The Coal Authority

Resolving the impacts of mining

October 2019

Garth Tonmawr Mine Water Treatment Scheme - New licence application for a previously exempt abstraction-Additional information

1. Introduction

Garth Tonmawr Mine Water Treatment Scheme (MWTS) is one of a group of three mine water treatment schemes located near Tonmawr village. These three schemes are collectively known as the Pelenna sites, the other two being Whitworth No.1 MWTS, and Whitworth A, B and Gwenffrwd MWTS. The Garth Tonmawr scheme was constructed in 1998-1999 by Environment Agency Wales (now Natural Resources Wales) and Neath Port Talbot County Borough Council before it was transferred over to the Coal Authority in 2014. The system treats the discharge from the former Garth Tonmawr Colliery which closed in the early 1960s.

The current scheme consists of: capture of the mine water emerging by gravity from the adit; flow via an open channel, then a pipe bridge across the Nant Blaenpelenna into an overflow chamber; here flow is directed into the treatment area, but any surplus water overflows directly back into the adjacent river; five constructed wetland cells provide passive treatment. These are constructed with honeycomb mat stabilised local colliery waste for the bunds and red brick walls between cells. Finally the treated water is discharged back to Nant Blaenpelenna.

Figure 1 shows the location of the Garth Tonmawr scheme.

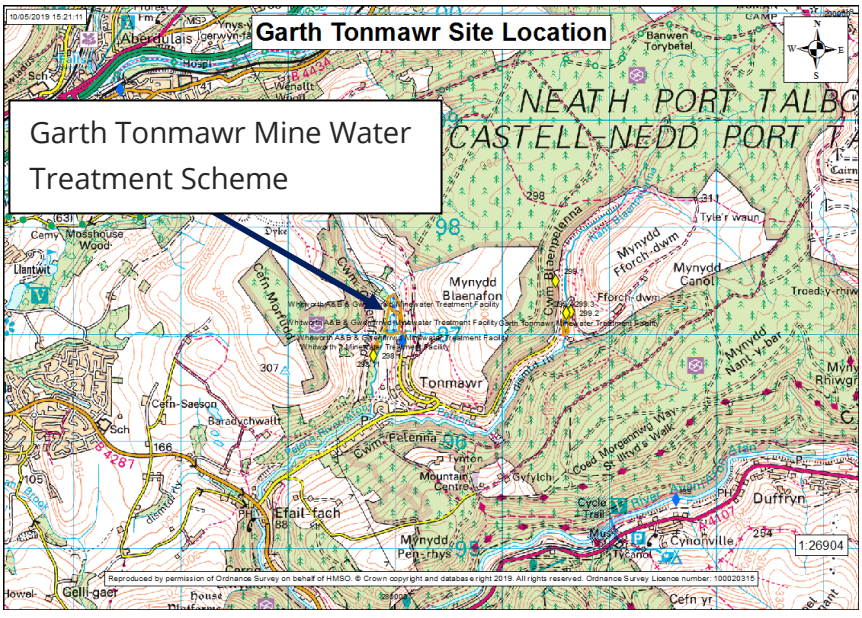


Figure 1: Garth Tonmawr Mine Water Treatment Scheme location

2. Pollution Remediation

The raw mine water has an average iron concentration of ~32mg/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.

When the Garth Tonmawr MWTS was originally constructed it consisted of five cells in series with a total treatment area of 6370m^2. The cells consisted of:

- **Cell 1** Aerobic settlement lagoon (2480m^2).
- **Cell 2** Reducing and Alkalinity Producing System (RAPS). This is an anaerobic downward flow wetland, formed from organic compost overlying a non-dolomitic limestone base (970m^2).
- **Cell 3** Aerobic wetland (980m^2).
- **Cell 4** Reducing and Alkalinity Producing System (RAPS). This is an anaerobic downward flow wetland, formed from organic compost overlying a non-dolomitic limestone base (980m^2).
- **Cell 5** Aerobic wetland (960m^2).

