



The Coal
Authority

Rhondda Cynon Taf Borough Council: Mine Water Heat Opportunities

July 2024



Making a **better future** for people
and the environment **in mining areas**

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Contents

Contents	iii
List of Figures	iv
List of Tables	iv
Executive summary	1
1 Introduction	2
1.1 Geographic area	2
2 Geological summary	3
2.1 Bedrock geology	3
2.2 Structural geology	3
2.3 Superficial drift geology	4
3 Mining situation	7
4 Mine water regime	8
4.1 Description of mine water blocks	8
4.2 Monitoring data	8
4.2.1 Mine water levels	8
4.2.2 Mine water temperature	9
4.2.3 Mine water chemistry	10
5 Mine water heat opportunities	12
5.1 Borehole schemes	12
5.1.1 Good borehole opportunities	12
5.1.2 Possible borehole opportunities	12
5.1.3 Challenging borehole opportunities	13
5.2 Mine water treatment schemes	15
5.3 Gravity-fed discharge schemes	15
5.3.1 Dinas Rhondda Discharges	16
5.3.2 Dinas Middle Shaft Discharge	16
5.3.3 Plasdraw Old Level	17
5.3.4 Pwll-yr-Afon	18
5.3.5 Ysguborwen Drainage Level	18
6 Summary & Recommendations – Rhondda Cynon Taf area	20
6.1 Borehole Schemes	20
6.1.1 Good Opportunities	20
6.1.2 Possible Opportunities	21
6.2 Mine water discharges	21

6.3 Summary and next steps	22
7 References	25

List of Figures

Figure 2.1: Regional geological cross-section approximately north-south for Rhondda Cynon Taf borough. Source Geological Sheet 248 Pontypridd.	4
Figure 2.2: Bedrock geology in the Rhondda Cynon Taf area. Contains British Geological Survey materials © UKRI [2024]	5
Figure 2.3: Summary stratigraphy and geological sequence for the study area	6
Figure 4.1: Mine water blocks in Rhondda Cynon Taf	11
Figure 5.1: Mine water heat opportunities – borehole schemes	14
Figure 5.2: Photo of one of the Dinas Rhondda Discharges	16
Figure 5.3: Photo of Plasdraw discharge	17
Figure 5.4: Photo of Pwll-yr-Afon discharge	18
Figure 5.5: Mine water heat opportunities – treatment schemes and gravity discharges	19
Figure 6.1: Combined mine water heat opportunities map	23
Figure 6.2: Highlighted opportunity areas within Rhondda Cynon Taf	24

List of Tables

Table 3.1: List of most recent colliery closures	7
Table 4.1: Mine water monitoring points	9
Table 4.2: Anticipated mine water temperatures block 8	9
Table 4.3: Anticipated mine water temperatures block 10	10
Table 4.4: Anticipated mine water temperatures block 10a	10
Table 4.5: Anticipated mine water temperatures block 11	10
Table 5.1: Summary of selected gravity-fed discharges for mine water heat potential	15
Table 6.1: Mine water heat opportunities within Rhondda Cynon Taf area	20

Executive summary

Coal mining has taken place in the Rhondda Cynon Taf at scale since the 1850s, with the last colliery to close being the Lady Windsor Colliery in 1988. Much of the borough is underlain by Upper, Middle and Lower Coal Measures, with exposed coal measures found in the north of the borough, becoming progressively deeper to the south. The topography of the valleys through the borough has exposed coal seams in the Upper Coal Measures, where a number have been worked from outcrop.

The methodology for identifying the mine water heat opportunity areas is described in the overarching report. The northern and central areas of the region have good potential for borehole based mine water heat schemes, avoiding areas of opencast workings and the shallowest workings in the far north of the region.

There are several gravity-fed discharges, where mine water is emitting at surface. This mine water may offer potential for mine water heat without the cost and risk of drilling and pumping. A selection of the larger discharges having a heat potential of over 0.5MW_{th} is listed in table below.

It is recommended that the opportunities listed are considered against surface heat demands to highlight those which may be served by mine water heat technologies. A subsequent, more detailed study of the mining and hydrogeology would add further information to firm up the case to take a number of mine water heat projects forward.

Summary of selected mine water heat opportunities across Rhondda Cynon Taf

No./ Area	Opportunity name	Opportunity type	Category	Potential MW _{th}
1	Aberdare and Mountain Ash	Borehole Scheme	Good	Subject to further testing
2	Treorchy, Treherbert and Rhondda	Borehole Scheme	Good	Subject to further testing
3	Tonypanyd, Porth and Trehafod	Borehole Scheme	Good	Subject to further testing
4	Ysguborwen Drainage Level	Discharge	Good	1.7
5	Plasdraw Old level	Discharge	Good	1.2
6	Pwll-yr-Afron	Discharge	Good	1.6
7	Dinas Middle shaft	Discharge	Possible	0.6
8	Dinas Rhondda discharges	Discharges	Possible	2.4

1 Introduction

The area covered in this section is the whole of the Rhondda Cynon Taf administrative boundary within which the presence of mine workings combined with knowledge (where available) of recovered mine water levels are used to provide a very high level assessment of the potential for exploring the development of open loop mine water heat projects in the borough.

1.1 Geographic area

Rhondda Cynon Taf covers an area of approximately 424 km², and runs roughly northwest-south east from approximately the A4059 in the north to M4 in the south. Urbanised areas are generally focused along the Rhondda, Rhondda Fach, Cynon, and Taff valleys along with to the north of the M4. The Coal Measures and coal mine workings include most of the area south of the A465. Elevation in Rhondda Cynon Taf ranges from approximately 30 mAOD (in the south parts) to >500 mAOD at Mynydd Bwllfa, south of Hirwaun.

2 Geological summary

The solid and superficial geology, along with seam information has been ascertained by consultation of the available British Geological Survey records including:

- Online GeoIndex viewer;
- Online geological memoirs (Woodland and Evans, 1964);
- Online geology maps (Sheets 231 and 248 for Rhondda Cynon Taf area); and
- Borehole and mine shaft scans across the area of interest.

2.1 Bedrock geology

Regional solid geology and selected structural geology is shown in **Figure 2.2**. The stratigraphic sequence and approximate depths are shown in **Figure 2.3**.

The geology of the Rhondda Cynon Taf borough consists of predominantly South Wales Coal Measures (Carboniferous), with areas of Devonian, Dinantian (Carboniferous), and Triassic rocks (**Figure 2.2**). The geology of the Rhondda region is described in detail in Woodland and Evans (1964). The following section will only describe the South Wales Coal Measures, and superficial deposits.

The South Wales Coal Measures Group consists of the Pennant Sandstone Formation (sometimes known as part of the Upper Coal Measures), the Upper Coal Measures, Middle Coal Measures, and Lower Coal Measures (**Figure 2.3**). Coal bearing horizons are found in the Middle and Lower Coal Measures, and the Upper Coal Measures/Pennant Sandstone Formation. The Pennant Sandstone formation is host to a number of notably hard quartz sandstones, alongside the shallowest productive coal seams, in the Rhondda Member and Brithdir Member. Middle and Lower Coal Measures are typically a sequence of siltstones, minor sandstones, seatearths and coal seams. The base of the Lower Coal Measures broadly follows the A465 "Heads of the Valleys" road.

