The Coal Authority

Resolving the impacts of mining

October 2019

Whitworth No. 1 Mine Water Treatment Scheme - New licence application for a previously exempt abstraction-Additional information

1. Introduction

Whitworth No.1 Mine Water Treatment Scheme (MWTS) is one of a group of three MWTS located near Tonmawr village. These three are collectively known as the Pelenna sites, the other two beingGarth Tonmawr MWTS, and Whitworth A, B and Gwenffrwd MWTS.

The Pelenna valley situated near the towns of Neath and Port Talbot in South Wales is a classic example of the legacy of coal mining. Coal mining began in the area around Tonmawr, a village in the Pelenna valley. The earliest records show mining dated back to 1823 followed by the development of a number of pits over the next 100 years. Mining ceased in the early 1960's. Following the closures of these mines, workings flooded and mine drainage discharged into the Gwenffrwd and Blaenpelenna, tributaries of the Afon Pelenna. The discharges stained the two tributaries and the River Pelenna orange. They caused elevated iron concentrations for approximately 7km, as far downstream as the confluence with the River Afan. Ecological assessments showed the mine water discharges were causing juvenile trout populations and macroinvertebrate assemblages to be impoverished.

A project was set up to look into ways to deal with the mine water pollution. The chosen method of treatment was to construct wetlands as a means of passively treating the mine water discharges.

The Pelenna Mine Water Treatment Group was constructed in three phases between 1995 and 1999.

The construction of the Whitworth No. 1 scheme was completed in October 1995 and the project was carried out in partnership by Neath Port Talbot Borough Council and the Environment Agency.

Whitworth No.1 MWTS was passed to the Coal Authority in 2014.

The current scheme consists of: capture of the mine water emerging by gravity from the adit; treatment in four constructed wetland cells; and discharge of treated mine water to Gwenffrwd.

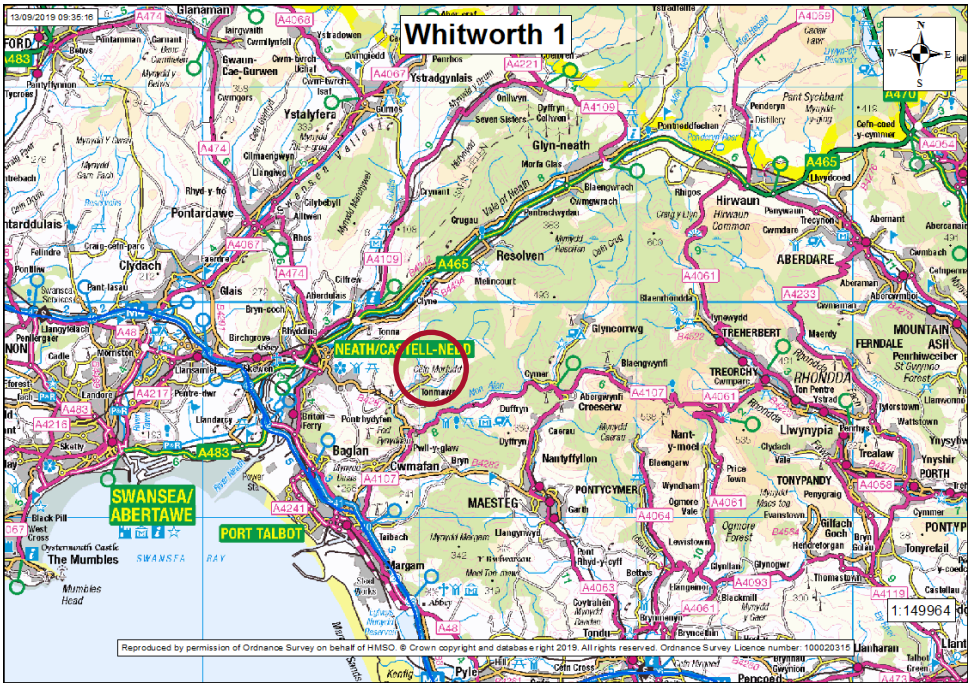

Figure 1: Mine Water Treatment Scheme location. Highlighted in red ring.

2. Pollution Remediation

The Whitworth No. 1 scheme was constructed in 1995 to treat the discharge from East End Colliery. It initially comprised of four cells of equal area totalling 900m^2. These were constructed in pre-cast concrete walls with a geo-textile base liner. The cells operated in parallel by splitting the incoming water into four channels. A number of treatment methods were used as part of research trials.

Since its construction however, the Whitworth No. 1 scheme has undergone significant refurbishment. The four cells were re-configured so the flow runs through them in series, as against the original parallel flow setup. The current MWTS comprises a series of four cells, the first of which is a settlement lagoon and the subsequent three cells are aerobic wetlands. The treated mine water is then discharged via an outlet system into the Nant Gwenffrwd.

