

Appendix D: Ground Conditions

Appendix D.3: Coal Mining Risk Assessment



Hollingworth Road, Littleborough

Coal Mining Risk Assessment

On behalf of **Bloor Homes**

Project Ref: 332010570/3501/R02 | Rev: 02 | Date: February 2024

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For and on behalf of Stantec UK Limited				

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01	Apr 23	First Issue	DBi	CE	OtB
02	Feb 24	Updated following revisions to the proposed development layout plan	RM	OtB	OtB

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1 Introduction

1.1 Proposed Development

- 1.1.1 Bloor Homes propose to submit a planning application for residential development of site approximately 19 hectares (ha) to the immediate west of Hollingworth Road, to the north-east of Smithy Bridge and south of Littleborough, near Rochdale, Greater Manchester.
- 1.1.2 The site is being considered for a mixed end use, with approximately 310 residential dwelling and a primary school proposed in the south east corner, together with associated open space, infrastructure and attenuation ponds.
- 1.1.3 Stantec UK Ltd (Stantec) has been appointed by Bloor Homes to prepare a Coal Mining Risk Assessment (CMRA) for the site to support the planning process. This CMRA is reliant primarily on third party sources and historical records. While reasonable efforts are made by Stantec to check the accuracy of the data, we do not warranty the accuracy, completeness, and reliability of these data sources. The data available is used in good faith, but going forward, in no event will Stantec be liable for any loss or damage arising from the use of this data. The Client needs to be aware that there is always a possibility of third-party data errors that may affect interpretations later utilised in design work.
- 1.1.4 This report should be read in conjunction with the notes included in **Appendix A**.

1.2 Regulatory Framework

- 1.2.1 The site is situated within a Coal Authority Reporting Area with a small, identified Development High Risk Area shown adjacent the north-west corner, coincident with a former mine entry (shaft). Therefore, given the close proximity of the High Risk Area to the proposed development site in an area of known former coal mining, a Coal Mining Risk Assessment (CMRA) report has been prepared to satisfy the requirements of the Coal Authority.
- 1.2.2 It is a requirement that a CMRA should be undertaken by a Competent Person(s). Accordingly, this risk assessment was prepared by David Bissell (41 years' experience, MSc, BSc (Hons), CGeol, FGS) and is reviewed by Dr Clive Edmonds (45 years' experience, PhD, MSc, BSc (Hons), DIC, CGeol, CSci, EurGeol, FGS).

1.3 Objectives and Scope

- 1.3.1 The objectives of this Coal Mining Risk Assessment are to:
- present a desk-based review of all available information on the coal mining issues which are relevant to the site.
 - to identify and assess the risks to the proposed development from the coal mining legacy, including the cumulative impact of issues.
 - identify 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 will influence the proposed development.
 - demonstrate that the application site is, or can be made, safe and stable with regard to development on unstable land.
- 1.3.2 Where the above considerations cannot be fully satisfied by the desk-based data and assessment, it will be necessary to undertake further works. Such works could consist of either

intrusive ground investigation works or be incorporated into the design of stabilisation measures for the site.

1.3.3 This report has been prepared in electronic pdf format only.

1.4 Site Location and Topography

1.4.1 The Site comprises 18.85 hectares (ha) of land to the north-east of Smithy Bridge and south of Littleborough, near Rochdale, Greater Manchester. The Rochdale Canal forms part of the northern boundary of the site, and Hollingworth Lake is to the south.

1.4.2 The site is centred approximately at British Grid Reference SD 93341 15448 and its boundary is outlined in blue on the Location Plan shown in **Figure 1-1**.



Figure 1-1 General Site Location and Extent

1.4.3 The site is located on the southern flank of a valley feature associated with the River Roch which is to the north. The land is variable in topography, with a high point in the north-west corner where Brown Brow Hill (which has an Ordnance Survey (OS) triangulation survey point atop) has a level of 181 m aOD (above Ordnance Datum). The land falls away to the north, east and south from this local hill. Along the northern boundary with the Rochdale Canal, ground levels are about 150 m aOD, to the east of the hill a shallow valley feature is present through the central part of the site towards the River Roch. Ground levels at the eastern boundary along Hollingworth Road are about 160m aOD near the canal rising to 175m aOD near Hollingworth Lake. To the east of the site and Hollingworth Road the land rises steadily towards Cleggwood Hill with a level of 207 m aOD atop the hill feature.

1.4.4 This variable topography is characteristic of the surrounding landscape.

- 1.4.5 The Hollingworth Lake is an impounded Victorian era reservoir (originally constructed to provide water for the Rochdale Canal). The reservoir site was not a natural choice for a reservoir, as there was no natural hollow or valley. Consequently, three large earth embankments were built to enclose the reservoir. The main embankment, Hollingworth Bank, which forms the southern boundary of the site is approximately 11 m high and about 200 m in length.
- 1.4.6 An unusual feature of the site is a small area along the northern boundary which has a terraced appearance. This area is commensurate with an area of a British Geological Survey (BGS) recorded landslip feature (see **Section 4.1**).

1.5 Consultations

- 1.5.1 Stantec has obtained information on the geological setting of the site from review of web-hosted data made available by the BGS and information on legacy coal mining direct from The Coal Authority.
- 1.5.2 Information on the environmental and historical setting of the site has been obtained through procurement of Groundsure reports.

1.6 General Notes

- 1.6.1 This report should be read in conjunction with the guidance for readers include at the rear of the main report text.

2 Desk-based Information Review

2.1 Data Sources

2.1.1 The following sources of information have been consulted in the preparation of this CMRA:

- Betts Geo Ground Investigation Report 18BLH008/GI dated September 2019. Hollingsworth Road, Littleborough. For Bloor Homes
- Department of Scientific and Industrial Research. Memoirs of the Geological Survey, England. Explanation of Sheet 76 (Rochdale) – The Geology of the Rossendale Anticline. 1927.
- British Geological Survey: Geology of England & Wales, 1:50,000 Series, Sheet EW076 Rochdale, Bedrock Edition published 2008 & 1:50,000 Series, Sheet EW076 Bedrock and Superficial Edition published 2008
- British Geological Survey: Sheet Explanations England and Wales (1:50,000 Series). Geology of the Rochdale district – a brief explanation of the geological sheet 76 Rochdale. Published 2010
- British Geological Survey: Geology of England and Wales (1:10,000 Series). Sheet SD91NW [1-3-2002]
- British Geological Survey (web hosted): GeoIndex Onshore Borehole Database accessed 13 January 2023
- Coal Authority Interactive Mapping Viewer¹ accessed 13 January 2023
- Coal Authority Consultants Coal Mining Report, Land north of Smithy Bridge, Littleborough, OL15 0NE (Ref. 51002604543001/HMD-8121639 Durham, dated 13 August 2021)
- Coal Authority Mine Abandonment Plans
- Google Earth - Publicly available online aerial photography viewed 13 January 2023
- Groundsure Map Insight report GS-9027685 produced 13 August 2021
- Groundsure Enviro Insight report HMD-8121637 produced 13 August 2021
- Groundsure Geo Insight report HMD-8121638 produced 13 August 2021
- Littleborough Local History – weblink [Cleggswood Colliery Littleborough \(littleboroughshistory.org\)](http://Cleggswood_Colliery_Littleborough_(littleboroughshistory.org)) viewed 13 January 2023
- National Library of Scotland web-hosted Ordnance Survey Maps – 25 inch England and Wales, 1841 -1952 data set, viewed 13 January 2023

2.1.2 The Ordnance Survey (small scale) 1:10,560 and 1:10,000 Series mapping is included in **Appendix B**.

2.1.3 The Coal Authority Consultants Coal Mining Report together with an accompanying plan are included in **Appendix C**.

2.1.4 The Mine Abandonment Plans obtained from the Coal Authority are included in **Appendix D**.

¹ The Coal Authority Interactive Viewer is updated on an annual basis

3 Land Use History

3.1 Introduction

- 3.1.1 This section presents a summary of current and historical land uses on and adjacent to the site. Land use is used to inform the potential hazard identification element of the risk assessment.

3.2 Current Land Use

- 3.2.1 The site currently comprises predominantly agricultural or open land with Lower Clegg Farm in the central part and a car park in the south-east corner. The Former Akzo Nobel Site borders the site to the north-east and the Hollingworth Lake is to the south.
- 3.2.2 A recent aerial image of the site taken from the Groundsure report with the site boundary shown highlighted in red and other features annotated is reproduced below as **Figure 3-1**.

Figure 3-1 Recent aerial imagery



3.3 Historical Land Use

- 3.3.1 **Table 3-1** below summarises historical features both onsite and in the vicinity based on selected historical Ordnance Survey maps obtained from Groundsure (and on the National Library of Scotland website), aerial imagery on the Google Earth platform and other web-based sources which have significance to the site history and past/ recent-past land use, and other web-hosted resources.
- 3.3.2 The OS historical map record comprises both small scale (1:10,560 and 1:10,000) and large scale (1:2,500) data sets. The small scale data set is included in **Appendix B**.

Table 3.1 General Site History Summary (OS Mapping)

OS Country Series 1851	The 1:10,560 scale map shows the site to comprise part of nine field enclosures with the <i>Lower Clegg</i> farmstead in the central part on Lower Cleggs Lane which bisects the site. A second property <i>Heald</i> is on the lane to the south. Fen Bank and Fen Lane form the southern boundary with the Hollingworth Reservoir to the south. Two (groundwater) <i>wells</i> are shown at this second property. The lane crosses the canal at the northern boundary by Browns Bridge. The property <i>Brown Bank</i> is shown to the east of the bridge. A <i>Drain / Conduit</i> is shown to cross the eastern part of the site from the lake running northwards and crossing the lands to the north to the Rochdale Canal. The canal forms part of the northern boundary, with the Lancashire & Yorkshire Railway line, the River Roch and Littleborough (with various woollen and textile Mills) to the north. The eastern boundary is in part formed by a road labelled <i>New Road</i> and in part by fields. A <i>Sandstone Quarry</i> is labelled in the north-west corner of the site, with a second quarry 150 m to the north of the site's north-eastern corner, and a further quarry about 100 m to the south of the south-west corner. An <i>Old Coal Pit</i> is shown near the quarry about 125 m to the north of the site boundary. The <i>Cleggs Wood Colliery</i> is shown 400 m north-east of the site on Cleggs Wood Hill A property labelled Brown Lodge is shown 250 m to the south-west of the site, close to the canal and the Lodge Bridge (over the canal).
OS County Series 1890-1892	<i>Brown Brow Hill</i> is shown in the north-west corner with a survey triangulation point identifying a local high point. The sandstone quarry is now labelled <i>Old Quarry</i>. A <i>Well</i> is shown a short distance to the west of the north-western corner of the site near the canal. The Paragon Works are recorded 250 m west of the site (on land between the canal and the railway). The road to the east previously <i>New Road</i> is now labelled as <i>Hollingworth Road</i>. On the land to the north-east (what becomes the Akzo Nobel Site – see Figure 3-1) the Clough Field Works and Clegg Works are now present. A reservoir is now also shown adjacent the central part of the eastern boundary, but the former drain/ conduit is no longer shown. The sandstone quarry to the south-west of the site is now labelled <i>Old Quarry</i>. Within the Cleggswood Oil Distillery to the immediate north-east, an '<i>Old Shaft (Coal)</i>' is marked and labelled (On 25 inch series map) The Cleggs Wood Colliery to the north-east of the site is no longer present. The Brearley Colliery is recorded about 700 m to the east of Hollingworth Road.
OS County Series 1907-1909	No significant change, other than <i>Heald Lane</i> is no longer shown to extend across the site, now only present as short sections in the northern and southern parts of the site. A <i>Spring</i> is now recorded close to the <i>Heald</i> property. The well recorded previously on the 1890-1892 map edition close to the north-west corner of the site is now labelled <i>Air Shaft</i>. The Cleggswood Oil Distillery is now recorded to the north-

	east. <i>Shafts</i> and <i>Old shafts</i> are now shown on the land to the east of Hollingworth Road. <i>Levels</i> (mine adits) are also shown around <i>Cleggswood Hill</i> .
OS County Series 1928	A building labelled <i>Water Meter House</i> is shown on the southern boundary at the base of a linear bank feature now depicted long the road. Hollingworth Reservoir is now labelled Hollingworth Lake. Adjacent the eastern boundary, an area of ground working is shown adjacent the small reservoir. The air shaft adjacent the north-west corner of the site is now labelled <i>Old Air Shaft</i>.
OS County Series 1938	No significant change to the site. On the land to the east of Hollingworth Road (Cleggswood Hill), <i>Old Levels</i> and <i>Old Shafts</i> are recorded.
OS Provisional Edition 1948-1954	No significant change has occurred to the site.
OS Provisional Edition 1967-1968	To the immediate north of Lower Cleggswood Farm an oval enclosure is now shown to the west of Heald Lane – this a possible area of ground working? The old air shaft close to the north-west corner of the site is not shown. The industrial site to the north-east is now simply labelled as <i>Works</i> .
OS National Grid 1976	The oval enclosure depicted on the previous map edition is no longer recorded. Residential development has taken place immediately to the west of the site. The development extends over the former sandstone quarry to the south-west.
OS National Grid 1989	A Car Park is now shown in the south-east corner. No other significant land use change has occurred to the site.
OS National Grid 2001	No significant change has occurred to the site.
OS National Grid 2010	The industrial site to the north-east is now shown as open land in 2010.
OS National Grid 2022	No significant change has occurred to the site or immediate surrounding lands.

4 Site Geology

4.1 Published Geology

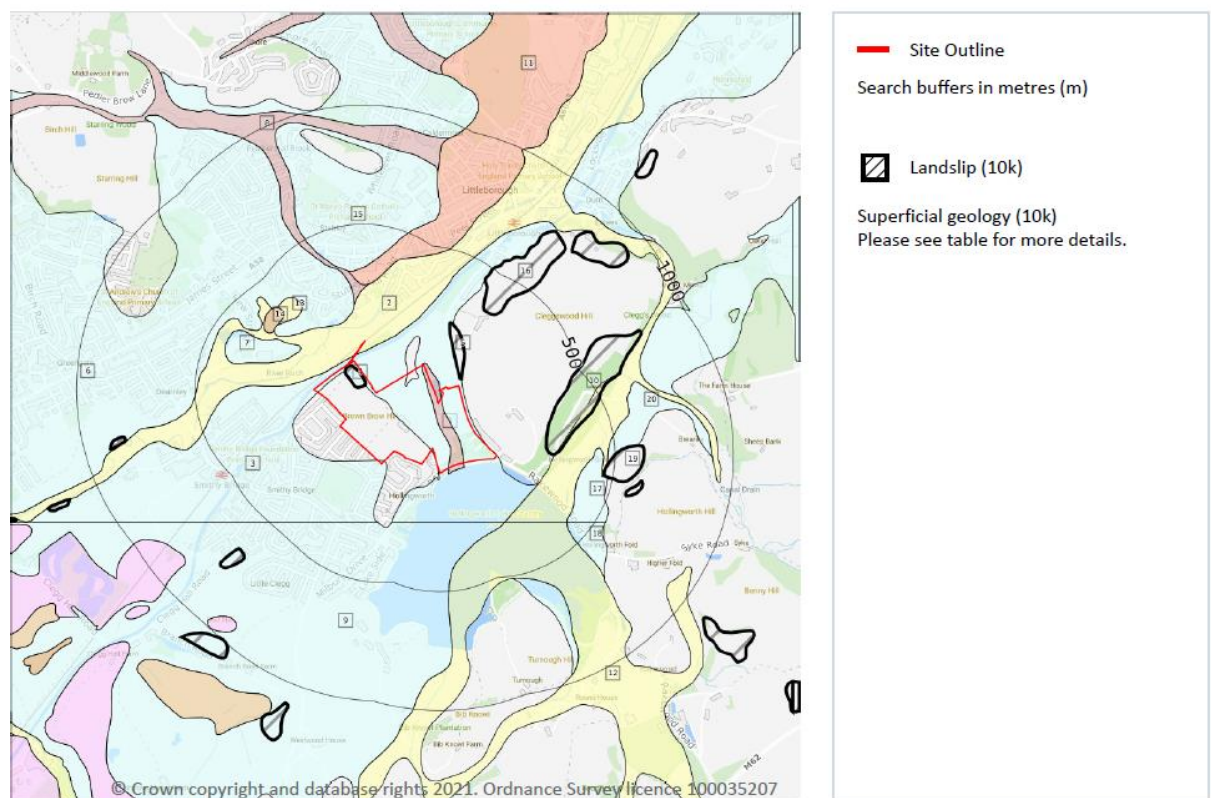
4.1.1 The 1:50,000 Series Sheet for the Rochdale district (EW76, Bedrock and Superficial edition, published 2009), shows the site to be underlain by bedrock strata of the Pennine Lower Coal Measures locally overlain and masked by Till deposits (gravelly glacial clays formerly termed 'boulder clay'). A narrow tract of Head deposits is shown in the central part of the site extending southwards to the current Hollingworth Lake (a flooded valley feature to form a Victorian era reservoir).