Figure 2 shows the original layout and design of the scheme.

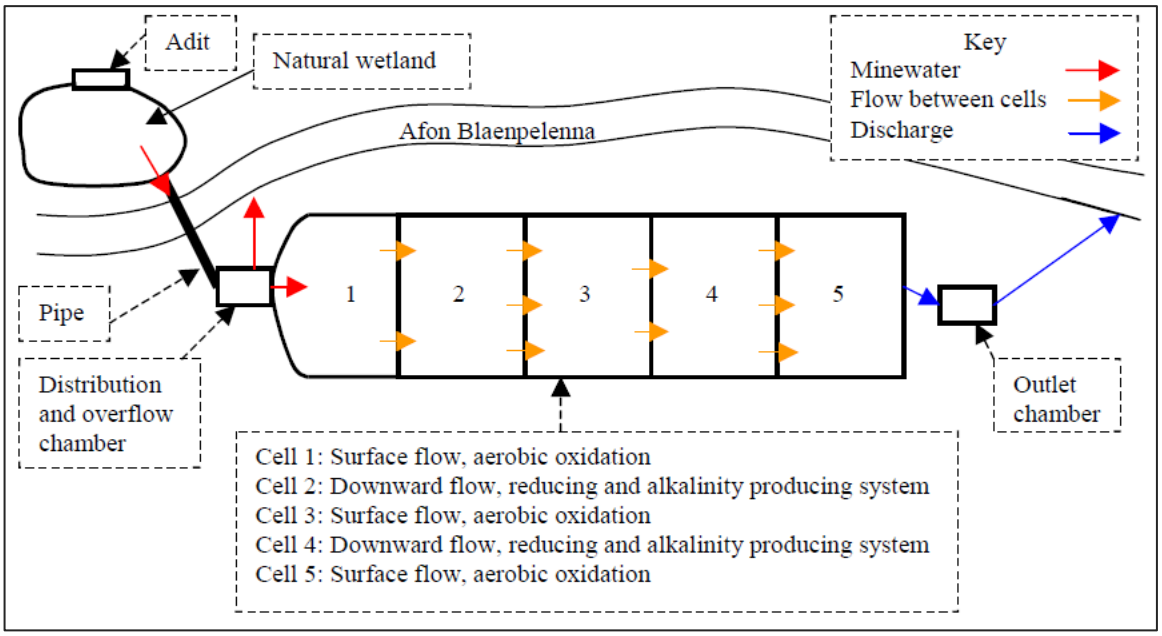


Figure 2: A schematic diagram of the original design for Garth Tomawr (Wiseman, 2002).

Since the construction of the scheme, there has been some improvement in the raw mine water chemistry that has allowed the scheme to be run as a series of reed beds and settlement lagoons. The water now flows through the site and cascades over designated overflow points in the walls of the cells.

From 2018 to present the discharging mine water has had an average iron concentration of ~ 0.9 mg/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. “Garth Tonmawr 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 owns the land where the water upwells and is piped to the treatment scheme. Please see Appendix A, Figures A2 and A3 for maps outlining abstraction points and land ownership, respectively.

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 of the site.

8.1 Abstraction history and evidence

Transfer of the mine water has taken place continuously throughout the full duration of the seven year qualifying period.

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.

Flow is measured at a v-notch weir at the inlet to the first pond. A final square weir records flow as it leaves the scheme. Only data from the v-notch weir has been included with this application due to inaccuracies within the rectangular weir readings.

The records of weir measurements are provided as evidence with this application. As the site flow 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 the year.

For ease of visualisation of the amount of data and the variability of flow measurements, a trend chart is provided in Figure 2.

