

MINING ASSESSMENT

Mynnydd Fforch-Dwm Wind Farm

Prepared for: REG Power Management Ltd

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1.0 INTRODUCTION

1.1 Appointment

SLR Consulting Limited (SLR) was commissioned by REG Power Management Ltd (REG), to undertake a Coal Mining Risk Assessment (CMRA) concerning the development of a proposed windfarm at Mynydd Fforch-Dwm located on land (the Site) 4 km to the south of Resolven, identified in Drawing 01 (Site Location). A CMRA has been requested to assess potential historical coal mining activities that may impact the proposed development.

The following sections of the report introduce the site, the assessment works undertaken and their results, along with a preliminary assessment of the mining risk under the site and in the vicinity of the infrastructure.

This report has been prepared by the SLR Land Quality Group based at the Edinburgh Office of SLR, 2nd Floor, Lochside View, Edinburgh, EH12 9DH, Tel: 0131 335 6830.

1.2 Proposed Development

The proposed development site lies approximately 7 km northeast of Neath in South Wales and comprises of two main areas of the Site, one on the boundary of Tonmawr to the northeast (Mynydd Blaenafon (MB)), and the other on the opposite side of the Nant Blaenpelenna watercourse further to the north east (Mynydd Fforch-Dwm (MFD)).

The application boundary corresponds to an area of around 290 ha. Around 50 ha of this comprises the site access corridor, which would be provided for the construction and operation of the proposed development. The proposed access corridor utilises a combination of existing and new access tracks which provide a route to and from the public highway.

The proposed development as presented in Drawing 02, in outline, will comprise:

- Erection of six proposed turbines, comprising four located within MFD and two located within MB.
- Construction of new access roads, including the use and upgrade of existing roadways.
- Construction of two switchgear buildings, temporary construction compounds, crane pads and hardstanding areas.
- Construction of a solar development within MB.
- Areas within the site boundary outwith the above activities, will remain undeveloped.

1.3 Background

The Site is located within a Coal Mining Reporting Area, underlain by Carboniferous coal bearing strata (Coal Measures). The Site also includes areas classed as a Development High Risk Area (DHRA) and thus a CMRA should be undertaken. A DHRA is defined as an area which contains one or more recorded coal mining features that have potential for instability or a degree of risk to the surface from the legacy of coal mining operations. This would comprise a combination of features which could include:

- mine entries;
- shallow coal workings (recorded and probable);
- recorded coal mining related hazards;
- recorded gas sites; and
- fissures and breaklines and previous surface mining sites.

The DHRA present within the site boundary relates to the proven outcrop locations of coal seams and the locations of recorded mine entries, predominately located within the margins of the Site, on the valley sides and bases.

The existing land uses at the Site include pastureland, open country and minor young plantation. Ground levels across the MB area to the west of MFD, vary from around 310m above Ordnance Datum (aOD) at the north-eastern extent of the plateau, to 155m aOD to the south of MB along the access corridor.

The topography locally is formed of steep river valleys with well incised channels. Within the eastern MFD area, ground levels range from around 200m aOD along the Nant Blaenpelenna watercourse in the north and west to 350m aOD in the southeast of the Site.

The opportunity has also been taken to review publicly accessible data. In summary, the work comprised the following:

- A review of historical map records;
- Review of mine abandonment plans;
- A review of information held on British Geological Survey and Coal Authority website; and
- Collating information about site conditions and assessing the potential mining risks.

To complete this coal mining risk assessment, geological information and maps were obtained from the British Geological Survey (BGS) 1:50,000 scale Ordnance Survey maps¹ and memoirs² were also reviewed. Additional searches were requested from the Coal Authority to address the extent of coal mining undertaken at the Site and, based on past mining activity, a search of suitable coal mining abandonment plans was also undertaken. To support the findings a review of available BGS boreholes drilled into the Coal Measures was also carried out to verify findings and, in some instances, confirm the location of coal seams and potential for workings.

This report thus provides a review of the likelihood of any mining activity (including traditional underground mining, both recorded and potentially unrecorded) which has taken place on the site.

The geological setting and mining framework of the site and surrounding area are described in Section 2.0, which is followed by the Mining Assessment in Section 3.0. Conclusions are presented in Section 4.0.

¹ BGS, 1963. Pontypridd. Geological Survey of England and Wales. Sheet 248. Solid Geology. 1:50,000

² Woodland, A W and Evans, W B. 1964. The Geology of the South Wales Coalfield, part IV the Country around Pontypridd and Maesteg. Memoirs of the Geological Survey of Great Britain, One-Inch Geological Sheet 248 (England and Wales).

2.0 GEOLOGICAL AND HYDROGEOLOGICAL SETTING

2.1 Geology

Information on geology and mining has been obtained from the Coal Authority Consultants Report, local planning records, BGS boreholes and published geological maps of the Site and surrounding area. No site-specific borehole information is available for the Site, therefore assessment of the geological setting and mining has been obtained from BGS online map viewer, BGS published maps¹ and memoirs².

2.1.1 Superficial deposits

Review of the drift geology in BGS records indicates an absence of superficial deposits over the majority of the site with recorded deposits comprising very small pockets of peat in the MFD area with minor glacial till deposits recorded adjacent to the site boundary in the south and west on the lower slopes of each area. These deposits may have been disturbed by forestry to the north and farming activities to the south.

2.1.2 Solid Geology

The extent of the Solid Geology underlying the site is shown on maps published by the BGS¹. In the vicinity of the Site, the underlying bedrock comprises rocks of the Upper Coal Measures primarily the South Wales Upper Coal Measures (UCMS) overlying the Pennine Middle Coal Measures, which forms part of the South Wales Coalfield.

The Upper and Middle Coal Measures essentially comprise sandstones, siltstones and coal seams with ironstones. They tend to occur in upper coarsening cycles with mudstones at the base passing up through siltstone and sandstone to a root bed underlying the coal seam. Thin clayband ironstones with layers of nodules are common in the mudstone beds above the coal seams. Blackband or slatyband ironstones also occur.

The area around the Site is faulted extensively. In general, the faults are normal, and bear on a north to south to strike. There are four faults recorded within the Site, with limited lateral and vertical displacement based on the dislocation of the mapped coal seams presented on published mapping. The stratigraphy is generally flat, with a minor dip to the northwest at between 2 and 5 degrees.

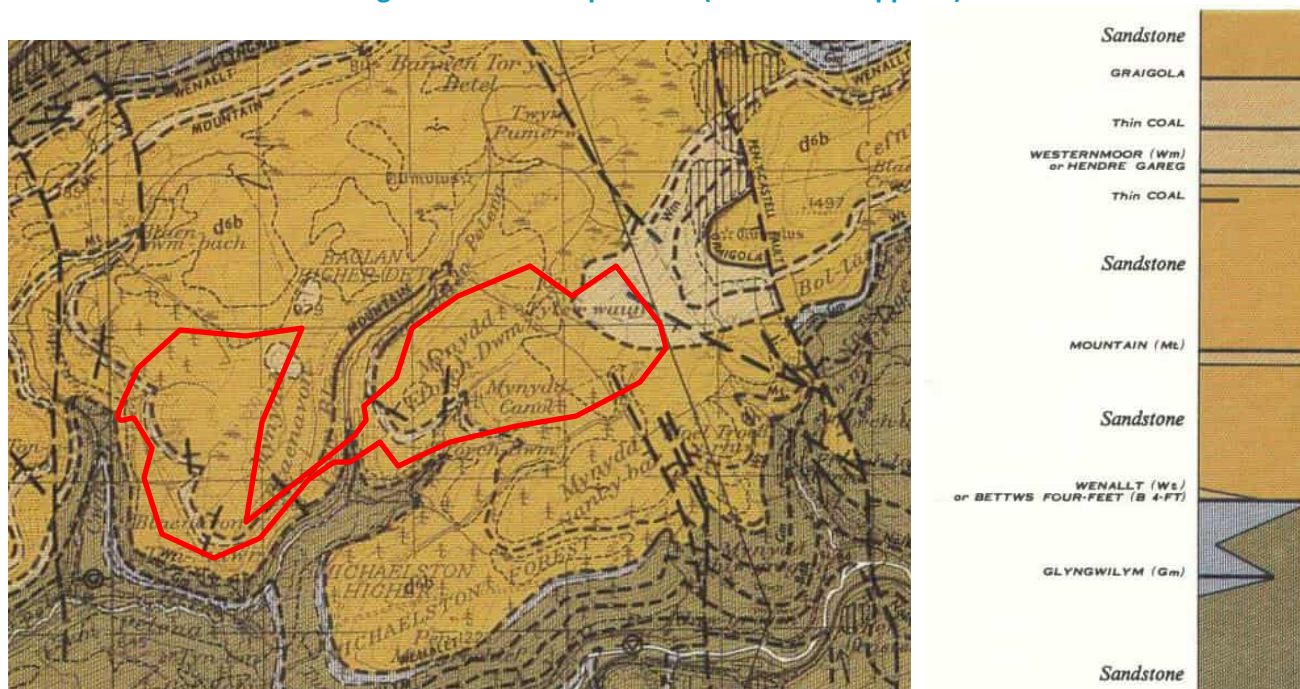
Two of the three formations which are Westphalian age in Wales are present in the local area, with the Upper and Middle Coal Measures occupying the entire area. The development of the Upper Coal Measures (UCMS) in the area is quite extensive, with the Middle Coal Measures (LCMS) developed to the north and south of the site.