4.1.2 The site is also covered by the 1:10,000 Series Sheet SD91NW (Solid and Drift Edition) dated 2002.

Superficial (drift) geology

4.1.3 An Extract from the current BGS 1:10,000 digital map (included in the Groundsure Geo + Enviro Insight report) showing the superficial geology is shown below.

Figure 4-1 Superficial Geology



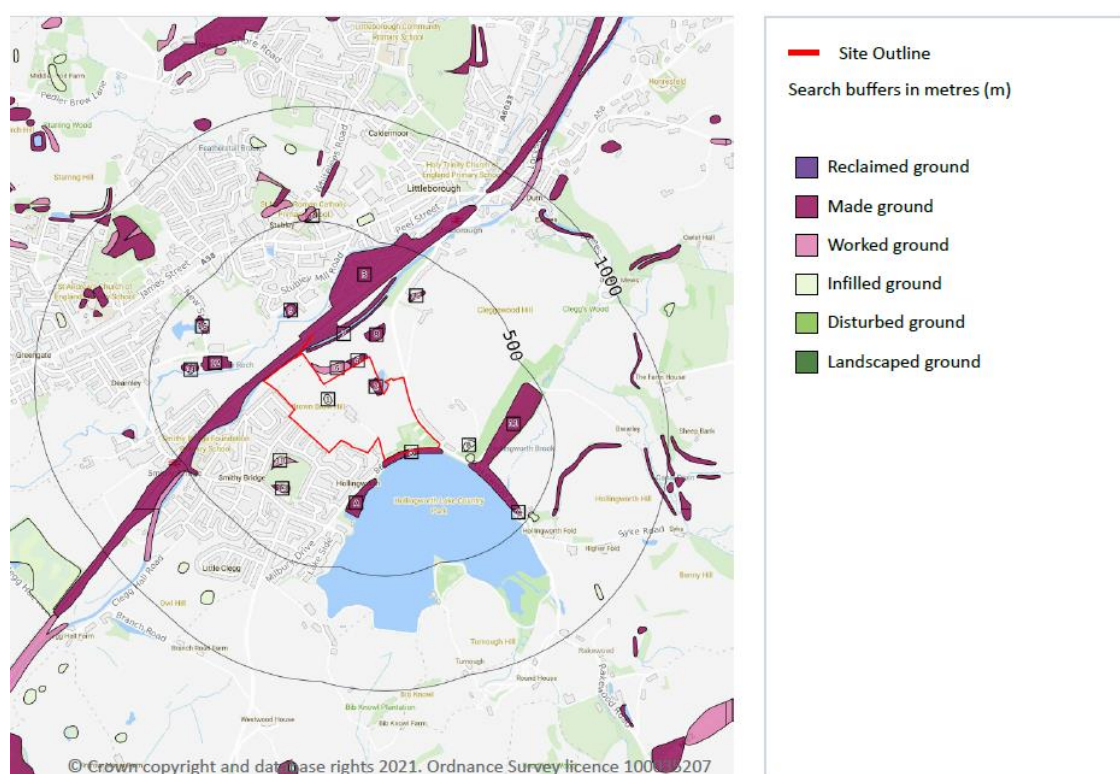
ID	Location	LEX Code	Description	Rock description
1	On site	HEAD-DMTN	Head - Diamicton	Diamicton
2	On site	ALV-XCZSV	Alluvium - Clay, Silt, Sand And Gravel	Clay, Silt, Sand And Gravel
3	On site	TILLD-DMTN	Till, Devensian - Diamicton	Diamicton

- 4.1.4 **Head:** The 1:10,000 Series map for the district describes this as comprising 'Sandy clay and silt'. Typically, the memoir for the district notes that Head is generally confined to steep slopes, but may be more extensive than mapped.
- 4.1.5 **Alluvium:** These fluvial deposits occur along the tract of the River Roch to the immediate north of the site and typically comprise clay and silt with a variable gravel content.
- 4.1.6 **Till:** This is described as typically 'Clay, grey-brown, pebbly, sandy and silty, stiff'.
- 4.1.7 **Landslip:** An area of landslip is shown on the published map on the northern boundary. These are a local feature of the Rochdale district often associated with glacially oversteepened valleys, faulting, and/ or stream rejuvenation in drift filled valleys.
- 4.1.8 The 1:10,000 Scale map of the area (Sheet SD91NW) depicts a deep buried (drift infilled) channel feature immediately to the north of the site aligned north-east to south-west, with the southern extent of the channel at this location broadly delineated by the canal. The feature is a glacial meltwater channel.

Artificial ground

- 4.1.9 The current BGS Digi Map coverage includes areas of artificial ground. **Figure 4-2** below shows an extract of this map layer covering the site.

Figure 4-2 Artificial and Made Ground (BGS Digi Map layer)



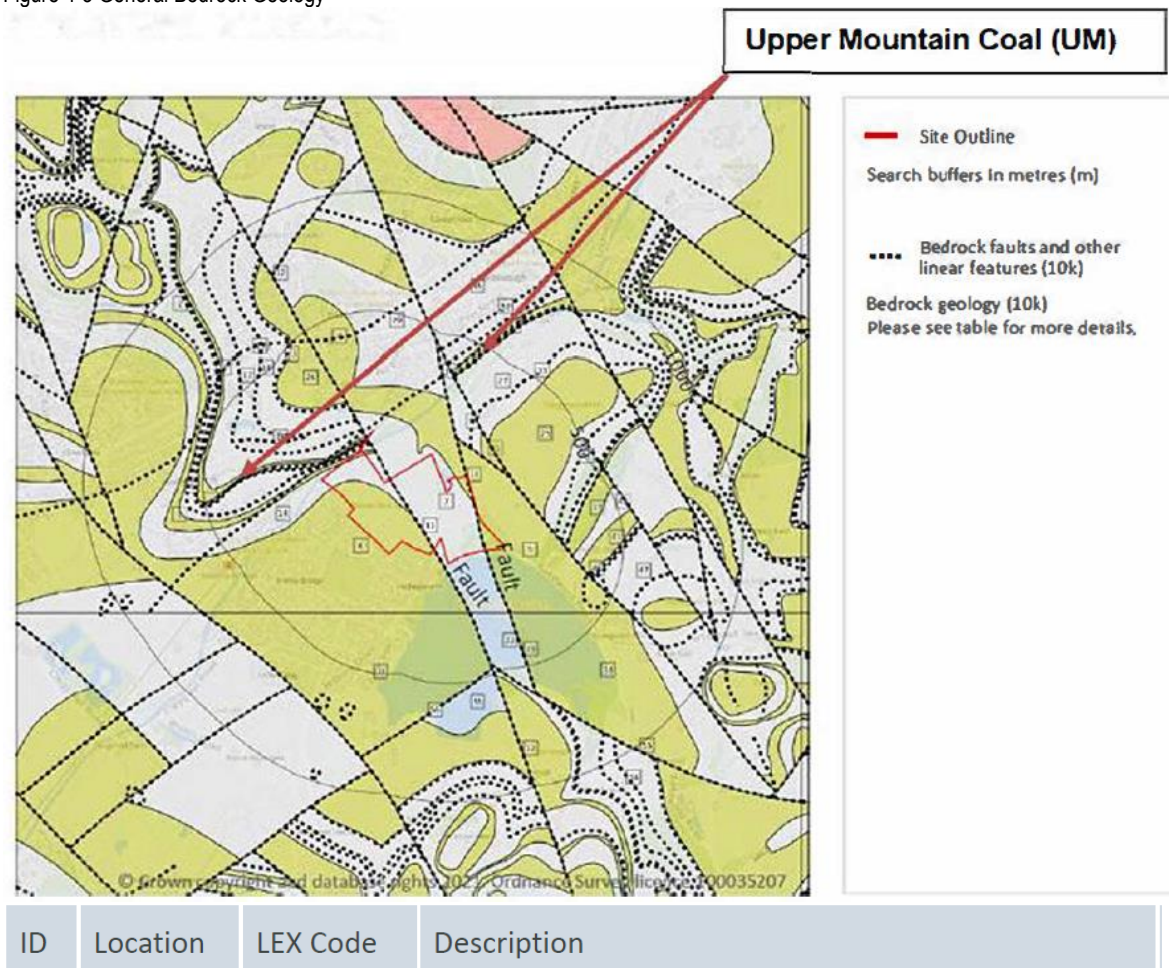
- 4.1.10 The Artificial/ Made Ground depicted on **Figure 4-2** as occurring on the site relate to:
- A bank feature along the southern boundary of the site (presumably the earth dam for the Victorian era Hollingworth Reservoir now Hollingworth Lake)
 - An area of 'ground working' to the immediate west of a small (industrial) reservoir on the eastern site boundary recorded on the 1928 OS map edition (see **Table 3-1**).

- 4.1.11 In addition to these two areas, the 1:10,000 Scale map (Sheet SD91NW) depicts a small area of Made Ground adjacent to Heald Lane and to the north of Lower Cleggswood Farm, in the central part of the site.

General bedrock geology

- 4.1.12 The BGS 1:10,000 digital map also includes a layer showing bedrock geology. An extract covering the site is reproduced below (with annotations).

Figure 4-3 General Bedrock Geology



- 4.1.13 The bedrock beneath the site consists of the Pennine Lower Coal Measures Formation (PLCM), which rest conformably on the Millstone Grit Group. The PLCM consist of interbedded mudstone, siltstone and sandstone with subordinate coal and seatearth deposited in cyclic sequences. The mudstones are typically dark grey to black weathering to orange-brown, planar laminated and micaceous, or massive. The mudstones are commonly overlain gradationally by siltstones, which are typically medium grey and grading vertically and laterally into sandstones.
- 4.1.14 The published memoir notes that the sandstones commonly form mappable, topographical features and are thus distinguished on the map from the mudstones and siltstones. The

sandstone units that are prevalent around the site include the Milnrow Sandstone (MS) which is recorded up to 50 m thick, the Darwen flags (DF) up to 10 m thick, the Great Arc Sandstone (GA) up to 9 m thick, and the Woodhead Hill Rock (WH), which is recorded at 10-45 m thick. Due to the bedrock being very close to the surface in many areas some of these sandstone units were quarried for stone for local building use. Within the sequence there are thin coals, seatearths and marine bands².

Structural geology

- 4.1.15 The Littleborough area lies within a large southwest to northeast trending open fold, known as the Rossendale Anticline. Across the anticline, the strata have a broadly northerly or southerly dip of 2 to 5 degrees. The available 1:10,000 Series Sheet SD91NW records a generalised dip of the strata of 5 degrees to the south in this general location.
- 4.1.16 The site is bisected by two faults as shown on **Figure 4-3**. Both broadly trend north-west to south-east; one bisecting the central part of the site following the approximate historical alignment of Heald Lane, the second bisecting the south-eastern corner. Both are shown as normal faults downthrown to the north-east. The fault that runs parallel to Heald Lane has a reported downthrow of 60 m to the east, whilst the fault that crosses the south-eastern corner of the site and Hollingworth Road has a downthrow of 12 m also to the east.

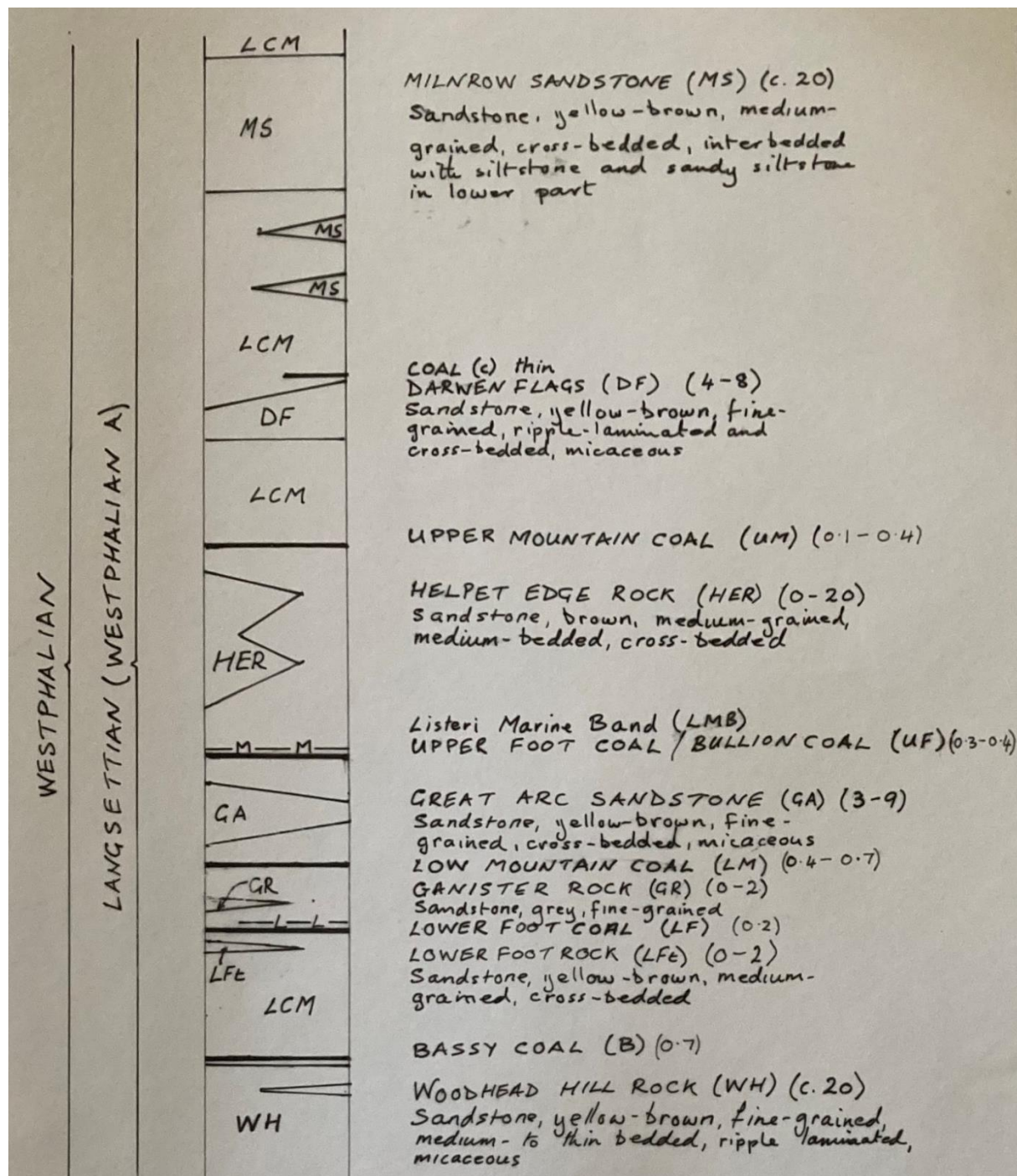
4.2 Coal Geology

Published map and district memoirs

- 4.2.1 The published memoir notes that coal seams are extensive in the district, but they vary laterally in thickness and composition, particularly by the number of dirt bands present within a seam. The coals generally cap upward-coarsening sedimentary cycles and are underlain by seatearth.
- 4.2.2 There are no recorded coal outcrops on the site or coal sub-crops beneath the superficial drift cover where present. The closest recorded outcrop is the Upper Mountain Coal – see **Figure 4-3**. The outcrop is fault controlled here by the fault that is parallel to Heald Lane.
- 4.2.3 An extract from the generalised vertical section summarising the stratigraphical sequence including associated coal seams (as depicted on the 1:10,000 Sheet SD91NW) is reproduced overleaf in **Figure 4-4**. The coal seams beneath the Milnrow Sandstone relevant to the site are:
- Upper Mountain Coal (UM) – 0.1 to 0.4 m thick
 - Upper Foot Coal/ Bullion Coal (UF) – 0.3 to 0.4 m thick
 - Low Mountain Coal (LM) – 0.4 to 0.7 m thick
 - Lower Foot Coal (LF) – 0.2 m thick
 - Bassey Coal (B) – 0.7 m thick

² Marine bands in this area are typically thin beds of black mudstone with marine fauna and commonly overlie coals or seatearths. They can be a few centimetres thick and rarely exceed 1 m.

