Appendix 4B
Coal Mining Risk Assessment

November 2025

NGED

UPPER OGMORE GRID CONNECTION

Appendix 4B: Coal Mining Risk Assessment

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PUBLIC

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APPENDIX 4B

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WSP

Amber Court
William Armstrong Drive
Newcastle upon Tyne
NE4 7YQ

Phone: +44 191 226 2000

WSP.com

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Signature		
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CONTENTS

TABLES

FIGURES

APPENDICES

1 INTRODUCTION

1.1 AUTHORISATION AND SCOPE

Pennant Walters commissioned WSP UK Limited (WSP) to produce a Coal Mining Risk Assessment (CMRA) for the proposed construction of a National Grid connection of a combination of overhead and underground cables. The proposed route connection is shown indicatively within **Figure 4-1, Volume 2 of the EIA Report**.

This report provides a Coal Mining Risk Assessment (CMRA) of the land within the Project red line boundary, as indicated in **Figure 4-1, Volume 2 of the EIA Report.**

The proposed development is located in an area of historical coal mining activity and classified by the Mining Remediation Authority (MRA) as a '*Coal Mining Reporting Area'*.

This CMRA has been prepared with reference to the following guidance documents:

- The Mining Remediation Authority – '*Coal Mining Risk Assessment model report template and associated guidance notes'*, dated January 2017; and,
- CIRIA C758D – '*Abandoned mine workings manual'*.

1.2 LIMITATIONS

This report is addressed to and may be relied upon by the following parties:

- National Grid Electricity Distribution (NGED)

This report shall not be relied upon or transferred to any other or unnamed parties without the express written authorisation of WSP. No responsibility will be accepted where this report is used in its entirety or in part, by any other party.

This report summarises information provided from a number of external sources. WSP cannot offer any guarantees or warranties for the completeness or accuracy of information relied upon herein, which is taken in good faith as being accurate. WSP cannot accept liability for any deficiencies in third party information.

This report is specifically limited to an assessment of mining risks.

A copy of the notes and limitations are included as **Annex B**.

1.3 SITE LOCATION

The site location and approximate redline boundary are indicated in **Figure 4-1, Volume 2 of the EIA Report**, with pertinent site details summarised in **Table 1-1**.

Table 1-1 – Site details summary

Aspect	Details
National Grid Reference	Approximately SS841934 to SS914951 (length approximately 9km)
Current site use	The land is currently a series of agricultural fields on a hilly landscape adjacent to a road and a residential area.
Topography	Using topographic information from Google Earth, it was identified that the site and surrounding area varies highly in elevation. The elevation of the site ranges from 300mAOD in the southwest to 175mAOD in the centre of the site and 560mAOD in the northeast.

1.4 PROJECT DESCRIPTION

The current proposed works comprise approximately 9km of power cables. Approximately 4.1km will be aboveground supported by wooden poles of between 5.5m and 10m above ground level and approximately 4.9km will be underground cables buried in trenches.

1.5 SCOPE OF COAL MINING RISK ASSESSMENT

The purpose of this Coal Mining Risk Assessment is to:

- Present a desk-based review of readily available information on ground conditions and mining issues which are relevant to the scheme;
- Use that information to identify and assess the risks to the proposed scheme from the mining legacy, including cumulative impact of issues;
- Assess the impact of the proposed scheme on the existing mining legacy risk;
- Set out appropriate mitigation measures to address any identified mining legacy issues affecting the site, including any necessary remedial works and / or demonstrate how mining issues may affect the proposed development

Other forms of mineral mining are not considered in this report.

Note that for the purposes of this report, the term ‘shallow mining’ or ‘shallow mine workings’ generally refers to mining within 30m of ground level or 30m below rockhead level, consistent with the MRA definition. Mining at depths greater than this would be referred to as deep mine workings. For a scheme of this nature deep mine workings are not expected to present a risk of surface instability and as such this report focusses primarily on risks from any shallow mine workings, along with risks from mine entries or surface mining, where recorded or suspected.

1.6 SOURCES OF INFORMATION

READILY AVAILABLE SOURCES

The following sources of readily available information have been reviewed and interpreted as part of this CMRA:

- Published geological maps:

BGS 1:50,000 Sheet Number 248, Pontypridd, Bedrock (1963) Series; and
BGS Online Geological Map Viewer (1:50,000), accessed through https://geologyviewer.bgs.ac.uk/.

- Mining Remediation Authority online database (interactive map viewer) accessed through http://mapapps2.bgs.ac.uk/coalauthority/home;
- British Geological Survey (BGS) online Geology Viewer, information and datasets (including historical borehole logs) accessed through http://mapapps2.bgs.ac.uk/geoindex/home.html;

REPORTS

The following reports which provide a factual summary of mining records held by the Mining Remediation Authority have been obtained and reviewed (included as **Annex C**), with pertinent findings forming part of this assessment:

- The Mining Remediation Authority: *Consultants Coal Mining Report*, CA ref: 51003506107001, 18 June 2025.

2 SITE BACKGROUND INFORMATION

HYDROLOGY

The site runs alongside two rivers named Nant y Ffyllon in the southwest and the Llynfi River in the north. The site does not cross these watercourses.

SITE HISTORY

A review of historic Ordnance Survey (OS) mapping for the site obtained from the National Library of Scotland indicates the following pertinent information in relation to mining history:

- From earliest mapping 1830s: Six old coal levels identified to the east and six to the west of the central part of the site, mostly concentrated around the residential areas of Spelter ranging from 50 to >200m from the site boundary.
- Mapping dated around 1900s: Three quarries identified >100m to the west of the central part of the site. Three disused collieries identified >100m to the west of the central part of the site. Collieries identified to the east of the centre of the site.
- Mapping dated around 1945: Old quarries identified in the west of the site and surrounding the site. Old Coal levels and disused collieries identified to the east and west of the centre of the site.
- Mapping dated around 1949: Dismantled tramways identified to the west of the site, along with topography changes possibly indicating opencast workings or spoil heaps.
- Mapping up to 2025: No significant change on or around the site.

3 GEOLOGY

3.1 SUPERFICIAL AND SOLID GEOLOGY

No Made Ground deposits are recorded within the site geological mapping. Made Ground deposits may be present in the south and central section of the site associated with construction of residential areas and roads in Maesteg and Spelter.

No 1:10,000 BGS mapping is available for the site. An extract of the 1:50,000 map is presented in Figure A1.1.

BGS 1:50,000 mapping indicates superficial deposits are unmapped across most of the central section and north of the site, with sections of Glacial Till (described by the BGS as Diamicton) in the central section and south of the site. Alluvium is also recorded to the east of the site and may be present beneath sections of the central section of the site associated with the various rivers.