The raw mine water has an average iron concentration of ~19 mg/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. Discharge concentrations from the scheme are ~1.5mg/l. Figure 1 shows the layout and design of the existing mine water treatment scheme.

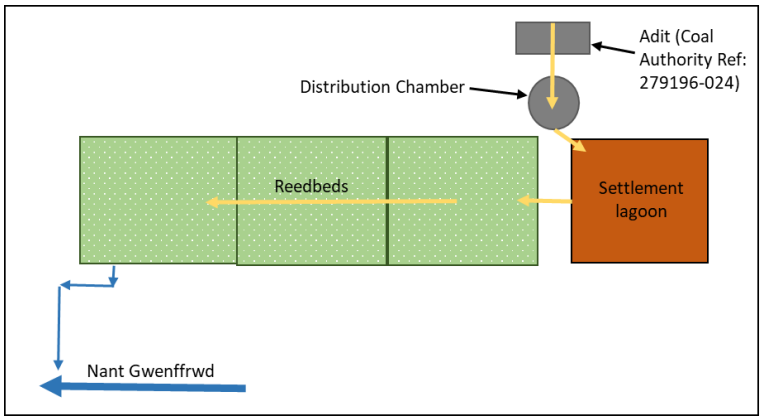

Figure 2: Design and layout of the Whitworth No. 1 Mine Water Treatment Scheme

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. "Whitworth No. 1- 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 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.

7.0 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 have been taken during visits.

The mine water discharges from the adit and is fed into the scheme via a purpose-built distribution chamber. A V-notch weir is contained within a deep chamber following the final treatment cell; however the confined nature of the distribution chamber makes it unsuitable for flow monitoring.

Some spot flow readings have been taken over the years; however, these are likely to have a large margin of error.

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, trend chart is provided

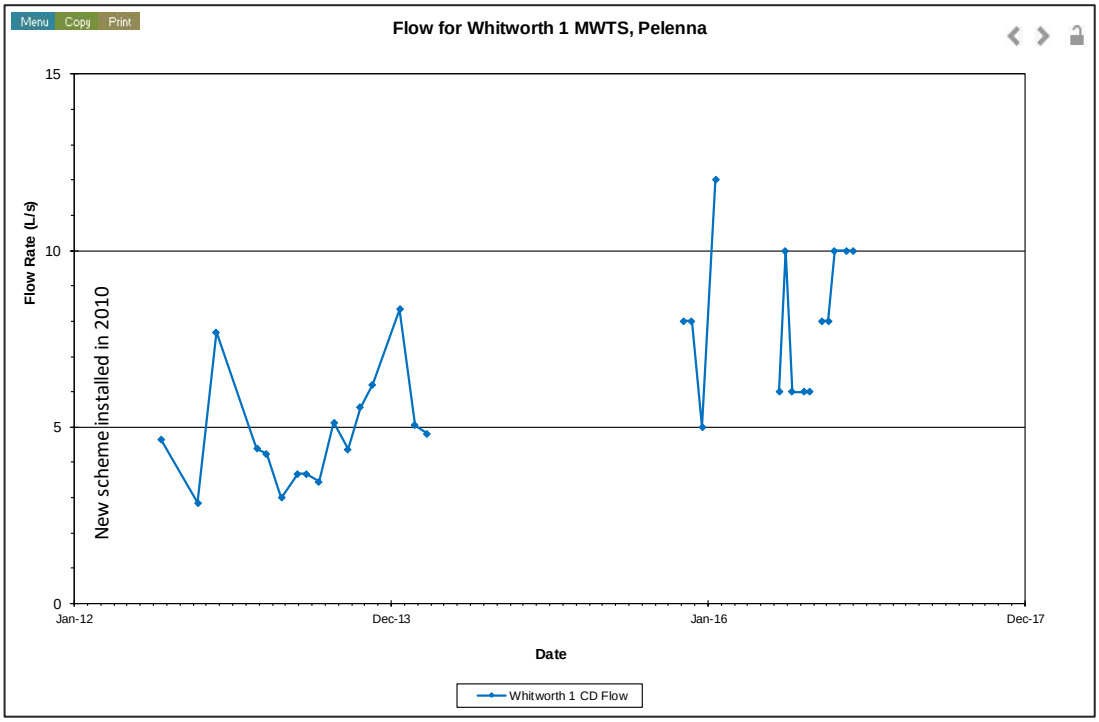

Figure 3: Graph showing v-notch weir flow readings

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 mine water is from adit with Coal Authority reference 279196-024.

The water upwells at site **entirely passively** at the adit. It flows through the distribution chamber, and into the four treatment cells.

