The Coal Authority

Resolving the impacts of mining

Tan y Garn Mine Water Treatment Scheme - New licence application for a previously exempt abstraction-Additional information

1. Introduction

The Tan y Garn (or Tan-y-Garn) Mine Water Treatment Scheme (MWTS) is located adjacent to the Afon Cathan (River Cathan) in a valley north east of the village of Garnswllt, near Ammanford. The experimental treatment scheme was commissioned in 2006 using a 'Reducing Alkalinity Producing System' (RAPS).

The mine water at Tan y Garn previously discharged directly into the Afon Cathan and resulted in a visual impact for approximately 1km downstream until the confluence with the River Loughor.

The treatment scheme is located approximately 2.5km south of Ammanford, south central Wales near the village of Garnswllt at National Grid Reference (NGR) SN 6317 0968.

Originally the mine water discharged from the abandoned coal mine adit via a pipeline approximately 10m long to the Afon Cathan. A mine water collection chamber was constructed over the existing pipe that carried the mine water to the river and the mine water is now diverted into the treatment scheme.

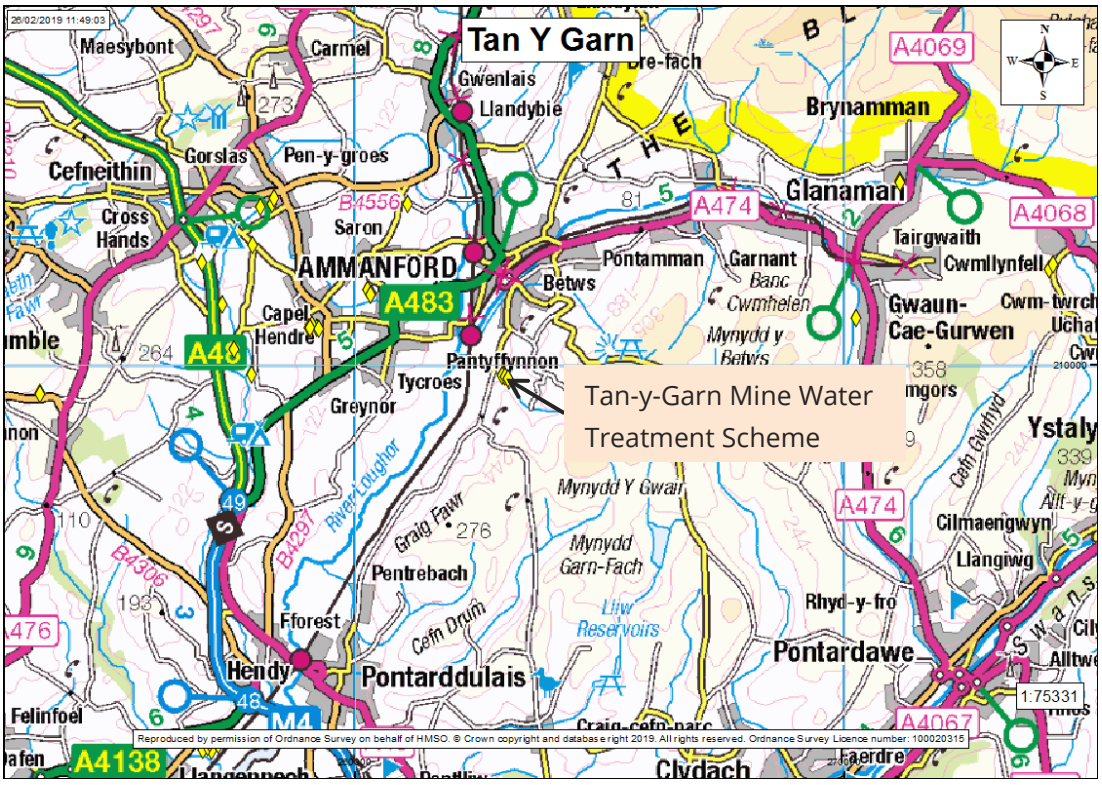

Figure 1: Location of Tan-y-Garn Mine Water Treatment Scheme

2. Pollution Remediation

The raw mine water has an average iron concentration of 36.5mg/l.

