

Ffos-y-Fran, Merthyr Tydfil

**Baseline and Preliminary Water Framework
Directive Compliance Assessment**

January 2025

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Approval Record	
Author:	Megan Williams BSc (Hons) MSc MCIWEM
Checker:	Aled Williams BSc (Hons) MCIWEM C.WEM
Approver:	Mike Wellington BEng (Hons) MSc CEng CEnv FICE FCIWEM C.WEM IMaPS MAPM

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This report will remain valid for a period of twelve months (from the date of last issue) after which the source data should be reviewed in order to reassess the findings and conclusions on the basis of latest available information.

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Introduction

This Baseline and Preliminary Water Framework Directive (WFD) Assessment has been prepared by Waterco Ltd on behalf of Merthyr (South Wales) Ltd in respect of restoration proposals of the former opencast mine at Ffos-y-Fran, Merthyr Tydfil, CF48 4AH. A Location Plan and Aerial Image are included in Appendix A.

Merthyr (South Wales) Ltd is seeking approval for the final restoration proposals of the former opencast mine at Ffos-y-Fran. The aim of this Baseline and Preliminary WFD Assessment is to assist the regulator in understanding the impact that the outlined activities may have on immediate waterbodies and any linked waterbodies.

This report should be read in conjunction with the following documents:

- Waterco Flood Consequences Assessment & Drainage Strategy (report reference: 15840-FCA & Drainage Strategy-01)
- Waterco Hydraulic Modelling Report (report reference: 15840-HMR-01)
- Amec Foster Wheeler Hydrological Analysis Report
- Richards Moorhead & Laing Ltd Baseline Ecology Report (report reference: 3274/11/20240306–Baseline Ecology Report. docx)
- Environmental Statement (which provides chapters on ecology, hydrogeology and water quality).

For the purposes of the WFD Assessment and as requested by NRW, a Zone of Influence of 15km has been assessed which incorporates the proposed works and the following WFD waterbodies:

- GB40902G201900 - SE Valleys Carboniferous Coal Measures
- GB109057033150 - Nant Morlais - source to confluence with the River Taff
- GB109057033100 - Taff - confluence with the Taf Fechan to confluence with the River Cynon
- GB109057033140 - Taff Bargoed
- GB109057027240 - Taff – confluence with the River Cynon to the confluence with the Rhondda River
- GB109057027270 - Taff – confluence of the Rhondda River to Castle Street
- GB109057033120 - Nant Bargod Rhymni - source to confluence with the Rhymney River
- GB109057027190 - Rhymney River - Nant Bargod Rhymni to confluence with Nant Cylla
- GB109057027280 - Rhymney River – confluence of Nant Cylla to Chapel Wood

A Zone of Influence Plan is provided in Appendix B together with a map identifying the WFD waterbodies

within the 15km zone of influence.

Assumptions and Limitations

All third-party published information and data is assumed to be correct, up to date and based on verified and accurate records, for example, Natural Resources Wales (NRW) flood mapping and British Geological Survey (BGS) geological mapping.

It is assumed that all required permits and formal agreements will be sought with relevant consultees.

A site walkover specifically pertaining to the WFD assessment has been undertaken by Waterco Ltd as part of this report. The purpose of the site walkover was to inspect the waterbodies and watercourses, assessing their flow and hydrological connectivity to WFD waterbodies. Due to access restrictions, it was not possible to inspect all the watercourses on or adjacent to the site in detail.

No monitoring or investigation to ground contamination has been undertaken by Waterco Ltd.

Policy Context

Legislation

Water Framework Directive 2000/60/EC

Published in December 2000, the Directive aims to preserve, restore and improve the water environment. It is a legal requirement within England and Wales, originally transposed into law through the Water Environment (Water Framework Directive) (England and Wales) (2003) to record data within River Basin Management Plans. River Basin Planning is managed in six-year cycles.

The environmental objectives of the WFD for surface waters include:

1. Prevent deterioration in the status of aquatic ecosystems, protect and improve the ecological condition of waters;
2. Aim to achieve 'good' status for all waterbodies by 2015. Where this is not possible and subject to the criteria set out in the Directive, aim to achieve good status by 2021 or 2027;
3. Meet the requirement of the WFD Protected Areas;
4. Promote sustainable use of water as a natural resource;
5. Conserve habitats and species that depend directly on water;
6. Reduce or phase out the release of individual pollutants or groups of pollutants that present a significant threat to the aquatic environment;

7. Progressively reduce the pollution of groundwater and prevent or limit the entry of pollutants; and
8. Contribute to the mitigating effects on floods and droughts.

The Water Framework Environment Regulations 2017 (Water Framework Directive) (England and Wales)

The Water Environment Regulations (WER) 2017 (Water Framework Directive) (England and Wales) transpose the Water Framework Directive into UK law.

The WFD protects surface waters including rivers, lakes, transitional waters (referred to in this advice as estuarine waters), coastal waters and groundwater.

The aims of the WFD are:

1. To enhance the status and prevent further deterioration of surface water bodies, groundwater bodies and their ecosystem.
2. To ensure progressive reduction of groundwater pollution.
3. To reduce water pollution, especially by Priority Substances and Certain Other Pollutants under Annex II of the Environmental Quality Standards Directive 2008/105/EC.
4. To support mitigating the effects of floods and droughts.
5. To achieve at least good surface water status for all surface water bodies and good chemical status in groundwater bodies by 2015 (Article 4), or good ecological potential for artificial or heavily modified water bodies.
6. To support sustainable water use.

Directive on Environmental Quality Standards (EQSD) 2008/105/EC

This Directive establishes the environmental quality standards (EQS) for priority substances and certain other pollutants in surface waters.

With reference to the WFD, good chemical status is achieved when a water body complies with the EQS for all the priority substances and certain other pollutants listed in the EQSD.

Water Act 2014 and Water Resources Act 1991

This Act governs the control of water abstraction, discharge to water bodies, water impoundment, conservation and drought provision.

Flood and Water Management Act 2010

This Act provides details on the management of risks associated with flooding and coastal erosion.

Environmental Protection Act 1990

This Act provides details for identifying and dealing with waste, emissions, contaminated land and water

resources.

The Land Drainage Act 1991

This Act establishes the regulation of ordinary watercourses by Local Authorities and Internal Drainage Boards. It outlines that a watercourse should be maintained by its riparian owner so that the flow of water is not impeded. The riparian owner must accept the natural flow from upstream but does not need to carry out works to cater for increased flows which may result from works carried out upstream.

The Groundwater (Water Framework Directive) (Wales) Direction 2016

This Directive is on the protection of groundwater against pollution and deterioration from hazardous substances and non-hazardous pollutants.

The Groundwater (England and Wales) Regulations 2009

This Regulation transposes 2006/118/EC into law in England and Wales.

Environmental Permitting (England and Wales) Regulations 2016

This Regulation provides a consolidated system of environmental permitting including the discharge of water and groundwater activities.

The Environmental Damage (Prevention and Remediation) (Wales) Regulations 2009

This Regulation aims to prevent and remedy damage to a protected species, natural habitat, a site of special scientific interest, water or land.

The Water Environment (Water Framework Directive) (England and Wales) Regulations 2017

This Regulation transposes 2000/60/EC into law in England and Wales and revokes the WFD (England and Wales) Regulations 2003.

The Environment (Wales) Act 2016

The Environment (Wales) Act puts in place a delivery framework for the sustainable management of natural resources and introduces some simple principles to underpin the way we all work.

Well-being of Future Generations (Wales) Act 2015

This act asks 44 Public Bodies in Wales to work in a sustainable way and think about the impact our work can have for people living in Wales, now and in the future.

Severn River Basin Management Plan 2021 – 2027

This report outlines the current baseline classification of waterbodies in the Severn River basin district, the objectives and targets for water quality within waterbodies of the area, challenges / issues within the catchment which have impacts on water quality and how the objectives / targets will be achieved in future.

The statutory objectives are as following:

- Prevent deterioration in status - Water body status will not be allowed to deteriorate.

- Achieve the objectives for Protected Areas - Achieve the standards set by the relevant legislation under which they were designated. For water dependent European sites we will continue to work towards achieving conservation objectives. Achieving good status by 2027 will contribute towards meeting those objectives.
- Aim to achieve good overall status/potential for surface waters and ground waters - Implement measures to achieve good overall status where they are technically feasible and not disproportionately costly

Site Setting

Hydrological Setting

The site is intersected by a network of unnamed drainage ditches; natural and manmade channels, some of which form part of historic workings on the site from previous mining activity. These carry rainfall runoff and discharge to watercourses local to the site. There are also a series of ponds and lagoons on site, several of which are designated as water treatment areas (sediment settlement lagoons).

The site drains to four watercourse sub-catchments, namely: Cae Harris, Nant Morlais, Cwm Blacs and Bargoed Taff. The Bargoed Taff (watercourse) is located immediately south of the site and its tributary, Nant Gyrawd (watercourse) is located immediately south-east of the site, flowing in a southerly direction. Nant Cwm Blacs (watercourse) flows westwards immediately south-west of the site. Nant Morlais (watercourse) borders the north-western site boundary. All of the aforementioned watercourses are hydraulically linked to the Afon Taff. The Afon Taff is located approximately 1.5km west of the site at its nearest point.

Topography

A topographical survey has been provided by the Client in July 2023. The topographical survey shows that the site slopes from approximately 475 metres Above Ordnance Datum (m AOD) in the eastern extent (an overburden mound) to approximately 250m AOD at the base of the quarry void.

Topographic levels to m AOD have also been derived from a 1m resolution NRW composite 'Light Detecting and Ranging' (LiDAR) Digital Terrain Model (DTM). The LiDAR data generally corroborates the topographical survey. A LiDAR extract is provided as Appendix C.

Geological & Hydrogeological Setting

The British Geological Survey (BGS) online mapping (1:50,000 scale) indicates that the southern extent of the site is partially underlain by superficial deposits of Devensian Till, generally comprising Diamicton. The superficial deposits are identified as being underlain by South Wales Middle Coal Measures Formation consisting of mudstone, siltstone and sandstone.

The geological mapping is available at a scale of 1:50,000 and as such may not be accurate on a site-specific basis.

There are several historical BGS borehole records located on site. Historical BGS borehole record reference SO00NE51, located immediately south-west of the quarry void, identifies:

- Sand and fine gravel of mainly coal, shale and seatearth from ground level to 1.5 metres below ground level (m.bgl)
- Dark brown to black, soft becoming very soft, sandy clayey silt (lagoonal fines) from 1.5m.bgl to 10.40m.bgl
- Dark brown to grey, soft, silty clay with fine gravel from 10.40m.bgl to 11m.bgl
- Dark brown to black, very soft, sticky, sandy clayey silt (lagoonal fines) from 11m.bgl to 12m.bgl
- Dark brown, soft, damp, sandy, silt with angular sandstone cobbles and gravel from 12m.bgl to 12.50m.bgl

The BGS borehole record is included as Appendix D.

According to NRW's Aquifer Designation data, obtained from the BGS GeoIndex online mapping [accessed November 2024], the superficial Devensian Till deposits are classified as a Secondary Undifferentiated Aquifer. Secondary Undifferentiated Aquifers are assigned in 'cases where it has not been possible to attribute either category A or B to a rock type. In most cases, this means that the layer in question has previously been designated as both minor and non-aquifer in different locations due to the variable characteristics of the rock type'.

The underlying South Wales Middle Coal Measures Formation is classified as a Secondary A Aquifer. Secondary A Aquifers are 'permeable layers capable of supporting water supplies at a local rather than strategic scale, and in some cases forming an important source of base flow to rivers. These are generally aquifers formerly classified as minor aquifers'.

The NRW's 'Source Protection Zones' data, obtained from the Welsh Government 'Data Map Wales' website [accessed November 2024], indicates that the site is not located within a groundwater Source Protection Zone.

The following information on hydrogeology has been provided by Groundwater Science Ltd:

'The hydrogeology of the site is complex and heavily influenced by the underlying geology including the Dowlais and Penydarren Faults, previous workings and mine drainage systems including the Merthyr Free Drainage System and the Dowlais Free Drainage System. Five underground drainage courses are known to exist in the vicinity of the site. The Black Ball Watercourse, Penyrheol watercourse and Penydarren Water Level, discharge to the west of the site which eventually drains to the Afon Taff. The free drainage Rhas Las Level and the Big Coal Free Drain discharge to the Bute and Nant Llesg watercourses which flow eastwards to the River Rhymney near Pontlloftyn.'