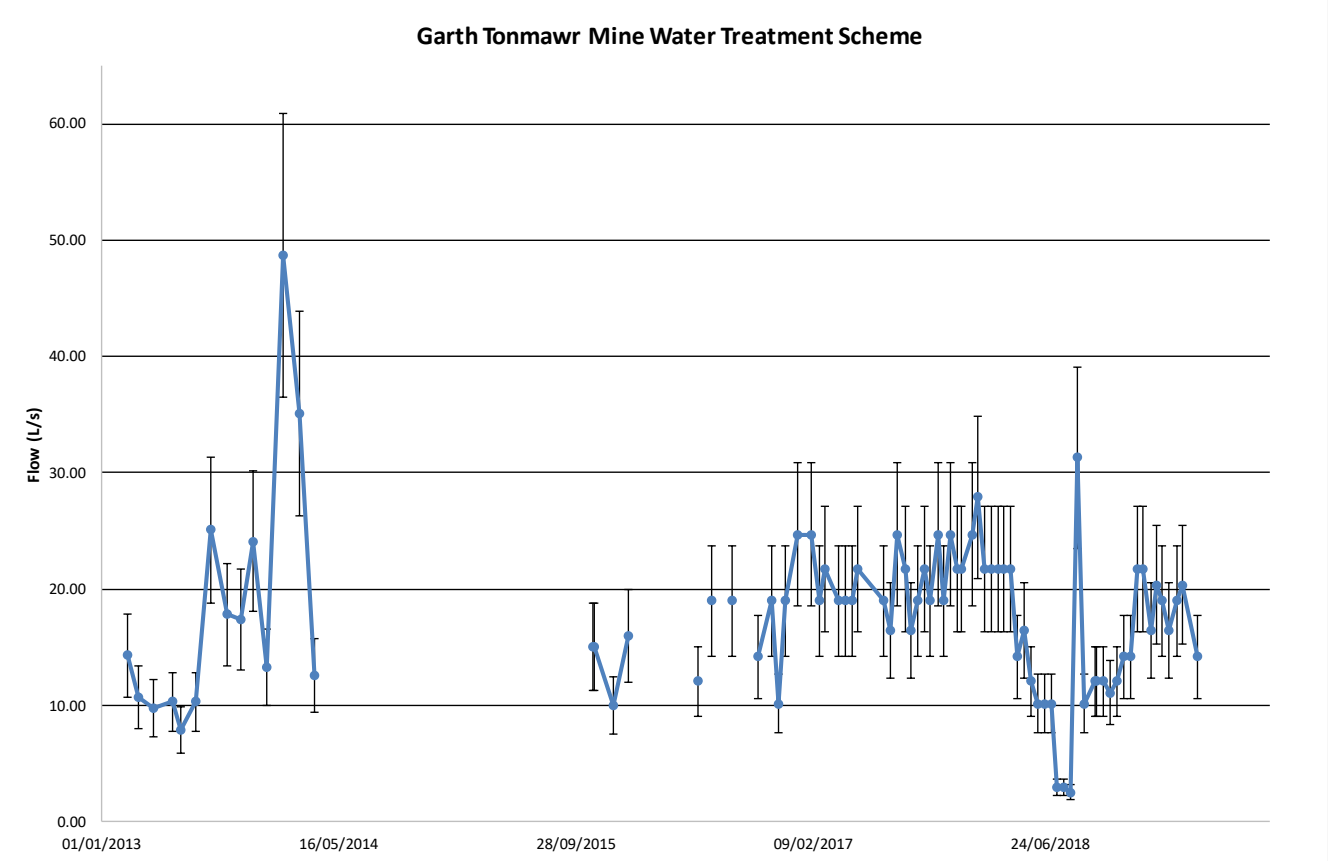


Figure 3: A graph to show weir flow readings, from June 2016 to August 2019.

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 do not dewater workings in the sense that water levels are not actively drawn down using pumps. The treated water emerges at the 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.

The source for the mine water is from Garth Tonmawr Colliery adit. The adit has the Coal Authority mine entry reference 281197-012.