The solid geology is dominated by sandstones and mudstones with limited coal bearing rocks and there are various seams within the Upper and Middle Coal Formation which have been worked in close proximity to the site. Numerous coal seams are identified within the deeper section of the Middle Coal Measures succession, however only a few seams are identified in the Upper Coal Measures, notably the:

- Graigola
- (unnamed thin coal)
- Westernmoor
- (unnamed thin coal)
- Mountain
- Wennalt or Bettws Four Feet
- Glyngwilym
- Brithdir Rider
- Brithdir

An extract of the BGS Map with the coal seam stratigraphy is provided in Figure 2-1.

Figure 2-1: BGS Map Extract (site in red – approx.)



The geological stratum beneath the Site is predominantly located within Hughes member sandstone units of the UCMS which overlie the Brithdir beds, represented in orange and brown in Figure 2-1 above respectively, comprising a number of coal seams of economic importance, further discussed below.

2.2 Coal Mining History

Information regarding the coal mining history within the surrounding area can be obtained within the BGS memoir, which outlines the number of seams of economic importance locally and the coal seam stratigraphy. While numerous economic seams are present beneath the Site, the majority are considered deep (i.e. >100m depth), including the Brithdir Seam, Rhonda 1, 2 and 3 seams. The overlying sequence of coal seams predominately located within the upper units of the Brithdir member and overlying Hughes member have been further assessed, as these seams may occur at shallower depths and may pose potential risk to the development.

The upper units of the Brithdir beds occupy the southern limit of the Site within the lower hillsides, continuing beneath the Site at depth. The shallowest seam within this unit is the Glyngwilym seam, located approximately 30m above the Brithdir Rider seam, and is recorded to consist of 0.6m of clean coal outcropping >100m south of MB. The overlying Wenallt seam, marks the boundary to the Hughes member sandstone units and is locally considered to be between 10 and 25m above the Glyngwilym seam separated by mudstone and siltstones.

The Wenallt Seam is of considerable local importance, recorded to have been 0.7m thick, overlain by locally present Wenallt Rider Seam of similar thickness. The memoir documents an intermittent seam, not outlined within the BGS vertical log, named the Garlant Seam, likely a thin coal of lower economic value. Above a series of sandstone and mudstones are recorded beneath the Mountain Seam, also referred to as the Daren DDU Seam locally. The seam is recorded to comprise several "dirt" partings, which lowers the economic importance of the seam otherwise noted to be approximately 0.5 to 0.7m thick. The seam is noted to have a massive sandstone roof, as part of a thick sandstone group of up to 60m above. There are several records of thin mudstone bands with associated coals within the thick sandstones, however these have not been named and are unlikely to have been extracted extensively and are of lower economic value. The final recorded seam within the Hughes member

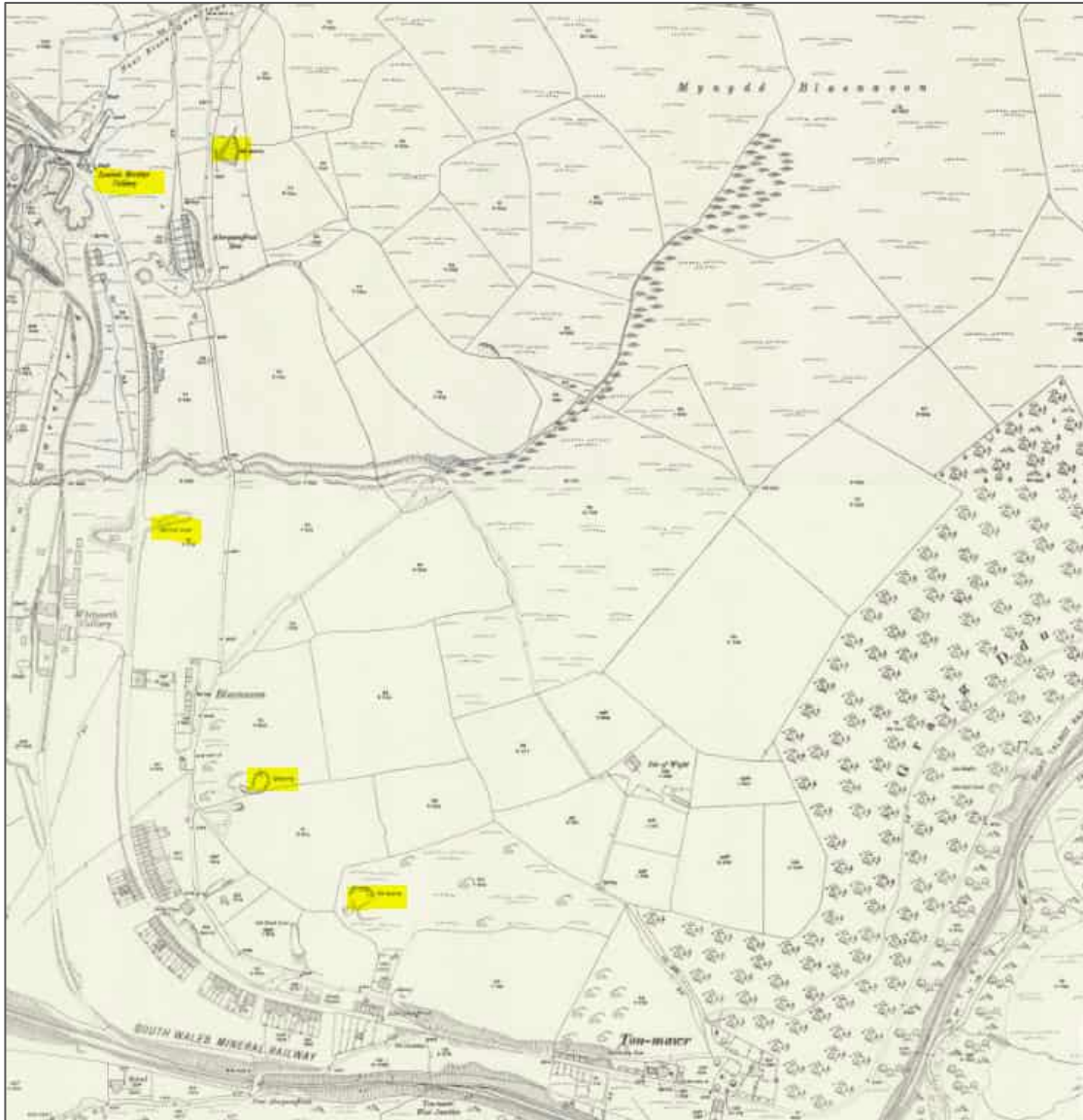
The overlying Swansea Beds are located above the Hughes member, with the transition represented by the Graigola Vein coal, recorded as a clean coal of approximately 1.6m thickness, interbedded with massive sandstones.

The MFD site area has a number of economic coal seams present, (from the Whitworth Colliery to the north and the Mercantile Colliery to the southwest), including workings, air shafts and trial levels present below the site. Several old mine shafts and collieries are indicated on the historical maps in the surrounding area, with the Whitworth Colliery located within the site boundary and the Mercantile Colliery to the southwest of the site (not on the site itself) are located within the site boundary. A number of shafts are located to the southeast of the site. This is consistent with workings immediately below the Site and surrounding the Site. The site is therefore considered to be underlain by worked coal measures across its entire area. Figure 2-2 and Figure 2-3 below provide an indication of the location and extent of the mining activity (OS 1st Edition 1888) on and adjacent to each area of the Site.

The map is a detailed topographic representation of the Ffynnon-ddu area in North Wales. It features a network of roads, railways, and waterways. The Mynydd Eforch and Mynydd Canol are prominent features, with various 'Old Trial Lods' and 'Old Quarries' marked. The map includes numerous place names, such as Ffynnon-ddu, Mynydd Eforch, Mynydd Canol, and various 'Old Trial Lods' and 'Old Quarries'. The map also shows the 'Ffynnon-ddu Wood' and 'Ffynnon-ddu Wood'.

SLR 

Figure 2-3: MB OS1888 Map Extract



From historical maps it's evident the mineral extraction is predominately located from mine entries at the valley base and lower sides, with no mining activity identified within the upper plateau areas of the Site.

Given the prevalence of mining within the local area, there are several information sources regarding the conjectured coal seams recorded beneath the Site. Information regarding the coal seams and the relevant information source is outlined in Table 2-1.

Table 2-1: Coal Seam Succession and Information Sources (youngest to oldest)

Mining Memoir	BGS Recorded Seams (West and East Area)	Coal Authority (Section 2.3)
Graigola	Graigola	-
Westernmoor	Westernmoor - Hendre Careg	-
Mountain	Mountain - Daren-DDU	Daren DDU

Mining Memoir	BGS Recorded Seams (West and East Area)	Coal Authority (Section 2.3)
Garlant	-	-
Wenallt Rider	-	Hughes Rider
Wenallt	Wenallt - Bettws Four-Feet	Hughes
Glyngwilym	Glyngwilym	-
Brithdir Rider	Brithdir Rider - Dirty	-
Brithdir	Brithdir - Craig Uchaf	-

As outlined above, there are numerous overlapping seams within the named seam succession. However, given the extensive written information provided within mining memoir², the succession highlighted above is considered most accurate for the Site and surrounding area.

2.3 Coal Mining Report

A Coal Mining Report was reviewed (*CA Report Reference 51003323333001*) as part of the assessment (Appendix A) with the mining plan provided as Appendix B. Key sections of the mining report are summarised below.

