



Coal Mining Risk Assessment

Pilsworth Lake / Fisheries

Moss Hall Road

Bury

OL10 2RF

Date: 8th July 2024

Version 1

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EnviroSolution Ltd
Document Verification

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Report Title	Coal Mining Risk Assessment		
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Disclaimer

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Table of Contents

1	Introduction.....	4
1.1	Site Location and Description	4
1.2	Development Proposal.....	4
1.3	Scope of Coal Mining Risk Assessment.....	5
1.4	Sources of Information.....	5
2	Environmental Setting.....	6
2.1	Historic Coal Mining Activity.....	6
2.2	Geological Context.....	6
3	Identification and Assessment of Site-Specific Coal Mining Risks	8
4	Proposed Mitigation Strategy.....	12
5	Conclusions.....	13
6	References.....	14

Table 1 - Historic Mapping Review	6
Table 2 - Coal Mining Hazards Summary	8
Table 3 - Mine Shaft Summary.....	9

Appendices

Appendix A – Site Location

Appendix B – Coal Authority Report

Appendix C – Historic OS Maps

Appendix D – Geological Maps

Appendix E – BGS Borehole Logs

Appendix F – Coal Resource Map

Appendix G – Coal Mining Summary Map

1 Introduction

1.1 Site Location and Description

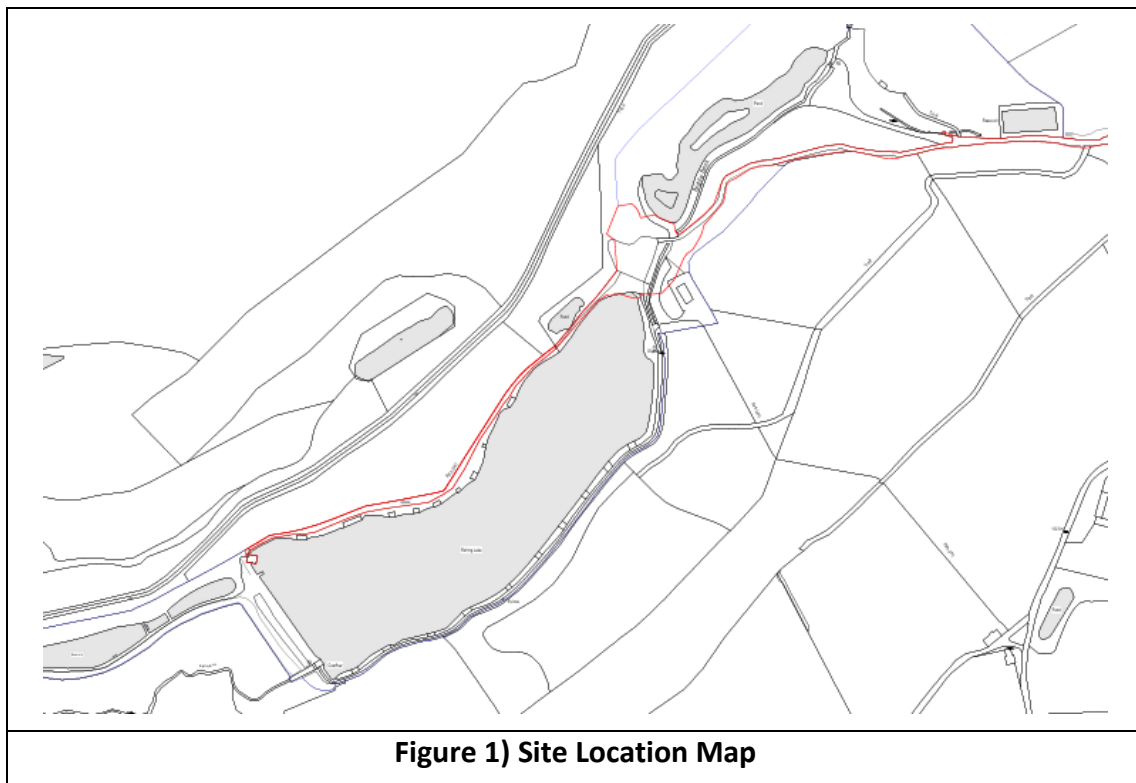
The site for the proposed new café/ shop and rebuild of the existing boat house is located at Pilsworth lake/ fisheries, Moss Hall Road, Bury, OL10 2RF. The British National Grid Reference for the approximate position of the proposed café is GR: 383115 408675.

The site is elongated in shape and follows a track running along the northern edge of the fishery, encompassing the existing boat house along the western boundary and a vacant parcel of land and a car park along the north-eastern boundary.

The site is accessed via a single track leading westwards from Moss Hall Road.

The topography of the site is generally flat at an approximate mean elevation of approximately 96m aOD.

A plan showing the location of the site is shown in **Figure 1**.



1.2 Development Proposal

It is understood that the development proposal includes the rebuilding of the existing boat house and the construction of a café/shop with associated access road, parking and landscaping.

The development plans are included in **Figure 3** and **Figure 4** in **Appendix A**.

1.3 Scope of Coal Mining Risk Assessment

EnviroSolution Ltd has been commissioned to prepare a Coal Mining Risk Assessment Report (CMRA) for the proposed development site, in order to provide the Local Planning Authority with information on the coal mining legacy risk(s), an assessment of their potential impact on land stability, and provide recommendations for the need to carry out any further investigations (including intrusive boreholes) to address these risk(s).

The CMRA has been undertaken in accordance with the principles of best practice including the Coal Authority's guidance document "Risk Based Approach to Development Management - Resources for Developers Version 3" (2014) (Ref. 1), CIRIA "SP32 Construction over Abandoned Mine Workings" (2002) (Ref. 2) and CIRIA "C758D Abandoned Mine Workings Manual" (2019) (Ref. 3), CIRIA, Publication C665, Assessing risks posed by hazardous ground gases to buildings (Ref. 4) and CL:AIRE "Good Practice for Risk Assessment for Coal Mine Gas Emissions", October 2021 (Ref. 5).

The purpose of the CMRA Report is to:

- present a desk-based review of available information on the coal mining issues that are relevant to the application site;
- use that information to identify and assess the risks to the proposed development from coal mining legacy, including the cumulative impact issues;
- set out appropriate mitigation measures to address the coal mining legacy issues affecting the site, including any necessary remedial works and/or demonstrate how coal mining issues have influenced the proposed development; and
- demonstrate to the Local Planning Authority that the application site is, or can be made, safe and stable to meet the requirements of National Planning Policy with regard to development on unstable land.

1.4 Sources of Information

This report is based on current information of past mining activities relevant to the site. The following information sources have been used:

- Consultants Mining Report dated 28th June 2024 (Ref: 51003434003001, **Appendix B**);
- BGS Geoindex geological map;
- BGS geological 1:50,000 England and Wales Sheet 85 Manchester;
- BGS Geology of the Manchester district: a brief explanation of the geological map Sheet 85 Manchester. 2012;
- Coal Authority Interactive Website;
- Historical Ordinance Survey maps.

2 Environmental Setting

2.1 Historic Coal Mining Activity

The development site and surrounding area has been reviewed with reference to historical Ordnance Survey (OS) maps. The history of the site and immediate surrounding area are summarised in Table 1. Copies of the historical OS maps are included in **Appendix D**.

Table 1 - Historic Mapping Review

Date	Scale	Historic Mining Activity
1844-1847	1:10,560	- The site is currently undeveloped and runs along the northern boundary to a reservoir. - Barlow's coal pits located 550m east of the site. - Old sandstone quarry 280m northeast of the site.
1889-1891	1:10,560	- Evidence of ground workings within the northern area of the site. - Pumping station built in northern area of the site.
1928	1:10,560	- No significant change.

2.2 Geological Context

The BGS geological mapping (Geoindex and BGS Sheet 85 Manchester) show that the site is directly underlain by superficial diamicton glacial deposits, generated during the Quaternary. Diamicton generally consists of overconsolidated unsorted clays, silts, sands and gravels. Mapping shows a band of superficial head deposits in the northern area. Head generally consists of poorly sorted gravels, sands and clays deposited by solifluction processes.

The underlying bedrock consists of the Pennine Lower Coal Measures Formation, which is of Carboniferous age. The Pennine Lower Coal Measures Formation generally consists of interbedded grey mudstones and siltstones with pale grey sandstones and numerous coal seams.