Although not toxic in itself, iron within the mine water oxidises and precipitates out of solution within the water course and can result in the smothering of river beds.

In order to treat the discharging mine water, the Tan y Garn MWTS was constructed in 2006 and consists of a RAPS wetland designed to change the chemistry from acidic to alkaline. There are then three settlement ponds that are each designed to remove about 40% of the iron entering each pond through particles settling from suspension. A final reed bed polishes the mine water prior to discharge. Passive schemes need only infrequent monitoring.

The mine water discharges from the scheme with an average iron concentration of 0.6mg/l.

3. Answers to Specified Sections of Form WRH

The following are responses to the application form sections, in cases where the referenced document is this one, i.e. "Tan y Garn Additional information".

2.4 Abstraction Invoices and Records

	Main Contact	Address	Phone Number	Email
Site Operation	Chris Crowe	Chris Crowe The Coal Authority 200 Lichfield Lane Mansfield NG18 4RG	07917174577, 01623637363	ChrisCrowe@coal.gov.uk; EnvironmentMail@coal.gov.uk
Invoice Abstractions	Accounts Payable	Account Payable The Coal Authority 200 Lichfield Lane Mansfield NG18 4RG	01623637000	FinanceDepartment@coal.gov.uk EnvironmentMail@coal.gov.uk
Abstraction Records	Jack Cropper	Jack Cropper The Coal Authority 200 Lichfield Lane Mansfield NG18 4RG	07917093506	EnvironmentMail@coal.gov.uk JackCropper@coal.gov.uk

4.2 What is your connection to the land where the abstraction takes place?

The Coal Authority has ownership of the land where the water upwells and where the treatment scheme currently sits. Please see Appendix A, for maps outlining land ownership/ abstraction and discharge points.

4.3 Do you have a legal right of access to the land where the abstraction takes place?

The Coal Authority has legal rights of access to the land where the abstraction takes place. Please see Appendix A, Figures A3 for maps outlining land ownership.

7 Abstraction Details

Mine water treatment schemes are associated with abandoned and disused mines in which mine water rebound has occurred. During the operation of the mines, water levels are artificially lowered via pumps and drainage adits. When operations in the mine ceases the pumps are turned off and the water levels rebound, flooding the mines. As a result, mine water discharges at the surface from former adits or shafts of these abandoned and disused mine workings. Transfer of the mine water for the purpose of pollution remediation, usually occurs at the surface and is a passive process, facilitated by gravity. We have therefore considered the transfer to be for surface water.

7.1 Site Map

Please see Appendix A for maps outlining the site.

8.1 Abstraction history and evidence

Abstraction has taken place continuously since operation began in 2006.

Since the MWTS is passive, visits are infrequent to avoid excessive management cost. As there is no power supply, only simple manual readings of flow are taken during visits.

The scheme is non-consumptive so the discharge flow rate is used as a proxy for the abstraction rate as inlet and outlet flows are assumed to be equal.

Flow is measured at a v-notch thin plate weir with a notch angle of 28º 4'. This weir – see Appendix B, Figure B3 - is located at the end of the final reed bed, a few meters before the consented discharge point.

As part of ongoing site improvement works, the Coal Authority has been undertaking internal assessments of weir accuracy. This work has included a check of the approach channel, weir installation, crest condition and downstream conditions. Using this information, a weir accuracy level has been given to the monitoring points that reflects the level of error that may be associated with the monitoring structure.

The weir at Tan y Garn is considered to be of medium accuracy with ± 15-25% on flow rate.

The records of weir measurements are provided as evidence with this application but the potential weir error of ± 15-25% should be taken into account when looking at the provided flow rates.