The mine water upwells at an area within the site **entirely passively (see Appendix B, Figure B1)** and is canalised within an open channel, lined with concrete canvas. The water then enters a pipe bridge across the Nant Blaenpelenna, from which it is directed into the overflow chamber. Here, under normal flow conditions, the mine water is directed through a narrow notch in the concrete chamber wall into the first of the five treatment cells. However, under high mine water flow conditions, flow surcharges in the overflow chamber and part of the flow goes over the chamber walls, or the removable section of weir wall, and enters the overflow pipe. Any such overflowing water does not receive any treatment, and is discharged directly below the chamber into Nant Blaenpelenna.

During periods of maintenance, it is also possible to remove the section of weir wall and direct the entire flow into the overflow to the river.

Note on location of abstraction:

It is possible to argue that since only part of the flow of mine water passes through the overflow chamber into the treatment cells, the location of the abstraction is actually at the overflow chamber. It is this overflow structure which effectively controls, or limits, the flow abstracted into the MWTS with any remaining surplus flow being directed to the overflow. We would welcome a discussion on the appropriate location of the abstraction point for the licence.

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

The abstraction volume is **entirely rainfall dependent** and flows depend on the mine water volumes within the workings. This means that extreme rainfall events across the coalfield area may 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 its construction in 1999.

Flows have typically ranged from 10L/s up to >30 L/s in extreme weather events (see Figure 2). Due to the flows being dependent on rainfall, we request that this be the basis for our abstraction licence volumes. If this is not possible, we ask that the maximum recorded flow reading of 49l/s.

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

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

An excel spreadsheet, entitled “Garth Tonmawr Data”, has been included with this application. The excel spreadsheet shows the flow rates estimated or measured, as specified, at the inlet weir (see Figure B2).

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

9 Discharge Details

Historically, the mine water treatment scheme at Garth Tonmawr has been operated by the previous operator, and more recently the Coal Authority, without a discharge permit. It is intended that a permit application for the consent to discharge will be in place by December 2019. The local NRW officer, Andrew Hood, is aware of this site and its operation.

The scheme is non-consumptive and 100% of the water abstracted is discharged into the Blaenpelenna River.

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.