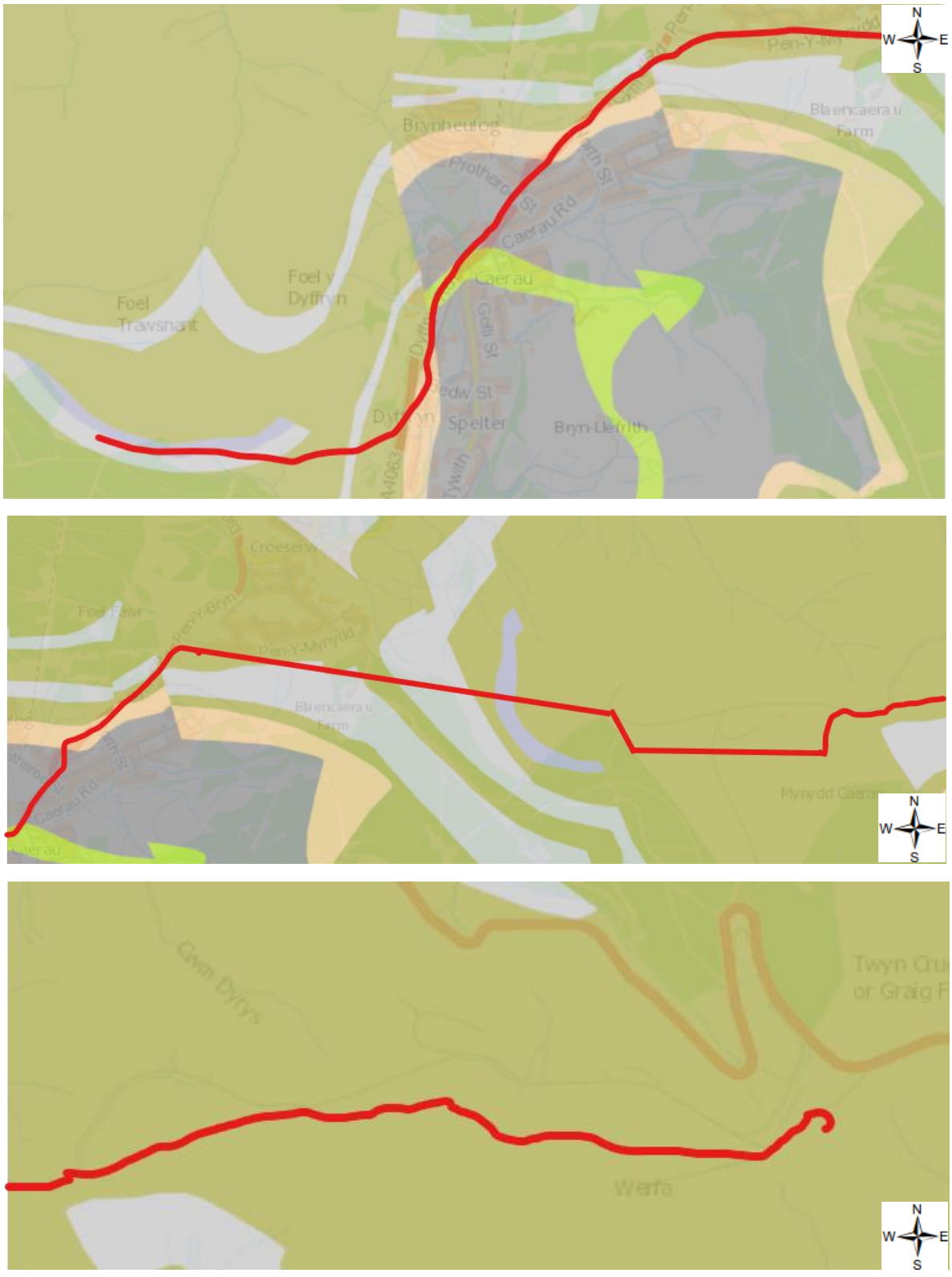
Figure 4B-1 – Extract showing BGS 1:50,000 Superficial geology with approximate route in red

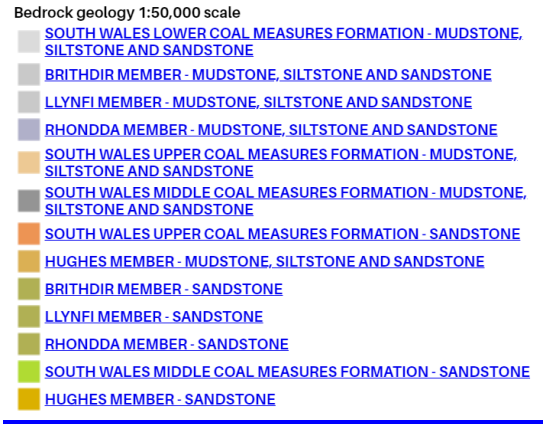
Superficial deposits 1:50,000 scale

- GLACIOFLUVIAL DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- GLACIOFLUVIAL ICE CONTACT DEPOSITS, DEVENSIAN - SAND AND GRAVEL
- TILL, DEVENSIAN - DIAMICTON
- ALLUVIUM - CLAY, SILT, SAND AND GRAVEL
- ALLUVIUM - SAND AND GRAVEL
- BLOWN SAND - SAND
- HEAD - CLAY, SILT, SAND AND GRAVEL
- STORM BEACH DEPOSITS - GRAVEL
- ALLUVIAL FAN DEPOSITS - SAND AND GRAVEL
- MARINE BEACH DEPOSITS - SAND AND GRAVEL
- TIDAL FLAT DEPOSITS - CLAY, SILT AND SAND
- PEAT - PEAT
- SUPERFICIAL THEME NOT MAPPED (FOR DIGITAL MAP USE ONLY) - UNKNOWN/UNCLASSIFIED ENTRY

The bedrock beneath the site is recorded as Sandstone of the Rhhonda Member in the east, Mudstone, Siltstone and Sandstone of the Llynfi Member in the central part and west of the Site and Mudstone, Siltstone and Sandstone of the South Wales Coal Measures Formation in the central part of the Site.

Figure 4B-2 - Extract showing BGS 1:50,000 solid geology, with approximate route in red





Several coal seams are recorded on the BGS mapping to outcrop across the site across the full route area, summarised in Table 2-1

Table 2-1 – Summary of Coal Seam outcrops

Coal Seam
Caedavid/Gorlwynn
Lower Pentre
Upper Yard
Victoria
Cwymbr
Hafod
Tormynydd
Wernpistyll
No. 2 Rhondda
Wernddu
Field Vane
No. 1 Rhondda

3.2 RECORDED FAULTS AND FISSURES

Eight faults are recorded approximately crossing the site in a north-south direction. One crosses the site adjacent to Caerau, two crossing the site in the location of Cymer Road and the remaining five cross the site in the northeast between Cymer Road and the easternmost point of the site.