Worked Coal Measures can be found at depths ranging from outcrop/surface, to over 300 mBOD (and deeper) across the region (**Figure 2.1**). The sequence of Coal Measures thickens from the northeast to the southwest, towards Maesteg and Margam, outside the Borough.

2.2 Structural geology

Structurally, the coalfield is cut by a number of northwest-southeast trending faults, and is gently folded. Coal seams in the Pennant Sandstone Formation outcrop along the valley walls throughout the area, with the Middle and Lower Coal Measures outcropping in the far north of the region.

2.3 Superficial drift geology

Superficial geology consists of glacial deposits, including clay-bearing tills, and glaciofluvial deposits of sands and gravels.

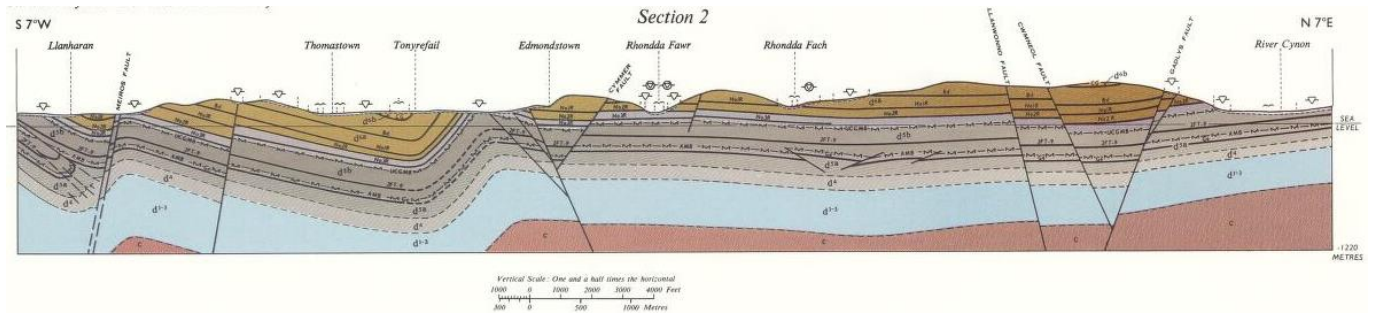


Figure 2.1: Regional geological cross-section approximately north-south for Rhondda Cynon Taf borough. [Source Geological Sheet 248 Pontypridd.](#)

Contains British Geological Survey materials © UKRI 2024.

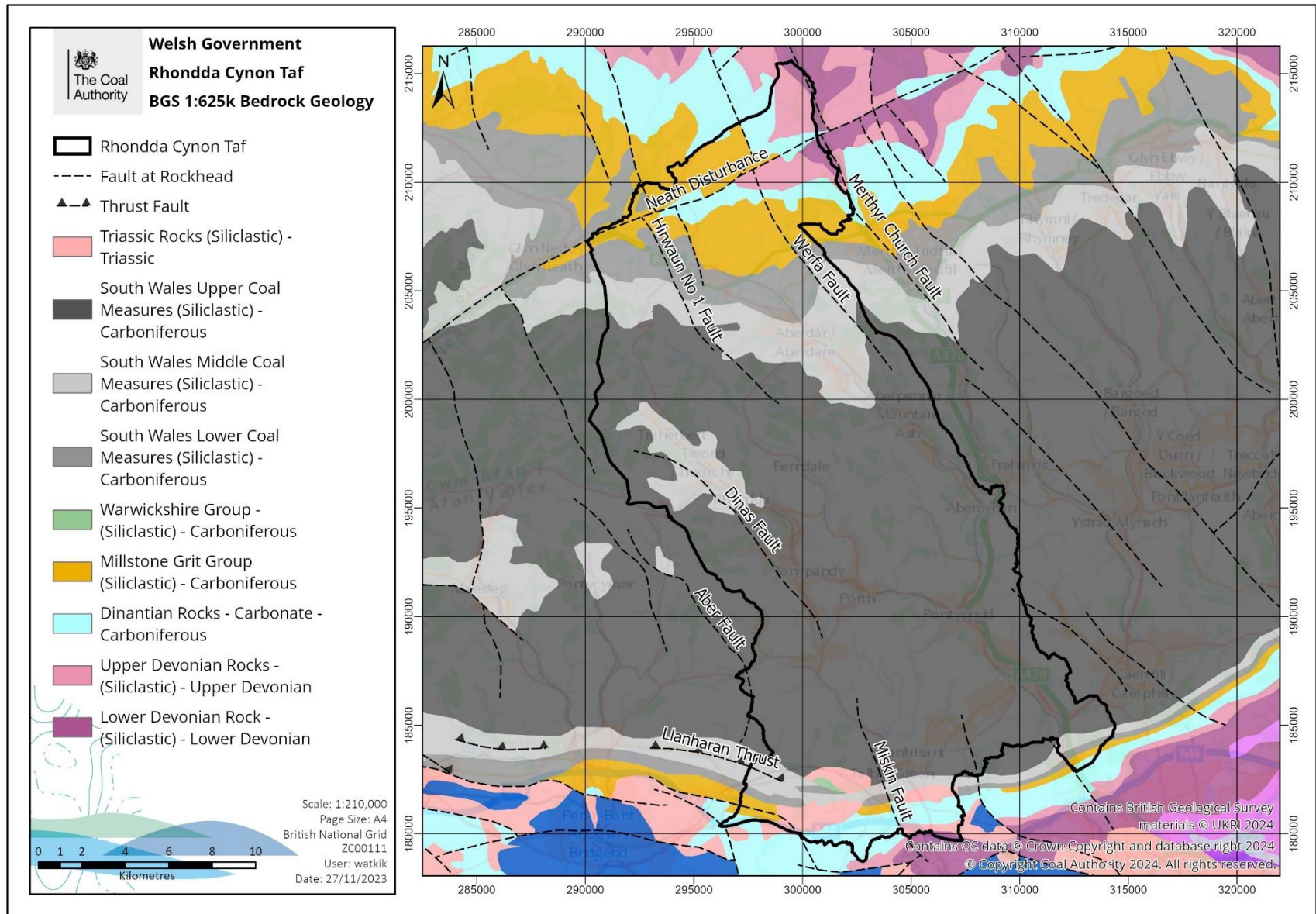
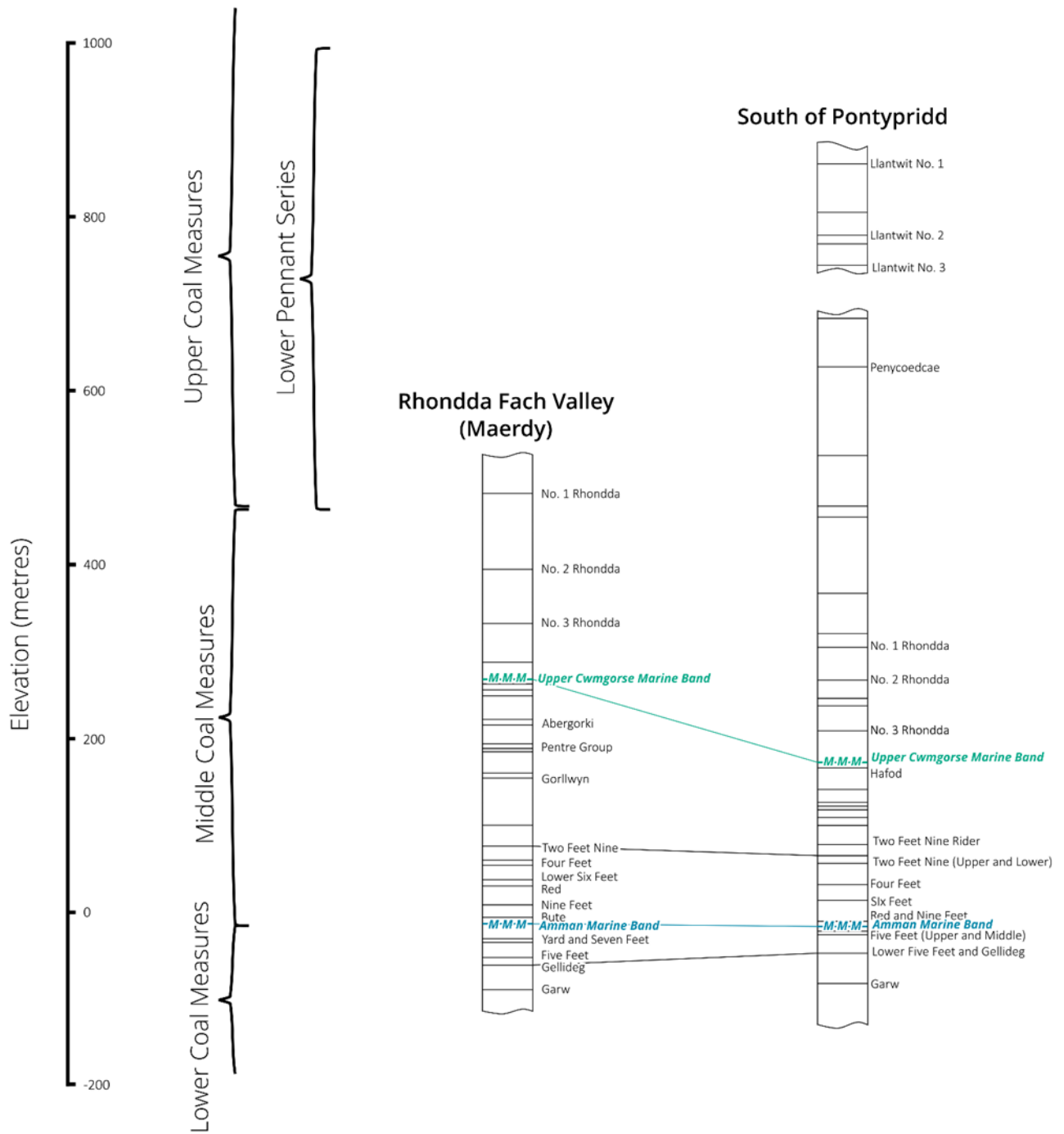