Figure 4-4 Generalised Vertical Section Extract (Sheet SD91NW)



- 4.2.4 The memoir for the district published in 1927 notes that the **Upper Mountain Coal** has been worked in many locations in the vicinity of Littleborough, both to obtain the coal and the thick layer of seatearth which everywhere in the district underlies it. The beds above the Upper Mountain in this area entirely consist of flagstones, mudstones and shales.
- 4.2.5 The **Upper Foot** or **Bullion Coal** occurs throughout the district maintaining a very uniform thickness and character. The memoir also notes that the seam was often not worked due to its pyritous or sulphurous nature.

- 4.2.6 The **Lower Mountain Coal** is noted in the memoir to be the important seam in the district and to have been worked out by 1927. Very frequently it has a ganister³ seatearth beneath it. This has also been extensively worked.
- 4.2.7 The **Lower Foot Coal** has locally been worked in small areas but never exceeds 1 ft (0.3 m) in thickness and it yields good quality bright coal.
- 4.2.8 The **Bassy Coal** is described as ‘..so shaley as to be practically worthless over the greater part of the area.’.

BGS boreholes

- 4.2.9 Review of the BGS Onshore borehole database has identified no records for boreholes sunk on the site and one record within 250 m of the site boundary. This record relates to the Cleggswold Colliery and is reported to be located 137 m north-east of the site. The ‘borehole record’ is a record of a shaft sunk to 115.21 m depth, to the Mountain Coal. The shaft record can be accessed using the weblink: [Page 1 | Borehole SD91NW6 | Borehole Logs \(bgs.ac.uk\)](#)
- 4.2.10 The shaft record is noted to end 0.78m below the base of the Lower Mountain seam with ‘Ganister’ onto hard rock noted.

Previous ground investigations

- 4.2.11 Ground investigation works carried out across the site (for Bloor Homes) by Betts Geo in September 2019, comprised machine excavated trial pits and small diameter dynamic sample type percussion boreholes to investigate the superficial geology of the site.
- 4.2.12 The investigation identified a variable mantle of superficial drift deposits across the site ranging from 1.2 to 3.5m+ in depth. A number of the exploratory holes encountered and terminated at shallow depth on weathered sandstone bedrock (the Milnrow Sandstone).

Coal seams

- 4.2.13 **Table 4-1** summarises the strata sequence and coal seams recorded in the Cleggswold Colliery shaft. The shaft record was made in feet and inches and was converted by BGS, who have also interpreted the drillers record to identify the sandstone units and coal seams.

Table 4-1 Cleggswold Colliery Shaft: Summary Details

Strata	Depth to top (m)	Thickness (m)	Comments
Glacial deposits	GL	6.40	
Milnrow Sandstone	6.40	13.41	
Measures	19.81	46.74	
Inch Coal	46.74	0.02	
Measures	46.76	8.99	
Darwen Flags (Sandstone)	55.75	7.46	

³ Ganister is a hard, fine grained siliceous sandstone used in the manufacture of silica/ refractoryThe bricks typically to line furnaces.

Strata	Depth to top (m)	Thickness (m)	Comments
Measures	63.21	8.67	
Forty Yards Mine Coal	71.88	0.41	Interpreted by BGS as Upper Mountain Coal (UM).
Measures	72.29	9.75	Coal seam underlain by seatearth
Inch Coal	82.04	0.03	
Measures	82.07	20.72	Black shale roof above coal seam
Bullion Coal	102.79	0.31	Also known as the Upper Foot Coal (UF)
Measures	103.10	10.97	
Mountain Mine Coal	114.07	0.66	Interpreted by BGS as the Lower Mountain Coal (LM).
Measures	114.73	0.48	Ganister on very hard rock noted on shaft record

- 4.2.14 The memoir for the district (published in 1927) specifically notes that the Upper Mountain Mine Coal was worked at the Cleggswood Colliery, together with the thick seam of seatearth that underlies it. The seam ranged from 12 to 18 inches in thickness (0.30 - 0.46 m) and is underlain by 4–5 ft (1.22–1.52 m) of 'soft yellow Fireclay'.

5 Coal Authority and Other Mining Data Sources

5.1 Introduction

5.1.1 A staged approach to reviewing available Coal Authority data has been carried out by Stantec. The first stage involved review of The Coal Authority Interactive Viewer followed, by specific requests for reports/ data sheets. The searches and findings are summarised below.

5.2 Coal Authority Interactive Viewer Data

5.2.1 Review of the Interactive Map Viewer in November 2022 identified the following headline information.

Table 5.1 Interactive Viewer – Summary Headlines

Item	Yes	No	Remarks
Inside a Coal Mining Reporting Area	✓		
Development High Risk Area		✓	Closest development high risk area is immediately to the north of the site (and the Rochdale canal/ railway line) and immediately to the east of the former Akzo Nobel site.
Mine Entries – On-site		✓	
Mine Entries – Adjacent site	✓		A mine entry is shown adjacent to north-west corner of the site (this as recorded on the OS map record – See Table 3-1). Two further shafts recorded to the north-east of the site within the former Akzo Nobel Site (formerly Cleggswood Colliery).
Fissures and Break-lines		✓	
Surface Mining (Past and Current)		✓	
Past Shallow Coal Mine Workings		✓	Closest immediately to north-west of the site. Not shown to extend beyond the canal
Probable Shallow Coal Mine Workings		✓	Closest immediately to north-west associated with identified Development High Risk Area
Coal Outcrops		✓	Closest immediately to north-west
Coal Subcrop		✓	
Northeast (NE) Mining and Groundwater Constraints		✓	

5.3 Consultants Coal Mining Report

Overview

5.3.1 A Coal Authority Consultants Mining Report was obtained in August 2021 and is included in **Appendix C**, together with a 'Summary of findings' overview drawing.

5.3.2 The Consultants Coal Mining Report identifies the following:

Table 5.2 Consultants Coal Mining Report – Summary Headlines

Item	Yes	No	Remarks
Past underground mining beneath Property	✓		Past workings beneath the property in the Upper Mountain and Lower Mountain coal seams. The depth of workings respectively at 60 m and 95 to 110 m depth respectively, with the last dates of working 1867 and 1900
Probable unrecorded shallow workings	✓		The location of this is not identified but based on the Map Viewer data, to the north of the canal
Spine roadways at shallow depth		✓	
Mine entries	✓		Two identified, but outside the site. One of the shafts adjacent to the north-west corner of the site and the canal.
Abandoned mines record catalogue availability	✓		Plans available and obtained
Coal outcrops		✓	No outcrops recorded by the Coal Authority
Geological faults, fissures, breaklines	✓		The site is bisected by two geological faults shown on the Summary Findings drawing supplied by the Coal Authority and included in Appendix C. The faults shown are also depicted on current BGS mapping. No fissures or breaklines are reported.
Opencast mines		✓	None recorded within 500 metres of the enquiry boundary
Coal Authority managed tips		✓	None recorded within 500 metres of the enquiry boundary.

5.3.3 In addition, the report also identifies the following:

- 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.

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

Past underground mining

- 5.3.4 The Coal Authority identify historical workings beneath the site at depths of between 60 m and 110 m, as summarised below in **Table 5-3**. It should be noted that the term 'Property' refers to the search area for the mining report.

Table 5-3 Past underground mining (identified by the Coal Authority)

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER MOUNTAIN	Coal	3X66	60	Beneath Property	8.1	South	30	1867
unnamed	LOWER MOUNTAIN	Coal	3XAN	95	Beneath Property	8.1	South	60	1886
unnamed	UPPER MOUNTAIN	Coal	3X64	96	West	8.1	South	30	1867
unnamed	LOWER MOUNTAIN	Coal	3XAP	110	Beneath Property	7.1	South-West	60	1900

- 5.3.5 Review of the data identifies that:

- The workings were in the Upper and Lower Mountain seams with coal the identified mineral extracted.
- The extraction thickness of the mineral is reported as 30 cm for the (shallower) Upper Mountain seam and 60 cm for the Lower Mountain seam.
- The last date of working is given as 1867 for the Upper Mountain seam and 1900 for the Lower Mountain seam.
- The collieries from which the seams were worked are simply stated as 'unnamed'.

Mine entries

- 5.3.6 The Consultants Coal Mining Report identifies two mine entries, details of which are summarised overleaf in **Table 5-4**. Review of the summary plan supplied with the report (see **Appendix C**) identifies that neither of the shafts are located within the site boundary but are within 100 m of the site boundary

Table 5-4 Mine entries in proximity of the site

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	392415-006	392977 415548	Records indicate that this shaft has been covered with a concrete pad at some time in the past but the details are not known.	Coal	
Shaft	393415-009	393380 415743	This shaft was found to be brick lined and filled with a "fatty waste material". It was excavated to a depth of 7.8m removing 2.6m of bedrock where a reinforced concrete cap was formed. The cap measures 8.5m sq at the base increasing to 10m sq at the top by 1.2m thick. The excavation was backfilled to the surface with compressed fill. An inspection pipe was installed passing through the cap and incorporating an inspection plate at the surface. Branching from this is a ventilation pipe fitted with a flame arrestor	Coal	

5.3.7 **Shaft 392415-006** is the *Old Air Shaft* recorded on the OS map record from 1910, having previously been identified as an Air Shaft on the 1909 map edition and as a *Well* on the earlier map edition of 1891 but not shown on the OS First Edition record of 1851. This shaft is shown on map records to be approximately 10 m from the site boundary and a similar distance from the canal bank. Review of historical mapping/ aerial image overlays through the National Library of Scotland weblink infers this feature is located within the small, wooded area to the rear of modern residential properties fronting onto Brown Lodge Drive (i.e., between the residential properties and the canal bank). The Coal Authority information identifies that this old air shaft has been covered with a concrete cap.

5.3.8 **Shaft 393415-009** is located within the Former Akzo Nobel site (the former Cleggswood Oil Distillery site) commensurate with an Old Shaft recorded on the OS 25 inch series map edition of 1892-1914 and approximately 215 m east of the historical alignment of Heald Lane. The Coal Authority identify that this shaft has been located and capped.

5.4 Mine Abandonment Plans

5.4.1 The Consultants Coal Mining Report identified the database contained a number of plans that may pertain to the property. A detailed search of the Abandoned Mines Catalogue was requested, and three plans subsequently identified (by the Coal Authority) obtained. These plans are as follows:

- Plan 1225 – Cleggswood Colliery – Lower Mountain.
- Plan 1882/2 – Dearnley Colliery at Smithy Bridge, near Rochdale Abandonment Plan in Three Parts - Part 2 – Cross and Eagle Mining Engineers, Manchester, 1886.
- Plan 1882/5 – Dearnley Colliery – Plan marked Copied 1868 Whitehead & Bamford.

5.4.2 A reduced copy of the plans obtained are included in Appendix D.

5.4.3 **Plan 1225 – Cleggswood Colliery** Abandonment plan NW1225 (1 of 2) covers the workings of the former Cleggswood Colliery with workings in the Lower Mountain Mine. The plan is untitled and there is no scale marked although the Coal Authority indicate the plan to be 1-inch to 20 yards. For geo-referencing purposes, the railway line and Rochdale Canal are shown on the plan, together with the Hollingworth Reservoir/ Lake and Hollingworth Road. The plan is orientated north-south along the long axis of the drawing.

5.4.4 The location of the colliery is not shown nor are depth measurements to the Lower Mountain Mine discernible on the plan nor a seam section. Coal Authority Shaft 392415-009 on the old Cleggswood Distillery site/ Former Akzo Nobel site is not shown, nor are any other shafts. The

plan shows that the workings extended up to but not beneath the earth embankment dam for the reservoir/ lake but did extend beneath the railway to the north of Hollingsworth Road.

- 5.4.5 The western extent of the workings is shown to be east of Heald Lane. The alignment of workings is approximately parallel to the fault line, which runs along Heald Lane. The fault restricted the western development of the Lower Mountain Mine. The workings thus extend beneath the south-eastern part of the site. In general, the workings are shown to be of the pillar and room type.
- 5.4.6 **Plan 1882/2 – Dearnley Colliery** This abandonment plan is titled as relating to the Three Quarters or Lower Mountain Mine seam and is dated 1886. The plan can be readily geo-referenced with the railway, Rochdale Canal shown and labelled, together with Heald Lane, the properties known as *Heald* and *Lower Cleggs Wood* are also shown. The plan shows that the workings in this seam from the Dearnley Colliery were controlled by the fault that runs parallel to Heald lane, with the plan identifying Cleggswood Colliery Workings to the east of the fault.
- 5.4.7 No depth to workings, seam sections or locations of any shafts are shown. Coal Authority Shaft 392415-006 relates to an *Old Air Shaft* on the OS record of 1910. Supposition of the OS map extract onto the abandonment plan infers that the air shaft was on the alignment of a main mine roadway labelled as the *Dearnley Holme Pit Level* which extends north-westwards beneath the canal and railway with possible connection to another possible colliery named Calliards. A small area of bord and pillar workings is shown in proximity of the fault in the north-east part of the site. No other details of the mine layout beneath the site are shown, other than notes identifying the dip of the mine as 1 in 7.
- 5.4.8 **Plan 1882/5 – Dearnley Colliery** This plan depicts workings off the *Dearnley Holme Pit Level* (which is not labelled) to the immediate north of the site. The plan shows bord and pillar workings between headways, with working dates (years) shown in some bords, but again no details of the depth to the workings nor seam section. As a continuation of the Dearnley Holme Pit Level it is interpreted that this plan also relates to workings in the Lower Mountain Mine seam.

