site would suggest any groundwater would flow in a south westerly direction towards the Naden Brook River.

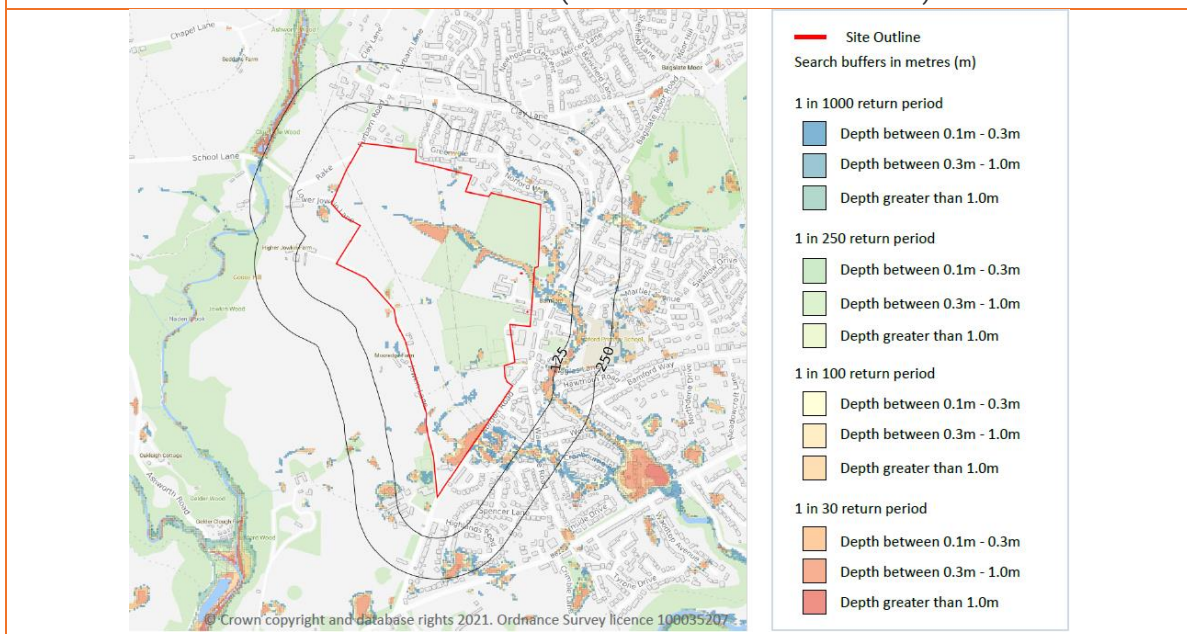
FIGURE 4.6 EA FLOOD RISK MAP



Source - <https://flood-map-for-planning.service.gov.uk/>

The Groundsure report states that a small central section and a section along the south eastern boundary of the site may be subject to surface water flooding in a 1 in 30 year event of greater than 1.0m. The Groundsure Report map is presented in Figure 4.7.

FIGURE 4.7 SURFACE WATER FLOODING (GROUNDSURE MAP EXTRACT)



4.10. INDUSTRIAL LAND USES

A review of current industrial land uses identified on historical Ordnance Survey maps within a 250 m radius of the site is summarised in Table 4.8.

Table 4.8 CURRENT INDUSTRIAL LAND USES

INDUSTRIAL LAND USE	DISTANCE	DIRECTION
Taylors Travel (Vehicle Hire/Rental)	69 m	South East
Rochdale Industrial Roofing Ltd (Construction)	78 m	East
Water Treatment Works	86 m	North
Works (Unspecified)	107 m	North
Rochdale PC (Electrical Equipment)	171 m	North East
Wind Pump (Disused)	199 m	South West

The Groundsure report states there are no current or recent petrol stations located within 500 m of the site. Furthermore, there are no gas pipelines within a 500 m radius.

According to Part 2A of the Environmental Protection Act 1990, the site is not determined as contaminated land.

4.11. SENSITIVE LAND USES

The subject site is situated within the Merseyside and Greater Manchester Green Belt. Future planning by Peel L&P Investments (North) Limited intend to represent a sustainable urban expansion without compromising the wider integrity of the strategic Green Belt through sustainable infrastructure, recreational facilities and enhancing existing footpaths and cycleways. They intent to protect habitats, utilise sustainable drainage systems and generate renewable energy.

The site is not within a Site of Specific Scientific Interest (SSSI), nor is it within a Special Area of Conservation (SAC) or Special Protection Area (SPA). However, the site is defined as an SSSI Impact Risk Zone characterised by the sensitivity of the site to future development and pollution. There are areas of designated ancient woodlands located close to the subject site. The Norden Brook Wood is located 223 m north west of the site and the Jowkin Wood is located 235 m west of the site. Ancient woodlands are classed as areas which have been present since at least 1600 AD and are relatively undisturbed by human development.

There are two listed buildings located 34 m south west of the site. They will not be affected by future development or site investigations.

Residential properties are located along the northern and eastern boundary of the site. These include the densely populated settlements of Norden and Bamford. The land west/south west of the site remains agricultural land. No other environmentally sensitive land uses have been identified within close proximity to the site.



4.12. SITE SENSITIVITY ASSESSMENT

The site is assessed to be located within a MODERATE sensitivity setting as discussed within Table 4.9.

TABLE 4.9 SITE SENSITIVITY ASSESSMENT

SENSITIVITY PROFILE	DISCUSSION	RATING
Groundwater Source Protection Zone or Drinking Water Safeguard Zone	The site is not located within a groundwater source protection zone or a nitrate sensitive area. There is no risk to drinking water.	Low
Distance to the Closest Groundwater Abstraction Point	The closest abstraction point, James Swallow Ltd Groundwater Abstraction is located 223 m south west of the site, utilised for general purposes. The underlying clay within the glacial till drift deposits will prevent the migration of contaminants from the abstraction point.	Moderate
Aquifer Classification in Superficial Drift Deposits	Secondary A Aquifer within the glaciofluvial drift deposits represent permeable layers of sand and gravel, supporting water supplies and base flow to rivers. Secondary Undifferentiated Aquifer within the glacial till deposits represent variable characteristics in the rock type.	Low
Aquifer Classification in Bedrock	Secondary A Aquifer in the bedrock consists of permeable layers of sandstone from the Riddle Scout Rock and Old Lawrence Rock Formations. Areas of underlying Pennine Lower Coal Measures will consist of low permeability mudstone and siltstone.	Low
Is the Site Underlain by Low-Permeability Drift to Depths in Excess of 10 m?	A nearby BGS borehole has indicated the presence of clay, sand, and gravel within the underlying superficial deposits up to 3.05m. Low permeability clay may reduce the migration of contaminants and the high permeability sand and gravel may increase migration of contaminants to watercourses of the bedrock aquifer.	Moderate
Is the Site Located Within 50 m of a Surface Watercourse?	The site is within the Roch (Spodden to Irwell) WFD surface water body catchment area. The closest water feature, the Naden Brook River is located 199 m west of the site. The distance is not likely to pose any significant risk to surface waters on site.	Low
Sensitive Land Uses	The site is situated within the Merseyside and Greater Manchester Green Belt. The densely populated settlement of Norden and Bamford are situated outside the northern and eastern border. No other sensitive land uses have been identified within the site.	Moderate
OVERALL SITE ENVIRONMENTAL SENSITIVITY		Low



5. CONSULTATIONS

5.1. LANDFILL SITES AND WASTE TREATMENT SITES

There are no active or recently active landfill sites located within 500 m of the site. A historical Refuse Tip was identified from 1961 Local Authority mapping records, located 381 m north west of the site. The tip is no longer active and is within a distance that would not pose a contamination risk to the subject site.

A historical landfill site, the Clay Lane Water Treatment Works was located 42 m north of the site. Ordnance Mapping suggests the land has been subject to infilling of Made Ground, a potential source of hazardous gases such as methane and carbon dioxide. The landfill is within the Glacial Till superficial deposits and as such, the low permeability clay will reduce the migration of ground gases and contaminants to the site.

5.2. REGULATORY DATABASE

The information summarised in Table 5.1 has been obtained from a commercially available environmental database. The summary table only includes records from within 250 m of the subject site and not otherwise detailed in the report.

TABLE 5.1 SUMMARY OF ENVIRONMENTAL DATA

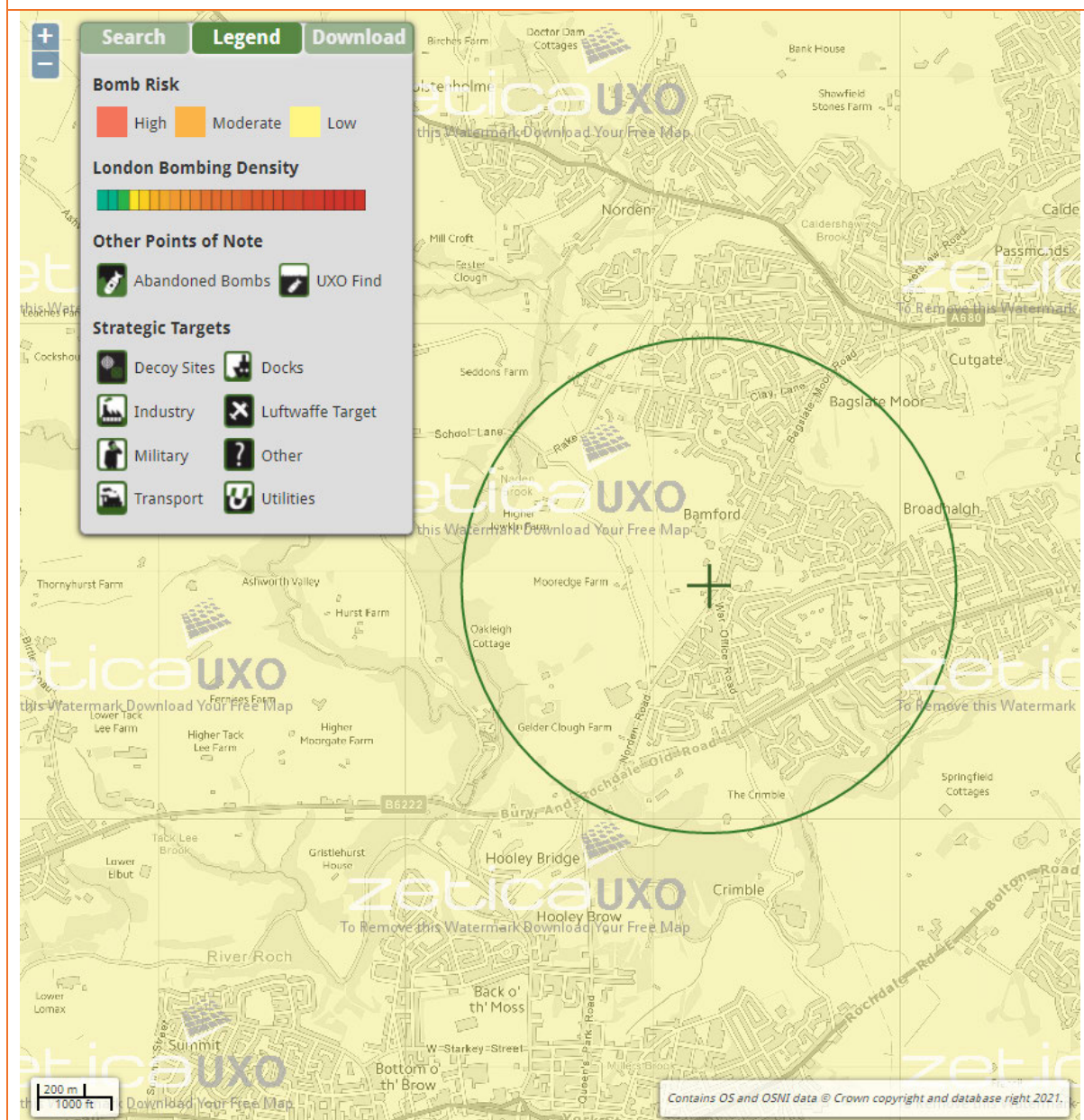
RECORD	ENTRIES WITHIN 250 m	DETAILS
Contaminated Land Register Entries and Notices	0	None Identified.
Authorised Industrial Processes (IPC/IPPC/LAPPC)	0	None Identified.
Fuel Stations Entries	0	None Identified.
Licensed Radioactive Substances	0	None Identified.
Enforcements, Prohibitions or Prosecutions	0	None Identified.
Discharge Consents	0	None Identified.
Pollution Incidents	1	Pollutant release from Bamford Dry Cleaners – no enforcement given.
Consents Issued Under the Planning (Hazardous Substances) Act 1990	0	None Identified.
Control of Major Accident Hazard (COMAH) Sites	0	None Identified.