2.3.1 Mining Activity and Geology

Past Underground Mining

There are 33 records of past underground mining, comprising 30 beneath the Site. These workings beneath the Site comprise 8 workings of the Daren DDU seam (Mountain Seam), 15 of the Hughes Seam (Wenallt Seam), 5 workings of the Hughes Rider Seam (Wenallt Rider Seam) and a single unnamed coal. These have each been worked from an unnamed colliery with the exception of a single recording of the Hughes Seam (Wenallt Seam) from the Garth Tonmawr Colliery in 1956.

Probable Underground Mining

The property is not considered to have probable unrecorded shallow workings (<30m depth).

Mine Entries

A total of 60 mine entries are recorded within 100m of the site boundary, predominately relating to adits with minor shafts, with 7 recorded to have been treated.

Outcrops

There are 25 recorded outcrops beneath the Site, comprising the Daren DDU (Mountain Seam), Hughes (Wenallt seam), Glyngwilym and an unnamed seam. SLR consider the unnamed seam to coincide with the Westernmoor Seam.

Opencast Mines

None recorded within 500m of the enquiry boundary.

Mine Gas

None recorded within 500m of the enquiry boundary.

Remediated Sites

There are three remediated sites within close proximity to the Site, however none are located within the Site itself.

Future

The property is not in an area where the Coal Authority has received an application for, and is currently considering whether to grant, a licence to remove or work coal by underground methods.

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

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

2.4 Mine History Summary

There is extensive evidence of historical coal extraction within the site boundary and the surrounding area. The historical mining activity is concentrated within the lower valley sides and base, utilising the topography to advance adits into a number of economic seams. There are three recorded worked seams at shallow depth beneath the Site, excluding the number of seams worked beyond 100m, and these include the Glyngwilym Seam, Wenallt Seam and Mountain Seam, based on the mining memoir² naming convention. These three seams appear to have economic value, however, have been predominately worked via unnamed collieries indicating smaller scale developments.

The high number of recorded mine entries (60) indicates the extensive nature of mineral extraction within the surrounding area, however when correlating with historical maps a number appear to be “trial levels” or small quarries, indicating these have been worked at smaller scale, on the valleys sides. There appears no evidence of workings on the valley tops or plateaus. The elevation contrast from the lower valleys sides and base is between 100m and 150m to the valley tops, with mineral extraction likely focused on the valley sides.

Based on the publicly available data and Coal Authority report, there is clear evidence of shallow workings beneath the Site which require further assessment in context with the wider development to determine the potential risks from mining.

3.0 Coal Mining Risk Assessment

For the purposes of this mining risk assessment all available sources including Coal Authority reports and publicly available information has been assessed and assigned a relative degree of risk to highlight potential areas of concern based on identified features and potential future actions.

3.1.1 Risk Assessment

Table 3-1 presents the framework used to complete the assessment.

Table 3-1: Risk Assessment Framework

Risk Status	Action
No Risk	Identified feature(s) not considered to pose any risk to proposed development. No further action required.
Low Risk	Identified feature(s) are unlikely to pose a risk to any future proposed development although further action may be required, such as intrusive site investigation.
Medium Risk	Identified feature(s) may present a risk to any future proposed development and further actions are likely to be required including, but not limited to, intrusive site investigation and potentially ground improvement works.
High Risk	Identified feature(s) present a risk to any future proposed development and further actions are required including, but not limited to, intrusive site investigation and potentially ground improvement works.

Generally, where mining is identified at less than 20m (approximately) from surface, this should be considered as a high risk for any future potential development. If the mining has taken place between 20-30m from surface a medium risk and in excess of 30m from surface a low risk.

Depth to workings is not the only factor to consider. The type of coal mining technique used, the amount and type of rock cover, the geological setting and dip of the coal strata are all significant factors which must also be considered. Finally, the most important consideration is the type of proposed end use, which will dictate the risk associated with historical mine workings. This assessment is based on the proposed development of a wind and solar farm comprising six turbines, new access roads and upgrading of existing roads, solar panels, switch control buildings and ancillary works to during the construction phase. The majority of the Site will remain undeveloped, retained as farmland and open country. Based on the extent of the development area, the assessment will focus on specific areas of potential concern in cognisance of the proposed end use, as outlined below.

3.1.2 Turbines and Associated Infrastructure

There are six proposed turbine locations, with associated infrastructure proposed comprising crane pads, hardstanding areas, solar panels, turning areas and HGV access areas. These elements are located in close proximity to each turbine location, with each position located within the upland plateau areas of the site at elevations ranging from 285maOD (Turbine 2 in MB) to 335maOD (Turbine 3 in MFD). The shallowest known workings beneath the upland areas are the of the Mountain Seam, occurring and intermittently worked at depths between 245maOD in the west to 260maOD in the east of MB, and at depths between 275maOD in the west and 290maOD in the east of MFD. When correlating these proven seam depths with each turbine locations, the Mountain Seam at its shallowest occurs at approximately 40m beneath Turbine 2. Based on these anticipated depths, these are considered to pose a low risk to the proposed turbine and associated infrastructure developments.

3.1.3 Switchgear Buildings and Temporary Construction Compound

There are two proposed switchgear buildings and temporary construction compounds, with one located within each area of the Site. The proposed building and compound within MFD is located centrally between Turbine 6 and Turbine 4, with the same risk profile described above relevant (low risk).

The proposed building and compound within MB is located on the hillside location, and is immediately down topographic gradient from the proven outcrop of the Mountain Seam. Despite the proximity of the seam, there is no evidence of any recorded mine entries locally. The underlying Wenallt Seam has been worked locally, via two adits at the base of the hillside, with the nearest located approximately 260m east at 180m aOD. The adits are orientated in the direction of the proposed building, however accounting for the topographic gradient and general flat lying seam, the workings should they continue beneath the proposed building (235m aOD) are likely in excess of 50m depth and are considered to pose a low risk.

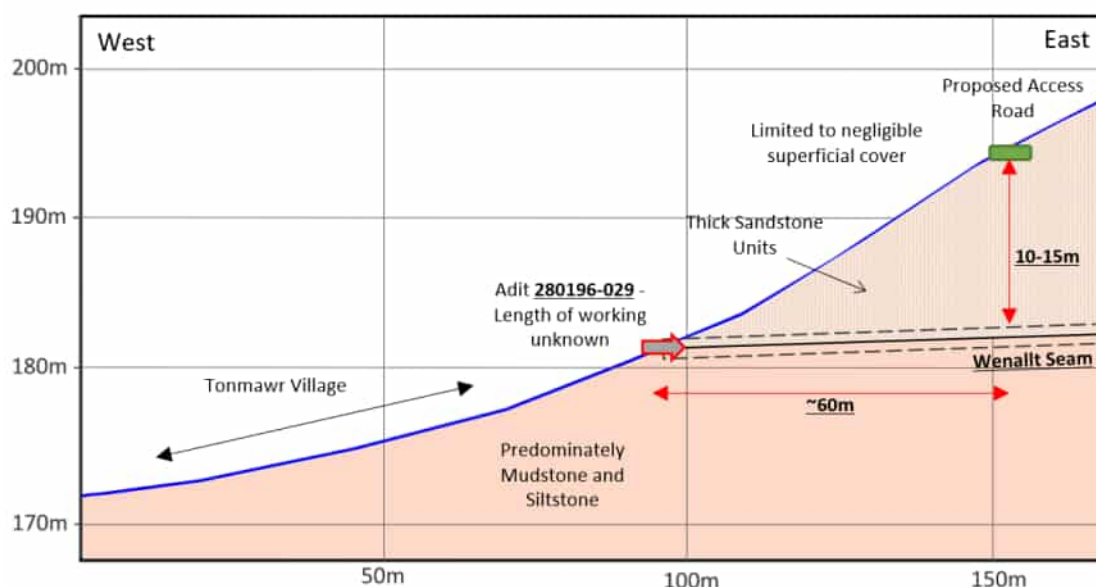
3.1.4 Access Road – New and Existing

There are extensive recorded workings across the development area, however based on the topography these are predominately located within the lower valley and valley base areas of the site and have limited interaction with the proposed development. The exception is in regard to the proposed new, and usage of existing access roads, to connect the proposed turbine locations with the public highways at the valley base. Where possible, access roads will utilise the existing road network such as in the south and southeast of MB and southwest of MFD.

When comparing the Coal Authority, mine entry data and geological mapping data, there are two areas where the access roads are located immediately above workings, which are diagrammatically presented in sections B and C below, and in Drawing 03.

Section B outlines, summarised in Figure 3-1, a proposed new access road in the southwest area of MB and the recorded position of a mine entry (adit – 280196-029), with workings of the Wenallt Seam. The adit entrance is laterally 60m to the southwest of the proposed road, with the elevation of 181m aOD underlying the proposed road at approximately 195m aOD. In the event the adit persists beneath the proposed road, the anticipated rockhead would be at approximately 12m, however the precise rockhead thickness could vary to between 10m and 15m accounting for accuracy of records. The Wenallt Seam is reported as of 0.7m in thickness, recorded as mined to between 1.4m to 1.8m thick.

