



# Blaenavon Mine Water Treatment Scheme - New licence application for a previously exempt abstraction-Additional information

## 1. Introduction

The Blaenavon Mine Water Treatment Scheme was constructed to remediate pollution impacts of mine-water caused by historic coal mining. Prior to the scheme build, the mine water impacted 1km of the Afon Lwyd due to elevated iron concentrations.

The mine-water discharge at Blaenavon issues from an adit known as River Arch. Originally, it joined with a minor run-off approximately 30m downstream of the adit portal and then with the, culverted, Afon Lwyd (River Lwyd) a further 400m downstream.

When the mine was in operation, pumped mine water (30-40l/s) discharged via the River Arch Adit. However, flow from the adit is no longer pumped but is gravity driven from two underground water courses that continuously discharge from the adit.

Figure 1 shows the location of the Blaenavon Mine Water Treatment Scheme (MWTS).



**Figure 1: Blaenavon Mine Water Treatment Scheme location.**

## 2. Pollution Remediation

The raw mine water has an iron concentration of ~7mg/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 treatment scheme at Blaenavon was constructed during 2001. It comprises of three reed bed cells, gravity fed by a pipe that runs from approximately 100m inside the River Arch adit. The stream was diverted to enable the reed beds to be accommodated in the narrow valley. The treated mine water discharges from the scheme with an average iron concentration of 0.15mg/l.

Maps, photos and plans showing the scheme are located within the appendices of this document.

## 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. "Blaenavon 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	<a href="mailto:ChrisCrowe@coal.gov.uk">ChrisCrowe@coal.gov.uk</a> ; <a href="mailto:EnvironmentMail@coal.gov.uk">EnvironmentMail@coal.gov.uk</a>
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 access to and leases the land where the water is piped from the adit and where the treatment scheme currently sits. Please see Appendix A, Figures A2 and A3 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 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 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 60deg. v-notch thin plate weir. This weir – see Appendix B, Figure B3 - is located after the final reed bed at 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.

An assessment of the weir at Blaenavon is considered to be of medium accuracy with  $\pm 15\text{-}25\%$  error on flow rate. The records of weir measurements are provided as evidence with this application but the potential weir error of  $\pm 15\text{-}25\%$  should be taken into account when looking at the provided flow rates.

As the flow rate of mine water at the site is rainfall related, and infrequently monitored, an estimation of the quantities abstracted are given on form WRH, in Table 8.1, using the largest measured flow rate recorded for the year (peak instantaneous flow rate in l/s). Consequently, these values are anticipated to be the maximum volumes of water that may have been abstracted during the year, but, in practice, volumes abstracted would have been less than the volumes stated. For ease of visualisation of the amount of data, and the variability of flow rate results, a trend chart is provided in Figure 2.