Mining activity has resulted in the removal and replacement of the coal measures with backfill. This has

generally not disturbed the existing underground drainage systems. The Dowlais fault has been excavated down to a minimum pavement level of 245 m AOD. Groundwater levels obtained prior to the commencement of mining demonstrated the presence of a head differential of approximately 20 to 40 m across the fault from east to west, from an average elevation of 277 m AOD in the present pit area to approximately 220-240 m AOD. The presence of higher groundwater heads on the upthrow side of the fault relative to the downthrow side suggests that it previously behaved as a partial, low permeability barrier to groundwater flow from east to west. Removal of the fault and replacement with backfill is likely to have affected the flow regime within the excavated volume given the prior influence of the structure on the local groundwater regime.

The eventual post-recovery rest level of the water table through the emplaced backfill will be a function of the transmissivity of the material and pavement level of the removed fault, which conceptually will act as a spill point for groundwater from east to west. The observation that the pit lake level (which drilling in the pit floor has confirmed is in continuity with groundwater), recovered to at least 264 m AOD in 2020 and the present-day level of circa 280 m AOD (May 2024) demonstrates that the groundwater level is above the elevation of the excavated Dowlais pavement at 245 m AOD. If the backfill material was highly permeable, the gradient of the water table would be relatively flat and therefore the pit water level would be close to the Dowlais pavement level elevation. Instead, since the lake water level has recovered steadily within the current pit void area, it appears that the bulk transmissivity of the emplaced backfill is sufficiently low to allow the development of hydraulic gradients that are not dissimilar to those that were present when the groundwater system was governed by the transmissivity of the heavily worked coal measures and Dowlais fault before they were mined out.

Local Drainage Setting

Public sewer and water records have been obtained from Dwr Cymru Welsh Water (DCWW) in August 2024 and are included in Appendix E. The DCWW sewer records show that there are no public sewers within the site. There is a network of public surface water, combined and foul sewers serving the urban area of Merthyr Tydfil north-west of the A4060.

As previously discussed, the site is intersected by a network of unnamed drainage ditches; some of which form part of historic workings on the site from previous mining activity, and known as the Dowlais Free Drainage System. These carry rainfall runoff and discharge to watercourses local to the site. There are also a series of ponds and lagoons on site, several of which are designated as water treatment areas (sediment settlement lagoons).

Flood Risk

The Welsh Government Development Advice Map, included in Appendix F, shows that the site is located within Flood Zone A – an area considered to be at little or no risk of fluvial or tidal flooding, with a less than 0.1% (1 in 1000) annual probability of flooding.

The NRW 'Flood Map for Planning' (Appendix F), shows that the site is located within an area outside of the extreme flood extent (Flood Zone 1), meaning it has a less than 0.1% annual probability of flooding from rivers and the sea.

The NRW 'Risk of Flooding from Surface Water' map (Appendix F) shows that there are areas across the site shown within surface water Flood Zones 2 and 3. Surface water Flood Zone 2 is defined as areas with between a 0.1% and 1% (1 in 1000 to 1 in 100) annual probability flooding from surface water and/or small watercourses, including the effects of climate change. Surface water Flood Zone 3 is defined as areas with a greater than 1% (1 in 100) annual probability of flooding from surface water and/or small watercourses, including the effects of climate change. The surface water flooding corresponds to the drainage ditches and ponds on site. By their nature, these features are intended to collect and convey water.

The NRW 'Flood Risk from Reservoirs' map shows that the site is not at risk of flooding from reservoirs.

The NRW 'Recorded Flood Extents' map shows that the site is not located within a historical flood extent.

NRW Flood Maps are included in Appendix F.

Other Designations and Considerations

According to MAGIC's online mapping (accessed November 2024) there is 1 no. statutory designated site within 2km of the site, namely the Cwm Glo a Glyndyrys Site of Special Scientific Interest (SSSI) located 1.85km south-west of the site.

There are two non-statutory designated sites within or in close proximity of the Site which could be affected by the proposed reclamation:

- Merthyr Comon Central Site of Importance for Nature Conservation (SINC) which lies adjacent to Bogey Road.
- Tair Carreg Moor SINC, directly east of Overburden Mound 2 (OB2).
- SE Valleys Carboniferous Coal Measures Drinking Water Protected Area (GW) (GB41001G204000).

A baseline ecology report was prepared by Richards Moorheads & Laing Ltd in July 2024 (provided within Chapter 11 of the corresponding ES). The baseline ecology report states:

'There are no internationally protected sites within a 10km radius of the site...

There is one nationally designated site within a 2km radius of the survey site. This is the Cwm Glo a Glyndyrys Site of Special Scientific Interest (SSSI) located 1.9 km to the south-west....

There are 11 areas of ancient woodland (either ancient semi-natural or restored) within 2 km of the site. The nearest lies 100 m to the south of the Site close to Bogey Road with the next nearest, 900 m to the south of the site at Pen-Coedcae...

There were 8 records of great crested newt (Triturus cristatus), returned within 2 km of the site of which three were recorded within Merthyr Common Central SINC and the other records located within ponds to the north of what is now OB3, within the red line boundary....

There was one record of otter (Lutra lutra). This was located within the now restored western bank of Merthyr Common, located to the south of the site adjacent to Bogey Road, dating from 2018...

There are positive records for GCN at the site and historical records of GCN are available for the SINC and a common frog was noted at the base of OB3 during the 2023 ecology survey...

No evidence for badgers, otters, hedgehog or other mammals has been recorded on site during the surveys. Though there is the possibility they could be encountered within suitable habitat where this occurs'

A Great crested newt survey (GCN) Technical Note has also been prepared by Richards Moorheads & Laing Ltd which includes descriptions of waterbodies on site, including the presence/absence of GCN based on eDNA sampling. This report is included in Appendix G.

Waterco Site Visit

A site visit was undertaken by Waterco on 11th September 2024. The purpose of the site visit was to inspect the waterbodies and watercourses on site, assessing their flow and hydrological connectivity to WFD waterbodies downstream.

A plan showing the locations of hydrological features on site, together with a photographic record is included in Appendix H. A summary of the findings of the site visit is included below.

- The easternmost extent of the site, immediately south-east of OB2 comprises an unnamed watercourse (ditch) which becomes culverted under an internal access road and Bogey Road before continuing south to converge with Cwm Golau (watercourse). This ditch originates off site. The source was not identified during the visit.
- Immediately south of OB2 and west of the aforementioned ditch there is a wheel wash lagoon (NGR: 308769, 206295). This is a closed system and is not hydrologically linked to the watercourses on site.
- Further west along the internal access road, there is a water treatment area (designated as WC1). This comprises 2no. attenuation lagoons which discharge to 2no. settlement ponds via a penstock valve. Treated flows are then discharged to an unnamed ditch that runs through the Central Ecological Area, eventually reaching the Bargoed Taff. Inflows into these attenuation lagoons originate from ditches upstream (originating between OB1 & OB2). These ditches conveyed minimal flow during the time of the visit. Some iron staining was observed.
- Barrel wash lagoons are located north of the internal access road at approximate NGR: 308106, 206498. Another washing area was located south-west at approximate NGR: 307920, 206489. Information from the Client reveals these are closed systems with no hydrological connectivity to the watercourses on site.
- 3no. culverts were identified on the north-western site boundary. Engineered ditches were observed along this site boundary; however no flow was present at the time of visit. 2no. culverts

are known to convey runoff under the A4060.

- A concrete channel was also observed in the northernmost extent of the site. This channel transitions into a culvert at approximate NGR: 307541, 207633 and is assumed to connect to the northernmost culvert along the north-western site boundary (known as Cae Harris culvert). No flow was observed during the site visit; it is assumed that the channel conveys surface water flows from OB1 during and following storm events.
- Water treatment area WB is located in the north-western extent of the site, comprising an attenuation lagoon which discharges to 2no. settlement ponds. Anecdotal information reveals that water is pumped into this lagoon from a sump at the base of the void. From the settlement ponds, water is then discharged via a consented outfall into the engineered ditch along the north-western site boundary.
- A lined lagoon was identified in the southern extent of the site, which discharges to Nant Cwm Blacs. The exact location of the outfall could not be determined at the time of the visit. A new man-made channel has also been construed in this area, however no flows were present at the site of visit.
- Sarn Howell Pond (a component of the Dowlais Free Drainage system) is located west of OB3 at approximate NGR: 307541, 205919. The outfall of this pond could not be identified at the time of the visit, however a ditch immediately south of this pond was visible. This ditch flows east and merges with another ditch which orientates south before flowing into the Bargoed Taff.
- Water treatment area WG is identified east of OB3 comprising of 1no. attenuation lagoon and 2no. settlement pond. It is assumed that flows from the area discharge to Nant Gyrrawd.
- The southernmost water treatment area WF is located south of OB3 and comprises 4no. settlement lagoons (all connected via a pipe). Inflows are controlled via a penstock valve. The outfall discharges to a large, shallow vegetated channel which eventually discharges to the Bargoed Taff downstream. Another outfall pipe was identified further north which conveys flows from OB3 into this channel.

Anecdotal information from the Client during the site visit revealed that Water treatment Areas WA and WJ, shown on the Conditions Plan (MA-CON-01) in Appendix I, have never been constructed.

Scheme Proposals

Scheme proposals are for the restoration of a former opencast coal mine. Three overburden mounds currently on site, referred to as OB1, OB2 and OB3, contain a total of approximately 37 million cubic metres of material, some of which will be reallocated as part of restoration works.

The key features of the final restoration strategy are to minimise bulk earthworks by retaining the existing

groundwater lake that has formed naturally in the main void following cessation of coal extraction and when the de-watering of the main void was no longer required. The sides of the main void will be re-profiled and using existing spoil material and material from the overburden mound OB1. The height of OB1 would be reduced and re-profiled as a sinuous undulating ridge and areas of open rock face and scree retained for biodiversity and visual amenity. Existing ponds and water bodies, such important relics of the previous industrial extractive industries will be retained and enhanced for nature conservation and preserved as heritage assets. The overburden mounds of OB2 and OB3 will be retained and returned to areas of upland grassland with areas of woodland planting and heathland on the flanks and lower slopes. The existing haul road routes would be retained as narrow plateaus and grassed tracks for future access and public amenity.

Scheme proposals are included in Appendix J.

WFD Screening (Stage 1)

The purpose of the screening stage is to identify the extent to which the proposals are likely to affect WFD water bodies within the Zone of Influence. A Zone of Influence Plan is included in Appendix B. The Zone of Influence includes the relevant WFD waterbodies for this site.

Waterbodies/watercourses on site are not classified as WFD water bodies, however there is hydrological connectivity to WFD waterbodies downstream. Therefore, the baseline conditions of the watercourses on site remain pertinent to this report.

There is no formal connectivity between the site and Rhas Las Pond to the east, and therefore Rhas Las Pond will not be considered further in this report.

Ordinary Watercourses on site

Water quality monitoring has been undertaken by Mine Environment Management (MEM) Ltd at specific locations across the site and within the Zone of Influence. Table 1 details the baseline conditions for specific water quality parameters for the watercourses and waterbodies on site and immediately downstream (off-site). A corresponding map showing the sampling points is provided as Appendix K.

Table 1 – Water quality data from Sample Locations across the site

Parameter	Value (mg/l)		
	Mine - Groundwater	Mine WB	MA6
2,4-dichlorophenoxyacetic acid (2,4-D)	0.03	-	-
Aluminium (Al)	0.02	0.01	0.02
Alkalinity (CaCO ₃)	-	311	198
Ammonia (NH ₃ -N)	-	1.2	0.2
Anthracene	0.01	0.01	0.01
Arsenic (As)	0.001	0.001	0.001
Boron (B)	0.01	0.1	0.01
Barium (Ba)	0.02	0.05	0.02
BOD	1	2.5	2.5
Calcium (Ca)	131	167	131
Cadmium (Cd)	0.00031	0.00002	0.00031
Chrysene	0.01	0.01	0.01
Chloride (Cl)	4	73	4
COD	5	39	5
Chromium (Cr)	-	0.001	0.001
Copper (Cu)	0.001	0.002	0.001
Dissolved Oxygen (DO)	13.8	11	12
Fluoride (F)	0.2	0.1	0.2
Fluoranthene	0.01	0.01	0.01
Iron (Fe)	0.03	0.01	0.03
Mercury (Hg)	0.00003	0.00003	0.00003
Potassium (K)	28	68	28
Magnesium (Mg)	108	128	108
Manganese (Mn)	0.063	1.23	0.063
Naph-thalene	0.01	0.01	0.01
Nitrate (N)	2.1	1.5	2.1
Sodium (Na)	17	44	17
Nickel (Ni)	0.006	0.352	0.006
Polycyclic Aromatic Hydrocarbons (PAH) (Total)	0.16	0.16	0.16
Phosphorus (P)	0.1	0.1	0.1
Lead (Pb)	0.001	0.001	0.001
PCB	-	0.07	0.07
pH	8.2	7.2	8
Phenols	0.05	0.05	0.05
Sulphide (S)	0.02	0.02	0.02
Selenium (Se)	0.002	0.006	0.002
SO ₄	567	714	567
Suspended Solids	5	5	5
Total Organic Carbon (TOC)	1.1	1.52	2.28
Zinc (Zn)	0.007	0.069	0.007

Local WFD Water Bodies

The closest Cycle 3 WFD River waterbody downstream of the site is the Taff Bargoed waterbody (Water body ID: GB109057033140). This WFD water body lies within the Zone of Influence for the site and has the potential to be impacted by the proposed works. It has a length of 23.4km.