Information of recorded underground workings beneath the site obtained from the Coal Authority interactive map confirms that the bedrock has a dip of approximately 8-10° towards the southwest.

Named coal seams expected to be present beneath the site include the Bassy (0-1.2m), Lower Foot (0-0.80m) and Lower Mountain (0-1.3m) (which can be up to 1.7m thick, Ref. 5).

A geological fault intersects the site boundary with an approximate trend of 135° (Whole Circle Bearing). The fault downthrows towards the southwest.

A BGS borehole log (ref: SD80NW379) has been obtained from BGS online records from 1.12km west of the site. The borehole shows 2.0m of Made Ground overlying 31m of superficial sands and gravels. Sandstone and marl bedrock was recorded at 33.0m bgl.

The location of the borehole is shown in **Figure 2**.

Unfortunately, the unknown thickness of the superficial deposits beneath the site makes it difficult to estimate the depth of the coal seams beneath the site.

None of the proximate coal seams in this area have a history of spontaneous combustion.

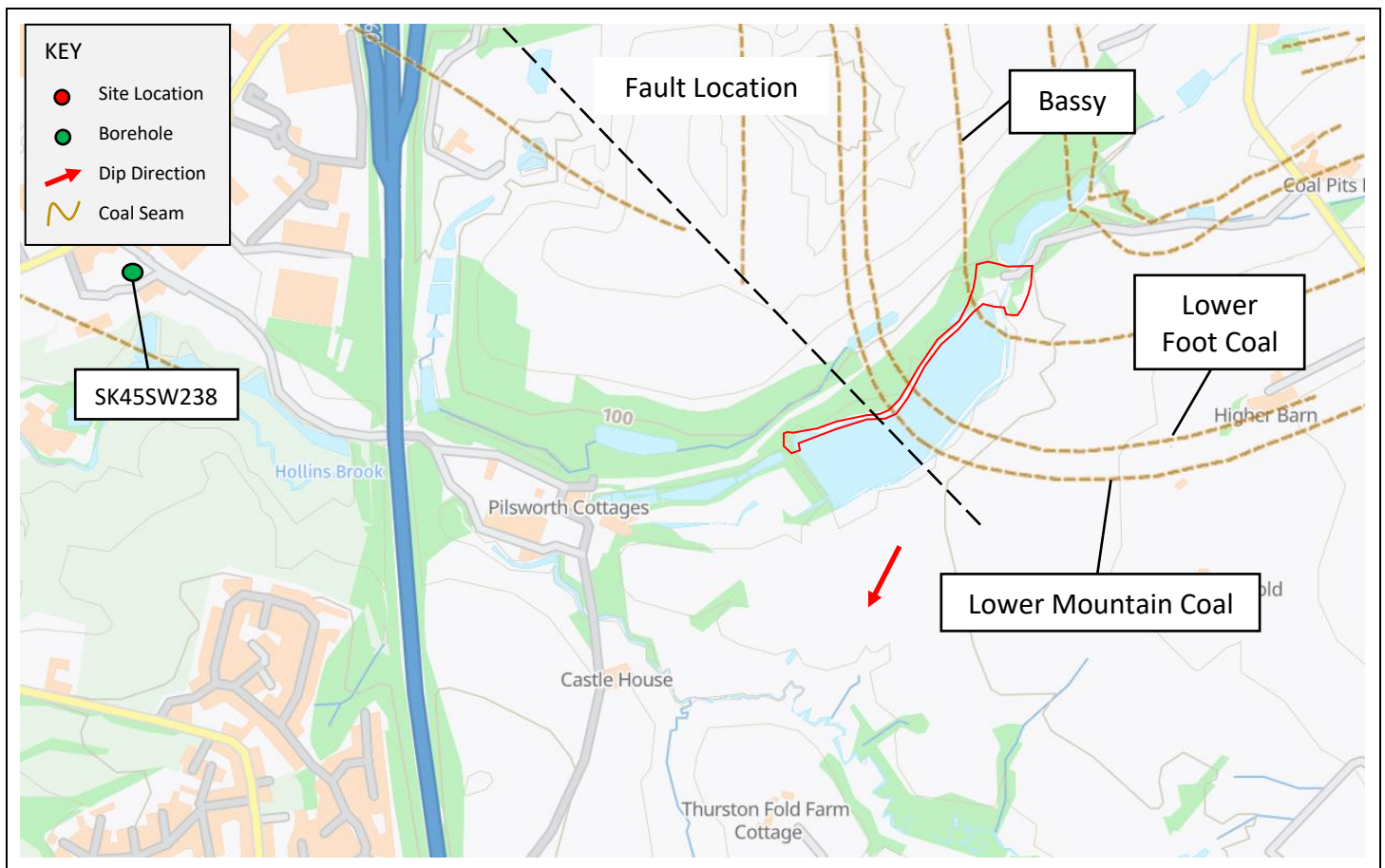


Figure 2) Coal Seam Location Map (Coal Authority Interactive Viewer)

The southwestern half of the site is situated within a Primary Opencast Coal Resource Area (**Appendix F**). The Primary Opencast Coal Resource Area is defined by the BGS as “an area that constitutes the main target for opencast coal extraction and comprises a relatively closely spaced succession of variable but generally thick coals. The northeastern half of the site is situated within a Secondary Opencast Resource Area, defined by the BGS as “a resource that represents one or more zones that contain opencast coal resources, but in which the coals are generally thinner and less concentrated in vertical and areal distribution. Coals from this resource zone have been exploited and continue to be worked, albeit on a smaller scale than the primary area coals”.

Notwithstanding this, it is considered to be very unlikely that there will be any interest in developing open cast coal mining operations at this location in the short or medium-term.

3 Identification and Assessment of Site-Specific Coal Mining Risks

Table 2 below summarises the potential risks associated with coal mining legacy for the proposed development site, which have been identified from list sources of information.

Table 2 - Coal Mining Hazards Summary

Coal Mining Issues	Yes	No
Coal outcrops	X	
Underground coal mining (recorded at shallow depths)		X
Underground coal mining (probable at shallow depths)	X	
Recorded mine entries (shafts and adits)	X	
Unrecorded mine entries (shafts and adits)	X	
Coal mining geology (fissures)		X
Record of past gas emissions		X
Recorded coal mining surface hazard		X
Surface mining (opencast workings)		X

The Coal Authority Interactive Map Viewer (**Appendix G**) has identified that portions of the site on the north-eastern side of the fault lie within a Development High Risk Area associated with the presence of sub-crops of the identified coal seams and areas of influence around a number of recorded shafts. The location of the boathouse is located outside of the Development High Risk Area, and therefore it is considered that there are no significant risks to that aspect of development.

A search of the Local Planning Authority planning records yielded no further information on site investigations in the surrounding area.

The report obtained from the Coal Authority (Consultants Mining Report, reference 51003434003001, dated 28th June 2024) showed the property to be in a surface area that is not affected by recorded underground mining.

However, the Coal Authority identify that there could be unrecorded workings associated with the Lower Mountain, Lower Foot and Bassy seams, located on the eastern side of the fault. Specifically, it is the area of potential unrecorded workings within the Bassy seam which intersects the proposed café. If this seam has historically been worked, it could present a risk to surface stability.

The Coal Authority report states that they are aware of 4 no. recorded mine entries within and close to the site boundary. The location and mine shaft information are summarised in Table 3 and **Figure 3**.

Table 3 - Mine Shaft Summary

Mine Shaft	Treatment	Departure	Assumed Shaft Diameter	Distance from Site
383408-002	No Information	10m	2.5m	On Site
383408-001	No Information	10m	2.5m	10m N
383408-003	No Information	10m	2.5m	41m NE
383408-004	No Information	10m	2.5m	75m NE

Shafts 383408-003 and 383408-004 are located in excess of 41m from the site. They are considered to be at such a distance from the site that the area of influence around the shaft will not intersect the proposed development.

Shaft 383408-002 is located within the northern section of the site and the area of influence around the shaft intersects the proposed car parking areas.

Shaft 383408-001 is located 10m north of the proposed overflow car park but the area of influence around the shaft is shown to intersect this car parking area.

