

PHASE I DESK STUDY
AT
CELLARS CLOUGH MILL
MARSDEN, HUDDERSFIELD, HD7 6LY
FOR
CELLARS CLOUGH PROPERTIES LTD
REPORT REF: CCP 3225

Engineering Geologists and Environmental Scientists



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EXECUTIVE SUMMARY

Risk	
• OS maps indicate the site was occupied by mill buildings since 1854 that were extended in more recent years.	
• Based on the past uses of the site and its immediate surroundings there may be a risk to future end users of the site due to contamination arising from on-site sources.	
• There is a low risk that the site under its present use is detrimentally affecting site users.	
• The site is unlikely to be classed under Part IIA of the EPA 1990 under its present use and may be on the local authority potentially contaminated land register	
Details	
• The site is underlain by Mudstone from the Marsdenian Millstone Grit Series.	
• Made ground may be present and is likely to be an unsuitable founding strata. The bedrock generally provide good bearing strata for low rise development; however an intrusive ground investigation will be required to properly assess suitable bearing strata for the new development.	
• The site lies on a secondary (A) aquifer overlain by alluvial drift with high permeability.	
• There are no potable water abstractions within 1000m of the site.	
• There are areas of historic landfill and two Environmental Agency licensed waste sites within 250m of the site. Monitoring for landfill gases is recommended.	
• The site according to the Environment Agency does lie in a Flood Risk Zone.	
• There is made ground on and adjacent to the site which may have a potential to emit methane	
• There is a low risk that the site has been undermined at shallow depth.	
• Any Japanese Knotweed on the site will require treatment.	
• The site is unlikely to be detrimentally affected by any regulated industries.	
• Radon protection is not required.	
• Water leakage from the dam and underground water discharge from the mill pond requires further investigation.	
• Surface water including Mill Ponds in the surrounding area may be affected by contamination.	
• Soakaways may be viable in underlying interbedded Sandstone.	
• Ground Source Heating by vertical open loop may be viable for the development.	
Recommendations	
• The report has been compiled with the development of the site as the driver. Quantification of the risks can be undertaken with an intrusive ground investigation.	
• Intrusive investigation should be undertaken to assess suitable founding strata and contamination risks before any new build construction is undertaken.	

Recommended Investigation	Nature of Investigation	Details of investigation for quantification of risk or for new build on the site
Intrusive to 5m	Window sampler Drilling	Assessment of strata, collection of samples for lab testing and foundation design and to install standpipes
Laboratory Testing	Contamination Tests Geotechnical Testing	Undertake tests for contamination on soil and water Undertake geotechnical testing for foundation design
Install standpipes	Monitoring	Monitoring for landfill gases and groundwater levels on a minimum of 6 No. occasions
Concrete Design	Testing for sulphates and clay shrinkage	BRE sulphate tests for underground concrete corrosion and lab tests for clay shrinkage.



1. INTRODUCTION

This report describes the results of a Phase 1 Desk Study undertaken for redevelopment of mill buildings at Cellars Clough Mill, Marsden, Huddersfield, West Yorkshire, HD7 6LY in the UK. The work was commissioned by Cellars Clough Properties Limited and was carried out by this Consultancy, the Ashton Bennett Consultancy.

The purpose of this Phase I Study was to collate and assess information on the site including geological, hydrogeological and mining information, archival maps and historical review to determine past use, a database review, environmental data on water and soil, and to undertake a site reconnaissance to enable a desk top assessment to determine the likely presence and areas of environmental concerns on the site and the presence of pathways of migration and potentially sensitive receptors, and to determine solutions to any geotechnical, environmental and mining concerns to the redevelopment of the land for residential purposes.

This report describes the research work carried out, presents the results of the desk study and from the conceptual model of the site makes recommendations regarding environmental, geotechnical and mining risks to site development. The report includes a Coal and Stone Mining Risk Assessment.

2. THE SITE

The site comprises an area for redevelopment of an existing mill into residential apartments within the premises of Cellars Clough Mill situated off the Manchester Road A62 between Huddersfield and Manchester within Marsden, West Yorkshire.

The mill comprises several stone buildings constructed on different dates. The main mill comprises two blocks constructed adjacent with a central yard area between, and a further mill extending eastwards along the northern boundary of the site, here there is another concrete courtyard and the mill chimney next to the canal. The mills are generally five storey with a two storey extension in the north eastern corner of the mill and a single story office extension along the central southern part of the mill. In the south eastern corner of the mill a single storey modern extension is present constructed 20 years ago following a fire which burnt down this part of the old mill. The extension comprises of stone with a modern metal corrugated sheeting roof, and is surrounded by an enclosed concrete yard.

The main mill buildings are stone with tiled and corrugated metal sheeting roof. Internally there are stone steps, a lift, and wooden floors overlain by concrete or stone slabs. To the east of the buildings is a part tarmac, part concrete yard with a tarmac track running along the south boundary of the site. In the open land to the east of the building is a rundown shed and to the south of the site is a caravan.

There are two bridges across the River Colne to the site, one is now disused. There is also a pipeline crossing the river. The site is bounded to the north by the Huddersfield Narrow Canal with open land beyond. To the east the site is bounded by open land and woodland, with a fence. To the west the site is bounded by two mill ponds, woodland and open land. To the south the site is bounded by the River Colne, with woodland and the A62 Manchester road beyond.

The site is accessed from a driveway which crosses the River Colne and leads off from the Manchester Road. The centre of the site lies around National Grid Reference 405850^E, 412500^N at a height of 160m above Ordnance Datum. Archival maps are presented in Appendix A. Photographs are presented as Appendix B. The Coal Authority Report is presented in Appendix C. A Conceptual Model is presented in Appendix D.

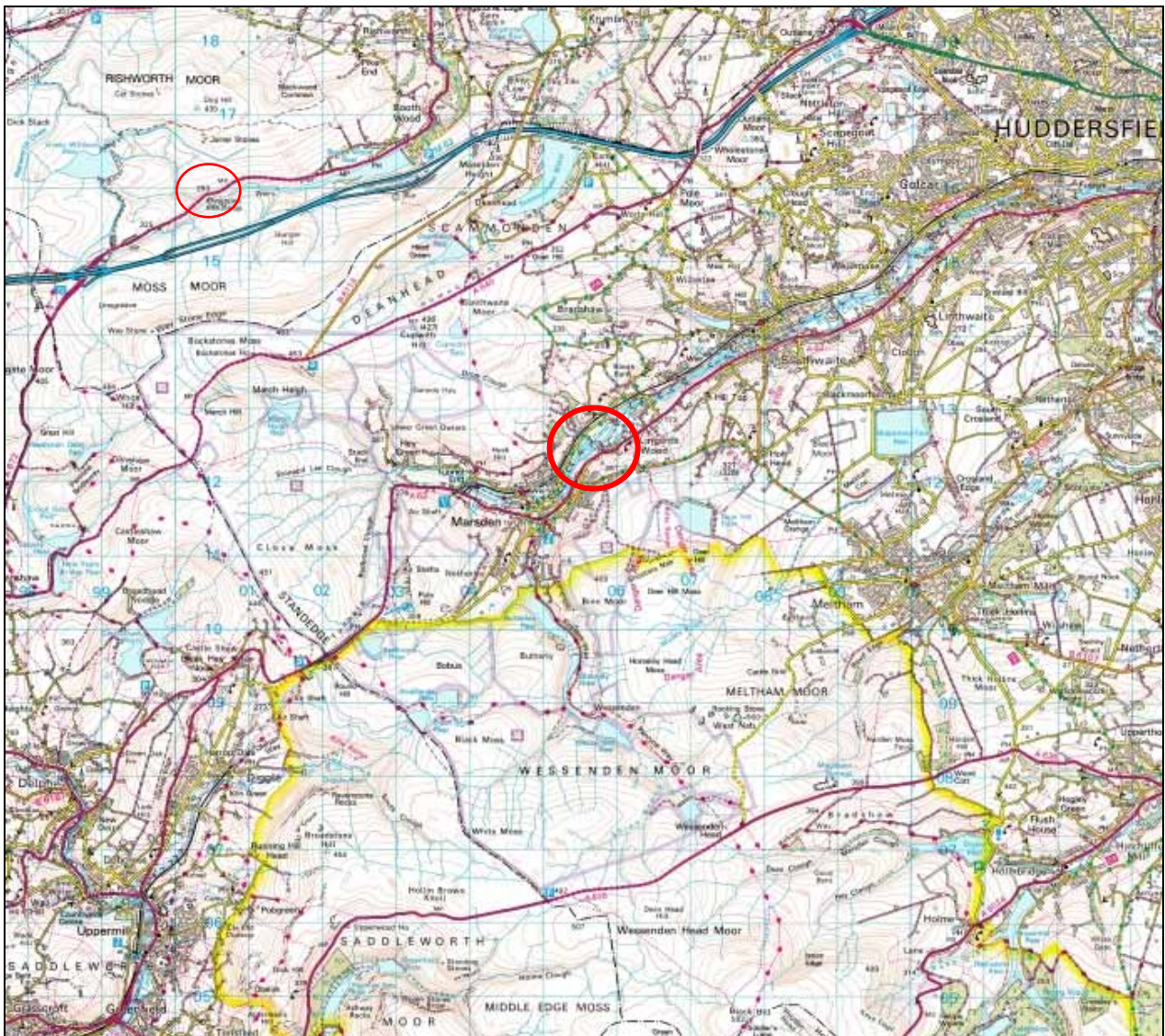


Figure 1 Site Location Plan

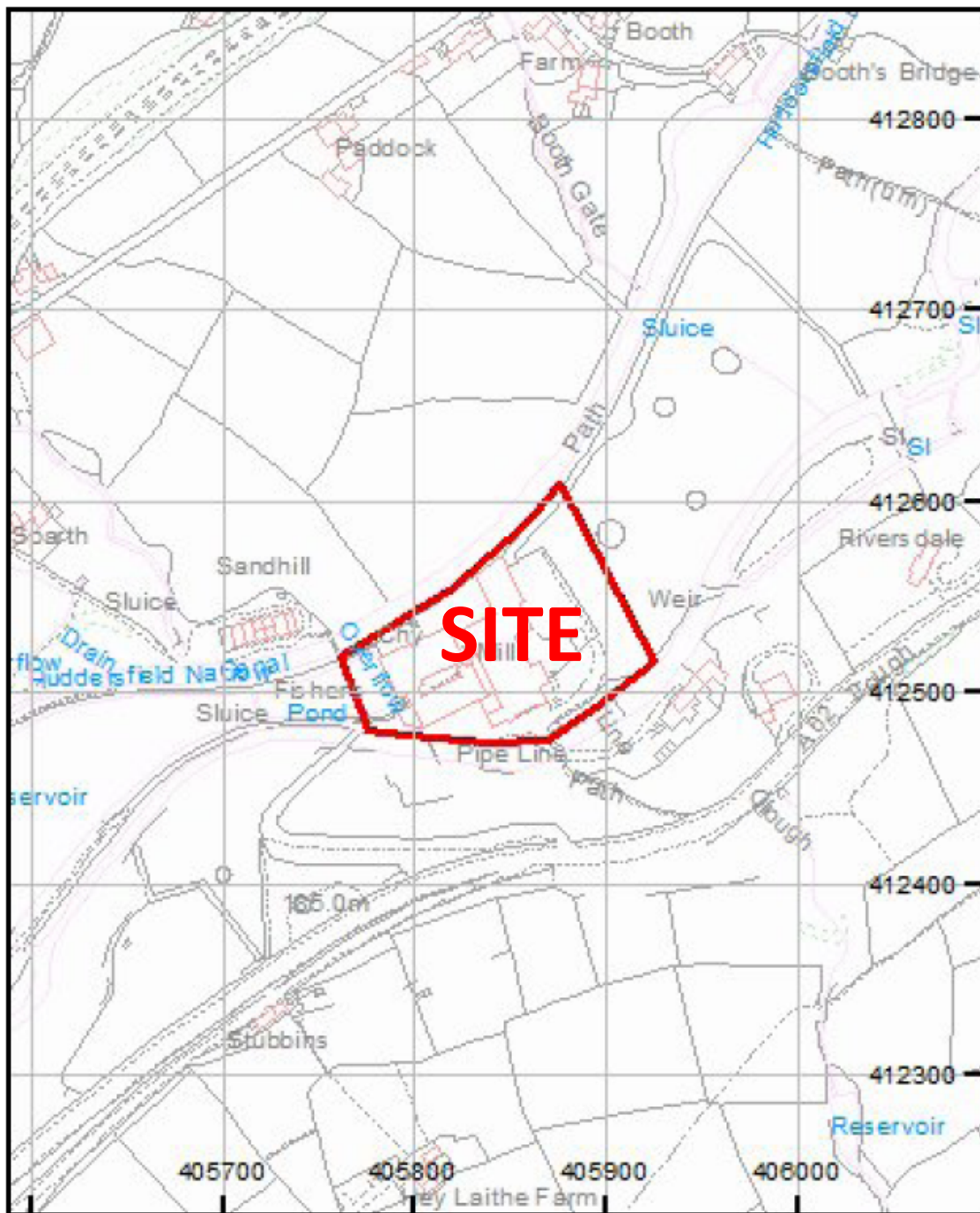


Figure 2 Site Plan

The centre of the site lies around National Grid Reference 405850 ^E, 412500 ^N at a height of 160m above Ordnance Datum. Archival maps are presented in Appendix A. The Coal Authority Report is presented in Appendix C. A Conceptual Model is presented in Appendix D.

3. REPORT OBJECTIVE AND REPORT SCOPE

3.1 Report Objective

The objective of the desk study is to determine the environmental nature of the site and to establish any environmental concerns and liabilities with particular reference to past contaminative uses of the site as far as is possible from historical and database review. Contaminative use is defined as “any use of land which may cause it to be contaminated by toxic substances” (Section 143 of the Environmental Protection Act 1990). The report undertaken is a Phase I Desk Study and Risk Assessment taking into account the possible contamination, the migration pathways and the presence of potentially sensitive receptors and the engineering properties of the strata and the mining history of the site.

3.2 Report Scope

The information for this report is from sources recommended by the Institute of Civil Engineers (ICE), the Association of Geotechnical and Geoenvironmental Specialists (AGS), Construction Industry Research and Information Association (CIRIA) and the Department of the Environment Transport and the Regions (DETR). The report has been compiled in accordance with the latest ICE, DETR, Department of Environment, Food and Rural Affairs (DEFRA), British Standard Draft Documents and British Standards, CIRIA, YAHPAC, CLR Reports and Eurocode 7.

In addition the scope of the investigation has used the extensive knowledge and experience of the staff of Ashton Bennett Consultancy to assess the data and to interpret the findings.

4. SITE HISTORY

The following maps and plans were inspected to assess the history of the site and its past environments. The maps are presented in Appendix A.

TABLE 1
Historical Maps Inspected

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1854	1:10,560	The site is shown to be occupied by Cellars Clough Mill (cotton) located towards the north of the site. A mill pond is located directly to the west of the mill. A track leads south from the mill towards the River Colne.	The surrounding area is largely open ground/farm land. There is a further mill pond to the south west of the site. To the north of the site is the Huddersfield Canal and the Canal reservoir to the northwest. Directly south of the site is the River Colne, further south again is the Manchester Road. There are many Sandstone Quarries located in the surrounding area.
1890	1:10,560	The site is shown to be occupied by the Mill with buildings having been extended towards the east of the site	The surrounding area is largely unchanged, however the mill pond to the southwest of the site has been extended so that it is now adjacent to the smaller pond. Residential properties ‘Sandhill cottages’ have been built to the northwest of the site just across the canal and ‘Cellars Clough House’ to the southeast across the river.
1892	1:2,500	The site is shown to be occupied by Cellars Clough Mills (woollen) with a large amount of building covering the site from the Canal to the River Colne. There is a chimney shown towards the north of the site.	The surrounding area is largely unchanged, however there is a bridge shown to be crossing the River Colne to the south of the site. Much of the land to the south of the site is now woodland.