In the original scheme configuration, the distribution chamber had the facility to allow high flows to avoid entering the cells, and instead go down an overflow pipe at the north end of the MWTS which discharged untreated surplus water to Gwenffrwd. In 2017 a significant blow out event occurred from the adit, temporarily feeding very high flows (probably 100's L/s) through the MWTS. Reportedly during this extremely high flow event, all the mine water passed through the MWTS to the consented discharge point, and no water was observed running via the overflow pipe. It is concluded then, that the site's current configuration does not include for any overflow, and that all water discharged from the adit will be transferred through the treatment cells.

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 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 1995.

Data is collected very infrequently at the site as no flow monitoring structures are currently in place. Some data points do exist for the scheme but these are understood to be visual estimates only.

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

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

An excel spreadsheet, entitled Abstraction Data, has been included with this application. The excel spreadsheet shows some flow estimates that were made at site.

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

9 Discharge Details

The Whitworth No.1 MWTS has Environmental Permit to discharge with reference BP0257801.

It states that the volume of the discharge is related to rainfall.

The scheme is non-consumptive and 100% of the water abstracted is discharged into the Gwenffrwd 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: Whitworth 1 Mine Water Treatment Scheme

Figure A1: Whitworth 1 Site Location Map; site circled in red

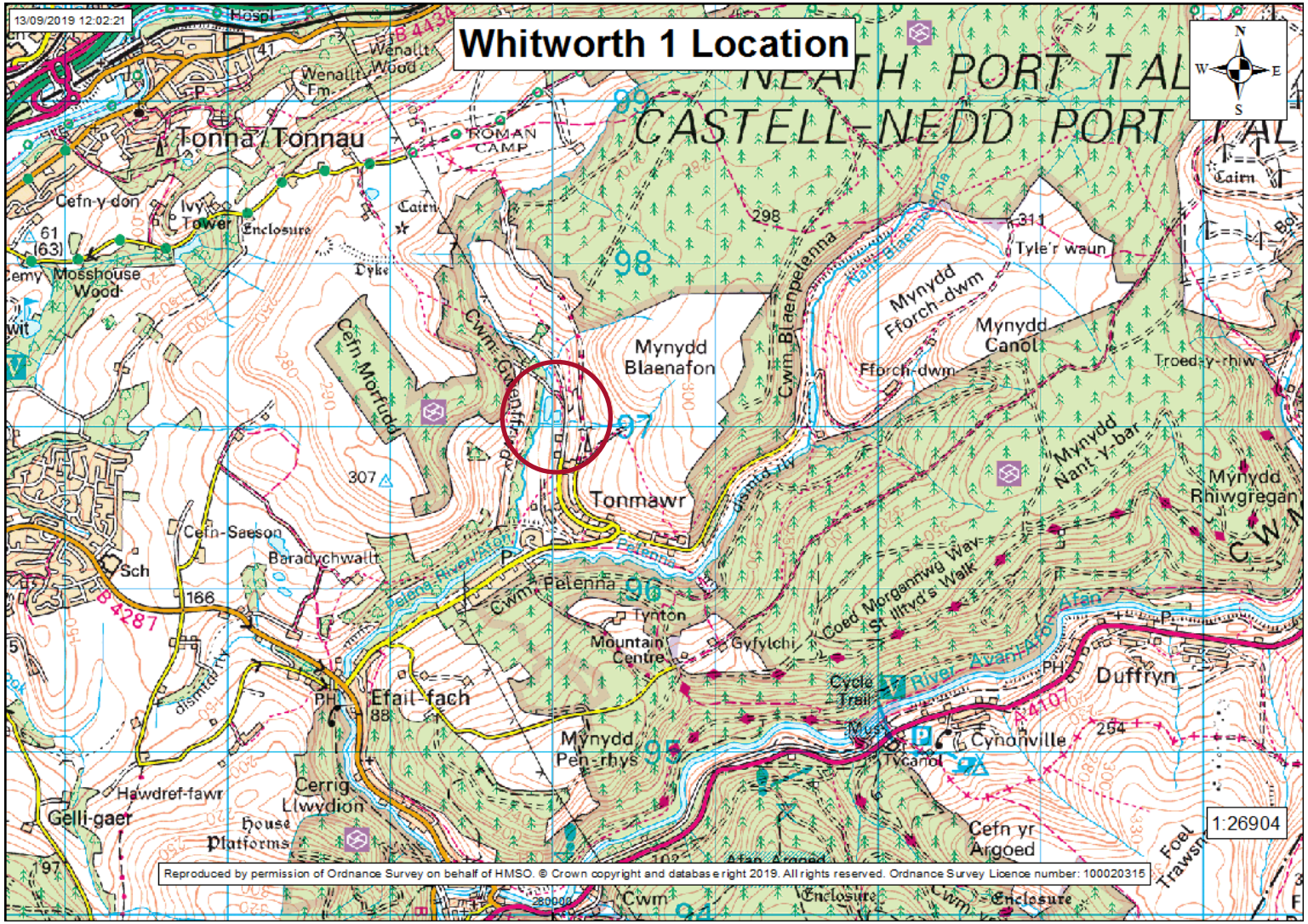

Figure A2: Site plan of Whitworth 1 with monitoring points marked on.