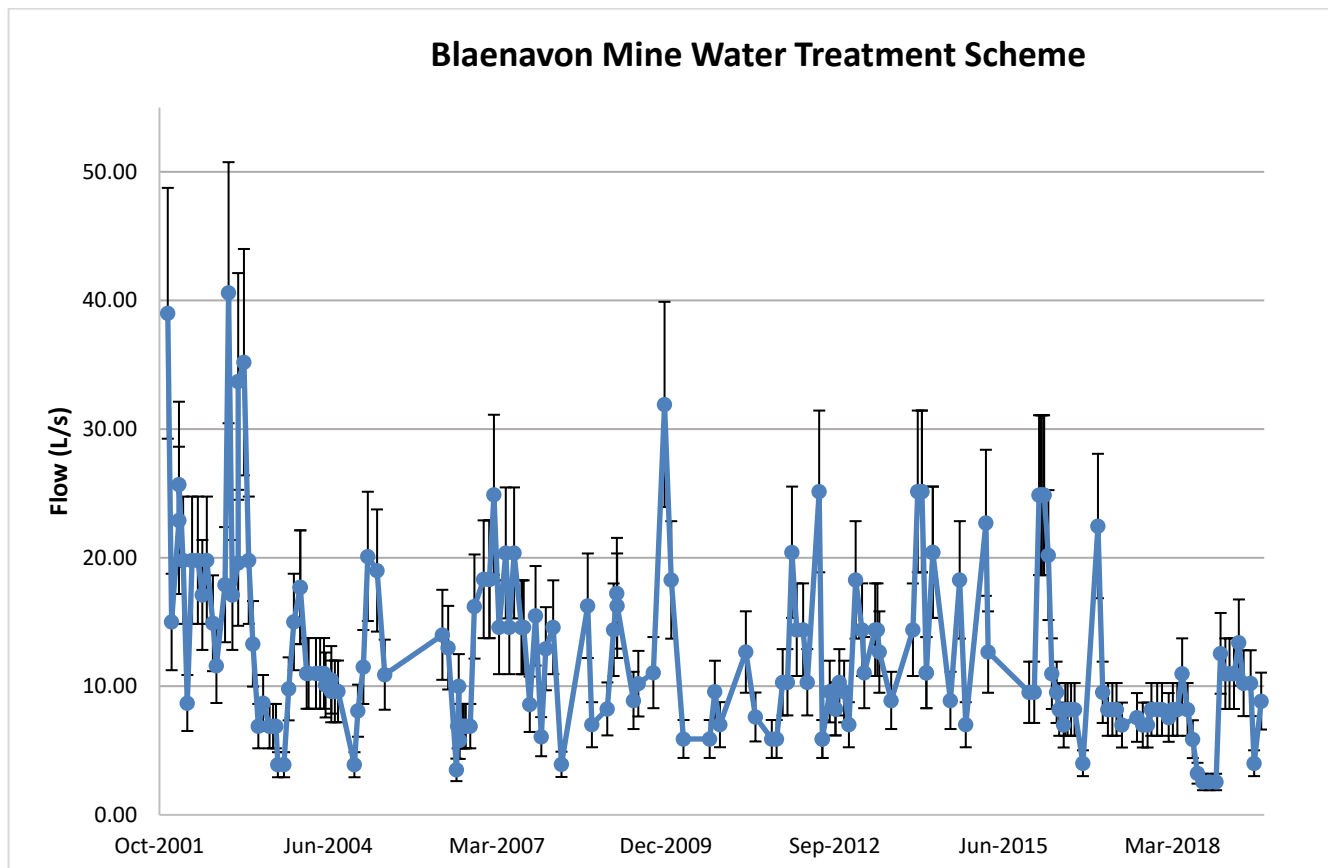


Figure 2: A graph to show v-notch weir flow readings

#### 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 abstraction is the River Arch Adit. The shaft has Coal Authority mine entry reference 324208-006. The adit continues to act as an emergency exit from Big Pit, which although mining ceased many years ago, continues to operate as a museum including various underground galleries.

The mine water is abstracted from the mine **entirely passively** via a gravity-fed pipe installed within the River Arch adit. See Appendix B, Figure B1 and Appendix C, Figure C1 for photos and as-built 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 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 its construction in 2001.

Flows typically range from 5l/s up to >35l/s in extreme weather events (see Figure 2). Due to the flows being dependent on rainfall we ask that this be the basis for our abstraction licence volumes. If this is not possible, we ask that the maximum recorded flow reading of 41l/s be used.

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

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

An excel spreadsheet, entitled "Blaenavon Data", has been included with this application. The excel spreadsheet shows the flow rates 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, AN0310401, which does not reference a flow rate.