The WFD 'Taff - confluence Taf Fechan to confluence River Cynon' River waterbody (Water body ID: GB109057033100) is located approximately 1.5km west of the site. This WFD water body lies within the Zone of Influence for the site and has the potential to be impacted by the proposed works. It has a length of 28.4km.

The WFD 'Nant Morlais - source to confluence with River Taff' River waterbody (Water body ID: GB109057033150) is located approximately 830m north-west of the site. It has a length of 9.9km. This WFD water body lies within the Zone of Influence for the site and has the potential to be impacted by the proposed works.

The WFD 'Nant Bargod Rhymni - source to confluence with Rhymney River' River waterbody (Water body ID: GB109057033120) is located 850m south-east of the site. It has a length of 17.08km. This WFD water body lies within the Zone of Influence for the site and has the potential to be impacted by the proposed works.

The WFD 'Taff – confluence River Cynon to confluence Rhondda River' River waterbody (Waterbody ID: GB109057027240) is located 10.6km south of the site. It has a length of 10.14km. This WFD waterbody lies within the Zone of Influence and therefore has potential to be impacted by proposed works.

The WFD 'Taff - confluence Rhondda River to Castle Street' River waterbody (Waterbody ID: GB109057027270) is located approximately 15.1km south of the site. It has a length of 44.08km. This WFD waterbody lies within the Zone of Influence and therefore has potential to be impacted by proposed works.

The WFD 'Rhymney River - Nant Bargod Rhymni to confluence with Nant Cylla' River waterbody (Waterbody ID: GB109057027190) is located approximately 7.9km south-east of the site. It has a length of 12.4km. This WFD waterbody lies within the Zone of Influence and therefore has potential to be impacted by proposed works.

The WFD 'Rhymney River – confluence with Nant Cylla to Chapel Wood' River waterbody (Waterbody ID: GB109057027280) is located approximately 12.8km south-east of the site. It has a length of 52.89km. This WFD waterbody lies within the Zone of Influence and therefore has potential to be impacted by proposed works.

The site is located within a WFD designated groundwater body, namely the SE Valleys Carboniferous Coal Measures groundwater catchment (Water body ID: GB40902G201900) and therefore this catchment has the potential to be impacted by the proposed works. This catchment has an area of 2,141km².

A plan showing the locations of the WFD waterbodies in relation to the site is included in Appendix B.

There are several other WFD waterbodies located within the Zone of Influence however they are either not hydrologically linked to the watercourses on site or positioned at a topographically higher elevation.

Consequently, these features will not be impacted by proposed works and are not considered further in this assessment.

Classifications for WFD waterbodies have been obtained from the NRW Water Watch Map Gallery and are included in the tables below. Where available, additional water quality parameters from the monitoring data compiled by MEM Ltd have been included in these tables. Sampling points are illustrated in Appendix K. No further data on chemical parameters has been provided by NRW.

Table 2 – ‘Taff Bargoed’ River Catchment Waterbody Classifications

Water Body	Taff Bargoed
Water body ID	GB109057033140
Length	23.4km
Overall Ecological Classification	Moderate
Overall Chemical Classification	High
Hydromorphological Designation	Heavily Modified
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	Poor
Invertebrates	Good
Macrophytes and Phytobenthos Combined	-
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved Oxygen	High
Morphology	-
pH	High
Phosphate	High
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	Moderate
Additional Water Quality Data (2015)	
Aluminium (Al)(mg/l)	0.02
Alkalinity (CaCO3)(mg/l)	146
Ammonia (NH3-N) (mg/l)	0.4
Anthracene	0.01
Arsenic (As)(mg/l)	0.001
Boron (B)(mg/l)	0.1
Barium (Ba)(mg/l)	0.02
BOD(mg/l)	1
Calcium (Ca)(mg/l)	75
Cadmium (Cd)(mg/l)	0.00034
Chrysene(mg/l)	0.01
Chlorine (Cl)(mg/l)	9
COD(mg/l)	5
Conductivity (µS/cm)	585

Chromium (Cr)(mg/l)	0.001
Copper (Cu)(mg/l)	0.001
Dissolved Oxygen (DO)	11.9
Fluorine (F)(mg/l)	0.1
Fluoranthene	0.01
Iron (Fe)(mg/l)	0.02
Mercury (Hg)(mg/l)	0.00003
Potassium (K)(mg/l)	16
Magnesium (Mg)(mg/l)	62
Manganese (Mn)(mg/l)	0.048
Nitrogen (N)(mg/l)	0.01
Sodium (Na)(mg/l)	0.4
Naph-thalene	11
Nickel (Ni)(mg/l)	0.003
Polycyclic Aromatic Hydrocarbons (PAH)	0.16
Phosphorus (P)(mg/l)	0.1
Lead (Pb)(mg/l)	0.001
PCB(mg/l)	0.07
pH	8.3
Phenols(mg/l)	0.05
Sulfur (S)(mg/l)	0.02
Selenium (Se)(mg/l)	0.001
SO4(mg/l)	319
Suspended Solids(mg/l)	5
Total Organic Carbon (TOC)	1.69
Zinc (Zn)	0.006

Table 3 – ‘Taff - conf Taf Fechan to conf R Cynon’ River Catchment Waterbody Classifications

Water Body	Taff - conf Taf Fechan to conf R Cynon
Water body ID	GB109057033100
Length	28.4km
Overall Ecological Classification	Moderate
Overall Chemical Classification	High
Hydromorphological Designation	Heavily Modified
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	-
Invertebrates	High
Macrophytes and Phytobenthos Combined	-
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	-
Dissolved Oxygen	High
Morphology	-
pH	High

Phosphate	High
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	Moderate
Specific Pollutants	
Arsenic	-
Copper	-
Chromium	-
Dimethoate	-
Iron	-
Linuron	-
Manganese	-
Permethrin	-
Phenol	-
Phenol, 2,4	-
Toluene	-
Zinc	-

Table 4 – ‘Nant Bargod Rhymni - source to conf Rhymney R’ River Catchment Waterbody Classifications

Water Body	Nant Bargod Rhymni - source to conf Rhymney R
Water body ID	GB109057033120
Length	17.0km
Overall Ecological Classification	Poor
Overall Chemical Classification	High
Hydromorphological Designation	Natural
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	Poor
Invertebrates	High
Macrophytes and Phytobenthos Combined	High
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	-
Dissolved Oxygen	High
Morphology	Not High
pH	High
Phosphate	Good
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	-
Additional Water Quality Data (2015)	
Aluminium (Al)(mg/l)	0.01
Alkalinity (CaCO3)(mg/l)	230
Ammonia (NH3-N) (mg/l)	0.14
Anthracene	0.01

Arsenic (As)(mg/l)	0.0003
Boron (B)(mg/l)	0.06
Barium (Ba)(mg/l)	0.049
BOD(mg/l)	2
Calcium (Ca)(mg/l)	64
Cadmium (Cd)(mg/l)	0.00002
Chrysene(mg/l)	0.01
Chlorine (Cl)(mg/l)	32
COD(mg/l)	20
Conductivity (µS/cm)	-
Chromium (Cr)(mg/l)	0.002
Copper (Cu)(mg/l)	0.0012
Dissolved Oxygen (DO)	8
Fluorine (F)(mg/l)	0.11
Fluoranthene	0.01
Iron (Fe)(mg/l)	0.005
Mercury (Hg)(mg/l)	0.00005
Potassium (K)(mg/l)	17
Magnesium (Mg)(mg/l)	44
Manganese (Mn)(mg/l)	0.093
Nitrogen (N)(mg/l)	0.5
Sodium (Na)(mg/l)	15
Naph-thalene	0.03
Nickel (Ni)(mg/l)	0.007
Polycyclic Aromatic Hydrocarbons (PAH)	0.03
Phosphorus (P)(mg/l)	0.5
Lead (Pb)(mg/l)	0.0003
PCB(mg/l)	0.07
pH	7.8
Phenols(mg/l)	0.02
Sulfur (S)(mg/l)	0.05
Selenium (Se)(mg/l)	0.001
SO4(mg/l)	120
Suspended Solids(mg/l)	10
Total Organic Carbon (TOC)	3
Zinc (Zn)	0.009

Table 5 – ‘Nant Morlais - source to conf R Taff’ River Catchment Waterbody Classifications

Water Body	Nant Morlais - source to conf R Taff
Water body ID	GB109057033150
Length	9.9km
Overall Ecological Classification	Moderate
Overall Chemical Classification	High
Hydromorphological Designation	Heavily Modified
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	-
Invertebrates	High
Macrophytes and Phytobenthos Combined	High
Physio-chemical quality elements	
Ammonia(Phys-Chem)	Moderate
Biochemical Oxygen Demand (BOD)	-
Dissolved Oxygen	Good
Morphology	-
pH	High
Phosphate	High
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	-
Additional Water Quality Data (2020)	
Aluminium (Al)(mg/l)	0.01
Alkalinity (CaCO ₃)(mg/l)	351
Ammonia (NH ₃ -N) (mg/l)	1.3
Anthracene	0.01
Arsenic (As)(mg/l)	0.001
Boron (B)(mg/l)	0.12
Barium (Ba)(mg/l)	0.03
BOD(mg/l)	1
Calcium (Ca)(mg/l)	143
Cadmium (Cd)(mg/l)	0.00003
Chrysene(mg/l)	0.01
Chlorine (Cl)(mg/l)	61
COD(mg/l)	5
Conductivity (µS/cm)	-
Chromium (Cr)(mg/l)	0.001
Copper (Cu)(mg/l)	0.001
Dissolved Oxygen (DO)	9.8
Fluoranthene	0.01
Fluorine (F)(mg/l)	0.2
Iron (Fe)(mg/l)	0.01
Mercury (Hg)(mg/l)	0.00003
Potassium (K)(mg/l)	58

Magnesium (Mg)(mg/l)	105
Manganese (Mn)(mg/l)	0.679
Naph-thalene	0.01
Nitrogen (N)(mg/l)	1.8
Sodium (Na)(mg/l)	34
Nickel (Ni)(mg/l)	0.136
Polyaromatic Hydrocarbons (PAH)	0.16
Phosphorus (P)(mg/l)	0.1
Lead (Pb)(mg/l)	0.001
PCB(mg/l)	0.07
pH	8.2
Phenols(mg/l)	0.05
Sulfur (S)(mg/l)	0.02
Selenium (Se)(mg/l)	0.002
SO4(mg/l)	445
Suspended Solids(mg/l)	5
Total Organic Carbon (TOC)	0.83
Zinc (Zn)	0.015

Table 6 – Taff - conf R Cynon to conf Rhondda R' River Catchment Waterbody Classifications

Water Body	Taff - conf R Cynon to conf Rhondda R
Water body ID	GB109057027240
Length	10.15
Overall Ecological Classification	Moderate
Overall Chemical Classification	High
Hydromorphological Designation	Natural
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	Moderate
Invertebrates	High
Macrophytes and Phytobenthos Combined	Good
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved Oxygen	High
Morphology	Not High
pH	High
Phosphate	Good
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	
Specific Pollutants	
Arsenic	-
Copper	High
Chromium	-

Dimethoate	-
Iron	High
Linuron	-
Manganese	High
Permethrin	-
Phenol	-
Phenol, 2,4	-
Toluene	-
Zinc	-

Table 7 – ‘Taff - conf Rhondda R to Castle Street’ River Catchment Waterbody Classifications

Water Body	Taff - conf Rhondda R to Castle Street
Water body ID	GB109057027270
Length	44.08km
Overall Ecological Classification	Moderate
Overall Chemical Classification	Moderate
Hydromorphological Designation	Heavily Modified
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	-
Invertebrates	High
Macrophytes and Phytobenthos Combined	Good
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved Oxygen	High
Morphology	-
pH	High
Phosphate	Good
Temperature	Good
Supporting elements (Surface Water)	
Mitigation Measures Assessment	Moderate
Specific Pollutants	
Arsenic	High
Copper	High
Chromium	-
Dimethoate	-
Iron	High
Linuron	-
Manganese	High
Permethrin	-
Phenol	High
Phenol, 2,4	High
Toluene	High
Zinc	High

Table 8 – ‘Rhymney R - Nant Bargod Rhymni to conf Nant Cylla’ River Catchment Waterbody Classifications