The area of potential influence around a shaft can be calculated by the sum of the diameter, departure and depth to rockhead. It should be noted that depth the rockhead beneath the site is not known to any accuracy. The nearest borehole records, some 1.1km from the site indicate superficial thicknesses up to 33.0m. However, it is noted that the location of the proposed car parks lie closer to the edge of the superficial deposits so may be thinner.

To provide context, the area of influence around shafts 383408-002 and 383408-001 have been plotted using the assumed diameter and departure in **Figure 4**.

Notwithstanding this, there may be mine entries in the vicinity that have not been recorded.

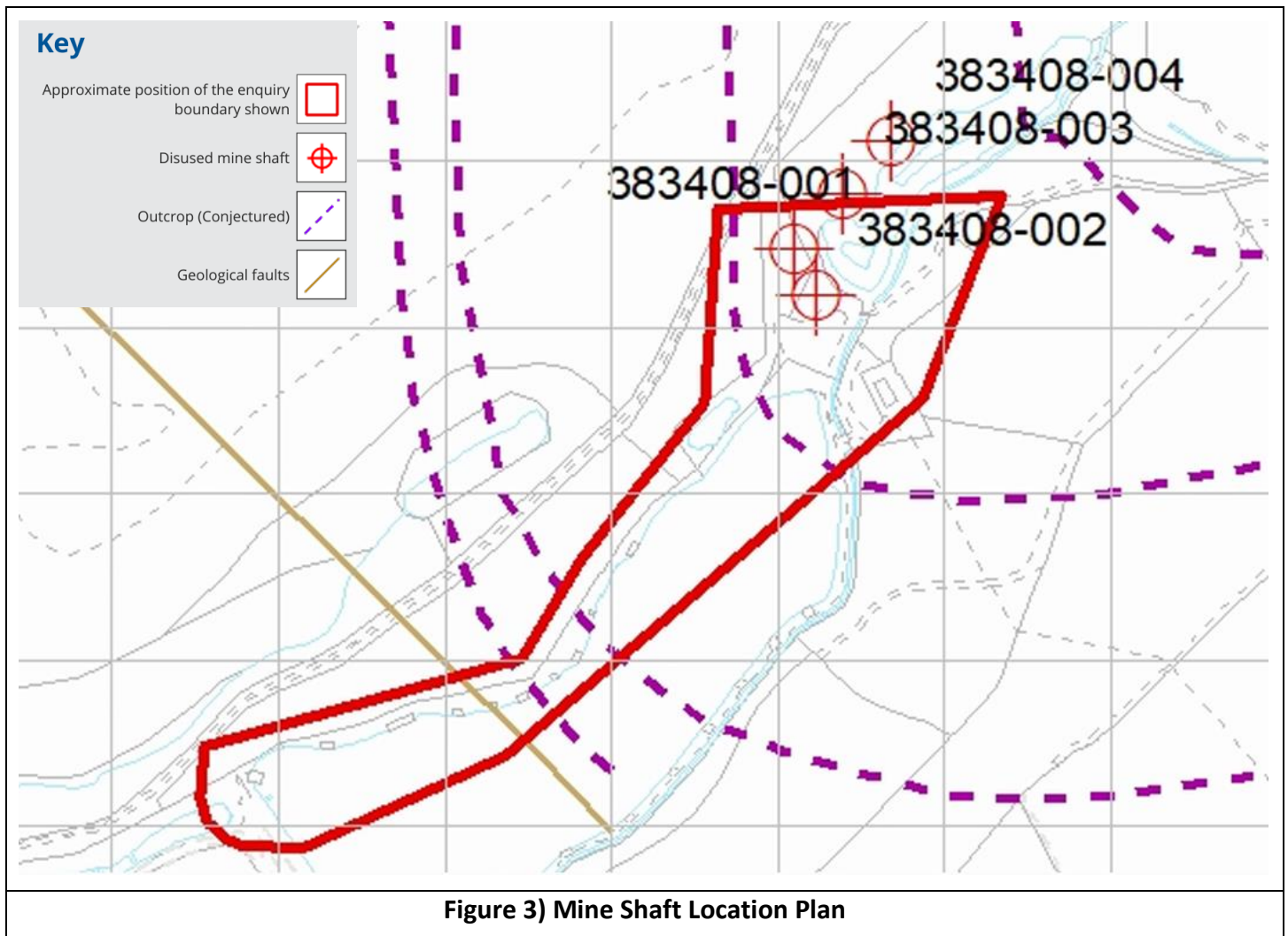




Figure 4) Area of Influence Plot

The Coal Authority mining report states the property is not within the boundary of a historic or current opencast site, and there are no licence requests outstanding to remove coal via this method in the future. The risk posed to the site from opencast mining methods is therefore considered to be negligible.

There are no recorded past mining gas emissions in the surrounding area; however, coal seams and coal mine workings pose a potential gas risk, which should be considered in any future investigations and development. At development sites with shallow coal workings, probable shallow coal mine workings, or pathway features such as mine entries and geological disturbances on or nearby the site, it is recommended that a detailed gas risk assessment is undertaken in accordance with relevant guidance.

4 Proposed Mitigation Strategy

- All built development should remain outside the area of influence around the proximate shafts (383408-001 and 383408-002).
- Because of the risk from unrecorded shallow abandoned coal mine workings in the Bassy coal seam, it is recommended that up to 4 no. rotary borehole are advanced to a minimum depth of 40m below ground level targeting the areas of proposed built development. Water flush should be used to safeguard against oxidation and potential spontaneous combustion of shallow coal. In order to undertake these works it will be necessary to obtain a drilling permit from The Coal Authority.
- Because the location of shafts 383408-001 and 383408-002 could potentially lie within the development boundary (beneath the proposed car parking areas), it will therefore be necessary to include a targeted trial pitting investigation in these areas.
- The provision for the installation of a reinforcement geogrid (Tensar or similar) should be made for the road access and car parking areas to mitigate the risk of subsidence caused by a shaft collapse.
- The possibility of unrecorded mine shafts has been highlighted in the Coal Authority report. The potential risk can be dealt with through vigilance during the earthworks stage of construction.

5 Conclusions

The Coal Mining Risk Assessment for the site at Pilsworth Fisheries in Oldham has concluded that the potential risk associated with coal mining related issues are significant based on information from the Coal Authority and geological interpretation.

The principal risks to the development arise from:

- the potential presence of unrecorded shallow mine workings;
- the presence of recorded shafts within and within influencing distance of the site;
- unrecorded mine entries;
- mine gas;

It is therefore recommended that further intrusive ground investigations are undertaken. These might include the drilling of 4 no. rotary probe boreholes to minimum depths of 40m bgl, located close to the proposed café development and mine shafts to determine the superficial thickness along with obtaining evidence of potential unrecorded coal mine workings. Provision should be made to install gas monitoring standpipes and undertake a programme of gas monitoring.

Targeted trial pitting should be undertaken in the areas of the recorded shafts to obtain information on their location and the state of backfill.

The provision for the installation of a reinforcement geogrid should be made for the road access and car park to mitigate the risk of subsidence caused by a shaft collapse.