Figure 3-1: Section B – MB

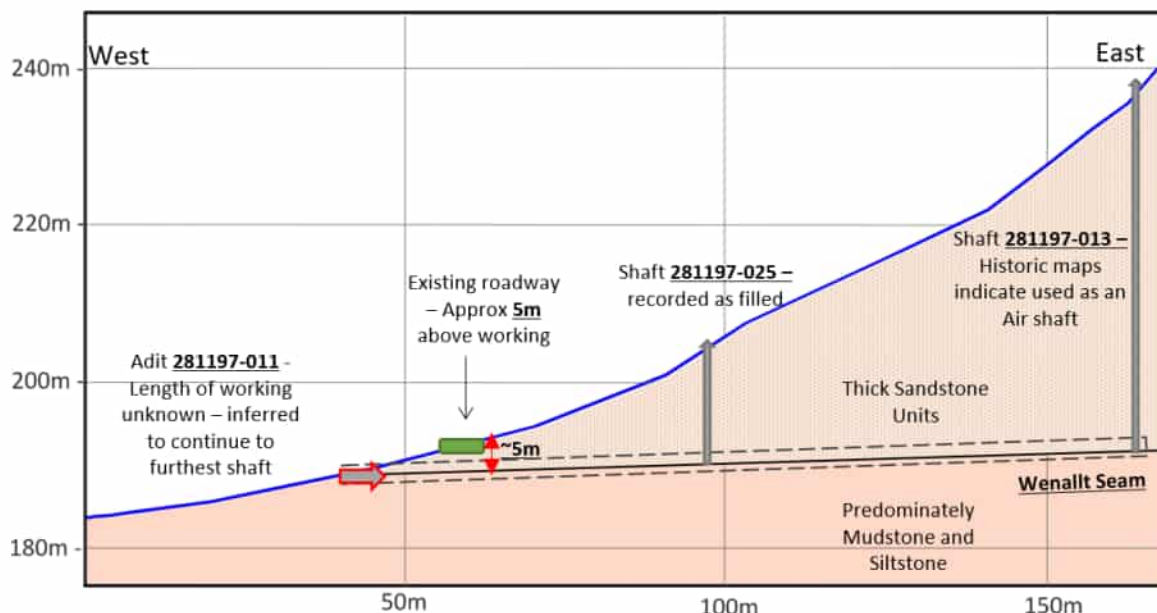


As outlined on Section B, should the adit extend beneath the proposed roadway there are potential stability risks associated with void migration with a rock to void ratio of less than 1:10m. Despite this, the presence of thick sandstone units overlying any working would mitigate the potential for void migration.

Section C relates to an area of existing road access in the southwest of MFD. The existing road comprises a single tarmac carriageway providing access to Fforch-Dwm farm from the village of Tomnawr to the west. When correlated with the coal authority mine entry records, there is a single adit (281197-011) orientated towards the road located approximately 15m to the west, down topographic gradient. The positioning of two mine entries, recorded as shafts including one air shaft, up topographic gradient indicates the continuation of the working of the Wenallt Seam via the adit beneath the road at shallow depths. The two shafts are located from 35m laterally to the east of the adit.

As outlined below in Figure 3-2, the road is likely to be undermined at shallow depths and with no records of treatment of the working. The narrow thickness of rock between the void and working is considered high risk. The condition and nature of the working is unknown and would require further assessment in context of anticipated future loadings likely to occur on the access road.

Figure 3-2: Section C - MFD



3.1.5 Risks to the Development from Unrecorded Workings

Whilst much of the recorded workings are located at depths and distances from proposed development unlikely to pose a risk, there are a number of shallow seams present not recorded by the coal authority. These comprise minor coals, predominately located above the Mountain Seam, mainly the Westernmoor Seam. As outlined within Drawing 03, the uppermost seam recorded by the BGS within the western area of MFD is likely to extend at shallow depths beneath the upland area and also occur at shallow depths within MB area. Despite this, the BGS do not record the Westernmoor Seam as present within MB, however this is known to occur at the boundary between Hughes sandstone members and the above mudstone and siltstone units. There is potential for this seam to occur at depths of <10m beneath the proposed Turbine 1 location, and if worked may pose potential stability risk.

Despite this, there is no evidence from the Coal Authority, historical maps or LIDAR imagery to suggest disturbed ground within this area, indicating that the risk posed by unrecorded workings to be low. The remaining turbine and buildings are located beneath any potential localised occurrence of the Westernmoor Seam.

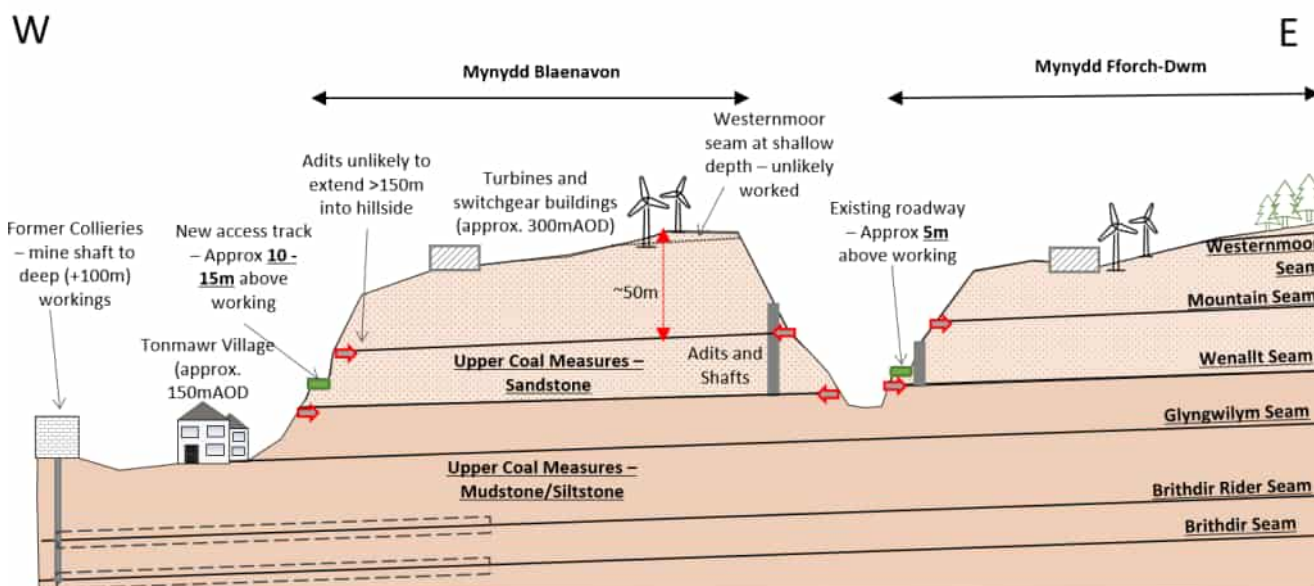
3.1.6 Risk Assessment Summary

There is extensive evidence of mining activities beneath the Site, however these occur at locations and elevations unlikely to affect the proposed infrastructure, with the exception of two areas of access roads where the current proposed development occurs in close proximity with the mining features. The two localities, demonstrated in Figure 3-1 and Figure 3-2, and positioned within Drawing 03, are considered to be high risk and require further assessment prior to construction to confirm stability risks and determine the requirement for potential treatment measures.

Whilst the potential for unrecorded workings, comprising unrecorded mine entries and shallow workings, cannot be ruled out, there is sufficient information to consider the risks to be low in relation to unrecorded workings. Should these occur, they are likely at a depth not to affect the development. Potential unrecorded workings beneath Turbine 1 are considered unlikely, however would occur at shallow depths if present and may pose potential stability risks.

Figure 3-3 presents a schematic summary of the mining assessment, outlined below.

Figure 3-3: Summary Schematic Cross Section



3.2 Mine Gas Assessment

The Site is partially located within a DHRA, classified by the Coal Authority. Therefore, when evaluating the potential risks, liabilities and costs associated with coal mining features, best practice is to consider site conditions using the principles of linkage between sources, pathways and receptors.

Hazardous ground gases may be present from the mine entries recorded adjacent to the Site and underlying mine workings that are present beneath the Site. Migration may occur via permeable made ground, superficial deposits or preferential pathways present at the Site. Receptors of hazardous gases include on-site human health and future buildings.

3.2.1 Risk Assessment

Potential ground gas sources associated with historical underground mining are present beneath the Site. However, the likelihood of a pathway to the proposed development is low based on information provided by the Coal Authority and summarised below:

- Recorded workings are present beneath the Site. However, these occur in excess of 40m below ground level beneath proposed buildings or potential confined spaces.
- There is no record of mine gas emission requiring action as outlined within the Coal Authority Mining Report (Appendix A).

Additionally, the proposed development comprises an unoccupied substation and turbines. Whilst foundations may extend into the underlying coal measures, these are unlikely to interact with the recorded seams and therefore there will be no preferential migration pathway to surface for potential mine gas.

The recorded coal workings are not considered to pose mine gas risks to the proposed development due to the depth of the workings beneath the Site and the absence of receptors at surface.

Based on the information above, risks associated with mine gas are likely to be low.

4.0 Summary and Conclusions

This coal mining risk assessment for a renewable energy development, comprising six wind turbines, solar farm, switchgear buildings, access roads and associated infrastructure concludes that, based on the available information reviewed, the Site is likely to be minerally stable with respect to the proposed development, however several areas requiring further assessment are present.

There are numerous recorded coal seams, intermittently worked, beneath the proposed turbines, buildings and associated infrastructure, however these occur at depths unlikely to potentially be of impact, and therefore the recorded workings are considered to pose a low risk to the development.

