

COAL MINING RISK ASSESSMENT

PLANNING APPLICATION

FOR

ZIPWORLD LTD.

RHIGOS MOUNTAIN

TOWER COLLIERY

R.C.T.

30/09/2019

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COAL MINING RISK ASSESSMENT

NOTE. Since the original C.M.R.A. was produced, the route of the zipline has been changed. There is no longer an Area 3 in the assessment, whereas Area 4 now contains structures. This is reflected in the edited text and figures. There is now a more detailed study of area 4.

1. INTRODUCTION

This Coal Mining Risk Assessment (henceforth C.M.R.A.) has been produced for Zipworld Ltd. in support of a planning application to Rhondda Cynon Taf L.P.A. (henceforth R.C.T.). The application is for a Zipline Ride to run from the top of Craig y Llyn down the mountainside to Tower No.4 Colliery. The visitor Reception will be situated on the site of Tower Colliery Yard. The development will include several structural pylons. Some of these will be situated on land within Coal Authority designated Development High Risk Areas. The reason for this classification is the presence of seam outcrops and shallow coal seams under some of the sites, and hence the possibility of shallow coal workings under the sites. With such a classification the C.A. become statutory consultees for any planning application. In a pre-application consultation the C.A. made it known that a C.M.R.A. would need to be produced to accompany and validate the planning application.

Richard Davies BSc. (Hons), MSc., F.G.S. of Rhondda Geotechnical Services has been commissioned as the competent person to prepare a C.M.R.A. of the proposed development site. The purpose of this is to provide the L.P.A. with information on possible coal mining and an assessment of its impact on the ground stability of the site. The purpose of this C.M.R.A. is to gather all the available information and use it to identify any coal mining risks and then to quantify them. It will then suggest, if necessary, any mitigation measures to satisfy the L.P.A. that the sites are, or can be made safe and stable in line with national guidelines. This will be done in line with the template and recommendations of the C.A. document Guidance for Welsh L.P.A.s (version 4, 2017).

The site location and site boundary can be seen overleaf in Figures 1 and 2. The proposed ride is nearly 2km long, but the structural elements are quite widely separated. For this reason, the site is going to be treated as three separate areas. These are labelled in Figure 2. Because of the wide separation of the structural

elements of the site the nature of the areas varies considerably. Area 1 is perched high on the spectacular crags of Craig-y-Llyn at an elevation of approximately 520m. Area 2 is lower down, on land that was originally boggy moorland. This has been previously planted with large areas of Sitka Spruce by the Forestry Commission, some of which have been subsequently felled. Area 2 is at an elevation of approximately 380m. Area 4 is the colliery yard of the former Tower No.4 Colliery and is at an elevation of 300m.

Figure 3 is an extract from the C.A. interactive viewer planning window showing very approximately the areas to be assessed. Areas 1, 2 and 4 will all have steel gantries. Areas 1 and 2 are partly, or wholly within Development High Risk Areas. Area 4 in Tower Colliery will now contain structural elements as the zipline is now going to end there. Area 4 does not lie within a High-Risk zone, with the exception of three mine entry influence zones. This has meant that a more detailed risk assessment is now required for area 4.

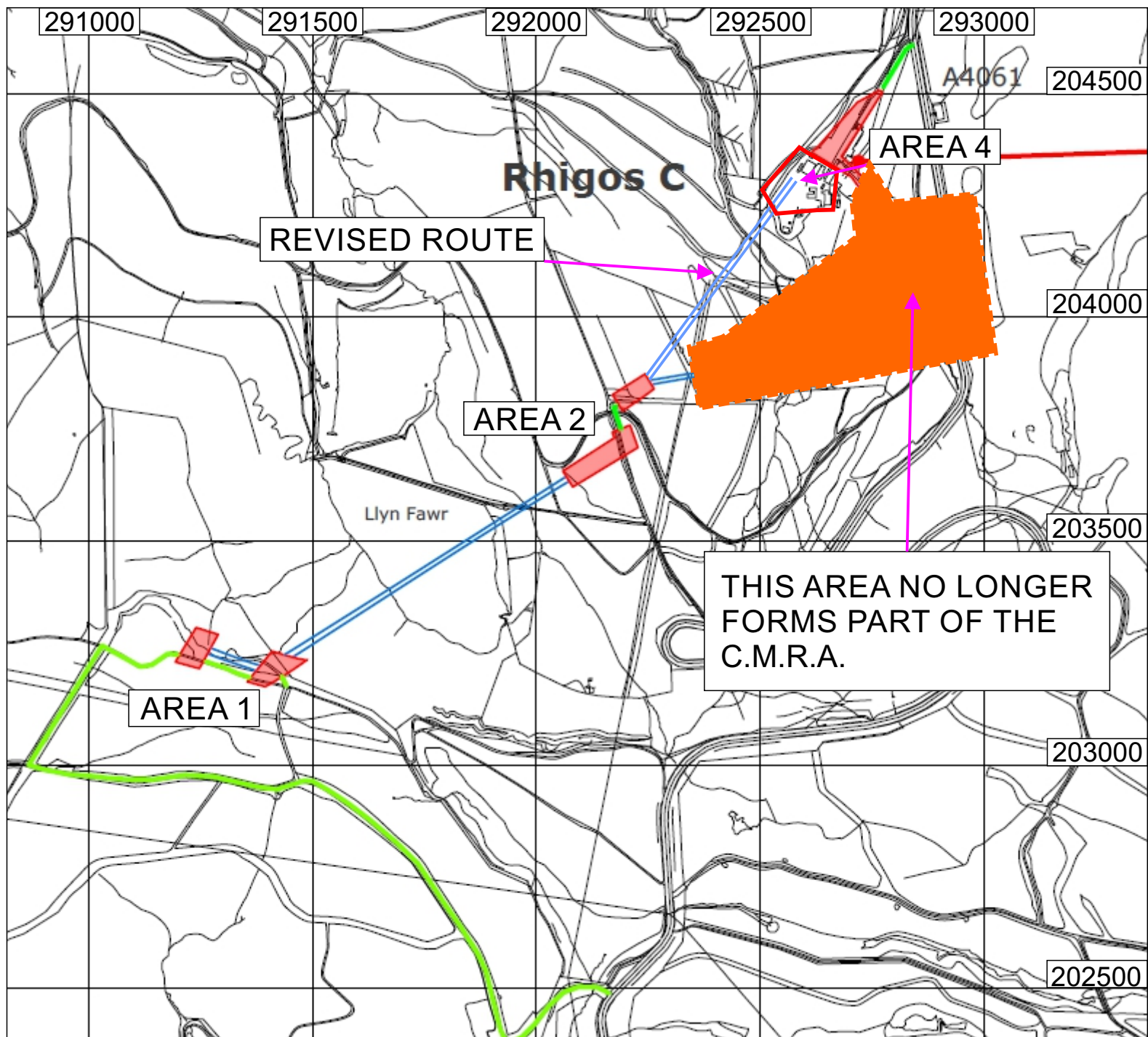


FIGURE 2

SITE LAYOUT AT RHIGOS MOUNTAIN SHOWING REVISED ROUTE AND LARGER AREA 4 TO BE RISK ASSESSED

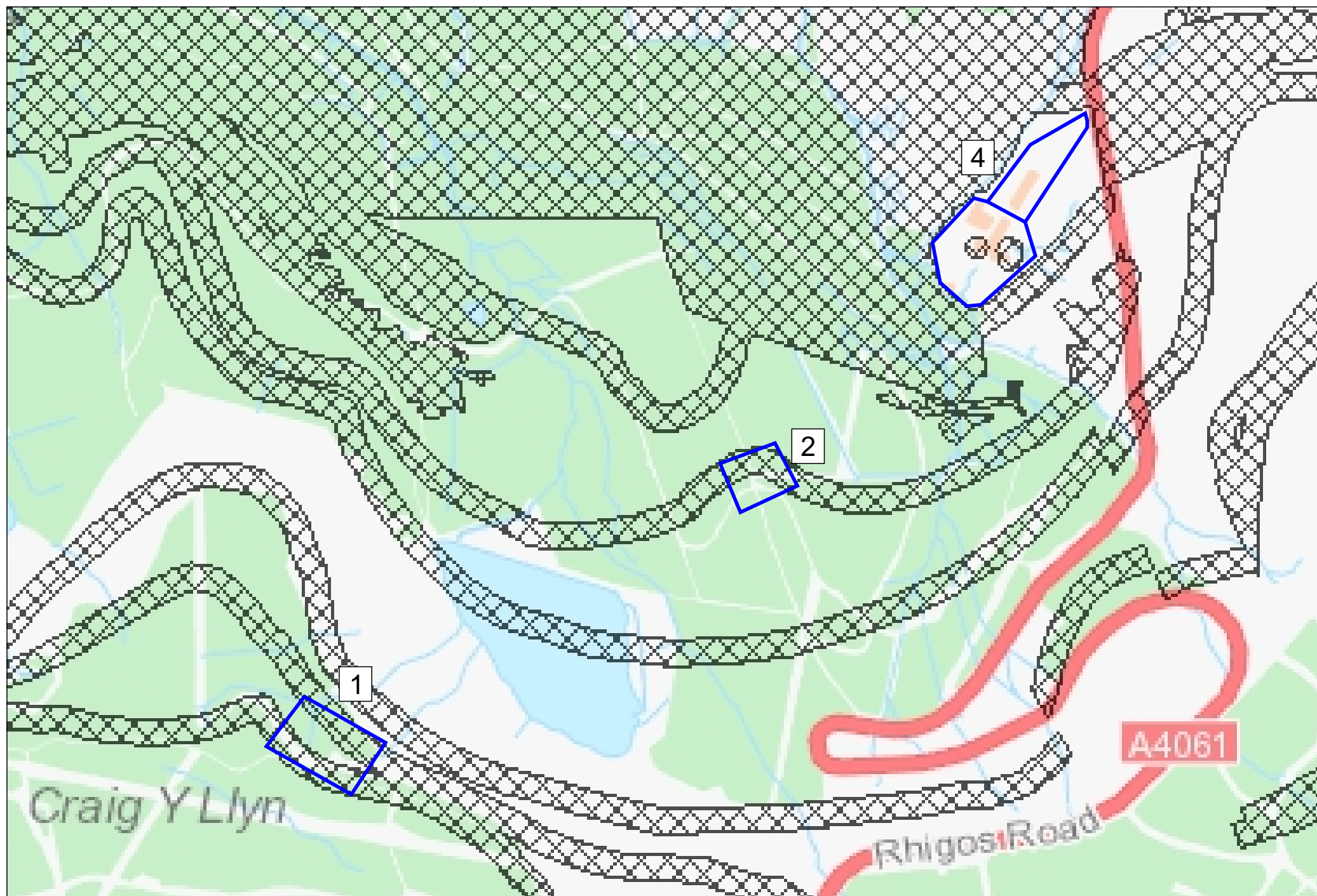


FIGURE 3 C.A. INTERACTIVE VIEWER, PLANNING WINDOW. DEVELOPMENT HIGH RISK HATCHED

2. SOURCES OF INFORMATION

a) Two C.A. Consultants Reports ref MR-51002050240001-1553513688379 and MR-51002059947001-1553521769707.

