



Merthyr Tydfil County Borough Council

INCLINE TOP

Coal Mining Risk Assessment





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1 INTRODUCTION

1.1 AUTHORISATION AND SCOPE

Merthyr Tydfil County Borough Council have commissioned WSP UK Ltd (WSP) to provide geotechnical services to assess the coal mining risk to a proposed development of two residential properties on an approximate 0.3-acre plot of land at Incline Top, Merthyr Tydfil, CF47 0TJ.

The Site is designated as *Development High Risk Areas* by the Coal Authority (CA). As such, the Local Planning Authority require a Coal Mining Risk Assessment (CMRA) to be prepared and submitted to support the planning application. The Local Planning Authority shall submit the CMRA to the CA for their comment and approval.

This CMRA has been prepared by WSP to provide an assessment of coal mining information and any potential impacts on ground stability associated with the development scheme.

1.2 LIMITATIONS

WSP has prepared this report for the sole use of the Client in accordance with generally accepted consulting practices and for the intended purposes as stated in the agreement under which this work was completed. This report may not be relied upon by any other party without the explicit written agreement of WSP. No other third-party warranty, expressed or implied, is made as to the professional advice included in this report. This report must be used in its entirety. Information provided by others has been taken in good faith as being accurate. WSP cannot accept liability for any deficiencies in third party information.

1.3 SITE LOCATION AND DESCRIPTION

Incline Top, referred to as the 'Site', is located approximately 1km east of Merthyr Tydfil; see Figure 1-1 [1]. The Site is centred around a National Grid Reference (NGR) of 305960 206905.



Figure 1-1 - Site location.

The Site is situated in a residential area north of the A4102 road and west of Goat Mill Road and, is approximately 150m southeast of Parc Tir Newydd. The Site can be accessed off Goat Mill Road and currently comprises of undeveloped land covered with semi-mature trees and shrubs.

With reference to OS Maps Online [2], the topography of the Site increases from approximately 270m AOD (Above Ordinance Datum) in the northwest of site to approximately 276m AOD in the southeast.

1.4 DESCRIPTION AND LAYOUT OF PROPOSED DEVELOPMENT

With reference to the proposed site plan (MPA-WSP-XX-00-DR-A-061 001), produced by Percy Thomas Architects and included within Appendix A, the residential development comprises two four-bedroom, detached houses with offroad parking and gardens. A retaining wall is proposed between both properties.

1.5 SCOPE OF THE COAL MINING RISK ASSESSMENT

The purpose of this Coal Mining Risk Assessment Report is to:

- Review the information within the CA Consultants Coal Mining Report to identify and assess the risks to the proposed development from the legacy of coal mining, including the cumulative impact of issues.
- Review publicly available information to assist in the assessment of coal mining risk on Site, such as geological and historical maps.
- Set out appropriate mitigation measures to address the coal mining legacy issues affecting the Site, including any necessary remedial works and/or demonstrate how coal mining issues may influence the proposed development.
- Demonstrate to the Local Planning Authority that the application Site is, or can be made, safe and stable to meet the requirements of national planning policy regarding development on potentially unstable land.

2 SOURCES OF INFORMATION

The following sources of information have been used in the preparation of this report:

- Google Earth Pro [1].
- OS Maps Online [2].
- Coal Authority Consultants Coal Mining Report, included in Appendix C.
- Mine Abandonment Plan, reference 16532, included in Appendix C.
- 1:50,000 scale bedrock and bedrock & superficial geological map of Swansea (Sheet 231), 1979 [3].
- 1:10,560 scale solid and drift geological map (sheet SO00NE), 1972 [3].
- British Geological Survey (BGS) Geoindex [4].
- BGS Online Lexicon [5].
- Coal Authority online map viewer [6].
- Geology of the South Wales Coalfield, Part V, the country around Merthyr Tydfil. Memoir for 1:50 000 geological sheet 231 (England and Wales), W. J. Barclay, K. Taylor and L. P. Thomas, 1988 [7].
- Merthyr Tydfil County Borough Council, Planning Simple Search [8].

2.1 PUBLISHED GEOLOGY

Based on the available information, the following geological sequence is anticipated at the site.

2.1.1 MADE GROUND

The geological maps suggest Made Ground consisting of spoil from coal and iron workings is present in the area surrounding the Site [3]. However, there is a small area at Incline Top where Made Ground is absent and the BGS Geoindex suggests most of the Site is in the area where Made Ground is absent. However, the western region of the Site may encroach into the area of Made Ground [4].