5.1. UNEXPLODED ORDNANCE

The regional unexploded bomb risk map from Zetica (2014) indicates that the site is in an area at low risk from possible unexploded ordnance (UXO) resulting from the Second World War. The Zetica UXO Risk Map is presented as Figure 5.1.



FIGURE 5.1 ZETICA UXO RISK MAP



Source - <https://zeticauxo.com/downloads-and-resources/risk-maps/>



5.2. INITIAL CONCEPTUAL SITE MODEL

In accordance with EA LCRM (2019) and BSI 10175 (Code of Practice for Investigation of Potentially Contaminated Land), E3P has developed an initial conceptual site model (CSM) to identify potential contamination sources, migration pathways and receptors within the study area. This is summarised within Table 5.1.

ON-SITE SOURCES OF CONTAMINATION

The following potential on site sources of contamination have been identified:

- ✚ The presence of Made Ground beneath developed areas including existing buildings, pylons and infilled ground may be a source of heavy metals such as ash, coal, hydrocarbons, and PAHs. The undeveloped nature of the site will limit areas of Made Ground however, unknown or historic services such as the Heywood Water Works Pipe may still be present on site with potentially Made Ground surrounding features.
- ✚ Infilled springs, reservoirs and local landfill sites may be a source of Made Ground and hazardous gases such as methane and carbon dioxide. Contaminants have the potential to migrate towards/away from the site or into waterbodies and underlying aquifers.
- ✚ ACM may be present within the Made Ground, particularly in areas where historic buildings or industrial land uses were once situated on site pre 1999.
- ✚ Volatile contaminants from potential fuel spills associated with the historical mills and agricultural machinery may be subject onsite. A heavy, long term use of fertilizers on site will be a source of potential contamination and migration.

OFF-SITE SOURCES OF CONTAMINATION

The following potential off site source of contamination have been identified:

- ✚ The historical landfill located north of the site may be a source of ground gases including methane and carbon dioxide which may migrate to the subject site.
- ✚ A gasometer was also located on the central eastern boundary of the site, this may be a source of ground gases.
- ✚ Nearby electrical substations may be a source of PCBs. If the substation is pre 1800 and any spills/leakages had occurred, PCBs may contaminate the ground. Any potential contamination will be localised to the specific area.



5.3. CONCEPTUAL SITE MODEL

Following the completion of the intrusive site investigation, chemical analysis and risk assessment, the conceptual model shown in Table 8.14 has been prepared for the site.

TABLE 5.1 CONCEPTUAL MODEL

POLLUTANT LINKAGE	CONTAMINANT (SOURCE)	PATHWAY	RECEPTOR	PROBABILITY	CURRENT RISK	RESIDUAL RISK AFTER MITIGATION
PL1 PL2	Heavy Metals, non volatile PAH, PCBs (Made Ground)	Dermal contact. Dermal contact and ingestion. Construction Workers	Future site users. Off site receptors.	Likely	High	LOW
Discussion: The site may be subject to Made Ground deposits in areas affected by anthropogenic activities. The demolition of historical buildings along the north west border may have resulted in the contamination of the underlying drift deposits. Current buildings will not require demolition prior to future development, reducing exposure to hazardous metals and ash within the Made Ground. Pre 1890, a water works pipeline was identified on site, the development of the pipeline may have involved the infilling of land. Historical springs and a reservoir which are no longer recorded on site may be another source of infilled land potentially containing hydrocarbons or hazardous ground gases. Historical Mills and the long term history of agricultural land uses on site may be a source of PAHs. PAHs contaminate the land through leakages/spillages from agricultural machinery or industrial development. The pylons and outdoor lighting are not likely to contain any PDBs however, where pylons have been built onsite, hardstanding and Made Ground will be present below. Recommendation: An intrusive investigation will be required with a chemical analysis to assess potential contaminants.						



PL3	ACM in Made Ground	Inhalation of dust.	Future site users. Buildings. Off site land users.	Likely	High	LOW
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Assessment:

No ACM were identified on site however, asbestos may be present. In the areas where buildings were demolished pre 1890, asbestos was a common material used in buildings. When demolished ACM may have contaminated the land below. Unspecified tanks were historically located onsite, it is unknown what the tanks were used for indicating a potential source of ACM contamination. Hazardous materials and heavy metals may be present within the Made Ground underlying developed areas.

Recommendation:

If encountered, ACM poses a risk through fibre dust inhalation and if present may pose a risk to construction workers during any future earthworks. These risks can be mitigated through the development of a detailed enabling works strategy following guidance and protocol specified within the Control of Asbestos Regulations (2012) and industry best practice as detailed in CIRIA733 (Asbestos in Soil and Made Ground: A guide to understanding risk).

PL4	Volatile Contaminants such as hydrocarbons (Made Ground, mills) Methane, carbon dioxide (coal measures and infilled land)	Inhalation of vapours. Migration through permeable strata and preferential pathways.	Future site users. Off site receptors.	Likely	Moderate	LOW
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Assessment:

There is a possibility of leakages/spillages from agricultural practices onsite or industrial machinery from the historic mills. The heavy use of agricultural fertilisers may be a source of volatile contaminants which have the potential to migrate. Infilled ground from historical springs and reservoirs located on site and in the surrounding areas may contain hazardous gases such as methane and carbon dioxide. This includes the nearby historical landfill site, there is a potential for pollutants to migrate through the drift geology into aquifers or into the bedrock. Two outcrop coal seams are located onsite, the Arley seams are associated with the Riddle Scout Rock within the bedrock geology and the depth is unknown.

Recommendation:

An intrusive investigation will be required with a chemical analysis to assess potential contaminants.



PL5	Mobile contaminants such as metals, PAHs, hydrocarbons, volatile compounds (Made Ground, mills)	Surface runoff. Migration through permeable strata and preferential pathways.	Groundwater (secondary A aquifer).	Likely	Moderate	LOW
Assessment: A BGS borehole located 181 m south of the site indicated the presence of clay within the Glacial Till drift deposits. The low permeability would reduce the migration of contaminants downwards into the aquifer or the solid geology. Areas with underlying glaciofluvial deposits will be more sensitive to lateral or vertical migration due to the high permeability sand and gravel. Certain areas of the site are subject to surface water flooding as a result of extreme rainfall events. In this case, surface run off may transport any underlying contaminants elsewhere. As the affected areas are located within agricultural land, the impact to humans is reduced. Recommendation: An intrusive investigation will be required with a chemical analysis to assess potential contaminants. Boreholes onsite and within the surrounding area will identify localised areas of ground conditions.						
PL6	Sulphate (potential ash within Made Ground)	Sulphate attack on concrete.	Building structure.	Likely	Moderate/Low	LOW
Assessment: Ash may be contained within Made Ground deposits associated with historical industrial land uses including the mills. The presence of low pH and high sulphate within any Made Ground deposits may result in corrosion of buried concrete within the proposed development. With the undeveloped nature of the site and no demolition of existing buildings prior to future development, the risk is low. Recommendation: An intrusive investigation will be required with a chemical analysis to assess potential contaminants.						



PL7	Organic contaminants such as hydrocarbons, (Made Ground, mills)	Ingestion of tainted water supply.	Future site users. Water pipes.	Likely	Moderate	LOW
Assessment: The site is predominantly agricultural, soft standing land. Even though the site is within a Flood Risk Zone 1, it is subject to localised surface water flooding caused by extreme rainfall events. Surface water will either flow west toward the Naden Brook or infiltrate where the underlying geology where it is permeable. It is unlikely contaminants will migrate to the underlying aquifer due to the drift geology and the low likelihood of groundwater flooding. Recommendation: An intrusive investigation will be required with a chemical analysis to assess potential contaminants.						
PL8	Phytotoxic contaminants (Made Ground)	Direct Contact (plant uptake).	Flora.	Likely	Low	MODERATE
Assessment: The site is within a Green Belt. With limited historical development on site and a nearby ancient woodland, habitats are likely to thrive and will be sensitive to future development and potential contaminants. Recommendation: An intrusive investigation will be required with a chemical analysis to assess potential contaminants.						

Main exposure pathways:

PL1 = soil ingestion, PL2 = dermal contact and ingestion, PL3 = dust inhalation; PL4 = Vapour/Gas Inhalation; PL5 = Vertical / Lateral Migration; PL6 = Corrosion of concrete; PL7=Tainting of water supply; PL8 = Uptake by plants;



6. CONCLUSIONS AND RECOMMENDATIONS

6.1. SITE SUMMARY

Current Site Use	The subject site is an irregular shaped parcel of land located to the east of Jowkin Lane referred to as the Bamford/Norden Site, Rochdale OL11 5PW. The site is part of the Merseyside and Greater Manchester Green Belt, predominantly used as agricultural land. A former school, now apartments and private housing is one of the few structures onsite. Another house is located along the western border of the site along Jowkin Lane. Playing fields are located on site with a cricket club/pitch, tennis courts and football fields associated with Bridge JFC. The site is flat in topography, covered by grassland and mature/semi mature trees which surround field boundaries. The Jowkin Lane and Norden Road border the majority of the site with housing located along the northern boundary. A series of pylons with overhead cables are located across the site.
Historical Site Use	Historical Ordnance Survey Mapping indicates a long history of agricultural land uses on site. A reservoir along with springs and tanks were located on site which have now been removed or infilled. As well as agricultural land uses the site was also subject to industrial practices. Pre 1890 the Bamford Woollen Mills was located in the southern section of the site and the Pitfield Mills bordered the eastern boundary. Six pylons were constructed onsite pre 1976 with overhead electrical cables which intersect the site from north to south. No other significant developments occurred onsite apart from a school, now identified as apartment/residential houses built pre 1975.
Site Sensitivity	The site is within a moderate sensitivity area. The Green Belt recognises the sites sensitivity to future development and pollution. Two listed buildings as well as an ancient woodland are located in close proximity to the site which is likely to be enriched with a variety of habitats. The site is not within a flood risk zone or groundwater flood zone, the low permeability Glacial Till will reduce the migration of potential contaminants into the bedrock and underlying aquifers. The dense settlement of Norden and Bamford border the north and east boundary of the site.

6.2. CONTAMINATED LAND ASSESSMENT

Human Health	Given the undeveloped nature of the site, there is unlikely to be extensive sources of contamination that would pose a risk to human health of prejudice the future development of the site. However, Made Ground is likely to be in areas subject to anthropogenic activities and historic development.
Controlled Waters	The low permeability Glacial Till will limit the vertical and lateral migration of any contaminants. As the site is within a Flood Risk Zone 1 and is unlikely to flood, the risk of potential contaminants migrating into nearby water networks is reduced.



Ground Gas	The off site quarry may be a source of ground gas however, the risk will be reduced due to the low permeability drift deposits potentially causing the migration of contaminants. Infilled land where springs and a reservoir were once located area likely to contain hazardous gases that will pose a risk if disturbed.
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6.3. COAL MINING

Coal Mining	The 1:10,000 mapping indicates the Arley sub crop is present to the north and south of the fault and dips in a southerly direction. An adit is indicated as present, which infers the potential for workings within the Arley coal seam. The area ~50m from the identified sub crop is identified as high risk in terms of unrecorded mine workings which, could consolidate inducing subsidence at the surface. The CA require exploratory holes to confirm the presence of the sub crop, the depth of rock and possibility for unrecorded workings. Exploratory boreholes will also be required to locate the adit, determine its conjectured location to inform the requirement for future consolidation of this feature.
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6.4. GEOTECHNICAL ASSESSMENT

Geological	Although the site is predominantly agricultural land, there may be areas of Made Ground. Made Ground is likely to be isolated in areas of the site subject to anthropogenic activities and historic industrial land uses. If volatile determinants are identified within the Made Ground, they will require removal from site. Elevated levels of heavy metals can be mitigated with the installation of a clean cover system within landscaped areas. The area is identified as a high risk site for coal mining due to the workable coal seam outcrops and mine entries onsite.
Civil and Structural	The current coverage of the site is predominantly soft standing agricultural land. An intrusive investigation will be required to assess the ground conditions.