No fissures are recorded within the vicinity of site.

3.3 HISTORICAL BOREHOLES

The British Geological Survey (BGS) holds records of a large number of accessible historical borehole records that were considered relevant to the site. These historical boreholes broadly confirm the stratigraphic sequence outlined in the mapping and some encountered Made Ground.

Table 2-2 provides a summary of pertinent data from the most pertinent nearby available borehole records. The locations of these boreholes are shown **Figure 4B-3**. Copies of selected borehole logs are presented as **Annex D.** Reference should be made to the BGS Geoindex to identify locations of included borehole records.

Figure 4B-3 - Historical Borehole Location Plan

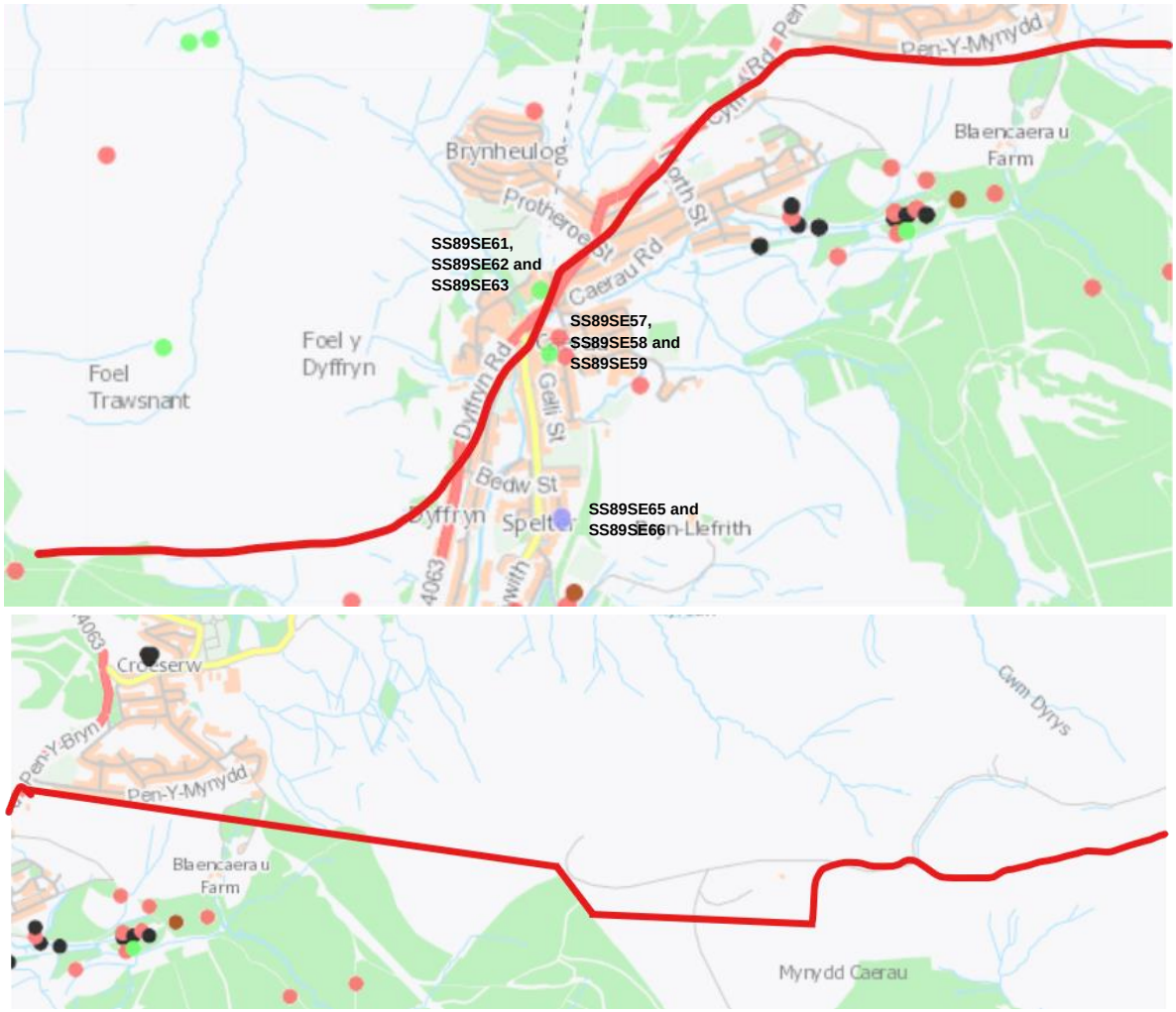


Table 2-2 – Summary of selected BGS borehole records for the site area

Borehole	Records	
SS89SE57	Made Ground (Tarmac and Made Ground) Glacial Till (Boulder Clay, Sand and Gravel) South Wales Coal Measures (Mudstone interbedded with Coal)	GL – 0.8m bgl 0.8 – 5.4m bgl 5.4 – 20.5m bgl
SS89SE58	Made Ground (Tarmac and Made Ground) Glacial Till (Boulder Clay and Gravel) South Wales Coal Measures (Mudstone and Siltstone interbedded with Coal)	GL – 0.7m bgl 0.7 – 6.4m bgl 6.4 – 32.5m bgl
SS89SE59	Made Ground (Tarmac and Made Ground) Glacial Till (Boulder Clay, Sand and Gravel) South Wales Coal Measures (Mudstone interbedded with Coal)	GL – 0.6m bgl 0.6 – 4.6m bgl 4.6 – 41m bgl
SS89SE61	Made Ground Glacial Till (Clay, Sand and Gravel) South Wales Coal Measures (Mudstone, Sandstone and Coal)	GL – 3m bgl 3 – 8m bgl 8 – 31m bgl
SS89SE62	Made Ground Glacial Till (Clay, Gravel and boulders South Wales Coal Measures (Mudstone, Sandstone, Siltstone and Coal)	GL – 0.5m bgl 0.5 – 8.1m bgl 8.1 – 30m bgl
SS89SE63	Glacial Till (Clay, Sand and Gravel) South Wales Coal Measures (Sandstone interbedded with Coal) **Soft void – Old Coal Workings**	GL – 6.3m bgl 6.3 – 15m bgl **11.6 – 12.8m bgl**
SS89SE65	Made Ground (Ash, Brick and Masonry Rubble) Glacial Till (Gravel)	GL – 1.3m bgl 1.3 – 5.5m bgl
SS89SE66	Made Ground (Ash, Brick and Masonry Rubble) Glacial Till (Gravel)	GL – 1.3m bgl 1.3 – 6.5m bgl

SS89NE16	Glacial Till (Clay and Stones) South Wales Coal Measures (Sandstone interbedded with Coal)	GL – 2.1m bgl 2.1 – 24m bgl

4 MINING REMEDIATION AUTHORITY DATA

4.1 MINING REMEDIATION AUTHORITY DATABASE

The Mining Remediation Authority (MRA) online interactive map, accessed in June 2025, identifies that all of the site is within a '*Coal Mining Reporting Area*' and within a '*Coalfield Consultation Area'*.

