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COAL MINING RISK ASSESSMENT
AT
HD1 PROJECT, STADIUM WAY,
HUDDERSFIELD
FOR
Kirklees Stadium Development Ltd
REPORT REF: KSDL 3282

Engineering Geologists and Environmental Scientists



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1. INTRODUCTION

This report describes the results of a Coal Mining Risk Assessment undertaken on a plot of land adjacent to and to the rear of the John Smith Stadium, Leeds Road, Huddersfield, HD1 6PG. The work was undertaken on behalf of the client Kirklees Stadium Development Ltd. The assessment was carried out by this Consultancy, the Ashton Bennett Consultancy of Holmfirth and London.

The purpose of this Coal Mining Risk Assessment was to assess the risk of past shallow and deep underground coal and fireclay mining being present beneath the site and potentially affecting proposals to redevelopment on the site. The mining risk assessment involved the collation and assessment of available information on the site including geological maps, topographical maps, available borehole records and a Coal Authority Report.

This report describes the research work carried out, presents the results of the Coal Mining Risk Assessment (CMRA) and assesses the risk to the site from deep and shallow underground coal and fireclay mining and disused mine shafts and adits.

2. THE SITE

2.1 Site Description

The site is in the order of 15 Ha and is located to the north and west of the John Smith Stadium which lies east of Leeds Road on the north east side of Huddersfield in West Yorkshire, HD1 6PG. The site entrance is located from Bradley Mills Road or Stadium Way, both leading off the Leeds Road.

The site is presently occupied by several car parks, a golf driving range and open ground.

The site comprises asphalt surfaced car parking areas in the northern and western areas, a golf driving range with associated hard-core surfaced car park at the southern end and a small area of grassland in the north east corner of the site. Asphalt access roads are present running along the western boundary of the site linking the main car park areas to the golf driving range.

The site is bounded to the west and northwest by the River Colne, which flows in a south to north direction. Kilner Bank, which comprises a vegetated rock slope and slopes steeply upwards towards the east is present along the eastern site boundary. A slope running downwards towards the John Smith Stadium forms the northeast site boundary. The southern site boundary is defined by a slope running downwards towards the south from the hardcore car park adjacent to the golf driving range.

Ground levels at the site vary significantly. The asphalt car park present on the western side of the site is relatively flat and at an elevation of around 64maOD to 67maOD. The ground slopes steeply down towards the river on the western site boundary. Water levels in the River Colne vary between 58.10maOD at the southern end of the site to 55.25maOD at the northern end of the site. A raised section of asphalt car park is present covering the northern and central portions of the site, the elevation of which is at around 70maOD to 72maOD. The raised car park is separated from the western car park and the golf driving range by a grassed slope. The golf driving range slopes gently downwards towards the west and is at an elevation of around 69maOD to 72maOD. The hardcore car park at the southern end of the site is relatively flat and is situated at an elevation of around 70maOD. The access road linking the golf driving range to the asphalt car park on the western side of the site slopes gently downwards towards the north with elevation ranging from 69maOD to 64maOD.

2.2 History of Site

The OS maps of 1851 indicate the site to be open land. A building named The Grove is present in the central eastern part of the site with a mill race named The Goit flowing south to north through the centre of the site. Grove Dye works and mill pond are present 100m to the north east of the site. By 1918 a tramway, Shaft and Colliery are indicated towards the north west centre of the site. By 1932 refuse heaps are indicated with tramways which are removed by 1958.

The historical maps confirm a mining and landfill use of the site in the past.

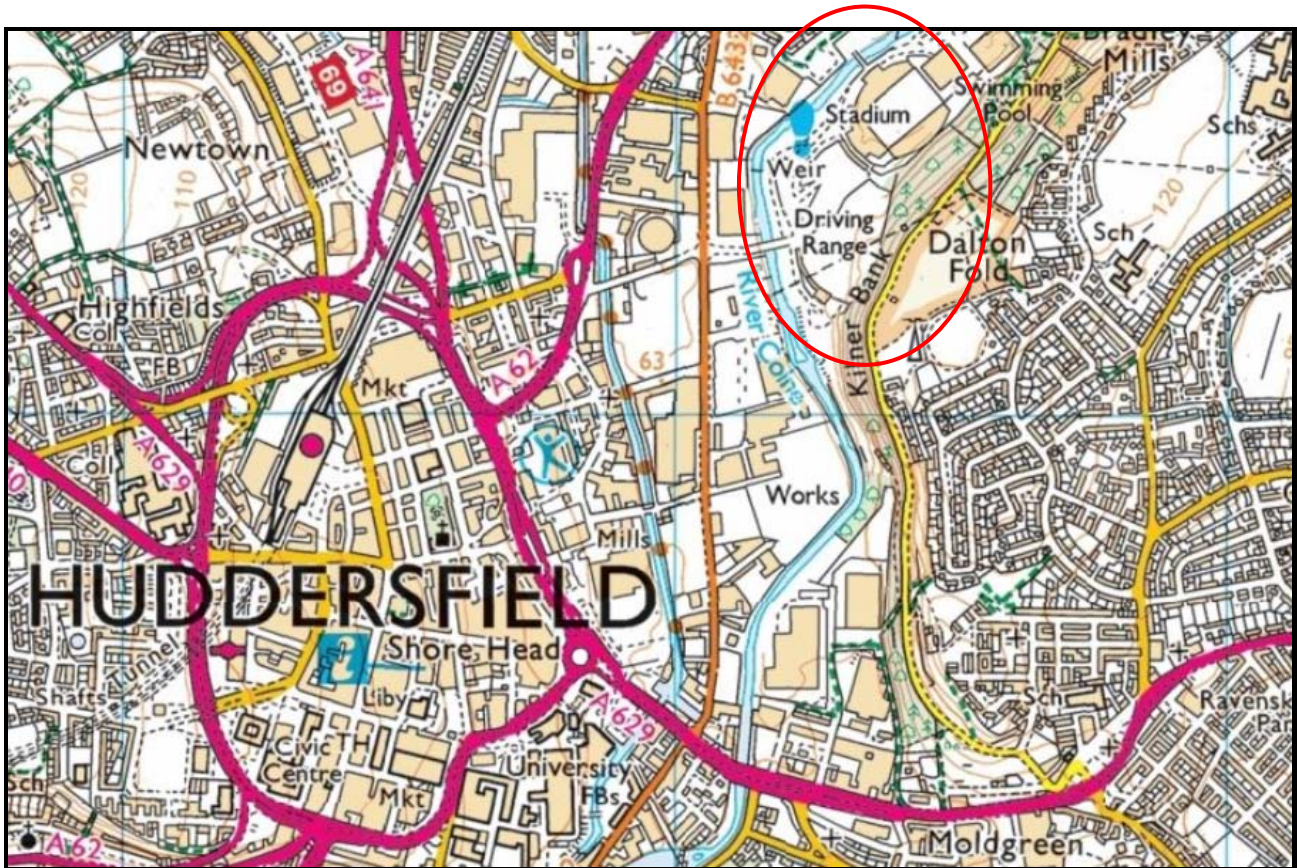


Figure 1 Site Location Plan

The site is bounded to the west by the River Colne in the south of the site and by Town Avenue in the north of the site with domestic and commercial properties beyond. The site is bounded to the north by the John Smith Stadium and Bradley Mills Road. The site is bounded to the east by Kilner Bank with the area of Dalton beyond. The site is bounded to the south by the River Colne, with industrial premises and Mold Green beyond.

The site is centred around National Grid Reference 415250E 417350N.

The proposals for the development of the site include a Hotel, Leisure Facilities, Ski Slope, car parking, shops and offices.

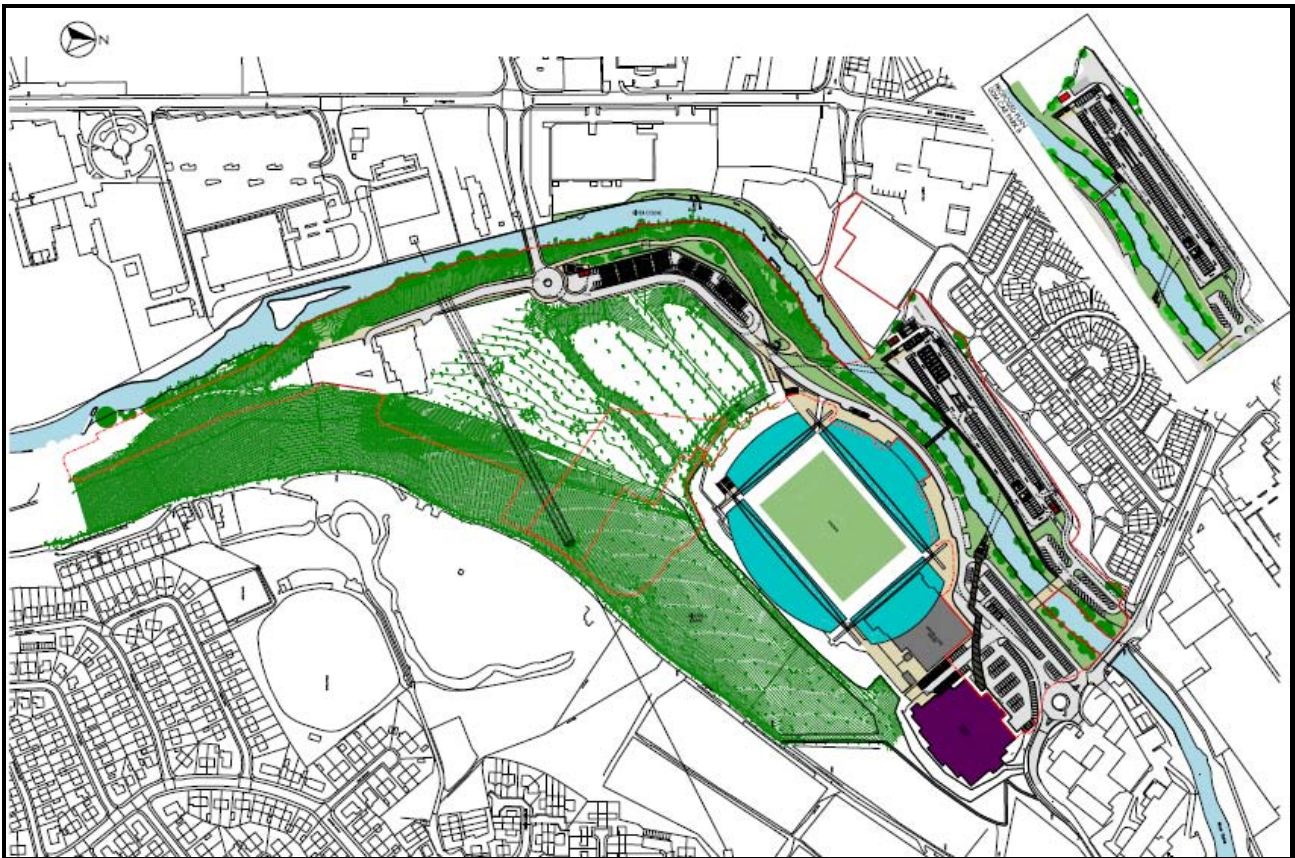


Figure 2 Detailed Site Plan

A Site Location Plan is presented as Figure 1 and a Detailed Site Location Plan as Figure 2 and a Proposals Lower Level as Figure 3, Proposals Upper Level as Figure 4, Location of Historic Boreholes as Figure 5, Geological Plan as Figure 6. A Plan of Coal Outcrops is presented as Figure 7. A Coal Mining Plan is presented as Figure 8 and Mine Shafts and Adits as Figure 9. Potential Mine Shaft Collapse is presented as Figure 10.