END OF REPORT



APPENDIX I LIMITATIONS

1. This report and its findings should be considered in relation to the terms of reference and objectives agreed between E3P and the client as indicated in Section 1.3.
2. For the work, reliance has been placed on publicly available data obtained from the sources identified. The information is not necessarily exhaustive and further information relevant to the site may be available from other sources. When using the information it has been assumed it is correct. No attempt has been made to verify the information.
3. This report has been produced in accordance with current UK policy and legislative requirements for land and groundwater contamination which are enforced by the local authority and the Environment Agency. Liabilities associated with land contamination are complex and requires advice from legal professionals.
4. During the site walkover, reasonable effort has been made to obtain an overview of the site conditions. However, during the site walkover, no attempt has been made to enter areas of the site that are unsafe or present a risk to health and safety, are locked, barricaded, overgrown, or the location of the area has not been made known or accessible.
5. Access considerations, the presence of services and the activities being carried out on the site limited the locations where sampling locations could be installed and the techniques that could be used.
6. Site sensitivity assessments have been made based on available information at the time of writing and are ultimately for the decision of the regulatory authorities.
7. Where mention has been made to the identification of Japanese Knotweed and other invasive plant species and asbestos or asbestos containing materials, this is for indicative purposes only and do not constitute or replace full and proper surveys.
8. The executive summary, conclusions and recommendations sections of the report provide an overview and guidance only and should not be specifically relied upon without considering the context of the report in full.
9. E3P cannot be held responsible for any use of the report or its contents for any purpose other than that for which it was prepared. The copyright in this report and other plans and documents prepared by E3P is owned by them and no such plans or documents may be reproduced, published or adapted without written consent. Complete copies of this may, however, be made and distributed by the client as is expected in dealing with matters related to its commission. Should the client pass copies of the report to other parties for information, the whole report should be copied, but no professional liability or warranties shall be extended to other parties by E3P in this connection without their explicit written agreement there to by E3P.
10. New information, revised practices or changes in legislation may necessitate the re interpretation of the report, in whole or in part.



APPENDIX II

GLOSSARY

TERMS

ACM	Asbestos containing material	MMP	Materials management plan
ADS	Acoustic design statement	ND	Not detected
AST	Above ground storage tank	NDP	Nuclear density probe
BGS	British Geological Survey	NMP	Noise management plan
BSI	British Standards Institute	NPSE	Noise policy statement for England
BTEX	Benzene, toluene, ethylbenzene, xylenes	NR	Not recorded
CA	Coal Authority	PAH	Polycyclic aromatic hydrocarbon
CBR	California bearing ratio	PCB	Polychlorinated biphenyl
CIEH	Chartered Institute of Environmental Health	PI	Plasticity index
CIRIA	Construction Industry Research Association	PID	Photo ionisation detector
CLEA	Contaminated land exposure assessment	POS	Public open space
CML	Council of Mortgage Lenders	PPE	Personnel protective equipment
CoC	Contaminants of concern	ProPG	Professional practice guidance
CSM	Conceptual site model	QA	Quality assurance
DNAPL	Dense non aqueous phase liquid (chlorinated solvents, PCB)	SGV	Soil guideline value
DWS	Drinking water standard	SPH	Separate phase hydrocarbon
EA	Environment Agency	SPT	Standard penetration test
EQS	Environmental quality standard	SVOC	Semi volatile organic compound
FFL	Finished floor level	TPH	Total and speciated petroleum hydrocarbon
GAC	General assessment criteria	TPH CWG	Total Petroleum Hydrocarbon (Criteria Working Group)
GL	Ground level	UKWIR	United Kingdom Water Infrastructure Risk
GSV	Gas screening value	UST	Underground storage tank
HCV	Health criteria value	VCC	Vibro concrete column
ICSM	Initial conceptual site model	VOC	Volatile organic compound
LEL	Lower explosive limit	VRSC	Vibro replacement stone columns
LMRL	Lower method reporting limit	VSC	Vibro stone columns
LNAPL	Light non aqueous phase liquid (petrol, diesel, kerosene)	WHO	World Health Organisation
MCV	Moisture condition value	WRAP	Waste and Resources Action Programme



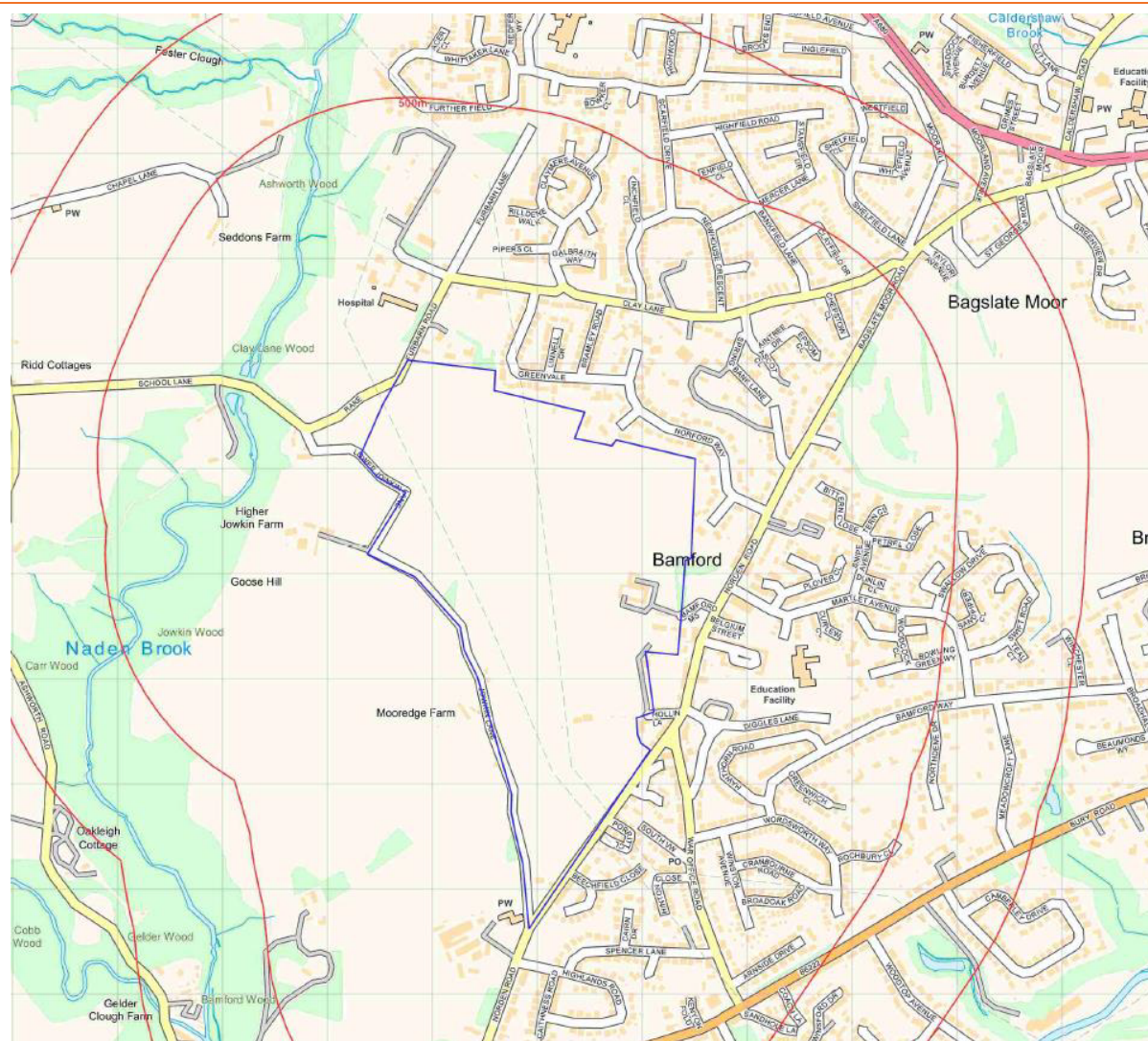
MIBK	Methyl isobutyl ketone	WTE	Water table elevation
m	Metres	ppm	Parts per million
km	Kilometres	mg/m³	Milligram per metre cubed
% v/v	Percent volume in air	m bgl	Metres below ground level
mb	Millibars (atmospheric pressure)	m bcl	Metre below cover level
l/hr	Litres per hour	mAOD	Metres above ordnance datum (sea level)
µg/l	Micrograms per litre (parts per billion)	kN/m²	Kilonewtons per metre squared
ppb	Parts per billion	µm	Micrometre
mg/kg	Milligrams per kilogram (parts per million)	SSRT	Site Specific Remediation Target
PSD	Particle Size Distribution	DD	Dry Density
CL:AIRE	Contaminated Land: Applications in Real Environments	Mc	Moisture Content
ρ	Bulk Density	GPR	Ground Penetrating Radar
NDP	Nuclear Density Probe	FFL	Finished Floor Level
LEL	Lower Explosive Limit	UKWIR	UK Water Industry Research
CIRIA	Construction Industry Research and Information Association	LOD	Limit of Detection

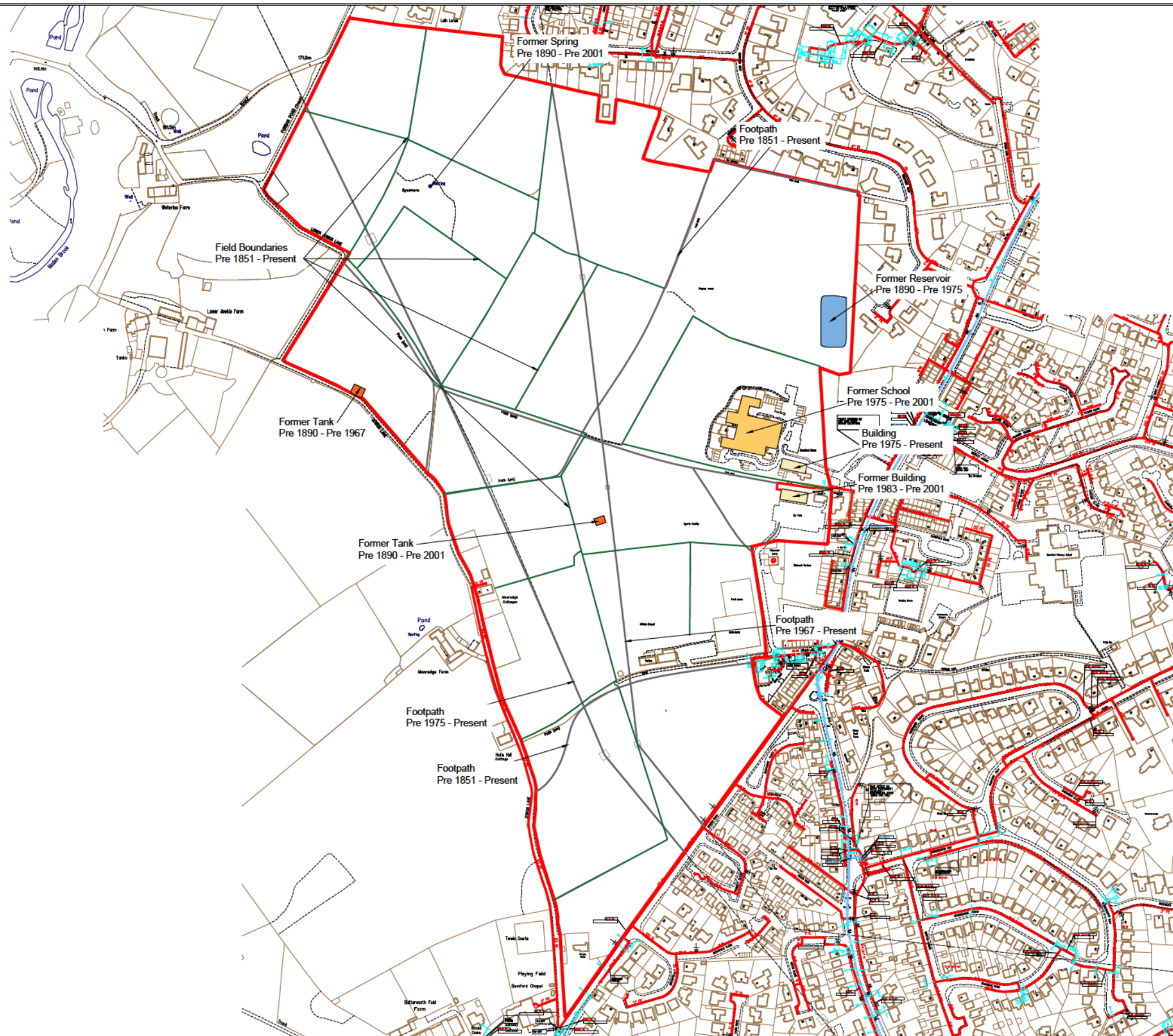


APPENDIX III

DRAWINGS

DRAWING 14-785-001 – PROPOSED DEVELOPMENT PLAN





- Historical Features
- Former Reservoir
 - Former School
 - Former Tanks
 - Buildings
 - Footpaths
 - Field Boundaries