Figure 4B-4 through to **Figure 4B-8** of this report show different screen shots from the MRA viewer to show:

- Coal outcrops (**Figure 4B-4);**
- Past shallow coal mining (**Figure 4B-5**);
- Probable unrecorded shallow coal mining (**Figure 4B-6**);
- Mine entries (**Figure 4B-7**), and;
- Surface mining (**Figure 4B-8**).

Figure 4B-1 - MRA mapped coal outcrops with approximate site extents in red

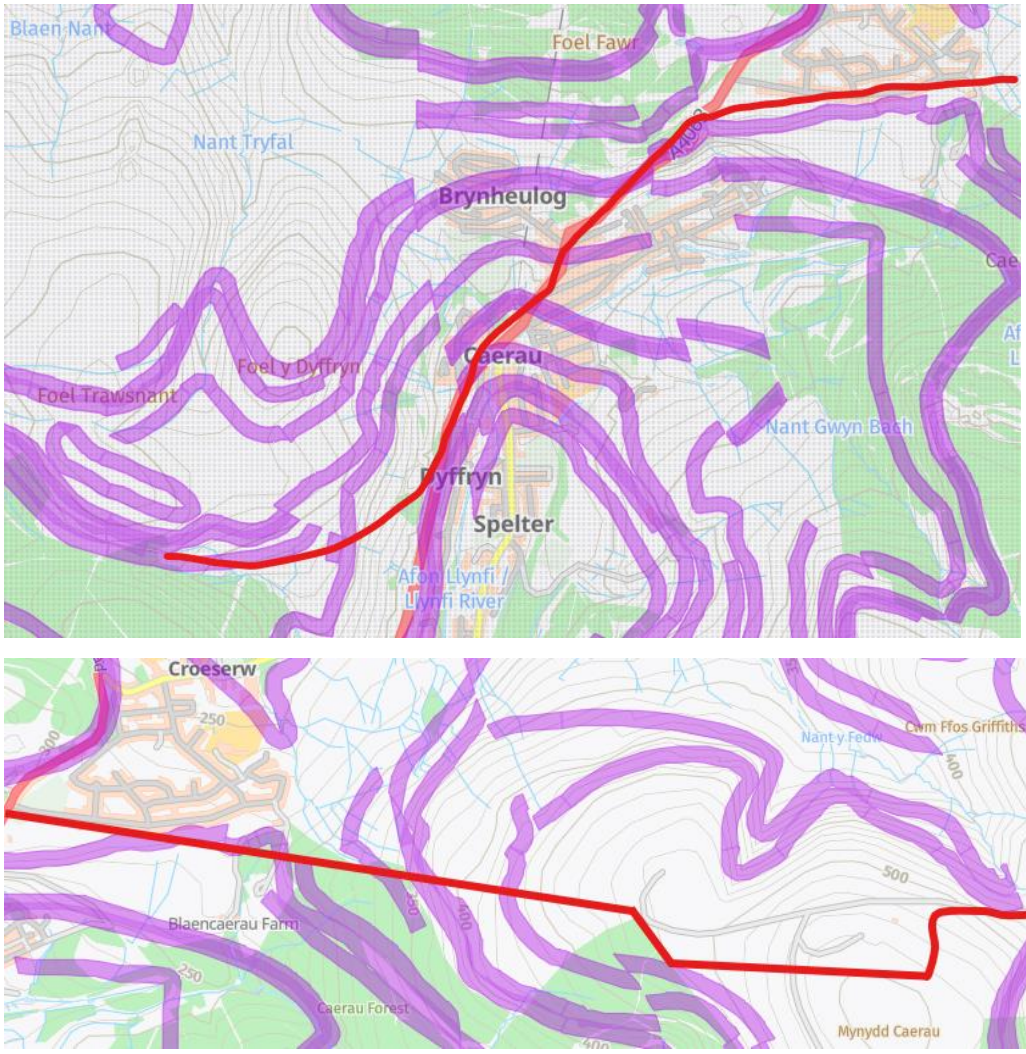
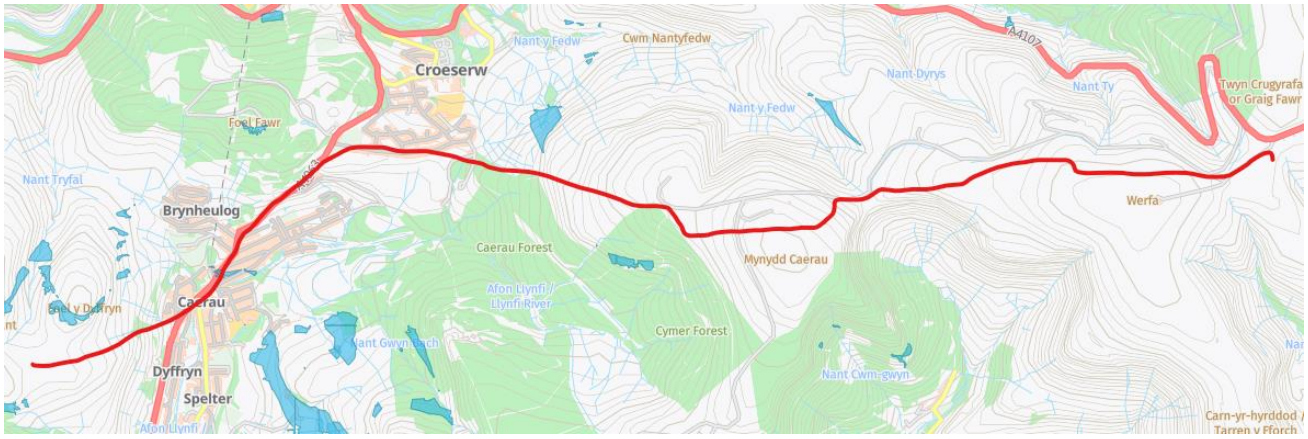
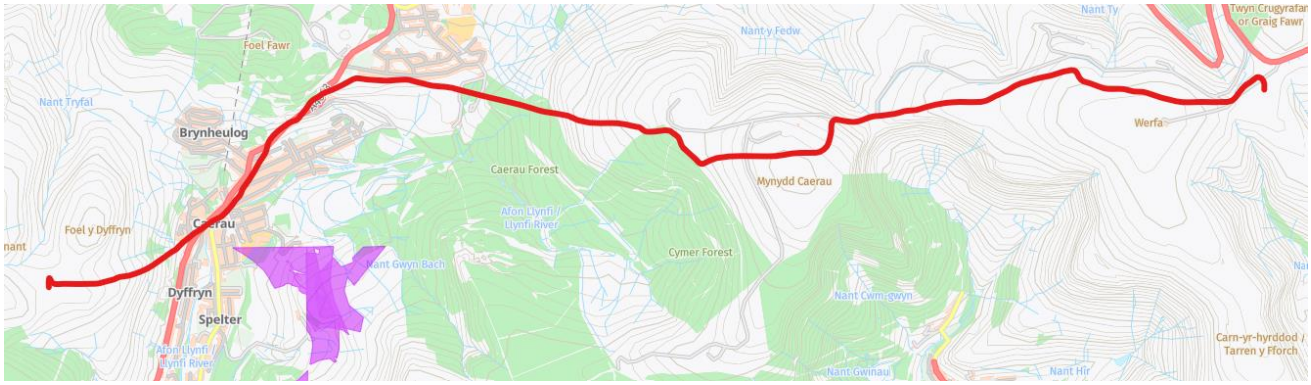