The Coal Authority Report and Shaft Plan and Data Sheets are presented in Appendix A. Cross Sections of the Coal Seams beneath the site are presented in Appendix B and a Mining Plan in the Halifax Hard Bed Coal is presented in Appendix C.

3. REPORT OBJECTIVE AND REPORT SCOPE

The objective of this Coal Mining Risk Assessment (CMRA) desk study is to examine the topographical, geological and mining data readily available for the site and determine the risk to the proposed development from past deep and shallow underground coal and fireclay mining and disused mine shafts and adits.

The Report has included a review of data as follows:

- Geological map of British Geological Survey (BGS) SE11NE 1:10,000, dated 1999
- On line BGS maps and data
- Coal Authority Report, dated September 2016
- BGS Historic Borehole Logs
- Coal Authority Mine Plan Catalogue number 6608, 1:2500, dated 2003.

- Ashton Bennett Geoenvironmental Ground Investigation Report 2011.

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

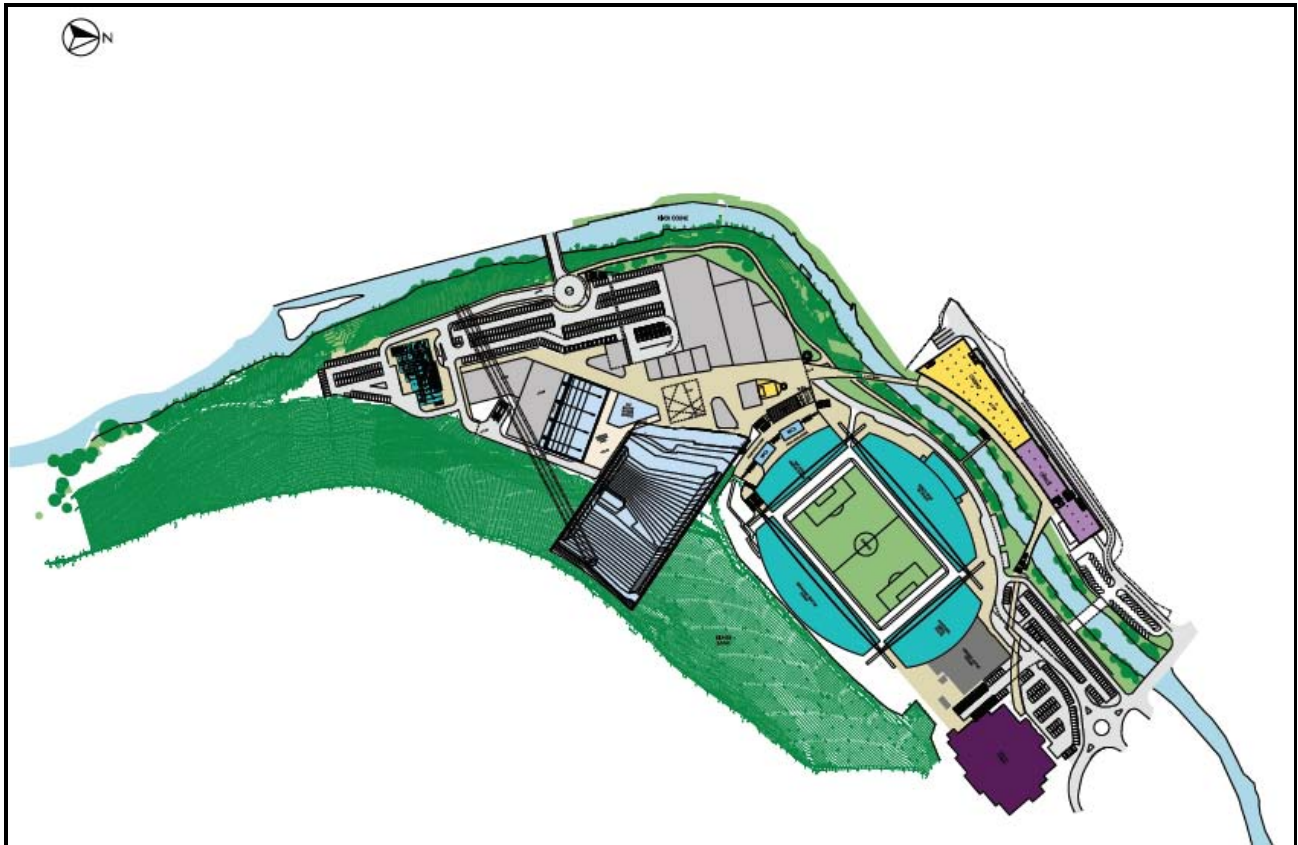


Figure 3 Proposals, Lower Level

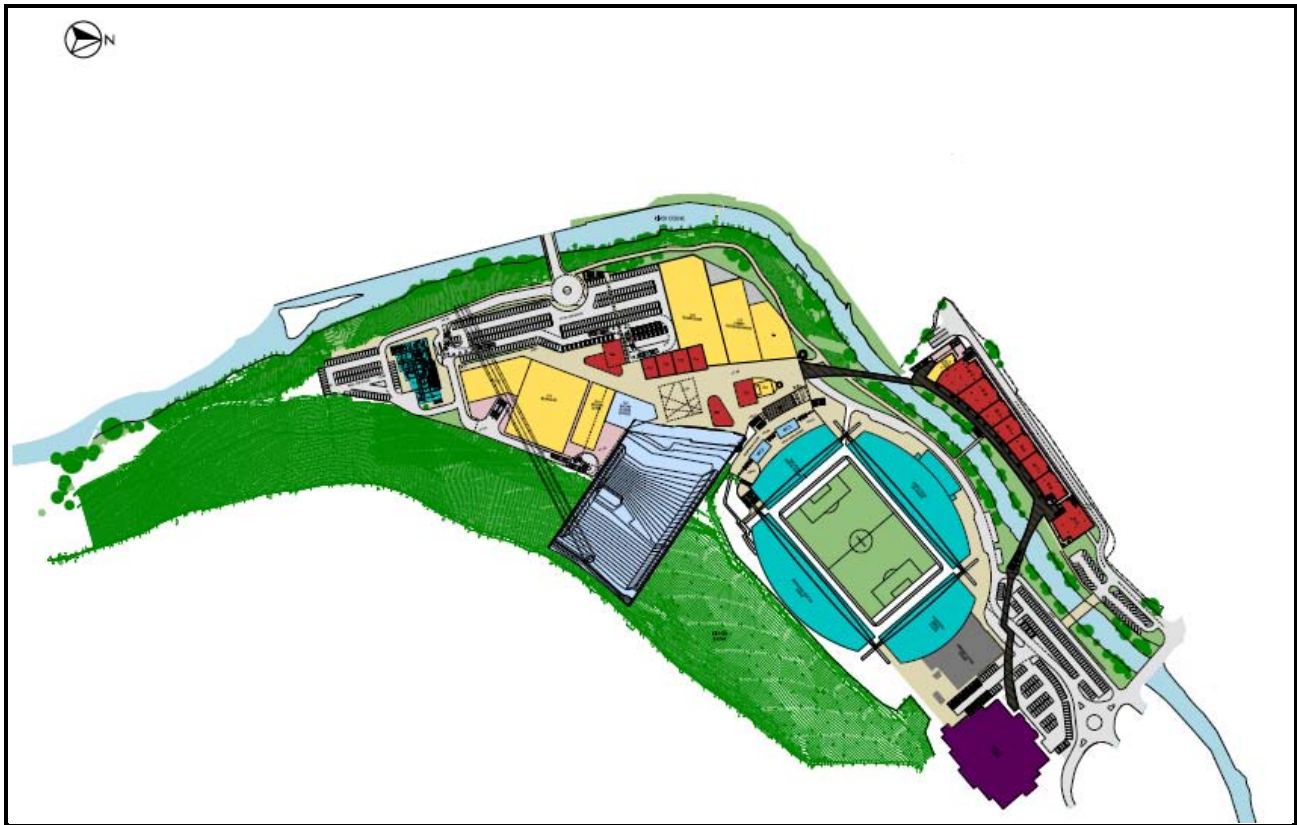


Figure 4 Proposals, Upper Level

4. SITE GEOLOGY

4.1 Geology

The published British Geological Survey (BGS) maps of the area at scales of 1:50,000 & 1:10,000 (Sheet 77 "Huddersfield" and Sheet SE 11 NE "Huddersfield East" respectively) show the site area to be underlain by Made Ground overlying Alluvium associated with the River Colne overlying mudstone and siltstone of the Lower Coal Measures (Upper Carboniferous). The 1:10,000 map shows the 36 Yard Coal to outcrop along the eastern boundary of the site at the foot of Kilner Bank. The Hard Bed Coal is anticipated to be present at around 20m and 45mbgl at the site. The Middle Band Coal, Middle Band Rock (sandstone), Soft Bed Coal, Soft Bed Flags (sandstone) and Pot Clay Coal are shown to be present below the Hard Bed Coal with the Pot Clay Coal expected to be present at around 100mbgl.

The bedrock is shown to dip gently to the east. Far-field geological sections indicating the likely nature of the coal seams running beneath the site have been constructed using BGS mapping and BGS borehole data and are presented in Appendix B as Drg. Nos. KSDL 3282/4, KSDL 3282/5 and KSDL 3282/6. A plan showing the alignment of the sections is provided as Drg No KSDL 3282/7.

Coal Authority mining plans covering the site and indicating the presence of past coal mining activity beneath the site were obtained by Ashton Bennett and are included in Appendix C.

The BGS maps indicate the presence of two NW-SE trending normal faults running through the centre of the site. The downthrow of the faults is indicated to be to the northeast. Geological faults can have a negative impact on the stability of the site when associated with voided ground due to past shallow mining.

BGS boreholes hold records of local boreholes which have been used to assist in interpretation of the geology.