b) The C.A. interactive viewer.

c) The 6" to the mile Geological Survey sheet SN 90SW (1980 revision)

d) The Memoirs of the Geological Survey of The South Wales Coalfield, part IV Pontypridd and Maesteg (second edition 1917 and third edition, 1963), and part V The Country around Merthyr Tydfil (third edition, 1988) together with other mining archive sources including the shaft records from Tower No.4

e) Historical Ordnance Survey maps, 25 inch Old County Editions for Glamorgan, Sheet X.12, 1875 edition with 1899 and 1914 revisions. Maps were viewed at 1:2500 scale. A 1948 1:10560 map GLAM 10SE (Old County Series) and 1:10560 National Grid SN 90SW (1960) were also studied. The latter is of course the base map for the 1980 Geological Survey Sheet.

f) A site visit to Tower No.4 pithead, together with documentation supplied by the current owners.

2a) AREA 1.

The mining report records a great deal of coal mining under the site from Tirherbert, Tower, Fernhill and Tower/Mardy. The shallowest of these is 277m deep in the Gorllwyn Seam. These will evidently not impact site stability. There has been no opencast working within 500m of the site. There are no faults, fissures or breaklines recorded. There have been no recorded gas emissions within 500m. There have been no subsidence claims or remedial treatments carried out within 50m. The site is still subject to a mining license and a withdrawal of support notice from 1976 has not been cancelled.

The report states that four coal seams outcrop within the site boundary. These are the No.1 Rhondda, No. 2 Rhondda and two unnamed seams. These are shown in Figure 4. It can be seen that the area selected for the report covers a far greater area than the structural elements that need to be risk assessed. The No.1 Rhondda outcrop actually runs through the gantry positions, whilst the other seams will underlie them at various depths. These depths will be examined in the next section. All these facts will feed into the later quantitative risk assessment.

AREA 2

The mining report records a lot of coal mining in the Gorllwyn Seam at depths ranging from 49m to 131m. This large variation in depth is due to the large size of the report area. The combination of a dip in the strata southwards combined with the difference in elevation between the two ends of the area explains the large difference in the depth of workings in the same seam. There are also workings in the Lower Nine Foot and the Five Foot seams. The Lower Nine Foot has an exceptional extraction thickness (for South Wales) of 2.97m. All the workings were carried out from Tower or Tirherbert. As will be expanded on later, these are one and the same. Opencast mining from the Ffyndaff site encroaches to approximately 450m of the nearest structure. This has now been backfilled and very well reinstated. There is a fault marked as a yellow line on the C.A. map in Figure 5. This is too far from Area 2 to have an influence. There have been no recorded gas emissions within 500m. There have been no subsidence claims or remedial treatments carried out within 50m. The site is still subject to a mining license and a withdrawal of support notice from 1976 has not been cancelled.

The report states that two seams, the Abergorchi (sic) and Hafod outcrop on the site. In Figure 5 it can be seen that the outcrop of the *Abergorki* indicates it underlies all the gantry areas at differing depths. The Hafod outcrop runs south of Area 2 so it does not underlie any of the structural elements due to the southerly dip direction.

2b) The C.A. interactive viewer contains a vast amount of information from various sources particularly on the mining data window. As was stated earlier the planning window shows that Areas 1 and 2 lie within broad linear areas of Development High Risk. This was seen in Figure 3. These usually mark buffer zones above seam outcrops. What is very noticeable on the mining data window is the total lack of recorded mine entries (with the exception of Tower/Tirherbert) in a large area surrounding the areas under consideration. To the east lies Hirwaun Common, intensively exploited for Coal and Ironstone for over 200 years. To the northwest lies the Blaengwrach/Cwmgwrach/Rhigos area, again intensively exploited from the late 18th Century. This is well

illustrated in Figure 6, taken from the mining data window. The reasons for this will be expanded on in the site-specific risk assessment (section 3).

The expanded Area 4 can now be seen to contain 3 small circular areas of Development High Risk. These are three 20m buffer zones surrounding the three well-recorded mine entries. A detailed assessment of these will follow in section 3.

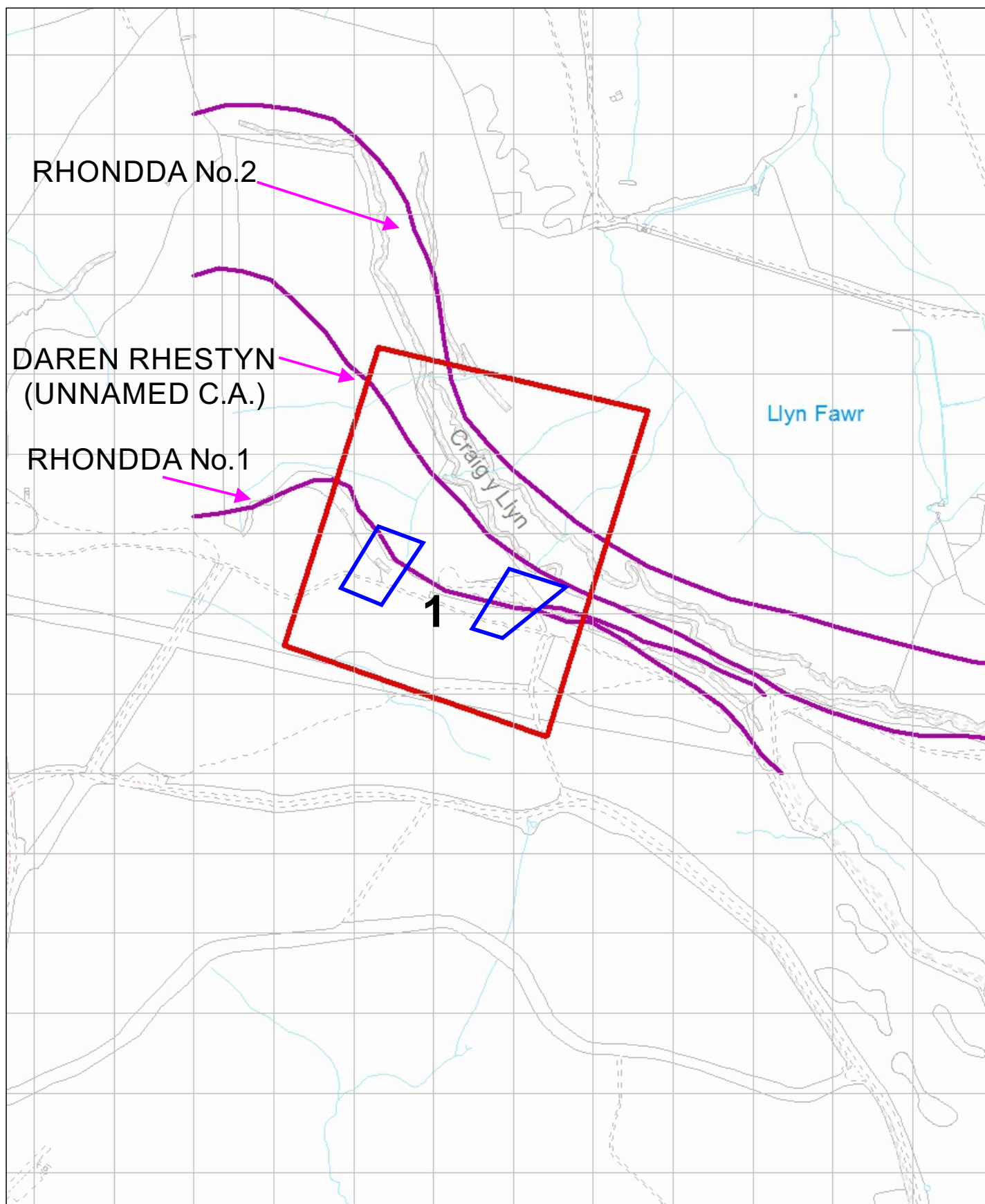


FIGURE 4

C.A. MAP OF AREA 1. THE SEAM OUTCROPS ARE PURPLE AND THE APPROXIMATE EXTENT OF THE STRUCTURES IS IN BLUE. THREE SEAMS WOULD APPEAR TO REQUIRE RISK ASSESSMENT