Figure 4B-2 - MRA mapped past recorded shallow coal mining with approximate site extents in red



There are several small and isolated areas of past shallow coal mining below the site in the north and the west, also within the wider surrounding area.

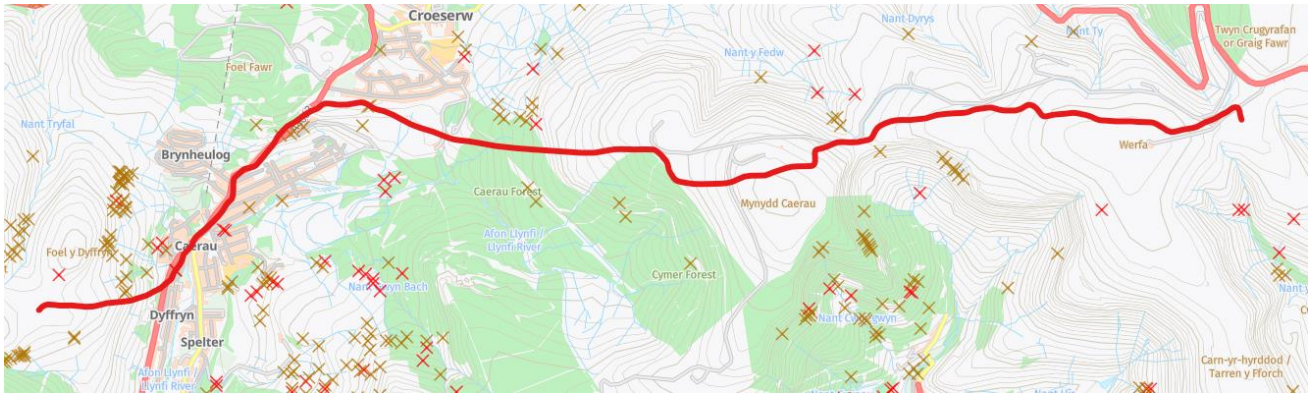
Figure 4B-3 - MRA areas of probable unrecorded shallow mining with approximate site extents in red



There are no areas of mapped probable unrecorded shallow workings affecting the site.

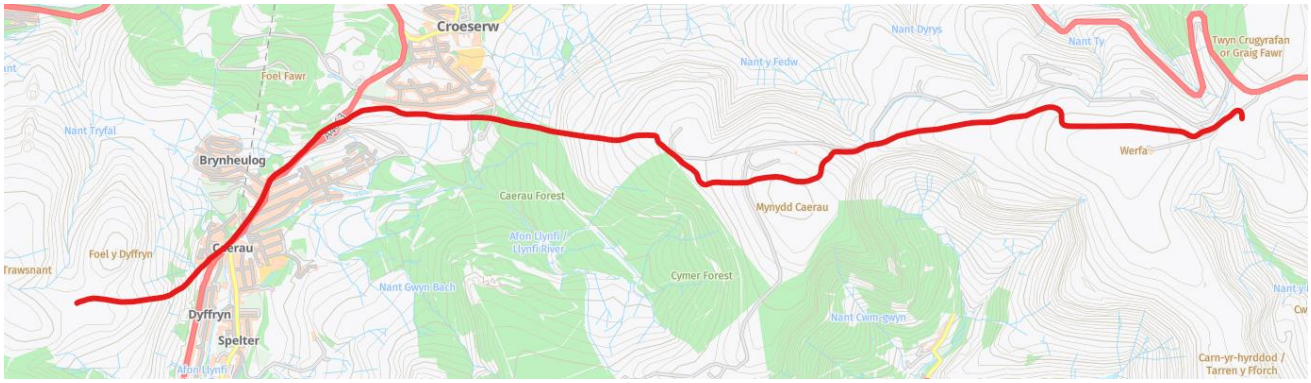
Approximately 200m to the south of the western part of the stie, several areas of probable unrecorded shallow coal mining is identified (to the east of Carau).

Figure 4B-4 - MRA recorded mine entries with approximate site extents in red



The MRA online viewer identifies 26 mine entries within approximately 100m of the site. Of these, 22 are adits (inclined tunnels into underground workings) shown as brown crosses and 4 are shafts (vertical shafts into mine workings) shown as red crosses. More accurate plots of these mine entries are included in the plans in the CCMRs discussed in section 4.2.

Figure 4B-5 - MRA recorded opencast workings with approximate site extents in red



There is no recorded opencast coal mining affecting the site.

4.2 CONSULTANTS COAL MINING REPORT

An MRA Consultants Coal Mining Report (CCMR) (MRA reference: 51003478139001) has been obtained for the extents of the scheme and is included within **Annex C**. A summary of the report is presented within **Table 4-1**.

Table 4-1 – Mining Remediation Authority CCMR summary

Mining Remediation Authority Data		June 2025
Section 1 – Mining activity and geology	Past underground mining (on site)	Upper Pentre seam, 31m deep, dipping 5.8° north, extraction thickness 102cm, last mined 1860.
		No. 2 Rhondda Seam, 45m, 46m, 66m and 95m deep, dipping 7.3° north, 5.4°, 4.7° northwest and 4.7° northeast, extraction thicknesses 117cm, 124cm and 145cm, last mined 1944.