2.1.2 SUPERFICIAL GEOLOGY

According to published geological maps Devensian Till is shown overlying the solid geology [3] [4]. Typically, this material typically comprises of a firm to very stiff, gravelly, sandy Clay.

2.1.3 SOLID GEOLOGY

The South Wales Lower Coal Measures Formation of Carboniferous age is present at beneath the Site, mantled by superficial and Made Ground materials [3] [4]. According to BGS Lexicon the Carboniferous Age strata comprise coal-bearing mudstones and siltstones with seatearths and minor sandstone [5].

2.1.3.1 Structure

Figure 2-1 shows extracts of the 1:10,560 SO00NE geological map [3]. The strata are indicated to dip 6° towards the southeast.

Inferred on the geological maps is the northwest to southeast trending Dowlais Fault, with the downthrown side towards the southwest. This is the closest mapped fault to Site and is approximately 600m to the northeast.

2.1.3.2 Coal Seams

The nearest inferred outcropping coal seam shown on sheet SO00NE is the Gellideg and is approximately 250m northwest of Site. Sheet SO00NE suggests the seam thickness is 1.2m to 1.5m. Approximately 200m towards the southwest of site, the geological map notes that the Gellideg seam was encountered at 231.6m AOD (Above Ordinance Datum). It is anticipated that this seam may be within 30m to 40m beneath Site [3].

According to the Geology of the South Wales Coalfield memoir [7]: *“In the Taff Valley around Merthyr Tydfil the Gellideg is the lowest of three closely spaced coals (the upper two forming the standard Five-Feet), which make up a composite seam, known formerly as the Lower Four-Feet”*.

The Gellideg seam underlies the Five Feet Seam, which has a recorded thickness of 1.4m.