The proposed roadways, which traverse the valley sides to connect the proposed development to the existing road networks are, at certain locations, in close proximity to the recorded shallow workings and associated mine entries. At two locations, one located in the southwest of MB and in the southwest of MFD, a proposed access road and existing public highway road respectively, there is strong evidence that workings are located at shallow depths below ground level with insufficient bedrock cover to mitigate potential for void migration, based on the current level of information for the Site. Mining in these two areas is considered to pose a high risk to the development and requires further assessment prior to construction.

Potential risks associated with unrecorded workings, or workings of seams that are not anticipated to have been worked extensively across the wider area, are low. However, there is potential for a shallow seam to be present beneath proposed Turbine 1, and if worked may pose potential ground stability risks.

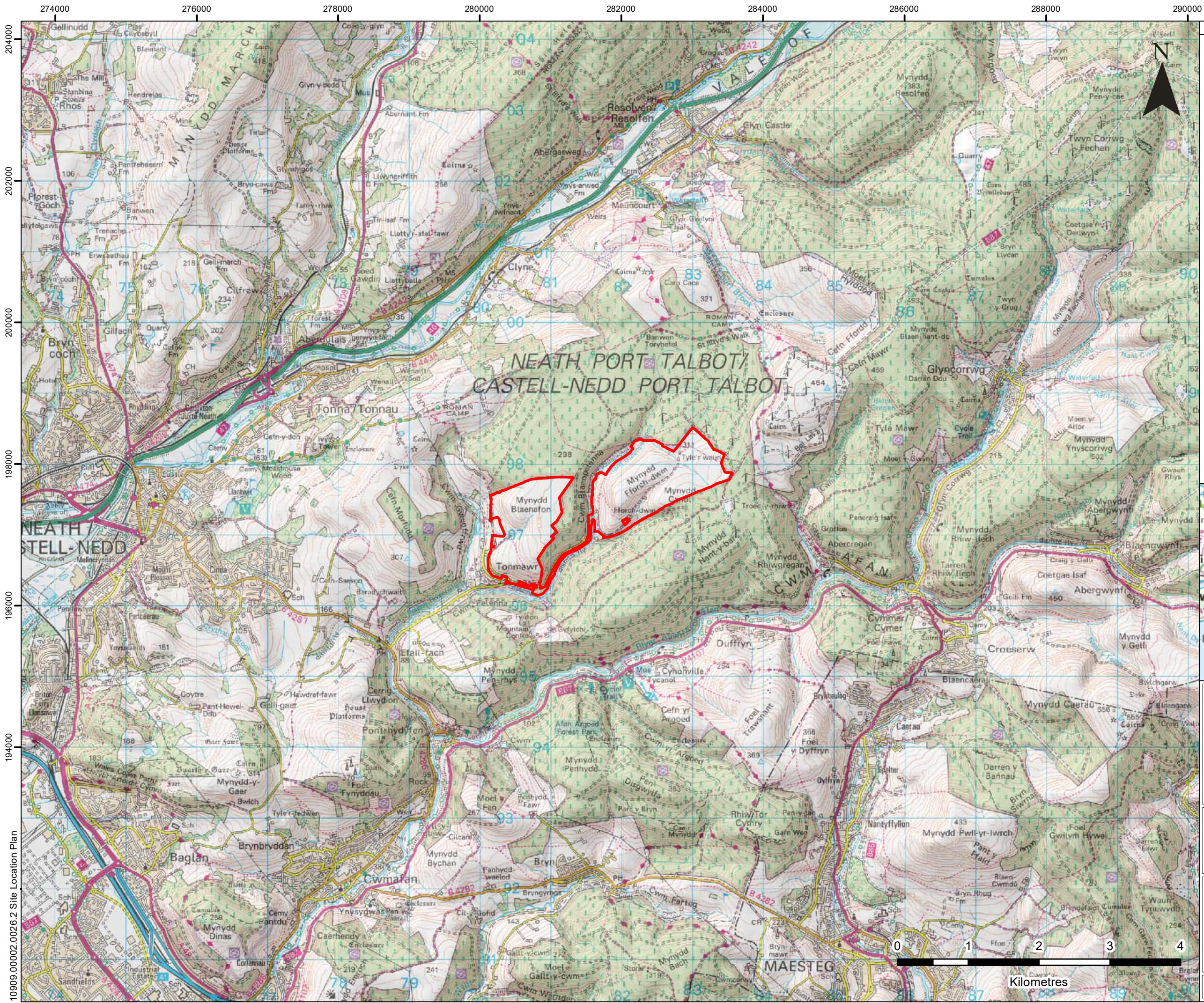
There is no record of a mine gas emission requiring action within the boundary of the property according to the Coal Authority. SLR considers the risk associated with mine gas to be low.

Based on the information reviewed, SLR considers that there is no requirement for an extensive mineral investigation as the risks to the wider development are low, outwith the high risk areas outlined above. In cognisance that a ground investigation in support of design phase of the development will be undertaken, SLR recommends the following supplementary steps are completed:

- Boreholes proposed beneath the proposed turbine locations are to be completed conscious of potential unrecorded workings and the likely permitting requirements of the Coal Authority, in particular for Turbine 1, where boreholes should be advanced to at least 10m into rock to confirm the absence or presence of workings.
- Proposed new access road in the southwest of MB should be investigated by boreholes to determine the depth and extent of mining beneath the road. Further assessment will be required to determine if any outstanding risks to the access road are present.
- The proposed use of the existing access road in the southwest of MFB should be structurally assessed, the adit further assessed and potentially investigated to determine if any potential risks are present by the anticipated loadings as part of the development. There is potential for mine treatment requirements associated with the adit should the proposed usage of the existing road be retained.

Furthermore, whilst the available information indicates the risks in relation to workings and mine entries to be low across the wider site, the risks associated cannot be completely discounted. Therefore, it is recommended that given the extent of mining locally, a watching brief is undertaken during groundworks to identify any potential ground stability issues, unrecorded mine entries or unanticipated ground conditions.

DRAWINGS



LEGEND

Site Boundary

4/5 LOCHSIDE VIEW
EDINBURGH PARK
EDINBURGH
EH12 9DH
T: +44 (0)131 335 6830
www.slrconsulting.com