DATE	SCALE	DESCRIPTION	
		SITE	SURROUNDING AREA
1904	1:10,560	The site is shown to be occupied by Cellars Clough Mill (woollen and wo rsted). There is no apparent change to the site.	An access road has been built to the southwest of t he site, crossing the River Colne and linking to Manchester Road. A footbridge has been constructed across the smaller of the two mill ponds. The rest of the surrounding area remains largely unchanged.
1906	1:2,500	The site is shown to be occupied by Cellars Clough Mill (woollen and wo rsted). There is no apparent change to the site.	The surrounding area remains much the same.
1930	1:10,560	No significant change to the area of the site.	The surrounding area remains much the same, apart from the con struction of a few small buildi ngs lo cated to the south of the site just across the River Colne.
1932	1:2,500	The map i ndicates th e mill buildings to extend to th e ea st. There is a tank lo cated on the northwest of the site.	The immediate surrounding area remai ns much the same, apart from the sludge and settling tanks that are located to the south of the site just across the River Coln e and the construction of a footb ridge across the River Colne to the south of the site.
1948	1:10,560	No significant change to the area of the site.	The immediate surrounding area remains much the same.
1951	1:10,560	No significant change to the area of the site.	The immediate surrounding area remai ns much the same. Huddersfield Narrow Canal is marked as disused.
1967	1:2,500	No significant change to the area of the site.	No si gnificant chang e. A pipeline is annotated al ong the River Colne.
1978 to 1980	1:10,000	No significant change to the area of the site.	No significant change to the surrounding area of the site.
1984	1:2,500	The site remai ns ge nerally unchanged asi de f rom the removal o f some bu ildings fro m the northwest of the site.	No significant change, aside from the removal of the settling and sludge tanks to the south of the river.
1993	1:2,500	No significant change to the area of the site.	No significant change to the surrounding area of the site.
2002	1:10,000	No significant change to the area of the site.	No significant change to the surrounding area of the site.
2012	1:2,500 & 1:10,000	No significant change to the area of the site.	No significant change to the surrounding area of the site.

In summary, the site h as been occupied by Cellars Cloug h Mill from before 1854 . The site h as remained largely unchanged to this day aside from the addition of a few more buildings.

5. POTE NTIAL CONTAMINATION

Potential so urces of co ntamination on the site have been identified fr om the pas t and present usage of the site and from neighbouring land-uses.

Based on the previous usage of the site as a cotton and woollen Mill, open land and settling tanks, and in more recent years as industrial units, as well as the offsite land uses, the following contamination could be present on the site:

- Ground gas – methane, carbon dioxide, VOCs from infilled land
- Organic substances (PAHs, TPHs, SVOCs, VOCs) from oil and waste fuel
- Polychlorinated biphenyls (PCBs) from electricity substation oils
- Metals, arsenic and sulphate from waste fuel and ash waste from chimney
- Asbestos from insulation and building materials
- Potential contamination in dyes
- Pesticides from wool
- Solvents from cleaning cotton/wool
- Solvents and degreasers

6. SITE GEOLOGY

6.1 Geology

The following published BGS geological map for the site has been examined: 1:50,000 scale (Solid and Drift) Sheet 86 "Glossop". The map shows the site to be underlain by Mudstone from the Marsdenian Millstone Grit Series which is Carboniferous in age. It is likely that these Mudstones interbedded with East Carlton Grit and Ready Con Dean Flags Sandstone – both of which are hard coarse grained sandstones, along with a thin coal seam. There are drift deposits shown to be overlying the Millstone Grit Series in the valley of the River Colne of alluvium – loose unconsolidated soils and sediments, these are unlikely to be much thicker than a few meters. The maps indicate the mudstone directly underlying the site to be dipping northeast at shallow angle of 5°-8° to the horizontal.

There are no workable coal seams within 150m of ground level.

It is probable that made ground may be present on the site.

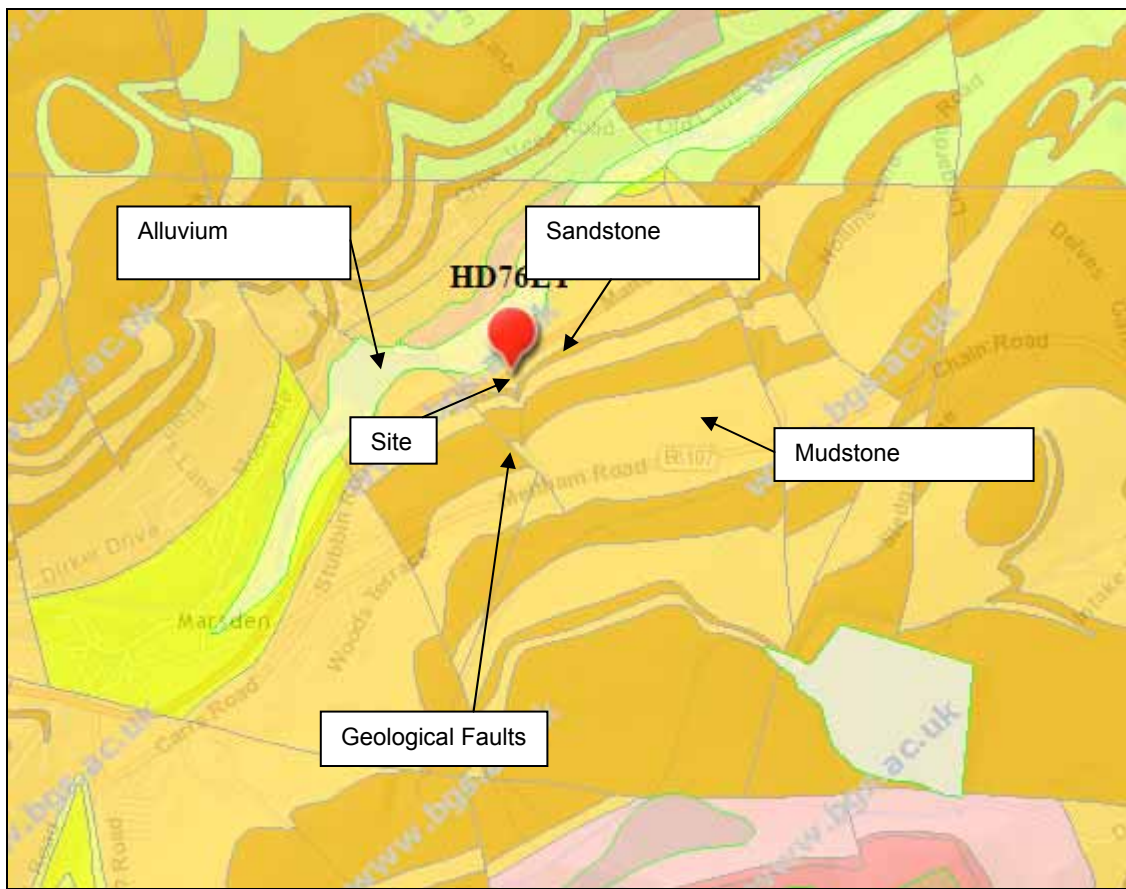


Figure 3 Geology Plan

6.2 Geological Faults

There is a fault to the south west of the site, trending northwest to southeast. The site is on the downthrown side of the fault. Within the local area there are many more faults which generally trend northwest to southeast. None of these faults actually cross the site, however it is possible that smaller faults sub parallel to these may exist in the strata causing fissuring and fracturing to the rock. Due to the lack of tectonic activity currently in the area, faulting is unlikely to detrimentally affect the stability of the site.

6.3 Engineering Geology

Any made ground on the site is unlikely to provide a suitable founding stratum for the proposed development. Alluvium drift deposits are likely to consist of soft clays, dense sands and gravels and the underlying bedrock is likely to be strong beneath the weathered horizon. Further comprehensive inspection or intrusive ground investigation should be undertaken to assess suitable foundation strata before any new build construction is undertaken on site.

6.4 Geological Hazards

There is a very low to low risk of a shrink and swell hazard from clays, soluble rocks, collapsible rocks and running sand on the site. There is a moderate risk of compressible deposits and landslides.

7. SITE HYDROLOGY AND HYDROGEOLOGY

7.1 Hydrology

The rainfall over the area of the site will naturally drain in a southerly direction into the River Colne which flows west to east immediately south of the site. There is a canal that runs to the north of the site from west to east, the Huddersfield Narrow Canal.

The site is shown by the Environment Agency to lie in a Zone 2 fluvial flood plain. Meaning there is 0.1% to 1% annual probability of flooding or greater. The BGS groundwater flooding susceptibility of the area is very high.

There are no biological river quality assessments within 1000m of the site. There are two chemical river quality assessments within 1000m of the site, the results are based on General Quality Assessment Headline Indicators scheme, where samples are measured for ammonia and dissolved oxygen with results graded from A ('Very Good') to F ('Bad'), both assessments were graded 'A'.

It is important that any contamination found on site is not allowed to detrimentally affect any watercourses. There are two surface water abstraction licences within the site.

There are no records of authorisation issued by the Environment Agency to discharge to watercourses in accordance with the Water Resources Act 1991, within 500m of the site.

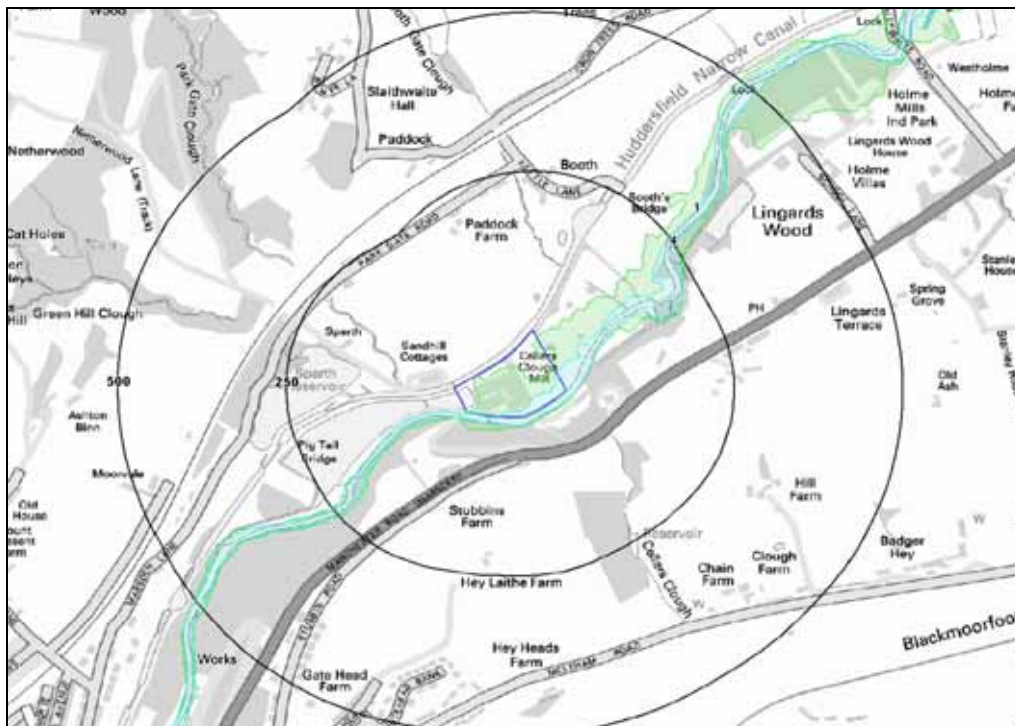


Figure 4 EA Flood Map for Planning (from rivers and the Sea)



7.2 Hydrogeology

The above mentioned geological maps produced by the BGS indicate the site to be underlain by sections of the Millstone Grit Series, particularly mudstones and sandstones. The sandstones (East Carlton and Ready Con Dean Flag Sandstone) and coal seams usually have a high permeability through fractures and high porosity as water is held in pore spaces between grains in the rock. However the interbedded mudstones are less permeable.

The Environment Agency Groundwater Vulnerability maps indicate the Mudstone and Millstone Grit to comprise a 'Secondary (A) Aquifer'. Secondary (A) aquifers (formerly referred to as minor aquifers) are formations with permeable layers capable of supporting water supplies at local rather than strategic scale, and in some cases forming an important source of base flow to rivers.

The Environment Agency Groundwater Vulnerability maps indicate the superficial deposits (alluvium) underlying most of the site to comprise of a 'Secondary (A) Aquifer'. Secondary (A) aquifers (formerly referred to as minor aquifers) are formations with permeable layers capable of supporting water supplies at local rather than strategic scale, which can percolate into underlying minor aquifers. Care should be taken during construction not to allow pollution to enter the aquifer.

The site is not shown to lie within a Source Protection Zone. There are no groundwater abstraction licences within 1000m of the site.

Other unrecorded or unlicensed wells may be present close to the site. Historic wells are known to exist within 500m of the site. As the local groundwater may be utilised for abstraction from old unlicensed wells, it is important that it is protected from pollution. It is an offence to pollute the groundwater, whether or not it is used for abstraction.

8. QUARRYING AND MINING

8.1 Quarrying

There is no known quarrying of rock on or within the vicinity of the site that is likely to have impacted on the site.

8.2 Mining

8.2.1 Coal Mining

8.2.1.1 Coal Authority Report

According to The Coal Authority Report, the property (the site) is not within the zone of likely physical influence on the surface from past underground workings. The property is not in the likely zone of influence of any present underground coal workings.

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 or otherwise work 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.

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

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

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

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.

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50 metres, since 31st 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.

There is no record of a mine gas emission requiring action by the Coal Authority within the boundary of the property. The property has not been subject to remedial works, by or on behalf of the Authority, under its Emergency Surface Hazard Call Out procedures.

The property is not in an area for which a notice of entitlement to withdraw support has been published. 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.

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. 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. The property lies outside the Cheshire Brine Compensation District.

The full Coal Authority Report is presented in Appendix C and should be read in full.

8.2.1.2 Shallow and Deep Coal Mining

There are no coal seams at shallow depth (<30mbgl) which could have been mined prior to mining records. There are several recorded coal seams at greater depth (>30m bgl) which are 0 to 0.10m in thickness and never knowingly mined.

8.2.1.3 Coal Mine Shafts

There are no coal mine entries recorded by the Coal Authority within, or within 20m of, the boundary of the property. Records may be incomplete however and mine entries may exist of which the Coal Authority has no knowledge.

Circular features or deep made ground should always be treated with care and investigated further by an engineer to check for mine entries before proceeding. It is unlikely that there are any mine shafts on the site.

8.3 Other Mineral Extraction

The site does not lie in an area of recorded mining for stone, tin, gypsum or salt or brine extraction.

9. ENVIRONMENTALLY SENSITIVE SITES

The site does not lie within or within 2000m of a National Nature Reserve, a Special Area of Conservation, a Special Protection Area, a RAMSAR site, a World Heritage Site, an Environmentally Sensitive Area, an Area of Outstanding Natural Beauty, a National Park or a Nitrate Sensitive Area or Green Belt.