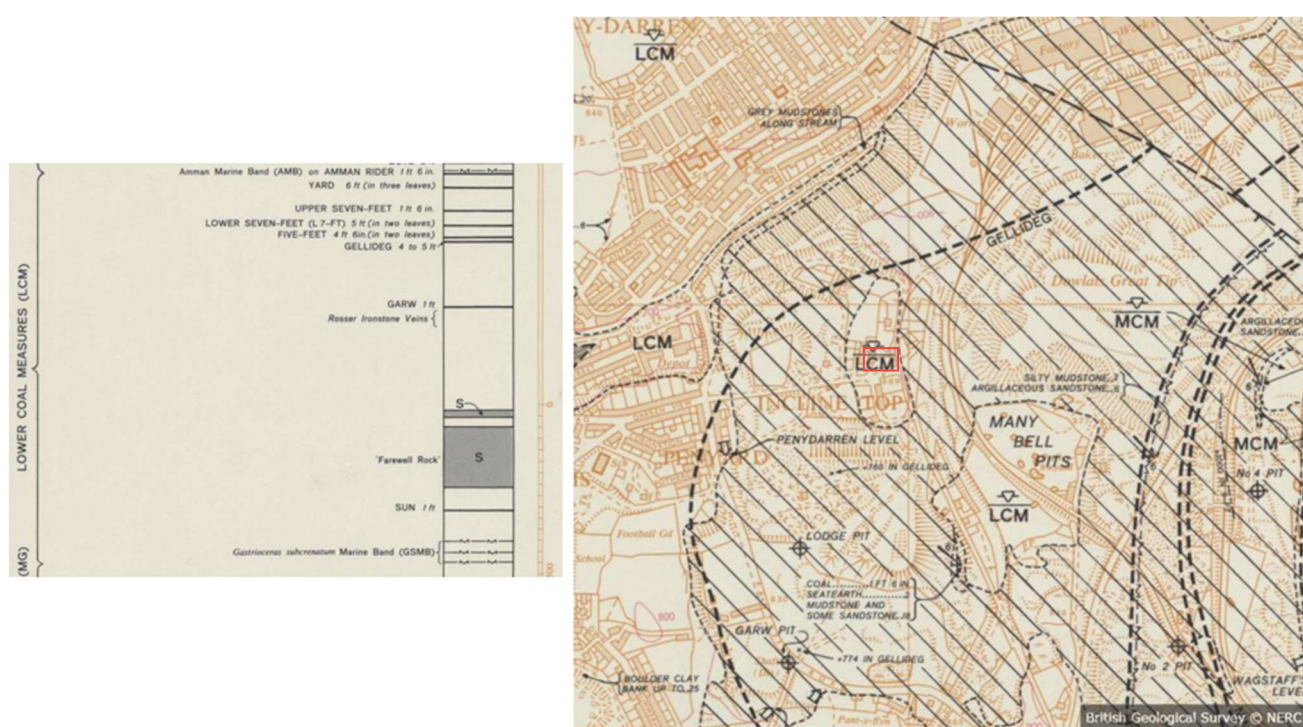


Figure 2-1 – Extracts from 1:10,560 SO00NE geological map showing the approximate Site location (red boundary) and the coal sequence.

The Lower Seven Feet crop is shown approximately 750m south of Site on the 1:10,560 geological map with an approximate north/south strike which continues southwards.

No mine entries are shown on site, however there are three adits between 200m and 600m southwest of site.

Two abandoned mine shafts, identified as Lodge Pit and Garw Pit, are located approximately 200m and 500m respectively to the southwest of site.

Various earthworks and tips associated with the industrial history of the area around the site are recorded. These features include direction:

- Dowlais Great Tip, east and northeast of Site, with its western boundary located within 100m to site.
- Many Bell Pits are shown at least 100m southeast of site.
- The boundary of workings southeast of the Pen Y Darren Level, north and northeast of Lodge Pit are indicated within 100m southwest of Site.
- The boundary of workings west and northwest are shown within 100m.
- Numerous railway embankments and cuttings.

2.2 BGS HISTORICAL BOREHOLE LOGS

A review of the BGS historical exploratory hole records has not identified any available borehole records on or close to site [4].

2.3 HISTORICAL LAND USE

Historical maps were obtained to identify former site usage; they are provided within Appendix B. A summary of the site history and surrounding land use from 1875 - 2000 is shown in Table 2-1.

Table 2-1 – Summary of Historical Land Use.

Date (Map Scale)	Within the enquiry boundary	Surrounding the enquiry boundary
1875 (1:528)	A row of terraced residential properties, aligned north/south, is situated along the eastern extent of the site. Most of the remaining area on site appears to comprise of garden space for the terraced residential properties.	Within 100m to the enquiry boundary: - Immediately towards the south and east, the site is bound by unnamed railways. - Another railway line is noted further east, beyond the county boundary line. - Beyond the southern railway line and the western boundary of site, terraced residential properties are shown. - Fields occupy the land outside the northern boundary and incorporate a small unknown structure. As outlined in Section 2.1.3.1, numerous cuttings and worked ground features surround site. This also extends beyond the 100m boundary.
1875 – 1882 (1:2,500)	No obvious changes.	The northwestern extent of the Pen Y Darren Iron Works is shown approximately 100m west of the site. There are no labelled mining features on or within 100m to site. Various mining features such as old shafts, air shafts, and levels are labelled within the area, some of which are disused. Pwll Y Hwyaidd is labelled, where Many Bell Pits are indicated on the 1:10,560 BGS map.
1900 (1:2,500)	No obvious changes.	Within 100m to the enquiry boundary: - The railway immediately east and south of site is no longer shown, though its footprint remains. - A railway, called the “G.W.R and Rhymney Joint Line” is shown east of the railway, on the eastern side of the county boundary, which separates Merthyr County from Caerphilly County. - A footpath is shown southwest of the southern terraced residential properties. - Pen Y Darren Iron Works is no longer labelled. Further away from site, Dowlais Steel Works Branch is shown southwest of the G.W.R and Rhymney Joint Line.
1919 (1:2,500)	No obvious changes.	The area where the Site is situated is labelled as “Incline Top”. The railway line to the east is identified as the Dowlais Railway.
1957	No obvious changes.	Within 100m to the enquiry boundary: West of site, a track is shown leading to Bradley Row behind the terraced residential properties and