Old Collieries

- 5.4.9 The mine abandonment plans supplied by the Coal Authority have identified two collieries, namely Cleggswood and Dearnley. In respect of these two 'collieries', a search of local historical and archaeological web sites has identified the following information.
- 5.4.10 **Cleggswood Colliery:** A local history group website⁴ identifies that mining commenced around 1820 with a drift (mine adit) into the hillside. Other structures are described to include an airshaft, an inclined plate-way, blacksmith shop and other structures. The mine was taken over in 1864 by a company looking for a source of fireclay for a brick and pipe works in Smithy Bridge and were given a 7-year licence to mine coal and fireclay. The mine is not shown on the 1892 OS map record, but the local historical website records it as closing finally in 1928, parts having been abandoned by 1910, and all evidence removed by 1930.
- 5.4.11 The borehole/ shaft record in the BGS database on the Former Akzo Nobel site to the north-east of the site (Coal Authority shaft 393415-009) is identified (on the original) as relating to the Cleggswood Colliery) but is about 300 m from the colliery identified on historical OS mapping.
- 5.4.12 **Dearnley Colliery:** This is shown on a plan of 'Coal Mining and Brick Tile and Pipe Works' on the Littleborough History website to be located to the north-west of the site and railway line. The mindat.org website⁵ identifies it was opened in 1851 by Bamford & Co, closing in 1880 with the last owners listed as Scofield & Co. No shaft record for this location is included in the BGS

⁴ [Coal Mining in Littleborough \(littleboroughshistory.org\)](http://Coal Mining in Littleborough (littleboroughshistory.org))

⁵ [Dearnley Colliery, Greater Manchester, England, UK \(mindat.org\)](http://Dearnley Colliery, Greater Manchester, England, UK (mindat.org))

Onshore Borehole database, and no reference to the Dearnley Colliery is included in the published memoir for the district (circa 1927)

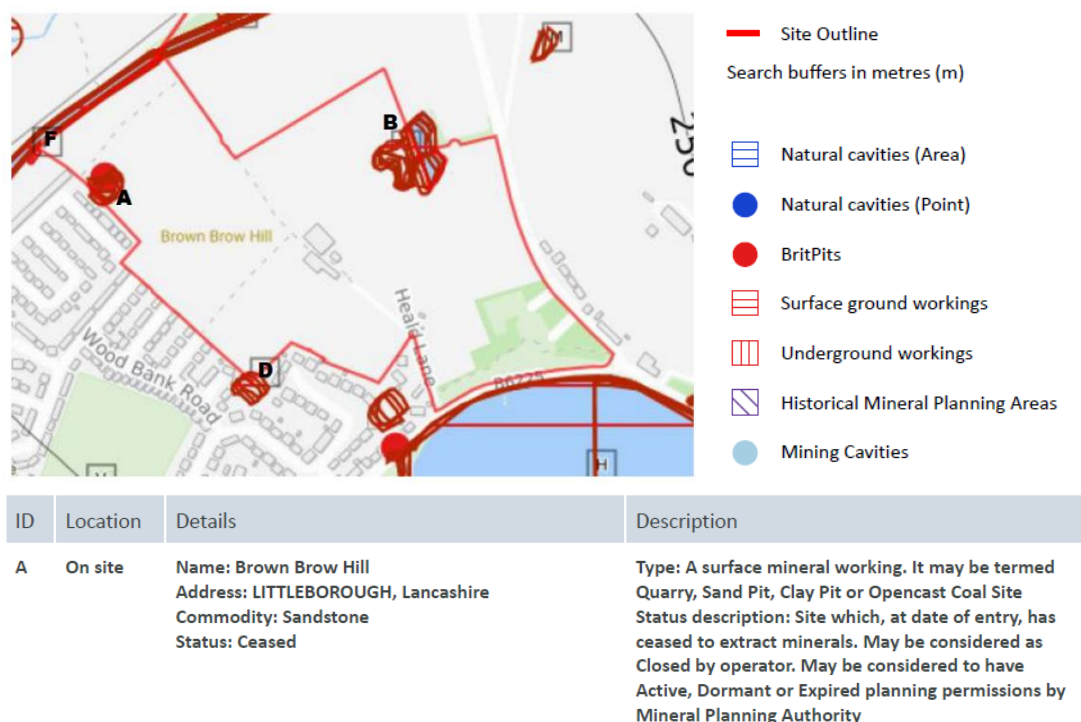
5.4.13 At this stage no further details are known regarding this presumed small colliery.

5.5 Non-Coal Mining Database Searches

Non-coal surface/ underground workings

5.5.1 The Groundsure Insight report includes searches of databases that hold information relating to artificial cavity occurrence as a result of surface/ underground working of non-coal minerals (including sand and gravel, roadstone, metalliferous minerals and fireclay). **Figure 5-1** summarises the database search result, with then the following sections providing further details.

Figure 5-1 Non-coal related surface workings and underground mining summary



5.5.2 The database identifies the presence of:

- Historical surface workings (for sandstone) in the north-west corner of the site (at Brown Brow Hill – **A** above) – this as recorded on the OS map record (see **Table 3-1**).
- Unspecified workings on the eastern boundary (adjacent a small reservoir) – **B** on plan– as recorded on the OS map record.
- A small pond/ former surface workings - **D** on plan– As recorded on the OS map record.
- The old air shaft adjacent the north-west corner of the site – **F** on plan.

5.5.3 The Groundsure report includes records of non-coal mining from other data sources:

5.7 Mining cavities

Records within 1000m

0

Industry recognised national database of mining cavities. Degraded mines may result in hazardous subsidence (crown holes). Climatic conditions and water escape can also trigger subsidence over mine entrances and workings.

This data is sourced from Stantec UK Ltd.

5.8 JPB mining areas

Records on site

0

Areas which could be affected by former coal and other mining. This data includes some mine plans unavailable to the Coal Authority.

This data is sourced from Johnson Poole and Bloomer.

- 5.5.4 The Stantec database referenced contains details of recorded non-coal mining underground mines. This includes where fireclay and ironstone has been the minerals extracted from the Coal Measures strata. The (Stantec) database has been interrogated and the closest recorded non-coal mining entry relates to lead mining at a location 2.8 km to the east of the site. This is at variance with historical information for the two colliery sites for which mine abandonment plans have been obtained.

6 Identification and Assessment of Site-specific Mining Risks

6.1 Introduction

- 6.1.1 This section presents a mining risk assessment considering only the principal geohazards (subsidence & ground collapse) that may impact on the proposed new residential development.
- 6.1.2 The site is being considered for a mixed end use, with approximately 310 residential dwelling and a primary school proposed in the south east corner, together with associated open space, infrastructure and attenuation ponds.
- 6.1.3 The ultimate element at risk is the public and property.
- 6.1.4 Where a geological hazard such as ground collapse and subsidence impinges upon human activity, it involves a degree of risk; the element at risk in order of importance is typically viewed as life, property and possessions followed by any environmental impact. The risk of ground collapse involves quantification of the probability that a hazard (hazard likelihood) will be harmful, and the tolerable degree of risk comprises a combination of vulnerability and consequence. The total risk of future ground collapse impacting the study area over the duration of the design life can be expressed as:

$$\text{Risk} = \text{Hazard} \times \text{Element at Risk} \times \text{Vulnerability}$$

- 6.1.5 Vulnerability relates to the element at risk, in this instance the proposed residential development and occupiers. solar farm array and associated infrastructure. Certain structures are more and less vulnerable to ground collapse and subsidence than others. New build residential properties are considered sensitive structures with limited tolerance for ground movement.

6.2 Mining Risk Assessment

- 6.2.1 Consideration is given to the potential coal mining legacy risks to the site from past underground mining beneath the site. The desk study has identified that in addition to coal, the extraction of fireclay for the local brick, tile and pipe industry needs to be considered. The extraction of fireclay is known to have been carried out widely in the district in conjunction with working of the deeper Lower Mountain coal seam.
- 6.2.2 Search of the detailed coal and other non-coal mining information identifies the following site specific legacy mining risks in respect of this proposed residential development site.

Table 6-1 Identified summary legacy mining risks

Legacy Coal mining issue	Identified		Risk Assessment	
	Yes	No	Rating – Outside worked area	Comment
a) Shallow surface workings		X	Very Low	No record of any surface coal workings.
b) Mine entries (shafts and adits (On site)		X	Very Low	No shafts or adits identified by the Coal Authority on the site.
c) Mine entries (shafts and adits (Adjacent site)	X		Low	Shaft Reference 392415-006 (old air shaft on historical OS records) identified adjacent north-west corner of site. Reported to be covered by concrete slab.
d) Underground coal mining present at shallow depth		X	Very Low	The Coal Authority advises the shallowest recorded workings at 60 m depth.

e)	Underground coal mining probable at shallow depth		X	Very Low	
f)	Underground coal mining at depth	X		Low	Recorded workings in two seams between 60 and 100 m depth
g)	Underground non-coal mining at depth	X		Low	Historical reference to working of the seatearth below the Upper Mountain seam from the Cleggswood Colliery.
h)	Record of past mine gas emissions		X	Low	None identified by Coal Authority
Red denotes that potential mining legacy issues have been identified requiring further investigation Amber denotes that there may be potential mining legacy issues that require further consideration and/ or investigation. Green denotes that no significant potential mining legacy issues have been identified and in normal circumstances no further investigation is considered to be required					

- 6.2.3 **Mine entries:** An old air shaft has been identified adjacent the north-west corner of the site and the canal but outside the red line site boundary. The shaft location is recorded on historical OS maps, initially identified as a *Well* but subsequently as an *Air Shaft* and subsequently *Old Air Shaft*. A mine abandonment plan for the Dearnley Colliery (about 1.1 km to the north-west) infers the air shaft is located on a major roadway for workings in the Lower Mountain Mine seam. The Coal Authority identify the shaft has a concrete slab cover the date of construction of which is unknown. The shaft is located within a small area of part wooded land behind residential housing built (map evidence infers) between 1968 and 1976. Mitigation for this legacy shaft feature is unlikely to be required, unless a new property was to be erected immediately on the corner of the site here which is considered unlikely.
- 6.2.4 **Shallow Mine workings:** These are generally considered to be workings to 30 m depth. The Coal Authority identify the shallowest recorded workings are at 60 m depth. The published geological map identifies the western part of the site is underlain by the Milnrow Sandstone. Whilst thin but impersistent coal seams are known to occur within the underlying sequence, the Upper Mountain Coal is the first persistent seam present – this the seam recorded as being worked at 60m depth. BGS archive record SD91NW6 relating to a shaft record on the adjacent Former Akzo Nobel site (137 m north-east of the site) records no coal seams in the measures overlying the Upper Mountain seam (which was at 71.88 m depth – noting the shaft is to the east of the fault that is parallel to Heald Lane).
- 6.2.5 **Mining at Depth:** The Coal Authority record workings in both the Upper Mountain and Lower Mountain seams, at 60 m and 95 to 110 m depth respectively with an extraction thickness of 30 cm and 60 cm. No detail of the mining technique used for the Upper Mountain is given but it can be assumed that it is the same as used for the Lower Mountain which mine abandonment plans infer was bord and pillar.
- 6.2.6 As noted in **Table 6-1**, the seatearth beneath the Upper Mountain seam was apparently worked from the Cleggswood Colliery for fireclay. The seatearth beneath this seam described as 4–5 ft (1.22–1.52 m) of ‘*soft yellow Fireclay*’. This would potentially equate to an overall extraction thickness (coal and seatearth) of 1.82 m.
- 6.2.7 The (deeper) Lower Mountain seam is also reported to have been widely worked in the district. The presence of brick, tile and pipe works in Smithy Bridge to the north-west of the site and recorded extensive mine roadway (labelled at the Dearnley Holme Pit Level) extending to the north-west is evidence that fireclay was worked in this locality.
- 6.2.8 A general rule of thumb suggests that risks from settlement following underground collapse are considered to be low where there is ten times the thickness of bedrock above a worked seam (e.g., 0.5 m seam and >5.0 m of bedrock cover). CIRIA C758 records this criterion as being a ‘rule of thumb’ that has been applied throughout the UK despite wide stratigraphic variance with the degree of protection afforded varying according to location. However, CIRIA C758 report

that this empirical approach, which has been proven to provide conservatism has served the industry well to date often irrespective of detailed knowledge of bedrock condition.

- 6.2.9 There is a considerable thickness of sandstone, siltstone and mudstone bedrock cover above the coal and seatearth workings of the Upper Mountain Mine, which as noted could have a potential combined extraction thickness of 1.82 m. The risk of support loss from the collapse of these workings can therefore reasonably be considered to be very low. Similarly, in respect of the (deeper) Lower Mountain Mine, whilst the thickness of the seatearth may only be 0.78 m thickness (as indicated by the shaft record for the Cleggswood Colliery reported by BGS as borehole record SD81NW6) giving a total (coal + seatearth) extraction thickness of 1.38 m. The risk of additional contributory support loss from the collapse of these workings can therefore reasonably be considered to be very low.
- 6.2.10 Whilst noting that the site is bisected by two geological faults, which have controlled the extent of workings in the respective coal seams from both the Cleggwood and Dearnley Colliery sites, it is considered unlikely that additional future subsidence associated with fault reactivation will occur.
- 6.2.11 Thus, specific mitigation for legacy issues associated with historical coal and fireclay is not considered to be required.
- 6.2.12 **Mine gas:** The Coal Authority has not identified any recorded mine-gas issues related to this site. It is noted that there are two identified, now infilled/ backfilled, historical sandstone quarries which may be a potential source of ground-gas. As part of separate geoenvironmental ground investigation works it is anticipated that consideration will be given to potential ground-gas occurrence.

7 Proposed Mitigation Strategy

7.1 Residential development

- 7.1.1 **General:** No specific mitigation strategy is proposed and there are no constraints or restrictions regarding the layout of the proposed development, other than in the far north-west corner where a suitable stand-off zone will need to be agreed with the Coal Authority. The site, however, sits within a historical mining area and therefore there is a residual risk of unrecorded mine entries to be present on site. All site operatives should be made aware of this potential risk and a watching brief should be maintained during site works.
- 7.1.2 **Shaft 332415-006:** The Coal Authority seeks to ensure that no development take place above, or within the zone of influence of, any mine entry. It is noted that the Coal Authority report this shaft as being covered by a slab, although no other details are known.
- 7.1.3 The location of the recorded mine entry is shown in the Coal Authority Consultant's Report (presented as **Appendix C**).
- 7.1.4 The zone of influence can be calculated based on the Coal Authority's departure distance (maximum of 10 m, to take into account any discrepancies in the source plans), the local depth to rock head (from which it is considered a worse-case 45° zone of collapse could occur) and the likely radius of the entry (nominally taken to be 1.25 m). On this basis:

Table 7-1 Likely zone of influence from Coal Authority Co-ordinates

Shaft Ref	Shaft 332415-006
Approximate Distance from site	21.9 m
Direction from site	West
CA Co-ordinates	392977, 415548
Co-ordinates from OS 25 inch map edition of 1892-1914	392982, 415549
Discrepancy from CA Co-ordinates	5.1 m
Depth to rockhead based on closest borehole	6.4 m Closest borehole terminated in drift at 3.0 m depth; depth to rockhead reported for Cleggwood Colliery shaft (BGS record SD91NW6) used.
Likely zone of influence from CA Co-ordinates	15 m (12.65m rounded to nearest 5m at this stage). Air shaft so diameter likely not to exceed 2.5 m.

- 7.1.5 On this basis, the shaft is not likely to have any constraint on the development layout. It would be prudent however, given the potential difficulties in physically proving the location of the shaft in land which is in third party ownership, to set back new construction from the immediate corner (i.e. using this corner for public open space). As part of any future ground investigation, a borehole could be located in this corner of the site to prove the local depth to bedrock and allow the likely zone of influence to be verified.
- 7.1.6 **Ground-gas:** The Coal Authority has also advised no record of past or potential ground-gas emissions. Consequently, for the proposed development no specific site wide mitigation strategy is required in respect of potential ground-gas emissions from past coal working. A

ground-gas risk assessment has been undertaken by a third party (Betts Geo) which recommends that the north east of the site should be classified as a 'red' risk area and therefore the removal of the ground gas source/ remedial measures are required. The centre of the site classified as an 'amber 2' risk area whereby basic ground gas protection measures are likely to be required, however additional ground gas monitoring is required to confirm this.