There is one designated environmentally sensitive site present within 500m of the site, 237m to the northwest of the site, the North Peak which is an Environmentally Sensitive Area. The site lies within a Nitrate Vulnerable Area. This is unlikely to be detrimentally affected by the proposed development.

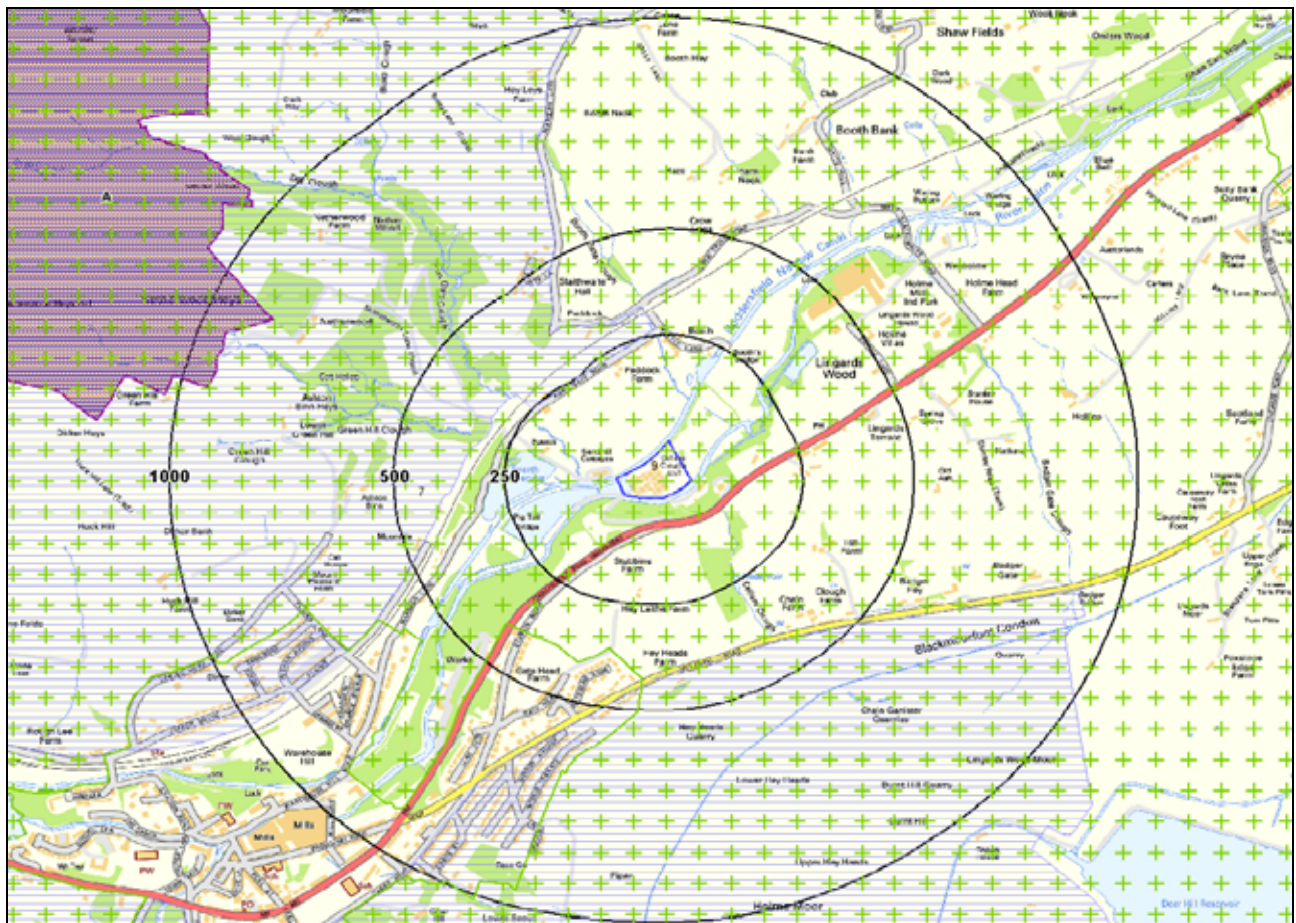


Figure 5 Designated Environmentally Sensitive Sites



10. REGULATED INDUSTRIES

Results of searches for regulated industries are presented in Table 3.

TABLE 3
Authorisations, Incidents and Registers

Regulated Industry	On SITE	Within 250m	DETAILS
Historic IPC Authorisations	None N	one	-
Part A(1) and IPPC Authorised Activities	None N	one	-
Water Industry Referrals	None N	one	-
Records of Red List Discharge Consents	None N	one	-
Records of List 1 Dangerous Substances Inventory Sites	None N	one	-
Records of List 2 Dangerous Substances Inventory Sites	None N	one	-
Records of Part A(2) and Part B activities and enforcements	None N	one	-
Records of Category 3 or 4 Radioactive Consents	None N	one	-
Records of Licensed Discharge Consents	None N	one	-
Records of Planning Hazardous Substance Consents and Enforcements	None N	one	-
Records of COMAH and NIHHS sites	None N	one	-
Records of National Incidents Recording System List 2	None 1		218m to the SW of site, Incident on 28/2/2011. Significant water impact (category 2), no land or air impact (category 4).
Records of National Incidents Recording System List 1	None N	one	-
Records of sites determined as contaminated land under Section 78R of EPA 1990	None N	one	-
Records of Worked Ground	None N	one	-
Records from EA landfill Data	None N	one	-
Records of Operational Landfill Sites	None N	one	-
Records of EA historic landfill sites	None 2		82m & 243m SW of site – Cellars Clough Mills. Manchester Road. Industrial, commercial household waste. Licence issued on 05/08/1985. Wood Bottom off Manchester Road. Industrial, commercial and household special waste type. Operator: Colne Valley Urban District Council. Licence issued on 14/10/1977
Records of non operational landfill sites	None N	one	-
Records of local authority landfill sites	None N	one	-
Records of operational waste treatment, transfer or disposal sites	None N	one	-
Records of non operational waste treatment, transfer or disposal sites	None N	one	-
Records of EA licensed waste sites	None 2		Both 79m SW of site off Manchester Road. Household, commercial and industrial waste landfill. One 75000 tonnes, other <25000 tonnes. Operator: Mr K S Cooper. Issued on 05/08/1985.
Current Industrial Land Use	1 4		On site: Chimney. 2m S: Pipelines.

			93m & 96m SE: Tanks. 221m NE: Pipelines.
Petrol and Fuel Sites	None N	one	-
Underground High Pressure Oil and Gas Pipelines	None N	one	-
Residential Property (within 250m)	No Yes		
Radon Protection Required	No	No	The property is not in a Radon Affected Area, as less than 1% of properties above action level. No radon protective measures are necessary.
Registered as Contaminated Land under Part IIA EPA 1990	No No		

Results of searches for regulated industries, pollution incidents and registered authorisations are presented in Table 3 above and indicate that the site is unlikely to be affected by other current off-site activity. However landfill sites lie within 250m of the site which should be monitored for toxic gases before any construction proceeds.

11. ENVIRONMENTAL RISK ASSESSMENT

11.1 Introduction

The environmental liabilities of the site and risk assessments have been undertaken for the future proposed residential use of the site. If the site use changes then a further risk assessment will be required.

Environmental risk considerations on the site have been assessed by adopting a site specific qualitative approach to identify the risk, if any, of environmental harm. In accordance with the DETR Draft Statutory Guidance on Contaminated Land the approach is by identifying a hazardous source and establishing possible links between the source via exposure pathways to a potential receptor.

The hazard is a contaminant or potentially polluting substance that is in, on or under the land and which has the potential to cause harm or to cause pollution to controlled waters. The receptor is a living organism or organisms, an ecological system or piece of property, which is being harmed, interfered with or polluted by the contaminant. The pollutant linkage is by means of the pathway which is one or more routes by or through which that receptor is being, or could be, exposed to, or affected by, that contaminant. Thus the presence of a hazard on a site does not necessarily mean that there are risks unless pathways and receptors are present and are receptive to being affected by that specific hazard or contaminant.

- SOURCE - release of pollutant - eg. oil spills
- PATHWAY - route to receptor - eg. permeable strata
- RECEPTOR eg. - river

The likelihood of contamination affecting the environment depends on the migration and persistence of contaminants which varies with the nature of the contaminant and the ground and groundwater conditions, and the presence of sensitive receptors.

The following tables (Table 4, 5, 6 and 7) which are extracted from CIRIA C552 'Contaminated Land Risk Assessment – A Guide to Good Practice' have been used to assess the risk to sensitive receptors from site contamination.

Any category which shows as medium risk or above may require investigation and if high risk is proven, remediation may be required following investigation.

TABLE 4
Risk Matrix – Comparison of Consequence and Probability

Risk = Probability x Consequences		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 5
Classification of Probability

Probability Classification	Definition
High Likelihood	There is a pollution linkage and an event that either appears very likely in the short term and 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 a pollution linkage but circumstances are such that it is improbable that an event would occur even in the very long term.

TABLE 6
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 IIA. 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 organisation 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).	Concentration of a contaminant from site exceeds 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. Lesser toxic and asphyxiate effects of carbon dioxide
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 repairable 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 7
Classification of Risks and Likely Action Required

Risk Classification	Definition
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 relatively unlikely that any such harm would be severe. 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 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.

Any category which shows as moderate risk or above may require investigation and possibly subsequent remediation.

11.2 Potential Sources of Contamination

Potential sources of contamination were investigated through archival maps and the Desk Study. The site has been occupied by open ground, a cotton and woolen mill, buildings of unknown use and car parking.

Based on the past and current usage of the site and its surroundings, possible contamination that may be present on the site could include:

- Ground gas – methane, carbon dioxide, VOCs from infilled land
- Organic substances (PAHs, TPHs, SVOCs, VOCs) from oil and waste fuel
- Polychlorinated biphenyls (PCBs) from electricity substation oils

- Metals, arsenic and sulphate from waste fuel and ash waste from chimney
- Asbestos from insulation and building materials
- Potential contamination in dyes
- Pesticides from wool
- Solvents from cleaning cotton/wool
- Solvents and degreasers

11.3 Potential Pathways for Migration

The potential pathways for carrying any contamination present on the site to reach sensitive receptors may include:

a) Ingestion of and/or skin contact with contamination in the soil

Low/Medium Likelihood – A large area of the site is hard covered where there is restricted potential for ingestion/skin contact with contamination in soil. If gardens and landscaped ground are proposed then the site should be checked for contamination. There may be a risk to workmen which may be partly mitigated by appropriate use of Personal Protective Equipment.

b) Ingestion of contamination and uptake of contamination in plants/vegetables/animals/pets

Low/Medium – Vegetables and plants may be grown if gardens are proposed, and ingestion of contamination through uptake in plants/vegetables may occur. If any vegetable gardens are proposed the ground should be tested for contamination. It is considered that animals in the food chain are unlikely to be present on site, although fish are caught from the mill ponds for consumption and the water should be tested for contamination. Pets may be present on site

c) Ingestion of contaminated drinking water through leaching of contamination into groundwater flowing to underlying aquifers/water abstractions

Low/Unlikely – Leaching of any contamination may detrimentally affect shallow groundwater present beneath the site. The site lies on a Secondary (A) Aquifer, however the site is not within a Source Protection Zone and there are no known groundwater abstractions within close proximity to the site.

d) Inhalation of vapours produced by landfill/radon/hydrocarbons/old mines

Low/Medium Likelihood – Made ground material is likely to be present on the site. Also, there is historic made ground / infill within 250m of the site and two Environmental Agency licensed waste sites. Ground gas may be produced by organic materials or contamination present in any made ground on the site. Hydrocarbons and pesticides may be present in the ground from previous and existing land use. Monitoring is recommended to assess risk or mitigating measures should be employed. The site does not lie in a radon protection area. The site is unlikely to be affected by mine gas.

e) Inhalation of contaminated airborne dust

Low Likelihood – The appropriate safety measures must be exercised to protect both the workers and the local residents from dust during construction. Provided this work is carried out diligently, the ongoing risk is low. Due to the former use of the site it would be prudent to check for asbestos.

f) Contamination of controlled surface waters

Low/Medium – Leaching of contamination into the millponds and leaching into the River Colne and Huddersfield Narrow Canal may be possible. The Environmental Agency indicate the River

Colne meets the standards and therefore contamination from the site is unlikely. It would however be prudent to test water samples from the Mill Ponds and the River Colne and canal.

11.4 Potential Sensitive Receptors

Potential receptors could include workmen, occupants of houses, gardeners, neighbouring land-users, buildings, groundwater, surface water and the air.

11.5 Summary Environmental Risk

By considering where a viable pathway exists which connects a source to a receptor, this assessment will identify where pollutant linkages may exist. If there is no pollutant linkage, then theoretically there is no risk. Therefore only where a viable pollutant linkage is established does this assessment go on to consider the level of risk. On this site there is a low to medium potential for contamination to be present and the site will be used for the high sensitivity land use scenario of residential use.

The risk is assessed by the combination of the probability of the risk and the severity of the risk in line with CIRIA recommendations and the risks are presented in Table 8. The risks cannot be fully determined without intrusive ground investigation, monitoring for toxic gases, groundwater level and testing the soils and groundwater for contamination. If any material is likely to be removed from site for development then Waste Acceptance Criteria Tests will be required to categorise the soils.

TABLE 8
Risk Assessment for a Residential Site Use with Plant Uptake

Pathways	Receptors	Perceived Risk	Probability of Risk	Consequence of Risk	RISK
Environmental					
Inhalation of vapours such as methane from landfill and hydrocarbons from ground contamination	Existing/future occupants of the premises and workmen.	Methane & Carbon Dioxide from infilled land, past site use, neighbouring site use.	Low/Medium Likelihood	Severe-Methane can be explosive in air.	Low to Moderate-Risk should be quantified by Phase II investigation and monitoring due to presence of landfill. Mitigating measures may be required.
Ingestion of and/or skin contact from contaminated soil	Existing/future occupants of the premises and workmen	Metals, hydrocarbons, asbestos, pesticides	Low/Medium Likelihood	Mild to Medium	Low to Moderate-Risk should be quantified by Phase II investigation Remediation may be required.
Ingestion of contaminated drinking water	Local abstraction wells	Contamination of potable water.	Unlikely/Low no potable boreholes within 1000m	Medium- prosecution can occur if site is affecting controlled waters	Low Risk. Any groundwater encountered should be tested.