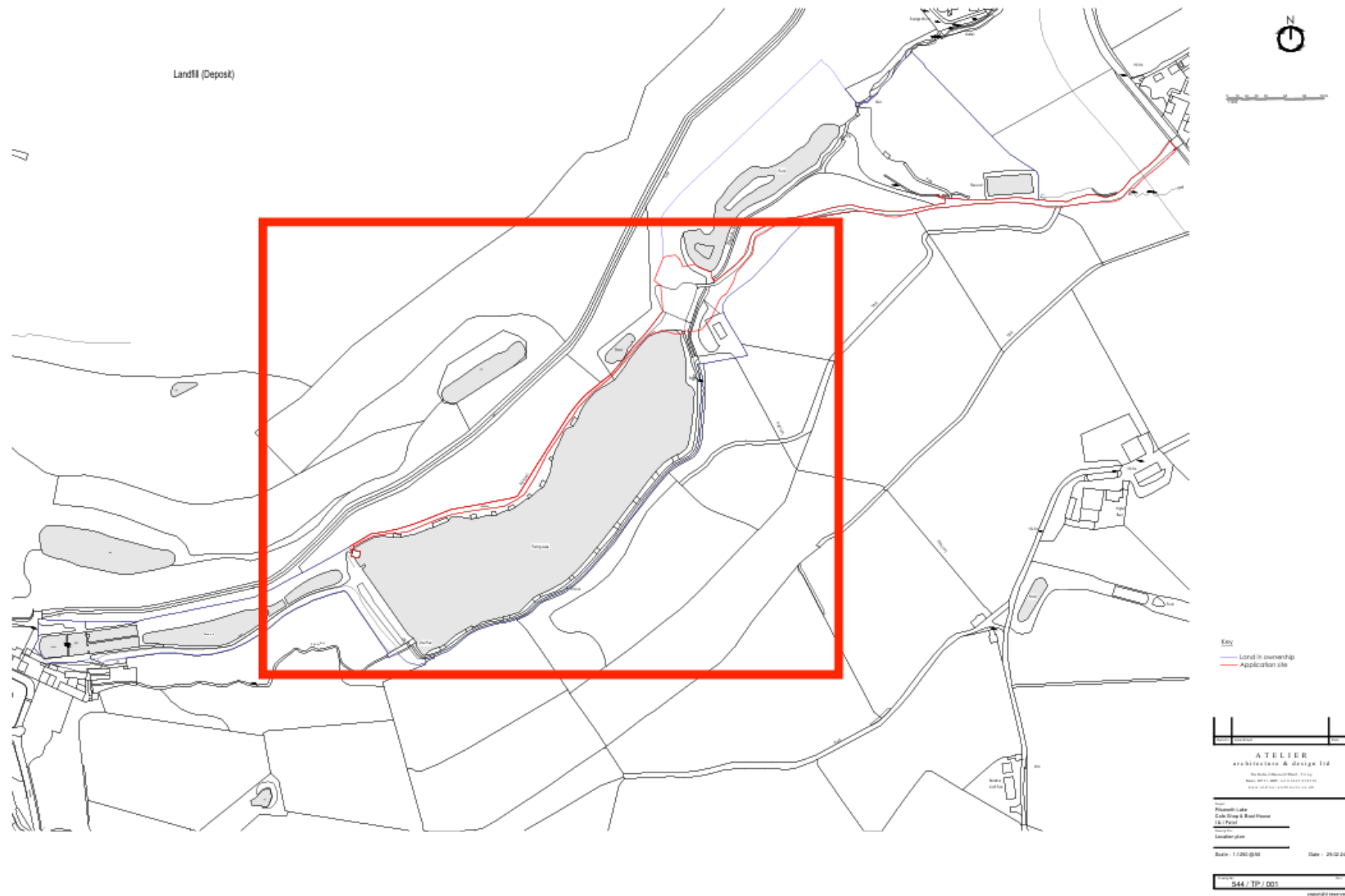
Prior to the commencement of intrusive works, a Coal Authority Permit will be required for drilling activities, that will disturb or enter any coal seams, coal mine workings or coal mine entries (shafts and adits). The scope of works for the investigation will need to be submitted and approved by the local authority prior to the commencement of the intrusive works.

Coal Authority approval will also be required for the ground surface protection against shaft collapse.

6 References

1. Coal Authority, 2014, Risk Based Approach to Development Management Resources for Developers, Version 3.
2. CIRIA, 2002, SP32 Construction over Abandoned Mine Workings.
3. CIRIA, 2019, C758D Abandoned Mine Workings Manual.
4. CIRIA, Publication C665, Assessing risks posed by hazardous ground gases to buildings.
5. BGS, 2012, Geology of the Manchester district: a brief explanation of the geological map Sheet 85 Manchester.
6. CL:AIRE, 2021, Good Practice for Risk Assessment for Coal Mine Gas Emissions.

Appendix A – Site Location



and fill (Deposit)



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Existing Site Plan





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**Proposed Café and Car Park
Development**

Appendix B – Coal Authority Report



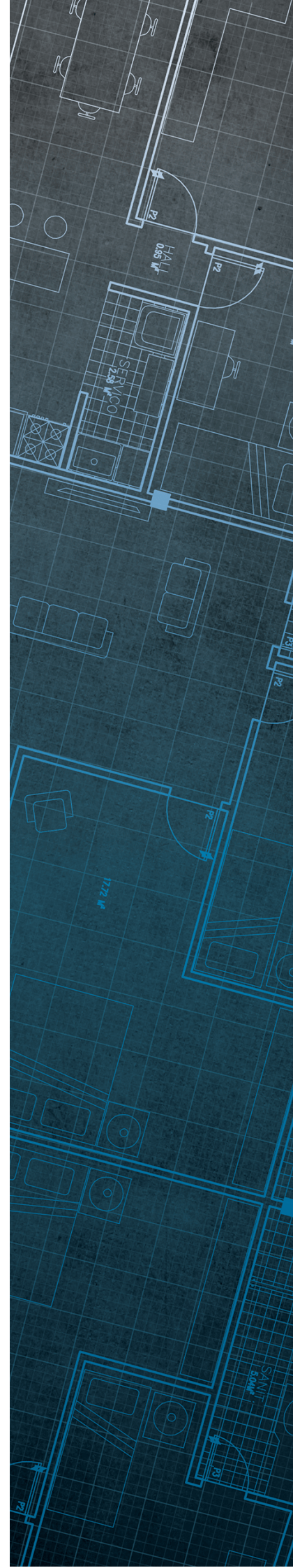
The Coal
Authority

Consultants Coal Mining Report

Pilsworth Fisheries
Moss Hall Road
Whitefield
Bury
OL10 2RF

Date of enquiry:	28 June 2024
Date enquiry received:	28 June 2024
Issue date:	28 June 2024

Our reference:	51003434003001
Your reference:	Pilsworth Fisheries



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

EnviroSolution Limited

Enquiry address

Pilsworth Fisheries
Moss Hall Road
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OL10 2RF

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Nottinghamshire
NG18 4RG

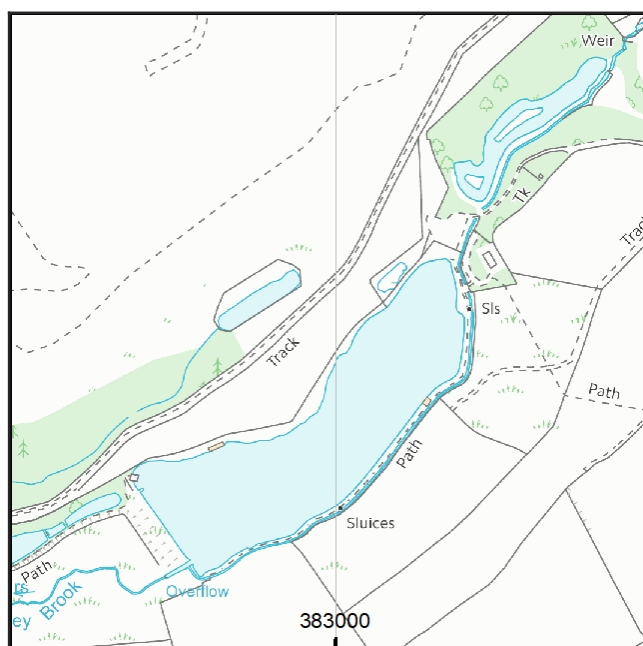
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

No past mining recorded.

Probable unrecorded shallow workings

Yes.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	383408-001	383111 408746		Coal	
Shaft	383408-002	383124 408719		Coal	
Shaft	383408-003	383139 408779		Coal	
Shaft	383408-004	383169 408811		Coal	

Abandoned mine plan catalogue numbers

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

16820		
-------	--	--

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

Outcrops

Seam name	Mineral	Seam workable	Distance to outcrop (m)	Direction to outcrop	Bearing of outcrop
BASSEY	Coal	Yes	Within	N/A	359
LOWER FOOT	Coal	Yes	Within	N/A	126
LOWER FOOT	Coal	Yes	Within	N/A	145
LOWER MOUNTAIN	Coal	Yes	Within	N/A	149
SIX INCH	Coal	Yes	41.9	North	175

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.

Fault under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

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

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

None recorded within 50 metres of the enquiry boundary.

Coal mining subsidence

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

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

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

Mine gas

None recorded within 500 metres of the enquiry boundary.

Mine water treatment schemes

None recorded within 500 metres of the enquiry boundary.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

None recorded within 200 metres of the enquiry boundary.