As the site is rainfall related, and infrequently monitored, the maximum quantities abstracted, given on form WRH, in Table 8.1, are estimated using the largest measured flow for each year.

For ease of visualisation of the amount of data, and the variability of flow measurements, the following trend chart is provided.

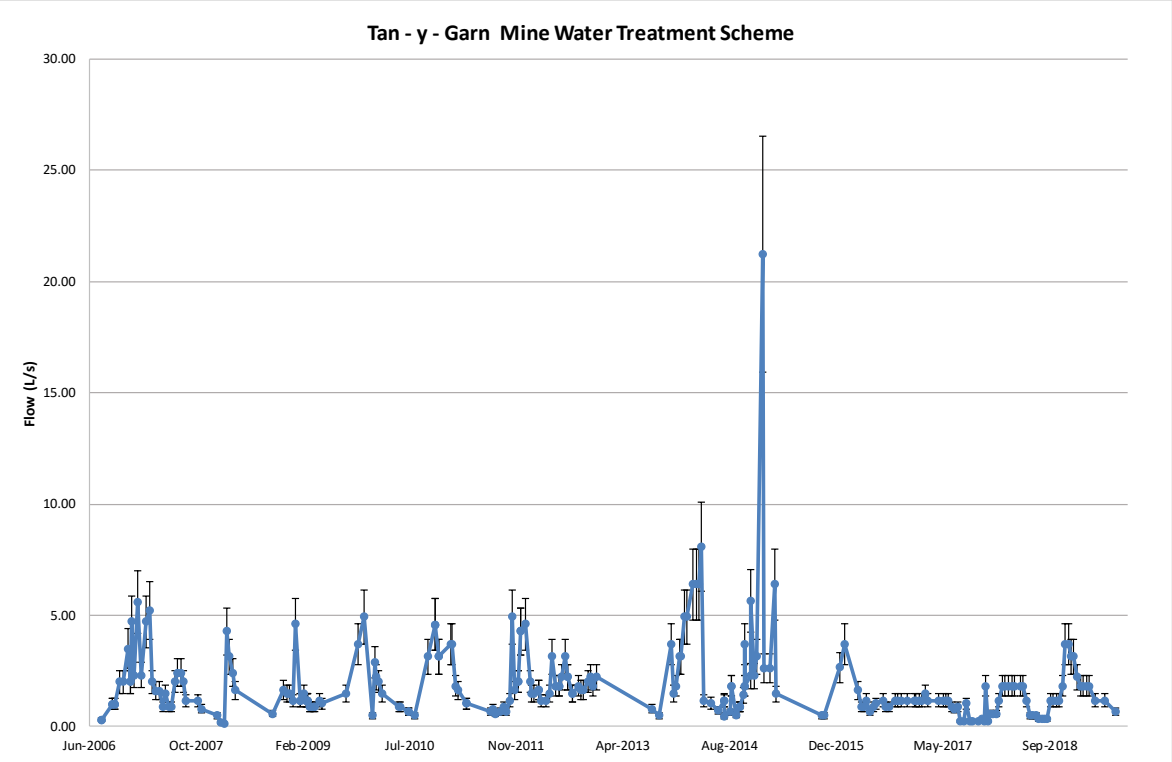

Figure 2: Tan-Y-Garn Mine Water Treatment Scheme

8.4 Detailed description of how the abstraction has taken place

None of the mine water treatment schemes in operation by the Coal Authority are associated with current, or future mine workings – they are all draining abandoned coal workings which have historically flooded, and discharged to surface. The Coal Authority schemes don't dewater workings in the sense that water levels aren't actively drawn down using pumps. The water treated emerges at surface as a result of water levels having fully recovered within the abandoned mines so that it naturally drains from the adits/ shafts. The drainage of the old workings may be considered to be passive dewatering (by gravity), as against active dewatering (with pumps). The main purpose of transferring the mine water is for pollution treatment. On the other hand, the passive dewatering is an integral first step in order to feed water into each treatment scheme.