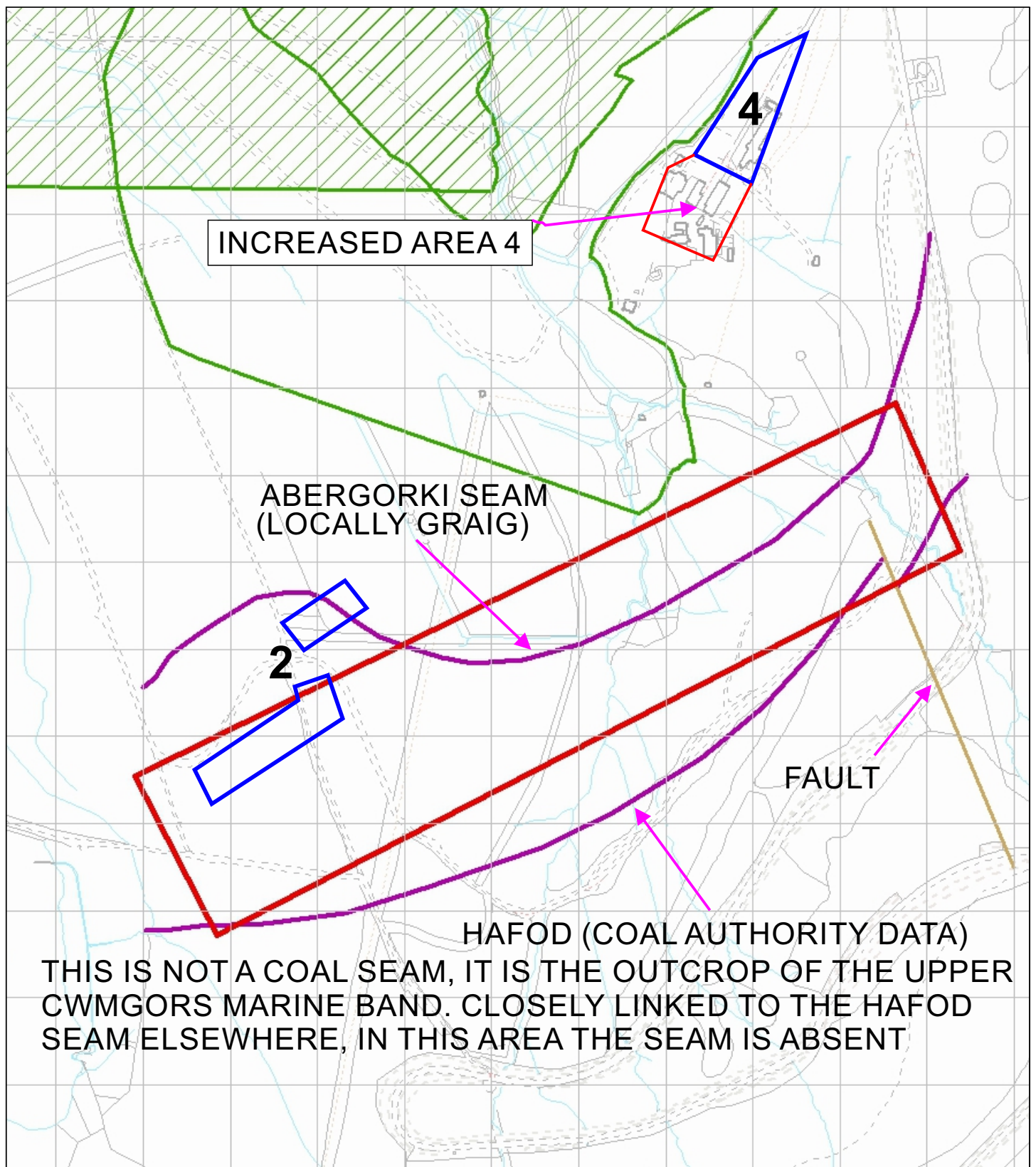


FIGURE 5

C.A MAP OF AREA 2 (AREA 4 IS ON THE MAP BUT WAS NOT INCLUDED IN THE C.A. CONSULTANTS REPORT AS IT WAS NOT ORIGINALLY IN A DEVELOPMENT HIGH RISK AREA). SEAM OUTCROPS ARE PURPLE, OPENCAST IS GREEN. THE APPROXIMATE SITE BOUNDARIES ARE SHOWN IN BLUE. THE RISK TO ALL STRUCTURES IN AREA 2 COMES FROM THE ABERGORKI SEAM

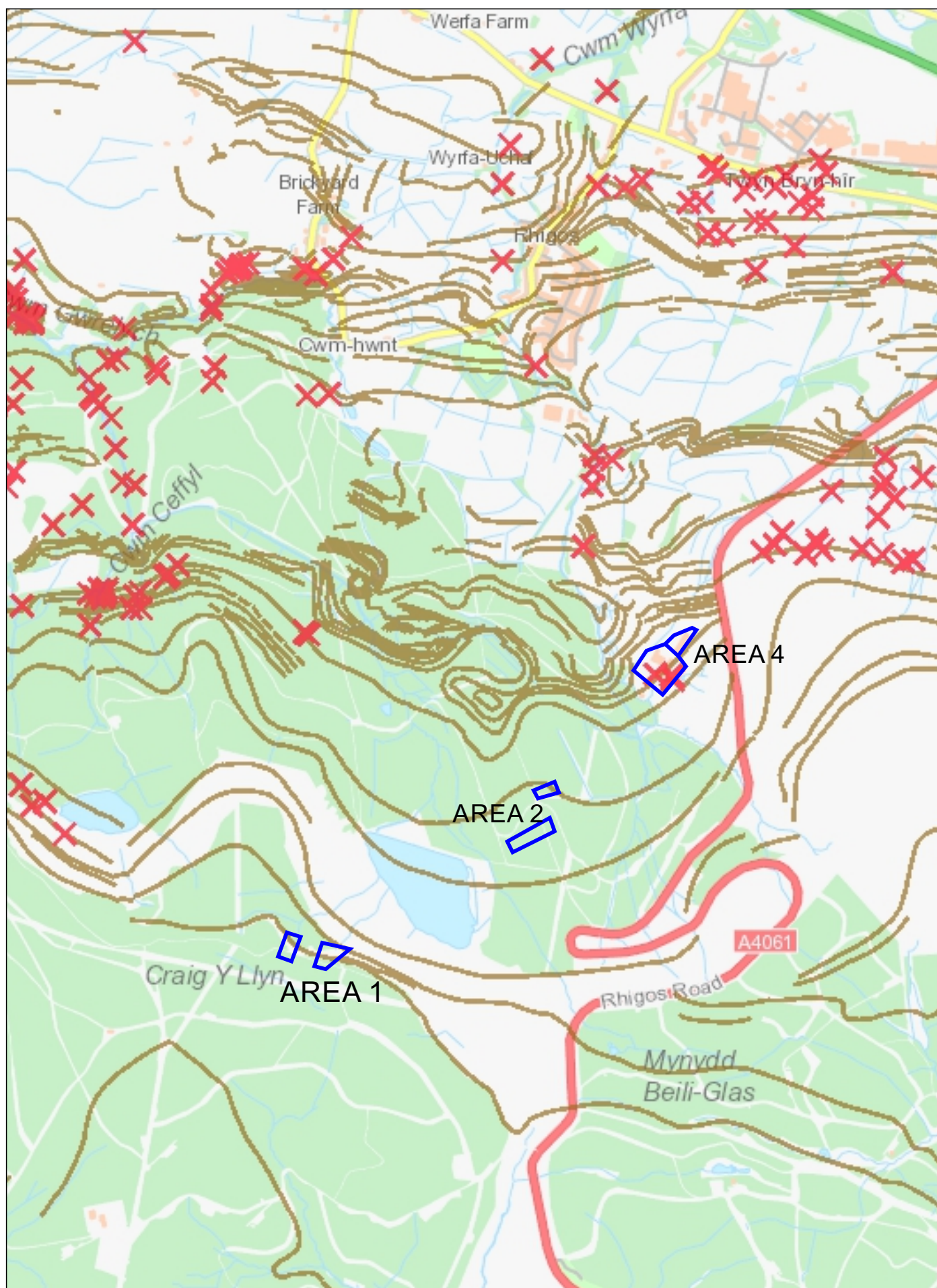


FIGURE 6

EXTRACT OF C.A. VIEWER, MINING DATA WINDOW. THE ABSENCE OF MINE ENTRIES IS IMMEDIATELY NOTICEABLE IN AREAS 1 AND 2
EXTENDED AREA 4 NOW INCLUDES THREE ENTRIES AND OUTCROP.

2c and d) The six inch to the mile Geological Survey sheet SN 90SW covers the area around the site. Two extracts of the map have been reproduced as Figures 7 and 8 overleaf. A section of the stratigraphic column from the map is shown in Figure 9 with the different site levels marked on it. It is always very useful to study the survey sheets in conjunction with the Memoirs. Used together, the six inch survey sheets and the Memoirs are an invaluable source of much detailed geological information on the area. Much of this has been obtained from mining records. Due to the very high economic importance of the area, extensive government funded geological surveys have been carried out in the past. These were completed in 1845, 1899 and 1954 respectively. Very little information on historical coal mining in the area is missing. The reasons for using two different Memoirs is that although they *should* be confined to separate 1" Survey Sheets (248 and 231) in practice geology does not work in rectangular areas. Although the site is off the northern boundary of sheet 248, the Pontypridd-Maesteg Memoirs contain information pertinent to the site.

At first glance the seam outcrops on the Survey Sheet closely match the Summary of Findings maps from the Consultants report. There are some subtle, but important differences.

AREA 1 (Figure 7). The first thing to notice is that the No.2 Rhondda does not underlie the site. There is an annotation showing that the seam is absent eastward from the point shown due to a washout. The Memoirs note that this is a very significant feature, stretching 7km to Aberaman.