TABLE 1
LOCAL BOREHOLES

BGS Reference no	Location	Depth	Geology in m bgl (prior to landfill)
SE11NE 18A Royds Mill No 1 Borehole for Water Abstraction	415198 417280	149.35 RWL 3.73m	GL-8.80 Clay and gravel 8.80-16.40 Shale <u>16.40 Coal</u> <u>18.50 Coal</u> <u>20.40 Coal (4.00m)</u> <u>91.00 Coal</u>
SE 11 NE 18B Royds Mill No 2 Borehole for Water Abstraction	415182 417417	123.14 RWL 10.36	GL-6.70m Made Ground 6.70-8.50 Sand and Gravel 8.50-16.50 Shale <u>16.50-18.90 Coal and Fireclay (2.40m)</u> 18.90-32.00 Shale 32.00-35.90 Sandstone 35.90-123.14 Shale underlain by Rough Rock Sandstone
SE 11 NE 21 Grove Pit	415246 417420	25.35	No Details
SE 11 NE 198	415210 417310	15.20	GL-11.10 Made Ground 11.00-12.50 Clay 12.50-14.55 Sand and Gravel 14.55-15.20 Mudstone/Shale
SE 11 NE 199		14.00	None of these boreholes encountered coal
SE 11 NE 200		14.50	
SE 11 NE 201		10.00	
SE 11 NE 202		12.00	
SE 11 NE 203		14.50	
SE 11 NE 204	415270 417440	16.00	GL-11.15 Made Ground 11.15-12.40 Clay 12.40-15.35 Sand and Gravel 15.35-16.00 Shale
SE 11 NE 205		14.00	None of these boreholes encountered coal
SE 11 NE 206		13.00	
SE 11 NE 207		4.50	
SE 11 NE 208		6.00	
SE 11 NE 209		5.05	
SE 11 NE 210		5.00	
SE 11 NE 211		4.00	

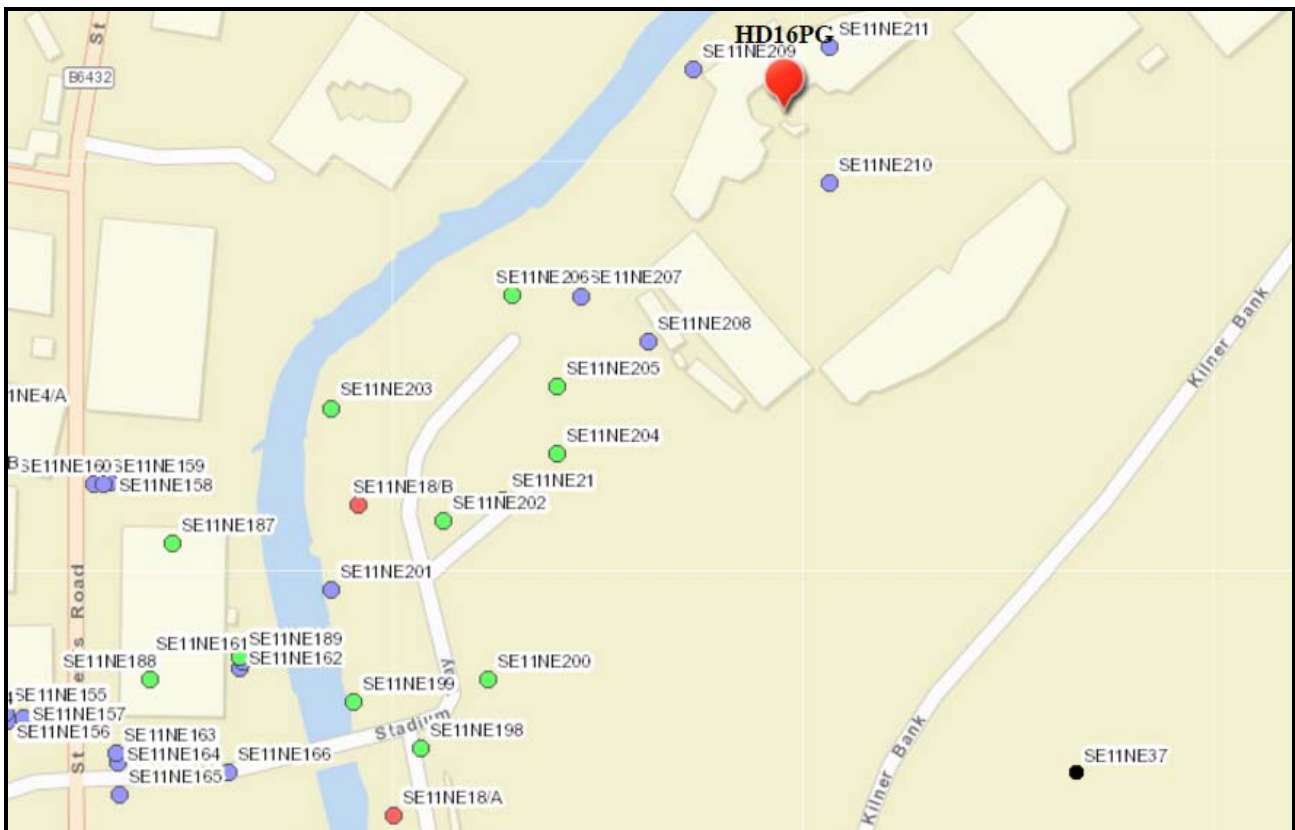


Figure 5 Location of BGS held Historic Boreholes

4.2 Geological Faults

The geological maps indicate the presence of several known geological faults. There are two NW-SE trending faults that cross the central area of the site. These faults dip to the northeast and have downthrown younger strata to the north east compared to older strata to the south west.

The Coal Measures strata are heavily faulted from past tectonic activity and small unrecorded faults may also be present.

The faults are unlikely to detrimentally affect the stability of the site unless shallow mined ground is present beneath the site.

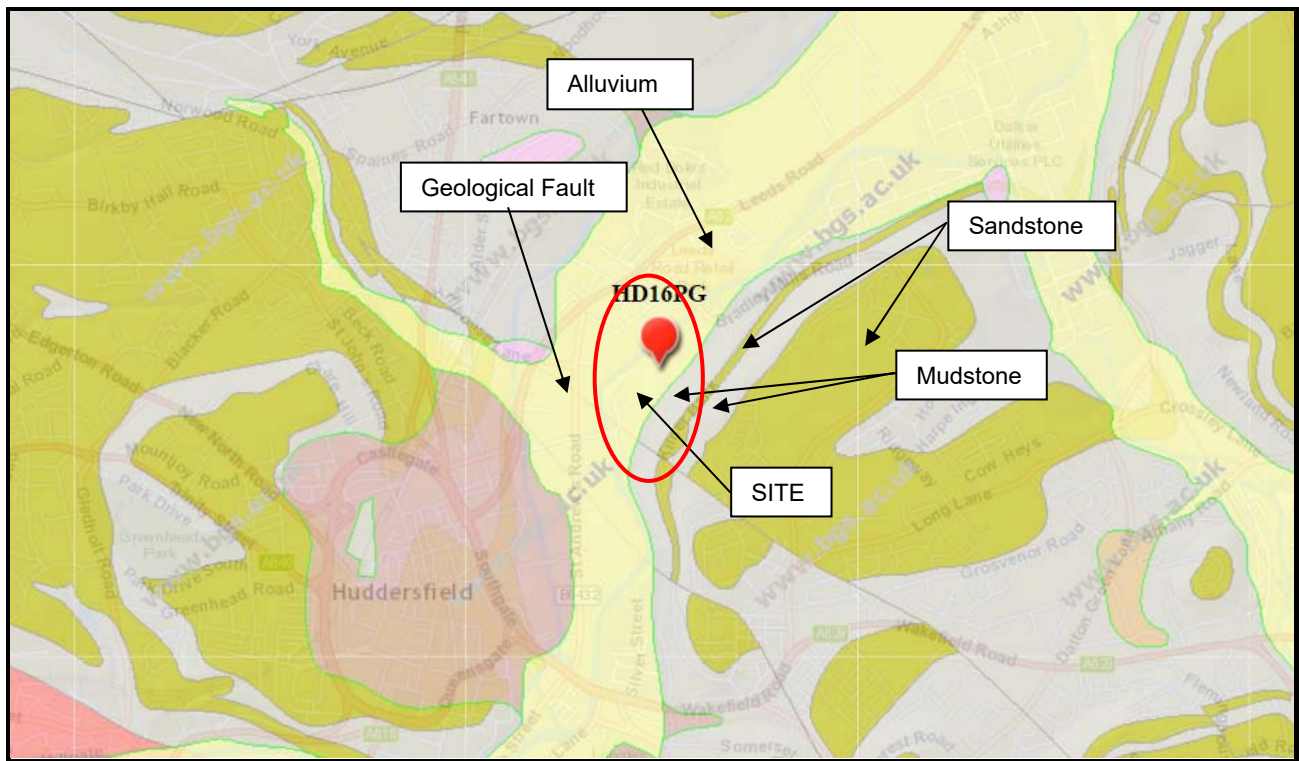


Figure 6 Geology and BGS Borehole Location Plan

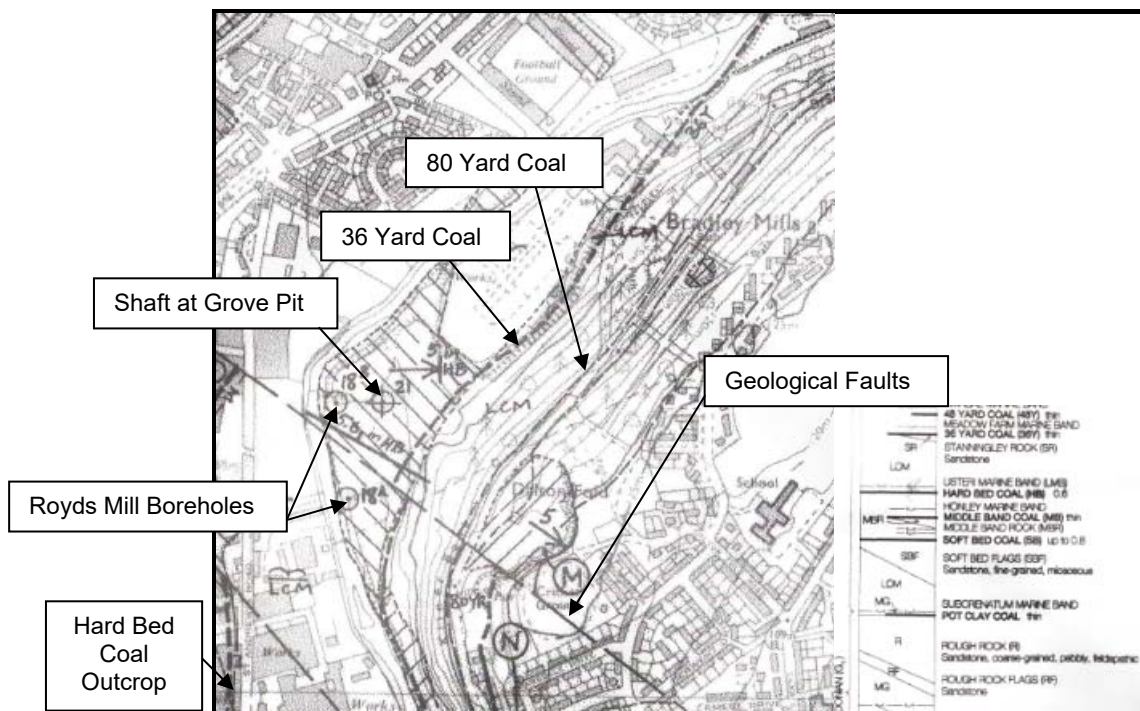


Figure 7 Plan of Coal Outcrops

5 MINING

5.1 The Coal Authority Report

The Coal Mining Report obtained from The Coal Authority for the site states that according to their records the property is in a surface area that could be affected by underground workings in 1 seam of coal at 80m depth and last worked in 1915.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity.

The property is not within a surface area that could be affected by present underground mining. The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a license has been granted to remove or otherwise work coal using underground methods. The property is not in an area likely to be affected from any planned future underground coal mining.

However, reserves of coal do exist in the local area which could be worked at some time in the future. No notices have been given, under Section 46 of the Coal Mining Subsidence Act 1991, stating that the land is at risk of subsidence.

The Coal Authority is not aware of any damage due to geological faults or other lines of weakness that may have been affected by coal mining. The property is not within the boundary of an opencast site from which coal has been removed by opencast methods. The property does not lie within 200m of the boundary of an opencast site from which coal is being removed by opencast methods.