Flow to the scheme is via a pipe from a former adit (Coal Authority reference 263209-024). This has been intercepted within a concrete chamber and the flow diverted into a pipe to the treatment system. The flow passes through a RAPS wetland, three settlement ponds and finally through a reed bed prior to discharge to the river.

A second small ephemeral flow, a diffuse discharge possibly associated with a coal seam outcrop, emanates from the batter to the south of the site. The flow is collected together with the surface water that flows off the batter during rain storms via a ditch running alongside the access track. A pipe passes under the access track and the flow discharges in to the reed bed at its southeast corner via a small head wall.

See Appendix B, Figure B1 and Appendix C, Figure C1 for photos and as-built drawings of the abstraction point.

Under normal operating conditions, all of the flow passes into the MWTS. This is to allow all of the mine water to be treated prior to its discharge into Afon Cathan.

The abstraction volume is **entirely rainfall dependent** and flows depend on the mine water volumes within the workings.

There is **no physical upper limit** to the volume abstracted into the MWTS other than pipe diameter. This means that extreme rainfall events across the coalfield area could result in abstracted flows being higher than the maximum value recorded to date. In a similar way, if there are fundamental changes to flow paths in the abandoned coal mines (through roof falls etc.) then higher flows could occur.

The abstraction into the MWTS has run continuously since the MWTS construction.

Flows typically range from 0.5 l/s up to 8 l/s in extreme weather events (Figure 2). Due to the flows being dependent on rainfall we ask that this be the basis for our abstraction licence volumes. If this isn't possible, we ask that the maximum recorded flow reading of 8l/s be used.

The abstraction is **non-consumptive**, and following treatment, all the abstracted water is returned to Afon Cathan.

It is possible for the abstraction into the MWTS to be stopped. This would be achieved by removing the bung in the original pipe, and inserting a bung into the pipe leading to the MWTS.. This original pipe runs directly into the Afon Cathan.

8.5 Please list the evidence you are providing to support your application

An excel spreadsheet entitled 'Tan y Garn Data' has been included with this application. The excel spreadsheet shows the flow volumes measured at the outlet weir.

Photos of the abstraction, treatment scheme and scheme discharge are also included in the appendices of this document.

9 Discharge Details

The site operates under discharge permit: BP03048101. The scheme is non-consumptive and 100% of the water abstracted is discharged into the Afon Cathan.

16. Licence Duration

The mine water will require treatment until water quality is significantly improved. Abstraction and treatment of the water is therefore likely to continue for >25 years. Due to this we ask that the licence be granted for the maximum permitted period of 18 years. However, we are also content if NRW choose to apply the common end date for the catchment.

As indicated above (response to 8.4) the abstraction into the MWTS can physically be stopped.

However, this would result in the continuing gravity-driven discharge entering the Afon Cathan.