Figure 2.2: Bedrock geology in the Rhondda Cynon Taf area. Contains British Geological Survey materials © UKRI [2024]



Adapted from Figure 2 in "Overview of the South Wales Coalfield" report reference A031899-2 by White Young Green 2007

Figure 2.3: Summary stratigraphy and geological sequence for the study area

3 Mining situation

Underground coal mining has taken place in Rhondda Cynon Taf since the 1820s, and at scale since the 1850s. The borough includes the Porth, Abercynon, and Aberdare mining districts, where a number of notable collieries have been developed. These include Lewis Merthyr (home to Rhondda Heritage Park), Hafod Colliery, Tyrmawr, and Cwm.

Coal was extracted from the Upper, Middle and Lower Coal Measures, from a number of shafts, surface drifts across the region, and opencast surface extraction. Workings in the Upper Coal Measures were typically isolated during mining from workings in the Middle and Lower Coal Measures to avoid additional water ingress during operation.

A number of collieries were open up until the 1980s, with the last colliery to close being Lady Windsor Colliery, near Pontypridd. The final collieries (most of which had become complexes) to close are set out in **Table 3.1** below:

Table 3.1: List of most recent colliery closures

<i>Colliery</i>	<i>Closure date</i>	<i>Connected underground to</i>
Lady Windsor Colliery	1988	Abercynon
Cwm	1986	Maritime
Penrhiwceiber	1985	Deep Duffryn, Nixon's Navigation and Cwmcynon

Note: a detailed assessment of underground mining connections is required to confirm the mining hydrogeological conceptual model(s)

Following these closures all mine water pumping ceased and the mines started to refill.

There are a total of 23 seams recorded as worked across the Borough. Seams become progressively deeper from the North (south of the A465), towards the south. The shallowest seams are the Hafod, the No.2 Rhondda, No.3 Rhondda. These all form part of the Upper Coal Measures/Pennant Sandstone formation, and top of the Middle Coal Measures. The more extensively worked seams across the Borough are found in the Middle and Lower Coal Measures, with the deepest worked seam being the Gellideg seam. Workings across the region are deep, with the Lady Windsor colliery sinking shafts to a depth of over 560 mBGL, and Cwm colliery sinking shafts to over 700 mBGL (NMRS, 2023).

4 Mine water regime

4.1 Description of mine water blocks

The Rhondda Cynon Taf Borough includes four of the South Wales mine water blocks – Area 8 (in the north), Area 10 (Central and western), Area 10a (southern, and south west), and Area 11 (eastern). All four mine water blocks extend into adjacent local authority boundaries:

- Area 8 is approximately 20km (east-west) and 10 km (north-south) across, extending into Merthyr Tydfil and Neath Port Talbot;
- Area 10 is approximately 10 km (northeast-southwest) and 20 km (northwest-south), and extends into Neath Port Talbot;
- Area 10a is approximately 8 km (north-south) and 15 km (east-west), extending into Bridgend and Neath Port Talbot;
- Area 11 is 22 km (north-south) and 10 km (east-west), and extends into Merthyr Tydfil and Caerphilly.

The mine water blocks group together a number of hydraulically connected collieries, typically for the deeper Middle and Lower Coal Measures, with some consideration given for the often isolated Upper Coal Measures. Further assessment of mine water blocks will need to be undertaken to confirm actual potential and recorded connectivity within and between the blocks. The mine water levels in each block for the Upper Coal Measures are broadly thought to be recovered and discharging. Although in Area 10, deeper mine water levels may still be recovering.

The mine water blocks in this locality are shown in **Figure 4.1**.

4.2 Monitoring data

There are a total of six monitoring points in the Rhondda Cynon Taf region, with information included in **Table 4.1**. Adjacent monitoring for each block can be found in the neighbouring local authorities.

4.2.1 Mine water levels

Nearly all monitoring points show a water level <75 mBGL, except New Rockwood, which indicates a deep (>100 mBGL) recovered water level (this partly reflects the elevated surface of the borehole location). The Rhondda Six Feet Seam borehole, monitoring the Middle and Lower Coal Measures mine water level, shows artesian conditions, and is thought to still be recovering.