Water Body	Rhymney R - Nant Bargod Rhymni to conf Nant Cylla
Water body ID	GB109057027190
Length	12.4km
Overall Ecological Classification	Good
Overall Chemical Classification	High
Hydromorphological Designation	Natural
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	-
Invertebrates	Good
Macrophytes and Phytobenthos Combined	High
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved Oxygen	High
Morphology	Not High
pH	High
Phosphate	Good
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	-
Specific Pollutants	
Arsenic	-
Copper	High
Chromium	-
Dimethoate	-
Iron	High
Linuron	-
Manganese	High
Permethrin	-
Phenol	-
Phenol, 2,4	-
Toluene	-
Zinc	-

Table 9 – ‘Rhymney R - conf Nant Cylla to Chapel Wood’ River Catchment Waterbody Classifications

Water Body	Rhymney R - conf Nant Cylla to Chapel Wood
Water body ID	GB109057027280
Length	52.89km
Overall Ecological Classification	Good
Overall Chemical Classification	Moderate
Hydromorphological Designation	Natural
Parameter	Status
NRW data (2021)	
Biological quality elements	
Fish	High
Invertebrates	High
Macrophytes and Phytobenthos Combined	High
Physio-chemical quality elements	
Ammonia(Phys-Chem)	High
Biochemical Oxygen Demand (BOD)	High
Dissolved Oxygen	High
Morphology	Not High
pH	High
Phosphate	Good
Temperature	High
Supporting elements (Surface Water)	
Mitigation Measures Assessment	-
Specific Pollutants	
Arsenic	High
Copper	High
Chromium	-
Dimethoate	-
Iron	High
Linuron	-
Manganese	High
Permethrin	-
Phenol	High
Phenol, 2,4	High
Toluene	-
Zinc	High

Table 10 – SE Valleys Carboniferous Coal Measures Groundwater Catchment Classifications

Water Body		SE Valleys Carboniferous Coal Measures	
Water Body ID		GB40902G201900	
Surface Area		2141km ²	
Overall Status		Poor	
Overall Quantitative Classification		Good	
Overall Chemical Classification		Poor	
Parameter			2021
NRW data (2021)			
Quantitative	Quantitative Status element		
		Quantitative Dependent Surface Water Body Status	Good
		Quantitative GWDTEs test	Good
		Quantitative Saline Intrusion	Good
		Quantitative Water Balance	Good
Chemical	Chemical Status element		
		Chemical Dependent Surface Water Body Status	Poor
		Chemical Drinking Water Protected Area	Good
		Chemical GWDTEs test	Good
		Chemical Saline Intrusion	Good
		General Chemical Test	Good
	Supporting elements (Groundwater)		
		Trend Assessment	High
Additional Water Quality Data (2023)			
Aluminium (Al)(mg/l)		0.02	
Acidity (CaCO ₃)(mg/l)		0.0	
Ammoniacal Nitrogen as N (mg/l)		0.2	
Anthracene		0.01	
Arsenic (As)(mg/l)		0.001	
Boron (B)(mg/l)		0.01	
BOD(mg/l)		1	
Calcium (Ca)(mg/l)		131	
Cadmium (Cd)(mg/l)		0.00031	
Chrysene(mg/l)		0.01	
Chlorine (Cl)(mg/l)		4	
COD(mg/l)		5	
Conductivity (µS/cm)		1880	
Copper (Cu)(mg/l)		0.001	
Dissolved Oxygen (DO)		13.8	
Fluoride (F)(mg/l)		0.2	
Fluor- anthene		0.01	

Iron (Fe)(mg/l)	0.03
Mercury (Hg)(mg/l)	0.00003
Potassium (K)(mg/l)	28
Magnesium (Mg)(mg/l)	108
Manganese (Mn)(mg/l)	0.063
Naph-thalene	0.01
Nitrate (N)(mg/l)	2.1
Sodium (Na)(mg/l)	17
Nickel (Ni)(mg/l)	0.006
Polycyclic Aromatic Hydrocarbons (PAH)	0.16
Phosphorus (P)(mg/l)	0.1
Lead (Pb)(mg/l)	0.001
pH	8.2
Sulphide (S)(mg/l)	0.02
Selenium (Se)(mg/l)	0.002
Sulphur (SO ₄)(mg/l)	567
Suspended Solids(mg/l)	5
Total Organic Carbon (TOC)	1.1
Zinc (Zn)	0.007

WFD Scoping (Stage 2)

The purpose of the scoping stage is to identify the risks from the proposed Scheme's activities to receptors based on the identified WFD waterbodies. The WFD Scoping (Stage 2) considers the potential risks during both the restoration phase of the proposed Scheme and its aftercare. Where risks have been considered, but the potential effect is considered to be negligible, this has been stated.

Risks to Hydromorphology

The hydromorphology of the watercourses on site, and subsequent WFD waterbodies downstream (and the underlying groundwater catchment) can be impacted by the proposed Scheme.

Table 11 - Potential Effects on Hydromorphology

Restoration or Aftercare Phase	Source of Effect	Potential Effects
Restoration	Suspended Solids Increased fine sediment supply to watercourses is likely to occur during restoration works. This may result from: • Runoff from vegetation free surfaces • Plant and vehicle washing • Excavation of the new watercourse channels • Earthworks associated with movement of material from OB1 to the quarry void.	A possible short-term increase in turbidity and siltation may occur. Increased sediment delivery may affect any sites of ecological importance located downstream. A reduction in diversity of the channel bed due to smothering by fine sediment as a result of increased fine sediment supply.
Aftercare	Suspended Solids Cessation of mining and restoring the site to urban common for grazing and public amenity.	A long term decrease in siltation and reduced sediment transfer into the wider hydrological catchment compared to the baseline scenario.

Risks to Biology

The biological habitats and fish and other species within the zone of influence can be impacted by the Proposed Scheme. Table 12 outlines the potential biological effects of the Proposed Scheme on the watercourses/waterbodies on site, and subsequent WFD waterbodies downstream (and the underlying groundwater catchment).

Table 12 – Potential Effects on Biology

Restoration or Aftercare Phase	Source of Effect	Potential Effects
Restoration	Suspended Solids Increased fine sediment supply to watercourses is likely to occur during restoration works. This may result from: • Runoff from vegetation free surfaces • Plant and vehicle washing • Excavation of the new watercourse channels • Earthworks associated with movement of material from OB1 to the quarry void.	Fine sediment has the potential to smother benthic organisms (removing prey from the food chain), increase turbidity (reducing light penetration for plant growth) and clog fish gills and spawning habitats (increasing mortality of reducing spawning success). Suspension of silt and changes to the hydrology in the channel during restoration can affect the ecology downstream. It can take time for habitats to recover for example for silt deposited to be washed out of sensitive habitats. Many macro-invertebrates are sensitive to sedimentation; sediment deposition in areas usually free of sediment can affect the composition and abundance of macro-invertebrate species present.
Restoration	Pollutants from construction vehicles and machinery The use of machinery and vehicles on or within the vicinity of the Site during the restoration phase has the potential to allow uncontrolled releases of pollutants such as fuel, cement dust, solvents and oils.	If not properly maintained and managed, pollutants from construction vehicles and machinery have the potential to harm aquatic life.
Restoration	Incorrect disposal of waste materials Uncontrolled released of waste materials (e.g. plastic packaging etc) from the restoration phase could be incorrectly “disposed” of along the banks of the unnamed watercourse.	Incorrect disposal of waste materials has the potential to harm aquatic vegetation and organisms.
Restoration	Noise & Vibration from Restoration activities Many aquatic species including eel and	Noise can propagate over long distances underwater, negatively affecting fish and other aquatic species.

	other fish species are sensitive to noise and vibrations generated by restoration activities.	For species with strong reliance on sound, this can lead to disorientation and altered behavioural changes. Vibration can disturb sediment in riverbeds, causing potential disruption to spawning grounds
Aftercare	Suspended Solids Cessation of mining and restoring the site to urban common for grazing and public amenity may reduce sediment loading.	With stabilised soil and re-established vegetation, less sediment is likely to enter the watercourses compared to the baseline scenario, which minimises the risk of smothering aquatic habitats.
Aftercare	Reduced Contaminants Cessation of mining and having restored the site to urban common for grazing and public amenity may potentially reduce pollutant levels in receiving watercourses.	Reduced level of heavy metals and other pollutants associated with mining entering the watercourse. This will result in a healthier environment, fostering the recovery of aquatic species and ecosystem stability.
Aftercare	Enhanced Habitat Diversity Creation of new watercourse channels and a quarry void lake	A lake and new channels will create varied habitats to support a wide range of species. Increased biodiversity by offering breeding, feeding and shelter areas for aquatic organisms.

Risk to Water Quality

There is potential for the proposed Scheme to impact on the water quality of a watercourse / water body. Table 13 outlines the potential water quality effects of the proposed Scheme on the watercourses/waterbodies on site, and subsequent WFD waterbodies downstream (and the underlying groundwater catchment).

Table 13 – Potential Effects on Water Quality

Restoration or Aftercare Phase	Source of Effect	Potential Effects
Restoration	Pollutants from construction vehicles and machinery The use of machinery and vehicles on or within the vicinity of the Scheme Area during the restoration phase has the potential to allow uncontrolled releases of pollutants such as fuel, cement dust, solvents and oils.	Accidental leakages and spillages during the restoration phase can have short to medium term effect on the unnamed watercourse and underlying groundwater. As the surface water may be in hydraulic continuity with the underlying groundwater aquifers, relatively significant pollution events may have an effect on the groundwater.
Restoration	Incorrect disposal of waste materials Waste materials (e.g. plastic packaging etc) from the restoration phase could be incorrectly “disposed” of within or near waterbodies.	
Restoration	Sediment Pollution Deterioration in water quality as a result of a release of sediments associated with the restoration works.	Water quality may be reduced by increased turbidity.
Aftercare	Reduced Contaminants Cessation of mining and restoring the site to urban common for grazing and public amenity may potentially reduce pollutant levels in receiving watercourses.	Decrease in pollutants with previous land use, allows pH levels to stabilise and results in overall improved water quality. The proposals are considered to have a positive impact on the water quality of the WFD waterbodies during the aftercare phase.
Aftercare	Suspended Solids Cessation of mining and having restored the site to urban common for grazing and public amenity may potentially reduce sediment loading.	With stabilised soil and re-established vegetation, less sediment is likely to enter the watercourses compared to the baseline scenario, improving overall water quality.
Aftercare	Creation of lake will provide natural filtration	Lakes act as natural filters, trapping sediment and excess nutrients and improving overall water quality.

Potential Effects of Invasive Non-Native Species (INNS)

The effects of INNS on a watercourse / water body can be impacted by the proposed scheme. Table 14 outlines the potential effects of the proposed scheme on the watercourses/waterbodies on site, and subsequent WFD waterbodies downstream (and the underlying groundwater catchment).

Table 14 – Potential Effects on INNS

Restoration or Aftercare Phase	Source of Effect	Potential Effects
Restoration	No non-native invasive plant species were recorded during the Phase 1 Habitat Survey (August 2023). Non-native invasive species may be unintentionally transferred from the Scheme Area to other areas, if they are present, or introduced to the Scheme Area, through contaminated equipment.	The spread of non-native invasive species may lead to colonisation of the Scheme Area, other areas, and downstream of the Scheme Area, and can adversely affect native habitats.
Aftercare	From a review of the available information, no vulnerable receptors have been identified as part of the aftercare phase of the Scheme.	Therefore, the proposals are considered to have a negligible impact on INNS during the aftercare phase.

Restoration and Aftercare Phase Mitigation

Best practice guidelines would be followed to avoid impacts from dust, wastewater, contaminated site drainage, chemical and reagent spillage, noise, vibration, and nighttime light spillage on the surrounding environment. These would be detailed in the Construction Environmental Management Plan (CEMP).

Impacts of the Proposed Scheme on WFD Compliance

Providing the mitigation measures identified below are implemented, the Proposed Scheme will have a negligible effect on the identified water bodies during both the restoration and aftercare phases.

Restoration Phase Mitigation

In order to minimise the risk of deleterious effects of the proposed Scheme on the relevant WFD waterbodies, their tributaries and the groundwater catchment, and to ensure that the proposed Scheme is WFD compliant, the following mitigation measures are recommended during the restoration phase.

Sediment

To prevent fine sediment entering watercourses, restoration activities should occur away from watercourses where possible. When restoration activities, including stock piling and storage of materials, occur in close proximity to a watercourse they should be separated from the watercourse with barriers (e.g. sediment fences) to prevent surface runoff from these sites entering the watercourse. Where practicable, consideration should be given to installing geotextile-material silt fences to filter suspended solids from runoff. An example of a silt fence is provided in Figure 1. Silt fences are not required around the quarry void where material will be transferred to raise the level of the void.



Figure 1: Silt Fence (source siltbuster.co.uk)

Timing of works must be carefully considered. If possible, the restoration activities should be carried out during periods of low flow and rainfall to reduce the risk of scour and erosion around structures and reduce runoff from the area of works.