Date (Map Scale)	Within the enquiry boundary	Surrounding the enquiry boundary
(1:1,250)		garden space. This track joins three tracks towards the southwest, which lead to unnamed structures. ▪ The railway west of the “G.W.R and Rhymney Joint Line” and east of the county boundary is no longer shown. ▪ New unnamed structures are shown east of the terraced residential properties south of the site. A structure called “The Bungalow” is also shown south of these terraced residential properties. ▪ Towards the west, northwest and northeast of site, further new unnamed structures are shown. ▪ Approximately 80m north of site a “ruin” structure is shown. ▪ Various Ponds are shown where Pwll Y Hwyaidd is labelled.
1972 – 1974 (1:1,250)	No obvious changes.	Within 100m of the site: ▪ Two new structures labelled “Oakdene” are shown within the land boundary north of the site boundary. ▪ An electricity Transmission line trends through the north to southeastern extent of the external 100m boundary. ▪ Two disused tips are shown southeast of the site. ▪ Beyond the terraced residential properties south of the site, and east of “The Bungalow”, new structures are shown and labelled “Kennels” and “Royvan”. ▪ Goat Mill Road is labelled in the location of the first railway east of the county boundary line. ▪ The G.W.R and Rhymney Joint Line is labelled as a dismantled railway. Greater than 100m beyond the site: ▪ Dowlais Great Tip is labelled east of site. ▪ Slag heaps are labelled south of Site. ▪ Two disused tips are shown southeast of the site. ▪ A clothing factory is shown north of Site.
1957 - 1989 (1:1,250) <i>Note: These changes are</i>	The row of terraced residential properties and gardens on site are no longer shown.	Within 100m of the site: ▪ South of site, the row of terraced residential properties is no longer shown. ▪ Neither are most of the terraced residential properties towards the west of site which appear to have been demolished and replaced with five new properties, which surround a cul-de-sac. The northern property of the furthest western row of terraced residential properties away from site remains.

Date (Map Scale)	Within the enquiry boundary	Surrounding the enquiry boundary
<i>likely to be from 1974.</i>		- West of the track that leads to Bradley Row, a disused tip is shown. The unnamed structures and the three tracks leading to them are no longer shown. - Immediately north of the site a property identified as Oakdene has been constructed. - Goat Mill Road has been constructed in approximate location of the former Dowlais Railway. Beyond 100m to the enquiry boundary two disused tips are shown west and northwest to site.
1993 (1:1,250)	No obvious changes, no redevelopment is shown within the site boundary.	Within 100m of the site: - Northwest and southwest of site, structures labelled Ty Llwyd and Highfield (which is situated on the previously labelled disused tip) are shown. - A track is shown along the immediate western boundary of site, where the railway was identified on the 1875 map. - Larger structures are shown towards the southern extent of the 100m external boundary. Greater than 100m outside the enquiry - Boundary a scrap yard is shown southeast of site.

2.3.1 AERIAL PHOTOGRAPHS

Google Earth Pro has been used to review the historical imagery of the site from 2001 to 2023 [1]. The aerial photography suggests that construction of four of residential properties, within 50m or more, towards the northeast of Site was underway in 2006. No other obvious changes have been identified.

2.4 ARCHAEOLOGICAL & HISTORICAL INVESTIGATIONS

WSP are not aware of any previous archaeological or historic investigations to Site.

2.5 NEARBY PLANNING APPLICATIONS

A review of nearby planning applications of the properties that surround Site has been undertaken [8]. Application P/13/0100 includes a Coal Mining Risk Assessment for the Site of the four residential properties, northeast of Site, closer to the Gellideg outcrop, where construction works were ongoing in 2006.

As part of this scheme a site investigation was undertaken in October 2004 which included the undertaking of four rotary percussive boreholes, which were drilled to depths of 20.5m bgl and 25.0m bgl. None of the boreholes encountered any soft drilling, coal, or voids. The report concluded that there was “little or no risk to the proposed dwelling from shallow mine workings and no further study is required”.

The Coal Authority Consultation Response dated 24 April 2013, implies that the applicant had obtained appropriate coal mining data to inform the proposed development and mining risk for the Site. In addition, the response states that coal mining issues are “not likely to be significant within the application site and are therefore not likely to pose a risk to the proposed development”.

2.6 UNEXPLODED ORDINANCE

The Zetica UXO Risk Map indicates that Site is located within an area of Low Bomb Risk [9].

2.7 DESIGNATED SITES & SENSITIVE LAND USES

According to Data Map Wales [10], no designations exist near the site.

3 COAL AUTHORITY RECORDS AND REPORTS

3.1 COAL AUTHORITY ONLINE DATABASE

With reference to the Coal Authority (CA) online interactive viewer [6], the Site falls within 'Development High Risk Areas'. This classification relates to the presence of known coal mining features. In addition to being situated in a development high risk area, the Site is also in an area of:

- Surface Coal Resource.
- Probable Shallow Coal Mine Workings.