There are a number of monitored and unmonitored discharges across the region, many linked to the Upper Coal Measures, some of which are described in **Section 5.3**. These would indicate a typically recovered coalfield extent, across the Lower, Middle and Upper Coal Measures.

Table 4.1: Mine water monitoring points

<i>Monitoring point name</i>	<i>Seam monitored</i>	<i>Mine water level (mAOD)</i>	<i>Comments</i>
Abercwmboi Upcast Shaft	Multiple in MCM	135 (2015)	<75 mBGL
Abercwmboi Downcast Shaft	Multiple in MCM	135 (2012)	<75 mBGL
Upper Cymmer Shaft	Multiple in LCM/MCM	97 (2022)	<75 mBGL, pumped
Rhondda (Six Feet) BH	Six Feet (LCM)	95(2023)	Artesian, rising
Ty Mawr BH	UCM	69 (2023)	<75 mBGL, shallow
Great Western Hetty Shaft	Multiple in MCM/LCM	42 (2023)	<75 mBGL, shallow
New Rockwood BH	Six Feet (LCM)	53 (2023)	>100 mBGL, recovered

4.2.2 Mine water temperature

A study into mine water temperatures at various depths around the Britain’s coalfields was published in 2020 ([Farr et al, 2020](#)). This study used historic underground water and strata temperatures along with data from mine water pumping where available. Temperature typically increases with depth and data published in the study are shown in from **Table 4.2** to **Table 4.5**.

Table 4.2: Anticipated mine water temperatures block 8

<i>Depth (m BGL)</i>	<i>Mean(°C)</i>	<i>Max. (°C)</i>	<i>Min. (°C)</i>
100	12.3	12.8	11.8
200	15	15.7	14.4
300	17.7	18.9	16.5
400	18.4	22.5	15.1
500	23.1	26.1	20.9
600	25.1	29.6	22.1

Table 4.3: Anticipated mine water temperatures block 10

<i>Depth (m BGL)</i>	<i>Mean (°C)</i>	<i>Max. (°C)</i>	<i>Min. (°C)</i>
100	11.3	14.2	9.8
200	13.7	17.8	11.8
300	16.5	23.7	13.2
400	18.9	25.6	14.6
500	21.6	29.6	16
600	24.4	33.6	17.4

Table 4.4: Anticipated mine water temperatures block 10a

<i>Depth (m BGL)</i>	<i>Mean (°C)</i>	<i>Max. (°C)</i>	<i>Min. (°C)</i>
100	10.9	10.9	10.9
200	12.8	12.9	12.7
300	14.7	14.8	14.6
400	16.6	16.8	16.5
500	18.5	18.7	18.4
600	20.4	20.6	20.2

Table 4.5: Anticipated mine water temperatures block 11

<i>Depth (m BGL)</i>	<i>Mean (°C)</i>	<i>Max. (°C)</i>	<i>Min. (°C)</i>
100	11.3	12.9	10.3
200	13.6	16.9	11.6
300	15.9	21	12.9
400	18.3	25.1	14.2
500	20.6	29.1	15.6
600	23	33.1	16.9

4.2.3 Mine water chemistry

Mine water chemistry can be highly variable depending on specific location and would not normally form part of any initial high level opportunity scoping considerations guided by this study. The matter would be included in any more detailed, site specific, studies which may be commissioned in future.

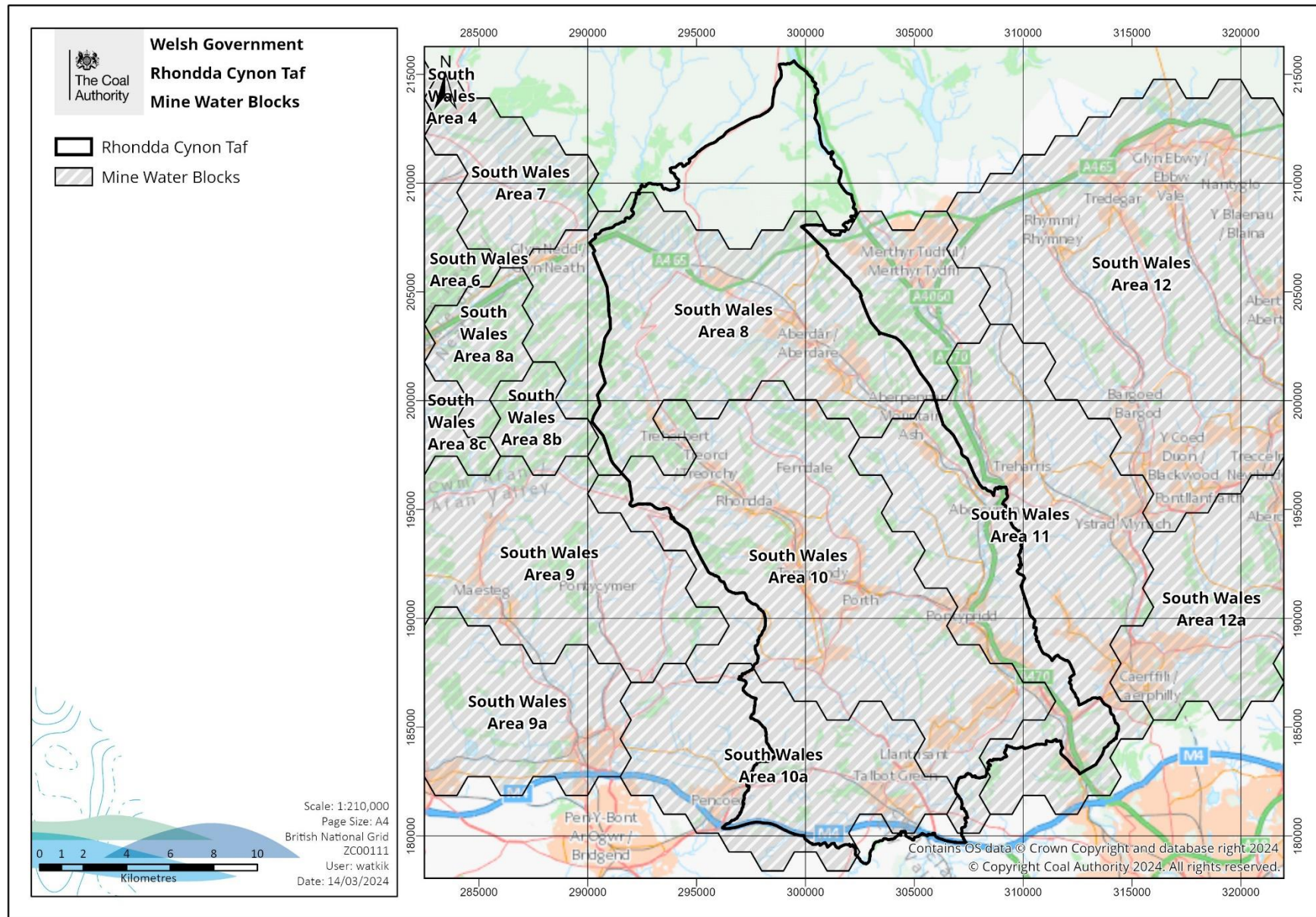


Figure 4.1: Mine water blocks in Rhondda Cynon Taf

5 Mine water heat opportunities

5.1 Borehole schemes

The prospects for progressing a mine water heat scheme based on drilling boreholes to access and return the mine water are assessed on a 'tier' basis.