Several water treatment areas (sediment lagoons and attenuation ponds) are located around the site, which

will ensure any flows impacted by restoration activities are treated (for sediment removal) before leaving site. This mitigates the potential effects on downstream WFD waterbodies.

Contamination

Potential contamination risks can be mitigated by ensuring that a suitably experienced and competent contractor is employed to undertake the works. The contractor should ensure that all method statements are prepared with due consideration to minimising the release of potentially contaminative materials / compounds such as fuel, oils and chemicals, which could have a significant impact in the vicinity and downstream of the restoration site. Contractors should also provide / implement the necessary measures needed to be in place to prevent the accidental release of pollutants into the watercourse and onto surrounding land.

Appendix L details some of the pollution prevention measures which should be put in place.

Further guidance on good practice is provided in the documents below:

- CIRIA Report C741 (January 2015) Environmental Good Practice on site guide (fourth edition);
- Environment Agency (EA) (2004) Getting Your Site Right: Industrial and Commercial Pollution Prevention; and
- Pollution Prevention for Businesses: Pollution prevention for businesses - GOV.UK (www.gov.uk)

Several water treatment areas (lagoons) are located around the site, which will intercept any flows impacted by restoration activities.

Aquatic Ecology

A toolbox talk shall be given to all site operatives to inform on the procedure to follow if a Great Crested Newt (GCN) is discovered on-site. Where GCN is discovered on site, all work should be ceased in the affected area and the procedures outlined in the toolbox talk should be followed.

Invasive Non-Native Species

Currently, no Schedule 9 invasive species are recorded on site. However, relevant biosecurity measures should be implemented to reduce the risk of introducing invasive non-native species to the site.

Restoration Phase Residual Risks

Given the site's history as a former surface mine, the potential effects of restoration activities on the hydrological environment are not anticipated to differ significantly from the baseline conditions.

Implementing the measures detailed above will ensure the residual effects of the restoration in the context of the WFD are negligible.

Where contamination is suspected, a suitably experienced operative should be appointed to undertake appropriate mitigation works.

Aftercare Phase Mitigation

The preparation of a regular maintenance plan will ensure the development has no impact on the hydrological flows of watercourses/waterbodies on site, and subsequent WFD waterbodies downstream (and the underlying groundwater catchment).

Restoring the former coal mine to urban common for grazing and public amenity will improve the status of receiving watercourses/waterbodies during the aftercare phase. By stabilising soils and re-establishing vegetation, the restoration scheme will reduce sediment loading and contamination. Furthermore, coir matting will be placed around pond margins. This will encourage the growth of marginal aquatic plants and improve availability of aquatic habitats. Coir mats may also help prevent soil erosion, thus limiting sediment input into the waterbodies and improve overall water quality. Overall, the proposed restoration scheme will create betterment over the existing scenario.

No additional mitigation measures are considered necessary during the aftercare phase.

Conclusions and Recommendations

Impact of the Proposed Scheme on WFD Compliance

The Proposed Scheme may have some local effects on the hydromorphological, biological and chemical status of the WFD watercourses/waterbodies on site, and subsequent WFD waterbodies downstream, primarily during the restoration phase. The effects will be negligible if a competent and experienced contractor is employed and work is undertaken in accordance with relevant pollution prevention guidance and construction best practice.

Overall, the works as proposed are expected to result in improvements to the ecological diversity of the site, including the WFD status of receiving waterbodies.

Recommendations

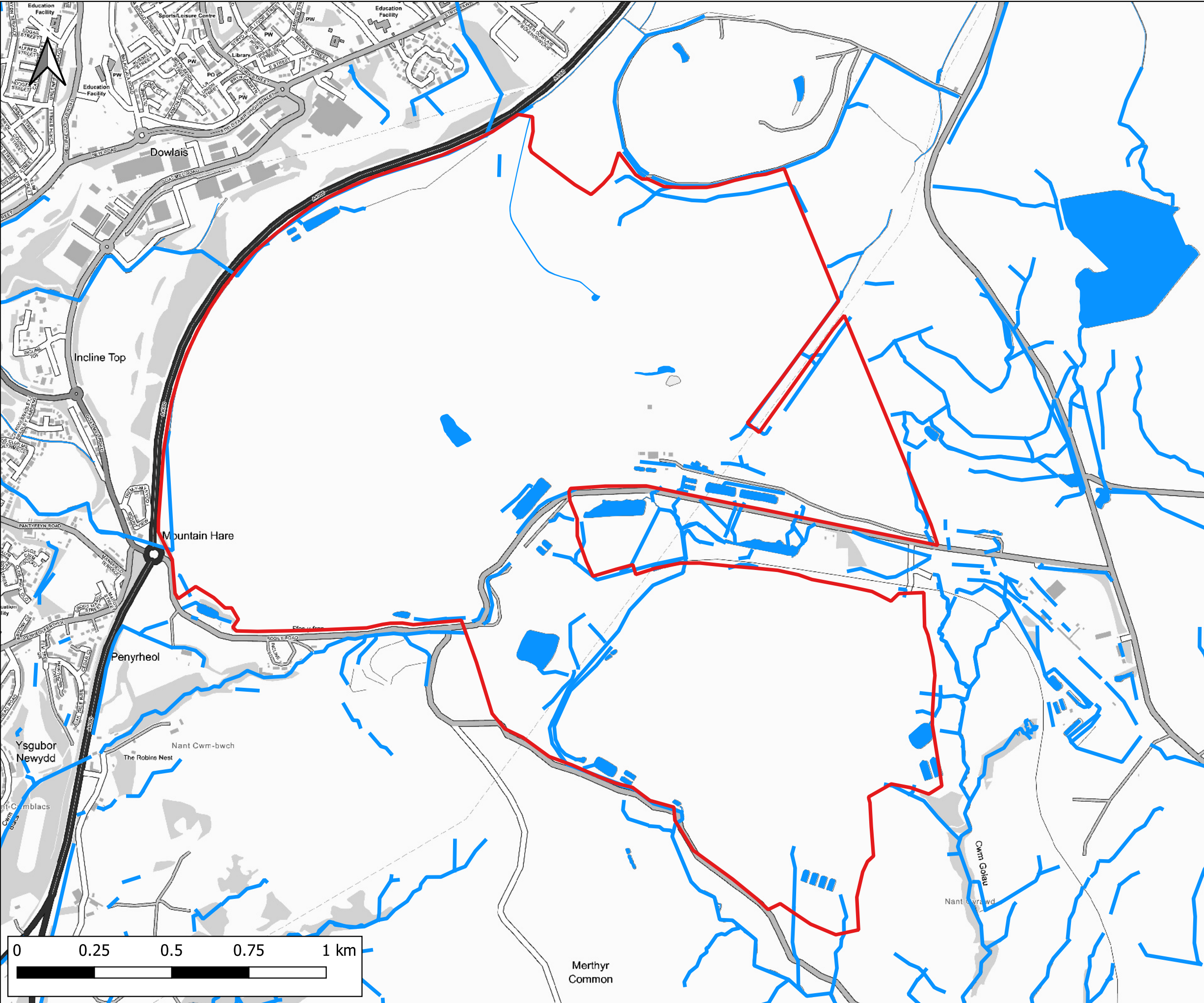
It is recommended that all contractors prepare method statements which include the necessary pollution prevention and construction good practice requirements for the proposed Scheme. These can be collated in a Construction Environmental Management Plan (CEMP) or similar style document that would ensure that all stakeholders during the restoration stage are working towards the same standard.

It would be prudent to confirm water quality data immediately following completion of the works, to highlight that the restoration phase has not had a detrimental effect on water quality.

It would be prudent to ensure there is a maintenance schedule which ensures regular inspection and clearance of culverts.

It is recommended that all mitigation measures outlined within this report are implemented to ensure the risks to controlled waters is negligible.

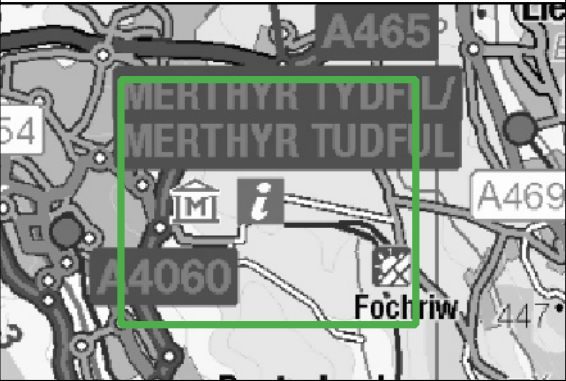
Appendix A Location Plan and Aerial Image



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Watercourses
- Waterbodies



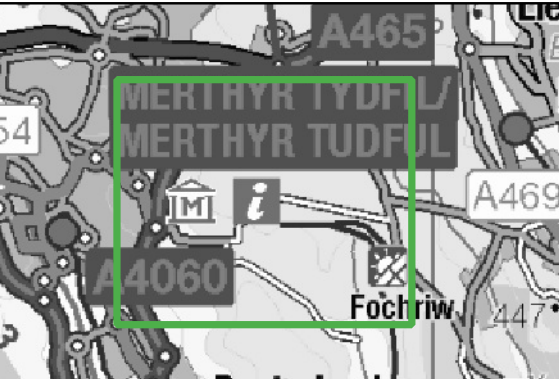
CLIENT:			
Merthyr (South Wales) Ltd			
 www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
Location Plan			
PLOT STATUS:		DATE:	
FINAL		19-08-2024	
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:12000
PLOT NAME:			REVISION:
15840_Location_Plan			-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

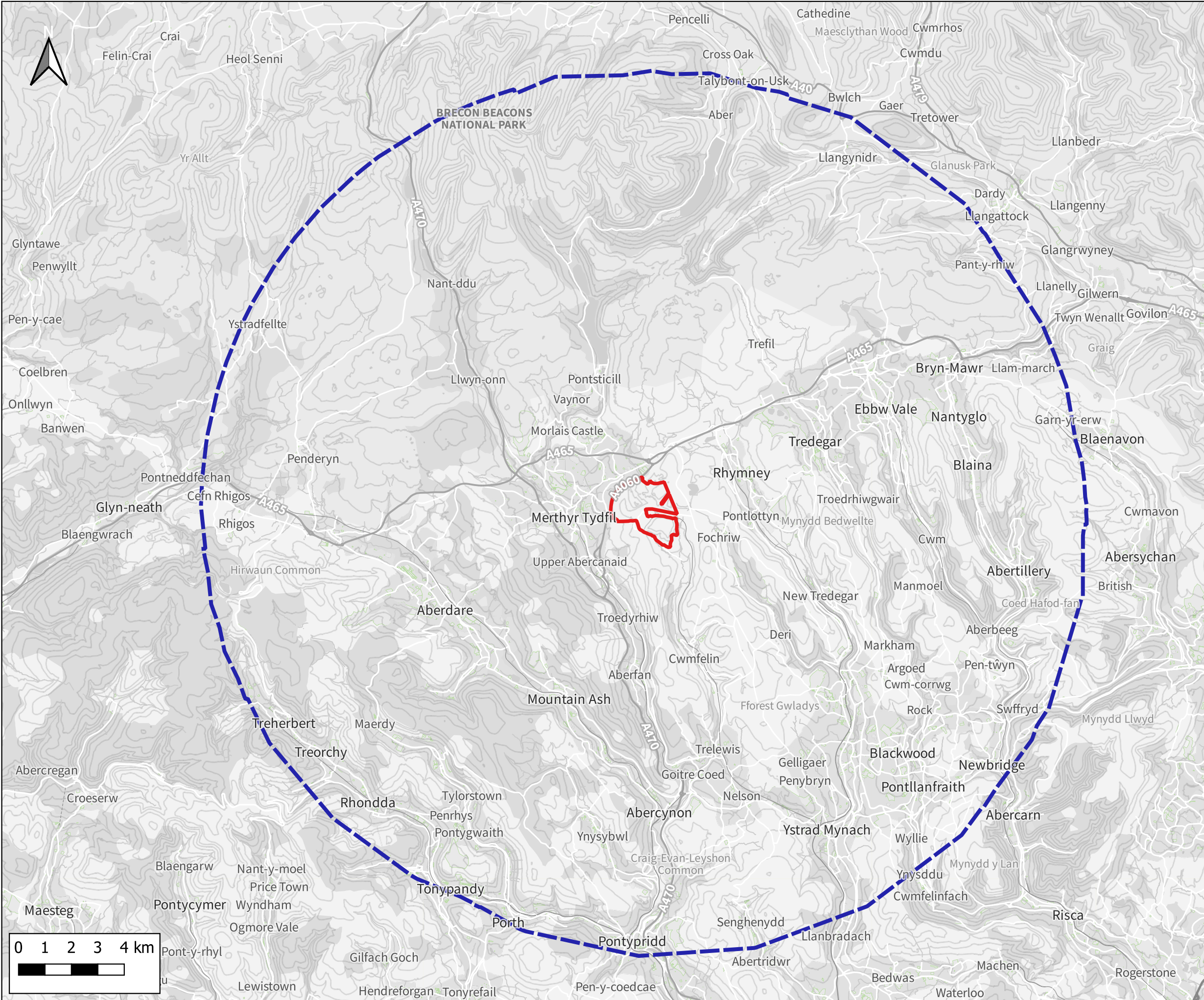
LEGEND

 Site Boundary



CLIENT:				Merthyr (South Wales) Ltd	
				www.waterco.co.uk	
SCHEME:				Ffos-y-Fran, Merthyr Tydfil	
PLOT TITLE:				Aerial Plan	
PLOT STATUS:		FINAL		DATE:	19-08-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:		
MJW	AW	MW	1:12000		
PLOT NAME:				REVISION:	
15840_Aerial_Plan				-	