Notes:

Client:

Peel L&P

Job No:

14-75

Date:

08.06.2021

Drawing No:

003

Scale:

NTS



Environmental Engineering
Partnership Ltd
Taylor Road, Trafford Park
Urmston, Manchester, M41 7JQ
Tel: 0161 707 9612
E-mail: info@e3p.co.uk
Website: www.e3p.co.uk

Job Title:

Bamford, Norden

Drawing Title:

Historical
Features Plan

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P1	REVA	08.06.2021	LM	EF
Phase	Issue	Date	Drawn	Checked

APPENDIX IV

HISTORICAL MAPS

Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: County Series

Map date: 1851

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1847
Revised N/A
Edition 1851
Copyright N/A
Levelled N/A

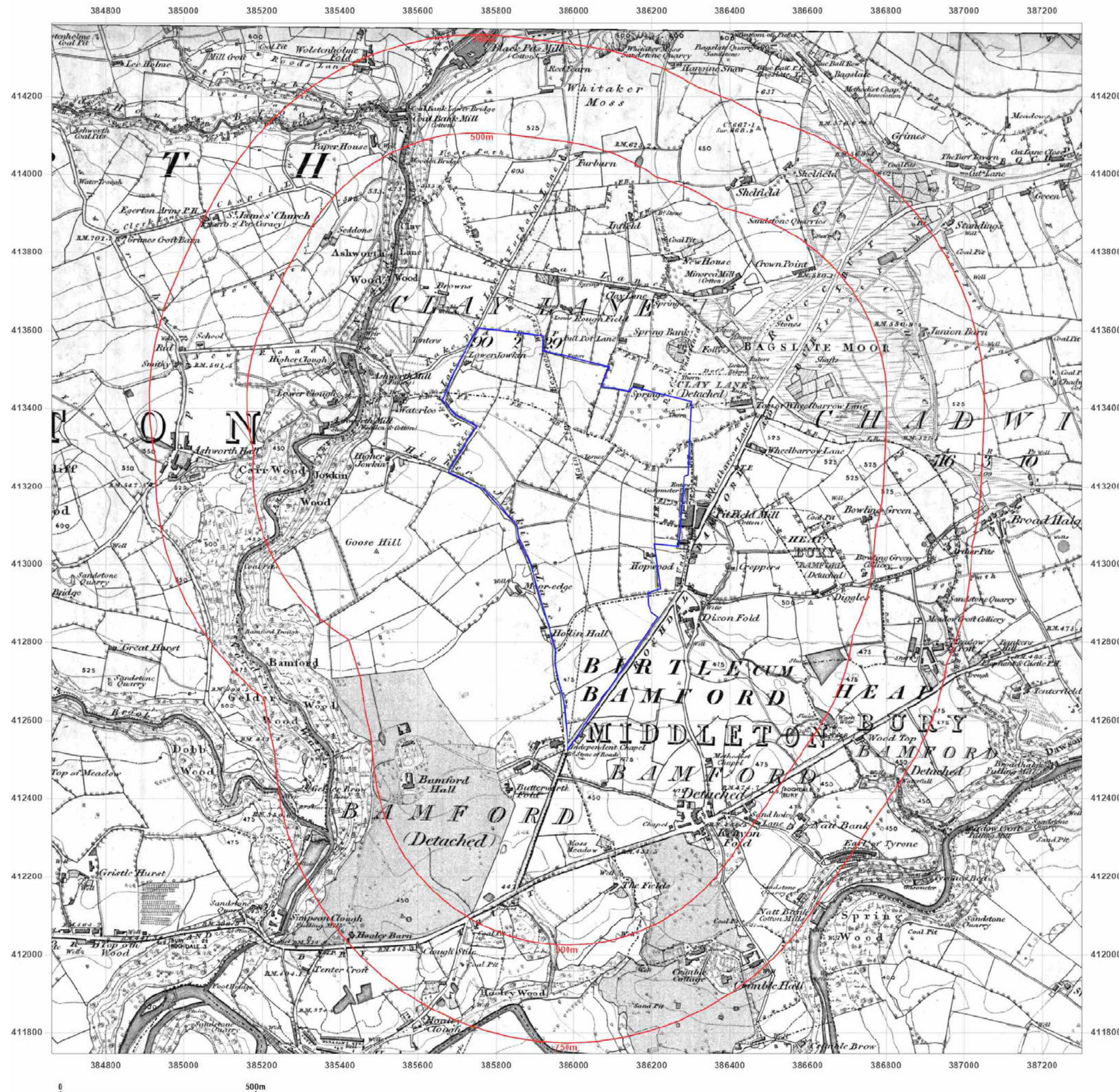


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: County Series

Map date: 1890

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1890
Revised 1890
Edition N/A
Copyright N/A
Levelled N/A

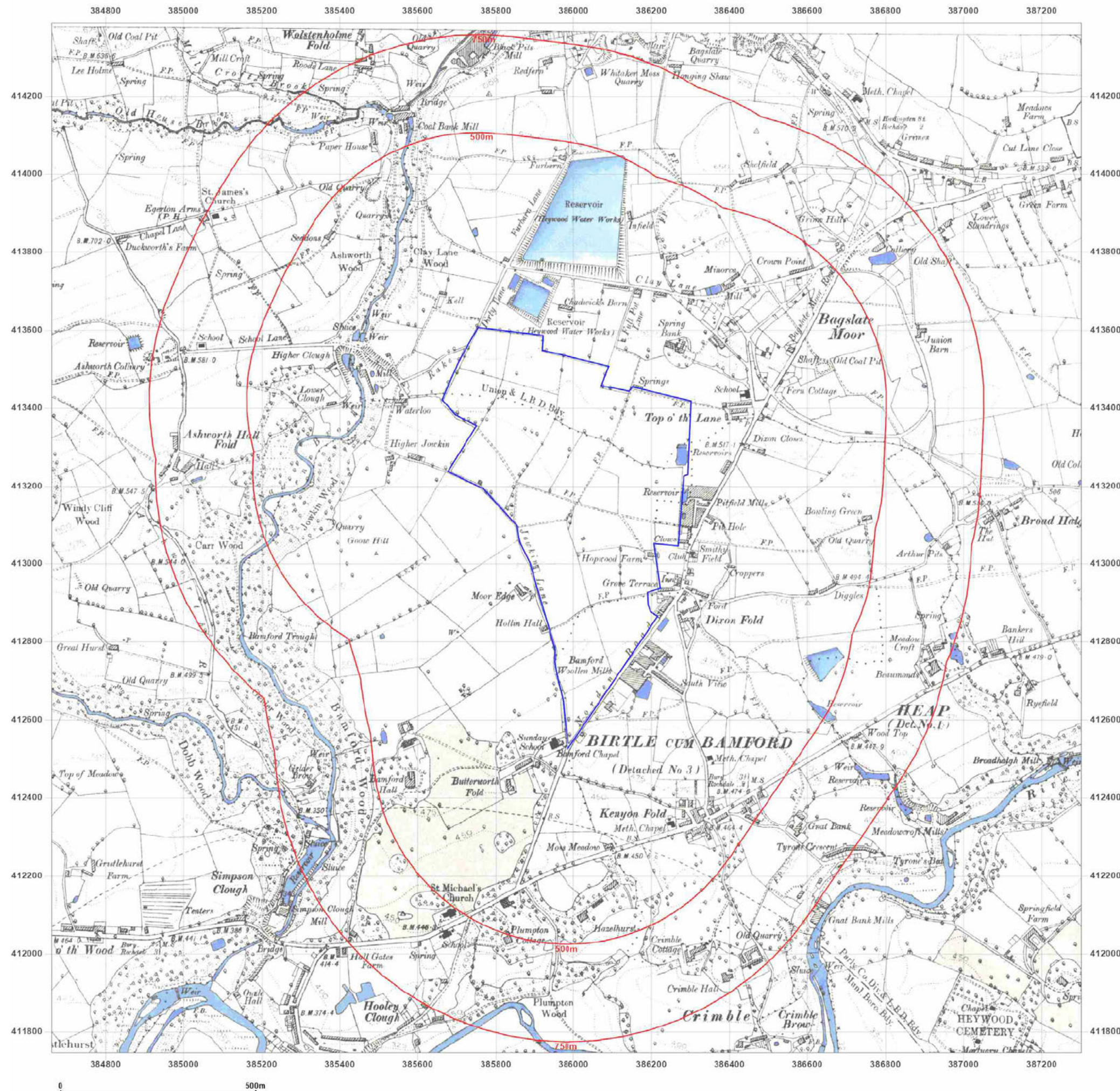


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: County Series

Map date: 1908-1909

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1848
Revised 1909
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1908
Edition N/A
Copyright N/A
Levelled N/A

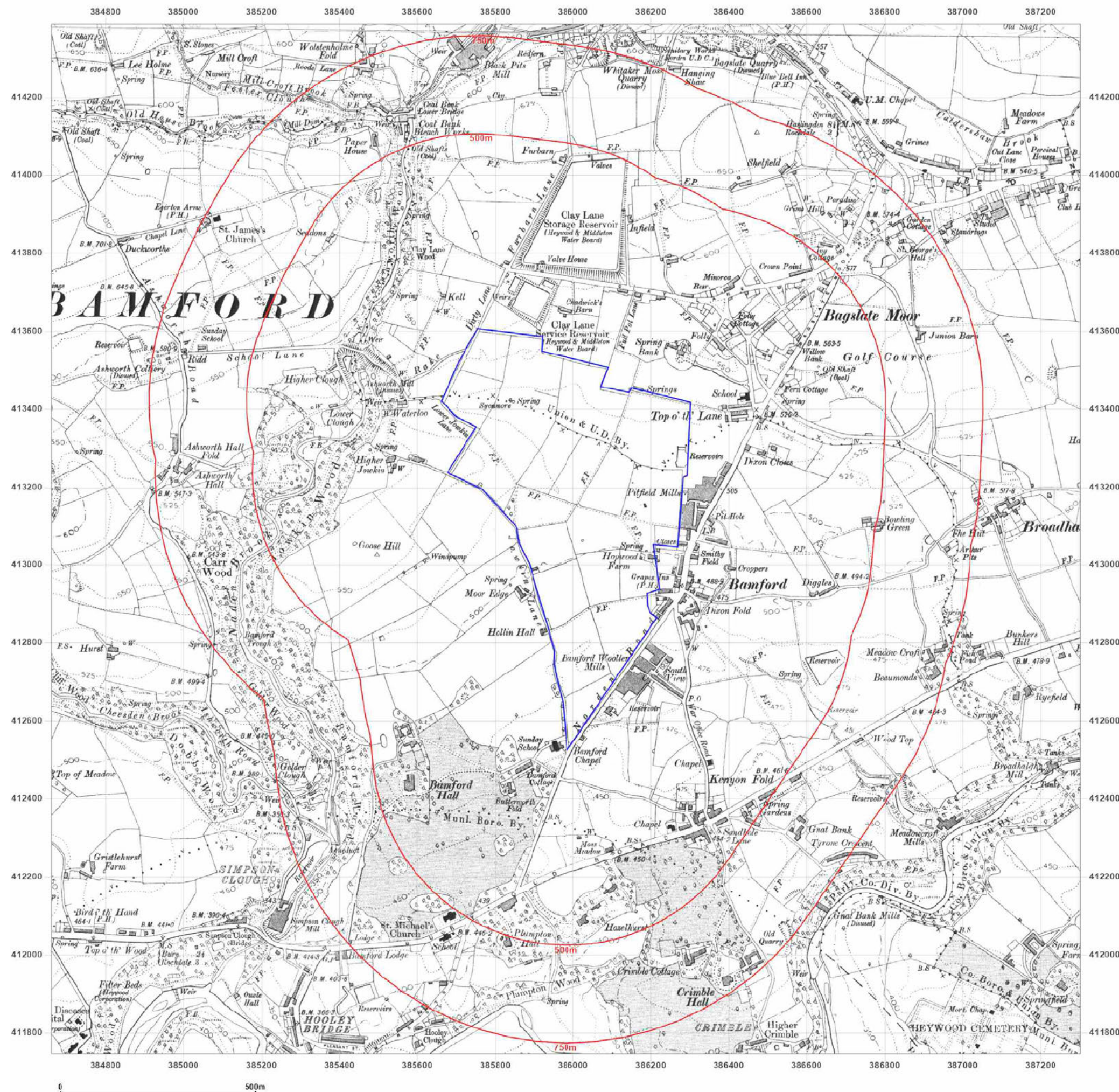


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: County Series

Map date: 1928

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1848
Revised 1928
Edition N/A
Copyright N/A
Levelled N/A