Contamination of surface and/or groundwater	Groundwater Surface Water of mill pond R. Colne & Huddersfield Narrow Canal	Contamination of groundwater Contamination of surface water/ ponds	Low Likelihood Low/ Medium Likelihood	Medium- prosecution can occur if site is affecting controlled waters.	Low/Moderate Risk to groundwater. Low to Moderate risk to surface water of R. Colne and Hudds Canal. Moderate risk to mill ponds.
Ingestion and uptake of contamination in plants/animals/vegetables.	Future occupants of garden premises	Ingestion of contamination via homegrown produce and fish.	Low /Moderate Likelihood	Medium	Low/Moderate Risk gardens needs contamination tests and topsoil tested for contamination.
Inhalation of airborne dust	Workmen, occupants of premises, neighbouring users	Dust during construction. Asbestos dust from building	Low likelihood	Medium	Low risk provided any asbestos is removed according to government guidelines. Good construction practice required on site to limit dust levels during construction.
Irradiation	Humans	Radon gas	Unlikely	Radon protection required	Low
Plants and vegetation	Plants and vegetation	Reduced growth due to phytotoxic compounds.	Low likelihood	Mild	Soils require testing for phytotoxic compounds
Controlled waters	River Colne, Huddersfield Canal and mill ponds	Contamination of water resources.	Low to moderate likelihood	Low to Medium	All controlled water on site require testing for contamination.
Flood Risk	New Houses	In Flood Zone 2	Low to Moderate	Severe	Full Flood Risk Assessment Recommended
Geotechnical					
Fire and Explosion	Buildings and humans	Methane gas. Spontaneous combustion of coal.	Low likelihood	Severe	Low to Moderate. Monitoring for gas required. No coal anticipated.
Settlement or Heave	Buildings High	ly plastic clays can swell and shrink under variable weather conditions. Slag can expand.	Low likelihood	Severe	Low to Moderate. Clays require testing for plasticity.
Chemical attack	Buildings	Sulphate can, under certain ground and groundwater conditions, attack concrete.	Low likelihood	Severe	Soils require testing for levels of sulphate

The potential sensitive receptors on the site which could be detrimentally affected by any contamination originating from the site and potential ground gas originating from on-site and off-site sources together with the likelihood of them being affected are identified in Table 8.

12. GEOTECHNICAL RISK ASSESSMENT

Made Ground and residual clays may be unsuitable foundation strata if they are in a loose state of compaction or of low strength and new foundations may have to extend to unweathered bedrock of the Coal Measures sandstone or mudstone. The bearing capacity of the strata should be

determined by insitu shear strength tests to ensure suitable bearing capacity for the proposed new build.

It is recommended that intrusive investigation is undertaken to determine engineering properties of the soils and bedrock. It is possible that strip footings may be used for development although this will depend on the results of the intrusive geotechnical investigation.

There is a risk of the residual sandy clays of the Coal Measures sandstones being highly plastic and liable to shrink and swell under varying moisture conditions and this should be checked by plasticity testing of the clays.

Excavations within the unweathered bedrock are likely to stand at near vertical angles in the short term. Excavations within any made ground alluvium deposits or residual clays are likely to require temporary support for construction.

Geotechnical tests should be undertaken for pH and sulphate content of the soils to enable design of underground concrete.

Due to the possible presence of made ground, the site should be monitored for the presence of methane and carbon dioxide levels and flow weekly for a period of at least 6 weeks. This is based on CIRIA recommendations and will enable design of appropriate mitigation measures and/or gas resistant membrane design for development.

There is a low risk of geotechnical problems causing a concern to development provided recommendations in this Report are undertaken.

13. RECOMMENDATIONS

It is proposed to redevelop the site for residential units. The environmental liabilities of the site and risk assessments have been undertaken for this potential future use.

The risk of the contamination detrimentally affecting adjacent land is low based on the expected ground conditions and expected contamination. There are no known ground water abstraction points that could be detrimentally affected by any contamination. Surface water abstractions and fish in the mill pond could be affected by contamination. The site is located over a secondary aquifer and care should be taken during construction not to cause contamination of the ground which could leach into groundwater.

The risk to human health from inhalation, dermal contact and ingestion of contamination is assessed as low to moderate at this preliminary stage with risks for garden areas and for the surface water, risks from toxic gases and contamination requiring assessment. This preliminary risk assessment should be quantified by a Phase II intrusive investigation in order to design and incorporate suitable mitigating measures into the proposed development.

A Phase II Investigation is also recommended for the assessment of load bearing strata and foundation design for the proposed new development.

A suitable Phase II investigation should comprise of:

- Window sampler boreholes in areas of development and targeted at potential sources of contamination on site and to assess ground conditions, collect soil samples and install standpipes.

- Trial pitting to assess existing mill foundations.
- Gas monitoring of borehole installations (methane and carbon dioxide) – minimum of 6No. return visits
- Geotechnical testing for foundation design
- Chemical testing to determine the presence/extent and severity of soil contamination
- Chemical Testing for sulphate to design underground concrete
- Water sample testing of Mill ponds and the River Colne and canal for potential contamination.

On completion of the Phase II investigation, the preliminary risk assessment undertaken as part of this Phase I Desk Study should be revised based on the findings. Remediation or mitigating measures, if required, may then be subsequently designed.

14. GENERAL REMARKS

This report truly reflects the conditions found during the desk study. Whilst the desk study was undertaken in a professional manner taking due regard of additional information which became available as a result of ongoing research, the results portrayed only pertain to the information attained, and the ground and gas conditions, mining conditions and contamination expected and it is possible that other undetected information and undetected ground and gas conditions, undetected mining conditions and undetected contamination may exist. The desk study was only undertaken within the site boundaries and should not be used for interpretation purposes elsewhere. These conclusions are only a brief summary of the report, and it is recommended that the report is read in full to ensure that all recommendations have been understood.

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Frances A Bennett
BSc, CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AEMA, MEnvSci

Appendix **A**



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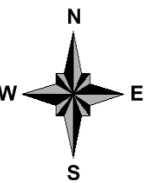
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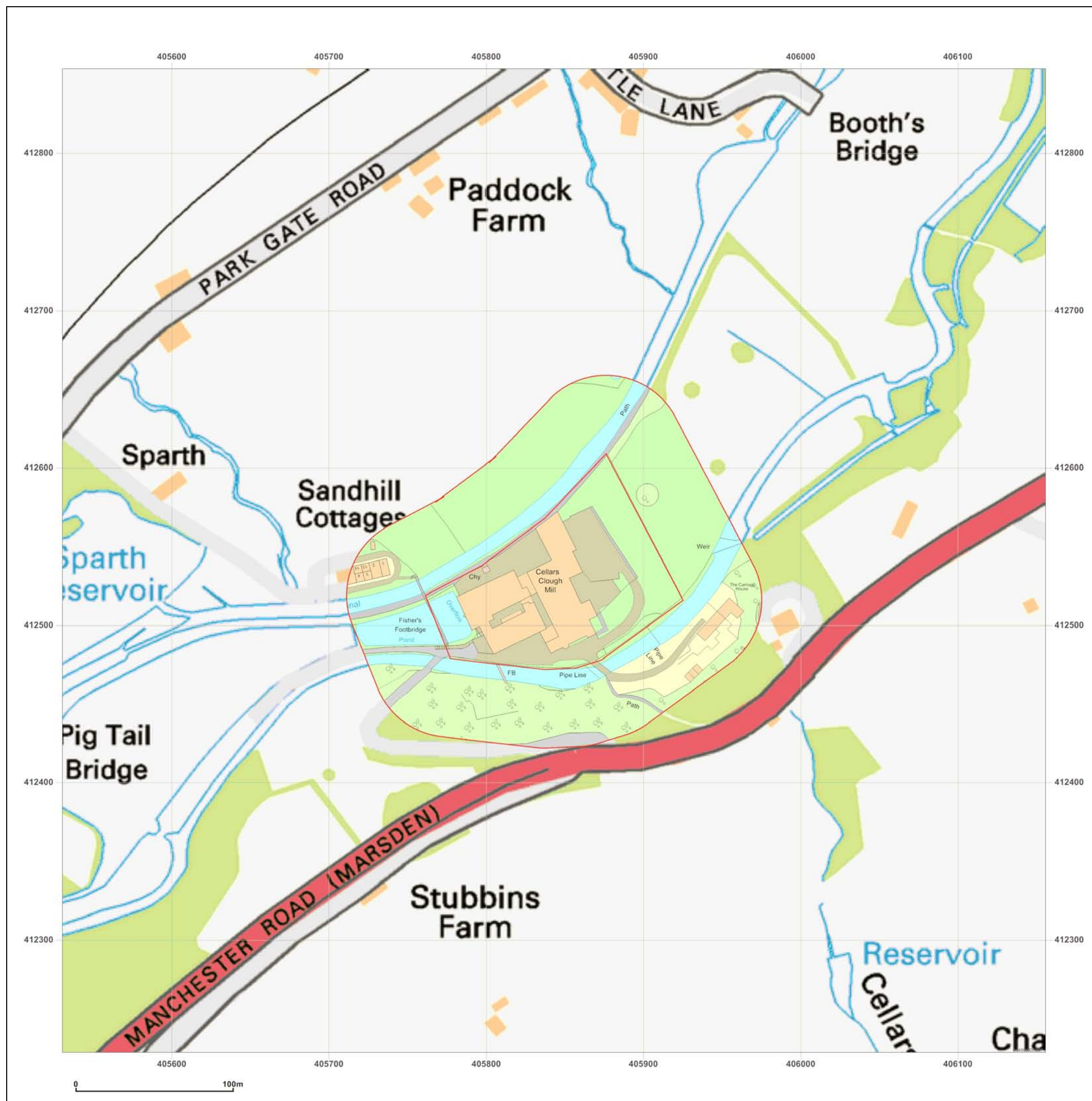


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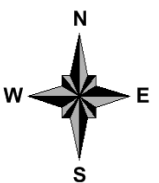
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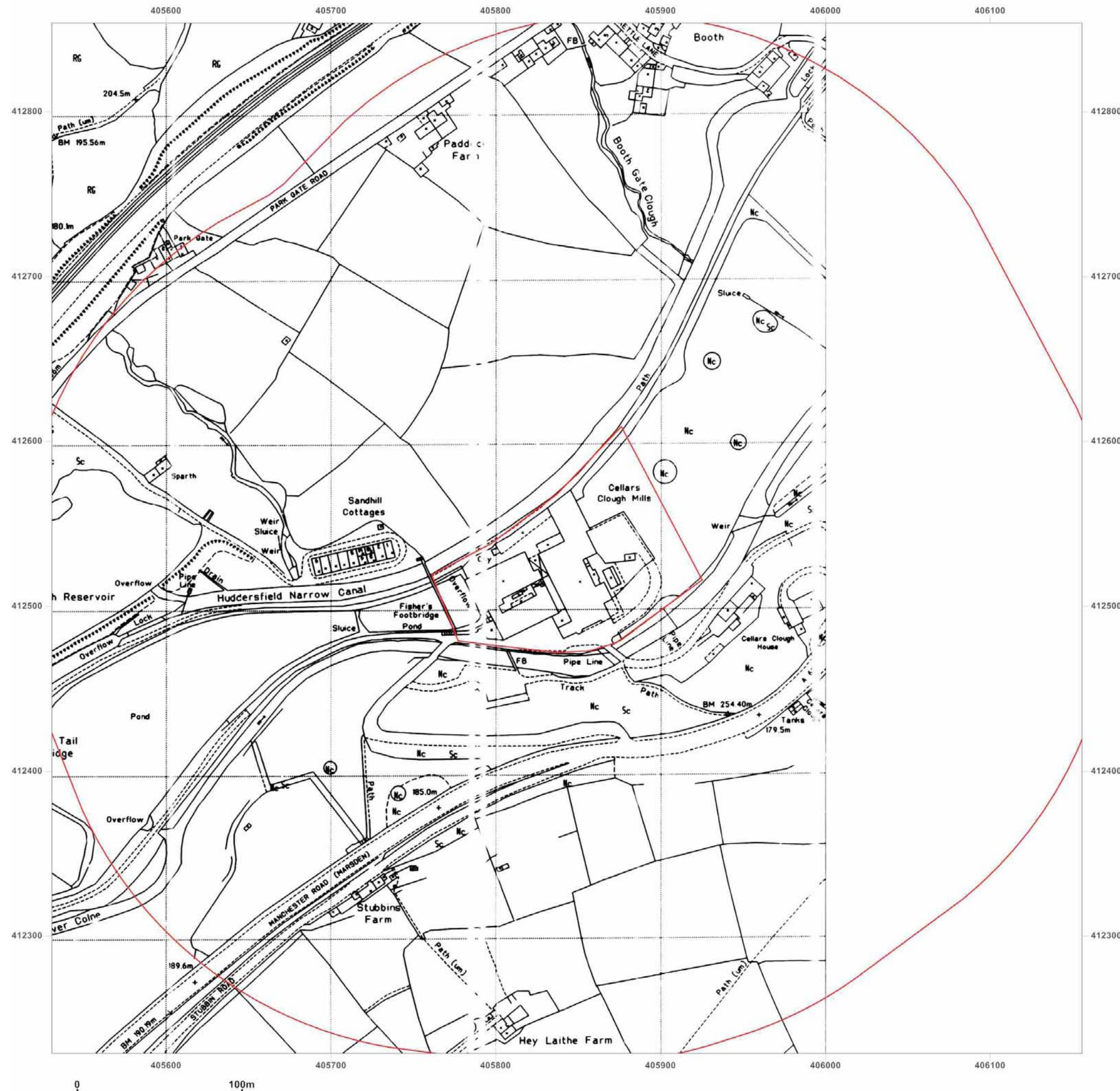


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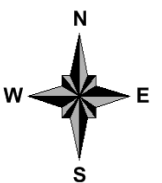
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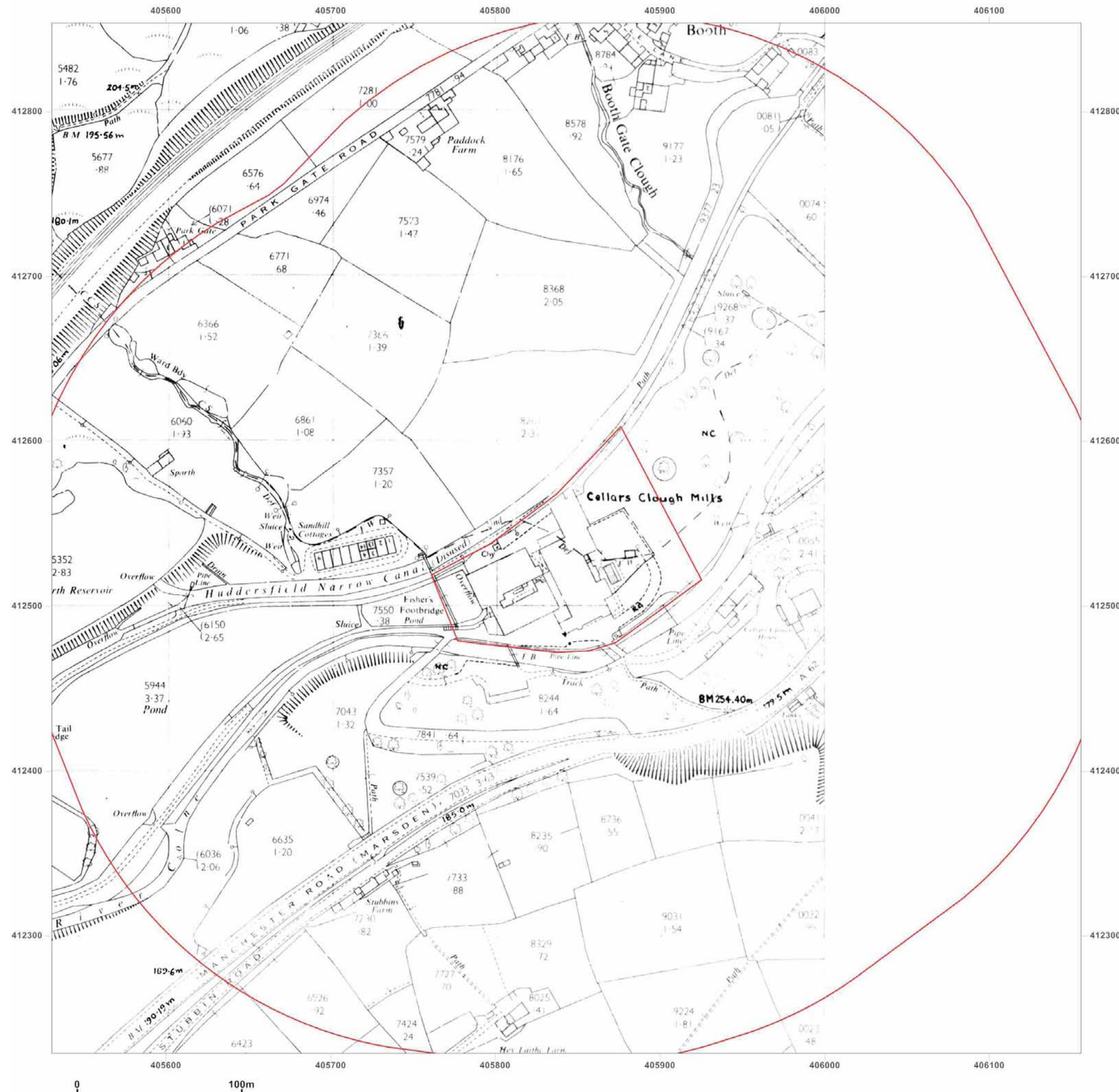