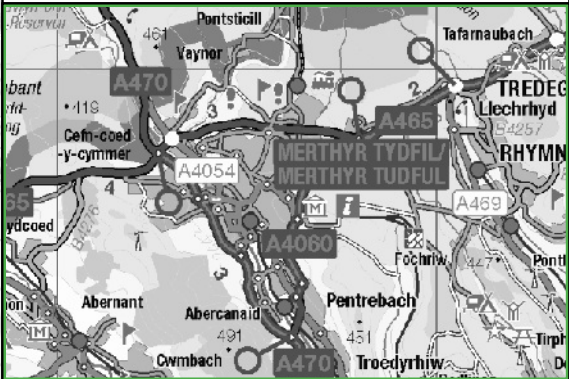
Appendix B Zone of Influence Plan & WFD Waterbodies Map



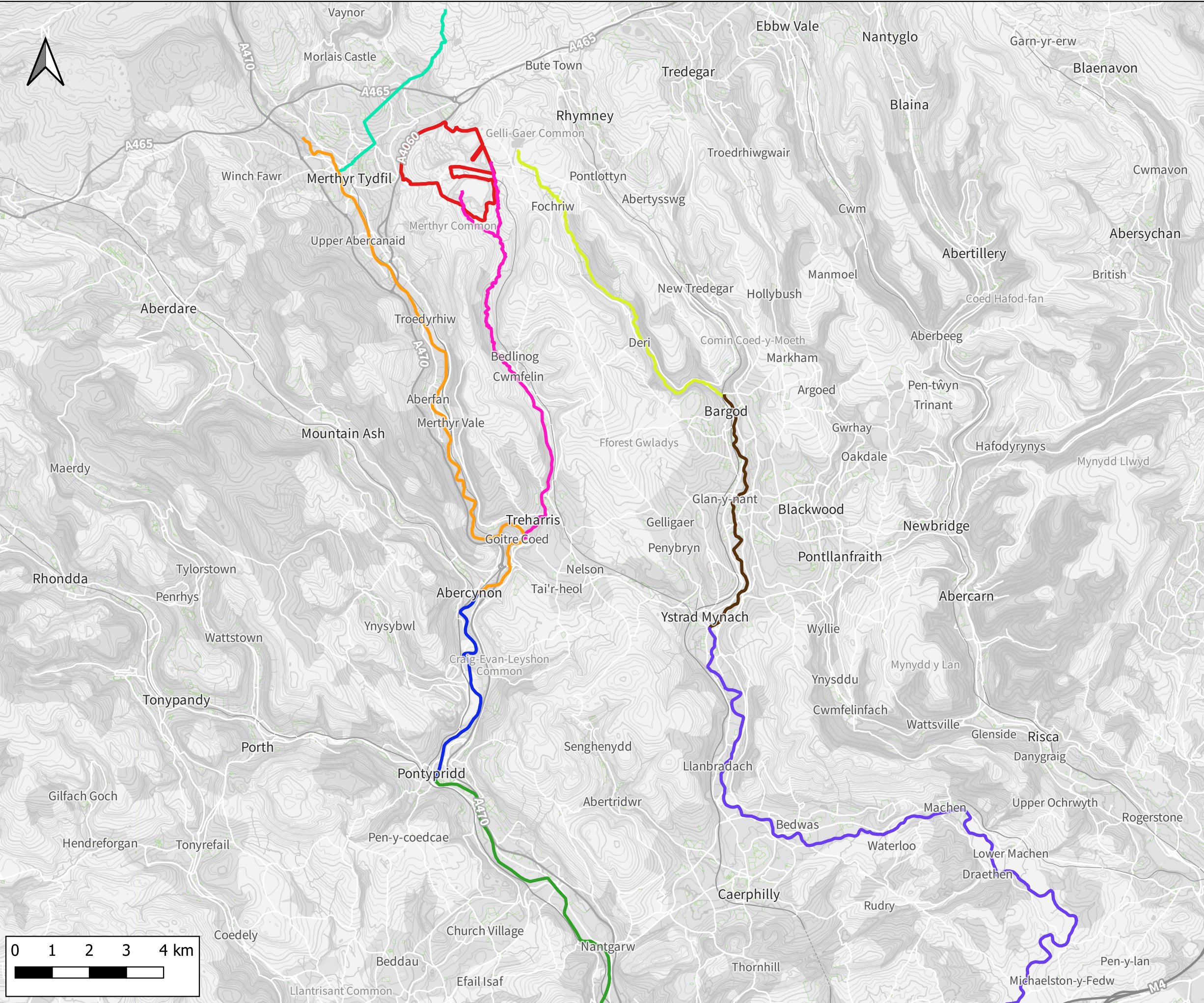
Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- 15km buffer



CLIENT:			
Merthyr (South Wales) Ltd			
waterco www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
Zone of Influence Plan			
PLOT STATUS:			DATE:
FINAL			06-11-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:140000
PLOT NAME:			REVISION:
15840_Zone_of_Influence_Plan			-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Rhymney R - conf Nant Cylla to Chapel Wood
- Nant Bargod Rhymni - source to conf Rhymney R
- Rhymney R - Nant Bargod Rhymni to conf Nant Cylla
- Taff - conf R Cynon to conf Rhondda R
- Taff - conf Rhondda R to Castle Street
- Taff - conf Taf Fechan to conf R Cynon
- Taff Bargoed
- Nant Morlais - source to conf R Taff



CLIENT:			
Merthyr (South Wales) Ltd			
 www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
WFD Waterbodies Plan			
PLOT STATUS:			DATE:
FINAL			05-11-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:100000
PLOT NAME:			REVISION:
15840_WFD_Waterbodies_Plan			-

Appendix C Topographical Data

Appendix D Historical BGS Borehole Records

Appendix H

NATIONAL COAL BOARD - SOUTH WALES & SOMERSET

Hyp name & No Longtown 724 " : Q 31
Contractor Drilling & Prospecting International Ltd.
Drill type Gryphon 10
Method of penetration Rotary Air Flush
Elevation AOD 338.70 m Grid reference E 06677 N 06593
Date started 25.10.75 Date completed 27.10.75

Record of Borehole LN1

Borehole			Casing		
From	To	Ømm	From	To	Ømm
0.00	12.50	158.7	0.00	12.50	139.7

Date	Depth m		Sample		Legend	Depth	Level m AOD	Piezo	Water	Description
	From	To	R	RQD						
25/10	0.00	0.50	U100	5401						0.00 - 1.50m: SAND and fine GRAVEL of mainly coal, shale and seat earth (SPOIL: washery discard)*
	0.50	1.00	U100	5402						
	1.00	1.50	U100	5403						
	1.50	2.50	U100	5404						1.50 - 10.40m: (approx.) dark brown to black, soft becoming very soft, sandy clayey SILT, damp (SPOIL: lagoonal fines)*
	2.50	3.50	U100	5405						
	3.50	4.50	U100	5407						
	4.50	5.50	U100	5408						
	5.50	6.50	U100	5409						
	6.50	7.50	U100	5410						
	7.50	8.50	U100	5411						
	8.50	9.50	U100	5412						
	9.50	10.50	U100	5414						

Morning water levels									
Date	26/10								
BH Depth	2.50								
Casing	--								
Water	Dry								

⊗ Water encountered here
▽ Water of ref x rose to here

N.B. 1.50 - 12.50m: 1m penetrated to recover each U100 (soft ground)

* Descriptions of spoil taken from jar samples.

Logged by G.D. Date November 1975

Sir William Halcrow & Partners

Sheet 1 of 2

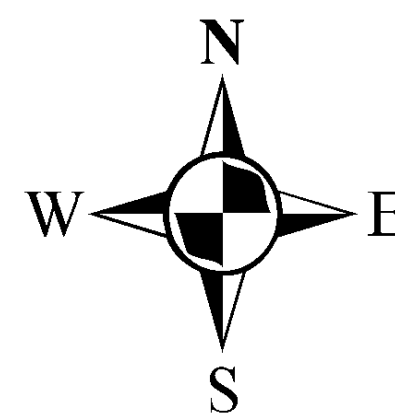
NATIONAL COAL BOARD - SOUTH WALES & SOMERSET								Appendix H			
Tip name & No Longtown 724						Record of Borehole LN1					
Contractor Drilling & Prospecting International Ltd.						Borehole			Casing		
Drill type Gryphon 10						From	To	Bmm	From	To	Bmm
Method of penetration Rotary Air Flush.						0.00	12.50	158.7	0.00	12.50	139.7
Elevation AOD m Grid reference E N											
Date started 25.10.75 Date completed 27.10.75											
Date	Depth m		Sample		Legend	Depth	Level m AOD	Piez	Water	Description	
	From	To	R	RQD						S.O.G.N.E./S1	
	9.50	10.50	U100	5414						10.40 - 11.00m (approx) MADE GROUND	
						11				10.50m JAR SAMPLE: dark brown to grey, soft, silty CLAY with fine GRAVEL	
	10.50	11.50	U100	5415						11.00 - 12.00m (approx.) SPOIL	
						12	326.70			11.50 JAR SAMPLE: dark brown to black, very soft, wet, sticky, sandy clayey SILT (Lagoonal fines).	
26/10	11.50	12.50	U100	5416					Dry	12.00 - 12.50m (approx.) MANTLE	
						13				12.50m JAR SAMPLE: dark brown, soft, damp, sandy, clayey SILT with angular sandstone COBBLES and GRAVEL	
BOREHOLE TERMINATED AT 12.50m DUE TO LOSS OF U100 IN HOLE.											
Morning water levels											
Date											
B.H Depth											
Casing											
Water											
☒ Water encountered here ☐ Water of ref x rose to here											
Logged by G.D. Date November 1975											
Sir William Halcrow & Partners Sheet 2 of 2											

Appendix E DCWW Sewer Plan



Dŵr Cymru
Welsh Water

15840 - Ffos Y Fran Merthyr Tydfil CF48 4AH



LEGEND(Representative of most common features)

- Waste network:
- | | | | |
|--|-------------------------|--|---|
| | Foul chamber | | Outfall |
| | Surface water chamber | | Lamp hole |
| | Combined chamber | | Storm Overflow |
| | Combined sewer overflow | | Rising main |
| | Special purpose chamber | | Gravity sewer |
| | Treatment works | | Private sewer |
| | Pumping station | | Private sewer subject to Sect. 124 adaptation agreement |
- NB: Sewer symbol colour indicates the type.
- | | | | |
|--------|--|--|------------------------|
| RED | Combined | | Private Sewer Transfer |
| GREEN | Surface Water | | Lateral Drain |
| BROWN | Foul | | Inspection Chamber |
| Purple | Former S24 sewers (for indicative purposes only) | | |

Notes:

Whilst every reasonable effort has been taken to correctly record the pipe material of DCWW assets, there is a possibility that in some cases, pipe material (other than Asbestos Cement or Pitch Fibre) may be found to be asbestos cement (AC) or Pitch Fibre (PF). It is therefore advisable that the possible presence of AC or PF pipes be anticipated and considered as part of any risk assessment prior to excavation

Dŵr Cymru Cyllynedy (the Company) gives this information as to the position of its underground apparatus by way of general guidance only and on the basis of the best information available and to the best of its knowledge and belief. The accuracy of the information is not guaranteed. The Company is not responsible for any loss or damage caused by reliance on this information. The information is supplied for the purpose of providing a service to the public and is not intended to be used for any other purpose. The information is not to be used for any purpose other than the provision of a service to the public. The information is not to be used for any purpose other than the provision of a service to the public. The information is not to be used for any purpose other than the provision of a service to the public.