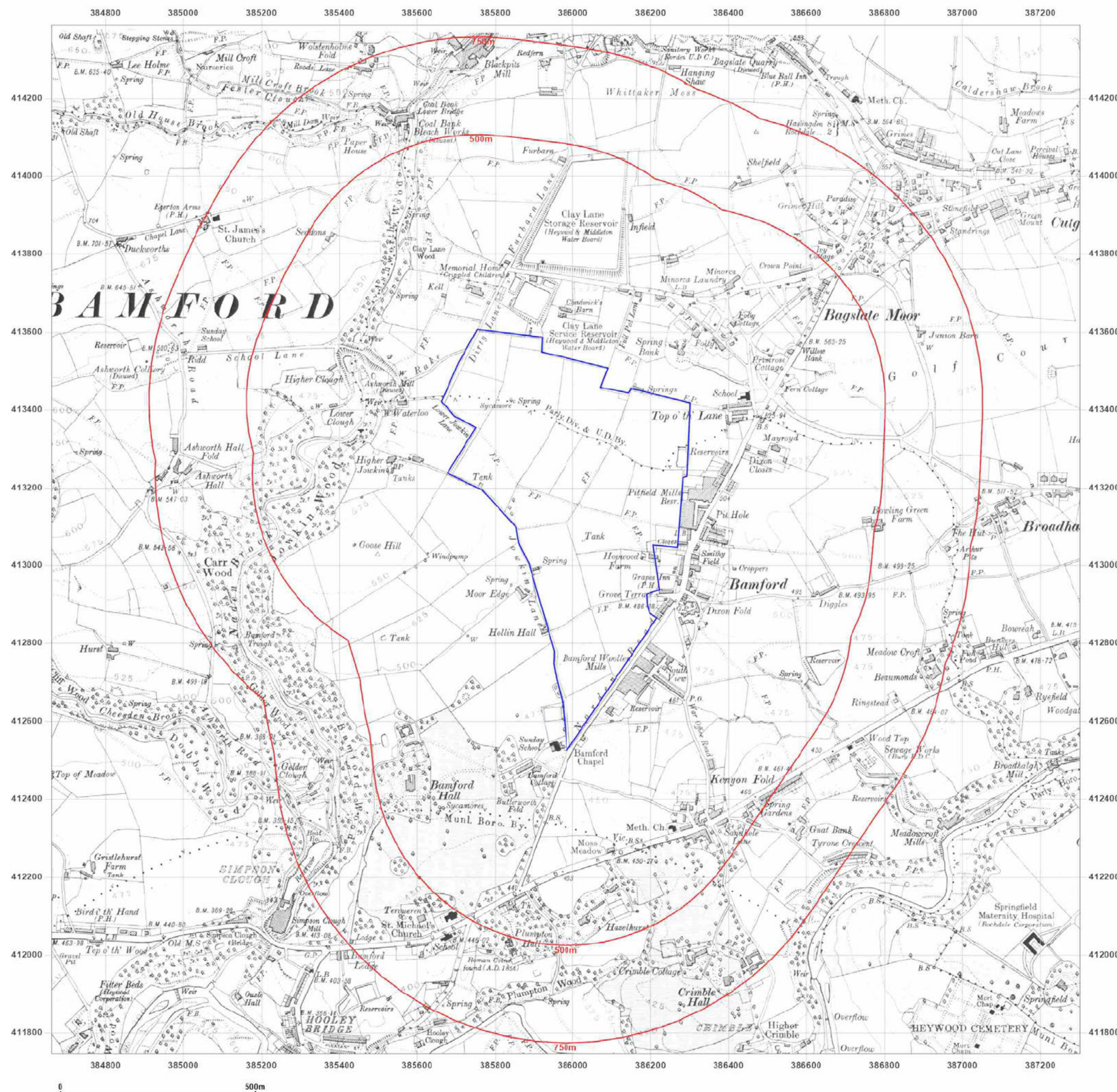


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1848
Revised 1938
Edition N/A
Copyright N/A
Levelled N/A

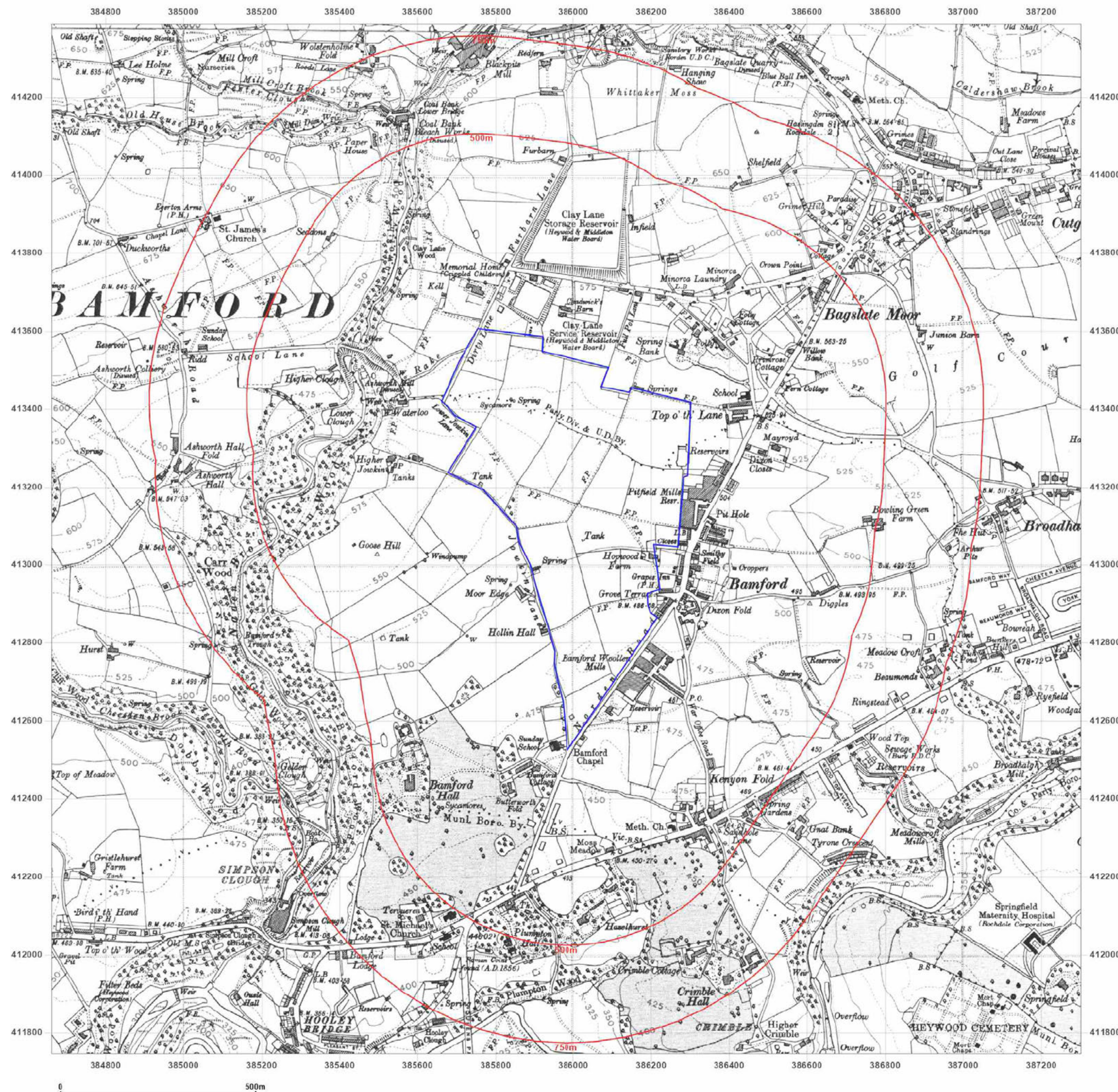


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: Provisional

Map date: 1956

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1949
Revised 1949
Edition N/A
Copyright 1956
Levelled N/A

Surveyed N/A
Revised 1955
Edition 1956
Copyright N/A
Levelled N/A

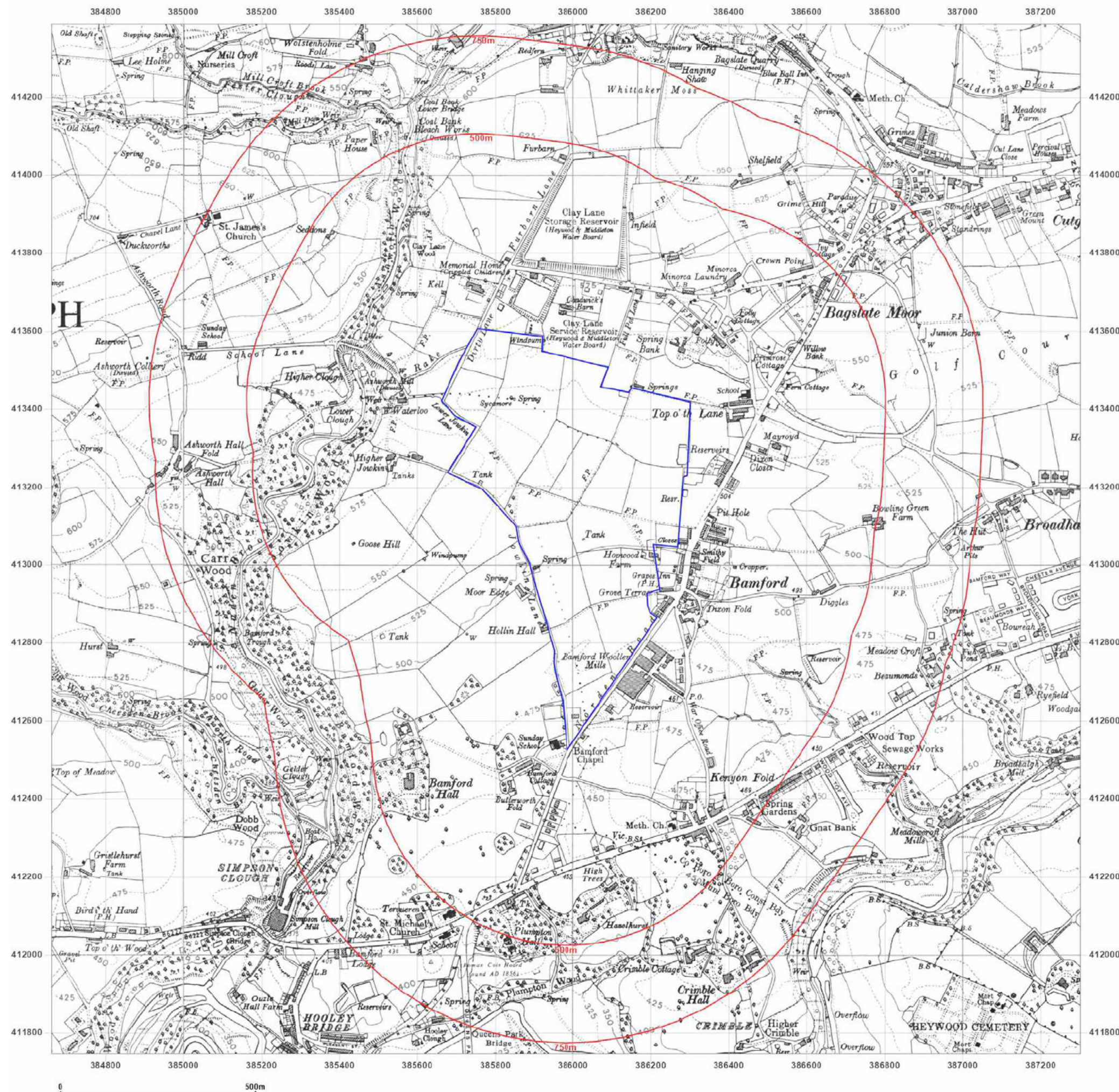


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: Provisional

Map date: 1967-1968

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1967
Revised 1967
Edition N/A
Copyright N/A
Levelled N/A