There are no licence requests outstanding to remove coal by opencast methods within 800metres of the boundary. The property is not within 800m of the boundary of an opencast site for which a licence to remove coal by opencast methods has been granted.

The Coal Authority has not received a damage notice or claim for the subject property, or any property within 50m, since October 1994. There is no current stop notice delaying the start of remedial works or repairs to the property. The Authority is not aware of any request having been made to carry out preventative works before coal is worked under Section 33 of the Coal Mining Subsidence Act 1991.

The Coal Authority has no record of a mine gas emission requiring action.

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

The property is not in an area 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.

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

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

Details of The Coal Authority Report are presented as Appendix A and should be read in full.

5.2 Coal Seams

The site is underlain within Kilner Bank by the youngest stratigraphic rocks on the site including the 80 Yard Coal which outcrops at the summit of the bank.

At the base of Kilner Bank the 36 Yard Coal outcrops, which is a thin coal of around 0.30m in thickness underlain by Ganister and Fireclay, valued by industry, of around 1.2m in thickness. Fireclay was used for refractory products. Ganister is a silica rich material and was used for manufacture of firebricks. These are underlain by around 30m of mudstone and shale underlain in turn by the Hard Bed Coal. The Hard Bed Coal is usually 0.68m in thickness in this area. The Hard Bed Coal contains coal balls or 'brass lumps' which are pyritous nodules which were worked locally for sulphuric acid. The Hard Bed Coal is underlain by 0.30m of Ganister and 1.20m to 2.10m of Fireclay, again valued locally for industrial use.

Beneath the Hard Bed Coal are 53m of mudstones and shales containing the Middle Band Coal and Sandstone and the Soft Bed Coal and Flags and the thin Pot Clay Coal which rests on the thick sandstone of the Rough Rock.

TABLE 2
Estimated Shallow Coal Seams beneath Site

Strata	Thickness in m	Depth in m bgl	Encountered in Site investigation	Workings recorded by Coal Authority	Possible workings before Coal Authority Records
Made Ground	GL-16.50	GL to 16.50	Yes		
Sand and Gravel	0.50-2.30	8.00 to 15.80	Yes		
Mudstone		6.20 to 15.80	Yes		
36 Yard Coal	Thin	GL-30.00	Not drilled		Possible
Stanningley Rock		GL-30.00	Not drilled		
Mudstone			Not drilled		
Halifax Hard Bed Coal	0.20-0.60	16.50-45.00	In historic BH	Yes	Possible
Fireclay	1.2 to 2.1		Not drilled		Possible
Mudstone					
Middle Band Coal	Thin	35.00-60.00	Not drilled		Unlikely
Middle Band Sandstone			Not drilled		
Mudstone			Not drilled		
Halifax Soft Bed Coal	0.10-0.80	60.00	Not drilled		Possible
Soft Bed Flags			Not drilled		
Mudstone and Fireclay			Not drilled		
Pot Clay Coal	Thin	100+	Not drilled		Unlikely
Rough Rock Sandstone			Not drilled		

Note. There are additional thin coals, mudstone and sandstone sequences not shown.



5.3 Shallow Mining

The 1:10,000 BGS geological map of the area shows the 36 Yard Coal to outcrop along the eastern boundary of the site at the foot of Kilner Bank. The Hard Bed Coal is anticipated to be present at around 26m and 45m below rockhead at the site. The Middle Band Coal, Middle Band Rock (sandstone), Soft Bed Coal, Soft Bed Flags (sandstone) and Pot Clay Coal are shown to be present below the Hard Bed Coal with the Pot Clay Coal expected to be present at around 100mbgl.

Schematic cross sections of the site which include information gathered from the BGS and the Coal Authority have been drawn and are presented in Appendix B as Drg No KSDL 3282/4, KSDL 3282/5 and KSDL 3282/6. A Plan showing the location of the section lines through the site is presented as Drg No 3282/7. The sections show that in many parts of the site the Hard Bed Coal is expected to be present at depths of between 20m and 45m below rockhead. Mining Plans obtained from the Coal Authority are presented in Appendix C and show that the Hard Bed Coal was extensively worked in the northern part of the site. The extent of these workings are shown approximately on Drg No KSDL 3282/7. There is also a possibility that the Hard Bed Coal has been worked outside of the area shown on the mining plans as it is likely that the underlying Ganister and Fireclay were also worked.

Towards the eastern limit of the site, the BGS maps show the 36 Yard Coal to outcrop and dip relatively shallowly towards the east. It is not known whether the 36 Yard Coal has been worked beneath the site. A previous Report on the site made reference to a reported crown-hole on Kilner Bank, which could have formed due to the collapse of workings on the 36 Yard Coal.

The Coal Authority have no records of the 36 Yard Coal seam being extracted but it is possible that it was mined before 1872 when it became law to deposit abandonment plans of mining with the then Ministry of Power. It was probably mined for its Ganister and Fireclay in addition to the Coal. The seam is known to have been mined in the northern extent of Kilner Bank to the rear of the Odeon Cinema, where stabilisation of the workings was undertaken prior to construction of the Cinema.

If the coal seams were mined and voids remain in the mined seams and if insufficient competent strata lies above the voids, then the voids may migrate by successive roof collapse over the years producing subsidence at ground level.

If sufficient thickness of competent strata overlies voids then the voids may become choked before they reach the ground surface.

As there are two coal seams and a fireclay seam within the upper 30m below rockhead beneath the site, one of which the Coal Authority record as mined and two which may have been mined, there is a **high risk** that the site could suffer ground subsidence in the future if voids migrate to the ground surface. If there is sufficient overlying competent rock strata to prevent voids migrating to the surface then ground stabilisation may not be required. This will depend on the depth of the coal seam and which seams have been mined. Alternatively there may be insufficient cover and ground stabilisation may be required for development to proceed.

The Coal Mining Plan in Figure 8 illustrates the known and expected mining in the local area including the site.

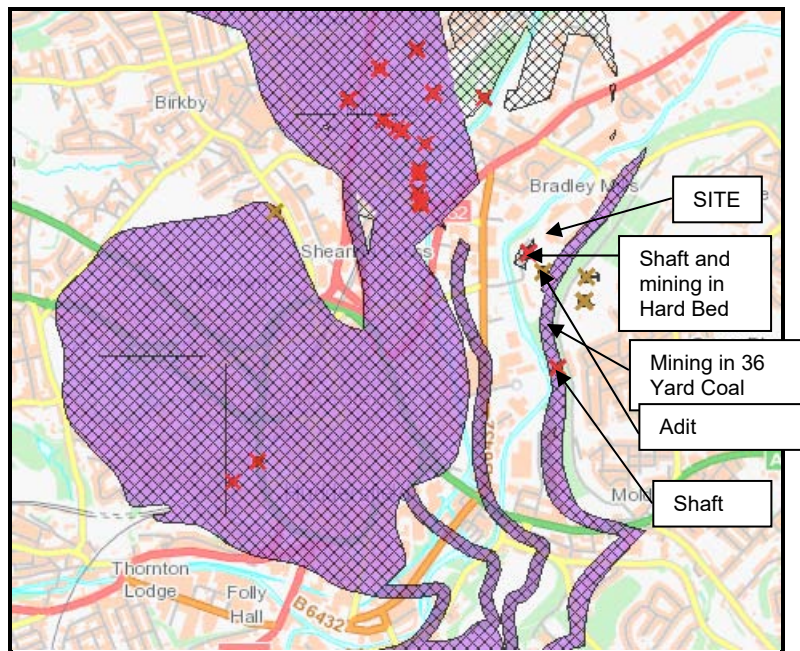


Figure 8 Coal Mining Plan

5.4 Deep Coal Mining

The Coal Authority have no records of any of the coal seams beneath the Halifax Hard Bed being mined. The Middle Band Coal and Fireclay and the Soft Bed Coal were mined elsewhere in the Huddersfield area. Any workings in these seams are likely to be overlain by sufficient competent strata to prevent ground subsidence occurring. It is a **low risk** that any deep mining will detrimentally affect the stability of the site.

5.5 Mine Shafts and Adits

The Coal Authority Mining Report for the site (refer to Appendix A) shows the presence of two mine shafts and an adit on the site as shown on Figure 9. The northernmost shaft at NGR 415248E 417426N is recorded as being around 26.5m deep from rockhead and sunk to mine the Hard Bed Coal, which would put the base at around 40m below current ground levels when the thickness of the overlying landfill is considered. Additionally, the shaft log indicates the presence of ironstone “balls” in the ground sequence above the Hard Bed Coal, which may also have been mined and Fireclay below which may have been mined.

The second shaft lies at NGR 415368E 416951N at the southern end of the site beyond the area of proposed development. There are no records at the Coal Authority for this shaft, its presence is noted on the 2nd Edition Geological map. It is likely that it was sunk to mine the 36 Yard Coal which lies at shallow depth in this area. There are no records to suggest that the shaft has been stabilised.

The adit lies at NGR 415307E 417348N and is located in the central eastern part of the site within the existing golf range. The adit is shown as a “drift” heading east north eastwards or 60 degrees to north, to intersect the Hard Bed Coal beneath Kilner Bank. This adit extends beneath the ski slope. There are no records to suggest that the adit has been stabilised.

The Coal Authority records are incomplete and any circular features detected on site should always be assessed by an engineer in case they represent an unstable mine shaft.

No development should take place over the mine shaft or adit within a distance from the mine shaft equal to a 45 degree angle from the surface of competent strata around the shaft as illustrated in Figure 10.

The presence and depth of any made ground requires investigating by drilling to determine the closest distance that development can be undertaken to the shaft.

Alternatively, if development is proposed close to or over the shaft or adit, then they both require to be located by closely spaced boreholes drilled to rockhead. Once located, they will need to be drilled to the base and then stabilised by injection of a mix of pfa and cement. The shafts will then need a reinforced concrete cap constructed that is twice the diameter of the shaft or adit and at least 0.45m in thickness. The cap is usually constructed at rockhead, however this may be impractical for the shaft due to the 13.50m of overlying landfill. Negotiation will therefore be required with the Coal Authority to design an acceptable solution to the shaft stabilisation for development to proceed.