Court orders

None recorded.

Section 46 notices

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

Withdrawal of support notices

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

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

Payments to owners of former copyhold land

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

Section 4 – Further information

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

Future development

If development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before beginning work on site. All proposals should apply specialist engineering practice required for former mining areas. No development should be undertaken that intersects, disturbs or interferes with any coal or coal mines without first obtaining the permission of the Coal Authority.

MINE GAS: Please note, if there are no recorded instances of mine gas within 500m of the enquiry boundary, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded. Developers should be aware that the investigation of coal seams, mine workings or mine entries may have the potential to generate and/or displace underground gases. Associated risks both to the development site and any neighbouring land or properties should be fully considered when undertaking any ground works. The need for effective measures to prevent gases migrating onto any land or into any properties, either during investigation or remediation work, or after development must also be assessed and properly addressed. In these instances, the Coal Authority recommends that a more detailed Gas Risk Assessment is undertaken by a competent assessor.

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. Please note, if there are no recorded instances of mine gas reported, this does not mean that mine gas is not present within the vicinity. The Coal Authority Mine Gas data is limited to only those sites where a Mine Gas incident has been recorded.

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

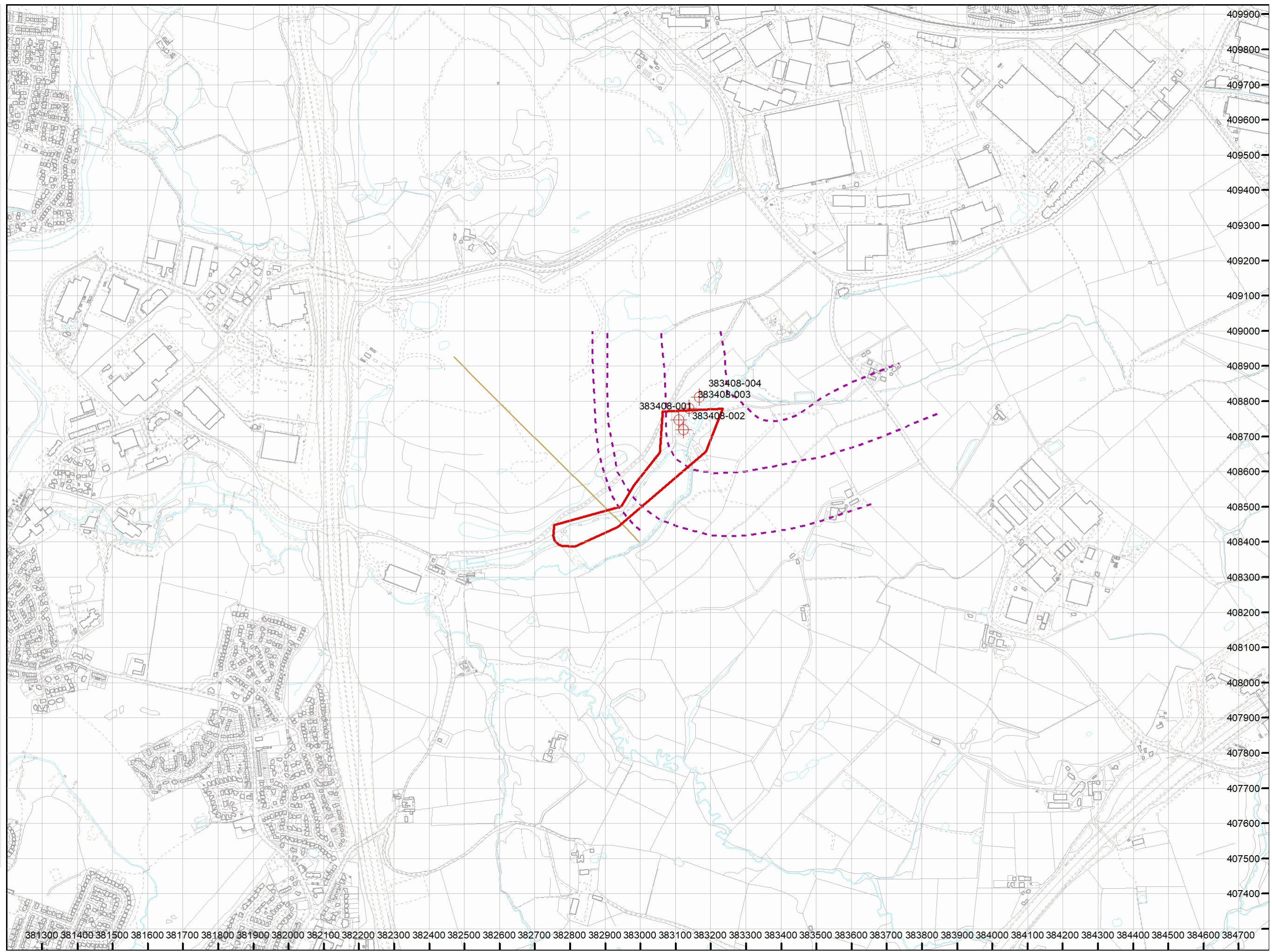
Relevant notices which may affect the property and any subsequent notice of retained interests in coal and coal mines, acceptance or rejection notices and whether any compensation has been paid to a claimant.