Moving upwards, the first C.A. unnamed seam is called the Daren Rhestyn by the survey. This is entirely logical as it is found between the No.2 Rhondda and The No.1 Rhondda in the Rhondda Valley to the south. It is recorded as 27" (0.7m) thick. It should be noted however, that the outcrop is along a precipitous cliff edge.

The second, discontinuous unnamed seam outcrop on the C.A. map is actually only 6" (150mm) thick. It was recorded during the geological section carried out by the Survey recorded near the bottom of Figure 7. Although it was recorded, as it had been actually observed, it was not even given a conjectural outcrop elsewhere, as it was considered so insignificant.

This leaves the uppermost seam, the No.1 Rhondda, the outcrop of which runs through both structures. Although mined extensively elsewhere in the coalfield, the memoirs record that here it is only 5" (0.13m) thick.

AREA 2 (Figure 8). Again there is a superficial resemblance between the Survey Sheet and the Summary of Findings map. However, the first thing to note is that the seam outcrop labelled Hafod by the C.A. is absent from the Survey Sheet. The position of it, sweeping in an arc through Llyn Fawr is closely mirrored by the Upper Cwmgorse Marine Band in Figure 8. The marine bands were very important correlation tools in the South Wales Coalfield. Although coal seams thicken, thin, split, coalesce or even disappear the marine bands are constant. The Upper Cwmgorse is indeed closely associated with the Hafod Seam elsewhere in the coalfield. The Memoirs make it clear that whilst the Hafod Seam is up to 0.65m thick several km away in the Cynon Valley, it is entirely absent in the area of the risk assessment. It has to be borne in mind that the primary source of outcrop information the C.A. have is the British Coal Development Plan maps. These were drawn up for opencast planning, and were themselves based on the Geological Survey maps, together with many field observations from existing opencast mines. Outcrops are often marked where there was little or no evidence for them, and this is certainly the case here. Since the supposed outcrop of the Hafod is now south of all the structures anyway it is no longer of any consequence to the risk assessment. In the case of the No.2 Rhondda in Area 1, the outcrop is marked where actual observations by the Survey have proved it doesn't exist.

The C.A. and the Survey closely agree on the outcrop of the Abergorki, which is known as the Graig from Aberdare to Cwmgwrach. Its outcrop actually runs through one of the structures in Area 2. It would probably be at a depth of 10m-15m under the larger structure in Area 2. The (Pontypridd) Memoirs describe the seam as having two leaves separated by 24" (0.62m) of seatearth in the northern end of the Rhondda Valley. The Merthyr Memoirs describe it as 0.9m of clean coal down the Neath Valley to the west, but it is described as several thin coals in the area of the site, with one workable leaf of 0.6m thickness 3km southeast of the site at Bwllfa. Even on Hirwaun Common, between these two locations, with its intensive mining of multiple seams, the adjacent Survey Sheet SN 90SE shows only primitive bell pits, and no large levels driven on the Abergorki seam.

The Survey Sheet has superficially significant differences with the C.A. Mining Data window (Figure 6) in Area 4. The three mine entries are shown on both sources. The Survey sheet shows the next seam down below the Gorllwyn as the Two Foot Nine. This outcrop is shown at a considerable distance north of area 4 and as a result does not appear in Figure 8. The strata column does record

several thin coals above the Two Foot Nine, and other thin, unnamed seams between the Two Foot Nine and another coal (The Driver) lower down the sequence. The Survey Sheet pre-dates the development of the Ffyndaff Opencast site. This encroached right up to the western edge of area 4 (i.e. the colliery site), but as the colliery was still operational the batter was specifically designed so as not to destabilise the pithead structures. This is the reason for the continuous block of Development High Risk seen surrounding Area 4 in Figure 3. Observations made in the opencast excavation would have resulted in the multiple outcrops plotted in Figure 6. Some of these are very convoluted, even circular and the seam codes (SW0491, SW0471 and SW0461) give the seam names as “unnamed”. This then explains the differences with the Survey Sheet. Although removed during opencasting there is no suggestion that they could have been mined by underground methods. As they were considered insignificant, they were not plotted on the Survey Map Sheet, although they do appear in the Stratigraphic Column. So, although these seams underlie Area 4, possibly at shallow depth, they present no risk to the site. The C.A. evidently agree with this, which is why the bulk of Area 4 is not considered Development High Risk in Figure 3.