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

### **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: Blaenavon Mine Water Treatment Scheme

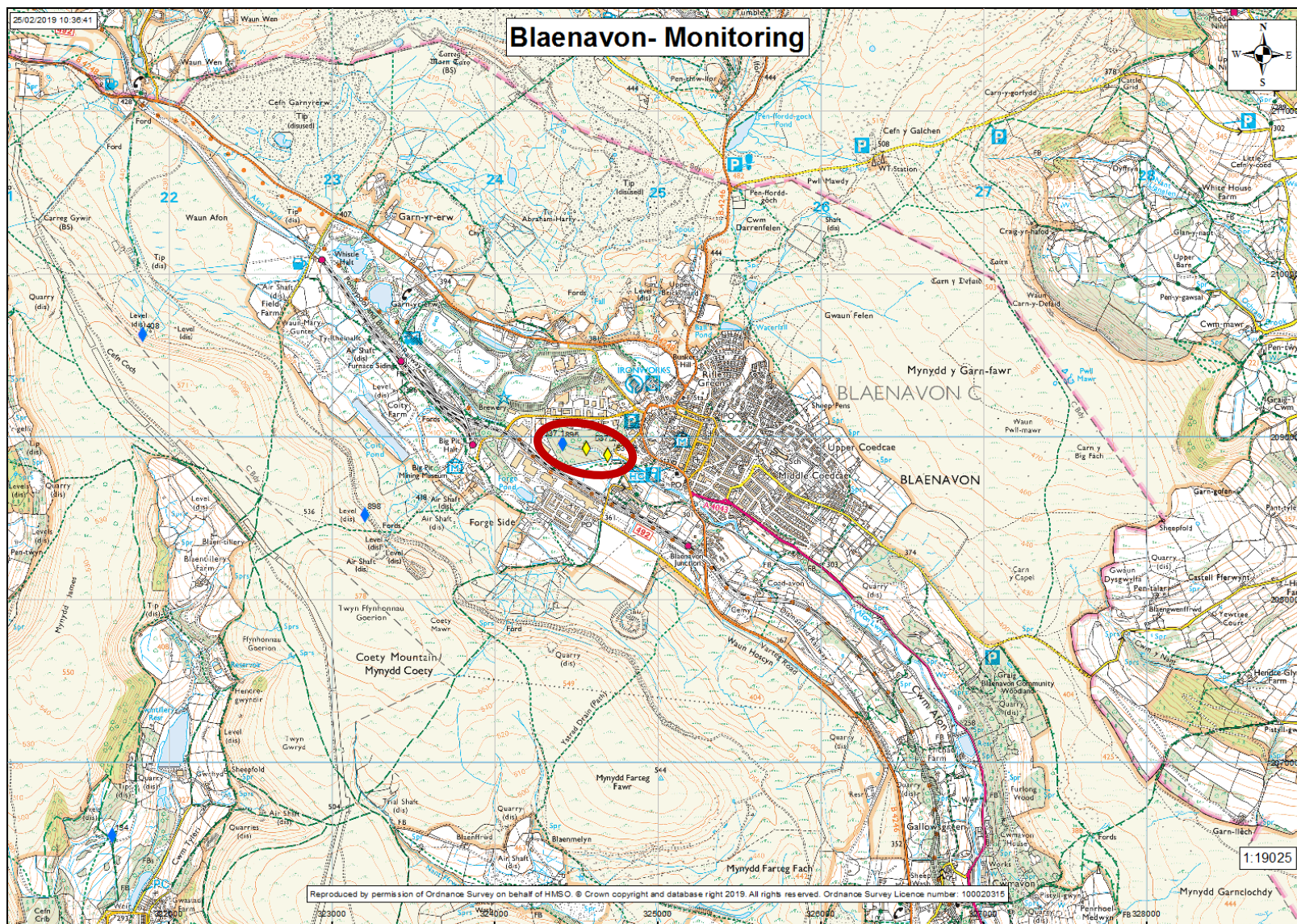


Figure A1: Blaenavon Site Location