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

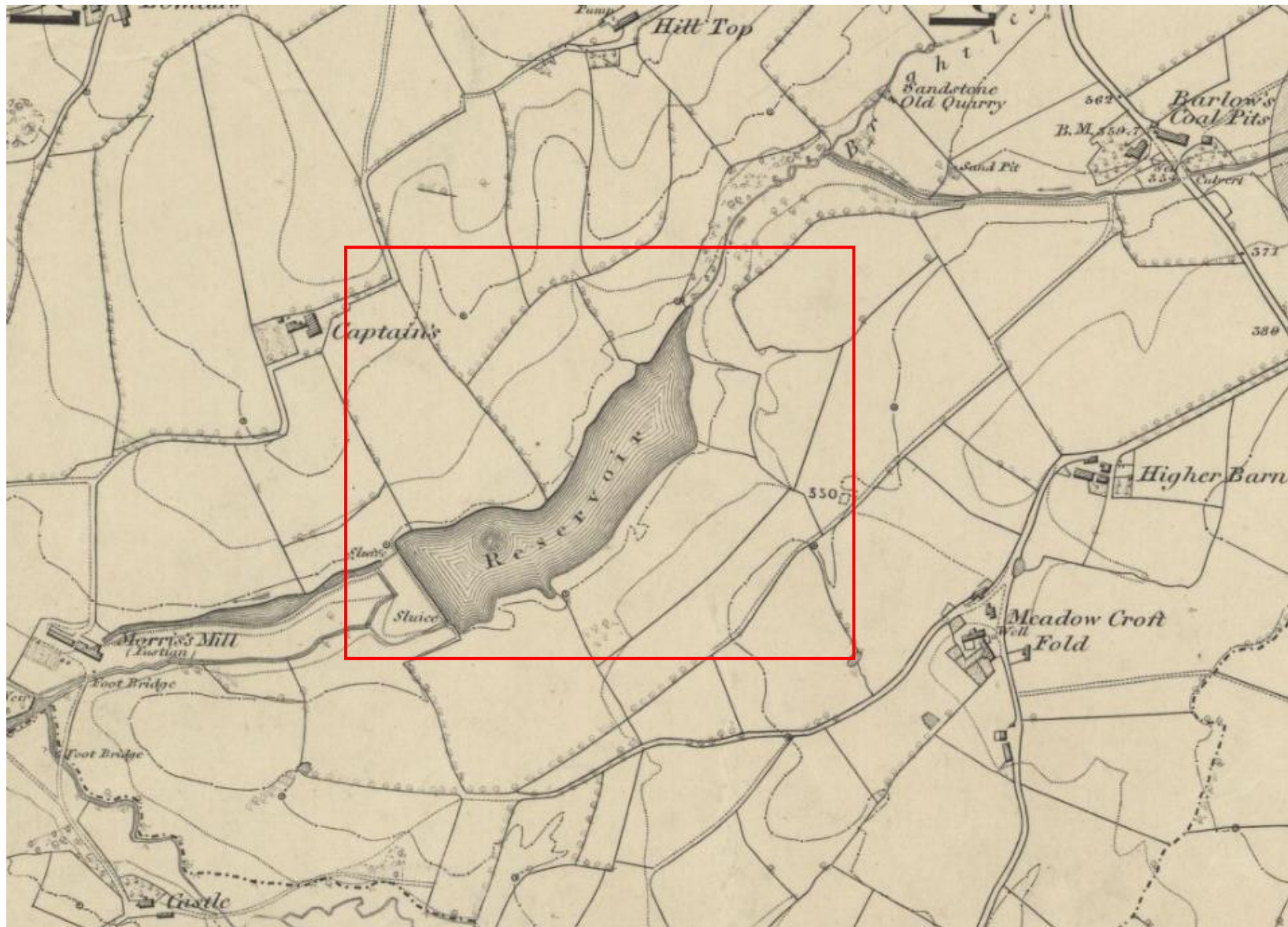
Key

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

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



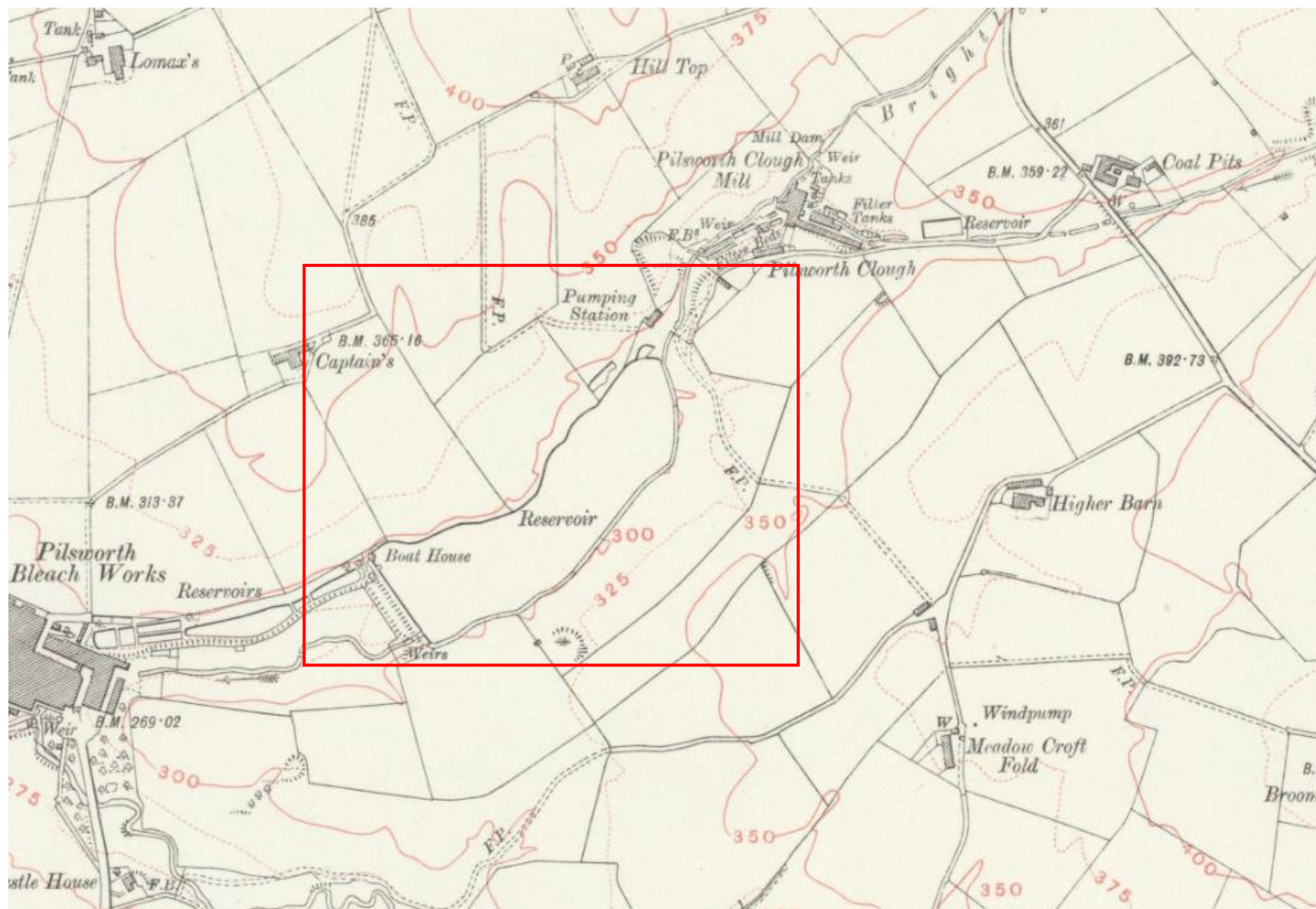
Appendix C – Historic Maps



Date: 1844-1847



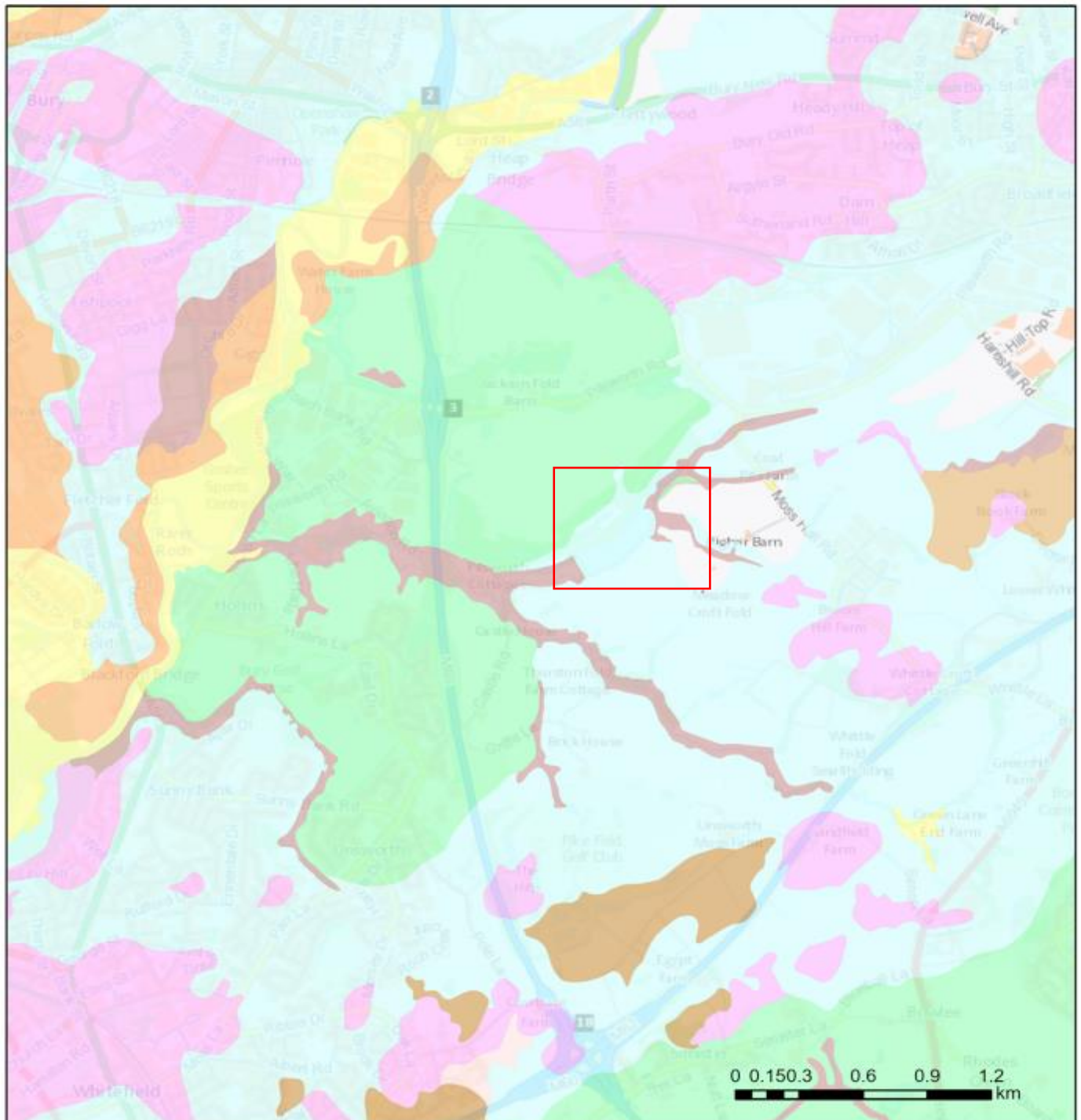
Date: 1889-1891



Date: 1928

Appendix D – Geological Maps

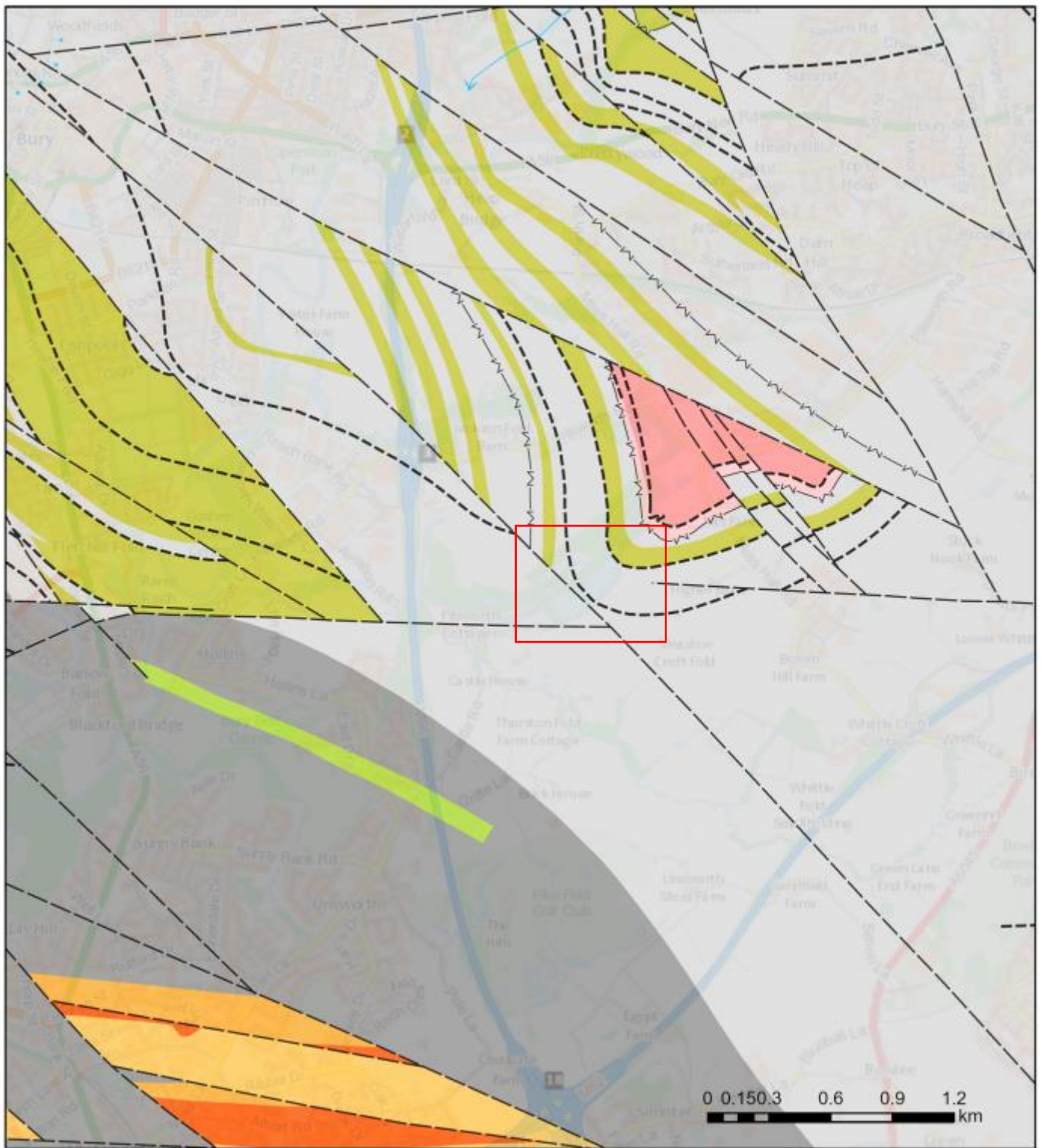
Superficial Geology



Superficial deposits 1:50,000 scale

- [GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL](#)
- [GLACIOFLUVIAL ICE CONTACT DEPOSITS, DEVENSIAN - SAND AND GRAVEL](#)
- [GLACIOFLUVIAL SHEET DEPOSITS, DEVENSIAN - SAND AND GRAVEL](#)
- [TILL, DEVENSIAN - DIAMICTON](#)
- [GLACIOLACUSTRINE DEPOSITS, DEVENSIAN - CLAY AND SILT](#)
- [HUMMOCKY \(MOUNDY\) GLACIAL DEPOSITS, DEVENSIAN - DIAMICTON](#)
- [HUMMOCKY \(MOUNDY\) GLACIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL](#)
- [ALLUVIUM - CLAY, SILT, SAND AND GRAVEL](#)
- [HEAD - CLAY, SILT, SAND AND GRAVEL](#)
- [RIVER TERRACE DEPOSITS, 1 - SAND AND GRAVEL](#)
- [RIVER TERRACE DEPOSITS, 2 - SAND AND GRAVEL](#)
- [LACUSTRINE DEPOSITS - CLAY](#)
- [LACUSTRINE DEPOSITS - SAND AND GRAVEL](#)
- [PEAT - PEAT](#)