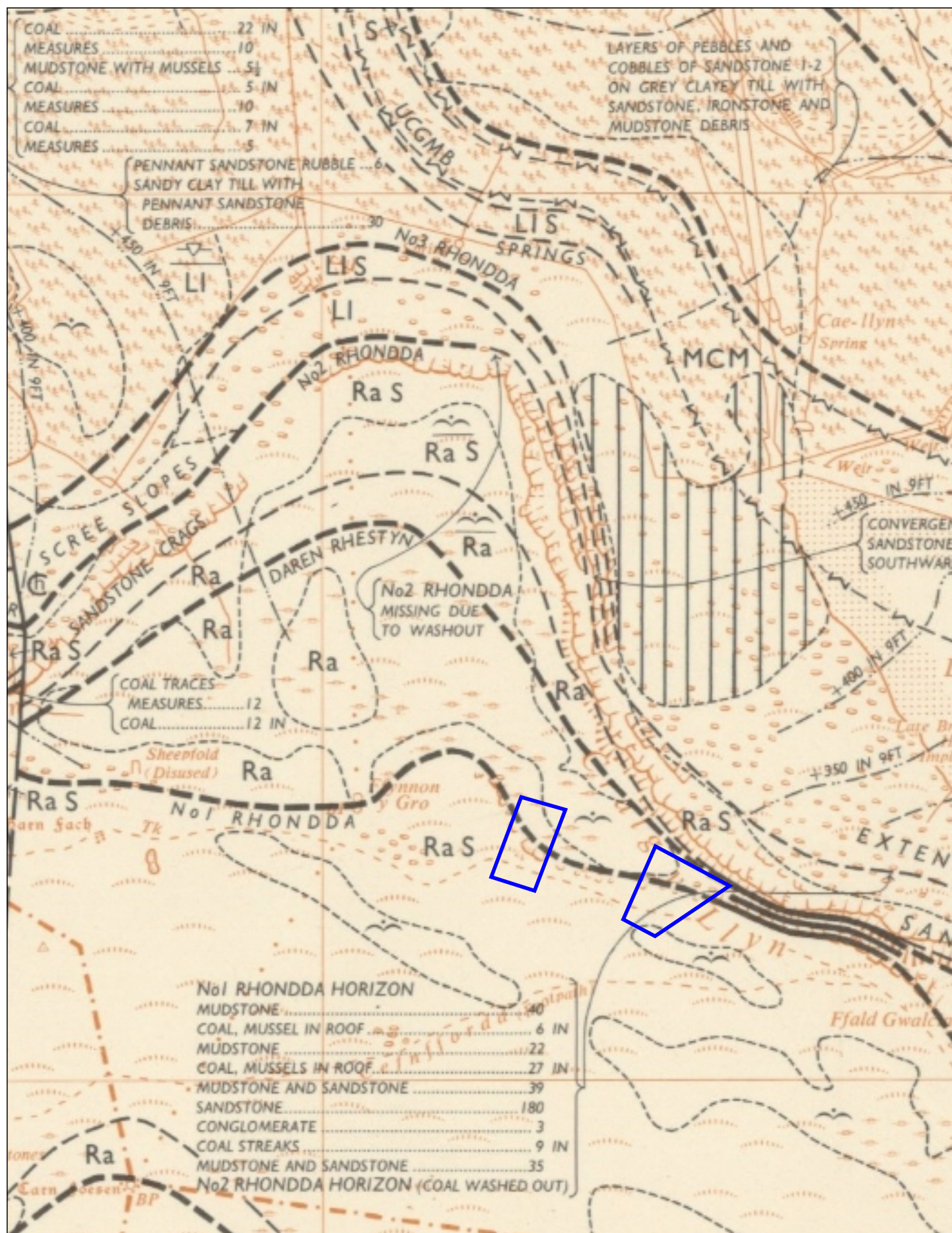


FIGURE 7
EXTRACT OF GEOLOGICAL SURVEY SHEET SN90SW
APPROXIMATE SITE POSITIONS SHOWN IN BLUE

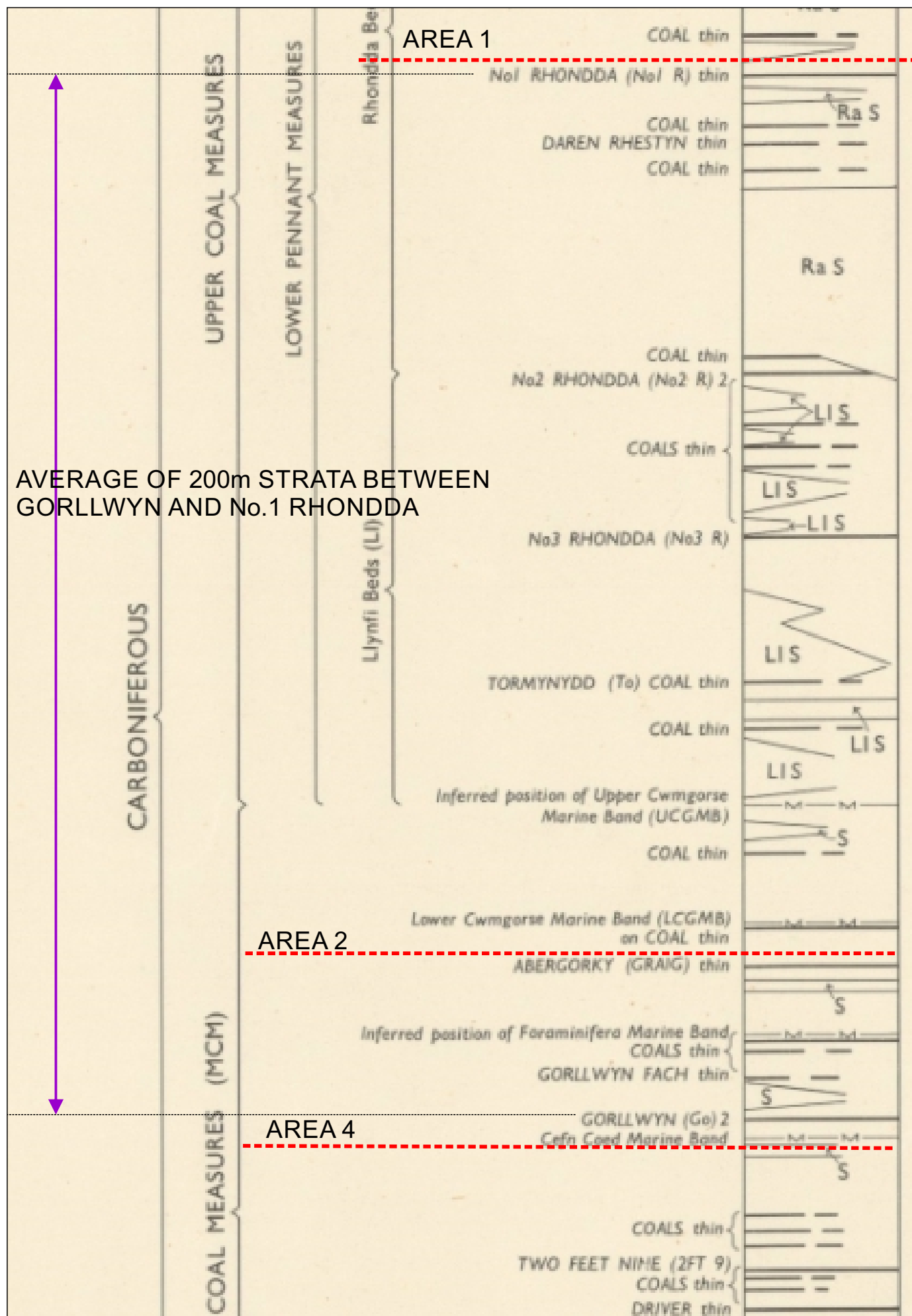


FIGURE 9
SECTION OF STRATIGRAPHIC COLUMN FROM SN 90SW
APPROXIMATE LEVELS OF THE DIFFERENT AREAS ARE MARKED

2e) Historical Ordnance Survey maps can prove invaluable in looking for evidence of coal mining activity. Since the first County Series maps were produced in the 1870's nearly all mining features have been recorded, even if they were considered "old" at that time. This is particularly true of the 1:1250 and 1:2500 scale maps. Since the possibility of shallow coal mining is the most important issue in this risk assessment, they are a useful additional source to the geological material. O.S. maps can also be an aid to looking at past topography and geomorphology before a site has been developed. This is not the case here however, because apart from the colliery yard, and the construction of the A4061 over to the Rhondda Valley there has never been any development of the area.

The 1875 map shows Tower Graig Level, with a tramway running off the map towards Hirwaun. There are several trial levels labelled, and an air shaft. All these features are northeast of Area 4 and so do not impact the site. Llyn Fawr is a natural glacial lake with extensive bog marked, extending over Area 2. Area 1 is also rough pasture with a track marked nearby. Two small levels are marked west of Llyn Fach. There is intensive mining activity in the Blaengwrach area with engine houses, shafts, levels and air shafts marked. All these are at a considerable distance from all the sites, and have no influence on them. They do however, illustrate how thorough the O.S. were in recording mining features. The contrast between this, and the areas under consideration is stark.

By 1900 all the mining features in both Blaengwrach and at Tower Graig are marked as disused. All the sites under consideration remain completely undeveloped. This remains the case on the 1914 revision. The one development in the area is that Llyn Fawr has been converted into a reservoir by the construction of a dam. A long straight access track for the supply of materials comes in from the north.

In the 1948 map Areas 1 and 2 still remain absolutely unchanged. A colliery now stands on Area 4. Although not labelled as such, this is Tirherbert, a large drift mine. Originally started in 1917, this is the first map it appears on. A shaft was sunk in 1941-43 primarily for ventilation, but also for use with men and materials. It then became incorporated, together with Coronation Level, into the Tower Complex after Nationalisation in 1948.

The 1964 map shows the first appearance of the A4061. Although built during the late 1920's as part of the Glamorgan Inter Valleys Road, it isn't shown on the previous map, indicating the map was only a partial revision. The National Grid

had been adopted in the 1964 map. The slightly altered map boundary shows the Coronation Level, now disused. The air shaft and spoil heap are clearly marked. Again this illustrates the point that it is virtually impossible to miss the signs of mining in such a rural area. In contrast to mining areas which have been swallowed up by urban development, spoil heaps, shafts and particularly levels remain over the years. Only the forces of nature slowly soften their appearance. Coronation Level and its associated spoil heaps can clearly be seen to the present day, adjacent to the first bend in the A4061, after the long, dead straight climb from the Heads of the Valley Road. This is nearly 90 years after its initial closure. Area 2 has been completely covered in Coniferous tree plantation. Since this map was published, many of the old mining features north of the site have been obliterated by opencast mining on a vast scale. Some of this has only recently ended, with reinstatement work still being carried out at the Tower and Selar sites. This opencasting has never reached as far as Areas 1 and 2. Area 4 was close to the high wall of Ffyndaf Opencast site, but a safe batter was left to support the winding gear and shaft, which were still operational at the time.

Because they illustrate the absence of mining, rather the presence of mining features, the maps have not been reproduced here. They do however, in this particular case, offer very strong evidence that there has never been any shallow mining in Areas 1 and 2.

2f) Because of the change in the route, the assessment of Area 4 had to be reconsidered as it would now have structural components. This was not the case previously, when it was only going to be a car park with some Portacabins. A visit to the site was considered essential to check on the dimensions and distances shown in Figure 10. Also information about treatment of the mine entrances was needed in order to properly assess the risks. The author contacted Tony Schott of Tower Colliery Ltd to gain admittance. Tony supplied the details of the shaft treatment. It had been filled with limestone aggregate nearly to rockhead, and then plugged with concrete. This is shown in Figure 11A. The visit confirmed the shaft was more than 20m from any structural components. Figure 11B shows one of the Tirherbert drift entrances. Both have been blocked with rubble and are over 60m from the end of the zipline. Dan Jones, the site surveyor was able to supply a plan of the workings in the Gorllwyn Seam. This can be seen in Figure 12. The plan carried contours in the Gorllwyn Seam. It also had O.S. grid lines on it. Dan Jones very kindly transferred area 2 onto the mine plan and then cross-referenced the areas with their Lidar information for the hillside. This meant the depth of the workings in the Gorllwyn can be seen in direct relationship to the

proposed structures above. In Area 2 (Figure 13) these can be seen to agree closely with the C.A. figures from the Consultants Report