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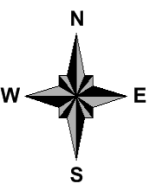
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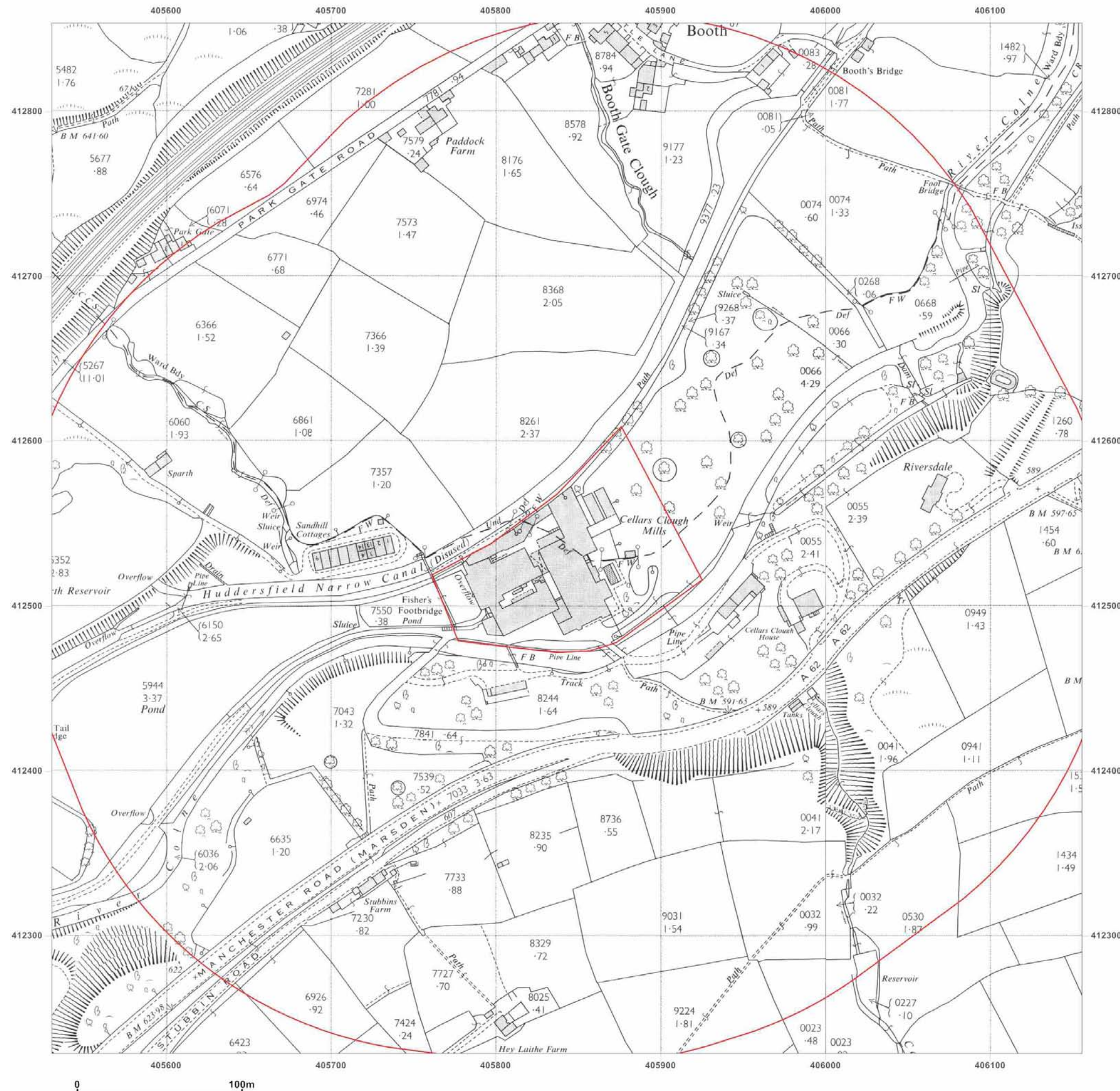


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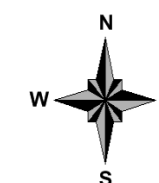
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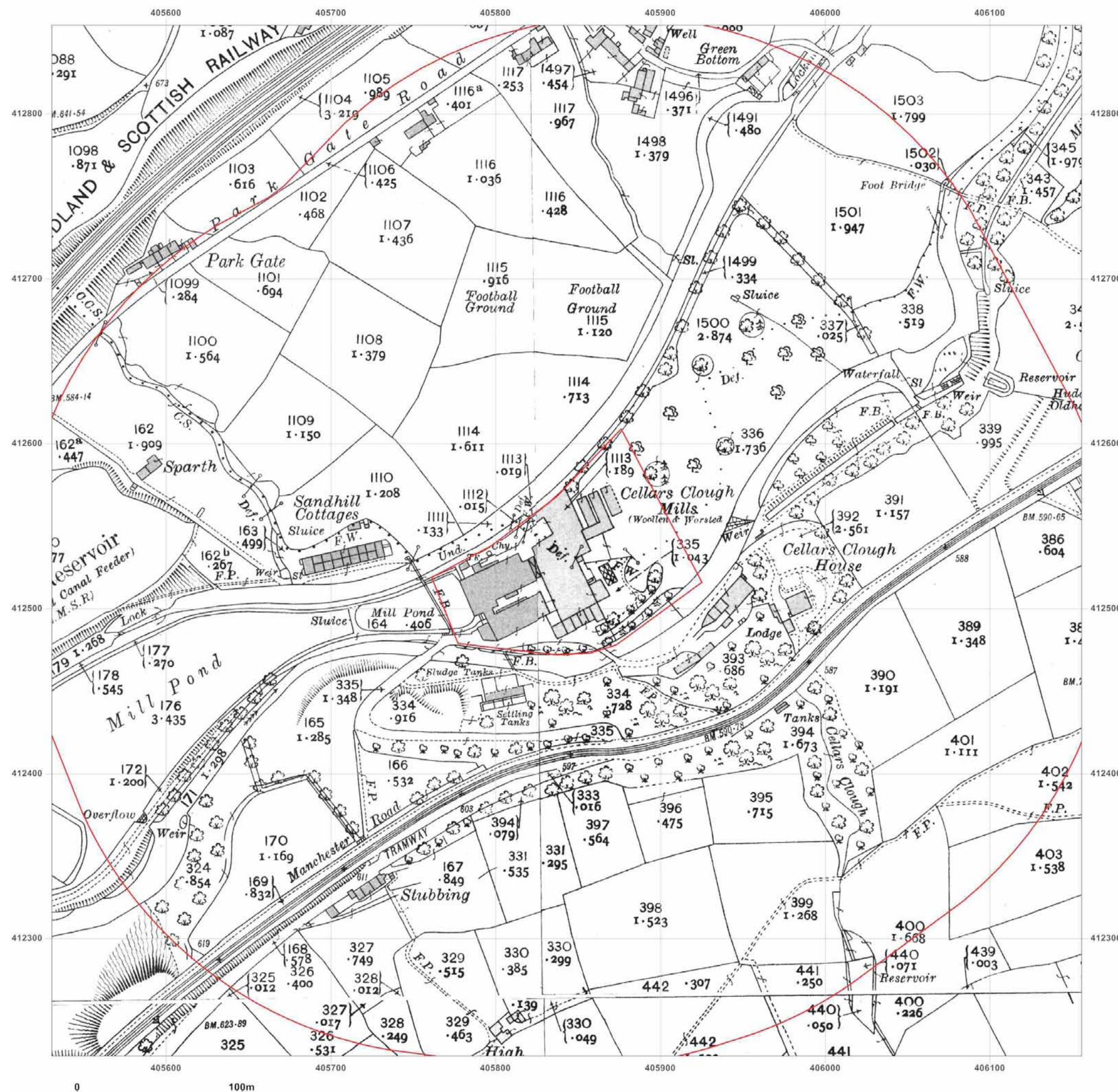


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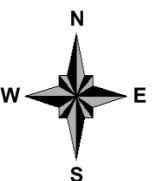
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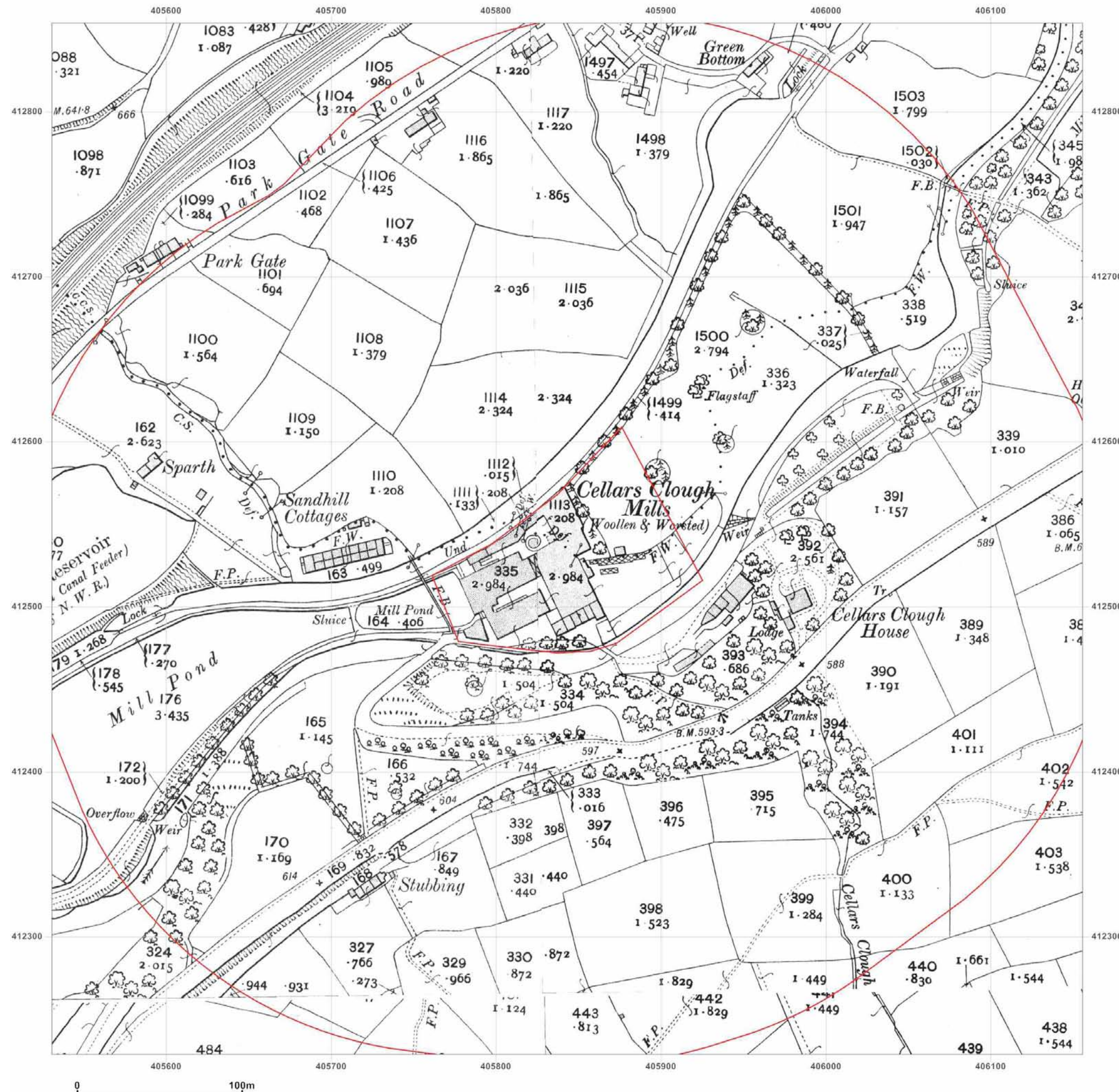