Appendix A: Tan y Garn Mine Water Treatment Scheme

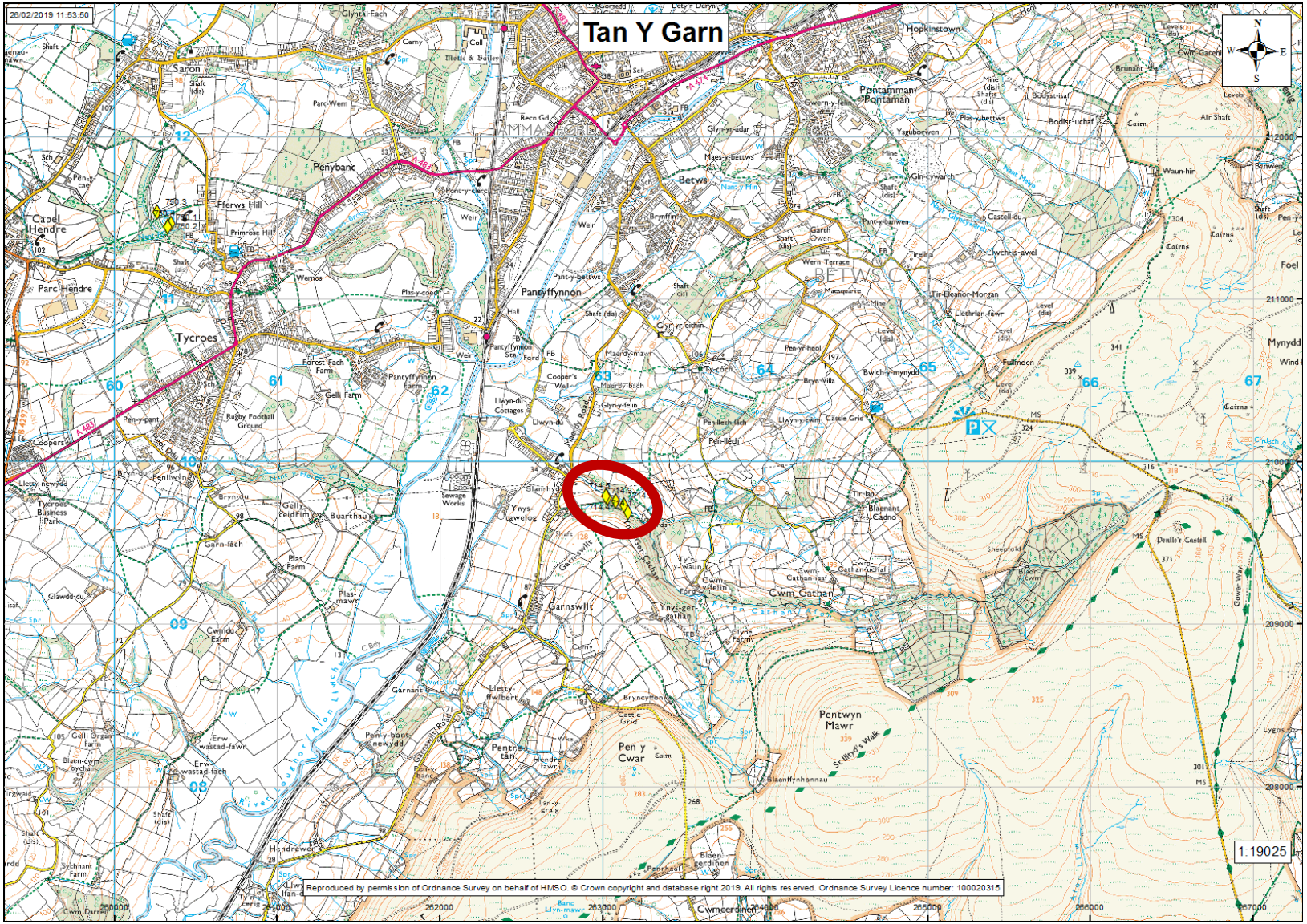

Figure A1: Tan y Garn Site Location Map; site circled in red.