MYNYDD FFORCH DWM

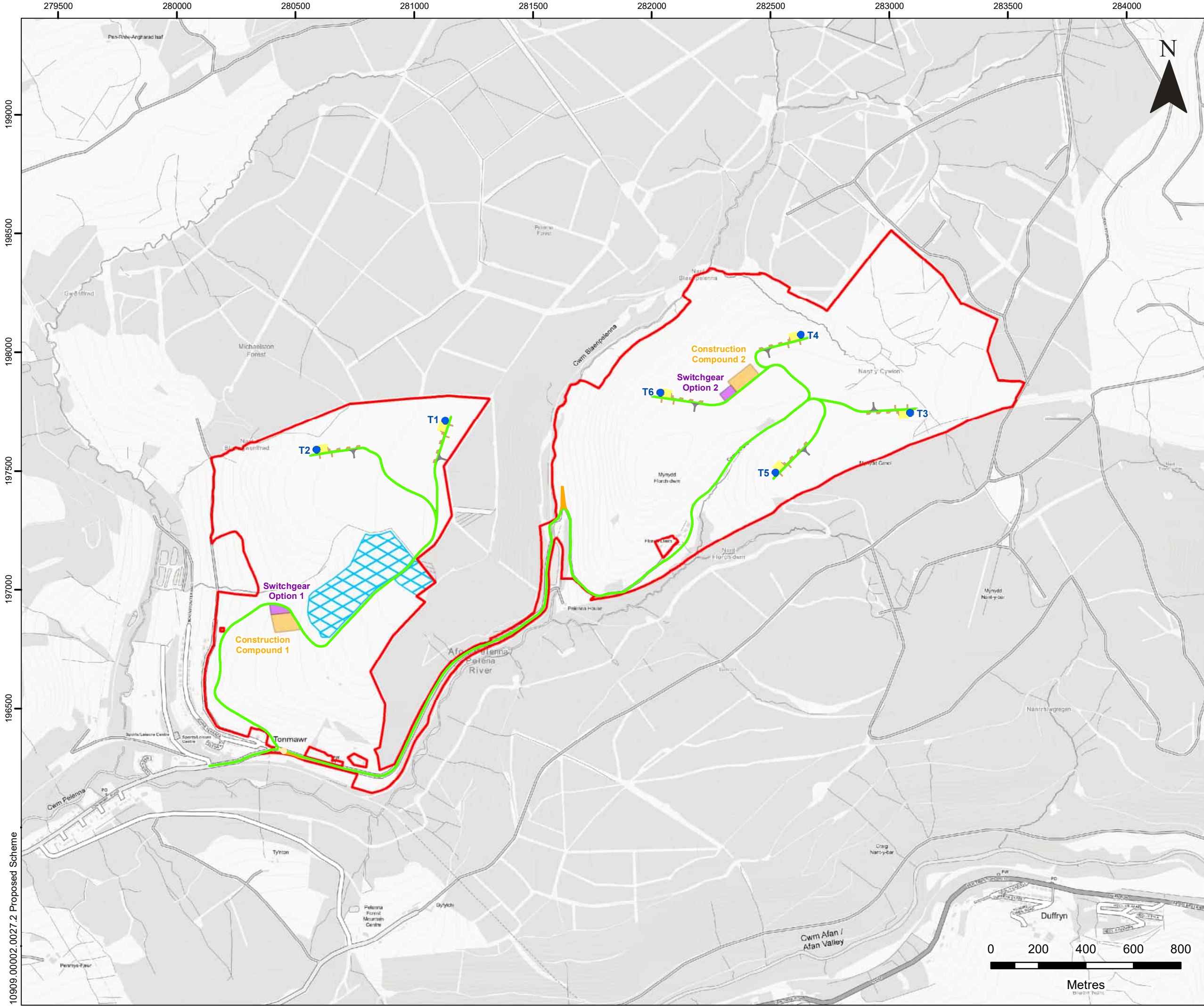
MINING ASSESSMENT

SITE LOCATION

01

Scale 1:50,000 @ A3

Date JUNE 2023



LEGEND

Proposed Turbine Location

Site Boundary

Potential Solar Development Area

Proposed Switchgear Building Location

Temporary Construction Compound

Proposed Access

Proposed Crane Pad

Proposed Hardstanding Area

Proposed Turning Head

Proposed Switchback Location

Proposed Standard HGV Turning Area



4/5 LOCHSIDE VIEW
EDINBURGH PARK
EDINBURGH
EH12 9DH

T: +44 (0)131 335 6830
www.slrconsulting.com

MYNYDD FFORCH DWM

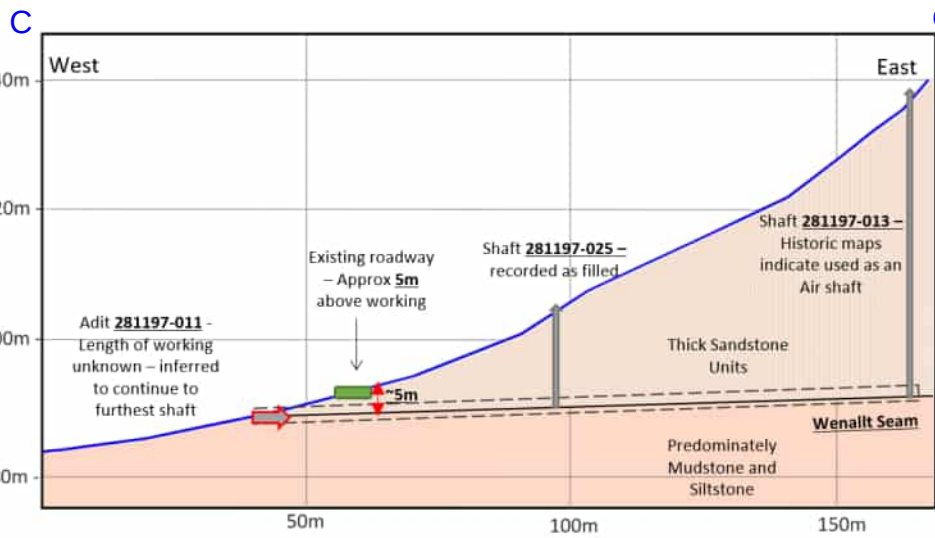
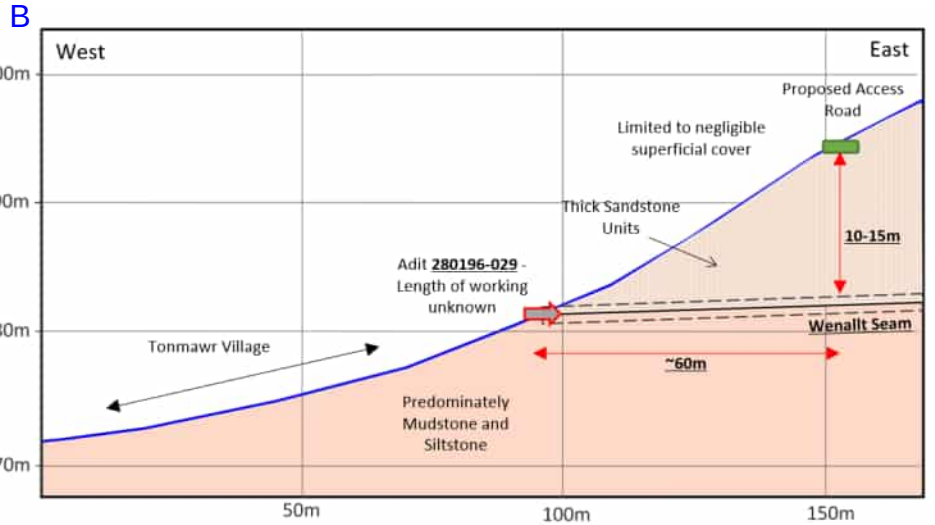
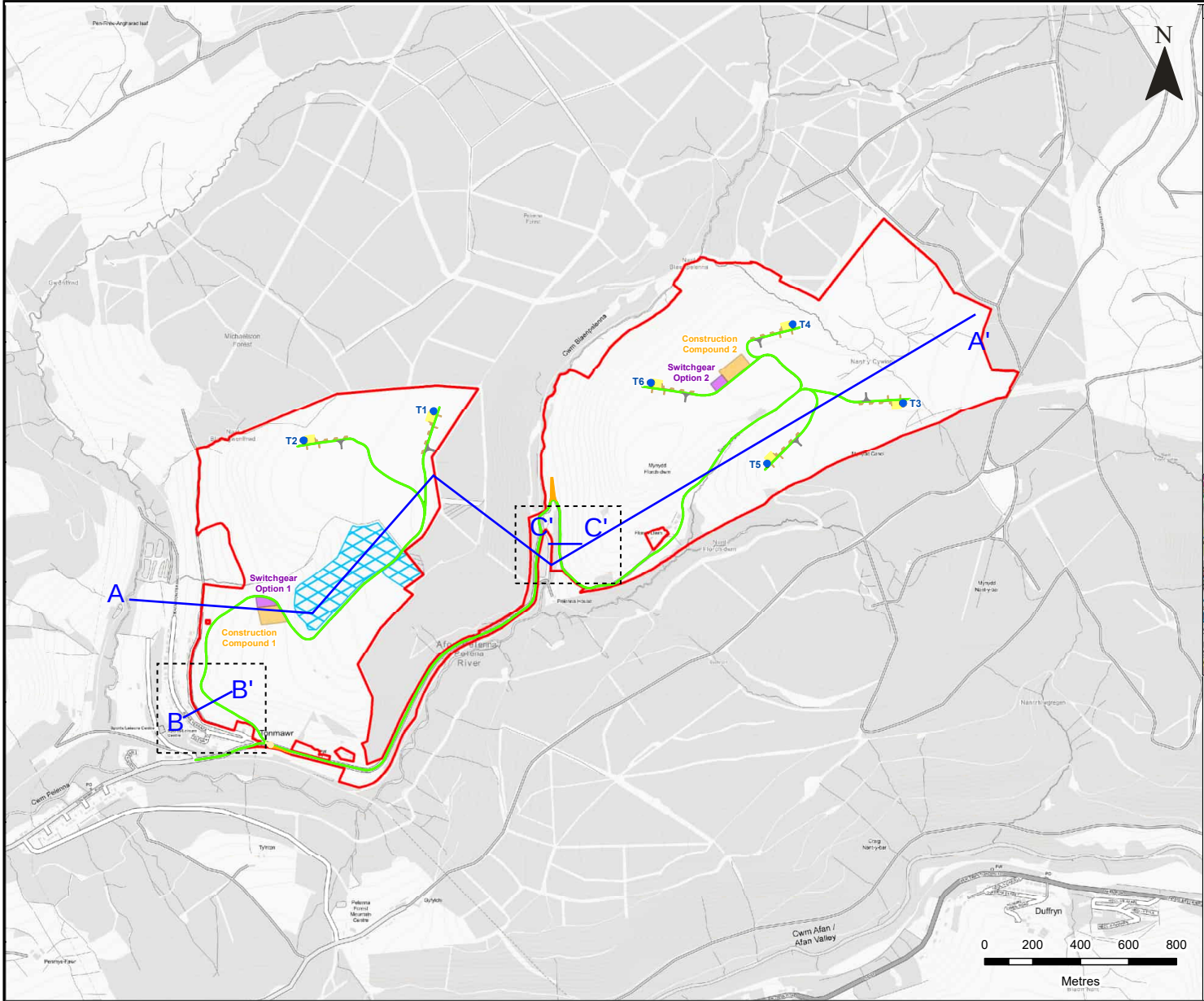
MINING ASSESSMENT

PROPOSED SCHEME

02

Scale1:15,000 @ A3

DateJUNE 2023



- LEGEND
- Proposed Turbine Location
 - Site Boundary
 - Potential Solar Development Area
 - Proposed Switchgear Building Location
 - Temporary Construction Compound
 - Proposed Access
 - Proposed Crane Pad
 - Proposed Hardstanding Area
 - Proposed Turning Head
 - Proposed Switchback Location
 - Proposed Standard HGV Turning Area