8 Conclusions

- 8.1.1 This report has identified that the site is in a location that has been subject to historical underground coal mining activity.
- 8.1.2 Two coal seams were worked beneath the site in the 1800s up to 1900. The worked seams are identified by the Coal Authority as the Upper Mountain and Lower Mountain seams at about 60 m and between 96 m and 110 m depth respectively.
- 8.1.3 The Coal Authority Consultants Mining Report identifies the Colliery/ Collieries that worked these seams as unknown. Subsequent mine abandonment plans obtained from the Coal Authority infer working of the (deeper) Lower Mountain seam from the Cleggswood Colliery to the east of the site and the Dearnley Colliery to the north-west. The extent of connection between the two mines is not known, the presence of a geological fault trending north-south across the site parallel to Heald Lane acting as a natural barrier. Published memoirs for the district (dated 1927) identify extensive working took place in the district in both the Upper Mountain and Lower Mountain seams. In addition to the coal, the seatearth underlying the Upper Mountain seam was extensively worked for the local brick, tile and pipe industry. The mine abandonment plan for the Dearnley Colliery shows an extensive roadway connection beneath the site to the north-west (where the brick, tile and pipe works were located).
- 8.1.4 The extraction thickness for the Upper Mountain seam was about 1.82 m (0.3 m coal + up to 1.52 m seatearth). For the Lower Mountain seam the extraction thickness was about 1.38 m (0.6 m coal and 0.78 m ganister seatearth). In the Lower Mountain seam bord and pillar working is inferred from the abandonment plans; no information is available regarding the Upper Mountain seam but as stated earlier, likely to be similar.
- 8.1.5 Both collieries were small in size in terms of surface infrastructure and operational for only a short time period. The last date of working is given as 1867 for the Upper Mountain seam and 1900 for the Lower Mountain.
- 8.1.6 No specific mitigation strategy is proposed and there are no constraints or restrictions regarding the layout of the proposed development, other than in the far north-west corner where a suitable stand-off zone will need to be agreed with the Coal Authority. The site, however, sits within a historical mining area and therefore there is a residual risk of unrecorded mine entries to be present on site. All site operatives should be made aware of this potential risk and a watching brief should be maintained during site works.
- 8.1.7 The Coal Authority has advised no record of past or potential ground-gas emissions. Consequently, for the proposed development no specific site wide mitigation strategy is required in respect of potential ground-gas emissions from past coal working. For the proposed development, as part of ground investigation works to inform foundation design, a ground-gas risk assessment should be undertaken. This may recommend basic gas protection measures within the foundation design, which are resistant to permanent gases (carbon dioxide, methane, carbon monoxide) and comparable to that suggested in the recent CL:AIRE Good Practice Guidance document, as commonly used to protect residential properties.

Appendix A Guidance Notes

Stantec Guide: Essential Guidance for Report Readers (England)

- 1) This report has been prepared within an agreed timeframe and to an agreed budget that will necessarily apply some constraints on its content and usage. The remarks below are presented to assist the reader in understanding the context of this report and any general limitations or constraints. If there are any specific limitations and constraints, they are described in the report text.
- 2) The opinions and recommendations expressed in this report are based on statute, guidance, and best practice current at the time of its publication. Stantec UK Ltd (Stantec) does not accept any liability whatsoever for the consequences of any future legislative changes or the release of subsequent guidance documentation, etc. Such changes may render some of the opinions and advice in this report inappropriate or incorrect and the report should be returned to us and reassessed if required for re-use after one year from date of publication. Following delivery of the report, Stantec has no obligation to advise the Client or any other party of such changes or their repercussions.
- 3) Some of the conclusions in this report may be based on third party data. No guarantee can be given for the accuracy or completeness of any of the third-party data used.
- 4) Historical maps and aerial photographs provide a “snapshot” in time about conditions or activities at the site and cannot be relied upon as indicators of any events or activities that may have taken place at other times. It is possible for developments to have occurred between surveys that are not shown or for the map record to have been censored for military security.
- 5) The absence of cavity records in the Stantec natural and mining cavities (non-coal) databases is not considered as conclusive as to the absence of these features and we do not warrant that the data is complete or error free.
- 6) The conclusions and recommendations made in this report and the opinions expressed are based on the information reviewed and/or the ground conditions encountered in exploratory holes and the results of any field or laboratory testing undertaken. There may be ground conditions at the site that have not been disclosed by the information reviewed or by the investigative work undertaken. Such undisclosed conditions cannot be considered in any analysis and reporting.
- 7) It should be noted that this report is a land condition assessment and does not purport to be an ecological, flood risk or archaeological survey and additional specific surveys may be required.
- 8) The identification of invasive and/or noxious plants such as Japanese Knotweed is outside the remit of our appointment.
- 9) This report has been written for the sole use of the Client stated at the front of the report in relation to a specific development or scheme. The conclusions and recommendations presented herein are only relevant to the scheme or the phase of project under consideration. This report shall not be relied upon or transferred to any other party without the expressed written authorisation of Stantec. Any such party relies upon the report at its own risk.
- 10) The interpretation carried out in this report is based on scientific and engineering appraisal carried out by suitably experienced and qualified technical consultants based on the scope of our engagement. We have not considered the perceptions of, for example, banks, insurers, other funders, lay people, etc., unless the report has been prepared specifically for that purpose. Advice from other specialists may be required such as the legal, planning and architecture professions, whether specifically recommended in our report or not.
- 11) Public or legal consultations or enquiries, or consultation with any Regulatory Bodies (such as the Environment Agency, Natural England or Local Authority) have taken place only as part of this work where specifically stated.

Appendix B Groundsure Map Insight report (small scale set)

Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1851

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1848
Revised N/A
Edition 1851
Copyright N/A
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Surveyed 1848
Revised N/A
Edition 1851
Copyright N/A
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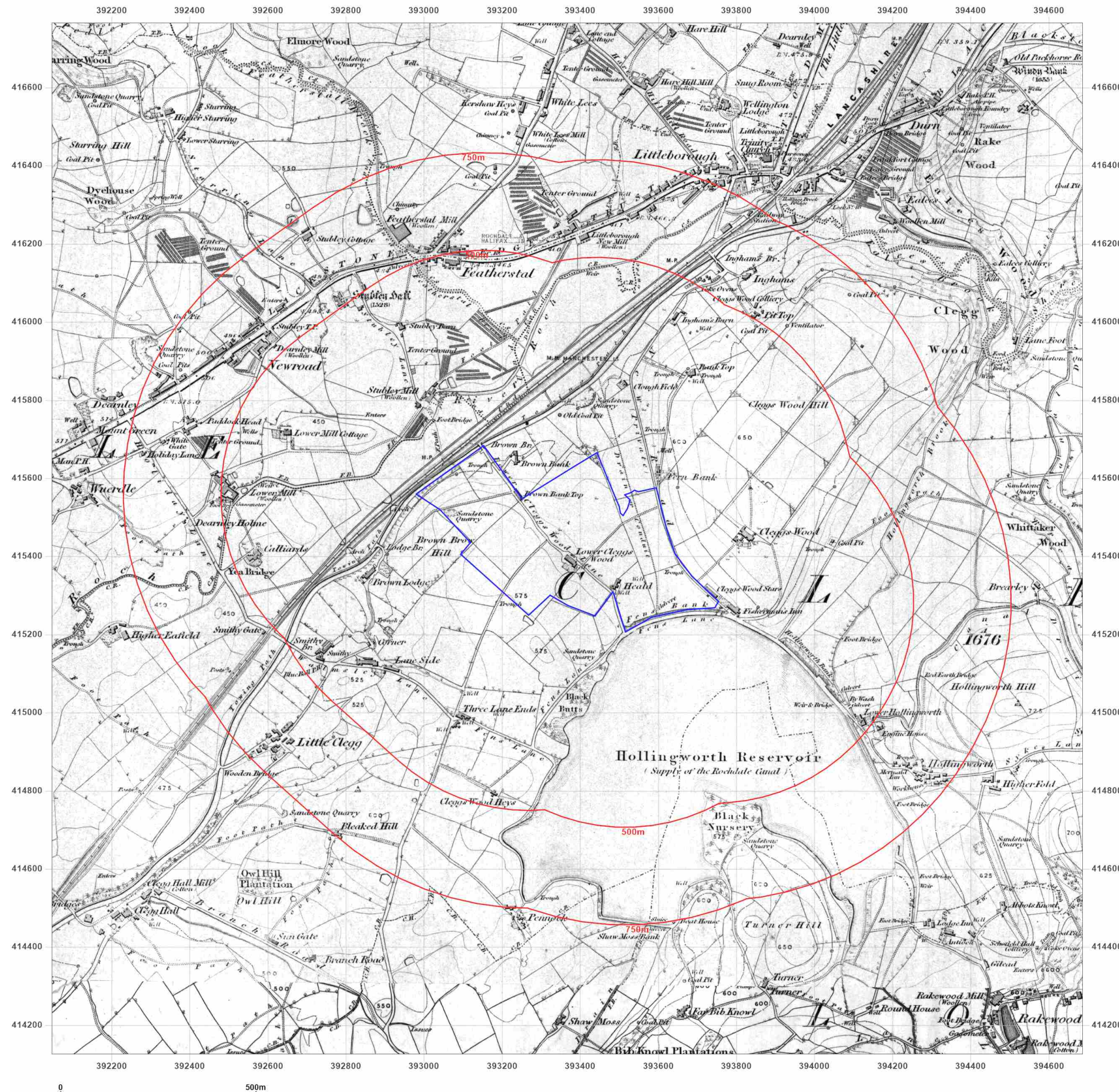


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Production date: 07 September 2022

Map legend available at:
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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1907-1909

Scale: 1:10,560

Printed at: 1:10,560



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Surveyed 1847
Revised 1909
Edition N/A
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Levelled N/A

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Revised 1908
Edition N/A
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Revised N/A
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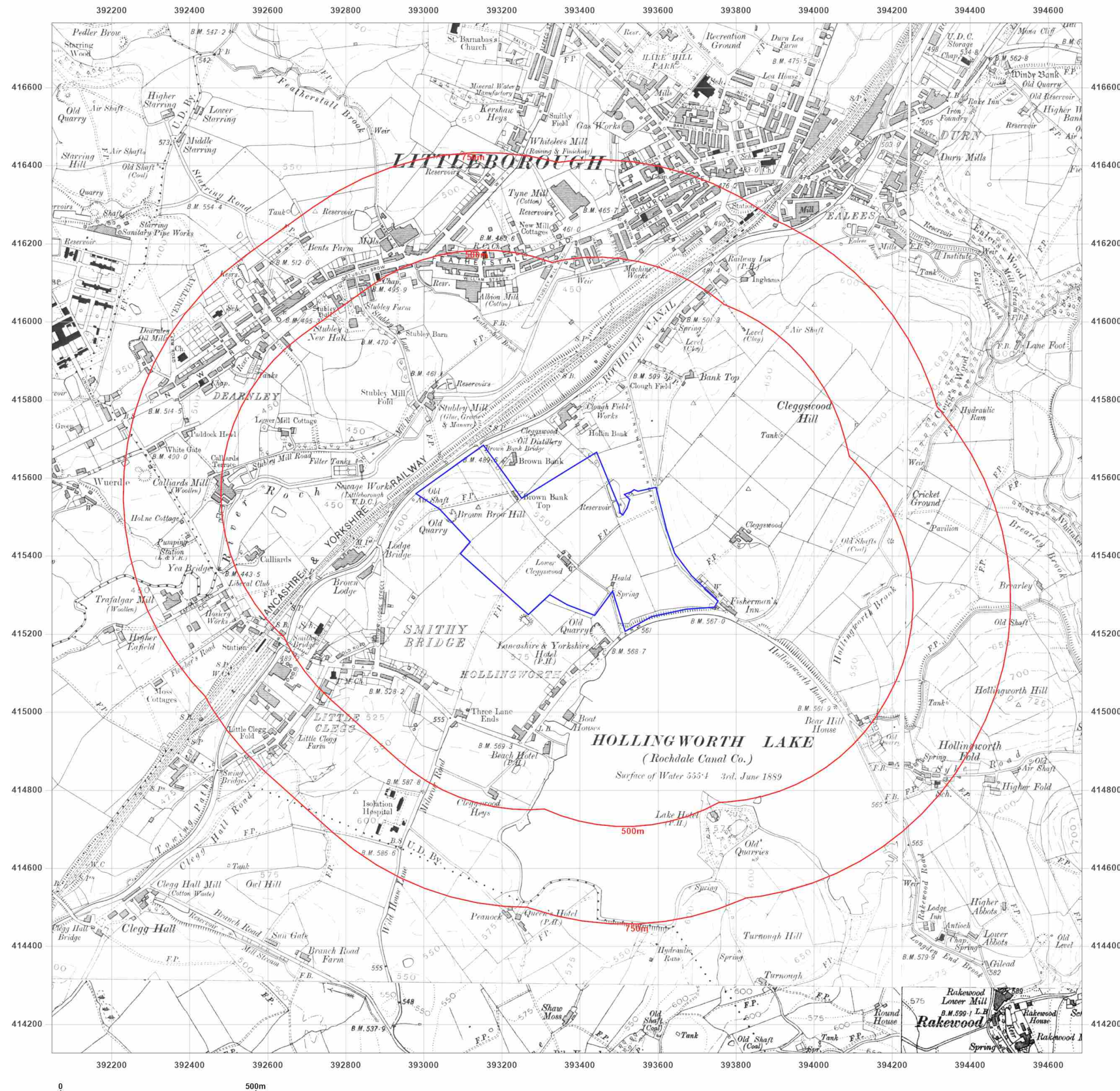


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1907-1911

Scale: 1:10,560

Printed at: 1:10,560



Surveyed 1849
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Surveyed 1849
Revised 1900
Edition N/A
Copyright N/A
Levelled N/A