Three tiers have been adopted for the purposes of this study, the methodology and assessment criteria being set out in the over-arching report for Welsh Government.

The tiers are:

Good opportunities – shown coloured dark orange

Possible opportunities – shown coloured mid orange

Challenging opportunities – shown coloured light orange

Any areas where no opportunity exists, mainly due to absence of mine workings are shown uncoloured.

The broad opportunity areas within the Blaenau Gwent County Borough boundary are outlined below and are illustrated in **Figure 5.1**.

5.1.1 Good borehole opportunities

There are a number of "Good" opportunity areas across the northern and western half of the region, where workings are <300 mBGL, overlapping, and with mine water levels <75 mBGL. Opportunity areas include:

- Aberdare through to Mountain Ash;
- The area covering Treherbert, Treorchy, and Rhondda;
- The area covering Trehafod Porth, Clydach Vale and to the west of Pontypridd.

Upper Coal Measures mine workings are considered suitable targets towards the south, and will be hydraulically isolated from the deeper Middle and Lower Coal Measures workings, which may form "Possible" opportunities should they be considered.

5.1.2 Possible borehole opportunities

A number of "Possible" opportunity areas across the northern, central, and eastern extent of the borough (**Figure 5.1**). A number of these are associated with the potential presence of opencast mine workings at surface, which may have removed a number of shallower target seams and workings. In areas where opencast workings are likely to be present, more detailed studies are required to confirm extents of extraction in each seam. Many of these represent areas where workings are between 300 and 500 mBGL, with some potentially deeper targets below 500 mBGL. Mine water levels in the Middle and Lower Coal Measures workings across centre of the borough are marked as artesian in some areas where the

topography is low, and recovering (from Coal Authority monitoring data near Trehafod). Artesian and very shallow mine water may be complicated in terms of operating and managing in a mine water heat scheme. “Possible” opportunity areas include parts of:

- Mountain Ash;
- Porth, and;
- A number of towns from Stanleytown heading north.

5.1.3 Challenging borehole opportunities

There are a number of “Challenging” opportunities across the borough, typically where mine workings are deeper than 500 mBGL. These are found in the east of the region, near Abercynon, and adjacent towns (**Figure 5.1**). There are also a number of worked seams >500 mBGL across the rest of the borough in the Middle and Lower Coal Measures. These deeper mine workings, beneath the shallower Upper Coal Measures, may be other “Challenging” opportunities to consider.

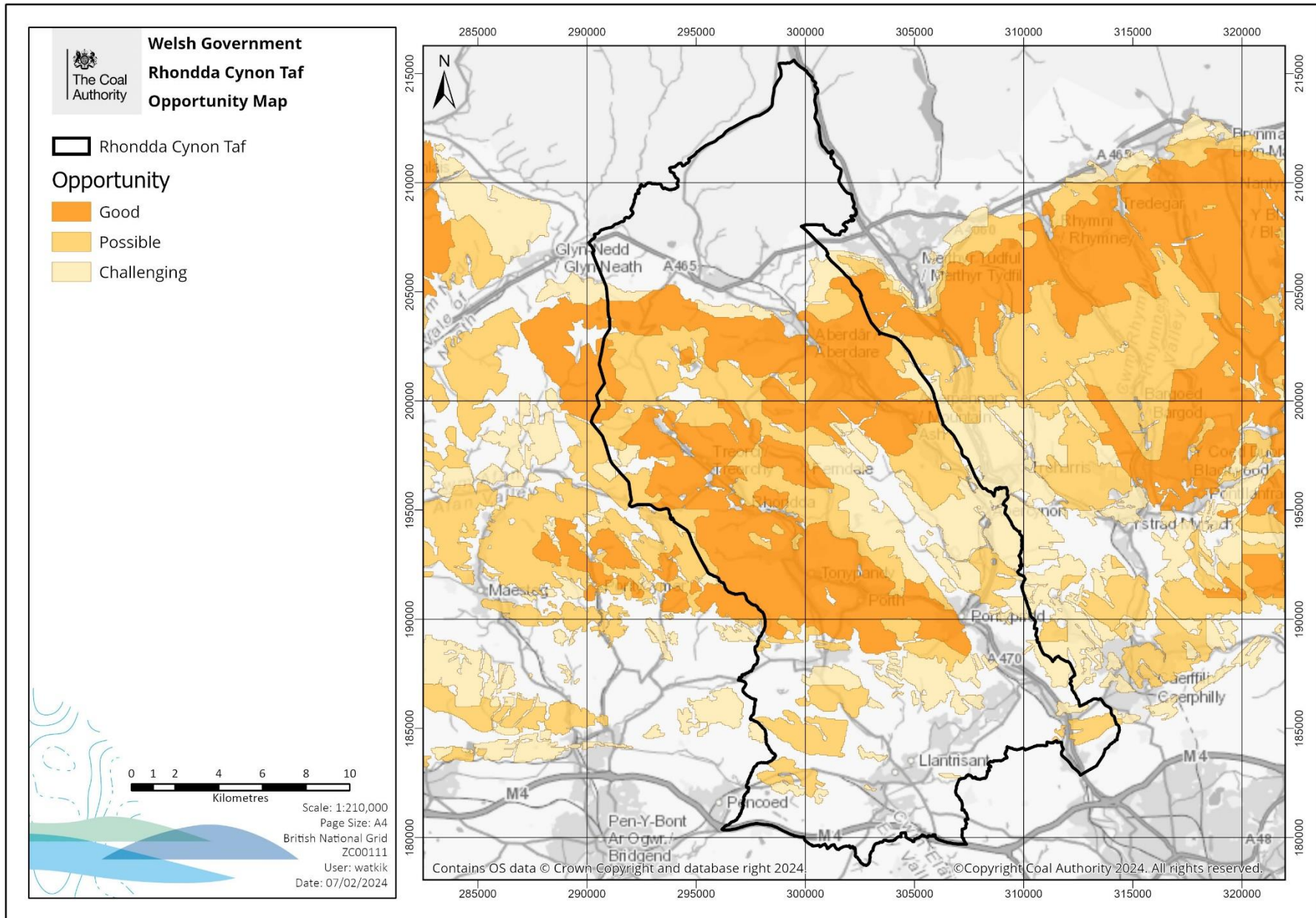


Figure 5.1: Mine water heat opportunities - borehole schemes

5.2 Mine water treatment schemes

There are no existing Coal Authority mine water treatment schemes in Rhondda Cynon Taf district area.

5.3 Gravity-fed discharge schemes

Numerous gravity mine water discharges exist in the Rhondda Cynon Taf area. Many are not monitored for flow rate, water quality or temperature – some of these unmonitored discharges may offer heat potential not presented in this report. Gravity-fed discharges generally occur when mine workings connect with the surface, typically via mine entries and boreholes.