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MINING ASSESSMENT
PROPOSED SCHEME AND MINING PLAN
03

Scale 1:15,000 @ A3 Date JUNE 2023

10909.00002.0027.2 Proposed Scheme

APPENDIX A

Coal Authority Mining Report



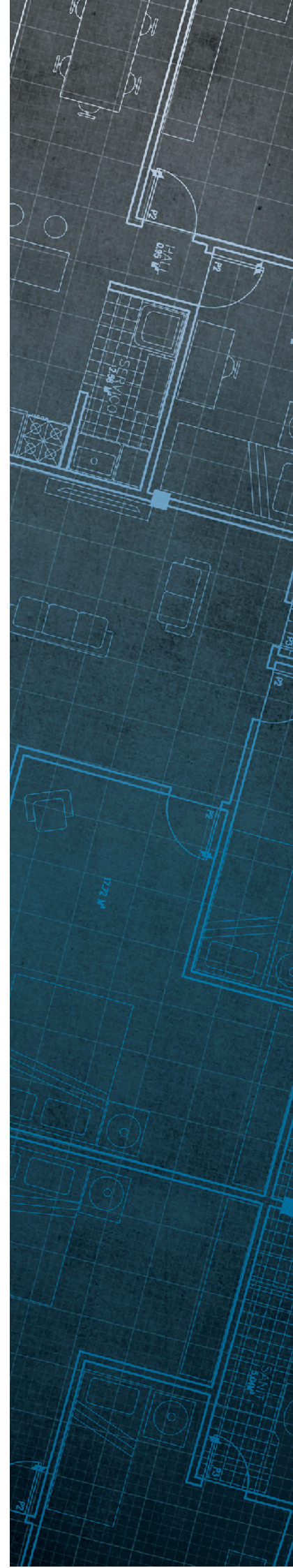
The Coal
Authority

Consultants Coal Mining Report

Site Located At 281990,197690
Neath Port Talbot

Date of enquiry:	26 April 2023
Date enquiry received:	26 April 2023
Issue date:	26 April 2023

Our reference:	51003351793001
Your reference:	310446565_1



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

NLIS Hub

Enquiry address

Site Located At 281990,197690
Neath Port Talbot

How to contact us

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

200 Lichfield Lane
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Nottinghamshire
NG18 4RG

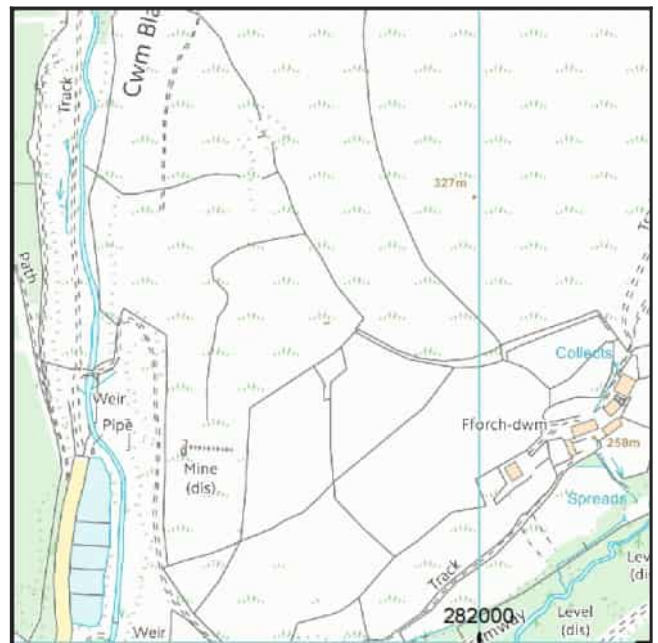
www.groundstability.com

 @coalauthority

 /company/the-coal-authority

 /thecoalauthority

 /thecoalauthority



Approximate position of property



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Section 1 – Mining activity and geology

Past underground mining

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	DARREN DDU	Coal	4F2Q	22	Beneath Property	4.6	North-West	140	1922
unnamed	DARREN DDU	Coal	4F2S	23	Beneath Property	7.8	North-East	120	1929
unnamed	DARREN DDU	Coal	4F35	25	Beneath Property	0.9	North	140	1918
unnamed	DARREN DDU	Coal	4H4V	31	Beneath Property	2.2	North-West	100	1924
unnamed	DARREN DDU	Coal	4FCC	33	Beneath Property	1.8	North-West	100	1926
unnamed	HUGHES	Coal	4F2Y	41	Beneath Property	1.7	North-West	170	1908
unnamed	HUGHES	Coal	4F2N	45	Beneath Property	2.0	North	125	1939
unnamed	DARREN DDU	Coal	4F2R	56	Beneath Property	2.8	North	140	1957
unnamed	DARREN DDU	Coal	4F2I	59	Beneath Property	5.9	North-West	100	1926
unnamed	UNNAMED	Coal	4F2T	60	Beneath Property	3.9	North	140	1900
unnamed	HUGHES	Coal	4F2Z	67	Beneath Property	1.7	North	170	1927
unnamed	HUGHES	Coal	4F2U	71	Beneath Property	4.1	North-West	170	1941
unnamed	HUGHES	Coal	4F38	74	Beneath Property	0.7	North-West	170	1938
unnamed	HUGHES	Coal	4FCG	79	Beneath Property	7.8	North-West	170	1940
GARTH TONMAWR	HUGHES	Coal	4H4Y	85	Beneath Property	2.3	North-West	170	1956
unnamed	HUGHES	Coal	4F2V	86	Beneath Property	3.4	North	170	1897
unnamed	HUGHES	Coal	4H4W	88	Beneath Property	0.0	East	170	1952
unnamed	HUGHES	Coal	4F2N	88	Beneath Property	3.6	North	180	1939
unnamed	HUGHES	Coal	4H4X	122	Beneath Property	4.9	North	170	1964
unnamed	HUGHES	Coal	4FCF	122	Beneath Property	8.0	North-West	170	1940
unnamed	HUGHES	Coal	4F2K	127	Beneath Property	2.1	North-West	180	1928
unnamed	HUGHES RIDER	Coal	4FCK	129	Beneath Property	4.4	North-West	140	1925

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	HUGHES	Coal	4F2X	129	Beneath Property	4.2	North	170	1901
unnamed	HUGHES	Coal	4FCH	129	South-East	16.0	North	175	1938
unnamed	HUGHES	Coal	4F2W	133	Beneath Property	4.1	North	170	1890
unnamed	HUGHES	Coal	4FCD	136	Beneath Property	4.1	North-West	170	1948
unnamed	HUGHES RIDER	Coal	4H4S	145	Beneath Property	3.1	North	60	1955
unnamed	HUGHES RIDER	Coal	4FCL	147	Beneath Property	5.3	North-West	140	1925
unnamed	HUGHES RIDER	Coal	4FCM	150	Beneath Property	6.5	North	150	1899
unnamed	HUGHES	Coal	4FCE	155	Beneath Property	2.0	South-West	170	1953
unnamed	HUGHES RIDER	Coal	4FCN	155	Beneath Property	4.7	North	117	1896
unnamed	NO.2 RHONDDA	Coal	4F2P	453	South-East	5.0	North-West	70	1922
unnamed	NO.2 RHONDDA	Coal	4FCA	582	South-East	10.2	North	100	1925

Probable unrecorded shallow workings

None.

Spine roadways at shallow depth

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

Mine entries

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Adit	280196-014	280735 196346		Coal	
Adit	280196-015	280191 196623		Coal	
Adit	280196-016	280069 196939	Cleaned sealed off and drained to nearby watercourse by West Glamorgan County Council (LA.17) See also SWA/MS/32/2	Coal	
Adit	280196-022	280690 196372		Coal	
Adit	280196-023	280944 196446		Coal	
Adit	280196-024	280945 196695		Coal	
Adit	280196-025	280951 196705		Coal	
Adit	280196-027	280138 196876		Coal	
Adit	280196-029	280143 196501		Coal	
Adit	280196-030	280233 196436		Coal	
Adit	280196-032	280724 196431		Coal	
Adit	280196-033	280754 196423		Coal	
Adit	280197-005	280245 197536		Coal	
Adit	280197-006	280275 197596		Coal	
Adit	280197-007	280269 197598		Coal	
Shaft	280197-023	280088 197558		Coal	
Shaft	280197-024	280135 197434	This shaft has been capped at some time in the past. There are no details on the date or construction of the cap.	Coal	
Shaft	280197-032	280219 197255		Coal	
Adit	281196-010	281391 196868		Coal	
Shaft	281196-012	281052 196623	This shaft has been filled with 32 tonnes of clean stone, mounded at surface and provided with a 5m x 5m permanent fence to the perimeter.	Coal	
Adit	281196-013	281081 196596		Coal	
Shaft	281196-020	281044 196638		Coal	
Shaft	281196-021	281388 196893		Coal	

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Adit	281196-028	281409 196882	Collapse sealed with large stone rammed into entrance and backfilled with imported stone by IMCL in February 1997	Coal	
Adit	281196-031	281336 196824		Coal	
Adit	281197-008	281574 197878		Coal	
Adit	281197-009	281457 197514		Coal	
Adit	281197-010	281521 197042		Coal	
Adit	281197-011	281644 197216		Coal	
Adit	281197-012	281605 197271	This adit was filled with hardcore with brick wall in 1967 There are no details on the construction of the wall.	Coal	
Shaft	281197-013	281745 197205		Coal	
Adit	281197-014	281764 197537		Coal	
Adit	281197-015	281876 197608		Coal	
Adit	281197-016	281888 197614		Coal	
Adit	281197-017	281888 197649		Coal	
Adit	281197-018	281760 197852		Coal	
Adit	281197-019	281788 197870		Coal	
Adit	281197-020	281863 197975		Coal	
Shaft	281197-025	281686 197204	This shaft has been filled at some time in the past. There are no details on the material or date of filling.	Coal	
Adit	281197-026	281454 197462		Coal	
Adit	281197-027	281462 197611		Coal	
Adit	281197-028	281461 197634		Coal	
Adit	281197-029	281456 197653		Coal	
Adit	281197-030	281549 197843		Coal	
Adit	281197-031	281555 197864		Coal	
Shaft	281197-033	281441 197129		Coal	
Adit	281197-034	281440 197251		Coal	
Adit	281197-035	281486 197682		Coal	
Adit	281198-001	281705 198007		Coal	