Appendix A: Garth Tonmawr Mine Water Treatment Scheme

Figure A1: Garth Tonmawr Site Location Map; site circled in red

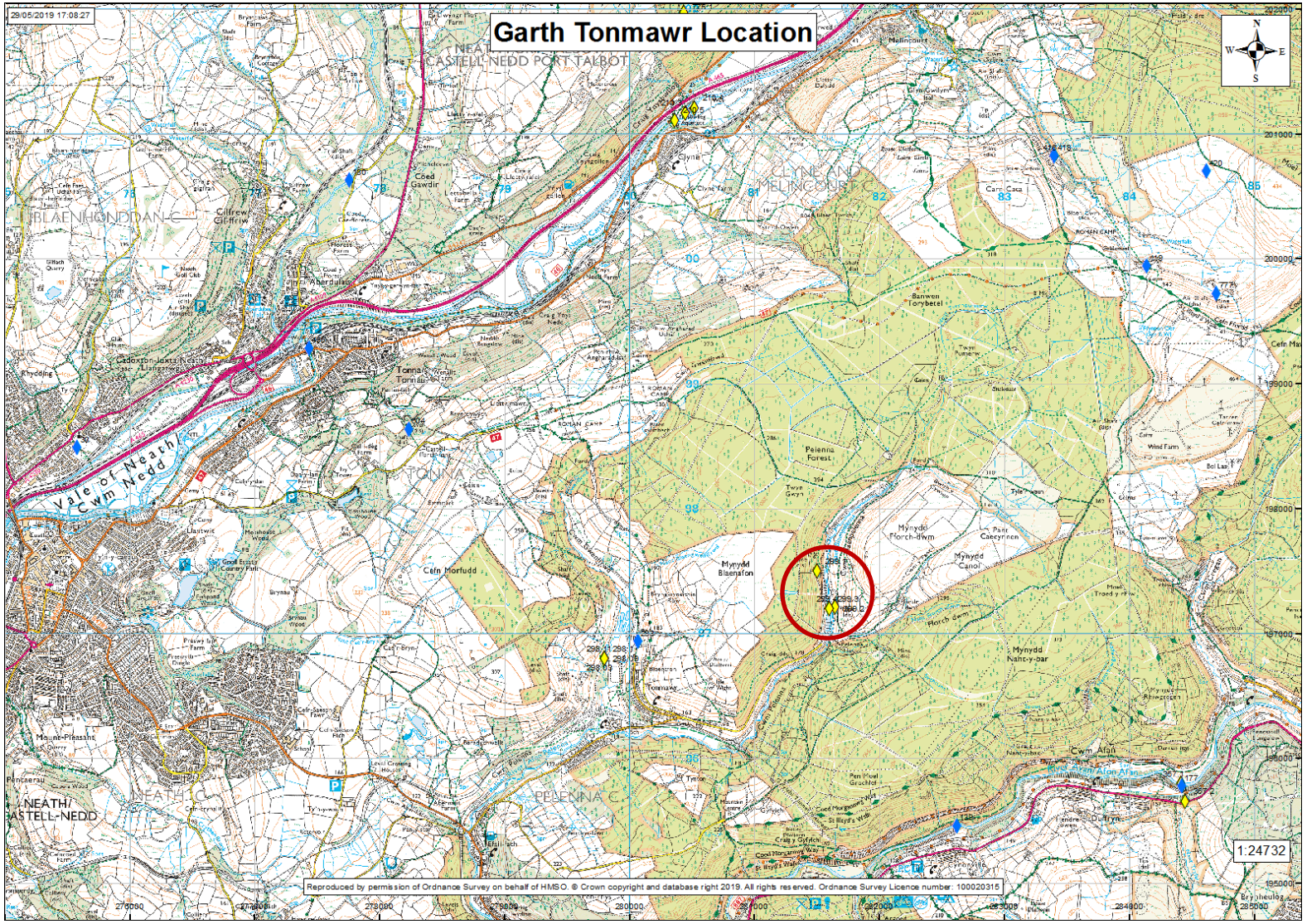


Figure A2: Site plan of Garth Tonmawr with monitoring points marked on.