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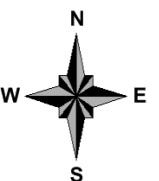
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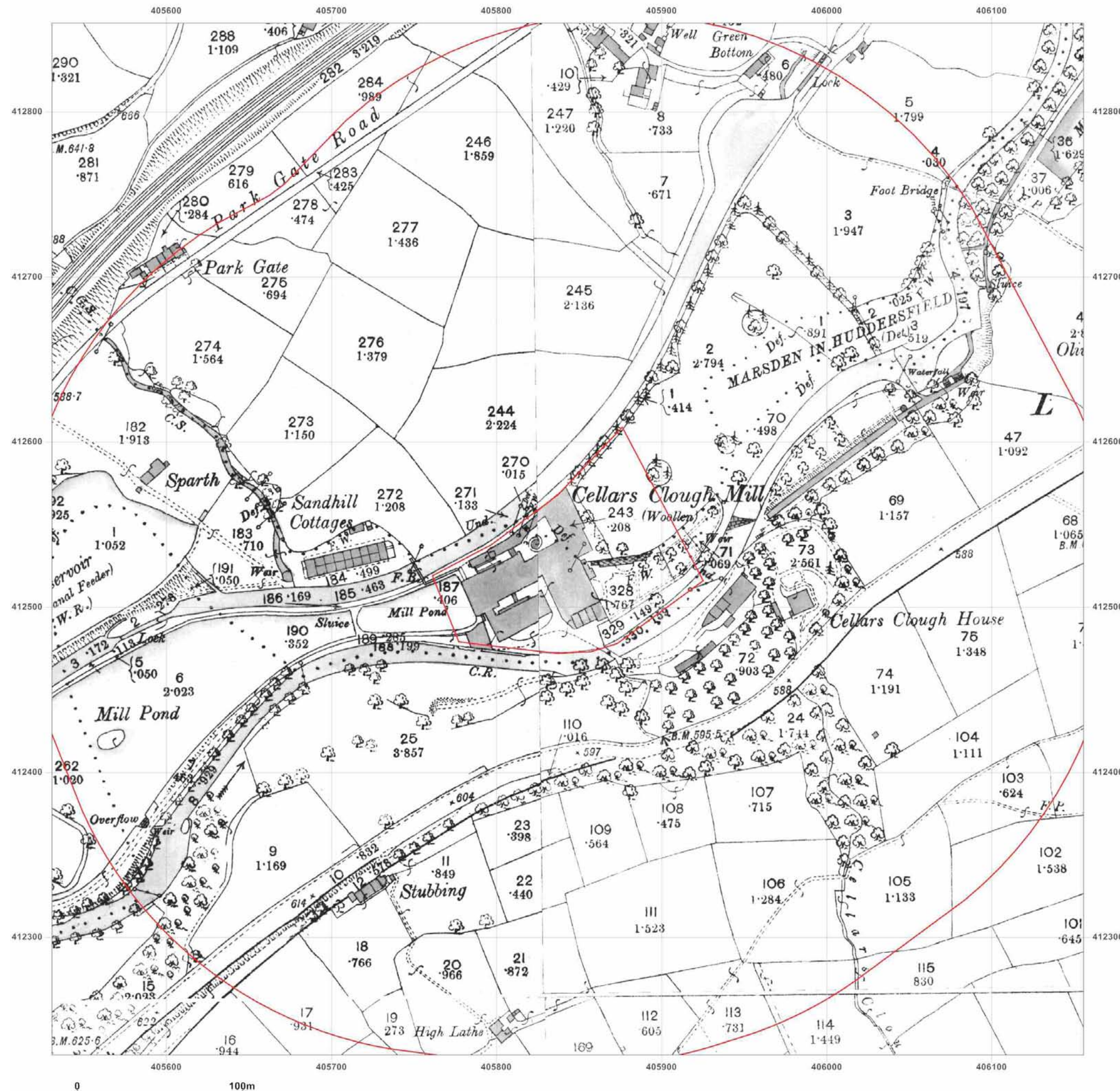
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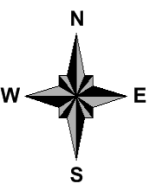
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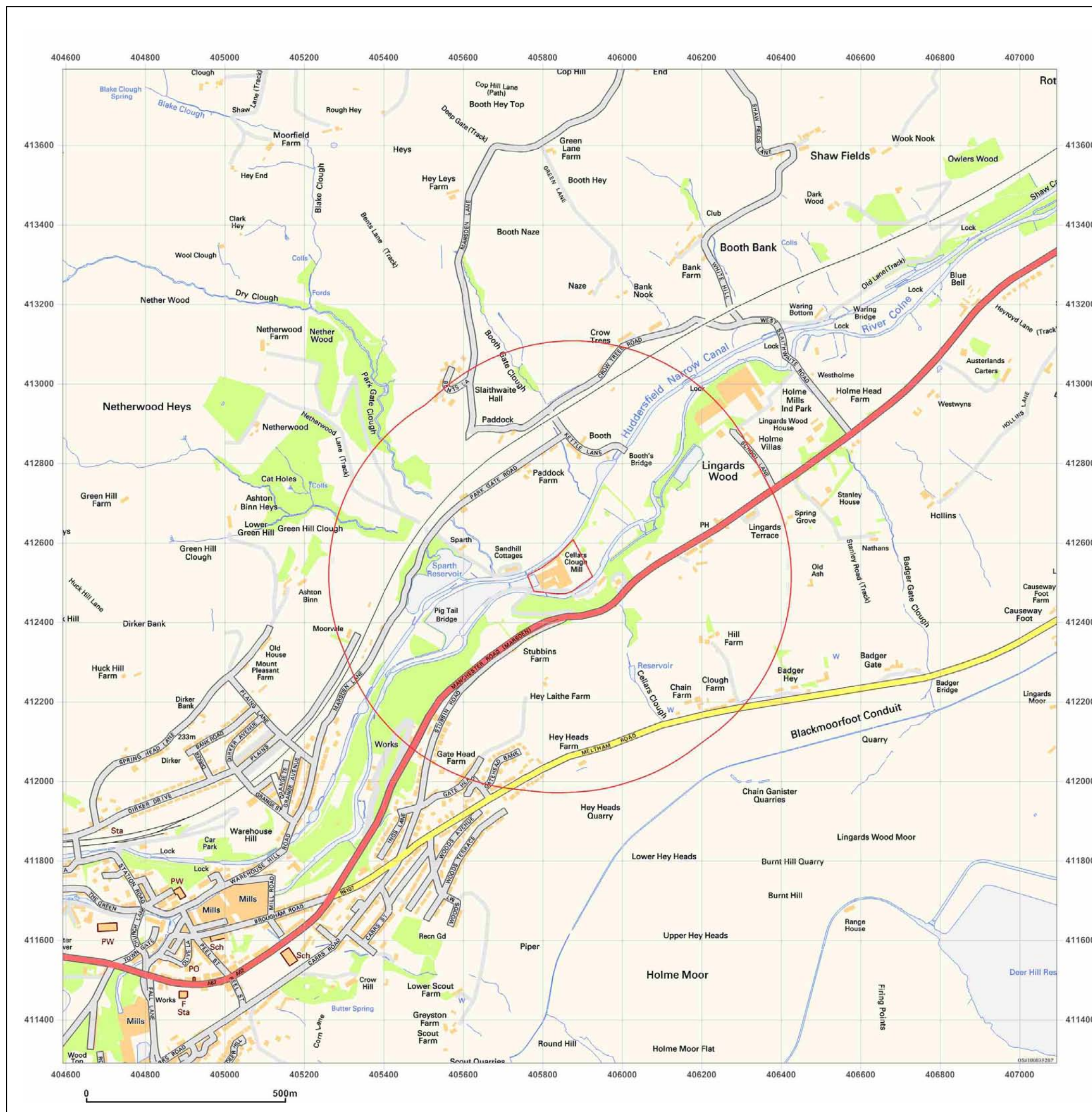


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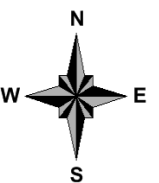
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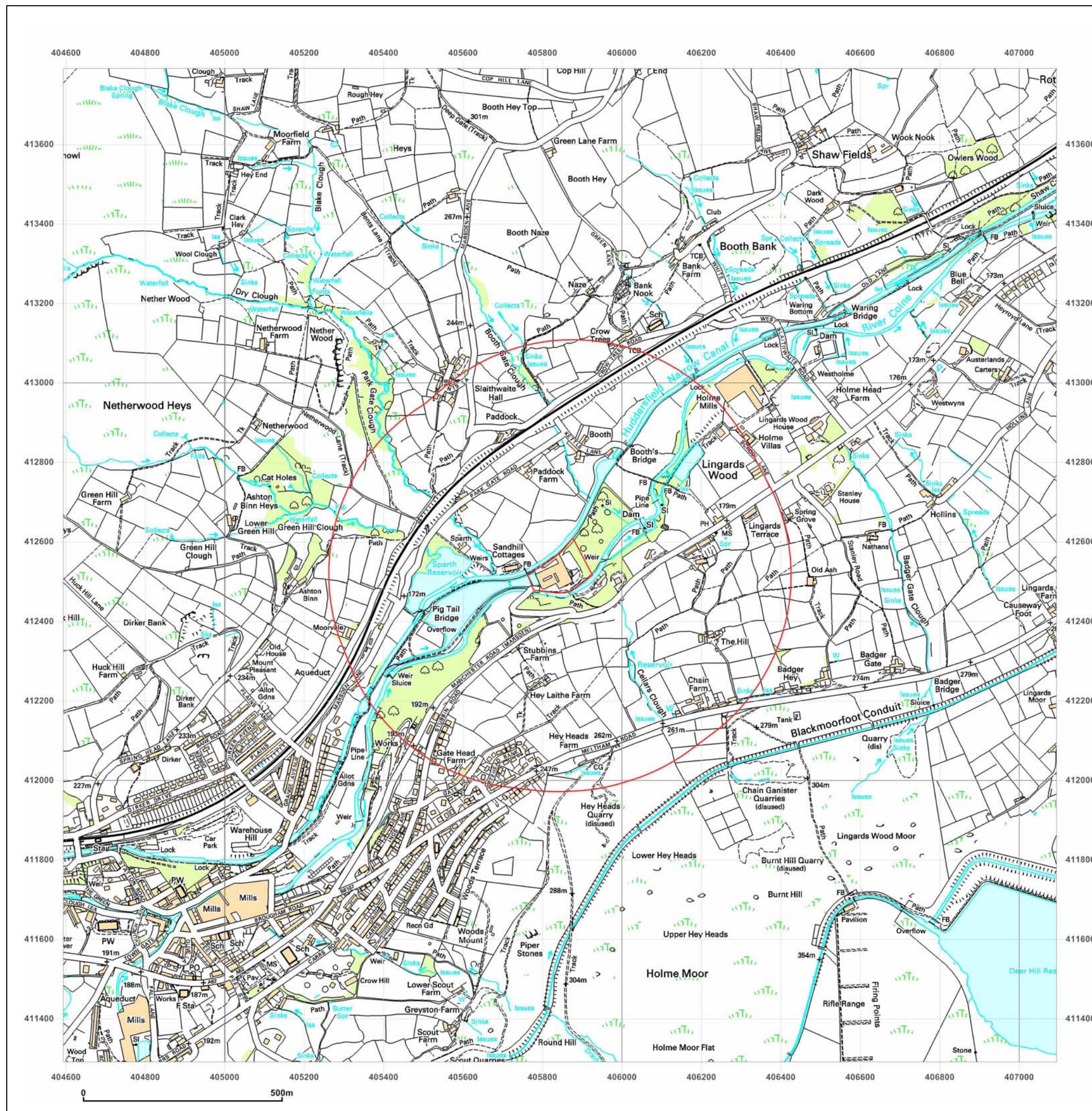


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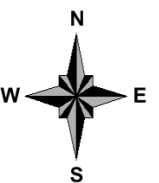
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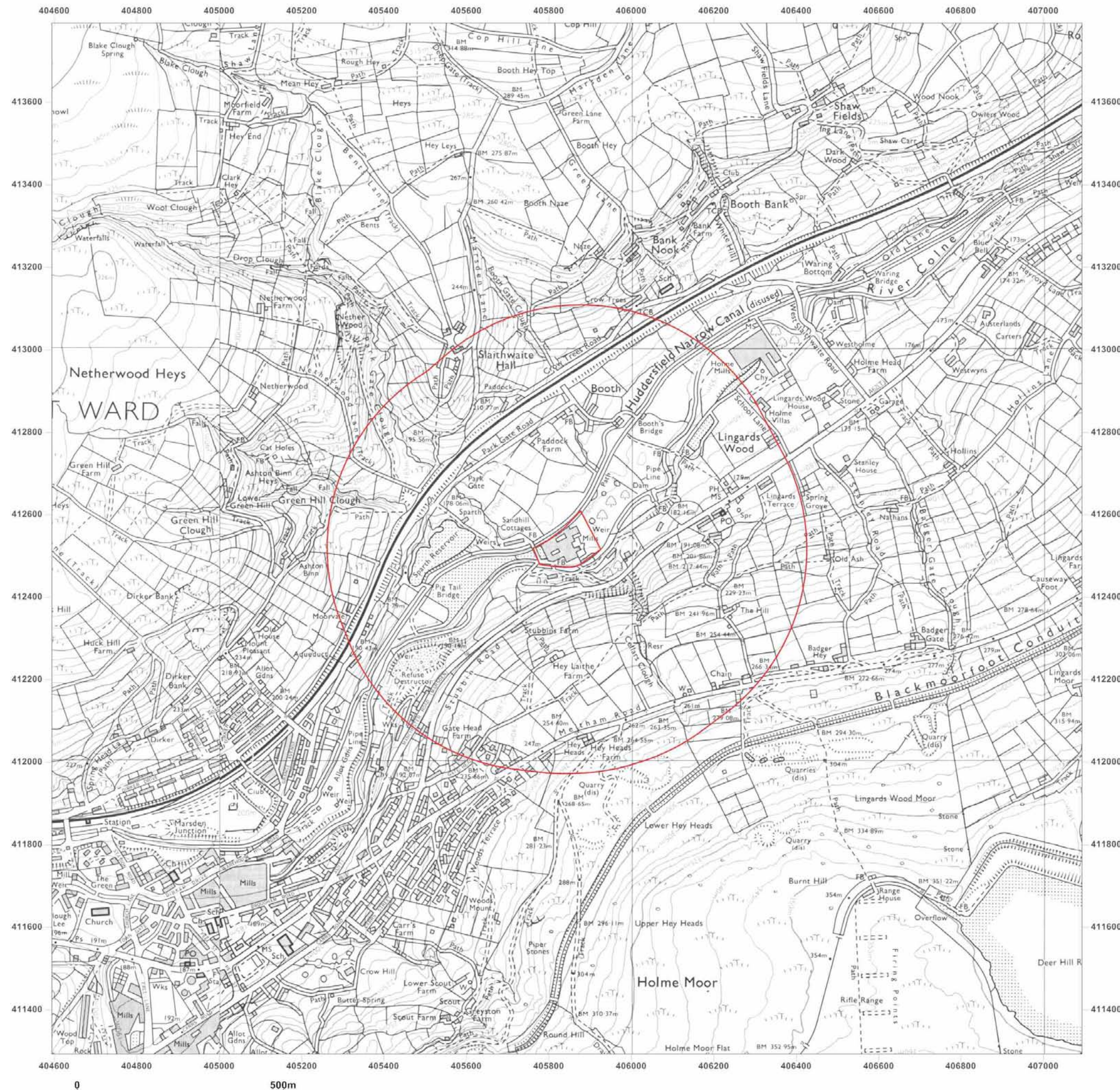


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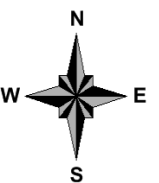
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Grid Ref: 405843, 412541