Tan-Y-Garn Site Plan

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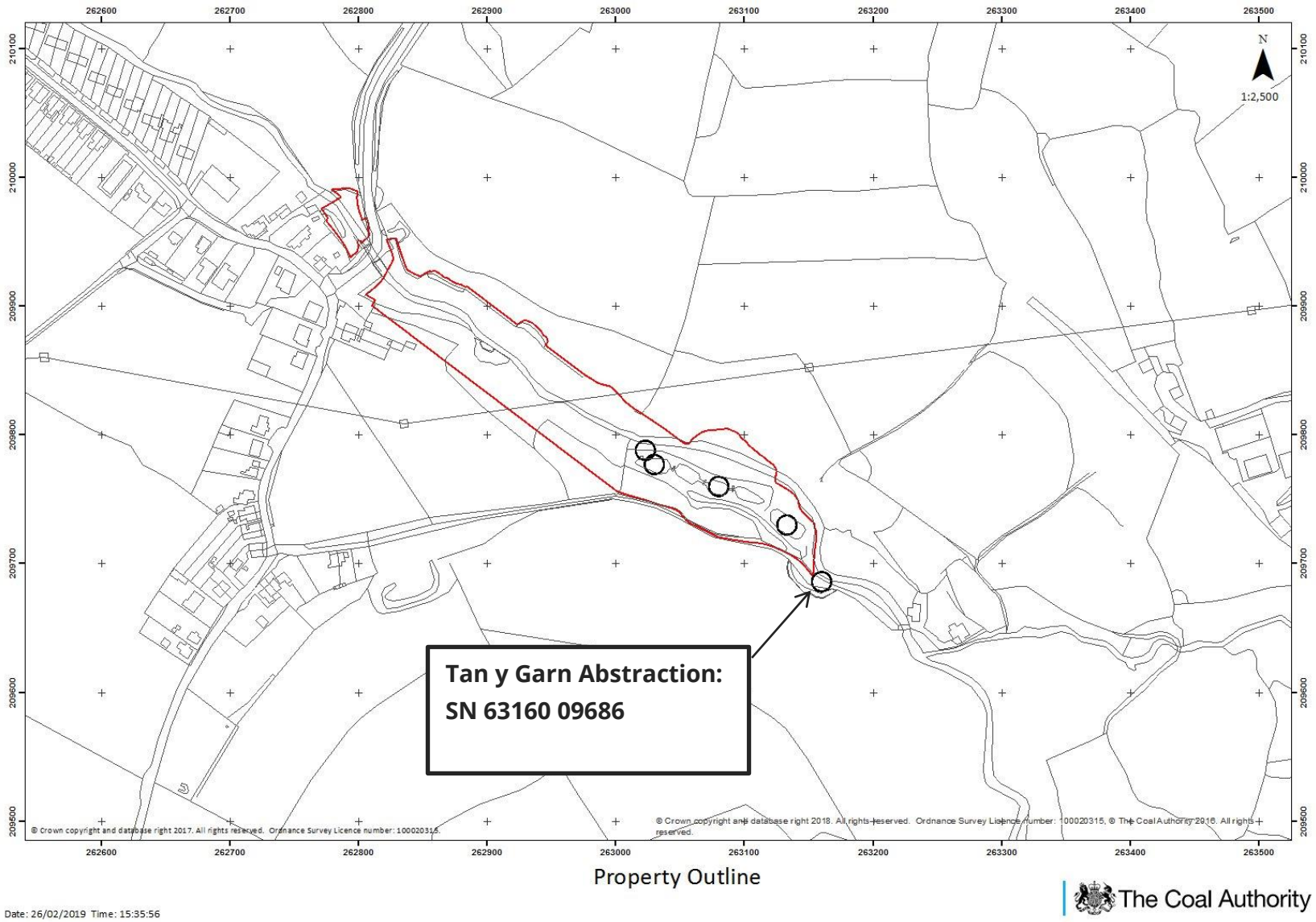

Figure A3: Property outline for Tan y Garn. The area ringed in red indicates owned property.

Appendix B: Tan y Garn Site Photos

Figure B1: Photos. Left: the capture chamber looking towards the sealed adit portal; the River Cathan lies directly behind the viewpoint. Right: Looking down into the mine water capture chamber where water is diverted from its original pipeline, and to the side, towards the MWTS.

Figure B2: Photos - Top photo taken 05/12/2017 showing water entering the settlement lagoons where the oxidised iron settles from suspension. Lower photo taken 28th June 2017 showing the reedbed.

Figure B3: Photos Left – water flowing from RAPS into first settling pond. Right - showing the now clean mine water discharging from the scheme passing over the flow monitoring weir. Both photos were taken on the 5th December 2017.