Surveyed 1968
Revised 1968
Edition N/A
Copyright N/A
Levelled N/A

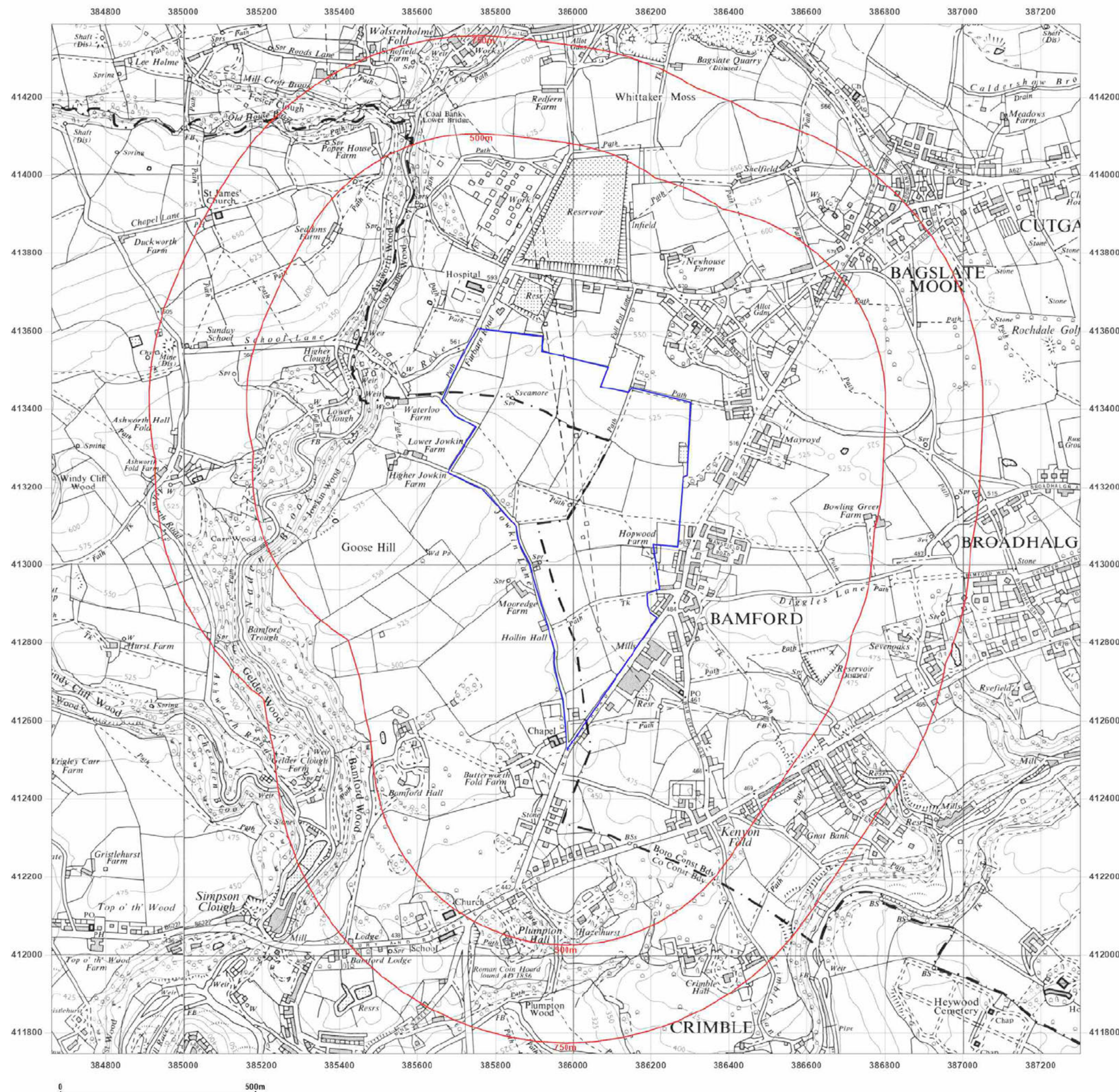


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 1975

Scale: 1:10,000

Printed at: 1:10,000



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

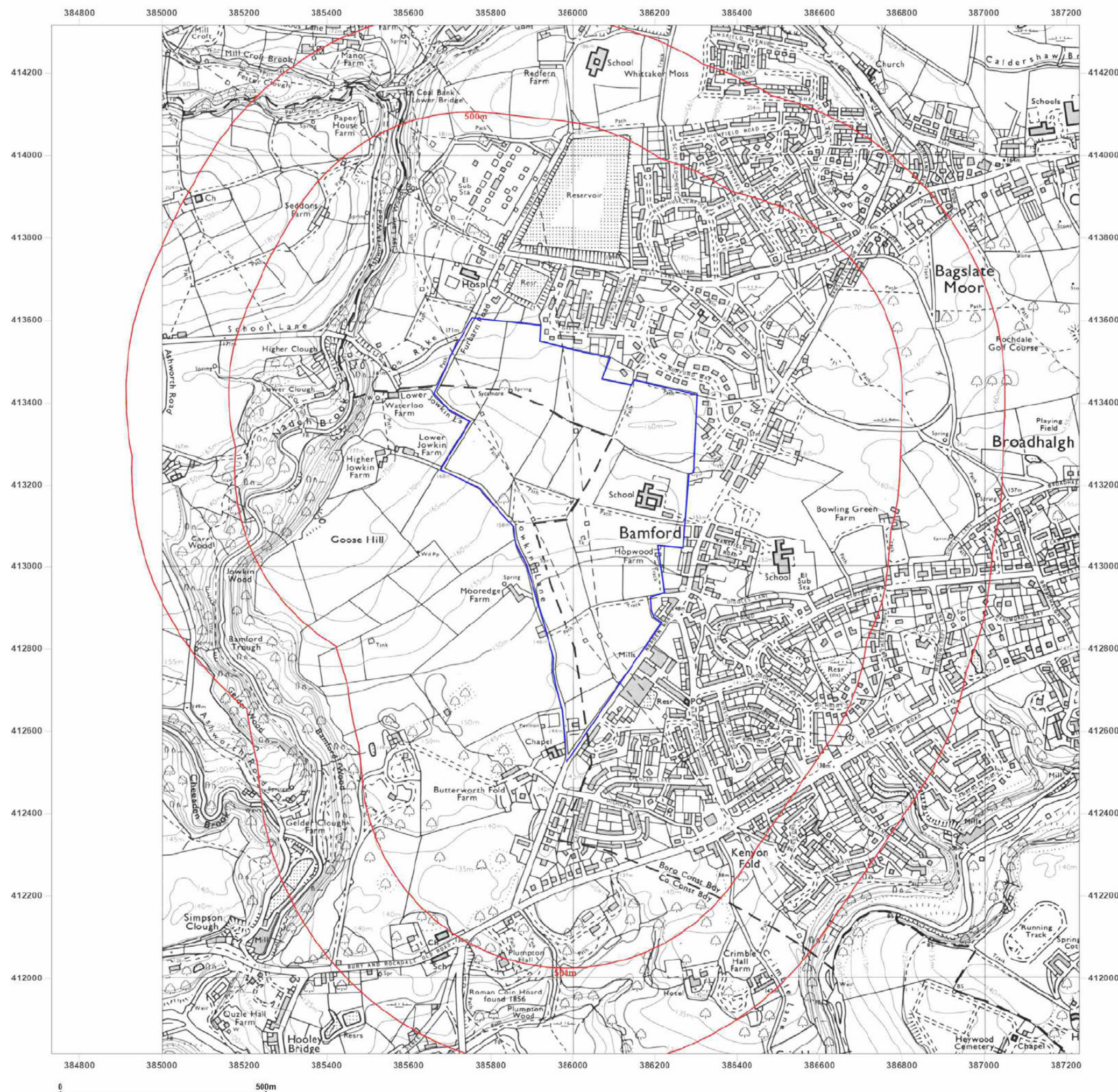


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Site Details:

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Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 1983-1987

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1977
 Revised 1983
 Edition N/A
 Copyright N/A
 Levelled N/A

Surveyed 1984
 Revised 1987
 Edition N/A
 Copyright N/A
 Levelled N/A

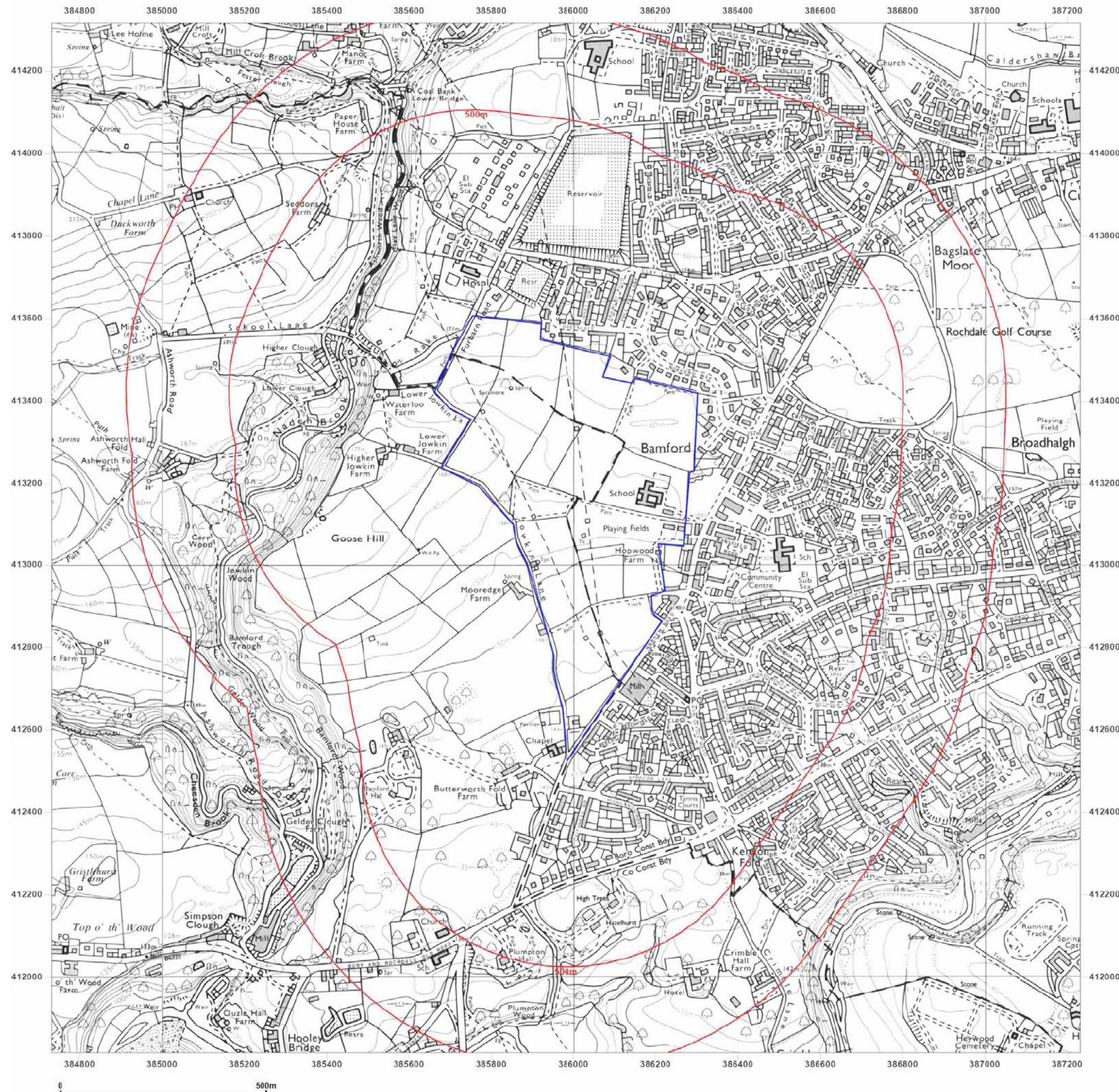


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Site Details:

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Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 1992

Scale: 1:10,000

Printed at: 1:10,000



Surveyed 1984
Revised 1992
Edition N/A
Copyright N/A
Levelled N/A

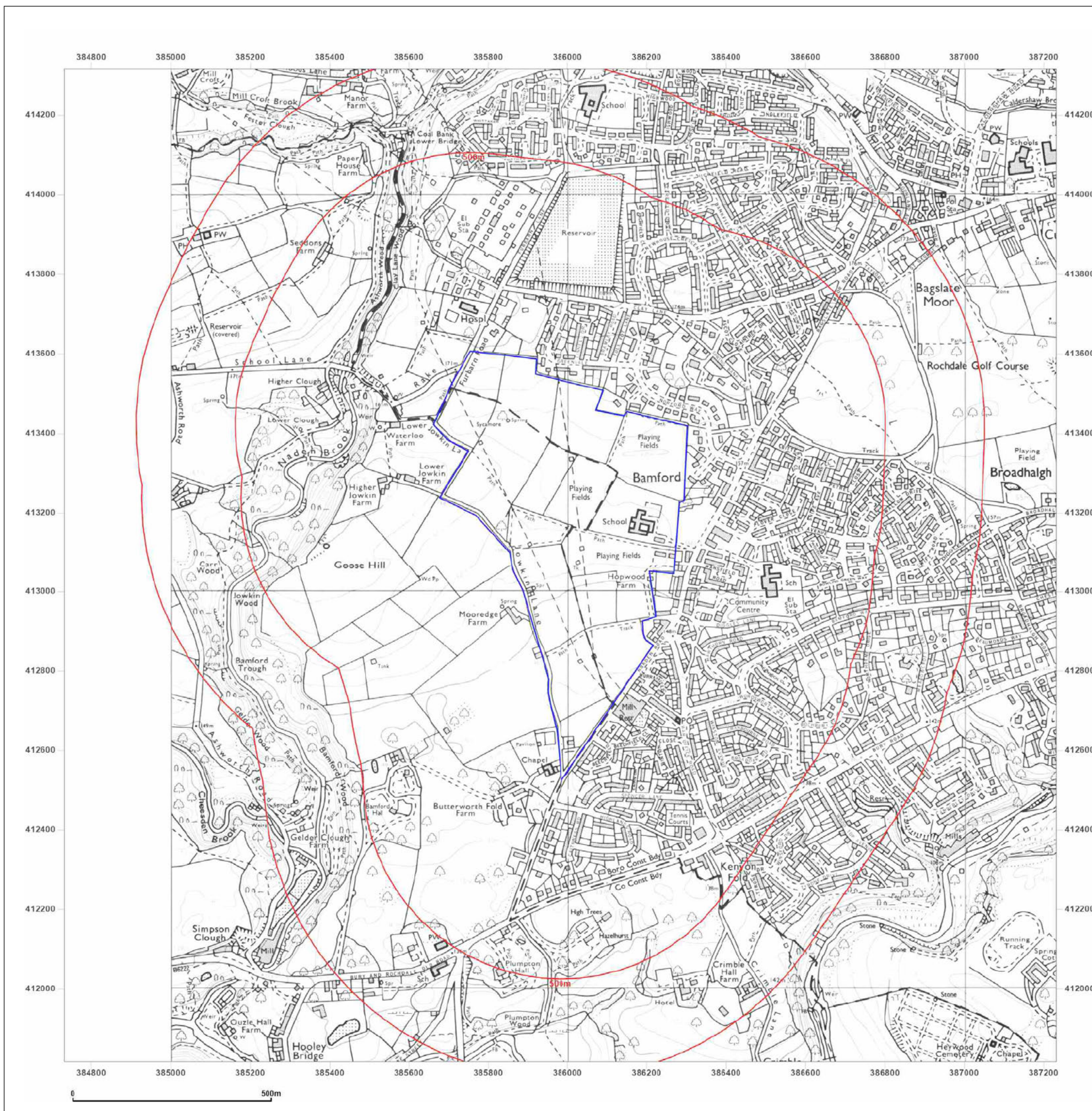


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Site Details:

HOPWOOD FARM, HOLLIN LANE, ROCHDALE, OL11 5PW

Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000



2001

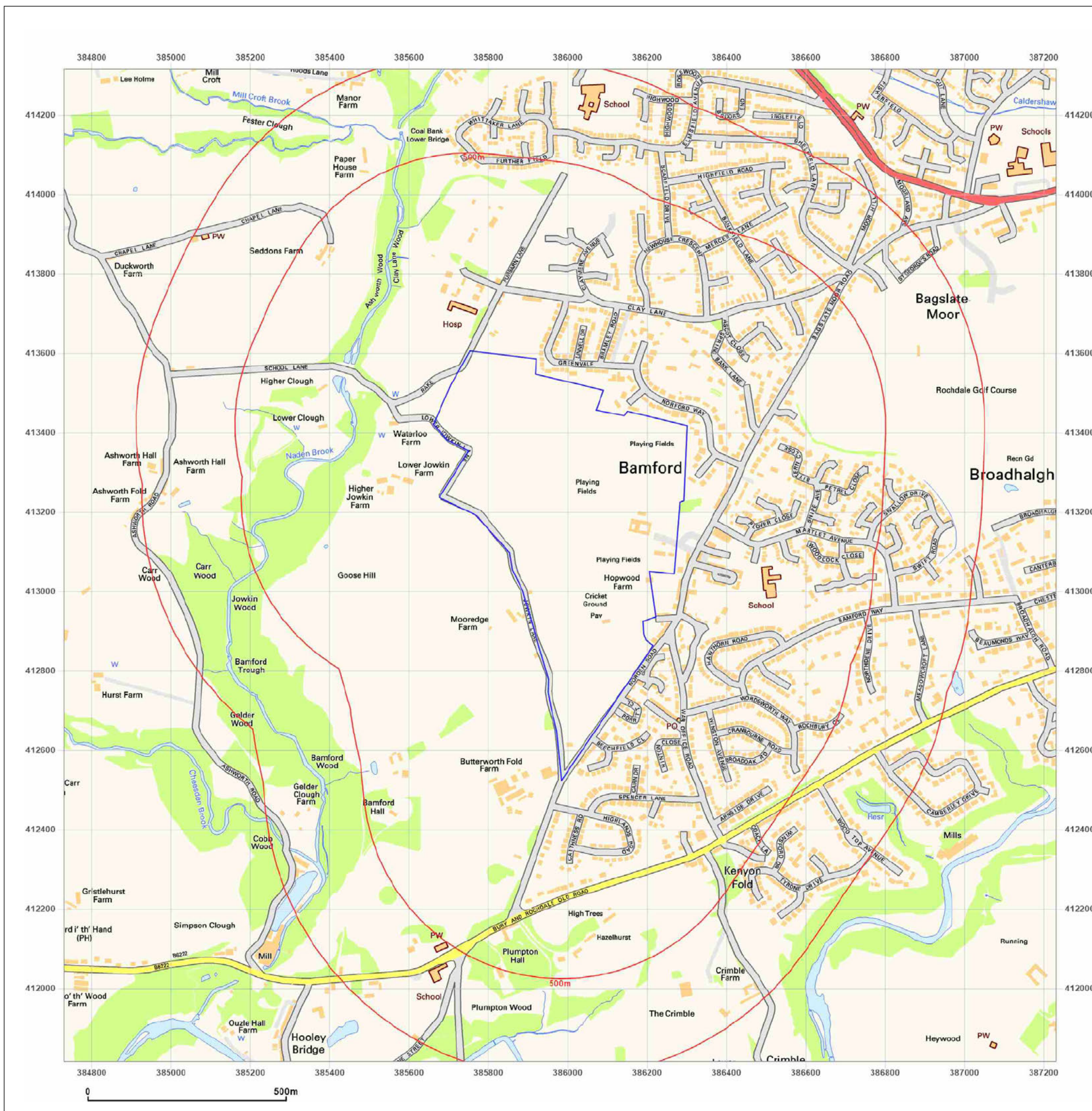


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Site Details:

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Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



2010

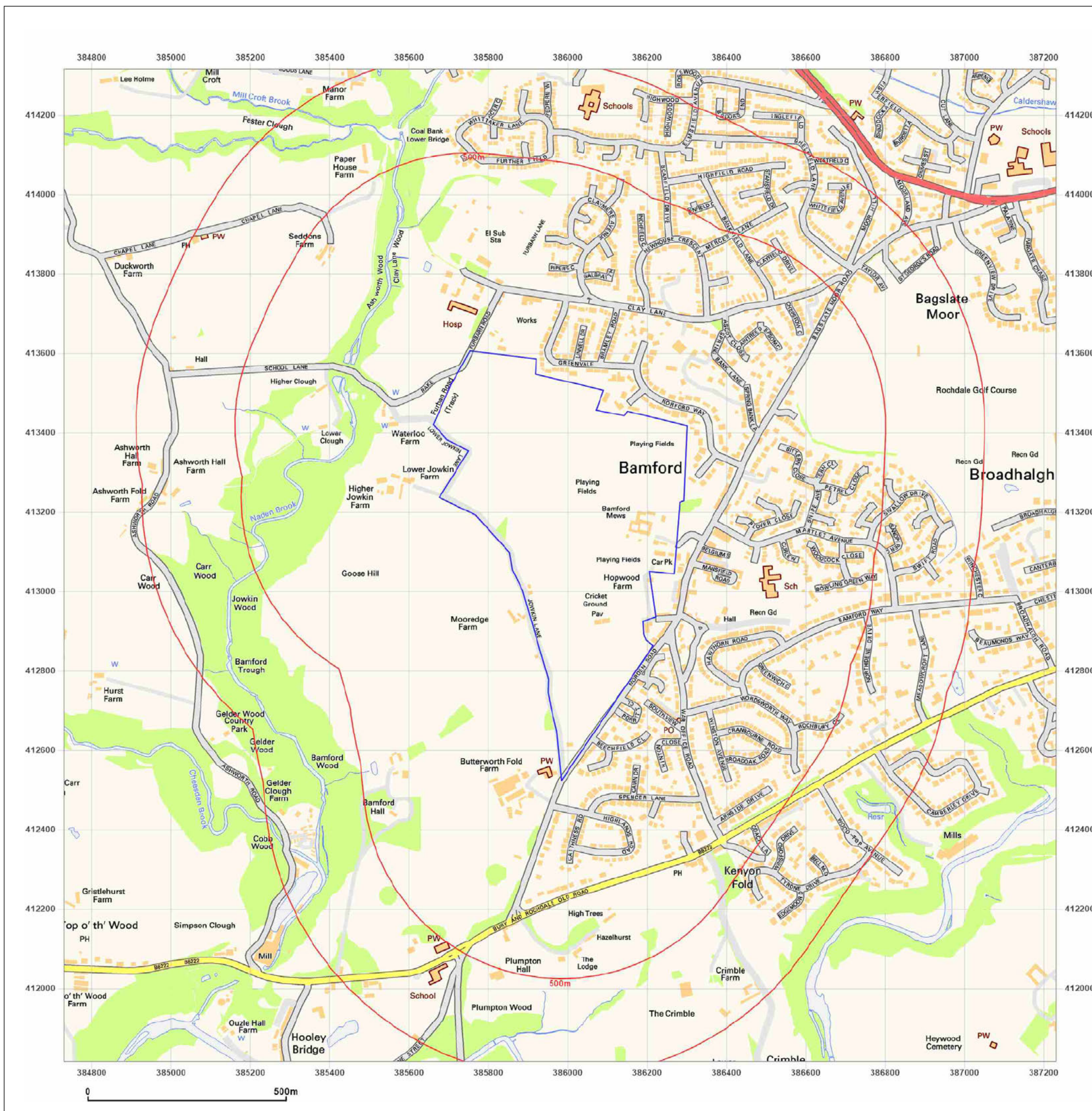


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Site Details:

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Client Ref: 14-785-01_AR
Report Ref: GS-7899402
Grid Ref: 385981, 413066

Map Name: National Grid

Map date: 2021

Scale: 1:10,000

Printed at: 1:10,000



2021

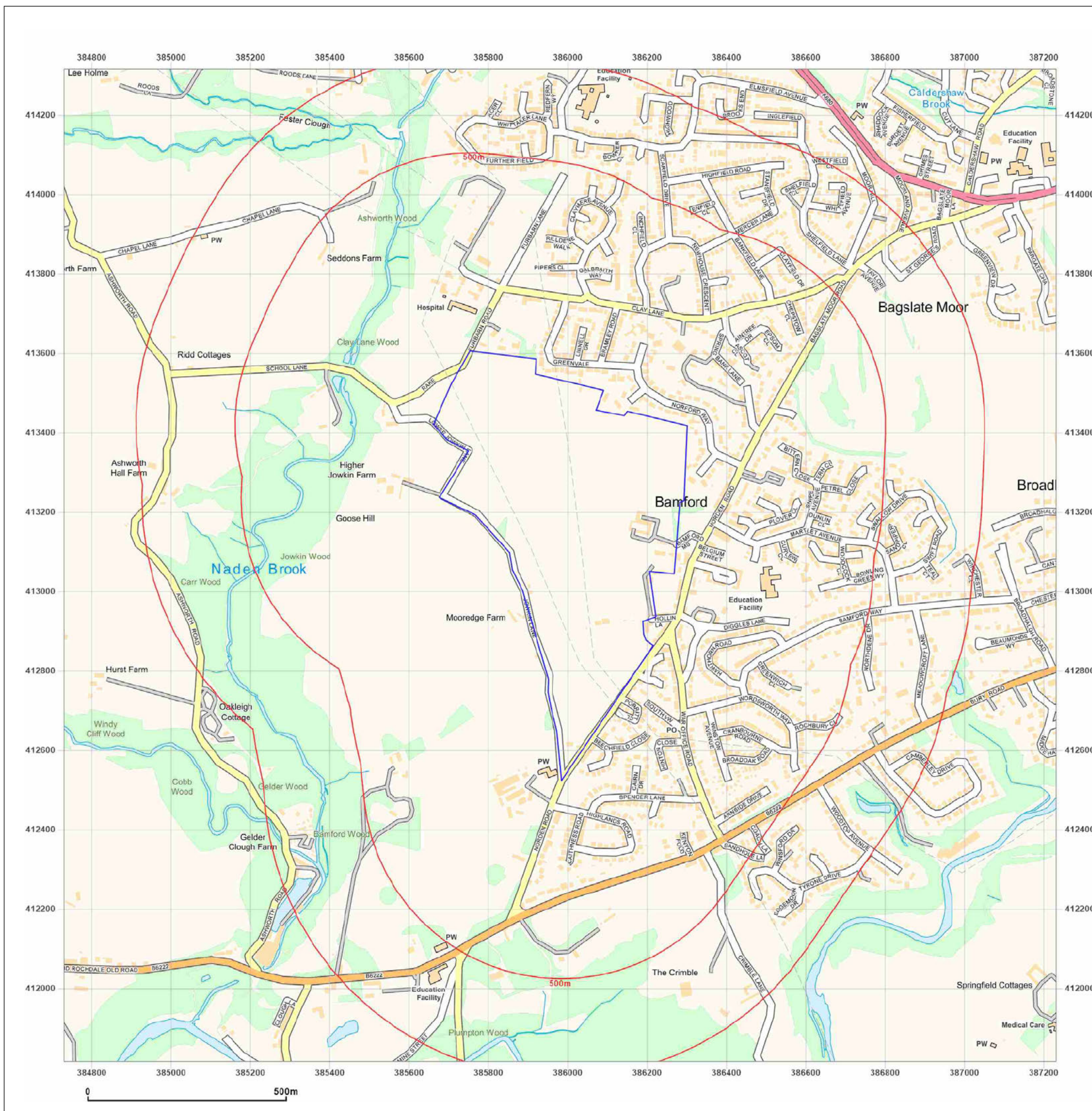


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APPENDIX V

COAL AUTHORITY REPORT

AND MINE ABANDONMENT

PLANS



The Coal
Authority

Consultants Coal Mining Report

Hopwood Farm, Hollin Lane,
Rochdale
Greater Manchester
OL11 5PW

Date of enquiry:	26 May 2021
Date enquiry received:	26 May 2021
Issue date:	26 May 2021

Our reference:	51002536478001
Your reference:	GS-7899403



Consultants

Coal Mining Report

This report is based on and limited to the records held by the Coal Authority at the time the report was produced.

Client name

GROUNDSURE LIMITED

Enquiry address

Hopwood Farm, Hollin Lane, Rochdale
Greater Manchester
OL11 5PW

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

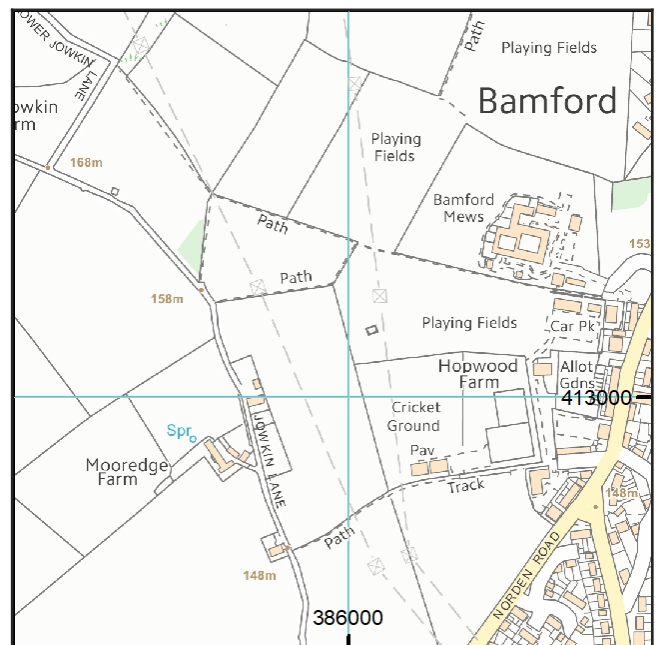
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Adit	386412-006	386234 412950		Coal	
Shaft	386412-012	386000 412564		Coal	

Abandoned mine plan catalogue numbers

The following abandoned mine plan catalogue numbers intersect with some, or all, of the enquiry boundary:

NW110	NW158	2748
16647	NW159	16820
3797	PO0	NW1176

Please contact us on 0345 762 6848 to determine the exact abandoned mine plans you require based on your needs.

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
ARLEY	Coal	Yes	Within	N/A	230
ARLEY	Coal	Yes	Within	N/A	234
ARLEY	Coal	Yes	Within	N/A	234
ARLEY	Coal	Yes	Within	N/A	259

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

Please refer to the 'Summary of findings' map (on separate sheet) for details of any activity within the area of the site boundary.

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres of the enquiry boundary, since 31 October 1994.

There is no current Stop Notice delaying the start of remedial works or repairs to the property.

The Coal 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

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

No notices have been given, under section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

Withdrawal of support notices

The property is not in an area where a notice to withdraw support has been given.

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

Payments to owners of former copyhold land

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

Section 4 – Further information

Based on the responses in this report, no further information has been highlighted.

Section 5 – Data definitions

The datasets used in this report have limitations and assumptions within their results. For more guidance on the data and the results specific to the enquiry boundary, please **call us on 0345 762 6848** or **email us at groundstability@coal.gov.uk**.

Past underground coal mining

Details of all recorded underground mining relative to the enquiry boundary. Only past underground workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination, will be included.

Probable unrecorded shallow workings

Areas where the Coal Authority believes there to be unrecorded coal workings that exist at or close to the surface (less than 30 metres deep).

Spine roadways at shallow depth

Connecting roadways either, working to working, or, surface to working, both in-seam and cross measures that exist at or close to the surface (less than 30 metres deep), either within or within 10 metres of the enquiry boundary.

Mine entries

Details of any shaft or adit either within, or within 100 metres of the enquiry boundary including approximate location, brief treatment details where known, the mineral worked from the mine entry and conveyance details where the mine entry has previously been sold by the Authority or its predecessors British Coal or the National Coal Board.

Abandoned mine plan catalogue numbers

Plan numbers extracted from the abandoned mines catalogue containing details of coal and other mineral abandonment plans deposited via the Mines Inspectorate in accordance with the Coal Mines Regulation Act and Metalliferous Mines Regulation Act 1872. A maximum of 9 plan extents that intersect with the enquiry boundary will be included. This does not infer that the workings and/or mine entries shown on the abandonment plan will be relevant to the site/property boundary.

Outcrops

Details of seam outcrops will be included where the enquiry boundary intersects with a conjectured or actual seam outcrop location (derived by either the British Geological Survey or the Coal Authority) or intersects with a defined 50 metres buffer on the coal (dip) side of the outcrop. An indication of whether the Coal Authority believes the seam to be of sufficient thickness and/or quality to have been worked will also be included.

Geological faults, fissures and breaklines

Geological disturbances or fractures in the bedrock. Surface fault lines (British Geological Survey derived data) and fissures and breaklines (Coal Authority derived data) intersecting with the enquiry boundary will be included. In some circumstances faults, fissures or breaklines have been known to contribute to surface subsidence damage as a consequence of underground coal mining.

Opencast mines

Opencast coal sites from which coal has been removed in the past by opencast (surface) methods and where the enquiry boundary is within 500 metres of either the licence area, site boundary, excavation area (high wall) or coaling area.

Coal Authority managed tips

Locations of disused colliery tip sites owned and managed by the Coal Authority, located within 500 metres of the enquiry boundary.

Site investigations

Details of site investigations within 50 metres of the enquiry boundary where the Coal Authority has received information relating to coal mining risk investigation and/or remediation by third parties.

Remediated sites

Sites where the Coal Authority has undertaken remedial works either within or within 50 metres of the enquiry boundary following report of a hazard relating to coal mining under the Coal Authority's Emergency Surface Hazard Call Out procedures.

Coal mining subsidence

Details of alleged coal mining subsidence claims made since 31 October 1994 either within or within 50 metres of the enquiry boundary. Where the claim relates to the enquiry boundary confirmation of whether the claim was accepted, rejected or whether liability is still being determined will be given. Where the claim has been discharged, whether this was by repair, payment of compensation or a combination of both, the value of the claim, where known, will also be given.

Details of any current 'Stop Notice' deferring remedial works or repairs affecting the property/site, and if so the date of the notice.

Details of any request made to execute preventative works before coal is worked under section 33 of the Coal Mining Subsidence Act 1991. If yes, whether any person withheld consent or failed to comply with any request to execute preventative works.

Mine gas

Reports of alleged mine gas emissions received by the Coal Authority, either within or within 500 metres of the enquiry boundary that subsequently required investigation and action by the Coal Authority to mitigate the effects of the mine gas emission.

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

Payment to owners of former copyhold land

Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Disused mine shaft 
- Disused adit 
- Outcrop (Conjectured) 
- Geological faults 

How to contact us
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+44 (0)1623 637 000 (International)
www.groundstability.com