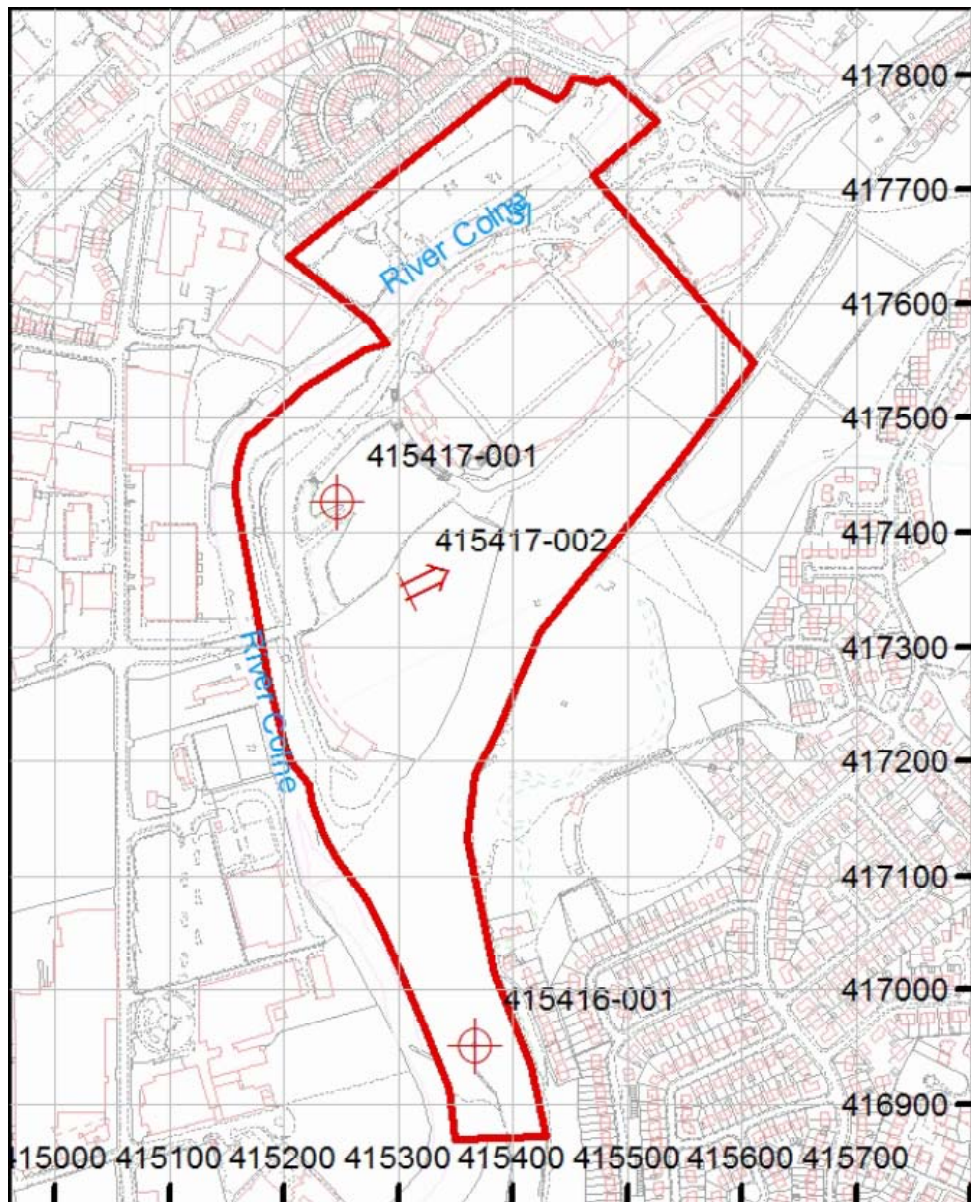


Figure 9 Mine Shafts and Adits

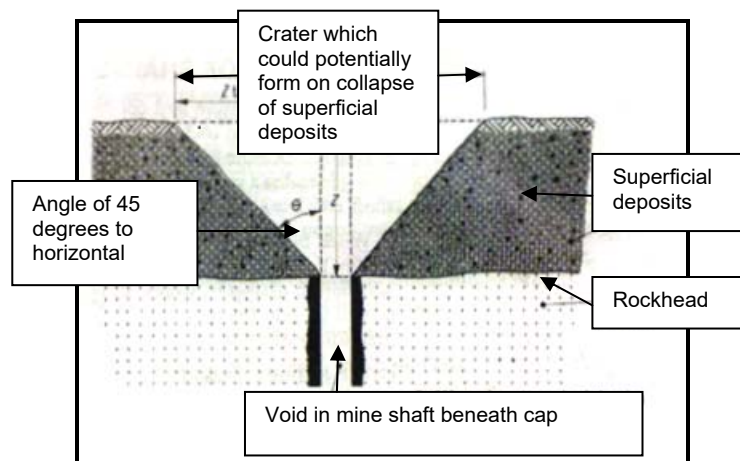


Figure 10 Potential Mine Shaft Collapse

5.6 Mine Gas

There is always a risk of mine gas where shallow mining has been undertaken.

It would be prudent to monitor for mine gases on the site, as shallow mining is recorded, in order to design any required precautions for development.

6. RISK ASSESSMENT

The Coal Mining Risk Assessment undertaken has indicated that the site is underlain by the Coal Measures comprising mudstones, sandstones and interbedded coal and fireclay seams. Based on the BGS geological maps and Coal Authority Report, the site is expected to be underlain by sandstones and mudstones with two shallow (<30m) interbedded coal and fireclay seams and further sandstones and mudstones with deeper (>30m) interbedded coal and fireclay seams.

The Hard Bed Coal, is recorded as having been mined beneath the site from a shaft of 26.5m depth below rockhead. The coal seam is likely to contain voids and there may be insufficient competent strata overlying the coal seam to prevent voids migrating by successive roof collapse and causing ground settlement and structural damage to the overlying development in the future. The Middle Band Coal and Fireclay and the Soft Bed Coal which lie stratigraphically below the Hard Bed Coal may also have been worked. Workings in these seams may impact on the piling design.

The 80 Yard Coal if mined will not detrimentally affect the site. Mining in the 30 Yard Coal could cause unstable ground along the base of Kilner Bank and beneath the Ski Slope.

The **shallow coal** (The Hard Bed Coal and Fireclay and ironstone) workings pose a **high risk** to future development. Any **shallow workings** in the 36 Yard Coal also pose a **high risk** to future development.

The Coal Authority have records of a coal being mined at 80m bgl beneath the site. Any subsidence from mining at depths >30m below rockhead should be complete. If voids remain in any pillar and stall workings in the deep coal seams (>30m below rockhead), and provided the workings are less than 3.0m in thickness, then it is unlikely they will migrate to the surface and cause ground subsidence due to the thickness of competent strata overlying the workings.

The risk of the site being detrimentally affected by workings in **coal or fireclay at depth** (>30m below rockhead) is a **low risk** due to the cover of competent strata, provided the workings are less than 3.0m in thickness. This should be checked by drilling in order to ensure mining does not impact on the pile design.

The risk that collapse of underground workings could cause subsidence at the ground surface above is normally empirically assessed using the T10 rule (developed by the National Coal Board in 1973 and based on experience) whereby if a thickness of 10 x the seam thickness of competent cover (i.e. rock) is present over the worked seam then it is deemed sufficient to be able to choke the voided ground without giving rise to surface settlement.

The Coal Authority mine plans record the Hard Bed Coal as worked at 26.5m beneath the rockhead on site and given the expected thickness of up to 0.80m, and the possibility of the ironstone and fireclay being mined to 4.0m thickness, it is considered **a high risk that the proposed development will be affected by past underground recorded shallow coal mining.**

The Middle Band Coal and Fireclay underlie the Hard Bed Coal at >30m below rockhead and may have been worked before records of abandoned mines were required by law and may therefore be unrecorded as worked by the Coal Authority. It is considered **a low risk that the proposed development could be affected by past underground unrecorded deep coal and fireclay mining.** This should be checked by drilling in order to ensure mining does not impact on the pile design.

Based on the local geology, the risk of the **disused mine shafts and adit** detrimentally affecting the site is considered a **very high risk** as development is proposed over one shaft and the adit and because the Coal Authority have no records of the shaft or adit being stabilised. The shaft and adit should be located, drilled to the base and stabilised by insertion of grout and capped to Coal Authority approval in order to prevent ground subsidence in the future. Precautions should be taken to check for any other circular features on the ground before and during development.

7. CONCLUSIONS AND RECOMMENDATIONS

The evidence in this coal mining risk assessment report suggests that there is a **high risk** to the proposed development from shallow coal and possible fireclay mining and from mine shafts and an adit causing ground subsidence in the future.

The potential hazards for the site arising from previous underground mining are summarised as follows:

- Potential for ground to collapse into unstable shaft or adit.
- Potential for ground to collapse into workings in the Hard Bed or 36 Yard Coal.
- Potential for voided ground in 36 Yard Coal, Hard Bed, Middle Bed and Soft Bed Coal to be within zone of influence of piled foundations that may be incorporated into the proposed development.

It is not known whether the 36 Yard Coal has been worked beneath the site and this would need to be established in order to assess any potential risks of ground collapse into voids associated with the 36 Yard seam.

With respect to the risk from the workings in the Hard Bed, records obtained to date indicate that the seam is around 0.8m thick (although mining would have undoubtedly extracted a seam of greater thickness taking into account the Fireclay and the pyrite nodules and ironstone). Using the T10 rule of thumb, it would appear that over the majority of the site there is likely to be a sufficient

thickness of competent rock (i.e. > 8m) over the Hard Bed to reduce the risk of a void migrating to the surface to low. However, investigation would be required to confirm this, especially as any proposed piled foundations will extend some depth into the underlying rock and therefore could be compromised by any voided ground below. Also, it is necessary to establish if there has been any mining of the ironstone above the Hard Bed Coal and in the underlying Fireclay which would increase the thickness of cover required. The Royds Mill Boreholes, Table 1, indicate 2.40m to 4.00m of coal at circa 16m to 20m below rockhead indicating that the cover of competent strata may not be sufficient to prevent voids migrating to the ground surface. Additionally, the depth to and condition of the Middle Bed and Soft Bed Coal Seams should be established to determine the potential risks to deeper piled foundations that may be required.

It is thus recommended that the footprint of the proposed areas of development are proof drilled to investigate the ground sequence down to a depth of at least 30m below bedrock prior to any construction taking place to check the depth of any workings in the underlying shallow coal seams. It is recommended that the proposed investigation follows the following course:

- Initially, 35 boreholes on the proposed development plots taken down to prove at least 30m of competent bedrock to confirm the ground conditions and assess the presence of any voids in the ground and the thickness of any competent cover above the voids.
- If the coal seams are not mined, or if sufficient competent strata overlies any voids to prevent them causing ground settlement, then ground stabilisation will not be required and founding strata can be determined.
- If insufficient competent cover is found over any mined coal or fireclay seams then additional boreholes will be required over the footprint of each structure to confirm the extent of workings (on the basis that the boreholes striking coal could have struck a pillar).
- If underground workings are proved and there is insufficient competent cover then ground treatment is likely to be required prior to proceeding with construction to stabilise the ground and further consideration will be required for foundation design.
- Drilling on a grid pattern to locate and stabilise the mine shaft and adit.
- Cap the shaft and adit to Coal Authority requirements.
- Design suitable foundations taking into consideration the stabilisation of any workings and shafts/adits.
- Gas monitoring in boreholes over 3 months before development.

During development, all coal located in service or other trenches should be removed or sealed with concrete to prevent spontaneous combustion. All coal located beneath foundations should be removed and the seam sealed with concrete. Piled foundations need to take into account the depth of mining. Piles should extend beneath any shallow mined ground following stabilisation.

The risk of collapse of voided shafts and voided mined ground increases with time due to the rotting of timber supports and punching of support pillars into the mine roof and migration of voids upwards by successive roof collapse.

Ashton Bennett would be able to supervise the proposed drilling works together with any follow-on ground treatment work that may be necessary and provide an updated risk assessment report for issue to the regulatory authorities as required. Ashton Bennett will acquire the necessary Coal Authority Permits required to drill through the coal.

8. GENERAL REMARKS

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

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Tristan Bennett
BSc

Frances A Bennett
BSc, CGeol, FGS, FIMMM, C.WEM, MCIWEM, CEnv, AIEMA, MIEEnvSci.