The CA interactive map viewer suggests the site is bound by two coal outcrops, the Gellideg, not inferred, and another outcrop to the east of Site. Not shown on the geological maps, the outcrop with a CA reference of SW018I is shown in Figure 3-1 and is shown to be inferred where it passes the Site. The Lower Seven Feet crop is shown approximately 750m south of Site on the 1:10,560 geological map and shares a similar outline to SW018I on the CA interactive viewer in this area. With this considered it is possible that the SW018I crop is the Lower Seven Feet.

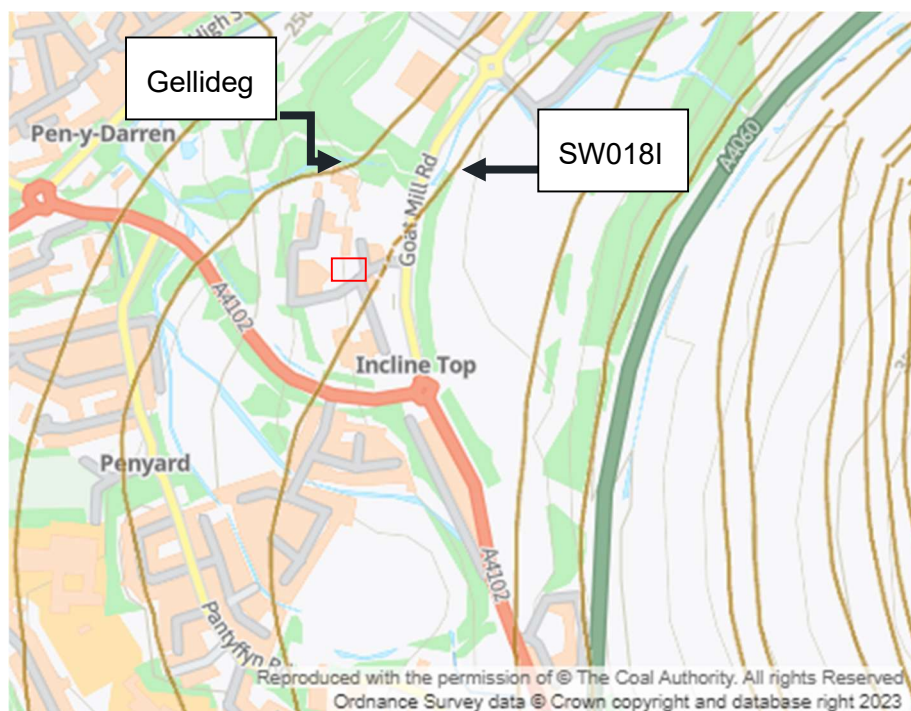


Figure 3-1 - Extract of the CA interactive viewer showing seam SW018I, passing east of the Site (red boundary).

Surrounding site, the CA interactive map viewer suggests the area has been subject to surface mining from unlicensed opencast works. Both features are shown to be very close to the southeast boundary of the Site.

Note: 'shallow coal mine workings' are defined to mean 'within 30m of ground level'.

3.2 COAL AUTHORITY CONSULTANTS COAL MINING REPORT

The Consultants Coal Mining Report in Appendix C, records mining activity on site. Probable unrecorded shallow workings are expected, and a spine roadway at shallow depth is recorded within Site. No direction to the spine roadway is provided.

The ‘*summary of findings*’ plan, also included in Appendix C, indicates that the site is bound by an unnamed, unlicensed opencast site. Great White Tip, another unlicensed opencast site is shown further west, sharing the footprint of Dowlais Tip on the BGS geological maps. A small area in the eastern part of the site crosses the boundary of the unnamed, unlicensed, opencast site.

Note: The enquiry boundary extends further east than the boundary presented on the figure provided in Appendix A.

Other points of note within the Coal Mining Report for this site are listed below:

- No past underground mining recorded.
- No mine entries are recorded within 100m of the enquiry boundary.
- No outcropping seams are noted within the enquiry boundary.
- No faults, fissures or break lines are recorded.
- No recorded Coal Authority tips within 500m of the enquiry boundary.
- No recorded site investigations within 50m of the enquiry boundary.
- No remediated sites recorded within 50m of the enquiry boundary.
- No record of subsidence within 50m of the site since October 1994.
- No records of mine gas within 500m of the enquiry boundary.
- No records of mine water treatment scheme within 500m of the enquiry boundary.
- No recorded future underground mining, coal mining licenses within 200m of the site boundary, court orders or Section 46 of the Coal Mining Subsidence Act 1991.
- The site is not in an area where a notice to withdraw support has been given under Section 41 of the Coal Industry Act 1994.
- The site is not in an area where a relevant notice has been published under the Coal Industry Act 1975 or Coal Industry Act 1994.