Map; site circled in red

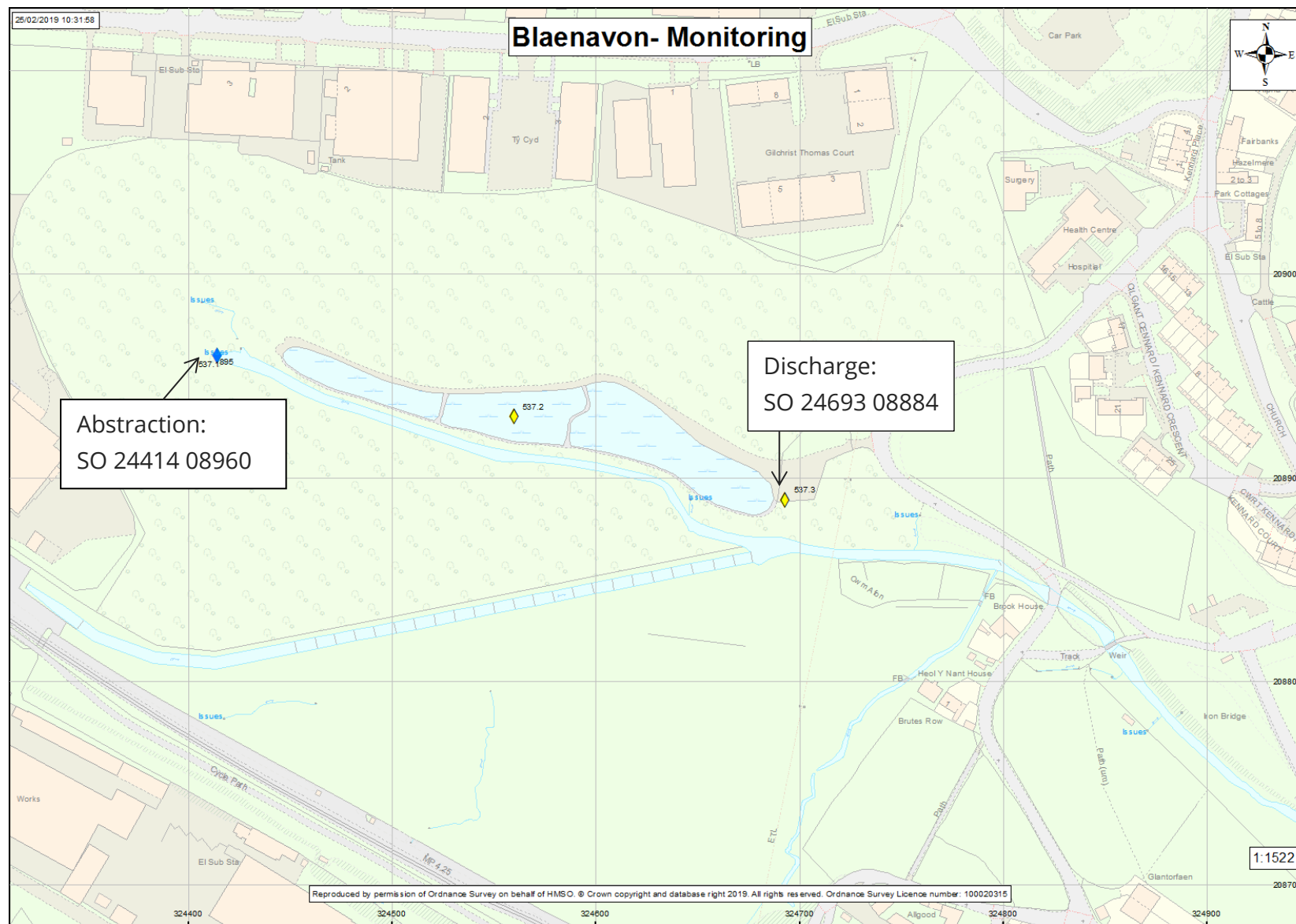
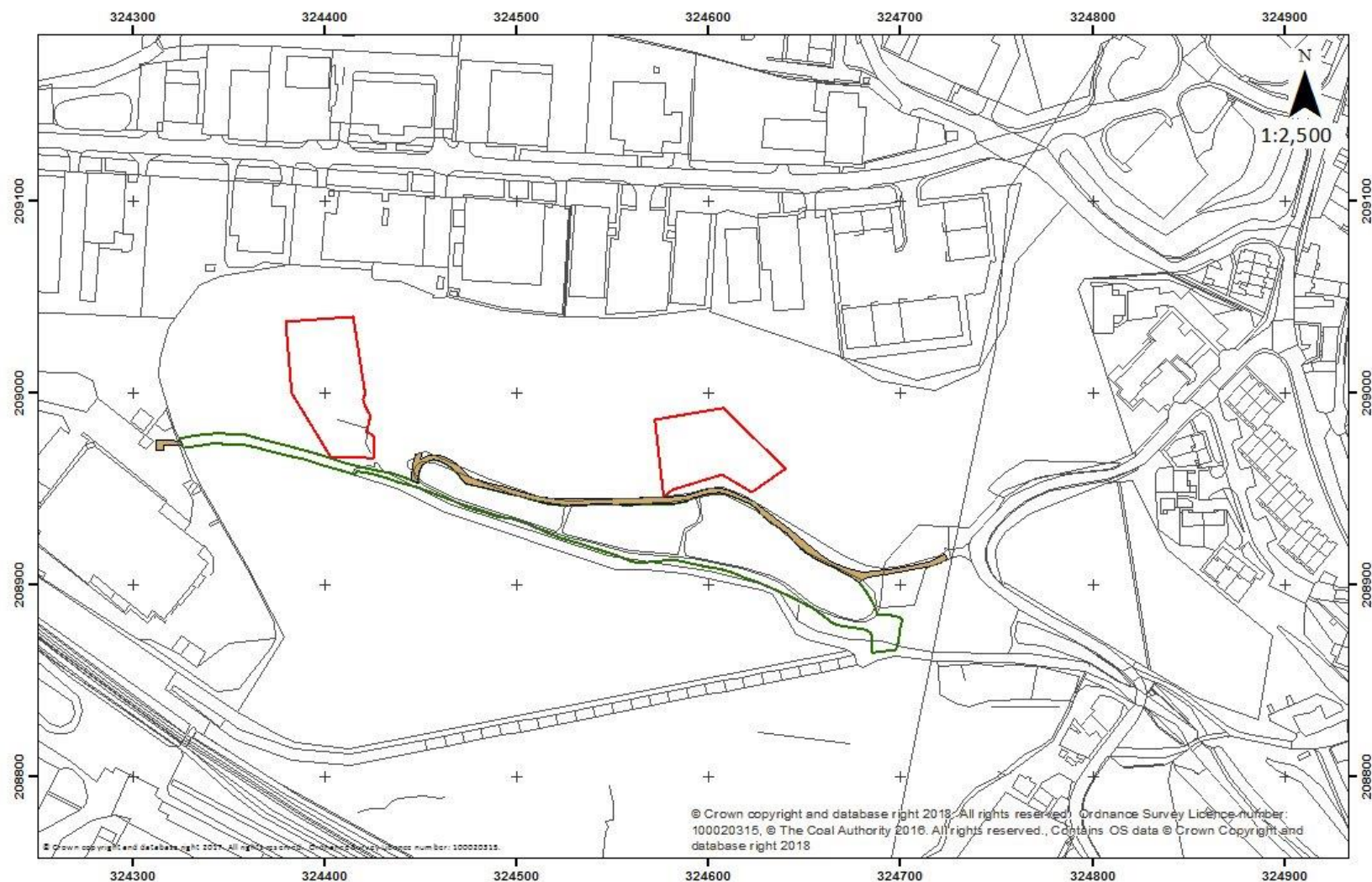