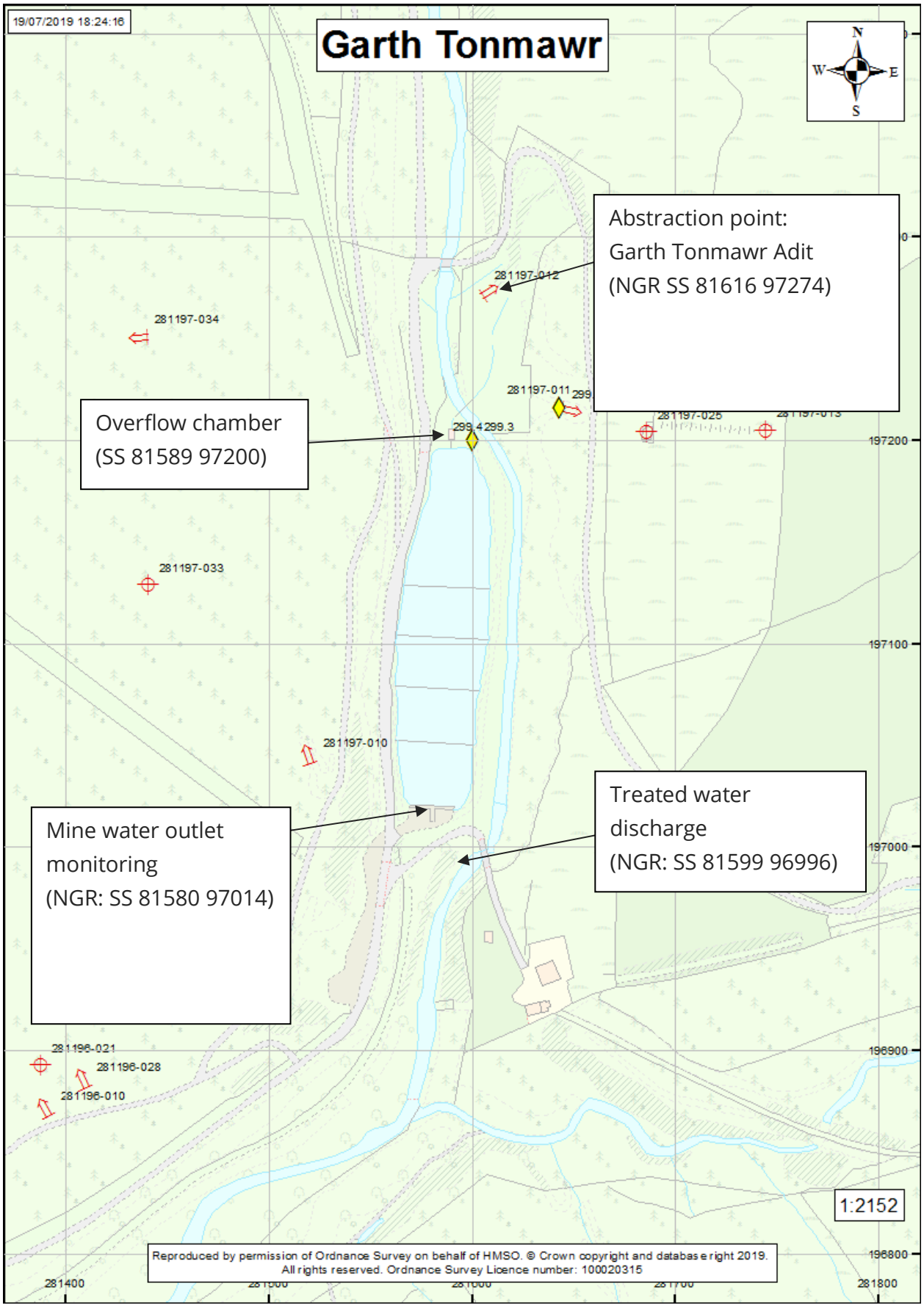