3.3 ABANDONMENT PLANS

Two abandonment plans were obtained which has some relevance Site, following a CA consultation. They are included in Appendix C and are referenced; SWR3608 and 16532.

3.3.1 ABANDONMENT PLAN SWR3608

This rationalised abandonment plan indicates workings within the Little Vein Seam, Lower Four Feet seam and Garw Seam from the Penydarren Brick & Coal Co’s. No issue date is provided, but it does predate to at least 1923 based off termination dates of workings.

The plan indicates an Old Level dated 22 September 1909 trending from northwest to southeast between the historic rows of residential terraced properties south and west of Site. The abandonment plans suggest this is the spine road beneath the Site, located towards the southwestern corner.

Southwest of the western row of terraced residential properties, an “arch” is labelled in the spine road which could suggests a reinforcing structure was implemented to support weaker, surrounding ground. Either side of the arch, spurs of workings are shown extending south from the spine road

away from the rows of terraced residential properties. The spurs are not shown to be terminated indicating that the plan may not show the full extent of the workings. The closest elevation levels shown on the plan are approximately 175m southwest of Site and suggest the Lower Four Feet seam is approximately at 230m AOD. No datum is indicated in workings associated with the spine road or the spine road itself.

With reference to the memoir above, the idealised vertical section shows the Lower Four Feet to comprise of 0.6m thick Fireclay, underlain by coal of 1.5m thickness. The Little Vein Seam (Seven Feet Seam) is shown to overly the Lower Four Feet seam and comprises 1.0m of coal. Workings in the Little Vein Seam are shown in the area south of the Site, however, as the Seven Feet Seam is recorded as sub-cropping to the east of the site it is unlikely that workings in this seam will impact the site. However, if the sub-crop has been mis-mapped it may impact the site at a shallow depth.

More features, such as faults and mine entries, are indicated on this abandonment plan, but they are considered unlikely to directly affect site.

3.3.2 PLAN 16532

This opencast completion plan at Incline Top was issued in 1994, and indicates coaling works commenced in 1992 and was completed in September 1993. The opencast shares the same boundary as the unnamed, unlicensed opencast site, shown on the 'summary of findings' map. The boundary shown on the abandonment plan encroaches the eastern boundary of the Site, though no opencast excavations are indicated in this area. The batter perimeter is shown at least 150m west of site, with opencast workings shown over 175m from site. Workings of the opencast mine is shown mostly west and southwest of Site. The lowest point of excavation is shown to be at a level of 226.3m AOD.

A vertical section taken at grid reference 305900E, 206700N; approximately 185m southwest of Site is shown. This is close to where the 1:10,560 SO00NE geological map, shows where the Gellideg seam was encountered at 231.6m AOD. This vertical section is up dip from the outcrop SW018I, understood to be the Lower Seven Feet, shown southeast of Site on the CA interactive map [6]. The abandonment plan indicated that within the Lower Four Feet Lower seam, now referred to as the Gellideg, were *old workings*, i.e., worked coal seams. The depth to the top of these *old workings* was 34.00m and as a result of the site being up dip of the section, it's likely that shallow workings will be present beneath Site, which is shown to be up-dip. Table 3-1 summarises the vertical section:

Table 3-1 - Summary of the vertical section with a grid reference of 305900E, 206700N.

Seam name	Depth to top of seam (m bgl)	Elevation of top of seam (m AOD)	Thickness (m)
Little Seam Rider	12.85	251.2	0.55
Little Seam Upper	30.13	16.73	0.77
Little Seam Lower	30.93	233.12	0.77
Lower Four Feet Upper (Standard Five Feet)	32.20	231.85	0.80

Seam name	Depth to top of seam (m bgl)	Elevation of top of seam (m AOD)	Thickness (m)
Lower Four Feet Middle (Standard Five Feet)	33.05	231.00	0.85
Lower Four Feet Lower (Gellideg)	34.00	230.05	1.40
Lower Four Feet Lower Leaf 2	35.45	228.60	0.15

The worked Lower Four Feet seams are very closely spaced, within 3.4m of each other, with a total coal extraction thickness of 3.2m, however, the *old workings* represented an extracted thickness of only 1.6m including a parting. No indication is provided as to why the Lower Four Feet Middle and Upper were not worked underground. It should be noted that the nomenclature of the seams and the sequence mapped in the section does not correlate with the published geology, the Little Seam Upper and Lower may not be possible to correlate with the known sequence in the district.