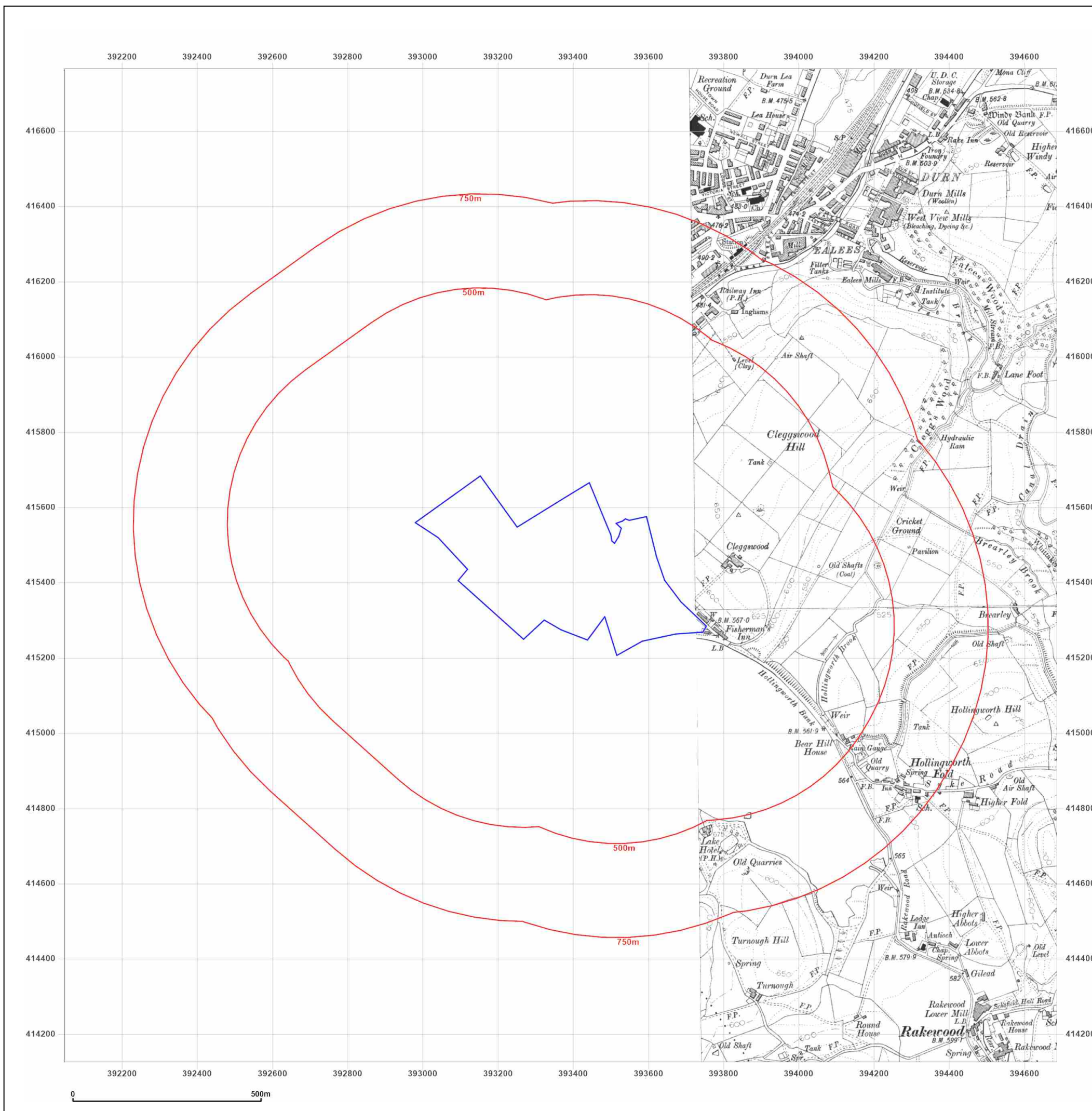


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1910-1911

Scale: 1:10,560

Printed at: 1:10,560



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Edition N/A
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Surveyed 1849
Revised 1910
Edition N/A
Copyright N/A
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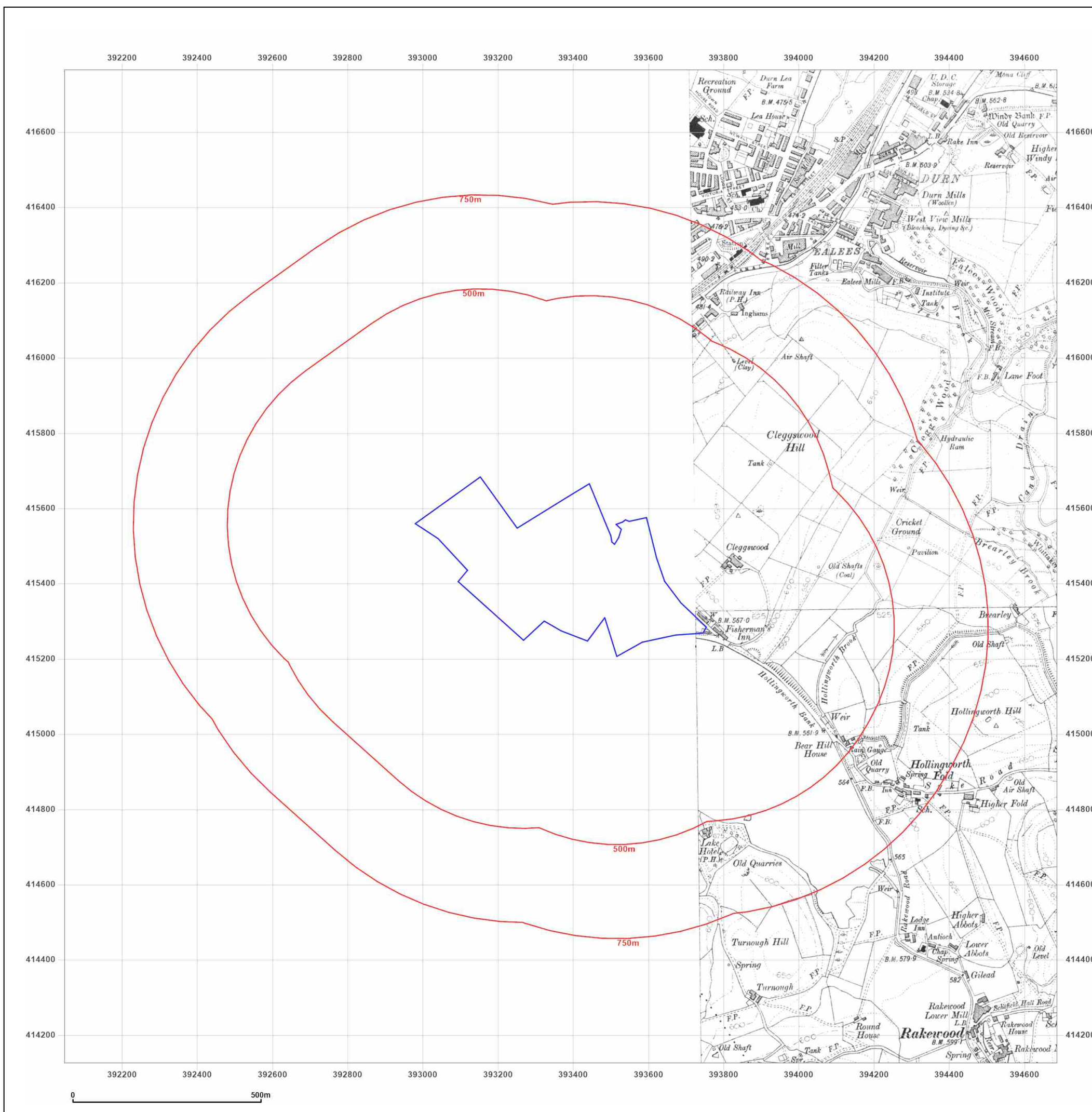


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1928

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1928
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Revised 1928
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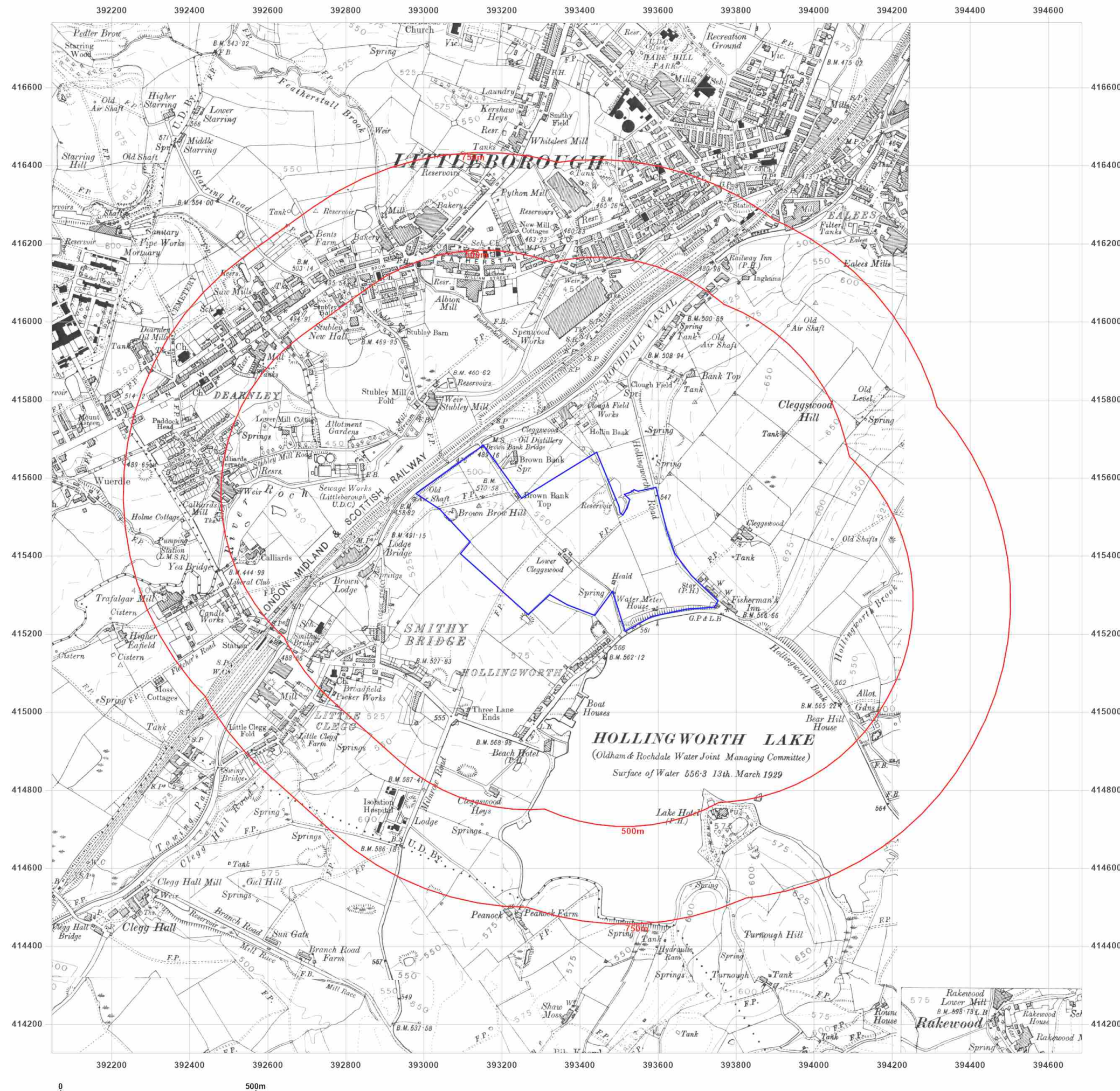


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: County Series

Map date: 1938

Scale: 1:10,560

Printed at: 1:10,560



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Revised 1938
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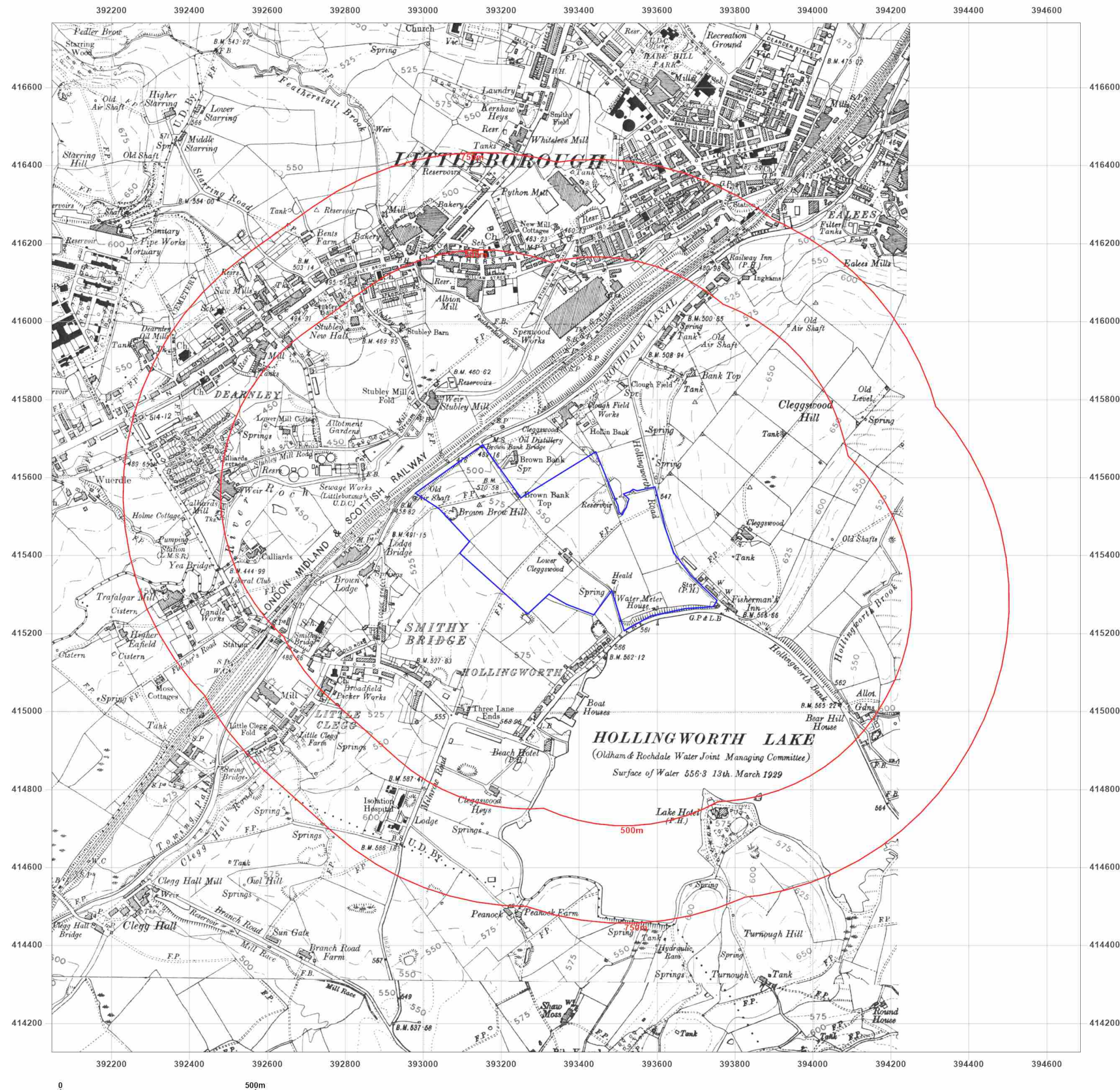


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: Provisional

Map date: 1949-1954

Scale: 1:10,560

Printed at: 1:10,560



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Surveyed 1954
Revised 1954
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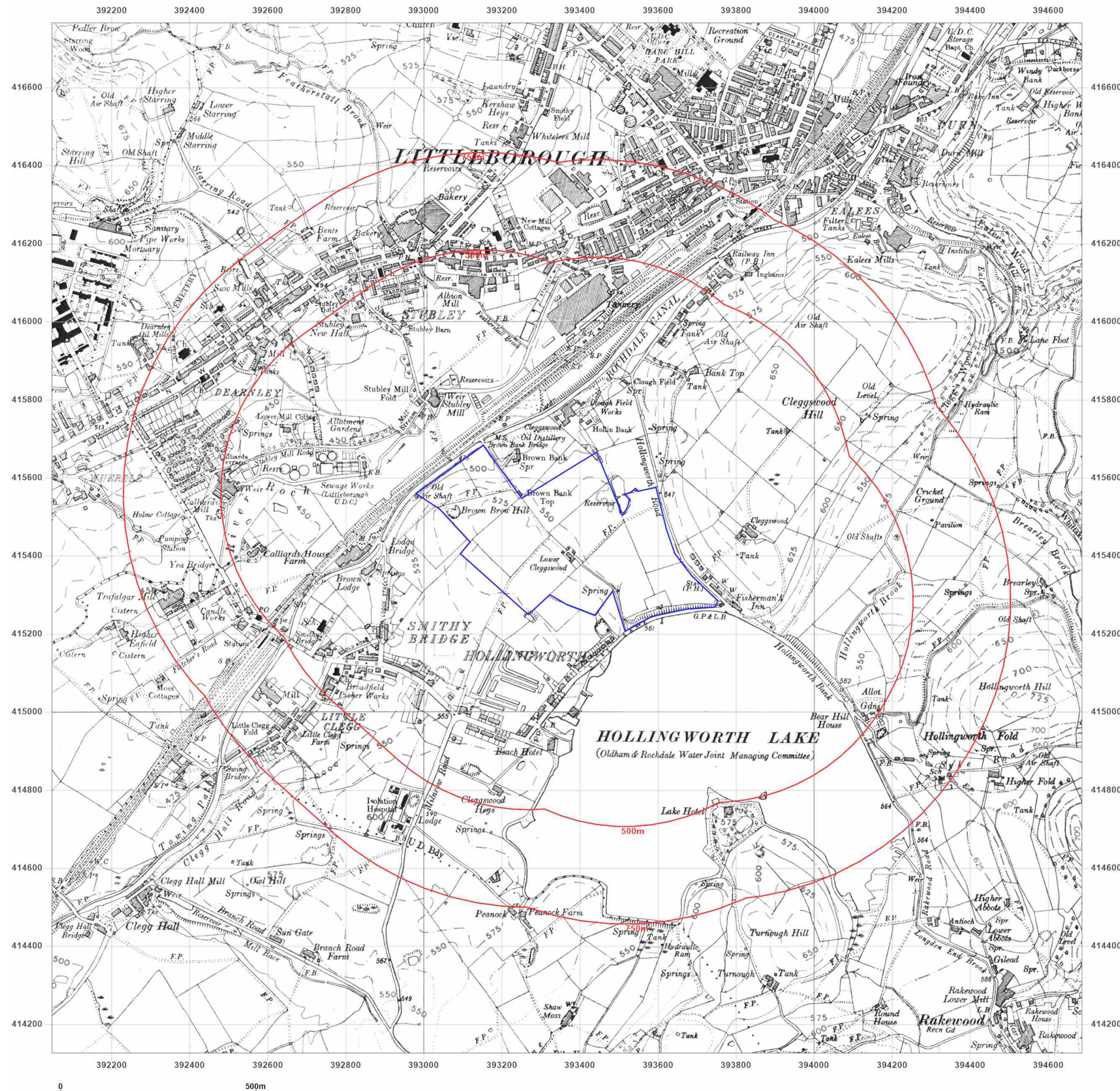