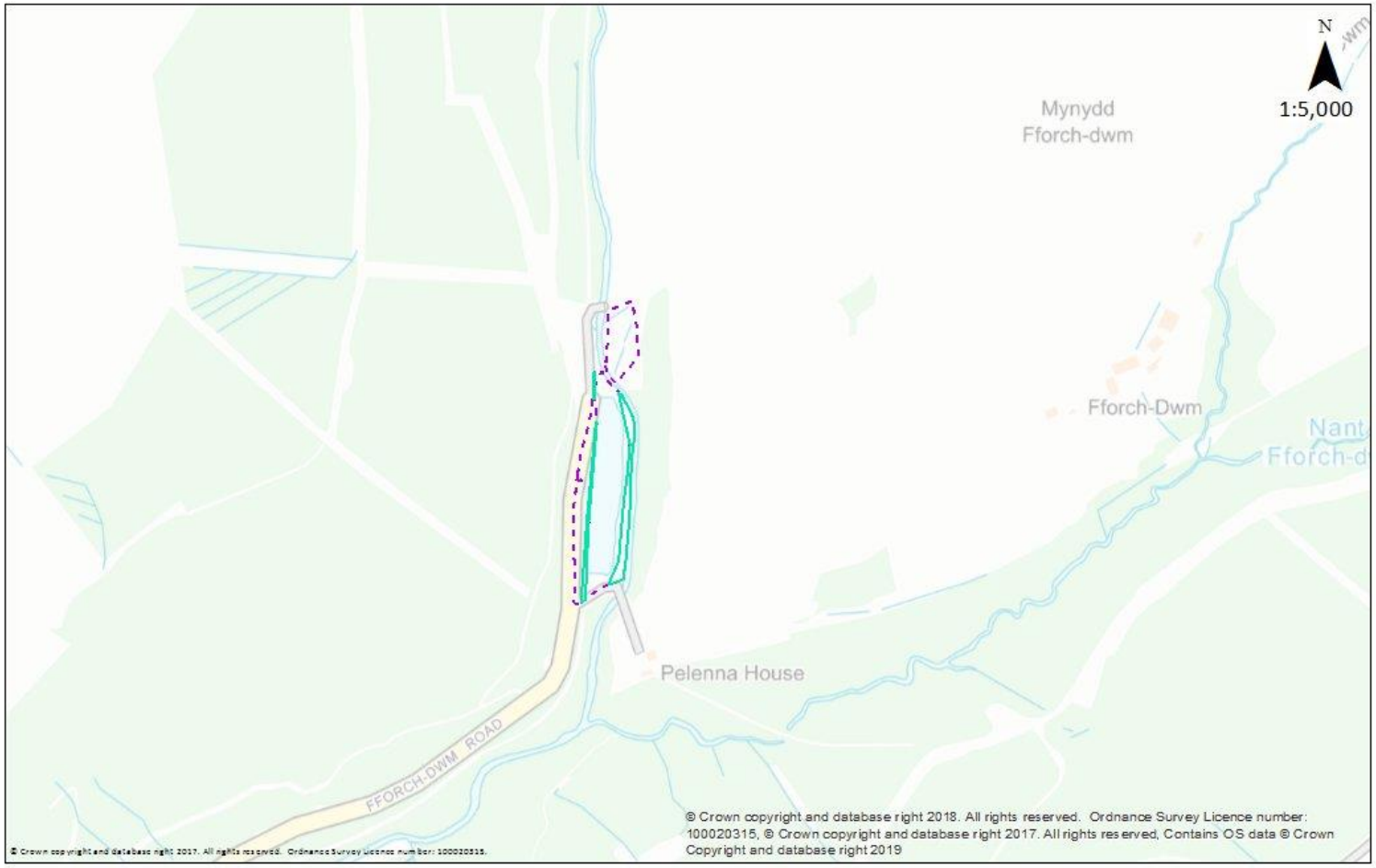