Figure B4: Aerial image of Tan y Garn Mine Water Treatment Scheme (MWTS)

Appendix C: Scheme as built drawings

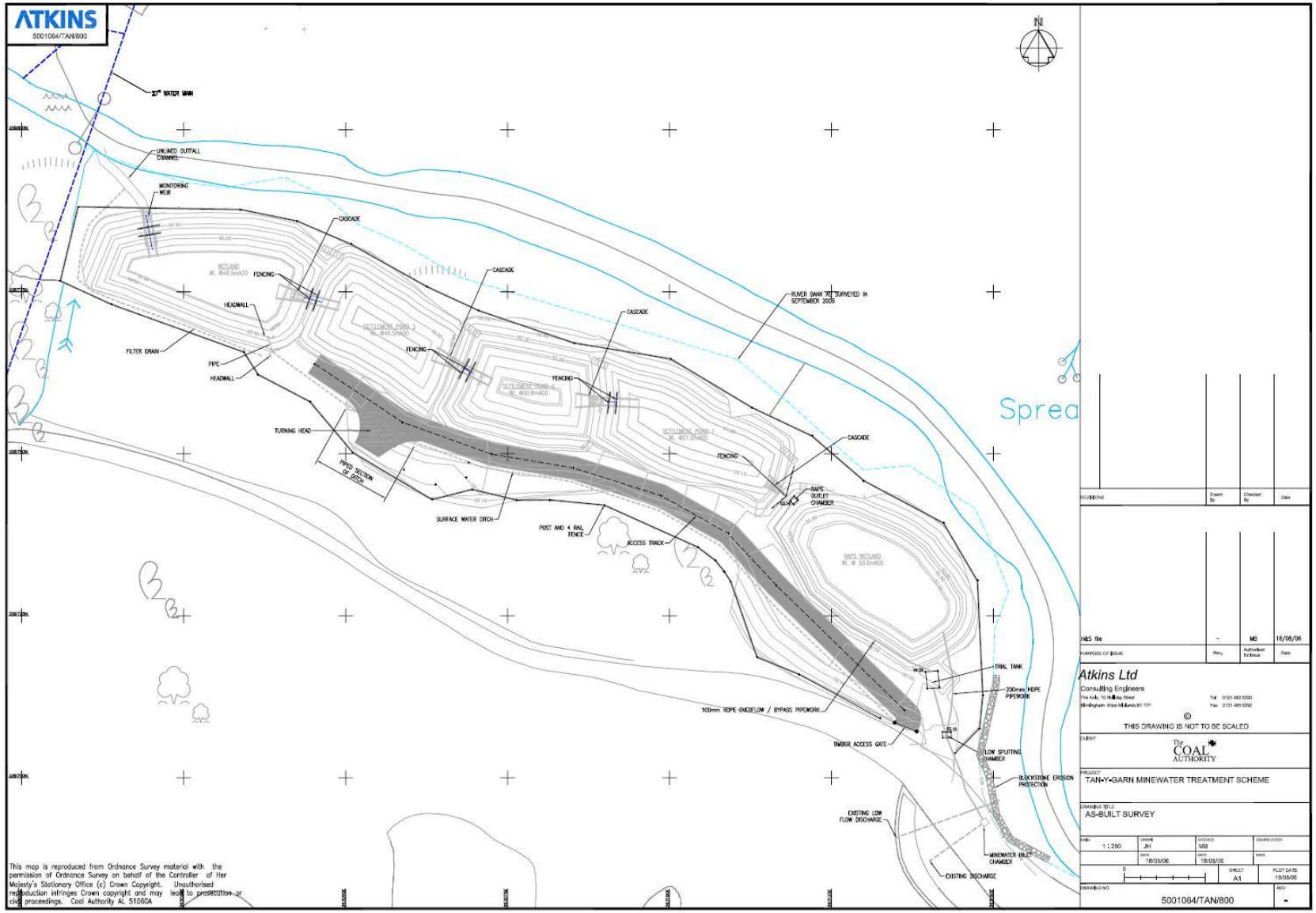

Figure C1: As-built drawings: scheme overview.