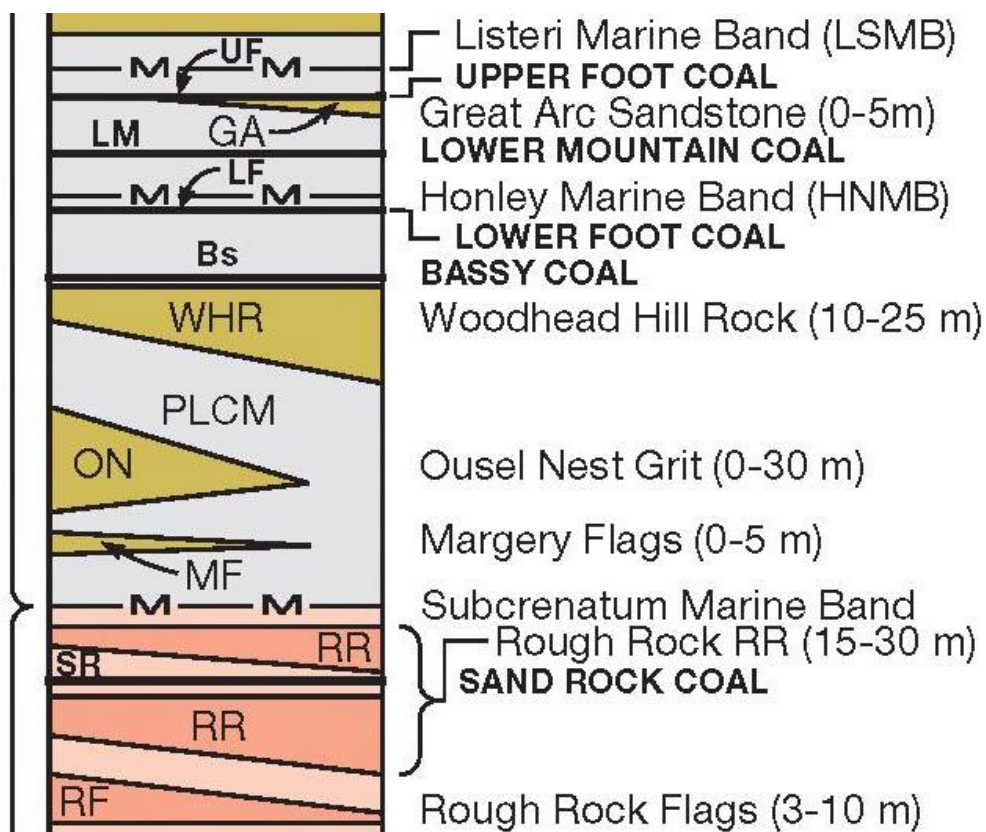
Bedrock Geology



Bedrock geology 1:50,000 scale

	<u>PENNINE LOWER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>ROSSENDALE FORMATION - MUDSTONE AND SILTSTONE</u>
	<u>ROUGH ROCK - SANDSTONE</u>
	<u>PENNINE UPPER COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>PENNINE MIDDLE COAL MEASURES FORMATION - MUDSTONE, SILTSTONE AND SANDSTONE</u>
	<u>CHESTER FORMATION - SANDSTONE</u>
	<u>COLLYHURST SANDSTONE FORMATION - SANDSTONE</u>
	<u>BLENFIRE ROCK - SANDSTONE</u>
	<u>CANNEL ROCK (SOUTH LANCASHIRE) - SANDSTONE</u>
	<u>DARWEN FLAGS - SANDSTONE</u>
	<u>GREAT ARC SANDSTONE - SANDSTONE</u>
	<u>HELPET EDGE ROCK - SANDSTONE</u>
	<u>MILNROW SANDSTONE - SANDSTONE</u>
	<u>OLD LAWRENCE ROCK - SANDSTONE</u>
	<u>PENNINE LOWER COAL MEASURES FORMATION - SANDSTONE</u>
	<u>ROYLEY SANDSTONE - SANDSTONE</u>
	<u>TRENCHBONE ROCK - SANDSTONE</u>
	<u>WOODHEAD HILL ROCK - SANDSTONE</u>
	<u>NEWTON HEATH SANDSTONE - SANDSTONE</u>
	<u>NOB END ROCK - SANDSTONE</u>
	<u>PENNINE MIDDLE COAL MEASURES FORMATION - SANDSTONE</u>
	<u>PEEL HALL ROCK - SANDSTONE</u>
	<u>WORSLEY DELF ROCK - SANDSTONE</u>
	<u>MANCHESTER MARLS FORMATION - MUDSTONE</u>

This geological map of the Heywood No. 1 area displays several geological units and features. The units are color-coded and labeled: 'RR' (red/orange), 'SR' (yellow), 'BS' (light green), 'LM' (dark green), 'LSMB' (light blue), and 'sa' (yellow with black wavy lines). The map includes topographic contour lines, a grid system, and various geographical labels such as 'Distribution Park', 'Hares Hill Frn', 'Stock Nook', 'Industrial Estate', 'BIRCH', 'Motels', 'Whittle Brook', 'Whittle Hill', 'Broom Hill Frn', 'Thurston Fold', 'Cem'y 101', 'Bunny Bank', 'Gigg', 'Sand', 'PH', 'No. 1', 'Heywood', 'BS', 'LM', 'LSMB', 'SR', 'RR', 'sa', 'A', 'H', '6', '5', '101', '102', '103', '104', '105', '106', '107', '108', '109', '110', '111', '112', '113', '114', '115', '116', '117', '118', '119', '120', '121', '122', '123', '124', '125', '126', '127', '128', '129', '130', '131', '132', '133', '134', '135', '136', '137', '138', '139', '140', '141', '142', '143', '144', '145', '146', '147', '148', '149', '150', '151', '152', '153', '154', '155', '156', '157', '158', '159', '160', '161', '162', '163', '164', '165', '166', '167', '168', '169', '170', '171', '172', '173', '174', '175', '176', '177', '178', '179', '180', '181', '182', '183', '184', '185', '186', '187', 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Appendix E – BGS Borehole Logs

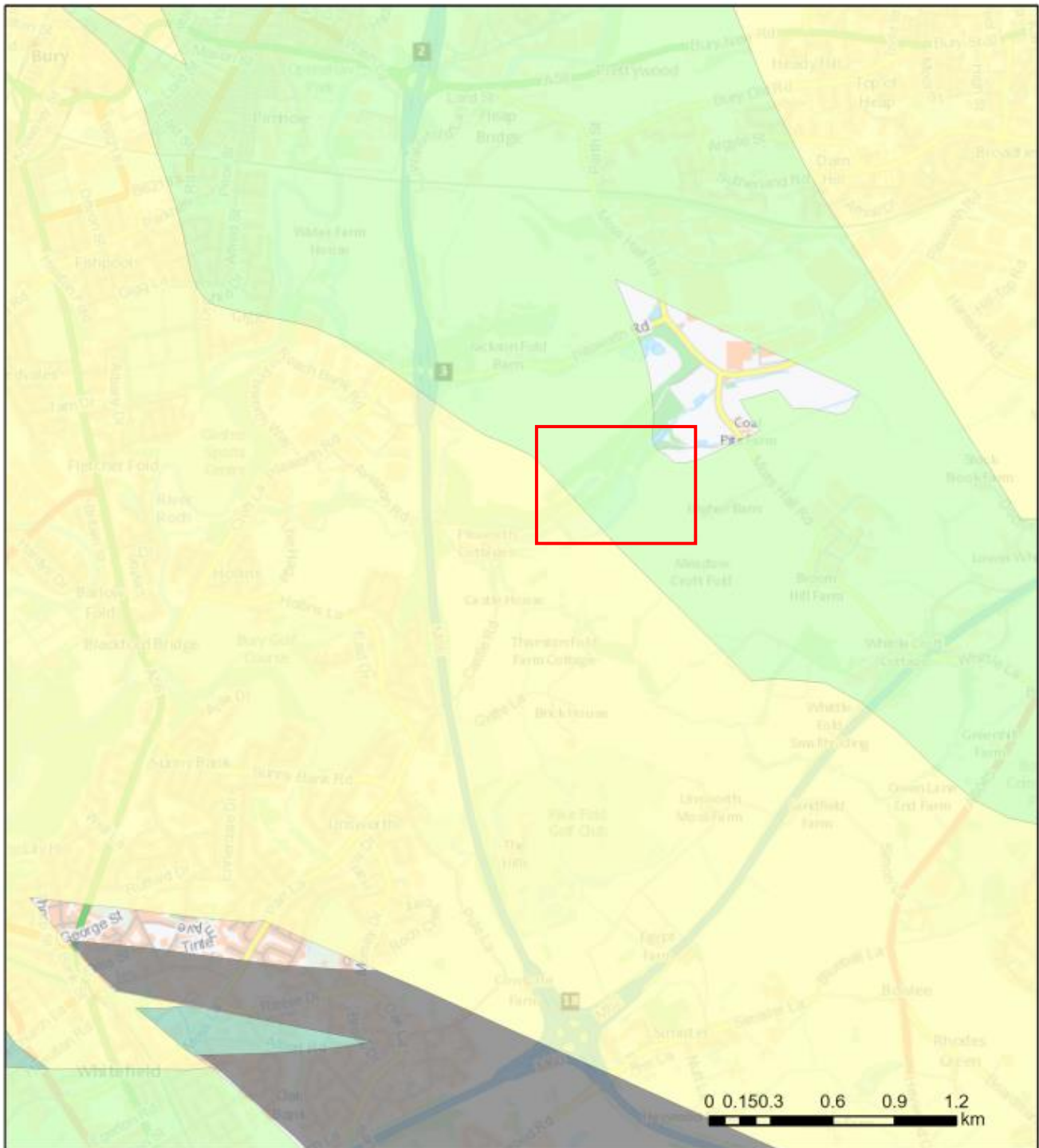
SD80NW379

D. STRATA LOG			
Geological Classification	Description of Strata	Thickness	Depth
(BGS only)		M	M
	Backfill	2	0 - 2
	Sand and gravel	31	2 - 33
	Marl	1	33 - 34
	Sandstone/marl	8	34 - 42
	Sandstone	34	42 - 76
	Sandstone/marl	4	76 - 80
	Marl with narrow sandstone bands	9	80 - 89
Other Comments			

FOR OFFICIAL USE ONLY

FILE: CONSENT NO: BGS REF. NO:
 LICENCE NO: USE OF BH: NGR:

Appendix F – Coal Resource Map



Shallow Coal

- Buried coal resource overlain by up to 50m overburden
- Primary opencast coal resource area
- Secondary opencast coal resource area
- Tertiary opencast coal resource area

Deep Coal

- Deep coal at more than 1200m
- Deep coal between 50m and 1200m

Appendix G – Coal Mining Summary Map