Map Name: Provisional

Map date: 1951

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1951
Revised 1951
Edition N/A
Copyright N/A
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Surveyed 1951
Revised 1951
Edition N/A
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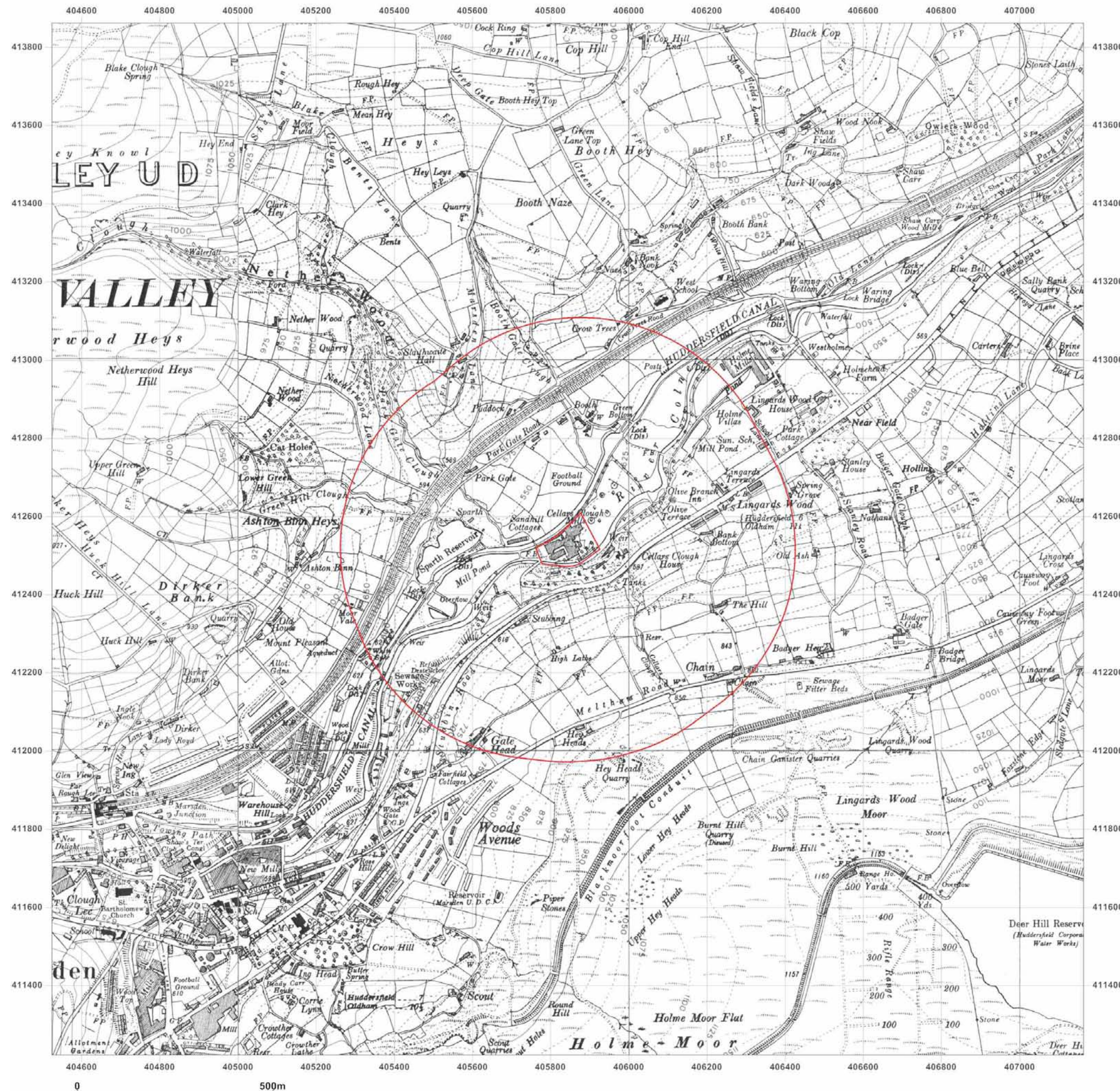


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Site Details:

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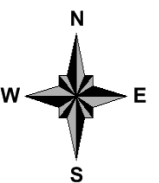
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Grid Ref: 405843, 412541

Map Name: County Series

Map date: 1948

Scale: 1:10,560

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Surveyed 1849
Revised 1948
Edition N/A
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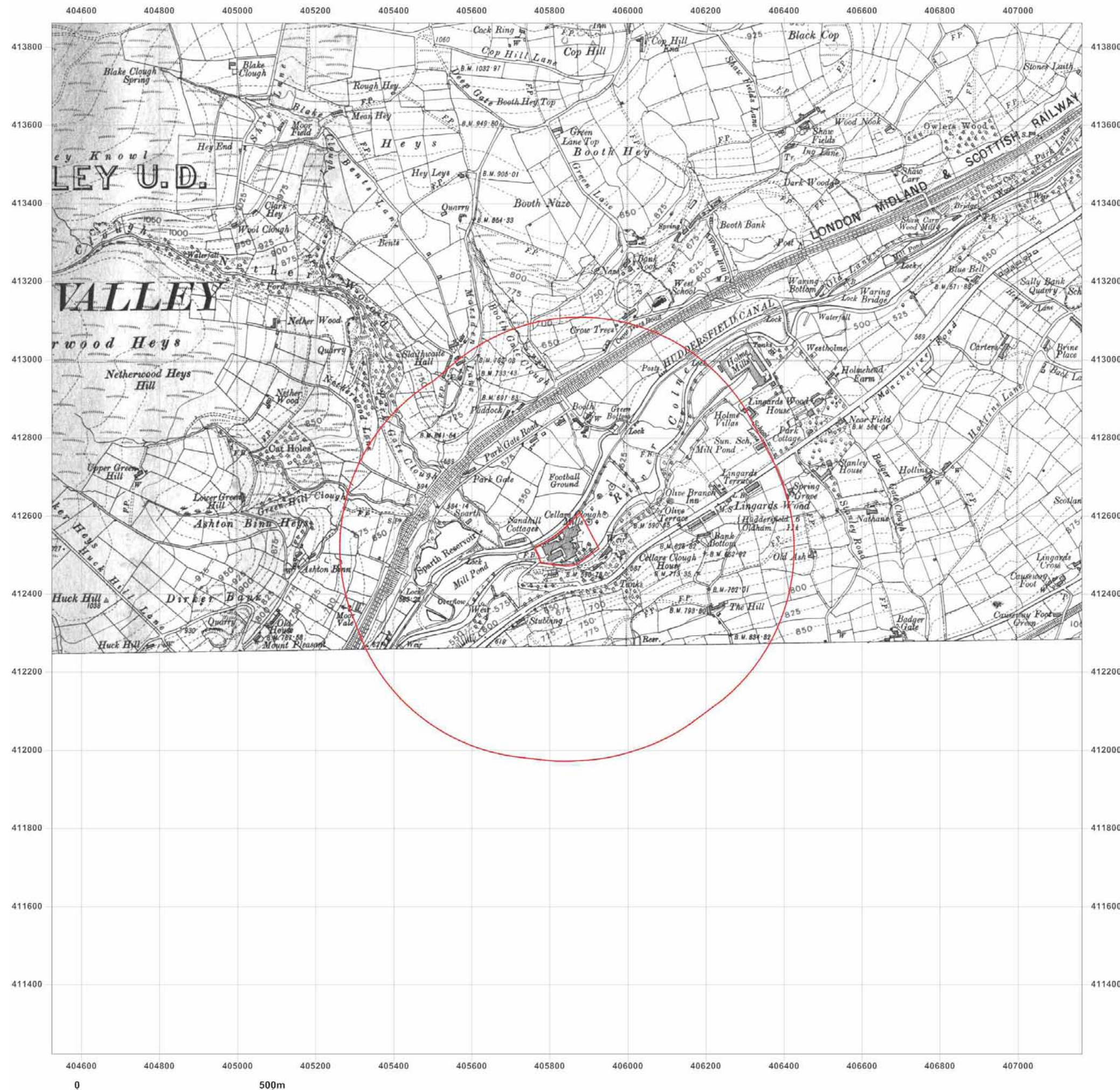


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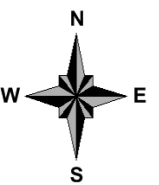
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Grid Ref: 405843, 412541

Map Name: County Series

Map date: 1930

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1849
Revised 1930
Edition N/A
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Surveyed 1850
Revised 1930
Edition N/A
Copyright N/A
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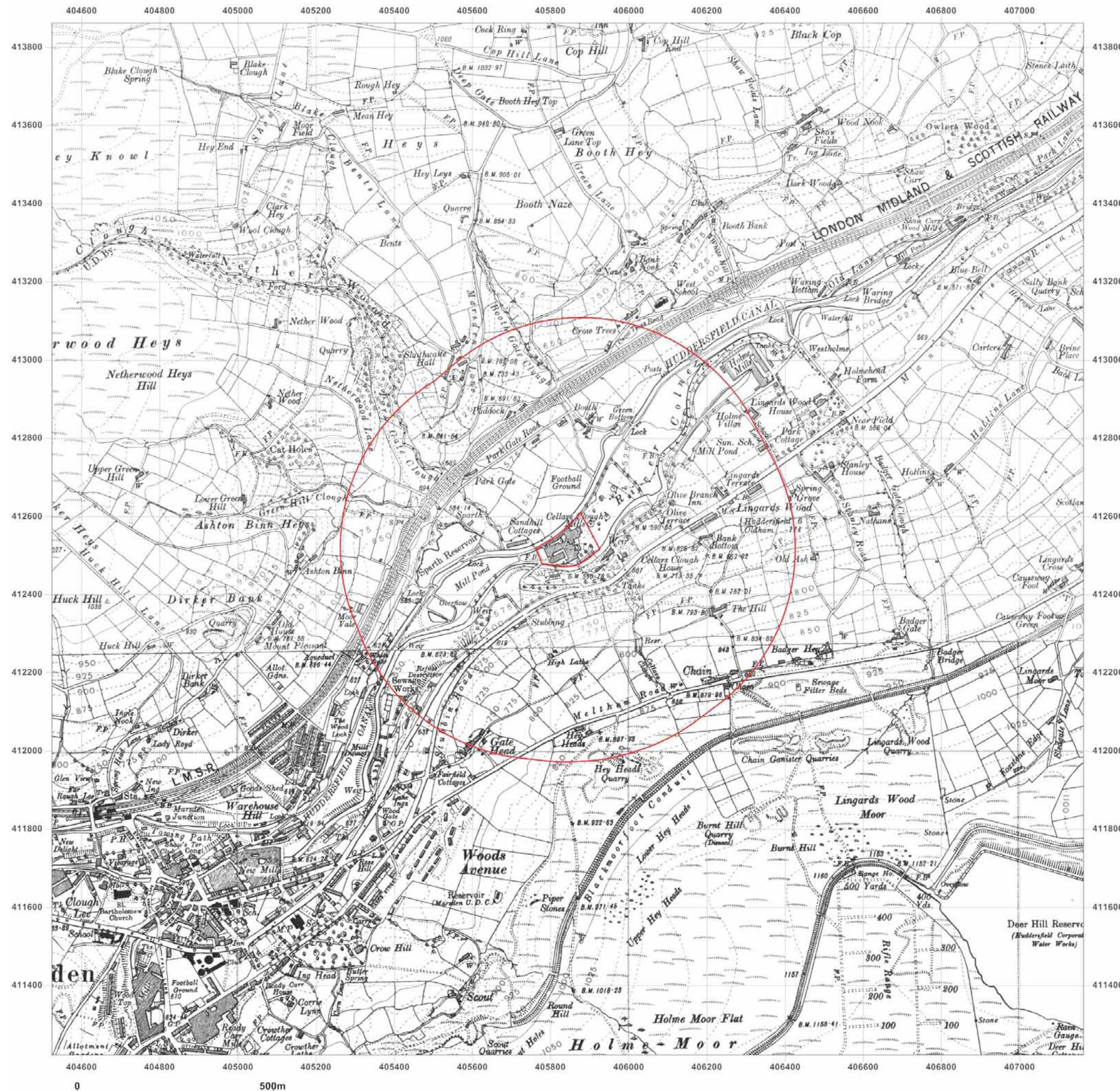


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Client Ref: 4873
Report Ref: CMAPS-CM-162672-4873-100712HIS
Grid Ref: 405843, 412541

Map Name: County Series

Map date: 1904

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1890
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Edition N/A
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Revised 1904
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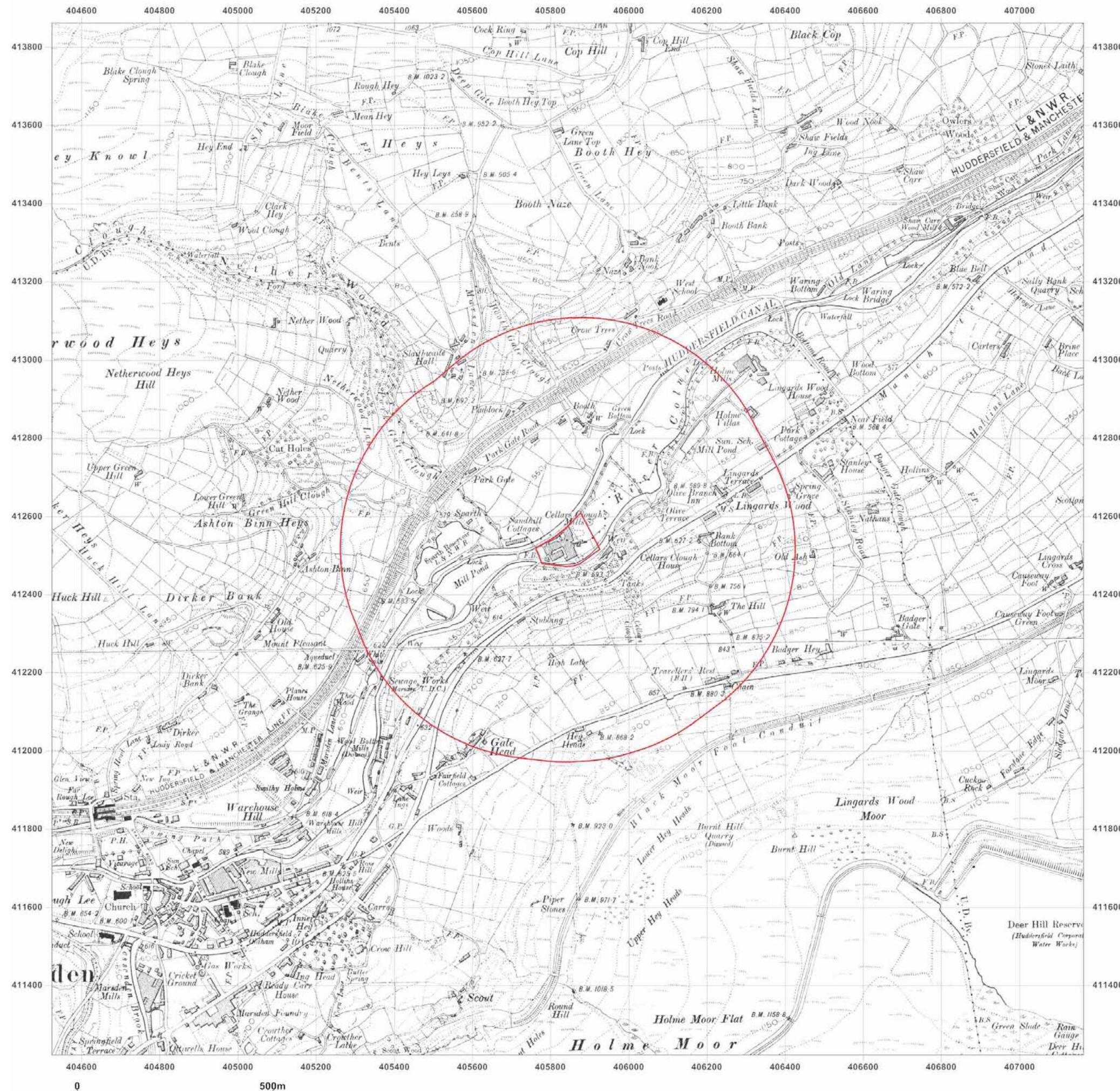


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Client Ref: 4873
Report Ref: CMAPS-CM-162672-4873-100712HIS
Grid Ref: 405843, 412541