Entry type	Reference	Grid reference	Treatment description	Mineral	Conveyancing details
Shaft	281198-002	281920 198178	This shaft was filled in March 1977. There are no details on the fill material used.	Coal	
Adit	281198-003	281920 198150		Coal	
Adit	281198-004	281984 198073		Coal	
Shaft	281198-005	281907 198186		Coal	
Adit	281198-006	281970 198054		Coal	
Adit	282196-001	282069 196982		Coal	
Adit	282197-001	282141 197039		Coal	
Adit	282197-002	282195 197120		Coal	
Adit	282198-009	282140 198176		Coal	
Adit	282198-010	282108 198160		Coal	
Adit	282198-011	282043 198229		Coal	
Shaft	282198-012	282133 198185		Coal	

Abandoned mine plan catalogue numbers

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

8205	SW443	7590
9716	9013	9812
6502	10635	R10971

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
DARREN DDU	Coal	Yes	Within	N/A	39
DARREN DDU	Coal	Yes	Within	N/A	43
DARREN DDU	Coal	Yes	Within	N/A	45
DARREN DDU	Coal	Yes	Within	N/A	71
DARREN DDU	Coal	Yes	Within	N/A	77
DARREN DDU	Coal	Yes	Within	N/A	88
DARREN DDU	Coal	Yes	Within	N/A	97
DARREN DDU	Coal	Yes	Within	N/A	118
DARREN DDU	Coal	Yes	Within	N/A	227
DARREN DDU	Coal	Yes	Within	N/A	235
DARREN DDU	Coal	Yes	Within	N/A	318
GLYNGWILLYN	Coal	Yes	Within	N/A	66
GLYNGWILLYN	Coal	Yes	Within	N/A	101
HUGHES	Coal	Yes	Within	N/A	29
HUGHES	Coal	Yes	Within	N/A	76
HUGHES	Coal	Yes	Within	N/A	102
HUGHES	Coal	Yes	15.3	West	156
HUGHES	Coal	Yes	Within	N/A	180
HUGHES	Coal	Yes	Within	N/A	223
HUGHES	Coal	Yes	Within	N/A	258
UNNAMED	Coal	No	Within	N/A	79
UNNAMED	Coal	Yes	Within	N/A	82
UNNAMED	Coal	Yes	Within	N/A	96
UNNAMED	Coal	No	Within	N/A	171
UNNAMED	Coal	No	Within	N/A	178
UNNAMED	Coal	No	Within	N/A	212

Geological faults, fissures and breaklines

Please refer to the 'Summary of findings' map (on separate sheet) for details of any geological faults, fissures or breaklines either within or intersecting the enquiry boundary.

Faults under or close to the property recorded.

Opencast mines

None recorded within 500 metres of the enquiry boundary.

Coal Authority managed tips

None recorded within 500 metres of the enquiry boundary.

Section 2 – Investigative or remedial activity

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

Site investigations

None recorded within 50 metres of the enquiry boundary.

Remediated sites

Distance to site remediation (m)	Direction
25.1	South-East
12.3	North-West
15.8	North-West

See Section 4 for further information.

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

Distance to scheme (m)	Direction
37.4	West
294.9	West
Within	N/A

See Section 4 for further information.

Section 3 – Licensing and future mining activity

Future underground mining

None recorded.

Coal mining licensing

Status	Licence type	Distance (m)	Direction
Future	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 1949 and 1953.

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.

Future development

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

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

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.

Remediated sites

The site is within an area of previous interest. It is close to where the Coal Authority has investigated and where necessary remediated mine entries and/or shallow coal mine workings following specific reported hazards.

The site requires further investigation and may influence your risk assessment. We recommend that you order the Coal Authority **Surface Hazards Incident Report**, which will include more information about the hazard.

Mine water treatment schemes

The enquiry boundary is within 500 metres of where the Coal Authority has previously investigated and where necessary remediated the effects of mine water flooding or mitigated potential contamination.

The site requires further investigation and may influence your risk assessment.

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

Mine water treatment schemes

Locations where the Coal Authority has constructed or operates assets that remove pollutants from mine water prior to the treated mine water being discharged into the receiving water body.

These schemes are part of the UK's strategy to meet the requirements of the Water Framework Directive. Schemes fall into 2 basic categories: Remedial – mitigating the impact of existing pollution or Preventative – preventing a future pollution incident.

Mine water treatment schemes generally consist of one or more primary settlement lagoons and one or more reed beds for secondary treatment. A small number are more specialised process treatment plants.

Future underground mining

Details of all planned underground mining relative to the enquiry boundary. Only those future workings where the enquiry boundary is within 0.7 times the depth of the workings (zone of likely physical influence) allowing for seam inclination will be included.

Coal mining licensing

Details of all licenses issued by the Coal Authority either within or within 200 metres of the enquiry boundary in relation to the under taking of surface coal mining, underground coal mining or underground coal gasification.

Court orders

Orders in respect of the working of coal under the Mines (Working Facilities and Support) Acts of 1923 and 1966 or any statutory modification or amendment thereof.

Section 46 notices

Notice of proposals relating to underground coal mining operations that have been given under section 46 of the Coal Mining Subsidence Act 1991.

Withdrawal of support notices

Published notices of entitlement to withdraw support and the date of the notice. Details of any revocation notice withdrawing the entitlement to withdraw support given under Section 41 of the Coal Industry Act 1994.

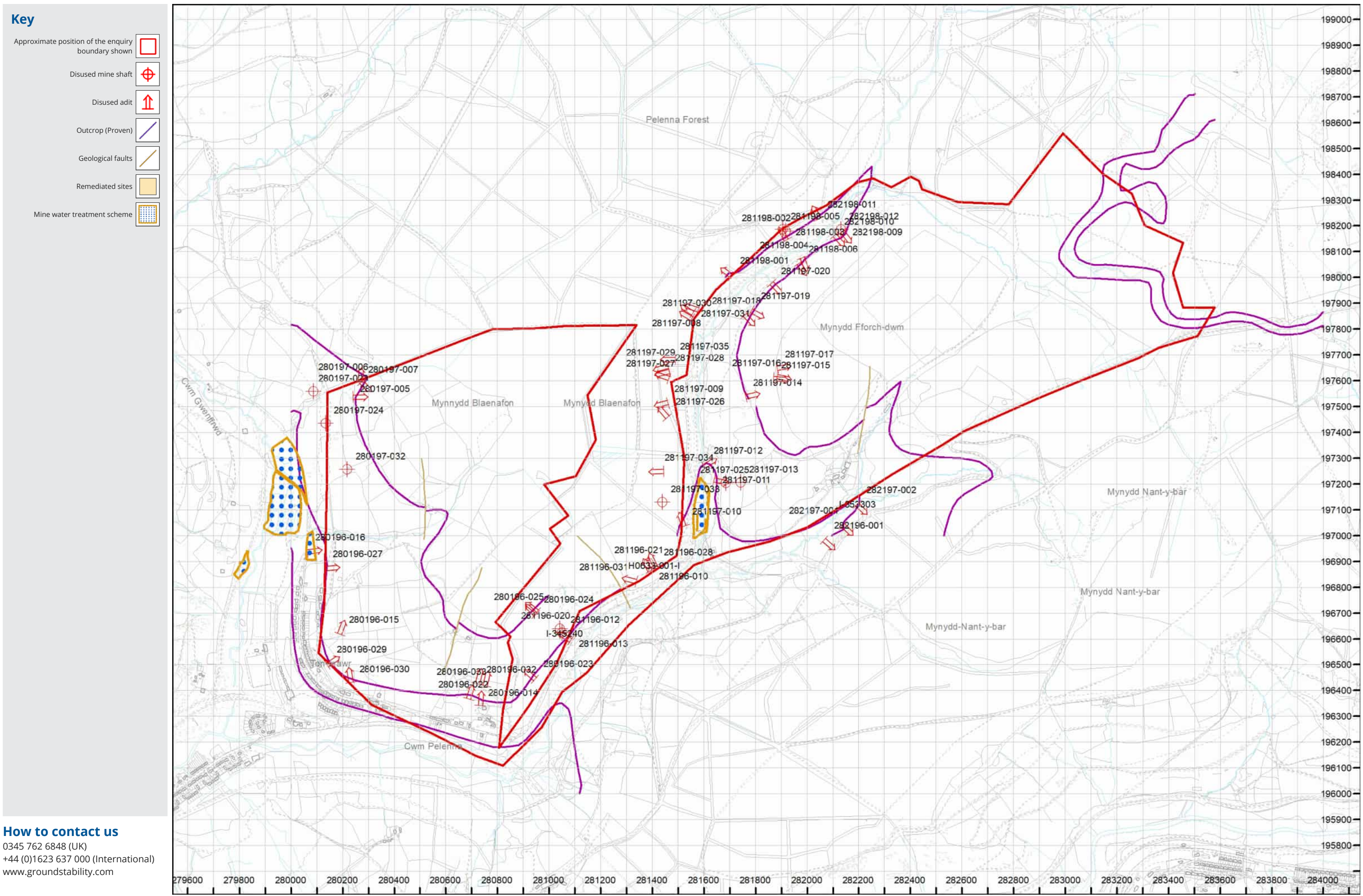
Payment to owners of former copyhold land

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

APPENDIX B

Coal Authority Mining Plan

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



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