The nature of gravity-fed discharges (flow, temperature and quality) will be dependent upon a number of factors including mining type and geometry, the hydrogeological system of the mine workings and rainfall.

Some discharges are likely to be more variable in flow rate and temperature than others but as many of the discharges are not currently monitored for flow rate, water quality or temperature and it is difficult to evaluate with any degree of confidence.

Those discharges that do have some monitoring data (albeit in some cases relatively limited) and are likely to have a heat potential of $>0.5\text{MW}_{\text{th}}$ are described in the sections below supported by data in **Table 5.1** and illustrated on the plans in **Figure 5.5**.

Table 5.1: Summary of selected gravity-fed discharges for mine water heat potential

Name	Flow average (L/s)	Flow range (L/s)	Typical temperature (°C)	Estimated potential heat (MW_{th})
Dinas Middle Shaft	30	5 to 70	13	0.5 to 0.7
Dinas Rhondda Discharges	115 (further testing required)	1 spot reading	9.4 (further testing required)	2.4 (est)
Plasdraw Old Level	45	10 to >100	11 (est)	1 to 1.3
Pwll-yr-Afon	60	25 to 150	11 (est)	1.3 to 1.7
Ysguborwen Drainage Level	65	1 spot reading	11 (est)	1.7 (est)

Note: Potential heat is based on spot readings and / or average flow rate. Potential heat will vary with flow rate, which varies with rainfall. Potential heat at a site may be above or below the estimated value at different stages of the year

Should a potential heat demand be identified close to one of these discharges (shown in **Table 5.1/Figure 5.5**) or any other discharge in the area, then a more detailed study would be required. Additional investigation and data gathering will likely be required to establish its potential.

5.3.1 *Dinas Rhondda Discharges*

There are two discharges to the Ogwr Fach (form the boundary with Rhondda Cynon Taf at the site) approximately 800m upstream of Evanstown, with parts of Gilfach Goch extending to <300 m from the discharges. One of the discharge is within Rhondda Cynon Taf boundary and the other is within Bridgend boundary. Further investigations would need to be undertaken to confirm flow rate, temperature, chemistry. Potential heat users and feasibility of transferring the water will also need to be confirmed by a future study.



Figure 5.2: Photo of one of the Dinas Rhondda Discharges

5.3.2 *Dinas Middle Shaft Discharge*

The discharge is from a culvert to the River Rhondda from Dinas Middle Shaft (which is part filled) at Tonypany. There are Pen Dinas flats at the site of the shaft, further studies will be required to identify other potential heat users. The discharge is monitored by the Coal Authority for flow rate and water chemistry. Using the shaft should be considered in any further studies, although it is uncertain if the shaft fill would influence pumping from the shaft itself.

5.3.3 Plasdraw Old Level

The discharge appears to be in to a culverted section of possible surface drainage from residential area at Aberdale. Monitoring data has been taken from the outflow end of the culvert. It is uncertain if the flow is entirely mine water, or if there is surface drainage included. Potential heat users and feasibility of transferring the water will also need to be confirmed by a future study.



Figure 5.3: Photo of Plasdraw discharge

5.3.4 *Pwll-yr-Afon*

The discharge is to the south bank of River Cynon between Penywaun and Hirwaun. The adit outfall is difficult to access safely. The line of the drainage adit goes under Rhydywaun Comprehensive School. Further investigations would need to be undertaken to confirm flow rate and temperature. Potential heat users and feasibility of transferring the water will also need to be confirmed by a future study. Feasibility studies of utilising shafts along the line of the drainage adit could also be undertaken.



Figure 5.4: Photo of Pwll-yr-Afon discharge

5.3.5 *Ysguborwen Drainage Level*

The discharge is located alongside Prysmian Cables & Systems at Aberdare. Access to the discharge is unclear and likely overgrown. Further investigations would need to be undertaken to confirm flow rate, temperature, chemistry. Potential heat users and feasibility of transferring the water will also need to be confirmed by a future study.

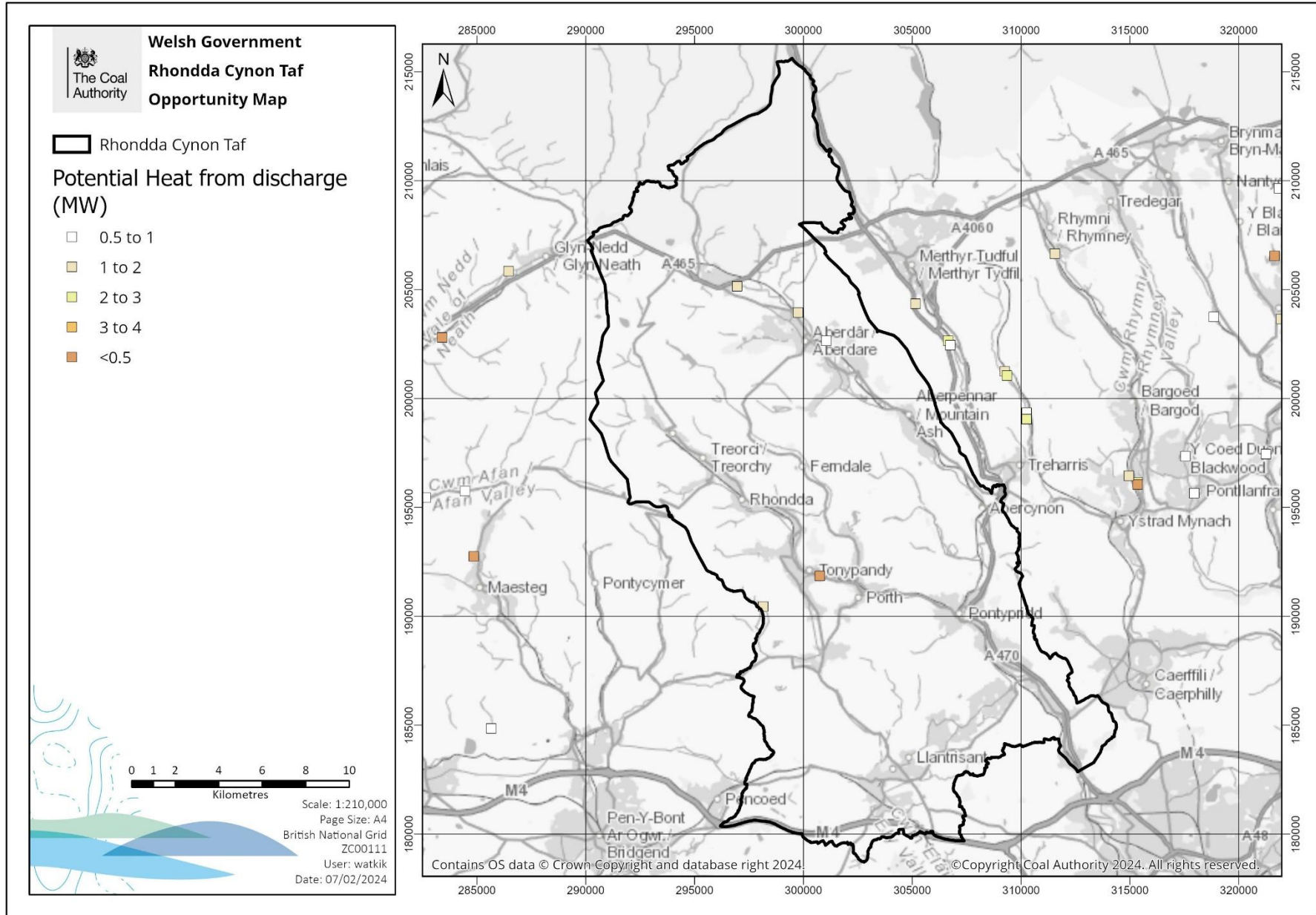


Figure 5.5: Mine water heat opportunities – treatment schemes and gravity discharges