4 COAL MINING RISK ASSESSMENT

4.1 RECORDED COAL MINING AT SHALLOW DEPTH (<30M)

The mining records suggests a shallow spine roadway exists within the Site boundary. The location of the spine road is anticipated to intercept the southwestern boundary of Site based off the abandonment plans. This needs to be investigated to confirm its presence, depth, extraction thickness, to inform the risk to the development.

4.2 UNRECORDED COAL MINING AT SHALLOW DEPTH

The CA interactive map viewer indicates that the Site lies within a surface coal resource area. The CA also suggest on the interactive map viewer and mining report that there are probable unrecorded shallow workings. Based upon the open cast abandonment plan, as discussed in 3.3.2, worked coals seams are likely to be present within approximately 30m of the ground surface.

4.3 RECORDED COAL MINING AT GREATER DEPTH (>30M)

The CA have no record to suggest coal mining at greater depth, the Gellideg or Lower Four Feet Lower being the lowest seam generally worked in the Merthyr District. Ironstone veins are known to have been worked below the Gellideg, particularly to the north of the District, however, no evidence has been found to indicate that they have been worked beneath the Gellideg in the area of the site.

4.4 SURFACE MINING (OPENCAST WORKINGS)

The CA has record of past opencast coal mining activities within the enquiry boundary or 500m of the Site. The boundary of the opencast site shown on abandonment plan 16532 is contiguous with that of the eastern boundary of the site, however, based upon the abandonment plan no excavations were undertaken in the immediate vicinity of the site.

4.5 MINE ENTRIES

The CA does not record any mine entries within 100m to site.

4.6 GROUND MOVEMENTS DUE TO COAL MINING

The CA has no records of any damage due to geological faults, ground subsidence or other lines of weakness that have been caused by coal mining. The CA has not received a damage notice or claim for subsidence within 50 meters of the enquiry boundary since October 1994.

4.7 MINE GAS EMISSIONS

The CA has no record of past mine gas emissions requiring action and no mine gas has been recorded within 500m of the Site. However, due to the presence of probable shallow workings beneath the Site, there is potential for mine gases to migrate to the surface through fissures within the rock and superficial strata.

4.8 MINE WATER TREATMENT SCHEMES

No recorded mine water treatment within 500m of the Site boundary.

4.9 RECORDED COAL MINING SURFACE HAZARD

The mining report contains no records of remediated Sites, site investigations or subsidence. There are no recorded CA managed tips within 500m of the Site boundary.

4.10 SUMMARISED COAL MINING RISK

Given the data obtained by the coal authority and geological maps, the development to site is considered High risk. The assessed coal mining risk is summarised in Table 4-1. Appendix D shows a summary of development risk to Site due to anticipated and known historical coal mine activity.

Given the historical coal mining activity, the understanding relating to the presence, nature, and location of unknown/known workings within the plots may change as the project develops. As such, coal mining risk should be updated as and when further information becomes available throughout planning, design, and construction stages.

Table 4-1 - Coal Mining Risk Assessment Summary.

Coal Mining Issue	Comment
Recorded coal Mining	HIGH RISK – A spine road at shallow depth is recorded within the Site. Abandonment plan SWR3608 suggests its location is beneath the southwest corner.
Unrecorded coal mining	HIGH RISK - The CA believe that the Site is subject to past shallow mining, as evidence by the records of <i>old working</i> within the Gellideg in the opencast abandonment plan. The CA have no records of past underground mining at greater depths.
Surface mining (opencast workings)	MEDIUM RISK – Though the opencast boundary is contiguous with the eastern boundary of the site, no opencast excavations have been recorded in the area of the site. Unrecorded workings, however, cannot be discounted.
Mine entries (shafts/adits)	LOW RISK – No mine entries are recorded on Site or within 100m. Abandonment plan SWR3608 does suggest the presence of mine entries west of the Site. According to the CA these have been removed by open cast mining. The Site has a history of coal mining activity. The presence of unrecorded mine entries cannot be discounted and should be investigated.
Ground movement due to coal mining	LOW RISK - The CA has no record of damage due to geological faults or other lines of weakness.
Gas emissions	MODERATE RISK - The CA has no records of past mine gas emissions affecting the Site. Due to the potential for unrecorded shallow workings, there is a potential for mine gases migrating upwards to the surface and affecting enclosed structures within the proposed development. This should be investigated further.
Coal mining surface hazard	HIGH RISK – There is no record of treatment within the Site. No record of CA managed tips within 500m of the Site boundary. No further information has been published in the mining report.