FIGURE 10
DETAIL OF ZIPLINE CONSTRUCTION ON AERIAL PHOTOGRAPH.
ALL STRUCTURES ARE GREATER THAN 20m FROM SHAFT

TOWER COLLIERY

No. 4 Shaft

N.G.R. SN 92614 04272

Shaft Diameter 4.877m
Shaft Volume 3021.4 cu.m

Plan No. 6A

PURPOSE - MAIN UPGRADE, MANRIDING & MATERIALS

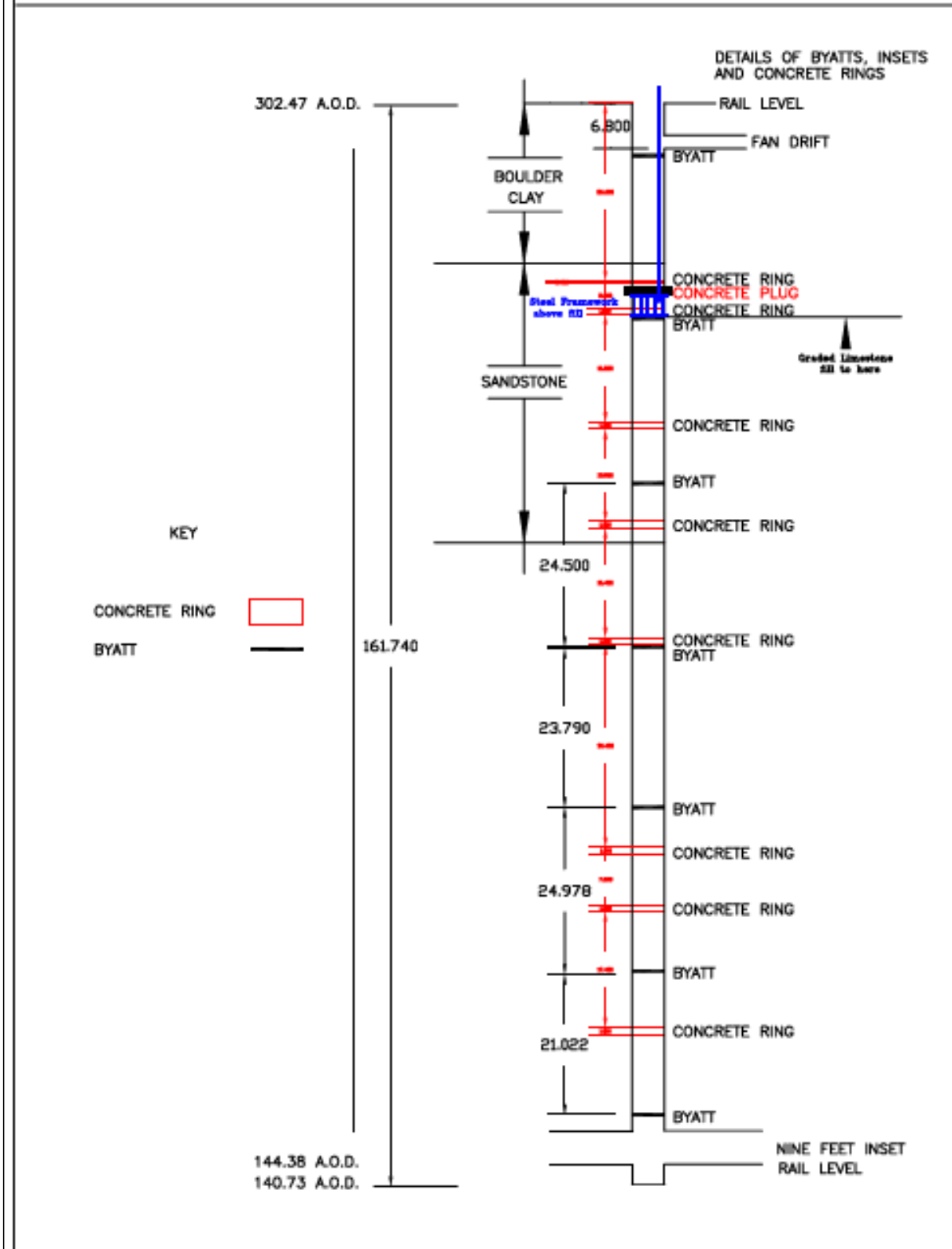


FIGURE 11A

SURVEY DRAWING OF No. 4 SHAFT WITH DETAILS OF LIMESTONE FILL AND CONCRETE PLUG SEALING SHAFT



FIGURE 11 B
INFILLED MOUTH OF ONE OF THE TIRHERBERT LEVELS

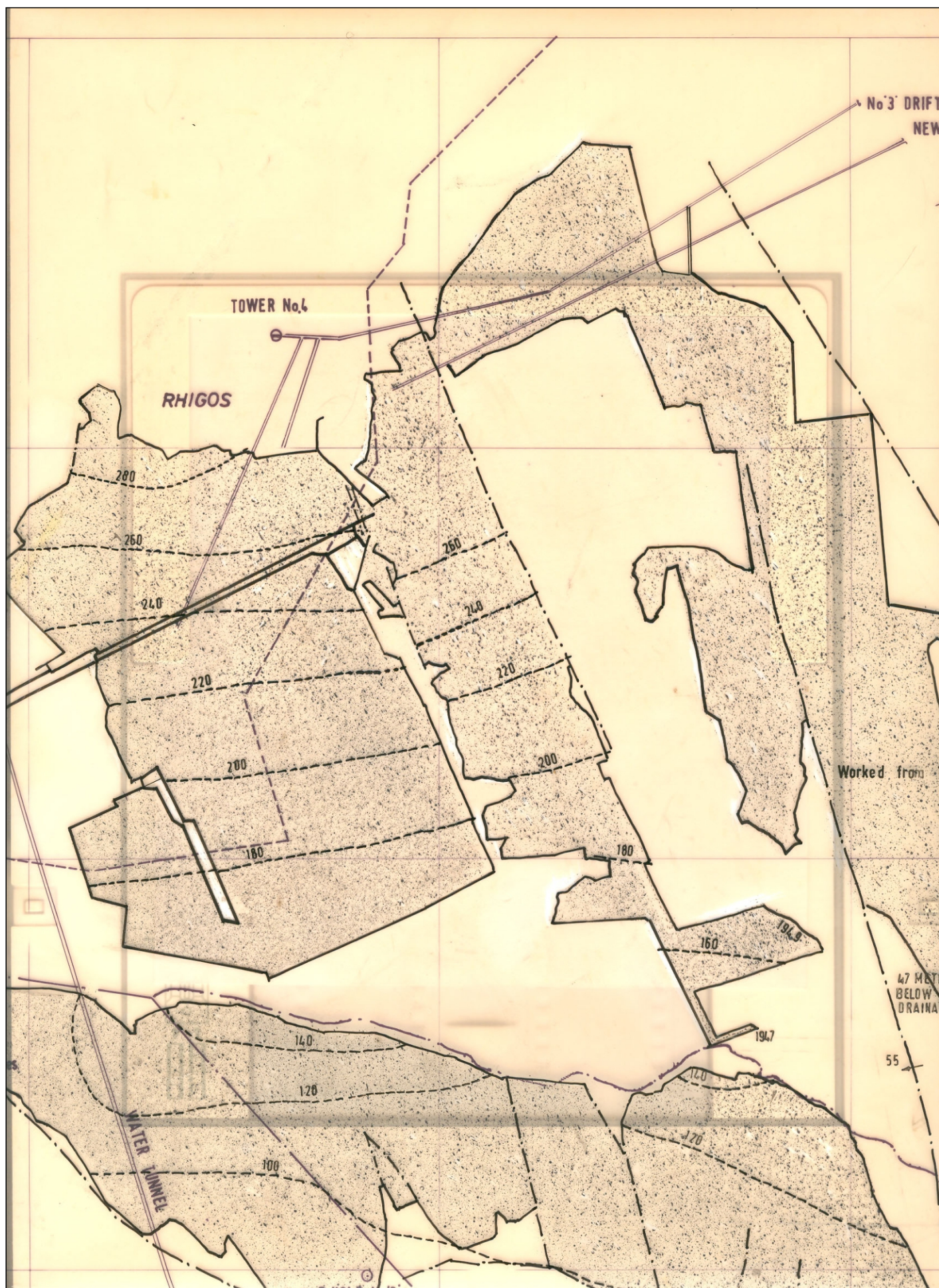


FIGURE 12

MAPPED WORKINGS IN THE GORLLWYN SEAM SOUTH OF AREA 4

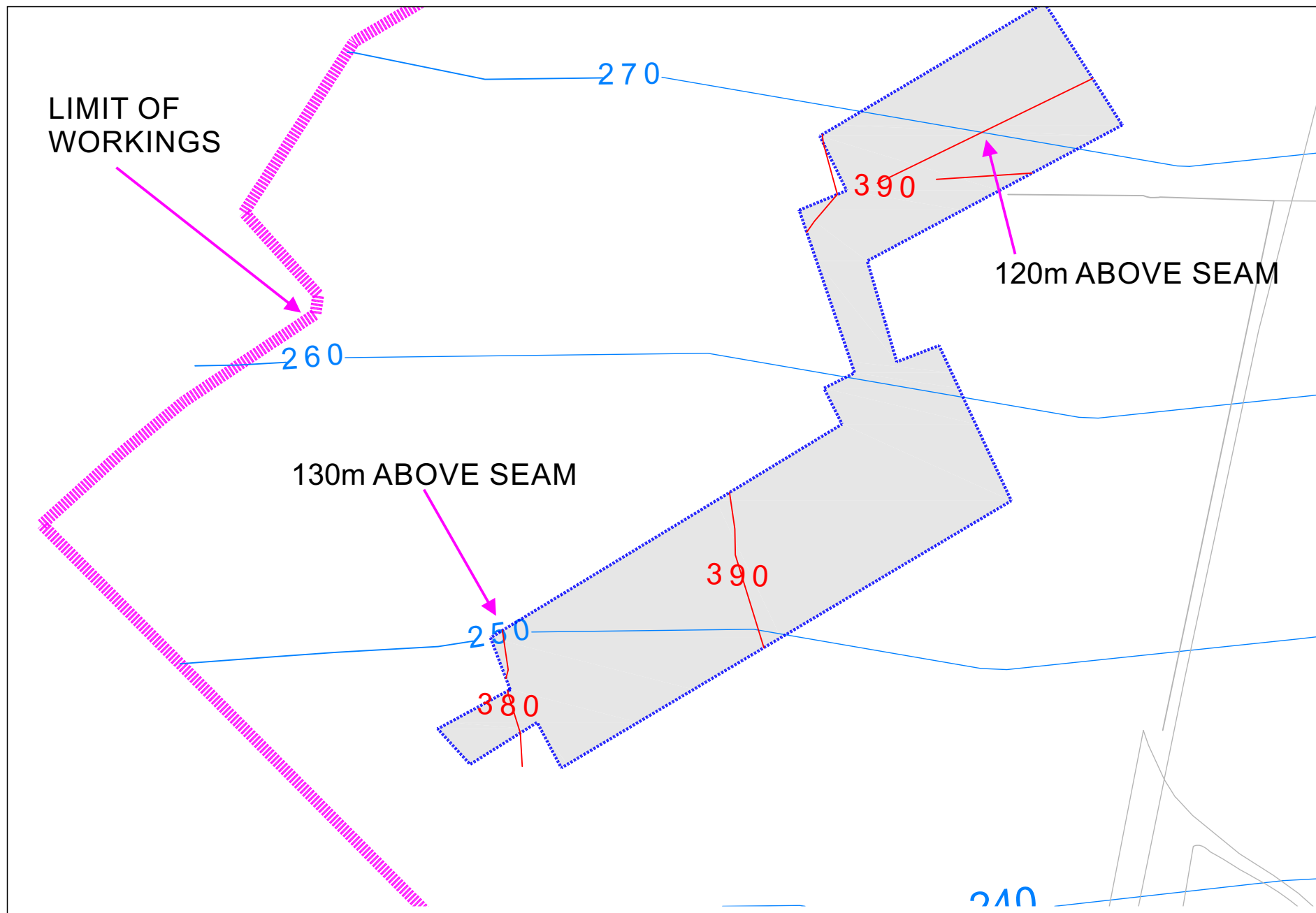


FIGURE 13
AREA 2 SHOWN ON SEAM CONTOURS (BLUE) OF THE GORLLWYN SEAM
LIDAR CONTOURS FOR THE GROUND BENEATH THE STRUCTURES ARE SHOWN IN RED

COAL MINING ISSUE		YES	NO	R.A?
SHALLOW RECORDED WORKINGS			X	
SHALLOW UNRECORDED WORKINGS		X		X
MINE ENTRIES			X	
FISSURES			X	
GAS EMISSIONS			X	
SURFACE HAZARDS			X	
SURFACE MINING			X	
FUTURE MINING LICENSE			X	

3. SITE SPECIFIC COAL MINING RISKS

From the table above it can be seen that only one issue requires a risk assessment for this site. That is the possibility of shallow unrecorded workings under all three sites.