Appendix A





The Coal
Authority

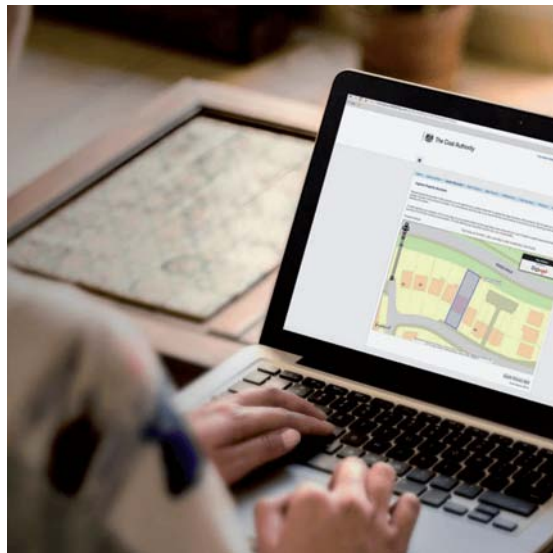
Resolving the **impacts** of mining

CON29M Non-Residential Mining Report

HUDDERSFIELD TOWN A F C LTD
STADIUM WAY
HUDDERSFIELD
HD1 6PG

Date of enquiry: 16 September 2016
Date enquiry received: 16 September 2016
Issue date: 21 September 2016

Our reference: 51001259298001
Your reference: 3282



CON29M Non-Residential Mining Report

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

Client name

ASHTON BENNETT CONSULTANCY

Enquiry address

HUDDERSFIELD TOWN A F C LTD, STADIUM WAY,
HUDDERSFIELD, HD1 6PG

How to contact us

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

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

www.groundstability.com

 /company/the-coal-authority
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 /coalauthority



Approximate position of property



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Summary

Has the search report highlighted evidence or potential of		
1	Past underground coal mining	Yes
2	Present underground coal mining	No
3	Future underground coal mining	Yes
4	Mine entries	Yes
5	Coal mining geology	No
6	Past opencast coal mining	No
7	Present opencast coal mining	No
8	Future opencast coal mining	No
9	Coal mining subsidence	No
10	Mine gas	No
11	Hazards related to coal mining	No
12	Withdrawal of support	No
13	Working facilities order	No
14	Payments to owners of former copyhold land	No
15	Information from the Cheshire Brine Subsidence Compensation Board	No

Further recommended reports
Mine entry interpretive report
Mine entry plan and data sheets

For detailed findings, please go to page 4.

Detailed findings

1. Past underground coal mining

The property is in a surface area that could be affected by underground mining in 1 seam of coal at 80m depth, and last worked in 1915.

Any movement in the ground due to coal mining activity should have stopped.

In addition the property is in an area where the Coal Authority believe there is coal at or close to the surface. This coal may have been worked at some time in the past. The potential presence of coal workings at or close to the surface should be considered prior to any site works or future development activity. Your attention is drawn to the Comments on the Coal Authority information section of the report.

2. Present underground coal mining

The property is not within a surface area that could be affected by present underground mining.

3. Future underground coal mining

The property is not in an area where the Coal Authority has plans to grant a licence to remove coal using underground methods.

The property is not in an area where a licence has been granted to remove or otherwise work coal using underground methods.

The property is not in an area likely to be affected from any planned future underground coal mining.

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

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

4. Mine entries

Within, or within 20 metres of, the boundary of the property there are 3 mine entries, the approximate positions of which are shown on the enquiry boundary plot.

There is no record of what steps, if any, have been taken to treat the mine entries.

There may however be mine entries/additional mine entries in the local area which the Coal Authority has no knowledge of.

For an additional fee, the Coal Authority can provide a Mine Entry Interpretive Report. The report will provide a separate assessment for the mine entry/entries referred to in this report. It gives an opinion on the likelihood of mining subsidence damage caused from ground movement as a consequence of the mine entry/entries. It also gives details of the remedies available for subsidence damage where the mine entry was sunk in connection with coal mining.

Please note that it may not be possible to produce a report if the main building to the property cannot be identified from Coal Authority plans (ie for development sites and new build).

For further advice on how to order this additional information please visit www.groundstability.com.

5. Coal mining geology

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

6. Past opencast coal mining

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

7. Present opencast coal mining

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

8. Future opencast coal mining

There are no licence requests outstanding to remove coal by opencast methods within 800 metres of the boundary.

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

9. Coal mining subsidence

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

10. Mine gas

The Coal Authority has no record of a mine gas emission requiring action.

11. Hazards related to coal mining

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

12. Withdrawal of support

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.

13. Working facilities order

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

14. 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.

15. Information from the Cheshire Brine Subsidence Compensation Board

The property lies outside the Cheshire Brine Compensation District.

Comments on the Coal Authority information

The Coal Authority own the copyright in this report and the information used is protected by our database right.

The boundary plot shows the approximate location of the disused mine entry/entries referred to in this report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991*). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

The Coal Authority, regardless of responsibility and in conjunction with other public bodies, provide an emergency call out facility in coalfield areas to assess the public safety implications of mining features (including disused mine entries). Our emergency telephone number is 01623 646333.

*Note, this Act does not apply where coal was worked or gotten by virtue of the grant of a gale in the Forest of Dean, or any other part of the Hundred of St. Briavels in the county of Gloucester.

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

Therefore if development proposals are being considered, technical advice relating to both the investigation of coal and former coal mines and their treatment should be obtained before

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

Additional remarks

Information provided by the Coal Authority in this report is compiled in response to the Law Society's Con29M Coal Mining and Brine Subsidence Claim enquiries. The said enquiries are protected by copyright owned by the Law Society of 113 Chancery Lane, London WC2A 1PL. Please note that Brine Subsidence Claim enquiries are only relevant for England and Wales. This report is prepared in accordance with the Law Society's Guidance Notes 2006, the User Guide 2006 and the Coal Authority and Cheshire Brine Board's Terms and Conditions applicable at the time the report was produced.

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Alternative formats

If you would like this report in an alternative format, please contact our communications team.

Enquiry boundary

Key

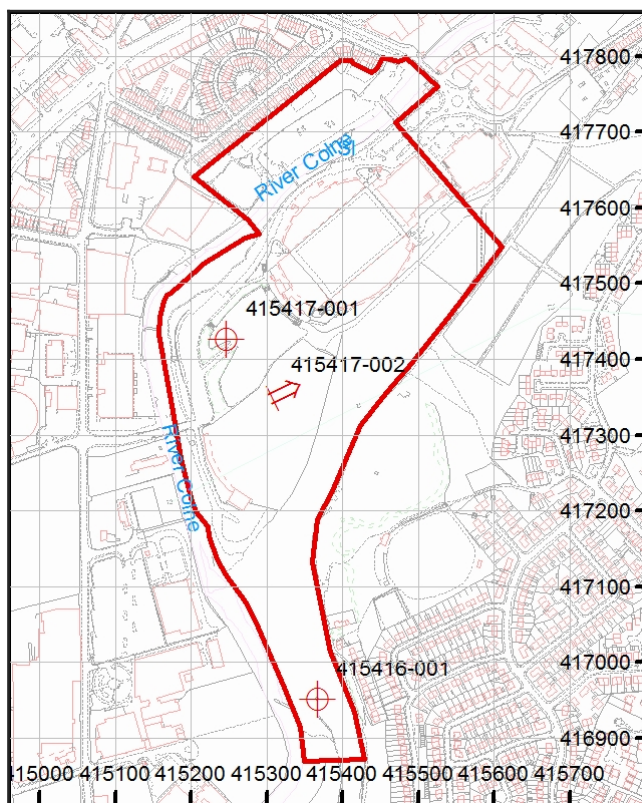
Approximate position of enquiry boundary shown



Disused adit



Disused mineshaft



How to contact us

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+44 (0)1623 637 000 (International)

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NG18 4RG

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VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	16 September 2016
Issued to	ASHTON BENNETT CONSULTANCY UNIT K BRIDGE MILLS HOLMFIRTH WEST YORKSHIRE HD9 3TW
Property search for	HUDDERSFIELD TOWN A F C LTD STADIUM WAY HUDDERSFIELD HD1 6PG
Reference number	51001259298001
Date of issue	21 September 2016
Cost	£193.00
VAT @ 20%	£38.60
Total received	£231.60
VAT registration	598 5850 68

Issued by:

The Coal Authority, Property Search Services, 200 Lichfield Lane, Berry Hill, Mansfield, Nottinghamshire, NG18 4RG
Website: www.groundstability.com Phone: 0345 762 6848

**ASHTON BENNETT CONSULTANCY
UNIT K BRIDGE MILLS
HOLMFIRTH
WEST YORKSHIRE
HD9 3TW**

Our reference:	51001262445001
Your reference:	3282
Date of your enquiry:	26 September 2016
Date we received your enquiry:	26 September 2016
Date of issue:	26 September 2016

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

Shaft Plan and Data Sheets

**HUDDERSFIELD TOWN, HUDDERSFIELD TOWN, JOHN SMITHS STADIUM, STADIUM WAY,
HUDDERSFIELD, KIRKLEES, HD1 6PG**

I refer to the enquiry dated 26 September 2016, received 26 September 2016, in connection with the above.

As requested I enclose the mine entry data sheet(s) held for the mine entry/entries referred to.

Mine Entry Data

Shaft/adit:	Shaft
Reference:	415417-001
Source:	Ab plan 6608. 2nd Ed. Geological.
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	26.5
Diameter of shaft (m):	Unknown
Probable adit azimuth:	Not Applicable
Treatment details:	Unknown
Conveyance:	Not Applicable
Easting:	415248
Northing:	417426
Other information:	None

Mine Entry Data (continued)

Shaft/adit:	Adit
Reference:	415417-002
Source:	Ab plan 6608
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	Unknown
Diameter of shaft (m):	Unknown
Probable adit azimuth:	64
Treatment details:	Unknown
Conveyance:	Not Applicable
Easting:	415307
Northing:	417348
Other information:	None

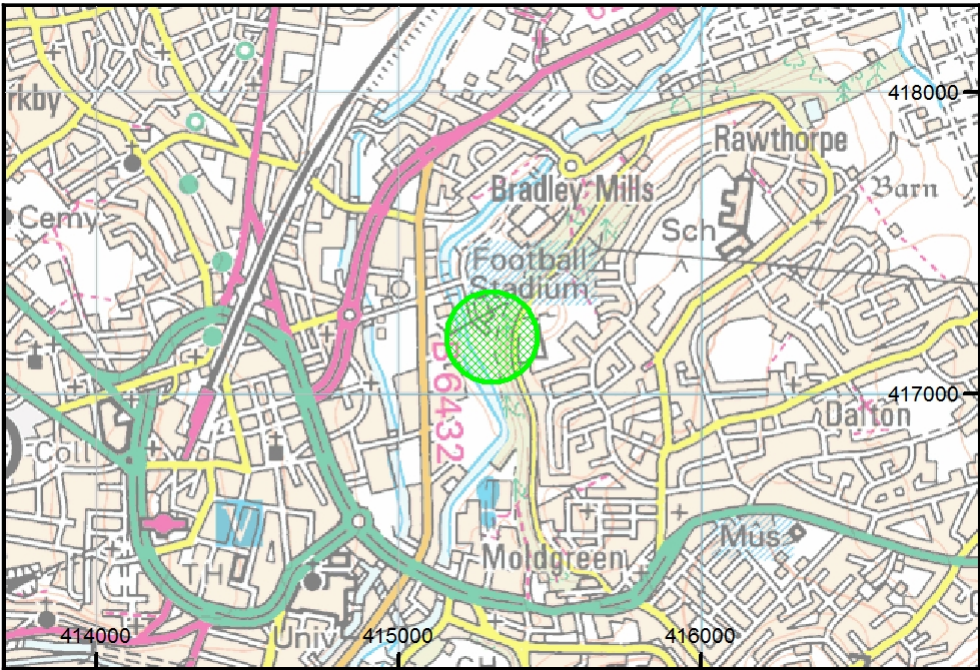
Mine Entry Data (continued)