Map Name: County Series

Map date: 1890

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1890
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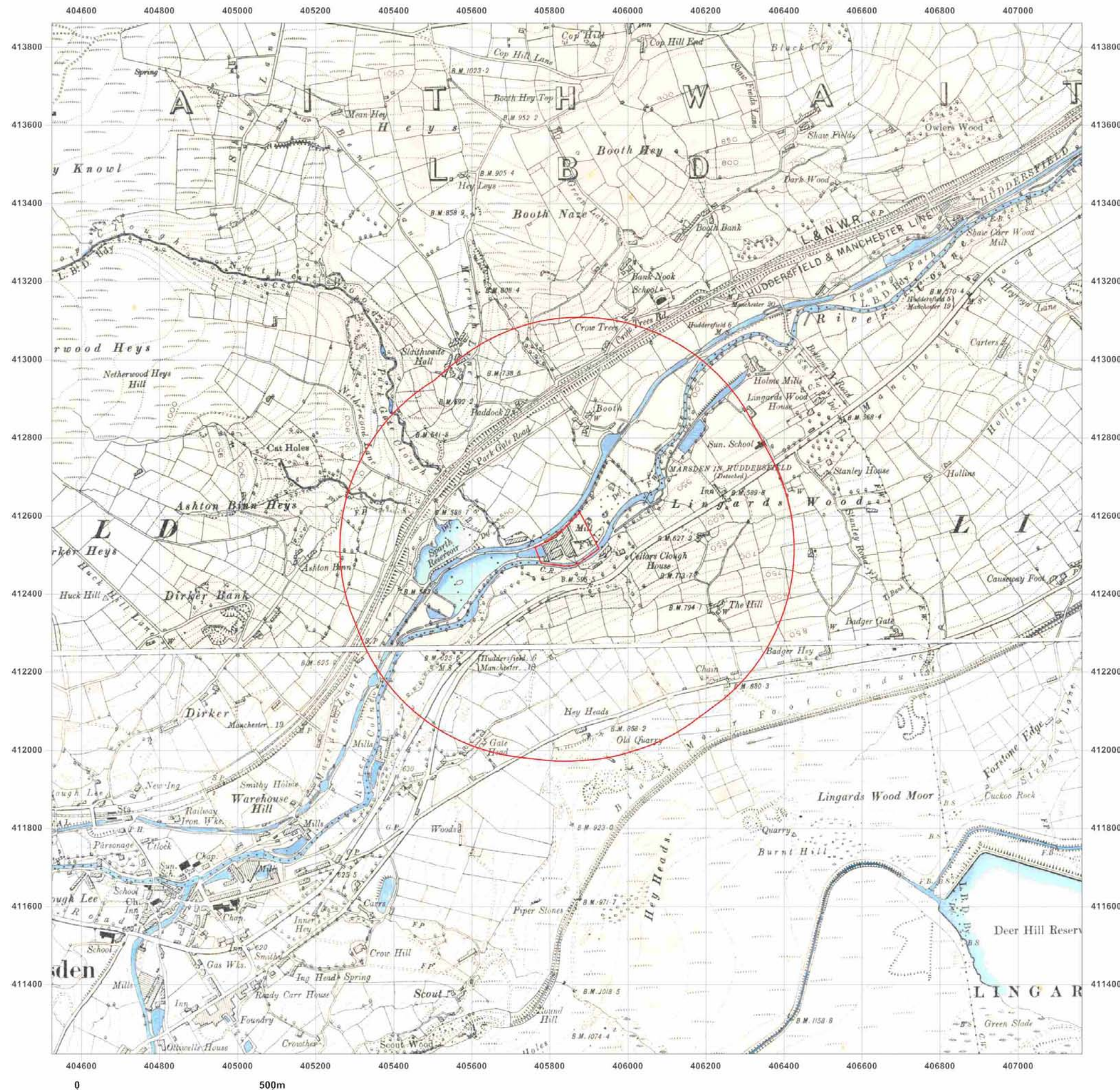


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Site Details:

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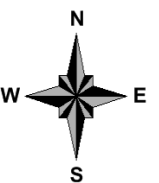
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Grid Ref: 405843, 412541

Map Name: County Series

Map date: 1854

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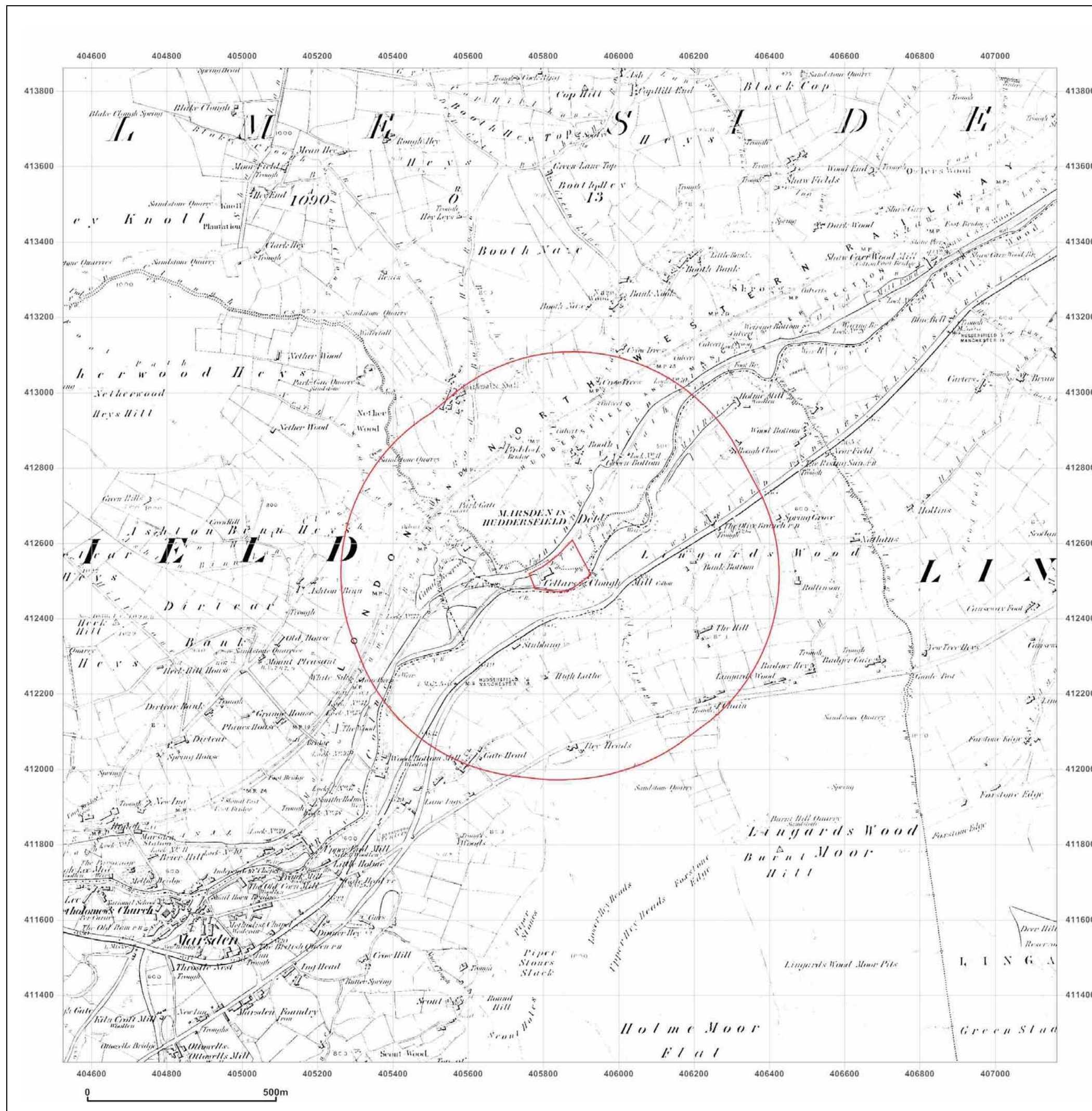


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Appendix **B**





View over mill pond and front of Cellar Clough Mill



View north east along the south of the site



Scrap metal and plastic in south of site



View north from south of site.



North east corner of site



Footpath over mill pond in far west of site



View south west over northern part of site



Interior of existing mill

Appendix C



The COAL AUTHORITY

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG

Website: www.groundstability.com Phone: 0845 762 6848 DX 716176 MANSFIELD 5

**ASHTON BENNETT
BRIDGE MILLS
HOLMFIRTH
HD9 3TW**

Our reference: **51000118835001**
Your reference: **3034**
Date of your enquiry: **10 July 2012**
Date we received your enquiry: **10 July 2012**
Date of issue: **10 July 2012**

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

Non-Residential Coal Authority Mining Report

CELLARS CLOUGH MILL, MARSDEN, NEAR HUDDERSFIELD, HD7 6NA

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	No
Brine Compensation District	No

Information from the Coal Authority

Underground coal mining

Past

According to the records in our possession, the property is not within the zone of likely physical influence on the surface from past underground workings.

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 or otherwise work 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.

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.

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 subject property, or any property within 50 metres, since 31st 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 not in an area for which a notice of entitlement to withdraw support has been published.

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.

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.

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Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	10 July 2012
Issued to:	ASHTON BENNETT BRIDGE MILLS HOLMFIRTH HD9 3TW
Property Search for:	CELLARS CLOUGH MILL, MARSDEN, NEAR HUDDERSFIELD, HD7 6NA
Reference Number:	51000118835001
Date of Issue:	10 July 2012
Cost:	£64.00
VAT @ 20%:	£12.80
Total Received:	£76.80
VAT Registration	598 5850 68

Location map



Approximate position of property

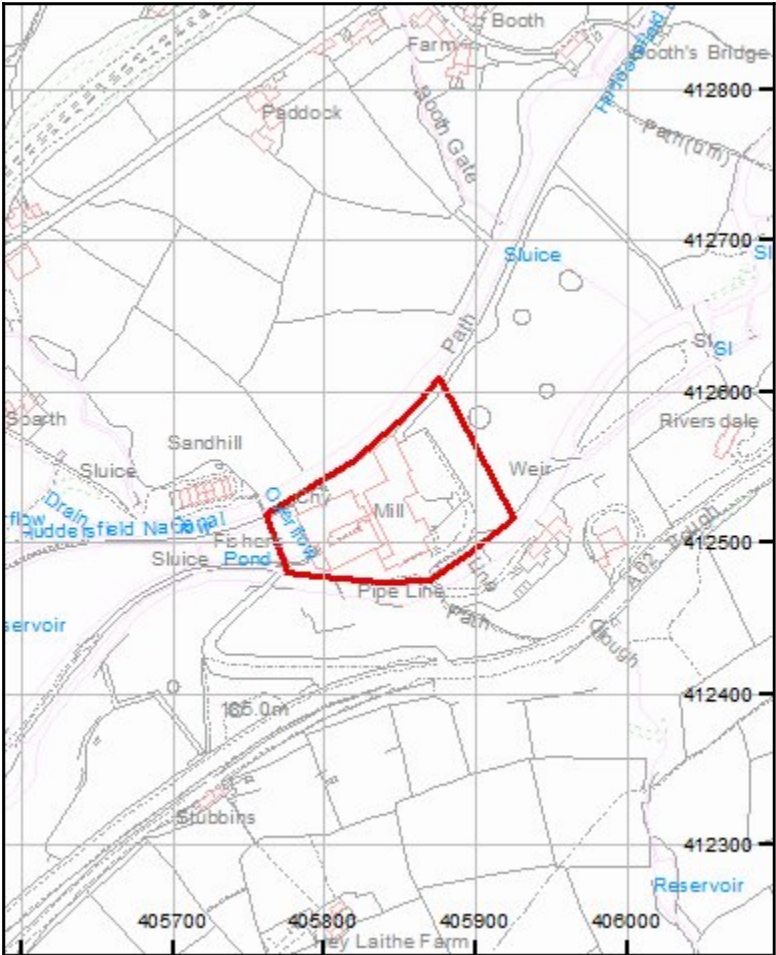


Enquiry boundary

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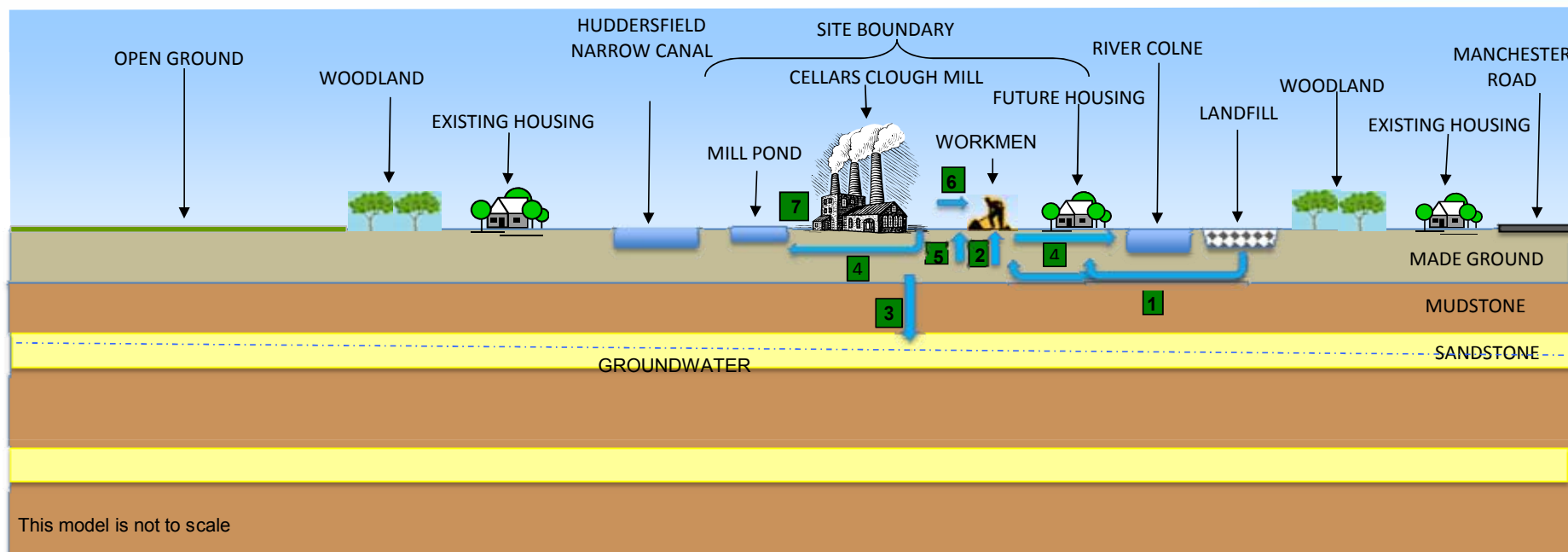
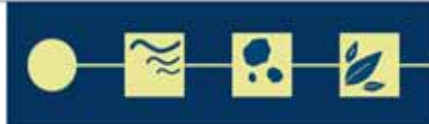
Key

Approximate position of enquiry boundary shown



Appendix D





SOURCES	PATHWAYS	RECEPTORS	RISK	GEOLOGY
<u>HISTORICAL USE AS</u>				
OPEN LAND	1 Inhalation of vapours	Workmen / future site users / adjacent land uses	Low/Mod - Landfill within 250m requires monitoring	MADE GROUND SANDSTONE MUDSTONE
MILL BUILDINGS	2 Ingestion and or skin contact	Workmen / future site users/ adjacent land uses	Mod - requires soil/water testing & mitigation measures	
<u>CURRENT USE AS</u>	3 Ingestion of drinking water / leaching to groundwater	Groundwater.	Low - No potable boreholes within 1000m	
DISUSED MILL WITH MILL PONDS	4 Leaching to surface water	Surface water/ mill ponds	Low/Mod - due to proximity to surface water and mill pond.	
<u>OFF SITE</u>				
RESIDENTIAL	5 Ingestion of plants/animals/veg	Future occupants / adjacent land uses	Low / Moderate - requires ground investigation	APPENDIX D
RIVER COLNE	6 Inhalation of dust	Workmen / adjacent land users	Low - assuming good construction practice	
CANAL	7 Ground subsidence/mill pond failure	Workmen/future site occupants	Low - Risk of damn wall stability	
MILL PONDS				