5 MITIGATION STRATEGY PROPOSED

5.1 RISK FROM MINE WORKINGS

Records indicate a spine road at shallow depth beneath the Site. The CA believe the Site is within an area of probable unrecorded shallow workings, which is supported by the records within the opencast abandonment plan. Therefore, the presence of unrecorded shallow workings across Site cannot be discounted.

It should be noted that the current proposed development plan indicates the properties in the central part of the site, to the north of the suspected spine road.

It is recommended that an intrusive investigation by means of boreholes to 50m bgl is undertaken to investigate the spine road, shallow coal, unrecorded shallow mine workings and any other voids associated with underground workings in these areas. It may be possible to define the location of the spine road more accurately through the use of non-intrusive methods such as Geophysics, prior to investigating intrusively by the means of exploratory holes.

If encountered, shallow mine workings/voids with insufficient ground cover would likely require remediation as part of Site development enabling works. This may comprise local excavation and backfilling with engineered fill, where the voids are very shallow, stabilisation by grout injection or, the use of high strength geogrids as tension membranes to manage the impacts of any ground movement below less sensitive areas, such as the garden space.

5.2 RISK FROM MINE ENTRIES

No mine entries are recorded onsite. Given the complex mining history within the area, the presence of unrecorded mine entries cannot be fully discounted. Therefore, it is recommended that a watching brief is kept during topsoil strip and general Site enabling earthworks. If any unusual ground conditions or features are exposed, which may represent an unrecorded mine entry, additional assessment and investigation shall be undertaken.

If any mine entries within influencing distance of the development plots are proven, these may require stabilisation to the satisfaction of the CA prior to Site development. Depending on their location, a 'no build zone' for structures may be required around the zone of influence of a mine entry if remediation is not possible. It should be noted that an exclusion zone is likely to be required around treated openings.

5.3 RISK FROM MINE GAS EMISSIONS

There is a risk of mine gas emissions affecting the proposed development due to the presence of mine workings beneath the Site. A ground gas monitoring programme should be undertaken to monitor the presence and concentration of hazardous ground gases on the Site and to enable a gas risk assessment to be undertaken for the Site. The presence of hazardous ground gases on the Site may require the implementation of gas protection measures for proposed enclosed and occupied spaces.

5.4 COAL WITHIN INFLUENCING DEPTH OF FOUNDATIONS

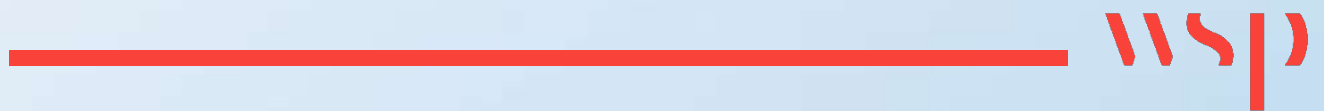
Due to its variable strength, coal is generally not an appropriate bearing stratum for foundations and, if found at foundation formation level, it should be removed locally such that foundations bear on competent strata below. It should be noted that coal may not be excavated with agreement with the CA and a royalty may be payable.

6 REFERENCES

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Appendix A

**PERCY THOMAS ARCHITECTS
DRAWING**





Rev

Description (By / Check'd / App'd)

Status

Pre-App Enquiry

Classification

non-classified

Client

Merthyr Tydfil Council

Project

Residential Development Proposals

Drawing

Incline Top

Site Plan - Proposed

Scale @ A2

1:200

Drawn

JA

Checked

RR

Approved

MT

Project No.

ED/001184

Date

11.04.23

Drawing Identifier

project

origin

zone

level

file type

rule

number

revision

MPA-WSP - XX - 00 - DR - A

061 001

P00

PERCY THOMAS ARCHITECTS

A WSP Company