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Source:	NG Ed. 1/2500 O.S. 2nd Ed. Geological
Colliery name:	Unknown
Entry name:	Unknown
Date abandoned:	Unknown
Depth of superficial deposits (m):	Unknown
Depth of shaft (m):	Unknown
Diameter of shaft (m):	Unknown
Probable adit azimuth:	Not Applicable
Treatment details:	Unknown
Conveyance:	Not Applicable
Easting:	415368
Northing:	416951
Other information:	None

Issued by:	The Coal Authority, 200 Lichfield Lane, Mansfield, Nottinghamshire, NG18 4RG
Tax Point Date:	26 September 2016
Issued to:	ASHTON BENNETT CONSULTANCY UNIT K BRIDGE MILLS HOLMFIRTH WEST YORKSHIRE HD9 3TW
Property Search for:	HUDDERSFIELD TOWN, HUDDERSFIELD TOWN, JOHN SMITHS STADIUM, STADIUM WAY, HUDDERSFIELD, KIRKLEES, HD1 6PG
Reference Number:	51001262445001
Date of Issue:	26 September 2016
Cost:	£45.50
VAT @ 20%:	£9.10
Total Received:	£54.60
VAT Registration	598 5850 68

Location map

Approximate position of enquiry



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This plan shows the approximate location of the disused mine entry / entries referred to in the attached mining report. For reasons of clarity, mine entry symbols may not be drawn to the same scale as the plan.

Property owners have the benefit of statutory protection (under the Coal Mining Subsidence Act 1991). This contains provision for the making good, to the reasonable satisfaction of the owner, of physical damage from disused coal mine workings including disused coal mine entries. A leaflet setting out the rights and obligations of either the Coal Authority or other responsible persons under the 1991 Act can be obtained by visiting www.groundstability.com.

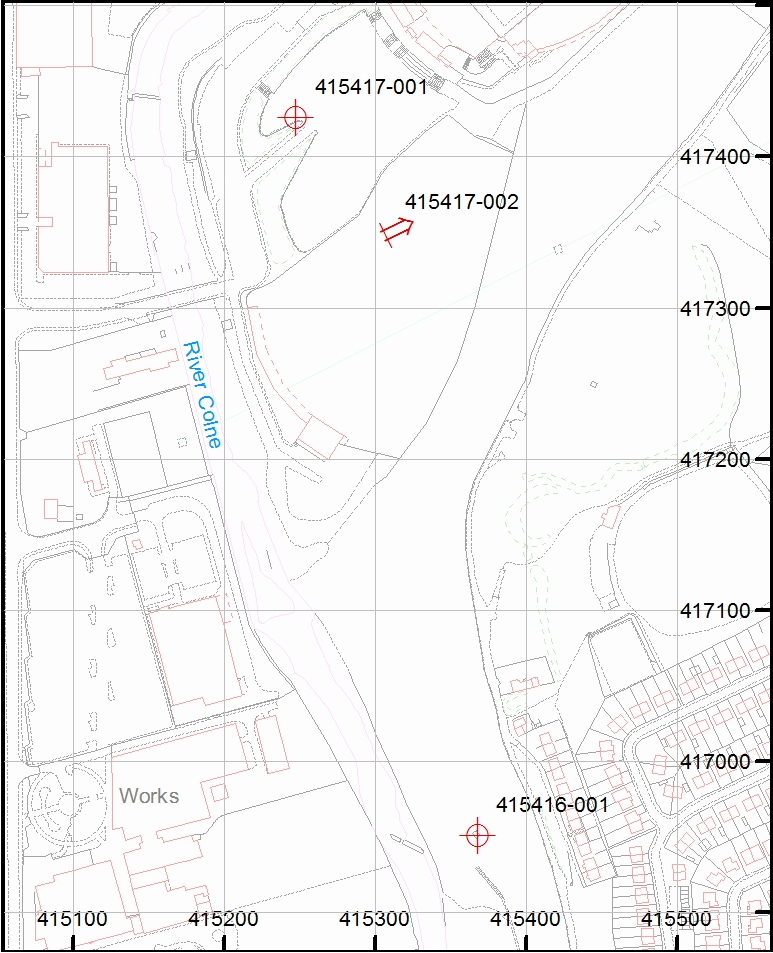
If you wish to discuss the relevance of any of the information contained in this report, you should seek the advice of a qualified mining engineer or surveyor. If you or your advisor wish to examine the source plans from which the information has been taken, these are available to view, free of charge, at our Head Office in Mansfield. To book an appointment please ring 01623 637225. Should you or your advisor wish to carry out a physical investigation that may enter, disturb or interfere with any disused mine entry, prior permission of the owner must be sought. For coal mine entries, the owner will normally be the Coal Authority.

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Our emergency telephone number is 01623 646333.