To first briefly deal with the issues marked NO on the table:-

- a) There is no possibility of recorded shallow workings underlying any of the sites. The shallowest recorded workings from Tower Colliery (and its predecessor Tirherbert) are in the Gorllwyn Seam. The shallowest depth these are recorded at is 130m under Area 2.
- b) Coal Authority records show no mine entries within influencing distance of Areas 1 and 2 as regards ground stability. Of course Area 4 is in the colliery yard. The mine only closed in 2008, up until which time all three mine entrances were well maintained. These consisted of a 162m shaft and two well engineered drift mine entrances leading south, away from Area 4. It was established in Section 2f that the shaft is within 27m of the closest part of the structure at the end of the zipline. Also, it has been capped and backfilled and can pose no threat to the structure. The filling of the twin drifts was of a less engineered nature, but they are at least 60m from any structure so again they pose no risk.
- c) The C.A. report states there are no fissures, surface hazards or lines of geological weakness affected by underground mining under areas 1 and 2. The major structural faults have large throws of up to 150m. The two major faults in the area are the Hirwaun No.1 and No.2 which are 1km and 1.5km to the east. The fault nearest the site is a minor fault en

echelon with these. The reactivation of major faults by mechanised longwall mining is well documented in South Wales, but this is no longer a threat. The last longwall extraction in the vicinity of the fault was 43 years ago. Also it is too far from Areas 2 and 4 to have an influence.

- d) There been no damage notices nor subsidence claims within 50 metres of any of the sites.
- e) The C.A. report states there have been no recorded gas emissions within the areas surrounding the sites.
- f) There has been extensive surface mining (opencast) close to the site in the recent past. This was 450m away from most of the structural components of the proposed zipline. Area 4 is only approximately 100m from the edge of the backfilled opencast workings of the Ffyndaff site. The slope adjacent to Area 4 was specifically engineered to support the mine headgear, shaft and colliery buildings, which were still operational during the life of the Ffyndaff Opencast. They cannot therefore pose a threat to the much lighter structures of the gantry at the end of the Zipwire.

Shallow Mineworkings-Area 1

It was established in section 2c, d that there is only one seam of workable thickness underlying Area 1 at shallow depth. This is the Daren Rhestyn, which the Geological Survey measured as 0.7m thick. This seam has been worked commercially in the past, 22km southeast of the site in the Pontypridd area. It was also established that the outcrop is close to a precipitous cliff edge, marked in Figure 7 as “Sandstone Crag”. For the benefit of anyone reviewing this assessment, who is probably unfamiliar with the area, Figure 14 is a photograph of the area concerned. The physical impossibility of carrying out coal mining operations is immediately apparent. The physical characteristics of the site are the “raison d’etre” for siting the zipline here. Added to this is the evidence from section 2e showing that the site has always been a completely undisturbed area of very high, and until the late 1920’s, inaccessible moorland. Any evidence of past coal mining would be immediately visible today, as it is in all areas surrounding the lower positions which have not been subsequently opencast. There is none, and it is safe to conclude there is no threat to the site from shallow unrecorded coal workings.

Shallow Mineworkings-Area 2

In section 2b passing reference was made to the lack of mine entries near area 2. This is in marked contrast to other nearby areas. The reasons for this are twofold. The first reason is that there is only one workable seam, this is the Gorllwyn. Section 2c showed that the Abergorki is poor quality and the Hafod is absent. The main reason for the lack of early exploitation of the Gorllwyn is the superficial deposits. The study area is in a classic glacial cirque. This can be clearly seen in Figure 14. Area 1 is situated high on the rim of the cirque, whilst area 2 is situated on the floor of the cirque. Here it would be normal to expect a great thickness of glacial sediments, and this is evidently the case. Apart from Tirherbert/Tower the only other mine entries within the cirque are two levels driven on the Gorllwyn outcrop due west of Tower. These are actually on quite high ground on a ridge separating the Llyn Fawr cirque from the adjacent, smaller Llyn Fach cirque. The site of Tower itself is quite high on the opposite side of the cirque. This site was evidently selected for the express reason that it would be expected the superficial cover would be thinner. The original twin levels were driven from north of the Gorllwyn outcrop to intercept the seam at depth. The shaft records from the 1941 sinking of the ventilation shaft at Tower record 25.7m of glacial deposits. An N.C.B. borehole just west of Area 4 records 21m of glacial deposits beneath the tip. It is highly probable that these will be even thicker at area 2. So the combination of very thick superficals overlying a poor quality seam mean that there is no risk to area 2 from unrecorded shallow coal workings.

Shallow Mineworkings-Area 4.

Section 2c and d established without doubt there are no workable seams at shallow depth beneath Area 4. Because of extensive opencast mining there is a very complete understanding of the stratigraphic sequence. The C.A. mining data map shows thin seams recorded during the opencast mining. These were too thin to have been mined using underground methods. A large "island" of coal has been left in the Nine Foot seam to avoid destabilising the pithead.



FIGURE 14
PANORAMIC VIEW OF THE GLACIATED LANDSCAPE AT LLYN FAWR. COPYRIGHT PETER WASP

4. MITIGATION STRATEGY

It is not proposed to offer any engineering or location based mitigation measures. The reason for this is that there is no possibility of ground instability caused by coal mining legacy issues on the site.

5. CONCLUSION

This risk assessment has presented abundant evidence from comprehensive research that there is no risk to ground stability posed by coal mining legacy issues at any of the sites where the structural components of the ride are to be sited. In particular, the risk of shallow unrecorded workings under the proposed structures has been thoroughly examined and discounted. Therefore it is the author's opinion that there is no need for the site to be classified as Development High Risk, and no reason for the Coal Authority to object to planning permission being granted for the proposed development.

Richard Davies BSc. (Hons), MSc., F.G.S.

30/09/2019

APPENDIX 1

COAL AUTHORITY CONSULTANTS' REPORTS



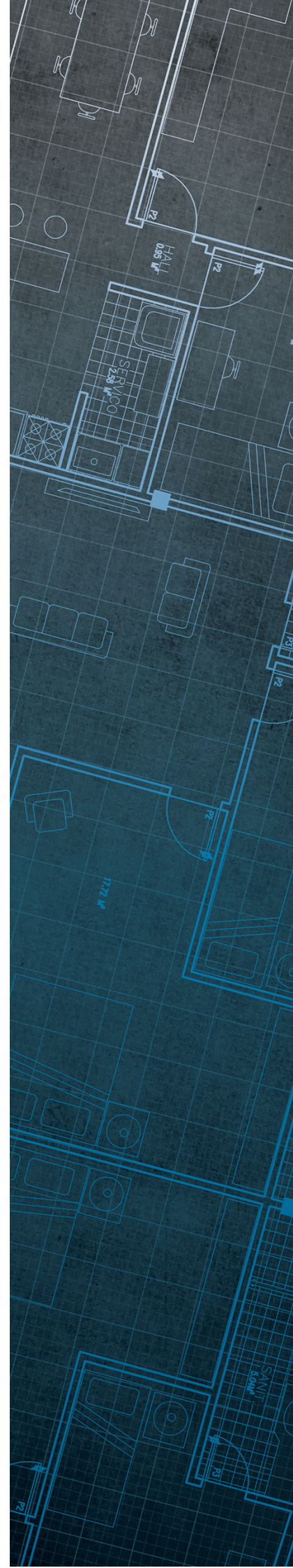
The Coal
Authority

Consultants Coal Mining Report

Rhigos Mountain
Rhondda Cynon Taff

Date of enquiry:	25 March 2019
Date enquiry received:	25 March 2019
Issue date:	25 March 2019

Our reference:	51002050240001
Your reference:	



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

Richard Davies

Enquiry address

Rhigos Mountain
Rhondda Cynon Taff

How to contact us

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

200 Lichfield Lane
Mansfield
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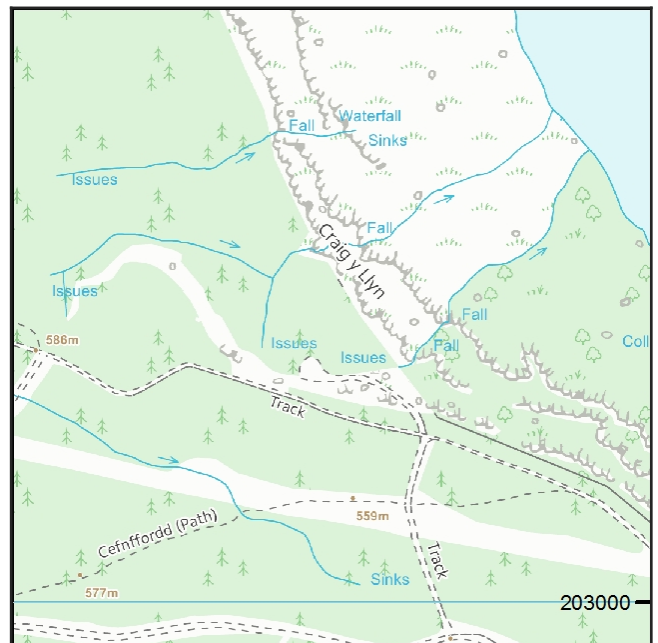
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 /company/the-coal-authority