Mining Remediation Authority Data		June 2025
		Gorlwwyn Seam, 44m deep, dipping 4.8° north, extraction thickness 117cm, last mined 1855.
		Eighteen Inch Seam, 46m, 260m, 262m and 327m deep, dipping 4.2°, 8.5°, 8.2°, 9.8° north, extraction thicknesses 50, 53, 102cm, last mined 1925.
		Lower Nine Foot Seam, 301m, 348m, 418m, 440m, 459m, 504m, 511m, 512m and 543m deep, dipping 10.7°, 9.9°, 11.1°, 8.7°, 5° north, 0° east and 9°, 13° northwest, extraction thicknesses 132cm, 140cm, 147cm, 155cm and 162cm, last mined 1973.
		Upper Six Feet Seam, 321m, 325m, 363m, 383m, 418m, 425m, 460m, 502m, 534m, 573m, 578m and 597m deep, dipping 6.5°, 9.5°, 7.9°, 3.9°, 6.8°, 7.8° north, 8.5° northwest, 8.5°, 6.9°, 6.3° northeast, 1.7° south and 6.4° southwest, extraction thicknesses 100cm, 140cm, 195cm, 200cm, 210cm and 270cm, last mined 1967.
		Two Foot Nine Seam, 419m, 424m, 490m, 521m and 548m deep, dipping 3.4°, 3° north, 2.6° northeast, 1.2° east and 1.5° west, extraction thicknesses 157cm, 165cm and 17c2m, last mined 1963.
		Pentre Rider Seam, 420m and 450m deep, dipping 2.5° southwest and 6.2°, east, extraction thickness 79cm, last mined 1879.
		Bute Seam, 425m and 523m deep, dipping 0° east and 7° north, extraction thicknesses 120cm and 145cm, last mined 1959.
		Upper 6ft Rider Seam, 435m, 489m and 490m deep, dipping 10.7° and 5.9° north and 5.8° northwest, extraction thicknesses 110cm and 147cm, last mined 1957.
		Cerau Seam, 462m, 481m, 485m and 530m deep, dipping 10.5° and 9.2° north and 5° northwest, extraction thicknesses 100cm and 147cm, last mined 1923.
		Upper Nine Foot Seam, 477m deep, dipping 6.9° east, extraction thickness 206cm, last mined 1953.
		Five Foot seam, 610m and 729m deep, dipping 3.4° north and 7.3° northeast, extraction thicknesses 102cm and 141cm, last mined 1961.
	Probable unrecorded shallow workings	No.
	Spine roadways recorded at shallow depth	Two spine roadways recorded at shallow depths beneath site.
	Mine Entries	26 recorded within 100m of the site boundary.
	Seam outcrops	15 outcrops recorded within the site boundary.
	Geological faults, fissures and breaklines	No fissures or breaklines recorded. The CCMR records 8 faults beneath the site running north to south.
	Opencast mines	None recorded.
	Mining Remediation Authority managed tips	One mining remediation authority managed tip is identified 323m south of the centre of the site.
Section 2 – Investigative or remedial activity	**Site Investigations**	One site investigation has been identified close to the eastern part of the north of the site, crossing the site in two areas in the north of the site.
	Remediated sites	None recorded within 50m of the site.
	Coal mining subsidence	One damage claims notice was made within 50m of the site in May 1966, the claim was rejected. No current stop notices. No requests to carry out preventative works before coal is worked are known of.
	Mine gas	One mine gas remediation site is recorded 489m south of the central part of the site.

Mining Remediation Authority Data		June 2025
Section 3 – Licensing and future mining activity	Mine water treatment schemes	None recorded within 500m of site boundary.
	Future underground mining	None recorded.
	Coal mining licencing	None recorded within 200m of boundary.
	Court Order	None recorded
	Section 46 notices (land at risk of subsidence)	No notices given.
	Withdrawal of support notices	Not in an area where notice has been published.
	Payments to owners of former copyhold land	Not in an area where notice has been published.

MINE ENTRIES

The CCMR reports indicate that there are 26 recorded mine entries within 100m of the site. Four of the mine entries were recorded as shafts and the other 22 recorded as adits. Due to the long history of mining in this area it is also possible that unrecorded mine entries are present in the vicinity of the site.

MRA MANAGED TIPS

The CCMR states that there is one MRA managed tip located 323m south of the central part of the site.

SPINE ROADWAYS

The CCMR identifies two spine roadway at shallow depth (<30m bgl) beneath the site. Spine roadways are underground tunnels connecting different areas of mine workings and may be within larger areas of seam workings or between separate areas of workings. Their positions are not indicated in the plans provided by the MRA within the CCMRs. It is possible that the spine roadways represent the below ground extension of the various adit tunnels which may pass below the site leading to deeper workings.

5 SITE SPECIFIC UNDERGROUND MINING RISKS

5.1 RECORDED MINE ENTRIES (MINE SHAFTS)

The MRA records indicate four mine shafts within approximately 100m of the site boundary, as indicated on the figures within the CCMR reports and summarised in Table 5-1 below. The risks associated with mine shafts are assessed by considering the potential zone of influence (ZOI), the zone where ground subsidence may reasonably be expected to occur in the event of a shaft failure, collapse or settlement of any infill. This ZOI has a radius defined as:

- *R = shaft diameter / 2 + departure distance + depth to rockhead*

The 'departure distance' is a measure of the likely degree of positional accuracy attributed to the mine entry by the MRA. Depth to rock head is conservatively assumed at 10m bgl at this stage, based on BGS borehole log data.

Table 5-1 – Summary of mine entries (shafts) within 100m of site

Shaft reference	Approximate co-ordinates	Departure distance (m)	Assumed diameter (m)	Zone of Influence (ZOI) radius (m)	Treatment details	Scheme within ZOI
285193-013	285292, 193991	5m	2.5m	(2.5/2 + 5 + 10) = **16.25m**	No records of treatment	No
285194-028	285601, 194243	5m	2.5m	(2.5/2 + 5 + 10) = **16.25m**	Capped to an unknown specification	No
285194-051	285588, 194244	10m	2.5m	(2.5/2 + 10 + 10) = **21.25m**	No records of treatment	No
287194-002	287543, 194904	5m	2.5m	(2.5/2 + 5 + 10) = **16.25m**	The shaft was filled at some point in the past with no details of filling	Yes

The co-ordinates and ZOI should be used to determine the affected areas in proximity to the planned cable route. These ZOI should ideally be avoided by the proposed underground cable or overhead section supports. Where the underground cable route or overhead section supports cannot be adjusted to avoid building over these zones, consultation with the MRA will be required to agree permission and any special precautions that may be required.

These are indicated on **Annex A** which indicates that the following shaft ZOI encroaches on the planned cable route: 287194-002.