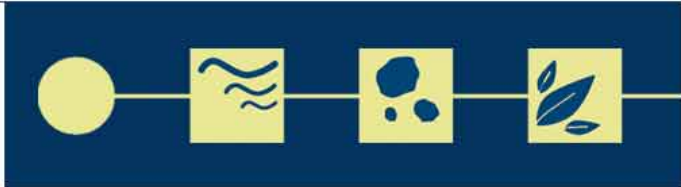
Key

Disused Adit or Mineshaft

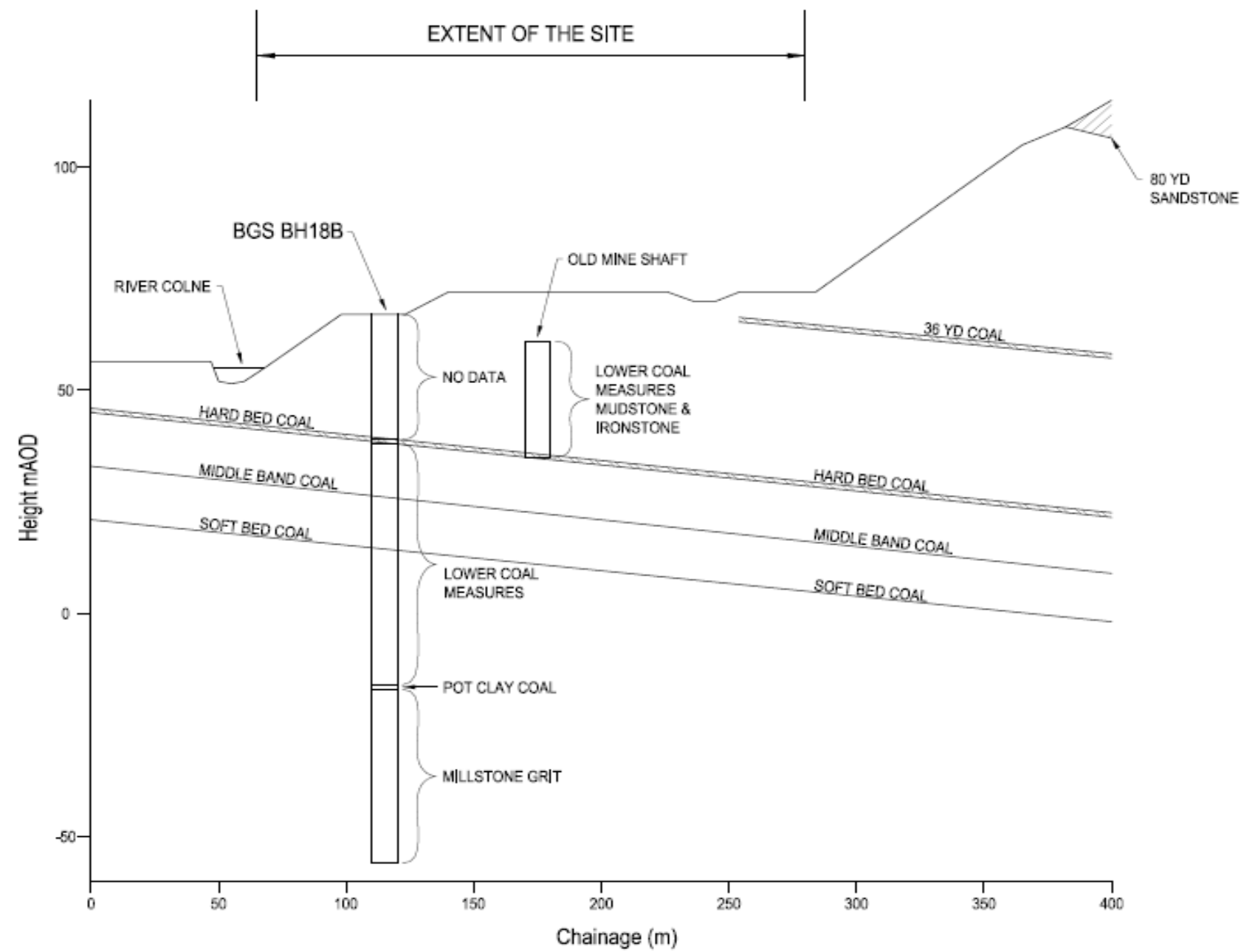


Appendix **B**

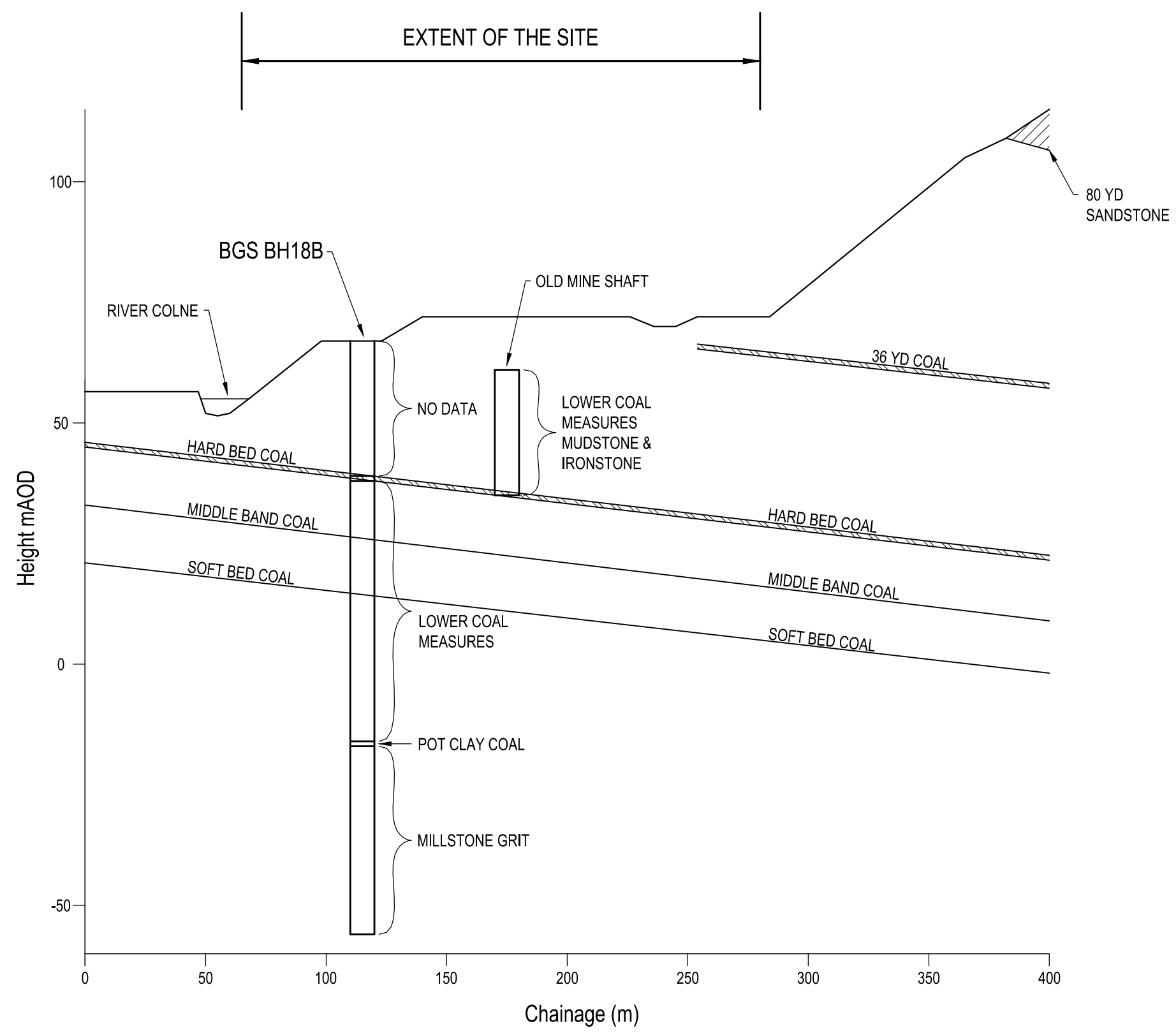




SECTION B-B



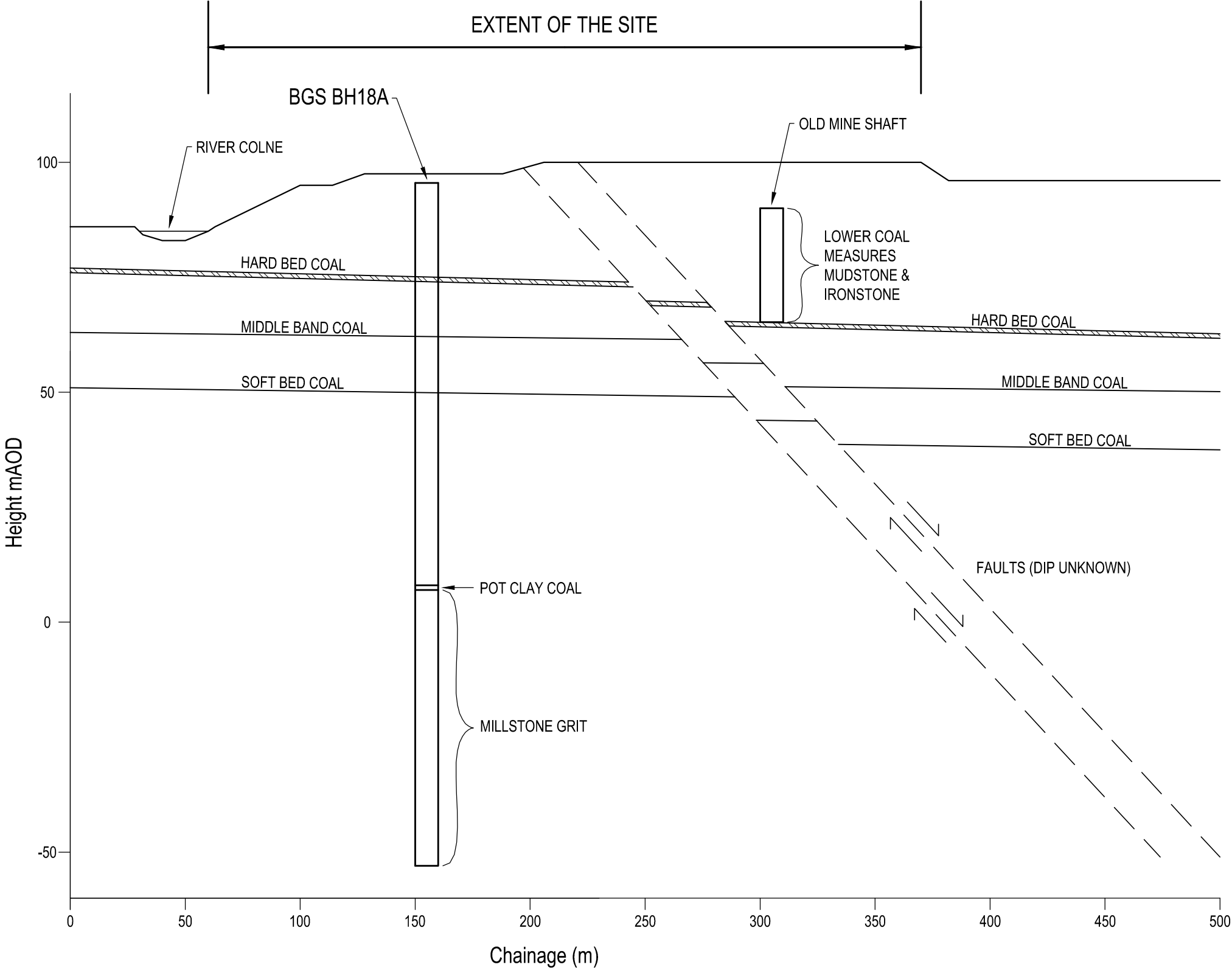
SECTION B-B



SCALE
HORIZONTAL = 1:2000
VERTICAL = 1:1000

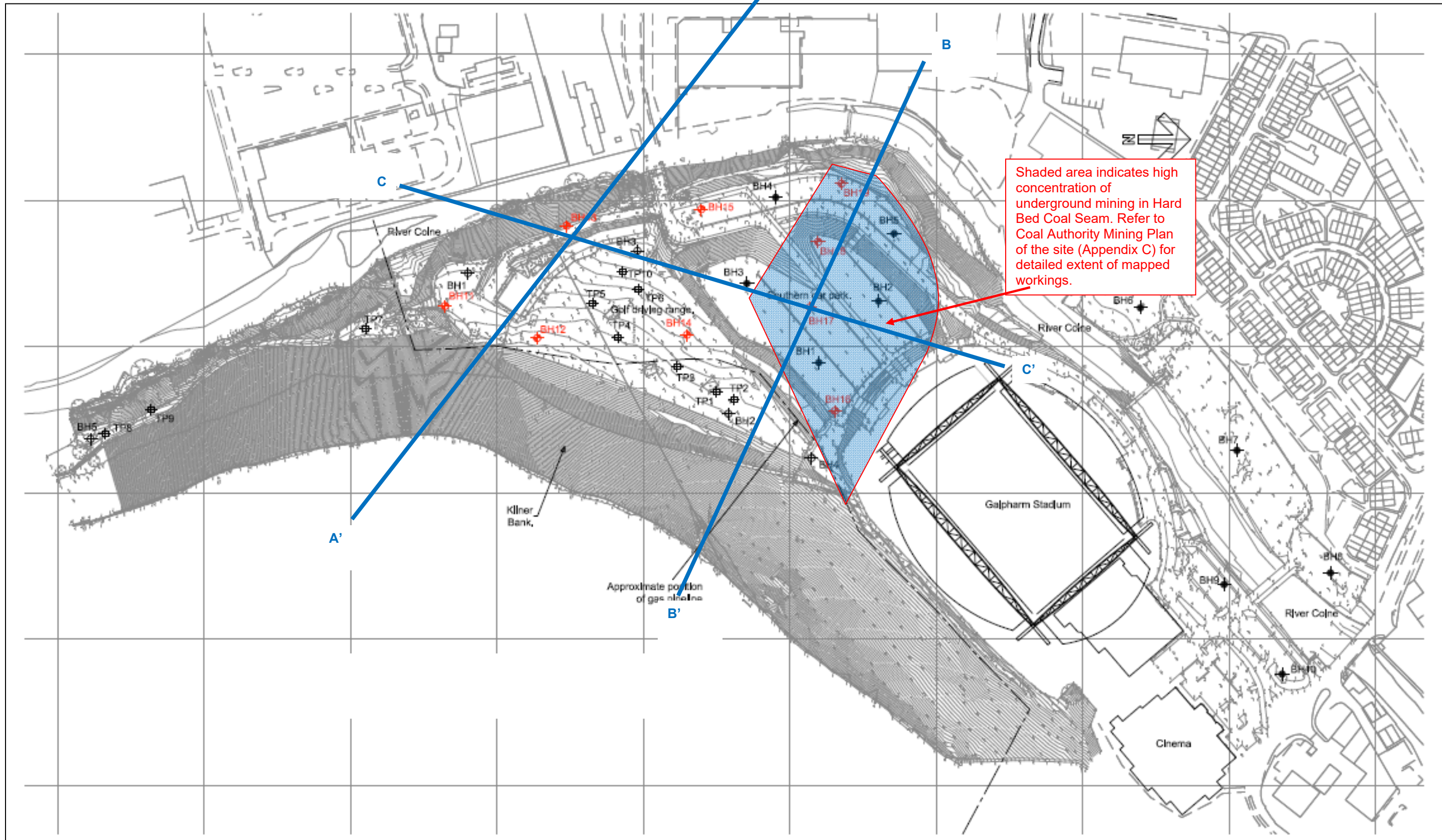
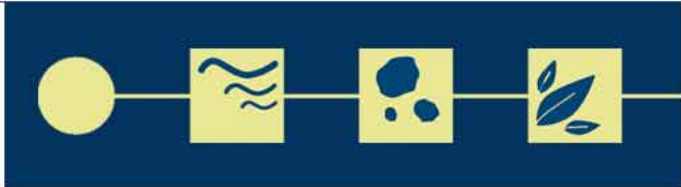
Ashton Bennett ENGINEERING GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS Unit 16, Bridge Mills, Huddersfield Road, Holmfirth, West Yorkshire HD9 3TW tel: 01484 689531 email: geociv@ashton-bennett.co.uk	Drawn By J.D.	Checked By J.D.	Approved By F.A.B.
	Sheet @ A3 2 of 3	Date 19.08.2011	Scale 1:2000 / 1:1000
Client KSDL	Drawing Number KSDL/ 2926/5	Revision 0	

SECTION C-C



SCALE
HORIZONTAL = 1:2000
VERTICAL = 1:1000

Ashton Bennett ENGINEERING GEOLOGISTS AND ENVIRONMENTAL SCIENTISTS Unit 16, Bridge Mills, Bokerfield Road, Holmfirth, West Yorkshire HD9 3TW tel: 01484 689531 email: geociv@ashton-bennett.co.uk		Drawn By <i>J.D.</i>	Checked By <i>J.D.</i>	Approved By <i>F.A.B.</i>
		Sheet @ A3 3 of 3	Date 19.08.2011	Scale 1:2000 / 1:1000
		Client KSDL	Drawing Number KSDL/ 2926/6	Revision 0



NOT TO SCALE

Drg No KSDL 2926/7

Appendix C



Appendix C – Halifax Hard Bed Mining Plan