 /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
tirherbert	GORLLWYN	Coal	4HW0	277	Beneath Property	6.1	South	88	1958
unnamed	GORLLWYN	Coal	4YCD	369	South	4.8	South	102	1937
FERNHILL	GORLLWYN	Coal	4HVV	375	South	12.3	South	88	1937
unnamed	GORLLWYN	Coal	4HVZ	407	South	12.7	South	88	1936
TOWER	LOWER NINE FOOT	Coal	4HWH	408	North	2.9	North-West	284	1952
unnamed	LOWER NINE FOOT	Coal	4HWC	410	Beneath Property	6.7	South-East	297	1963
unnamed	LOWER NINE FOOT	Coal	4HWF	412	Beneath Property	16.9	North-West	216	1981
unnamed	GORLLWYN	Coal	4YC9	427	South-West	2.5	South	102	1940
FERNHILL	TWO FOOT NINE	Coal	4YCS	429	South	5.8	South	88	1948
unnamed	LOWER NINE FOOT	Coal	4HWL	441	West	0.0	East	238	1954
FERNHILL	FOUR FOOT	Coal	4YCO	443	South	6.7	South	182	1962
TOWER	LOWER NINE FOOT	Coal	4HWG	446	Beneath Property	17.9	West	216	1982
TOWER	BUTE	Coal	4HWP	465	East	0.0	East	100	1970
unnamed	LOWER NINE FOOT	Coal	4HWE	480	Beneath Property	13.0	South	258	1969
TOWER	BUTE	Coal	4YCV	508	East	7.0	South	81	1969
FERNHILL	LOWER NINE FOOT	Coal	4YCE	513	South	5.5	South-West	196	1968
unnamed	BUTE	Coal	4HWA	521	Beneath Property	5.0	South-West	99	1971
TOWER	BUTE	Coal	4YCU	522	South	4.4	South-West	99	1973
TOWER	BUTE	Coal	4HW9	523	South	26.7	South	99	1971
TOWER	BUTE	Coal	4YCW	532	South	6.0	South	81	1971
TOWER / MARDY	FIVE FOOT	Coal	V32	552	Beneath Property	7.0	South	150	1991
TOWER / MARDY	FIVE FOOT	Coal	V34	571	South	4.6	South	150	1992

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

No spine roadway recorded at shallow depth.

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

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

SWR3086	SWR1296	SWA1224
SWA1156	SWA1223	18135
SWR1887	16570	SWA1283

Our records show we have more plans than those shown above which could affect the enquiry boundary.

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
NO.1 RHONDDA	Coal	Yes	Within	N/A	115
NO.2 RHONDDA	Coal	Yes	Within	N/A	169
UNNAMED	Coal	No	Within	N/A	108
UNNAMED	Coal	Yes	Within	N/A	129

Geological faults, fissures and breaklines

No faults, fissures or breaklines 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

Status	Licence type	Distance (m)	Direction
Past	Underground	Within	N/A

See Section 4 for further information.

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 in an area where a notice to withdraw support was given in 1976.

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.

Coal mining licensing

The report has highlighted that the site is close to a Coal Authority license area for coal mining operations. Please contact us if you require further information.

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.

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VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	25 March 2019
Issued to	RICHARD DAVIES 56 MEYLER STREET THOMASTOWN TONYREFAIL RHONDDA CYNON TAFF CF39 8EA
Property search for	RHIGOS MOUNTAIN RHONDDA CYNON TAFF
Reference number	51002050240001
Date of issue	25 March 2019
Cost	£106.79
VAT @ 20%	£21.36
Total received	£128.15
VAT registration	598 5850 68



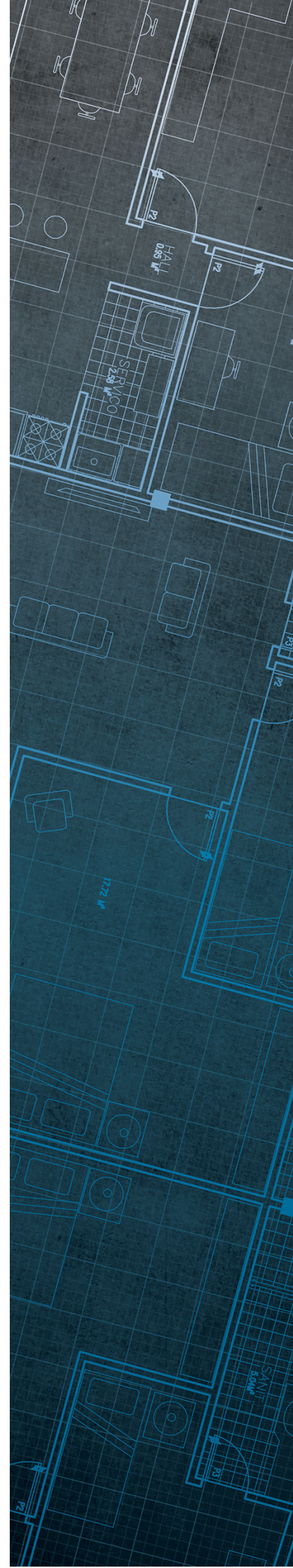
The Coal
Authority

Consultants Coal Mining Report

Tower Colliery
Rhondda Cynon Taff

Date of enquiry: 25 March 2019
Date enquiry received: 25 March 2019
Issue date: 25 March 2019

Our reference: 51002059947001
Your reference:



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

Richard Davies

Enquiry address

Tower Colliery
Rhondda Cynon Taff

How to contact us

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

200 Lichfield Lane
Mansfield
Nottinghamshire
NG18 4RG

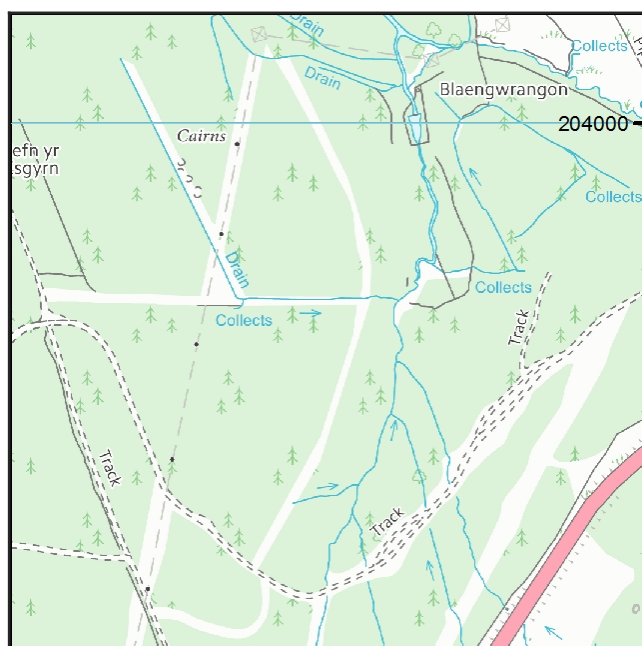
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Approximate position of property



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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	GORLLWYN	Coal	4YEL	49	Beneath Property	4.8	South	80	1928
unnamed	GORLLWYN	Coal	4YDU	78	Beneath Property	5.9	South	130	1940
unnamed	GORLLWYN	Coal	4HW1	121	Beneath Property	5.6	South	88	1953
unnamed	GORLLWYN	Coal	4YDV	131	Beneath Property	6.2	South	130	1950
TOWER	LOWER NINE FOOT	Coal	4YDO	152	Beneath Property	3.4	North	216	1955
tirherbert	GORLLWYN	Coal	4HW0	159	South-West	6.1	South	88	1958
TOWER	LOWER NINE FOOT	Coal	4YDP	170	Beneath Property	7.4	South	282	1955
TOWER	LOWER NINE FOOT	Coal	4YDQ	177	Beneath Property	7.2	South	282	1970
TOWER	LOWER NINE FOOT	Coal	4YEE	187	North	4.6	South	244	1942
TOWER	LOWER NINE FOOT	Coal	4YED	194	Beneath Property	8.0	North	244	1941
unnamed	LOWER NINE FOOT	Coal	4HWC	243	Beneath Property	6.7	South-East	297	1961
TOWER	FIVE FOOT	Coal	4YDI	248	Beneath Property	8.4	South	140	1975

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

Distance to spine roadway (m)	Direction to spine roadway
Within	N/A

Mine entries

None recorded within 100 metres of the enquiry boundary.

Abandoned mine plan catalogue numbers

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

SWA3898	SWR2005	SWR2753
SWR3086	SWR2743	SWR1964
SWR2492	SWR1296	SW111

Our records show we have more plans than those shown above which could affect the enquiry boundary.

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
ABERGORCHI	Coal	Yes	Within	N/A	199
ABERGORCHI	Coal	Yes	Within	N/A	289
HAFOD	Coal	Yes	Within	N/A	34
HAFOD	Coal	Yes	Within	N/A	216

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

Please refer to the "Summary of findings" map (on separate sheet) for details of any opencast areas 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

Status	Licence type	Distance (m)	Direction
Past	Underground	Within	N/A

See Section 4 for further information.

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 in an area where notices to withdraw support were given in 1976.

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.

Coal mining licensing

The report has highlighted that the site is close to a Coal Authority license area for coal mining operations. Please contact us if you require further information.

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Section 5 – Data definitions

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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.

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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.

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

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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.

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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.

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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.

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VAT receipt

Issued by	The Coal Authority 200 Lichfield Lane Mansfield Nottinghamshire NG18 4RG
Tax point date	25 March 2019
Issued to	RICHARD DAVIES 56 MEYLER STREET THOMASTOWN TONYREFAIL RHONDDA CYNON TAFF CF39 8EA
Property search for	TOWER COLLIERY RHONDDA CYNON TAFF
Reference number	51002059947001
Date of issue	25 March 2019
Cost	£121.49
VAT @ 20%	£24.30
Total received	£145.79
VAT registration	598 5850 68