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: Provisional

Map date: 1967-1968

Scale: 1:10,560

Printed at: 1:10,560



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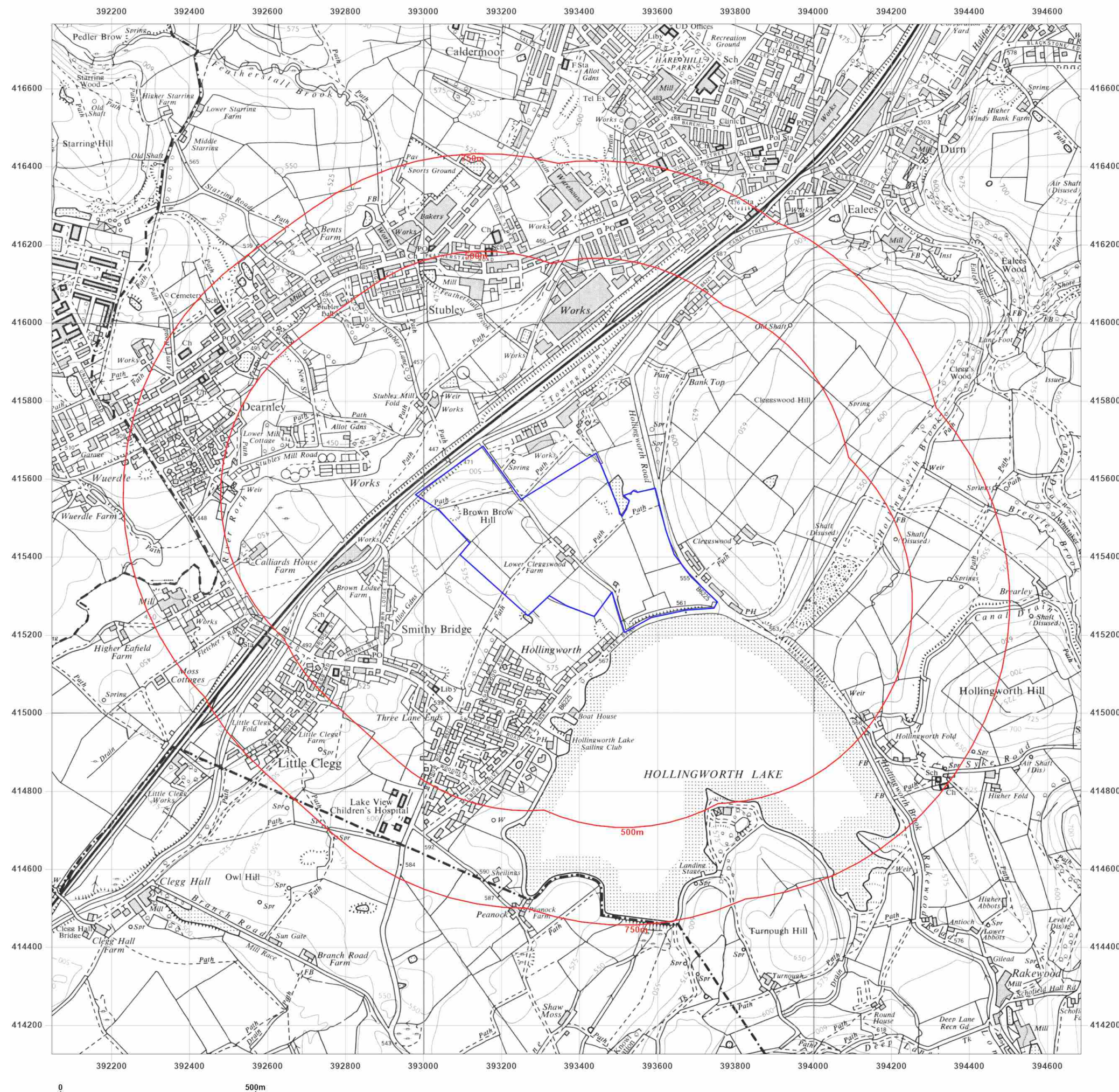


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Site Details:

HOLLINGWORTH ROAD,
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Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: National Grid

Map date: 1976

Scale: 1:10,000

Printed at: 1:10,000



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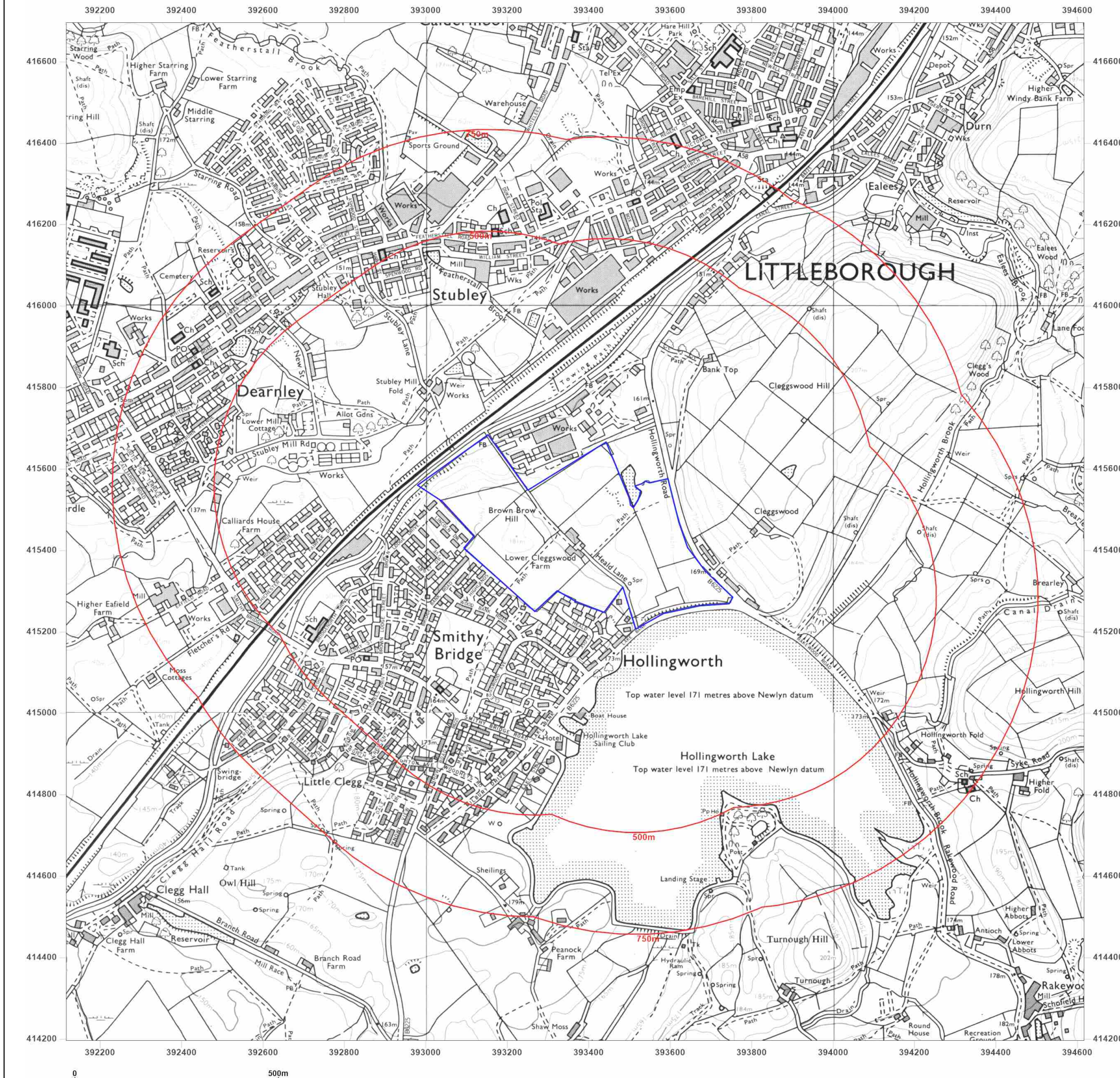


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Site Details:

HOLLINGWORTH ROAD,
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Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: National Grid

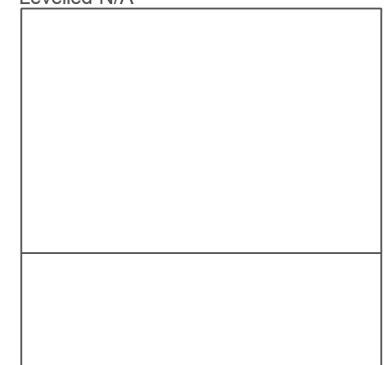
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Printed at: 1:10,000



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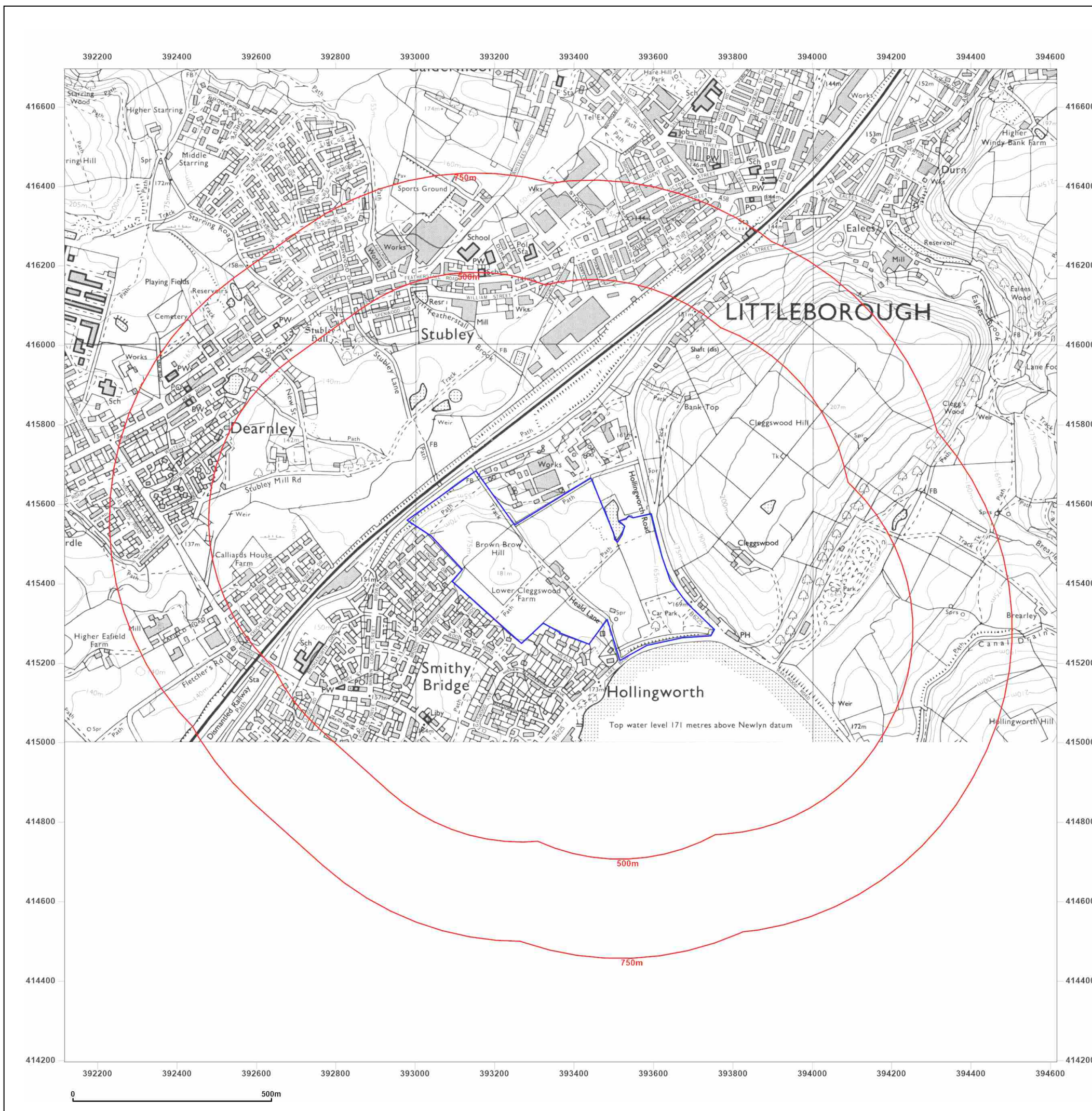


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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: National Grid

Map date: 2001

Scale: 1:10,000

Printed at: 1:10,000



2001



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Site Details:

HOLLINGWORTH ROAD,
LITTLEBOROUGH, OL15 0AZ

Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: National Grid

Map date: 2010

Scale: 1:10,000

Printed at: 1:10,000



2010

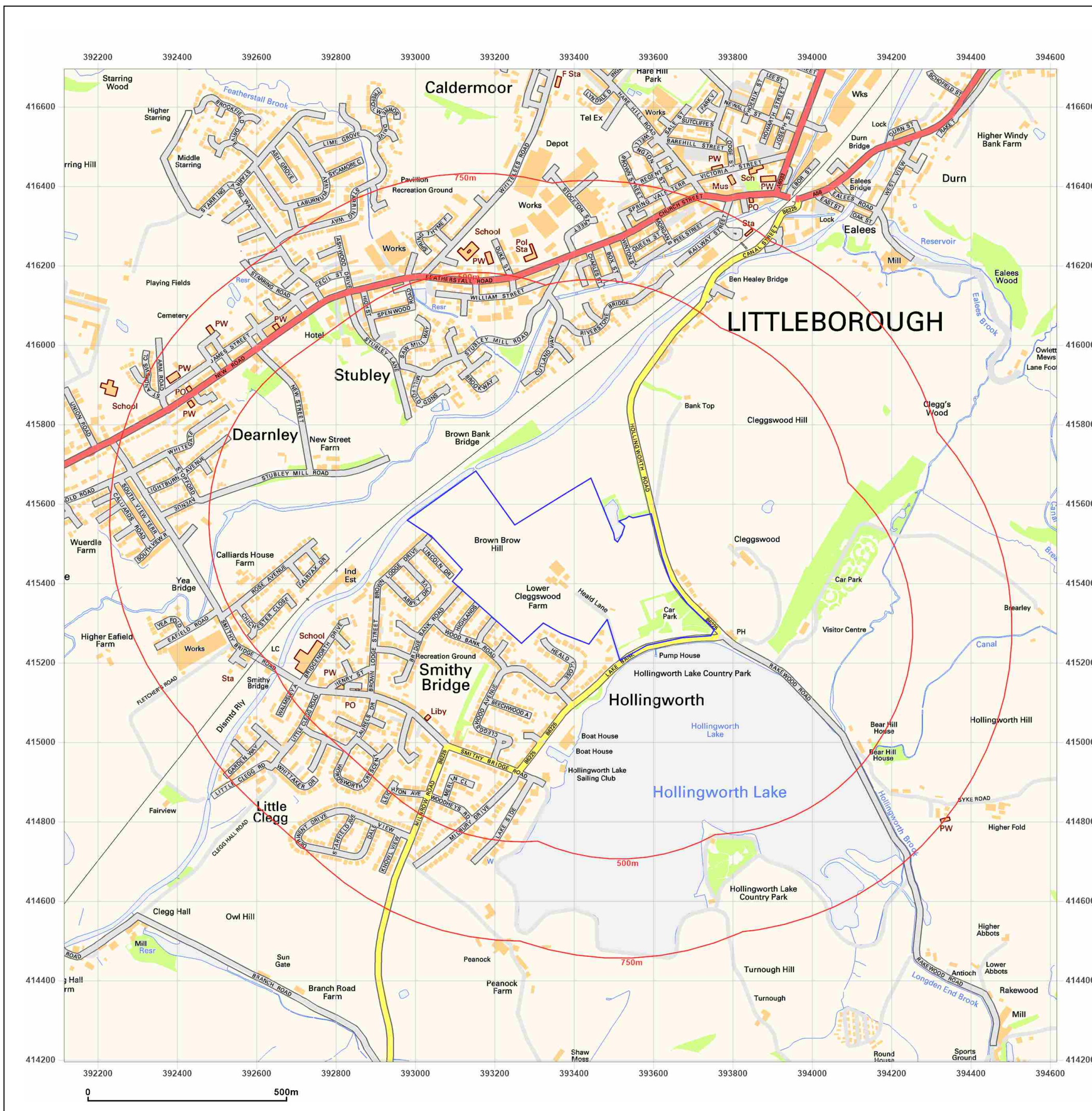


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Site Details:

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Client Ref: EPL014140
Report Ref: GS-9027683
Grid Ref: 393366, 415445

Map Name: National Grid

Map date: 2022

Scale: 1:10,000

Printed at: 1:10,000



2022

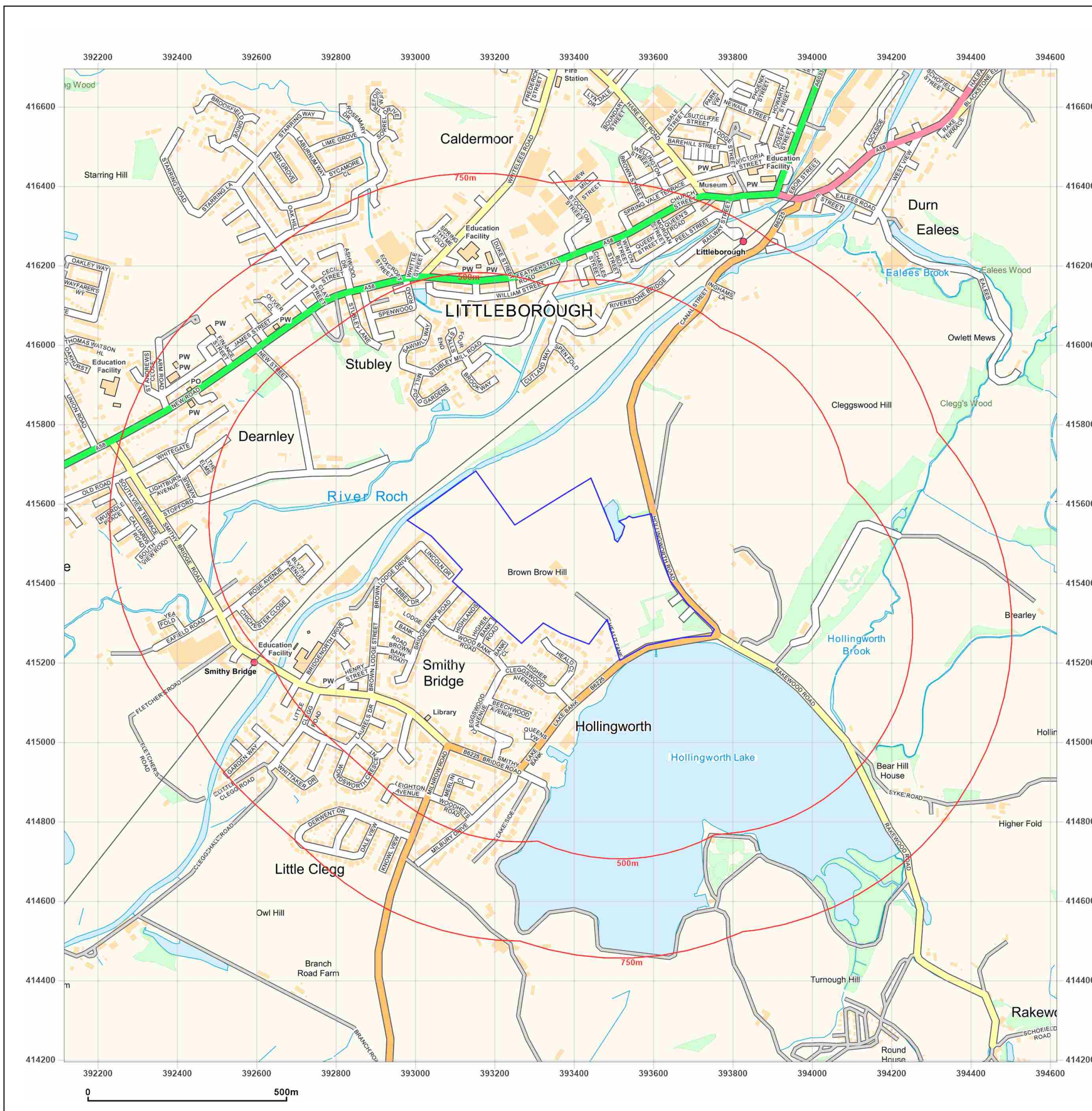


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Appendix C Consultants Coal Mining Report



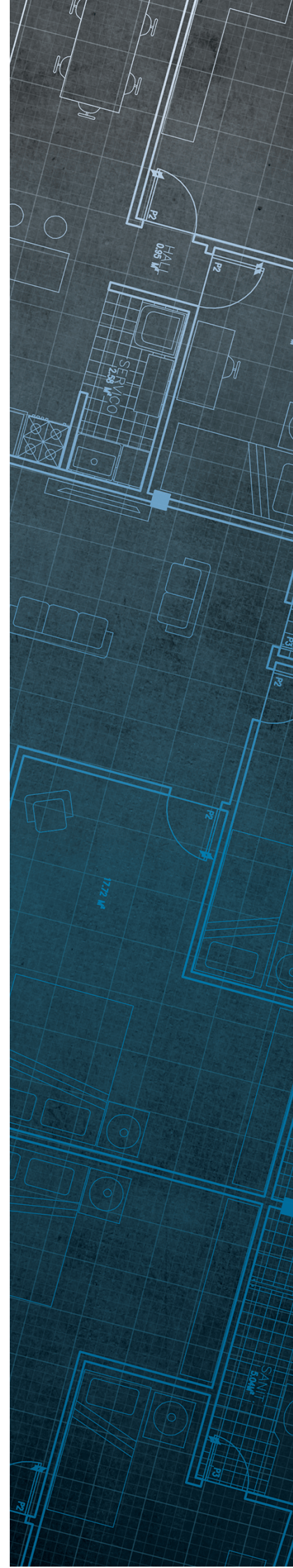
The Coal
Authority

Consultants Coal Mining Report

Land North Of Smithy Bridge,
Littleborough, OL15 0ne
Greater Manchester

Date of enquiry:	13 August 2021
Date enquiry received:	13 August 2021
Issue date:	13 August 2021

Our reference:	51002604543001
Your reference:	HMD-8121639



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

Land North Of Smithy Bridge, Littleborough, OL15
One
Greater Manchester

How to contact us

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

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

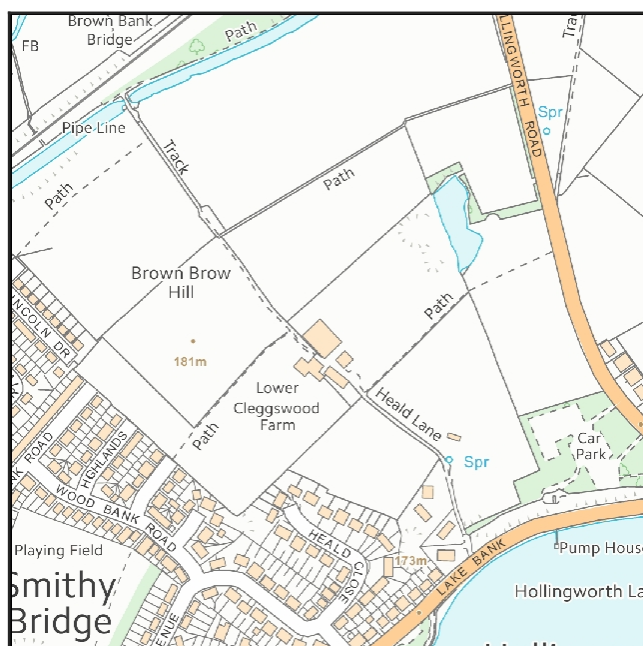
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

Colliery	Seam	Mineral	Coal Authority reference	Depth (m)	Direction to working	Dipping rate of seam worked (degrees)	Dipped direction of seam worked	Extraction thickness (cm)	Year last mined
unnamed	UPPER MOUNTAIN	Coal	3X66	60	Beneath Property	8.1	South	30	1867
unnamed	LOWER MOUNTAIN	Coal	3XAN	95	Beneath Property	8.1	South	60	1886
unnamed	UPPER MOUNTAIN	Coal	3X64	96	West	8.1	South	30	1867
unnamed	LOWER MOUNTAIN	Coal	3XAP	110	Beneath Property	7.1	South-West	60	1900

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
Shaft	392415-006	392977 415548	Records indicate that this shaft has been covered with a concrete pad at some time in the past but the details are not known.	Coal	
Shaft	393415-009	393380 415743	This shaft was found to be brick lined and filled with a "fatty waste material". It was excavated to a depth of 7.8m removing 2.6m of bedrock where a reinforced concrete cap was formed. The cap measures 8.5m sq at the base increasing to 10m sq at the top by 1.2m thick. The excavation was backfilled to the surface with compressed fill. An inspection pipe was installed passing through the cap and incorporating an inspection plate at the surface. Branching from this is a ventilation pipe fitted with a flame arrestor	Coal	

Abandoned mine plan catalogue numbers

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

1882	16820	NW1225
PO0	6309	NW1224

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

Outcrops

No outcrops recorded.

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

The following potential risks have been identified and as part of your risk assessment should be investigated further.

Development advice

The site is within an area of historical coal mining activity. Should you require advice and/or support on understanding the mining legacy, its risks to your development or what next steps you need to take, please contact us.

For further information on specific site or ground investigations in relation to any issues raised in Section 4, please call us on 0345 762 6848 or email us at groundstability@coal.gov.uk.

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.

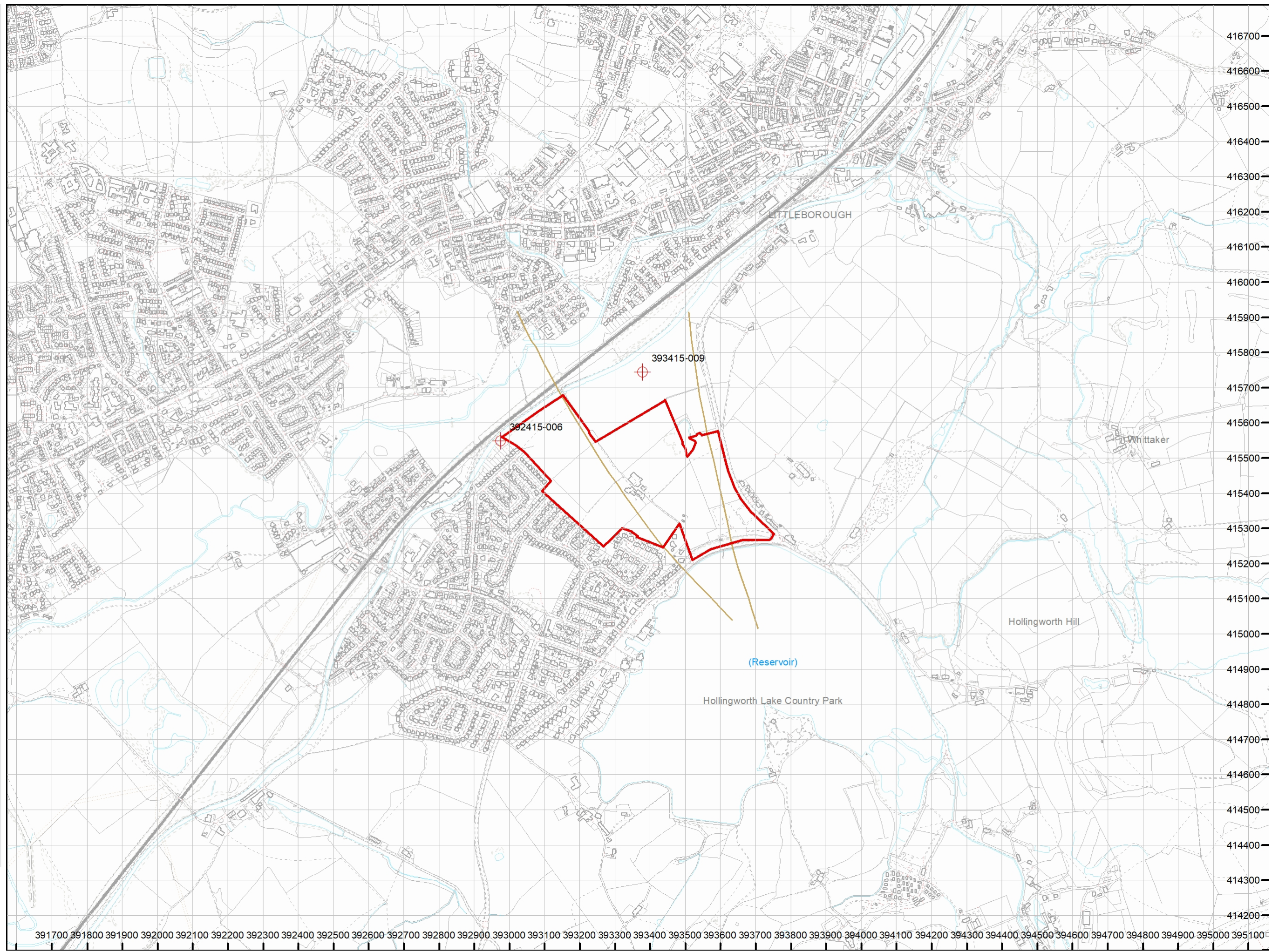
The map highlights any specific surface or subsurface features within or near to the boundary of the site.

Key

- Approximate position of the enquiry boundary shown 
- Disused mine shaft 
- Geological faults 

How to contact us

0345 762 6848 (UK)
+44 (0)1623 637 000 (International)
www.groundstability.com



Appendix D Mine Abandonment Plans