Figure A2: Site plan of Blaenavon with monitoring points marked on.





Blaenavon- Land Access



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**Figure A3: Property outline for Blaenavon; areas outlined in red indicate property owned by the Coal Authority, areas in green indicate land leased by the Coal Authority and brown areas indicate permitted access.**



## **Appendix B: Blaenavon Site Photos**



**Figure B1: Photos showing the mouth of the River Arch Adit and the end section of pipework. The pipe seen in both photos is the diversion of the mine water from the adit to the mine water treatment scheme.**





**Figure B2: Photos showing the diverted ochreous mine water entering the reed bed where the oxidised iron settles from suspension.**





**Figure B3: Photos showing two of the reed beds at the site and the now clean mine water discharging from the scheme. The lower photo shows the v-notch weir used to measure flows at the discharge point.**





Blaenavon site plan



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**Figure B4: Aerial image of Blaenavon Mine Water Treatment Scheme (MWTS)**

## Appendix C: Site Schematic

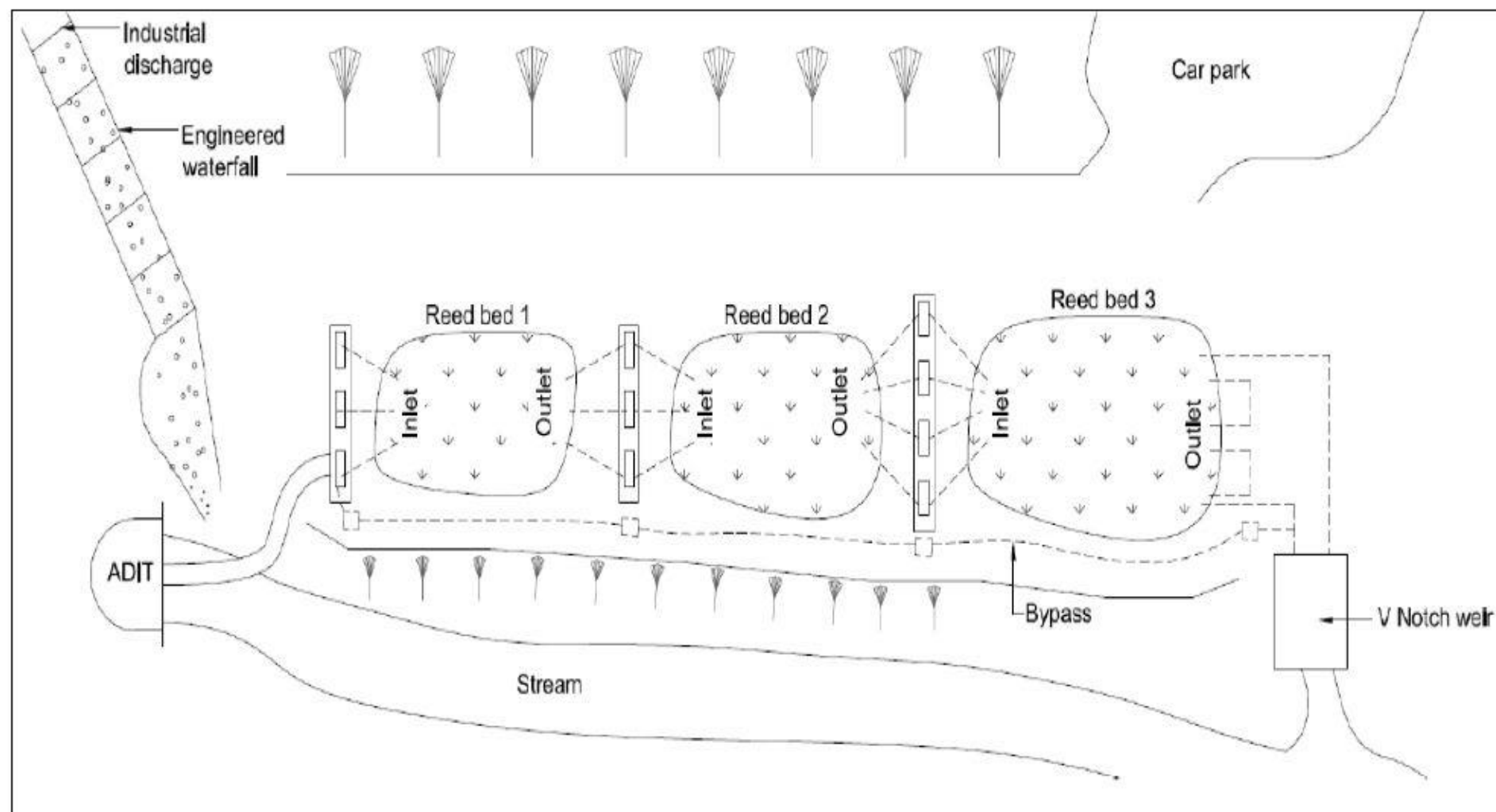


Figure C1: Drawings showing the water diversion from the adit to the reed beds and the location of the flow monitoring weir.