Figure A3: Property outline for Garth Tonmawr; areas outlined in green and purple indicate property owned by the Coal Authority



Appendix B: Garth Tonmawr Site Photos

Figure B1: The left photo shows an area of mine water upwelling where the water is canalised via a concrete canvas. The right photo shows the length of the channel prior to the water entering a pipe crossing the river.

Figure B2: The left photo shows the overflow chamber with monitoring weir at the entrance to the scheme. Normal flows pass through the narrow notch (top-middle) into the treatment cells. The overflow pipe is to the left hand side below the removable weir wall (seen at the top-left). Note the ochre staining on top of the walls, and the tide mark (right wall) indicating that overflows occur. The right photo shows the engineered overflow points in the brick walls between cells.

Figure B3: Photos showing an aerial view spanning the entire Garth Tonmawr.

Figure B4: Both photos show the scheme discharge point where flows are measured via a gauge board and rectangular weir.

Figure B5: Both photos show the scheme discharge into the Afon Blaenpelenna. The left photo shows the discharge during low flow periods. The right photo shows a period of higher flow.

Appendix C: Site Schematic

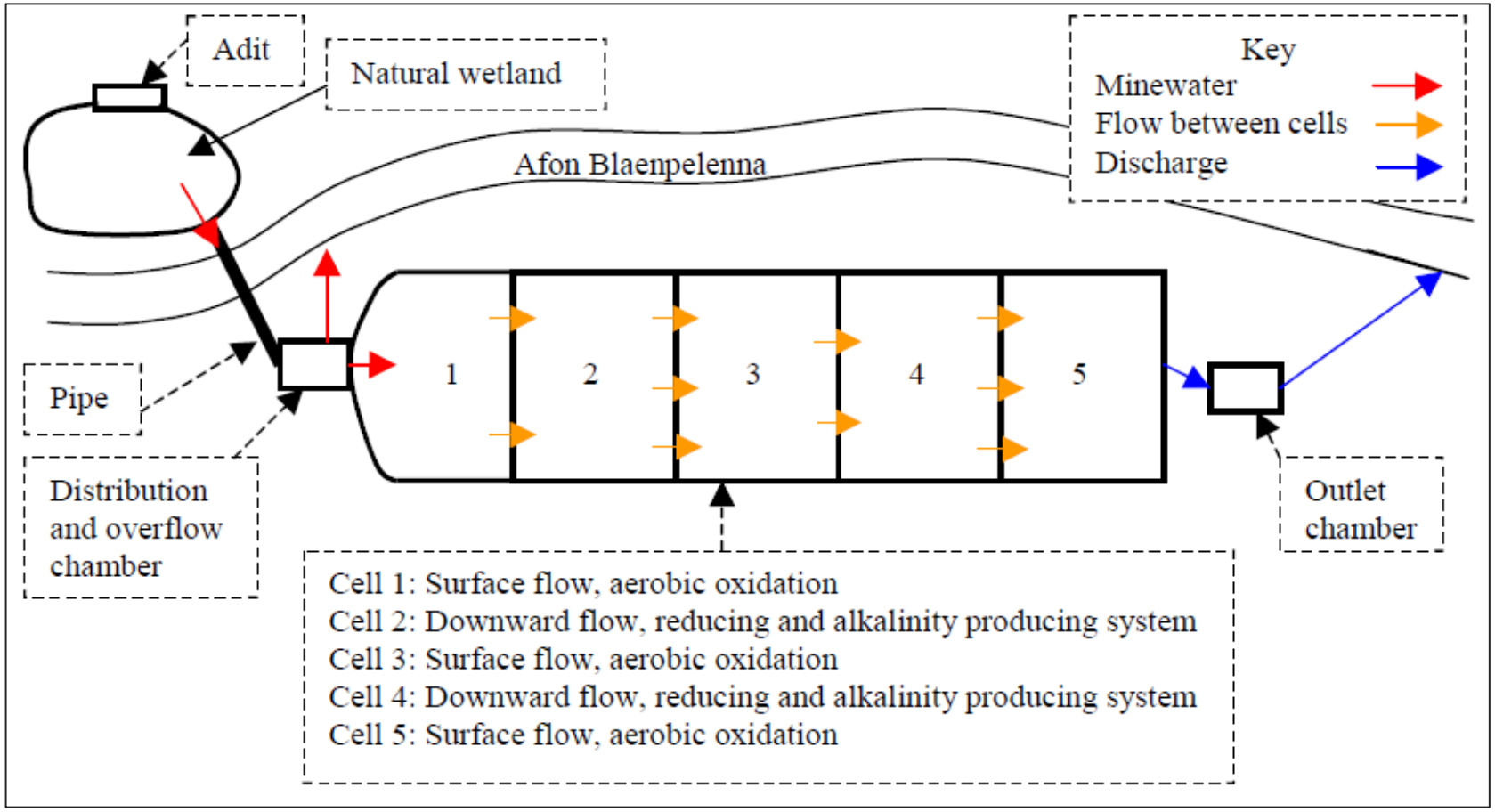


Figure C1: Drawings showing the water diversion from the adit to the treatment cells. (Wiseman, I. 2002. Constructed Wetlands for mine water treatment. R&D Technical Report P2-181/TR