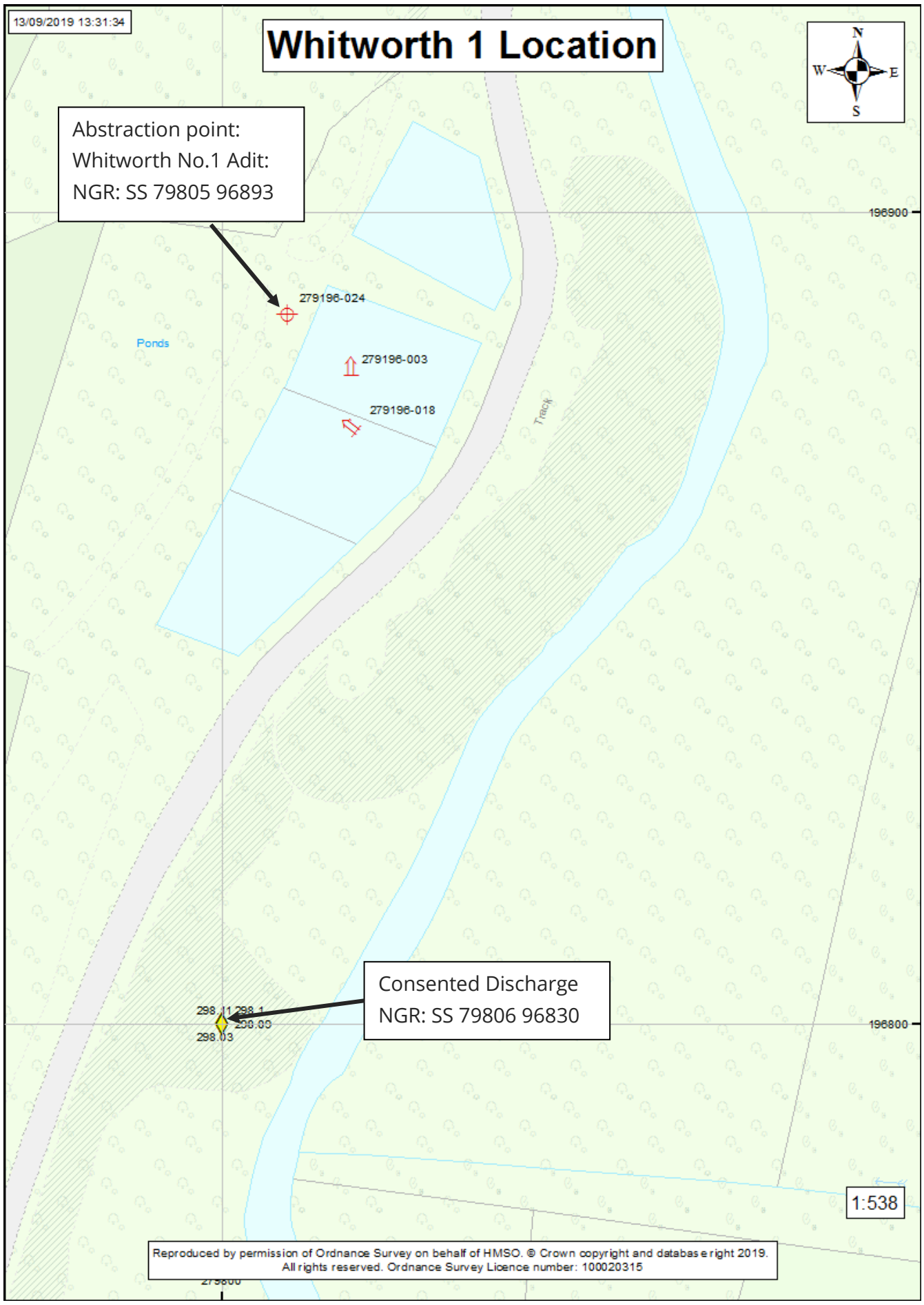

Figure A3: Property outline for Whitworth 1; areas outlined in purple indicate property owned by the Coal Authority

Appendix B: Whitworth No.1 Site Photos

B1a.

B1b.

B1c.

B1a: Adit where the mine water discharges.
B1b: Adit where mine water emerges with lagoons visible in the background.
B1c: Distribution chamber prior to mine water entering the first lagoon

B2a.

B2b.

B2c.

B2a: Settling lagoon to allow for ochre settlement.
B2b: Cells with reed beds to filter iron.
B2c: Water discharging from the scheme with no discolouration visible.

Appendix C: Site Schematic