6 Summary & Recommendations – Rhondda Cynon Taf area

The Rhondda Cynon Taf borough has been extensively worked for coal across the Upper, Middle and Lower South Wales Coal Measures, from the 1850s to 1980s. A number of deep pits are noted across the region, including Lewis Merthyr, Tyrmawr and Cwm collieries. Water levels have broadly recovered or are recovering, with levels <75 mBGL, with evidence that deeper workings in the centre of the region have mine water levels above the ground surface (artesian conditions). Mine water temperatures are estimated to be between 11°C and 27°C, depending on the mine water block.

A summary of possible opportunities are presented in **Table 6.1**, **Figure 6.1** and **Figure 6.2**.

Table 6.1: Mine water heat opportunities within Rhondda Cynon Taf area

No./ Area	Opportunity name	Opportunity type	Category	Potential MW_{th}
1	Aberdare and Mountain Ash	Borehole Scheme	Good	Subject to further testing
2	Treorchy, Treherbert and Rhondda	Borehole Scheme	Good	Subject to further testing
3	Tonypandy, Porth and Trehafod	Borehole Scheme	Good	Subject to further testing
4	Ysguborwen Drainage Level	Discharge	Good	1.7
5	Plasdraw Old level	Discharge	Good	1.2
6	Pwll-yr-Afron	Discharge	Good	1.6
7	Dinas Middle shaft	Discharge	Possible	0.6
8	Dinas Rhondda discharges	Discharge(s)	Possible	2.4

6.1 Borehole Schemes

6.1.1 Good Opportunities

There are a number of “Good” opportunity areas for borehole mine water heat schemes across Rhondda Cynon Taf Borough, with a number of the main settlements underlain by mine workings which may be suitable. These areas are shown in **Figure 6.2** and **Table 6.1**, **Areas 1 to 3**.

- **Area 1** covers Aberdare and parts of Mountain Ash, where there are substantial settlements with a number of end-user types;
- **Area 2** covers the region around Treorchy, Treherbert and Rhondda, where there may be opportunities adjacent to large residential areas, schools and industrial users;

- **Area 3** covers the region around Tonypany, Porth and Trehafod, in the centre of the borough, which consists of a mix of residential properties, community buildings, and notable tourism landmarks (like Rhondda Heritage Park).

6.1.2 Possible Opportunities

There are “Possible” opportunities for borehole mine water heat schemes to the southeast of Mountain Ash, where some residential developments can be found, alongside in a number of “Good” areas, should deeper targets than those <300 mBGL be considered.

6.2 Mine water discharges

A number of gravity mine water discharges are known to exist in the Rhondda Cynon Taf borough, but only five have monitoring data. Ratings have been applied to discharges according to the following criteria:

- Good means heat potential over 0.5MW uncomplicated capture and uncomplicated heat transfer.
- Possible means heat potential over 0.5MW complicated capture or complicated heat transfer.
- Challenging heat potential over 0.5MW complicated capture and complicated heat transfer

The five gravity discharges are:

- **Location 4**, Ysguborwen Drainage Level, which has “good” potential as there’s a potential heat output $>1 \text{ MW}_{\text{th}}$, and nearby end users consisting of industrial and residential properties;
- **Location 5**, Plasdraw Old level, which has “good” potential as it has a potential heat output $>1 \text{ MW}_{\text{th}}$, and nearby end users consisting of a number of residential properties around Abernant, a school, and hospital $>600 \text{ m}$ to the northwest;
- **Location 6**, Pwll-yr-Afron, which has “good” potential as it has a potential heat output $>1 \text{ MW}_{\text{th}}$, and nearby end users consisting of a school and residential properties;
- **Location 7**, Dinas Middle shaft; which has “possible” potential as it has a potential $>0.5 \text{ MW}_{\text{th}}$ output, and is in proximity to a residential block of properties, which are uphill to the relevant position of the discharge;
- **Location 8**, Dinas Rhondda discharges, which are considered to have “possible” potential due to the limited presence of end-users in the vicinity.

They have been highlighted in **Figure 6.2**.

6.3 Summary and next steps

There are a number of potential mine water heat scheme opportunities across the region. While some of the areas are relatively undeveloped, the opportunity areas have been considered against the major developed areas in the borough to seek to identify places where good or possible heat supply opportunities may coincide with significant heat demand. It is suggested that the opportunities covered in this section and listed in **Table 6.1** and shown in **Figure 6.2** are further considered for more detailed study.

For borehole based mine water heat schemes, there are opportunities across much of the region in the Upper and Middle/Lower Coal Measures, with “Good” potential areas identified around Aberdare, Treorchy, and Porth. Some areas have been ranked “Possible” on the basis of opencast workings at surface, potentially deep mine water levels (>100 mBGL) and on depth alone (300 - 500 mBGL, or close to shallow workings/outcrop). The heat potential of the borehole schemes cannot be estimated to any degree of certainty until more detailed and localised study is undertaken.

Point source opportunities across the region include a number of gravity discharges, including Ysguborwen Drainage Level, Plasdraw Old level, Pwll-yr-Afron, Dinas Middle shaft, Dinas Rhondda discharges.

It is suggested that a survey of the main heat loads, particularly potential large ‘anchor’ loads such as hospitals or larger public buildings is undertaken in the opportunity areas in **Table 6.1** to establish synergies between potential heat supply and heat demand. Once areas are identified, it is recommended that more focused Phase 1 studies take place at a number of these locations to review the nature of the workings in detail, site specific water levels, potential mine water chemistry, and offer suggestions on possible targets suitable for a mine water heat scheme.