5.2 RECORDED MINE ENTRIES (ADITS)

The MRA records indicate 22 mine adits within 100m of the site, as indicated on the figures within the CCMR reports and summarised in Table 5-2 below. The MRA does not have any record of treatment for any of these adits. The adits which are oriented towards the proposed cable route, and hence expected to be present passing below the site are indicated **bold**. The positions of these are also shown on Figure A1.2.

Table 5-2 – Summary of mine entries (adits) within 100m of site

Adit reference	Approximate co-ordinates	Orientation direction	Orientation (towards or away from site)	Expected below site (Y/N)
284193-031	284954, 193922	SW	Away	N
284193-044	284982, 193956	SW	Away	N
284193-045	284979, 193864	**SW**	**Towards**	**Y**
284193-046	284973, 193848	**SW**	**Towards**	**Y**
285193-012	285285, 193994	**N**	**Towards**	**Y**
285193-047	285112, 193976	SW	Away	N
285194-027	285228, 194118	W	Away	N
285194-031	285944, 194833	**SSE**	**Towards**	**Y**
286194-016	286010, 194845	**SSE**	**Towards**	**Y**
286194-017	286028, 194860	**NNW**	**Towards**	**Y**
286194-018	286091, 194884	SSE	Away	N
286195-020	286492, 195015	**SE**	**Towards**	**Y**
286195-021	286504, 195021	**SE**	**Towards**	**Y**
287194-005	287311, 194961	NE	Away	N
287194-006	287443, 194946	E	Away	N
287194-007	287478, 194926	NNE	Away	N
287194-013	287516, 194988	N	Away	N
287194-014	287343, 194938	**SW**	**Towards**	**Y**
287195-013	287517, 195040	E	Away	N
287195-022	287301, 195031	SE	Away	N
289194-004	289691, 194734	**NNE**	**Towards**	**Y**
290194-005	290084, 194699	NE	Away	N

The ten recorded adits which are indicated to pass towards and hence potentially below the site at shallow depth may pose a risk due to potential instability of the entrance and possible shallow workings related to the adit tunnel. Where an adit is expected below the site, it's depth below ground level will be a function of it's inclination and the topography, hence depth bellow the cable route will be complex and requires consideration on a site-specific basis.

The co-ordinates and alignment of these adits should be used to determine the affected areas in proximity to the planned cable route. These areas should ideally be avoided by the proposed overhead section supports. Where the underground cable routes or overhead section supports cannot be adjusted to avoid building over these zones, consultation with the MRA will be required to agree permission and any special precautions that may be required.

Of particular risk will be any adits which daylight very close (i.e. within say 20m) of the cable route. On the basis of the data reviewed the following mine adits may daylight within approximately 20m of the site and pass below the site:

- 284193-046
- 285194-031
- 285194-016
- 285194-017
- 286194-020
- 286194-021

5.3 RECORDED UNDERGROUND MINE WORKINGS (SHALLOW <30M BGL)

The CCMR does not record any shallow mine workings at a depth of less than 30m bgl. The shallow recorded workings at 34m bgl in the Upper Pentre seam (102cm extraction) are expected to have in excess of 20m of rock cover above, hence not expected to represent a risk of instability.

5.4 RECORDED SHALLOW SPINE ROADWAYS (<30M BGL)

These features may represent an area of potential surface instability, depending on depth, roadway void height and thickness of rock cover above. It is noted that these features may coincide with nearby adits as there are no recorded workings shallower than 30m bgl.

5.5 RECORDED UNDERGROUND MINE WORKINGS (DEEP >30M BGL)

The CCMR records indicate deep working (>30m bgl) in numerous coal seams below other parts of the site, at depths between 34m bgl and in excess of 785m bgl. These workings are at sufficient depth that they are not expected to present a risk of surface instability that could affect the proposed project and need not be considered further.

5.6 PROBABLE UNRECORDED SHALLOW MINE WORKINGS

The CCMR does not record any specific areas of shallow unrecorded mine workings.

The site area is characterised by several areas of sub-cropping coal seams and coal seams are therefore expected to be present at or close to ground level across these parts of the site. In most cases the MRA designate these sub-crop zones as a '*development high risk zone'* but do not designate them as areas of '*probable shallow unrecorded coal mine workings'*. It is conjectured that the MRA have reason to believe that those sub cropping seams are typically not affected by unrecorded shallow working in this areas, possible due to the low quality or thickness of those coal seams.

5.7 INTERPRETATION OF RECORDED AND UNRECORDED UNDERGROUND MINE WORKINGS RISK

Current guidance on risks associated with underground mineworkings is outline in detail in *CIRIA C758D Abandoned Mineworkings Manual*. That describes the ratio between the solid cover thickness above mine workings and the thickness of the mining voids, referred to as the 't' value. It is a well-established conservative consideration that greater than 10t is usually required to provide stability in relation to upward migration of mining voids, although under certain geological or mining conditions greater or lesser than 10t values may be appropriate.

RECORDED SHALLOW SPINE ROADWAYS

Two shallow spine roadways are recorded. Due to the nature of the proposed development, it is anticipated that the shallow spine roadways will not affect the stability of the development.

UNRECORDED SHALLOW WORKINGS

There is some historical borehole evidence in BGS borehole SS89SE63 of unrecorded shallow workings, in the north of Spelter (logged as "soft void – old coal workings" at 11.6 - 12.75m bgl). In this location the Upper Yard or Pentre coal seams are expected to be present at shallow depth. In this area is it possible that shallow unrecorded mine workings may be present which may have less than 10t rock cover and as such there may be a potential risk of surface instability in the event of a collapse and upward migration of any shallow mining voids.

This area of the site is currently heavily developed with the road and many structures and the proposed scheme currently includes for undergrounding of the cable in this area. Accordingly, the proposed cabling project is not considered to be at particular risk from ground surface instability, any more or less than the other existing structures or infrastructure in this area. As such it is not considered proportionate to recommend mitigation of this risk by intrusive investigation or remedial stabilisation works if any unrecorded shallow mine workings were present in this areas. However, this risk, should be acknowledged in the project risk register and if any particular evidence for collapse of shallow mine workings or instability is recorded during construction, further advice should be sought.

5.8 UNRECORDED MINE ENTRIES

Records held by the MRA are incomplete and as such the presence of unrecorded mine entries within the scheme extents cannot be discounted. Any evidence of unrecorded mine entries encountered during any subsequent ground investigation or any future construction works should be specifically assessed and the MRA updated accordingly.

5.9 WORKING AND PROPOSED UNDERGROUND MINES

The CCMR states that there are no recorded coal mining licences within 200m of the scheme and no recorded future underground mining within the scheme extents. The risk to the scheme from current or future mining is considered to be very low.