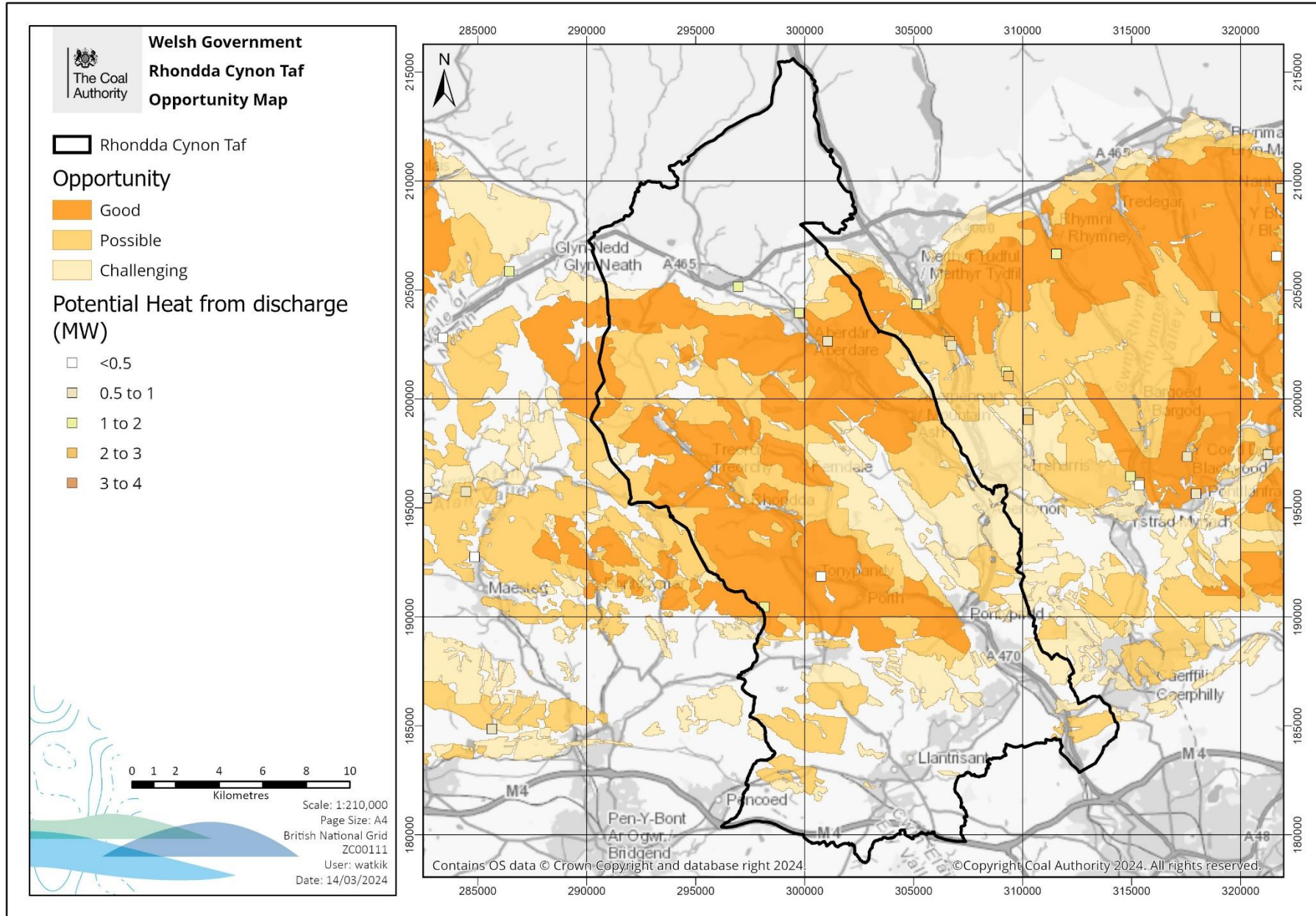


Figure 6.1: Combined mine water heat opportunities map

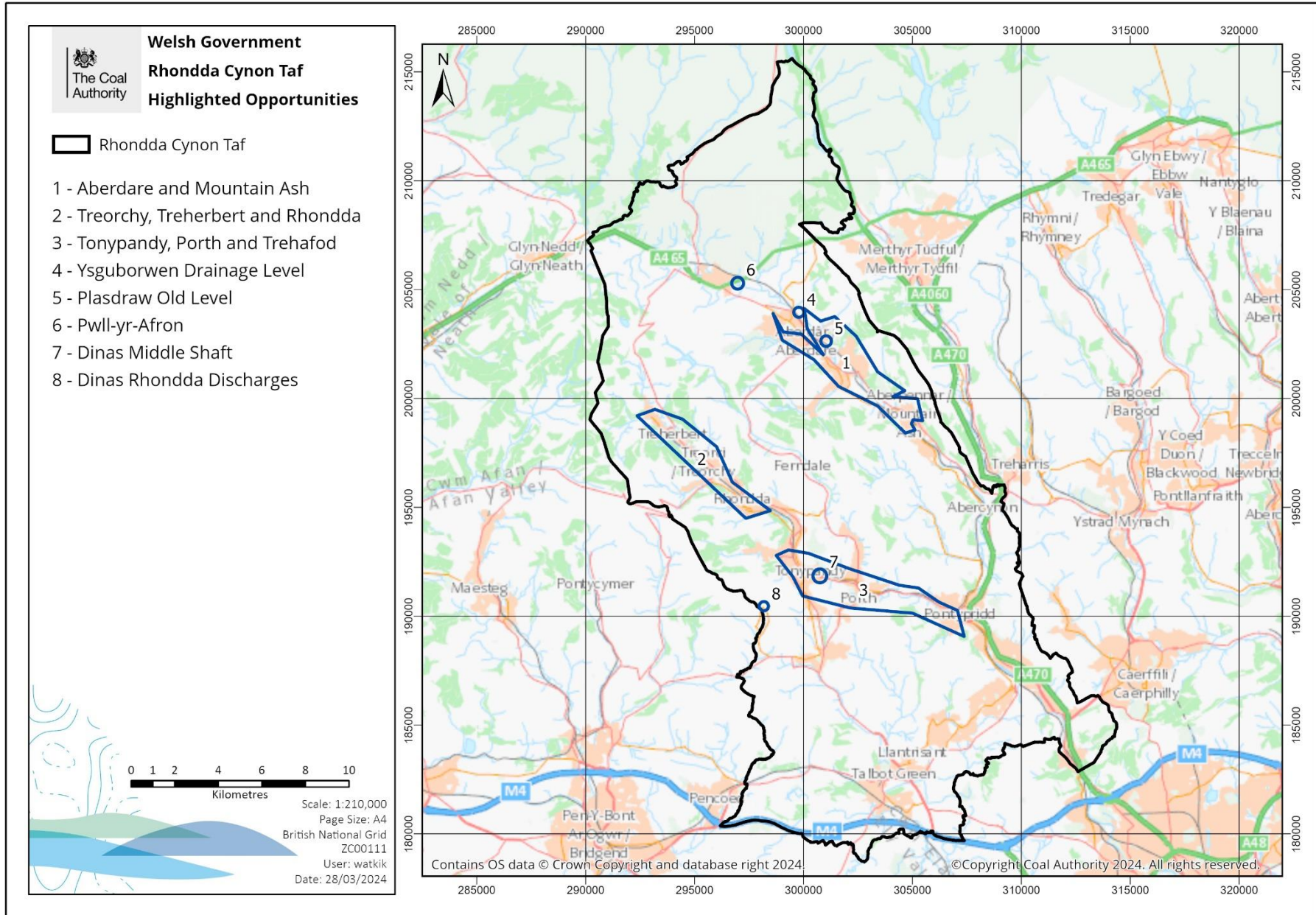


Figure 6.2: Highlighted opportunity areas within Rhondda Cynon Taf

7 References

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