5.10 MINE GAS EMISSION RISK

The CA report states that there has been one mine gas remediation site 489m south of the centre of the site.

The site is also underlain by shallow mining and coal bearing strata within 50m of the site surface. The risks related to mine gas affecting the scheme is therefore considered to be moderate. This risk should be included in the project risk register and shall be considered if any intrusive ground investigation is planned or prior to any entry into any confined spaces or excavations.

6 RECOMMENDATIONS

6.1 SUMMARY OF MINING RISK ASSESSMENT

On the basis of the data sources reviewed, **Table 6-1** provides a summary of mining risks specific to the scheme. This is intended to highlight those mining issues which may impact the proposed works and to support further consideration of these risks/potential mitigation measures. In this context, the term 'shallow' refers to within 30m of ground level, consistent with the Mining Remediation Authority terminology.

Table 6-1 – Mining Risk Assessment Summary

Coal Mining Issue	Risk of affecting the scheme	Commentary
Recorded shallow underground coal mining (<30m bgl)	Low - Moderate	There are no *recorded* shallow coal mine workings (i.e. <30m bgl) below the footprint of the planned cable route shown on MRA records. There are small areas of recorded shallow working in close proximity to the route, hence any route changes amy require consideration of this risk.
Unrecorded shallow underground coal mining (<30m bgl)	Low - Moderate	There are no areas of *probable* (unrecorded) shallow coal mine workings (i.e. <30m bgl) identified by the MRA below the footprint of the planned cable route. There are small areas of probable unrecorded shallow working in close proximity to the route, hence any route changes may require consideration of this risk. The likelihood of unrecorded shallow underground coal mining is unlikely but not impossible, considering the presence of several shallow coal seams in the area and deeper recorded workings in some of these seams in the wider area.
Recorded deep underground mining (>30m bgl)	Low	Deep mineworkings (>30m bgl) are recorded below the site at depths of between 34mbgl and 785mbgl. There is considered to be sufficient rock cover above these deeper workings to prevent instability affecting the development.
Shallow spine roadways (<30m bgl)	Low	Two shallow spine roadways are identified beneath the site, likely related to adits. The location of these are not indicated in the MRA records provided. They is likely to be associated with the Adits (discussed below). It is not expected that they would present a significant stability risk to the planned scheme.
Surface mining (opencast workings)	Low	None recorded by the MRA on site.
Coal mining geology (fissures)	Low	There are no recorded mining fissures or breaklines in the vicinity of the site.
Recorded coal mining surface hazard	Low	There are no recorded coal mining surface hazards in the vicinity of the site.
Record of past mine gas emissions or potential	Low	There are no recorded past mine gas emissions in the vicinity of the site.

Coal Mining Issue	Risk of affecting the scheme	Commentary
Mine entries (shafts)	Moderate	Several mine entries (shafts) are recorded within the close vicinity of the site and the ZOI for one of these mine entries marginally encroaches onto the site boundary (reference 287194-002). This represents a potential stability hazard should a structure be proposed within this ZOI. There remains a possibility of unrecorded mine entries at affecting the site.
Mine entries (adits)	Moderate	Several Adits are recorded within the close vicinity of the site. Of the 22 adits recorded within 100m of the site boundary, 10 of these extend beneath the site in some capacity, potentially at a shallow depth. Of these 10, 3 daylight within approximately 20m of the proposed route (underground section) and 3 daylight within 20m of the proposed route (overhead pole mounted section). These represents a potential stability hazard should a structure be proposed within the ZOI of these adits. Further assessment may be required to establish the location and dept of these adits below the route in order to further assess the level of risk and any mitigation required.
Unrecorded mine entries (shafts or adits)	Moderate	MRA records for mine entries are incomplete. Due to the mining activity in the area and the large number of recorded shafts and adits in the vicinity of the site, there remains a risk of unrecorded mine entries being present which may impact the scheme.

7 CONCLUSION AND PROPOSED MITIGATION

For the coal mining risks identified from the data reviewed, as outlined in this report and summarised in Table 6-1 the following mitigation is proposed:

Table 7-1 – Mitigation of Mining Risks

Coal Mining Issue	Mitigation
Recorded shallow underground coal mining (<30m bgl)	If there are any changes to the route, the records of shallow mining should be reviewed and if the revised route is affected intrusive investigation may be required to determine if there is a risk of instability affecting the structures proposed. If workings are particularly shallow then grout stabilisation may be required in localised areas.
Unrecorded shallow underground coal mining (<30m bgl)	If there are any changes to the route, the areas of 'probable shallow coal mining' should be reviewed and if the revised route is affected intrusive investigation may be required to determine if there is a risk of instability affecting the structures proposed. If workings are particularly shallow then grout stabilisation may be required in localised areas.
Mine entries (shafts)	The layout of the overhead support poles should be reviewed and amended such that no structures is proposed within the Zone of Influence of the recorded mine shaft(s). If this cannot be avoided, engagement with the MRA will be required to agree further necessary mitigation to allow construction, such as provision of piled foundations to rock or investigation work to accurately locate the shaft to clarify the ZOI.
Mine entries (adits)	The layout of the overhead support poles should be reviewed and amended such that no structures is proposed within the Zone of Influence of the recorded mine adits where these are sufficiently shallow that they may represent a risk. The mircositing allowance of 10m should be sufficient. However, in the unlikely scenario the mine adits cannot be avoided, engagement with the MRA will be required to agree further necessary mitigation to allow construction, such as provision of piled foundations to rock or investigation work to accurately locate the shallow adit sections to clarify the ZOI. From observation of the currently proposed overhead pole locations, locations 28b and 42b may need to be moved to avoid the adit routes beneath the site. As mentioned above, the mircositing allowance of 10m should be sufficient to avoid adits routes.
Unrecorded mine entries	The slight risk of unrecorded mine entries being present at the site should be included in the project risk register. This risk can be mitigated by way of a watching brief during any future ground works as part of the scheme. If any ground features which may indicate an unrecorded mine entry are encountered during site works, these should be subject to further assessment and investigation by a competent geotechnical or mining engineer. If subsequently found to be a mine entry further advice should be sought in relation to necessary stabilisation or treatment.

Annex A

DRAWINGS

Annex B

NOTES AND LIMITATIONS

Annex C

MINING REMEDIATION AUTHORITY CONSULTANTS COAL MINING REPORT

Annex D

HISTORICAL BOREHOLE RECORDS

APPENDIX TITLE

APPENDIX TITLE

Amber Court
William Armstrong Drive
Newcastle upon Tyne
NE4 7YQ

wsp.com