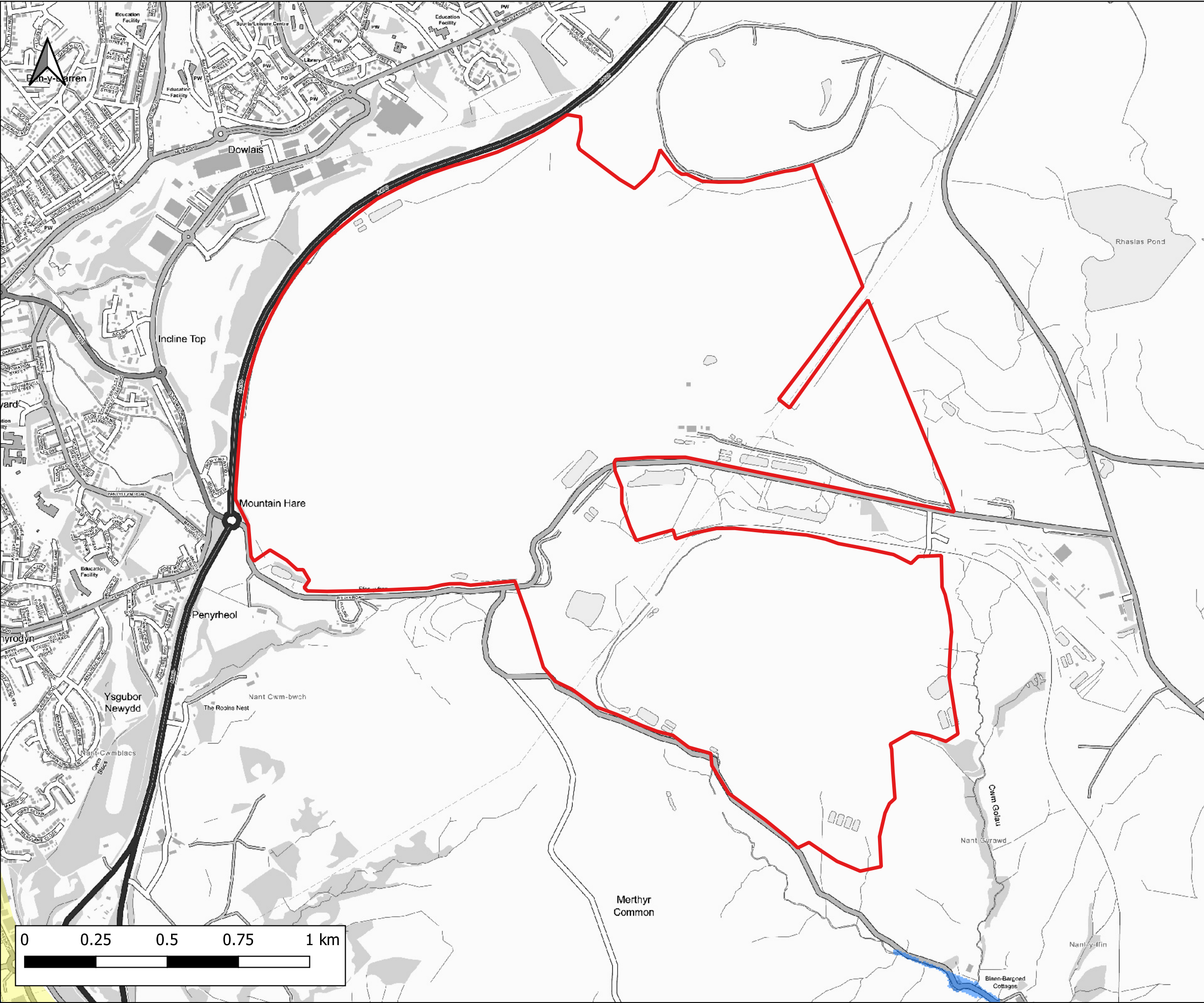
Service pipes are not generally shown but their presence should be anticipated.

EXACT LOCATIONS OF ALL APPARATUS TO BE DETERMINED ON SITE.

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Map Ref: 307367,206570
Map scale: 1:4000
Printed by: Warren Rees
Printed on: 22 Aug 2024

Appendix F NRW Flood Maps



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Development Advice Map (TAN15)

Zone A

Zone B

Zone C1

Zone C2

CLIENT:

Merthyr (South Wales) Ltd

www.waterco.co.uk

SCHEME:

Ffos-y-Fran, Merthyr Tydfil

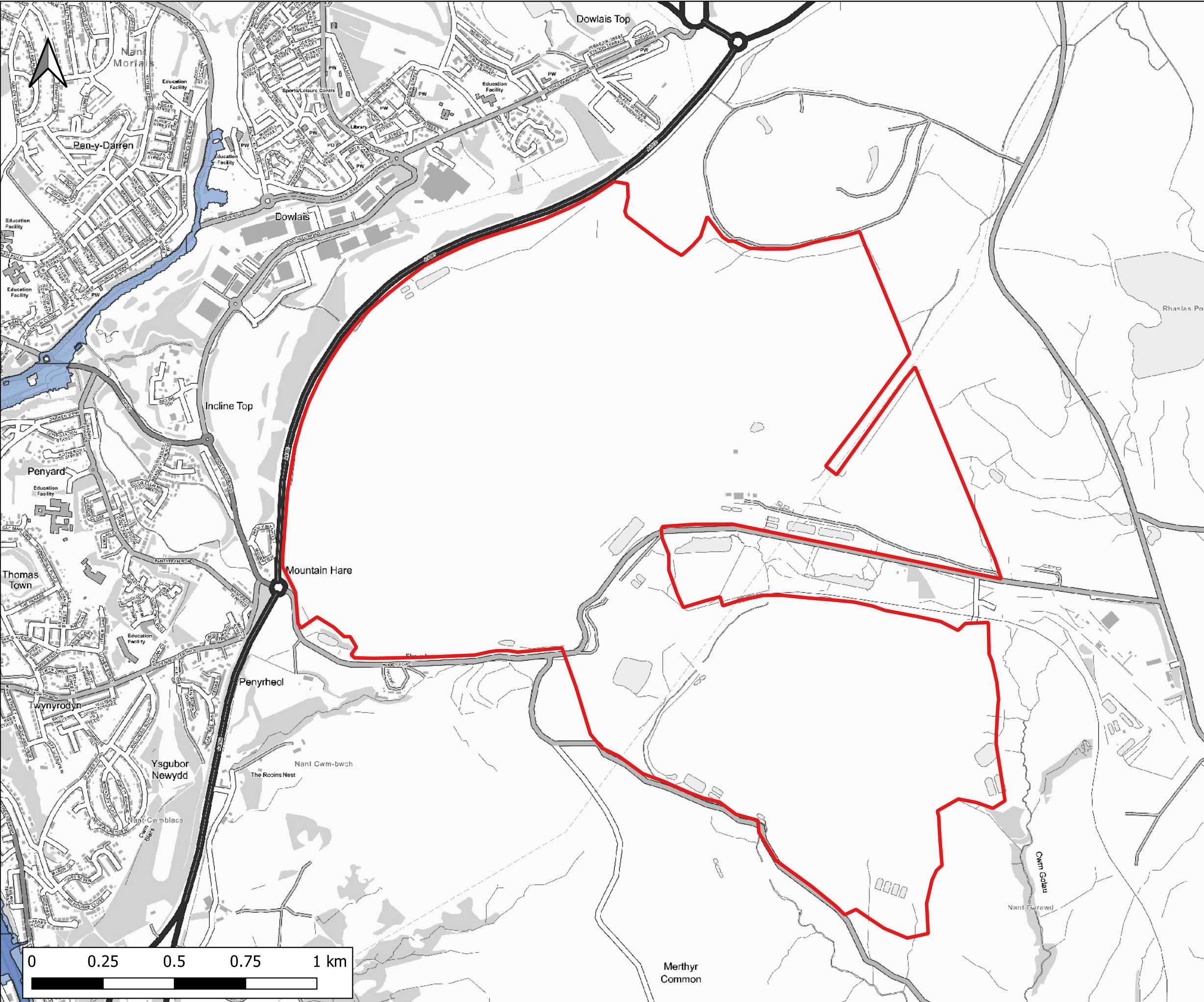
PLOT TITLE:

NRW Development Advice Map
Data accessed August 2024

PLOT STATUS:		DATE:	
FINAL		19-08-2024	

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:13000

PLOT NAME:	REVISION:
15840_NRW_DAM_Map	-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Flood Risk from Rivers

Flood Zone 1

Flood Zone 2

Flood Zone 3

CLIENT:

Merthyr (South Wales) Ltd

www.waterco.co.uk

SCHEME:

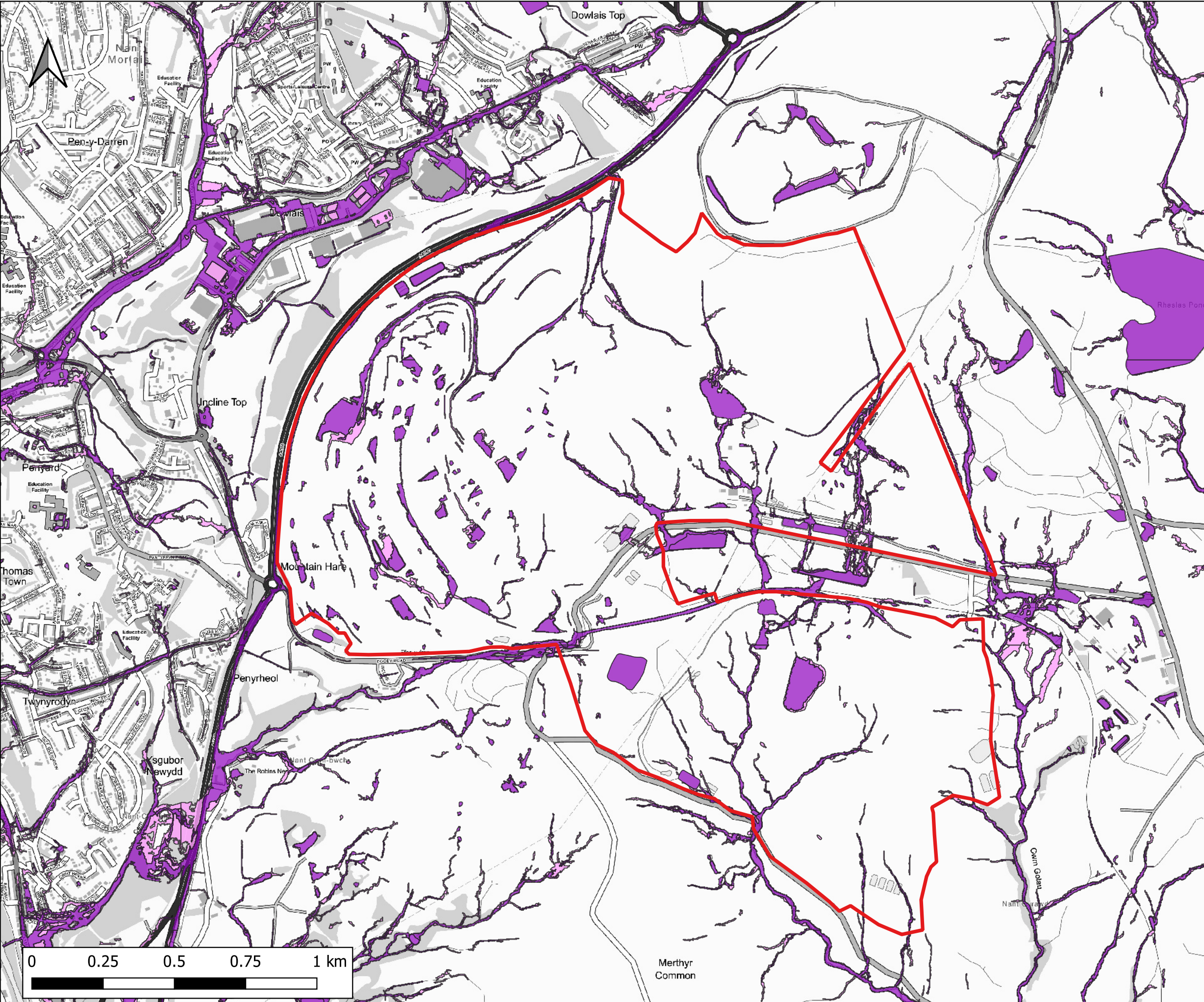
Ffos-y-Fran, Merthyr Tydfil

PLOT TITLE:

NRW Flood Risk from Rivers
Data accessed August 2024

PLOT STATUS:		FINAL		DATE:	19-08-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:		
MJW	AW	MW	1:13000		

PLOT NAME:		REVISION:
15840_NRW_Flood_Risk_from_Rivers		-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

Site Boundary

Flood Risk from Surface Water & Small Watercourses

Flood Zone 2

Flood Zone 3

Flood Zone 1

CLIENT:

Merthyr (South Wales) Ltd

www.waterco.co.uk

SCHEME:

Ffos-y-Fran, Merthyr Tydfil

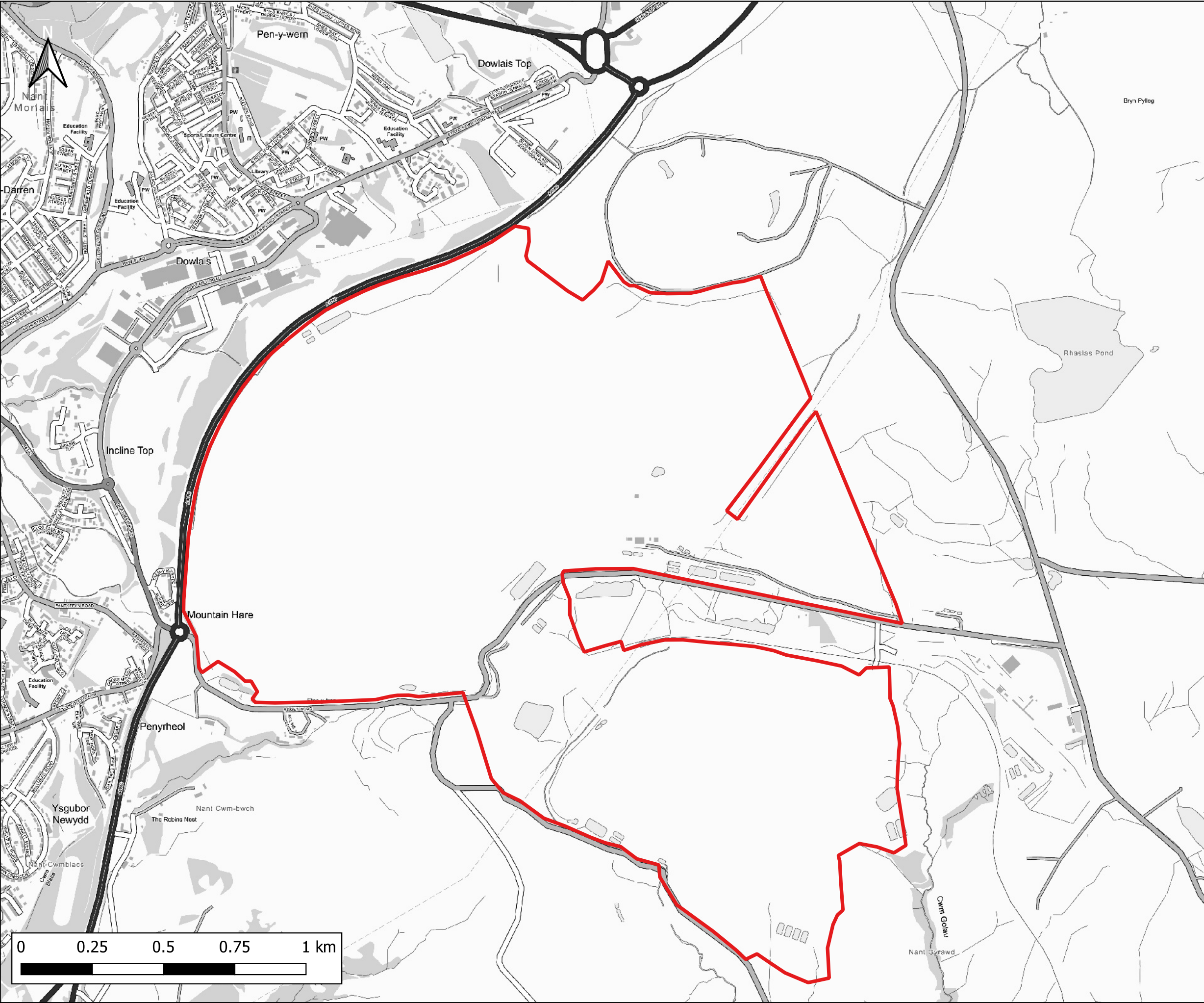
PLOT TITLE:

NRW Flood Risk from Surface Water & Small Watercourses
Data accessed August 2024

PLOT STATUS:		DATE:	
FINAL		19-08-2024	

DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:13000

PLOT NAME:	REVISION:
15840_NRW_Flood_Risk_from_Surface_Water	-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

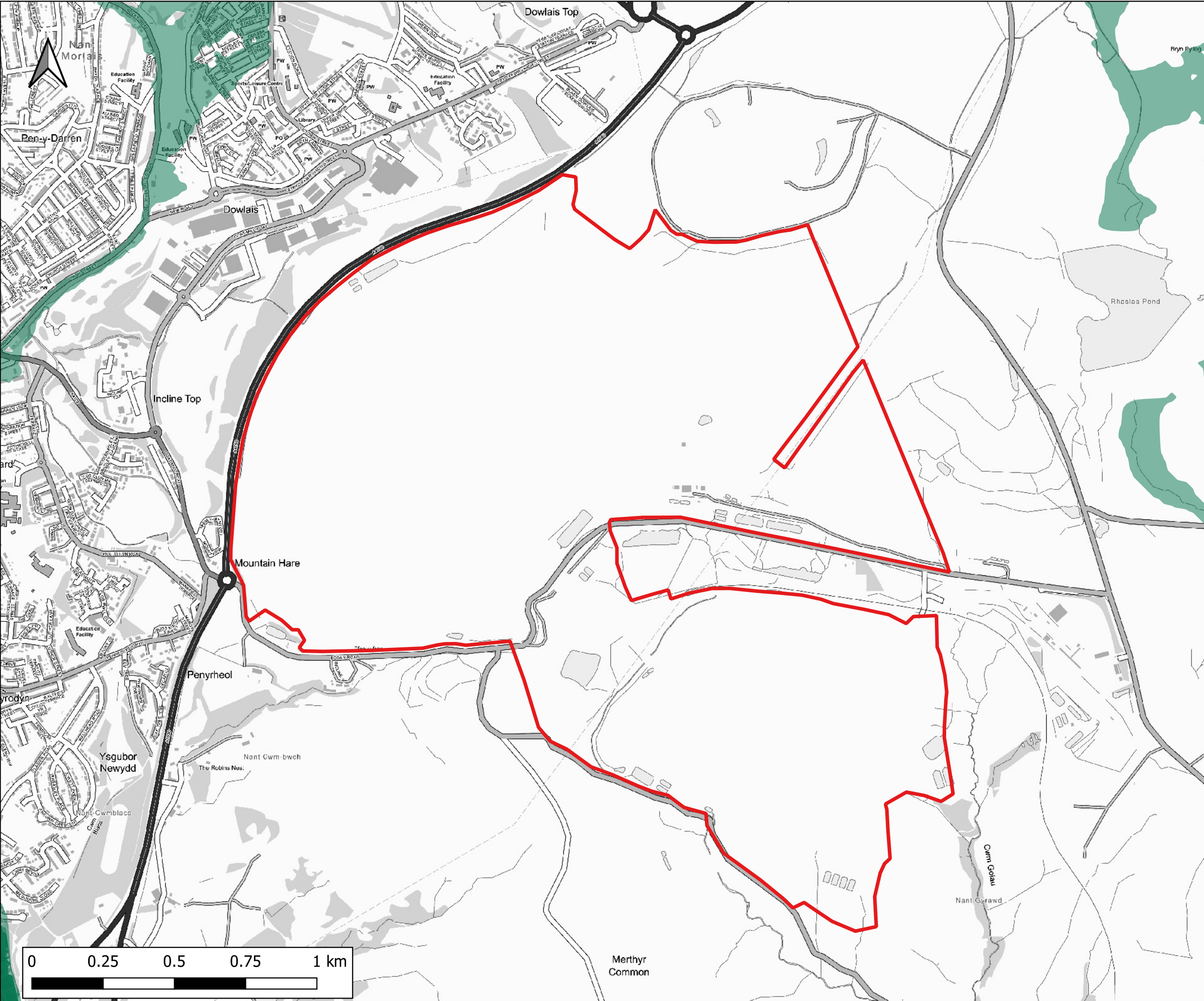
Site Boundary

Flood Risk from Sea

Flood Zone 2

Flood Zone 3

CLIENT:			
Merthyr (South Wales) Ltd			
 www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
NRW Flood Risk from the Sea Data accessed August 2024			
PLOT STATUS:			
FINAL			
DATE:			
19-08-2024			
DRAWN:			
MJW			
CHECKED:			
AW			
APPROVED:			
MW			
PLOT SCALE AT A3:			
1:13000			
PLOT NAME:			
15840_NRW_Flood_Risk_from_the_Sea			
REVISION:			
-			

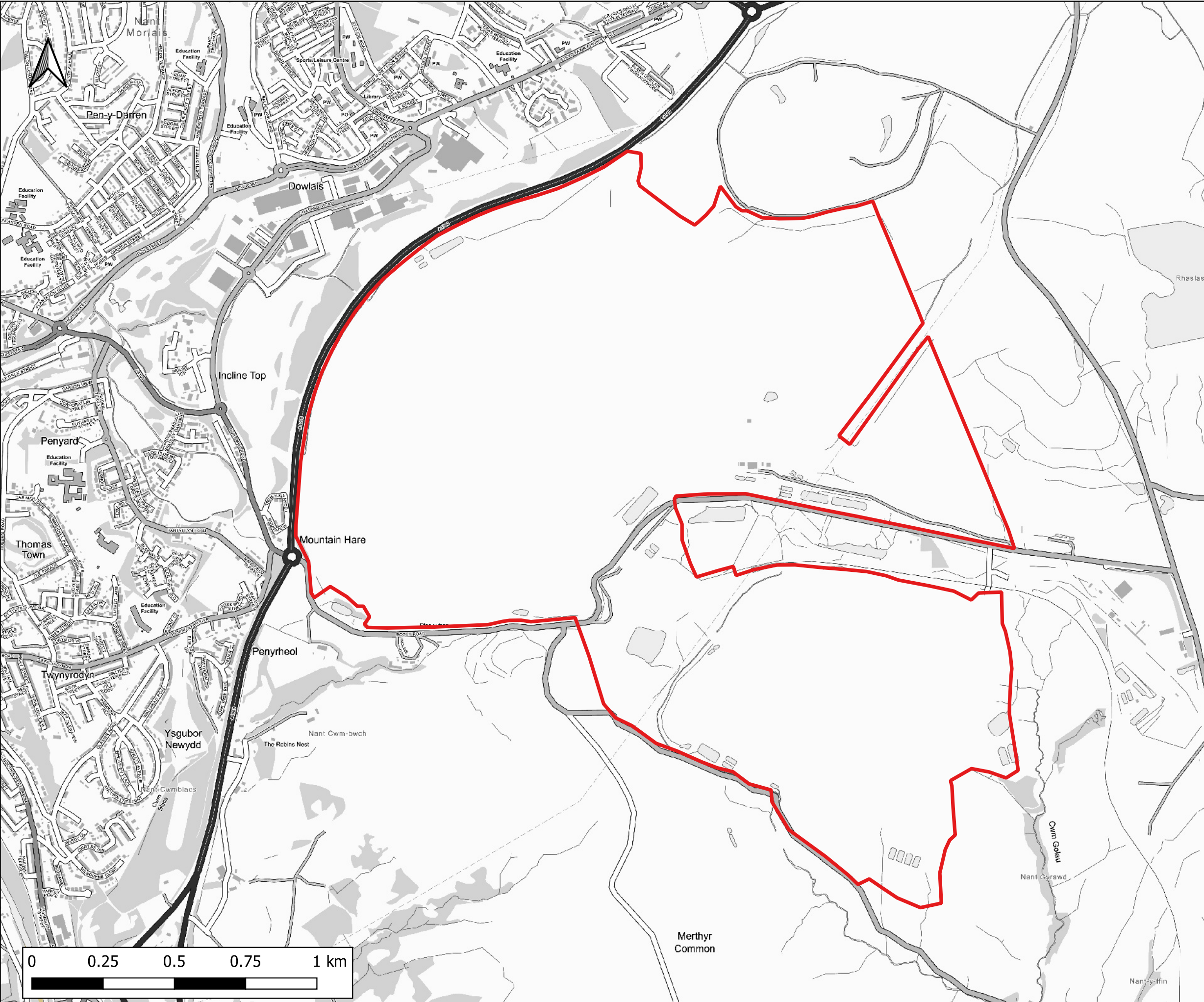


Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

LEGEND

- Site Boundary
- Flood Risk from Reservoirs Extent

CLIENT:			
Merthyr (South Wales) Ltd			
 www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
NRW Flood Risk from Reservoirs Data accessed August 2024			
PLOT STATUS:			DATE:
FINAL			19-08-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:13000
PLOT NAME:			REVISION:
15840_NRW_Flood_Risk_from_Reservoirs			-



Notes:
1) All dimensions are in metres and all levels in metres above Ordnance Datum unless stated otherwise

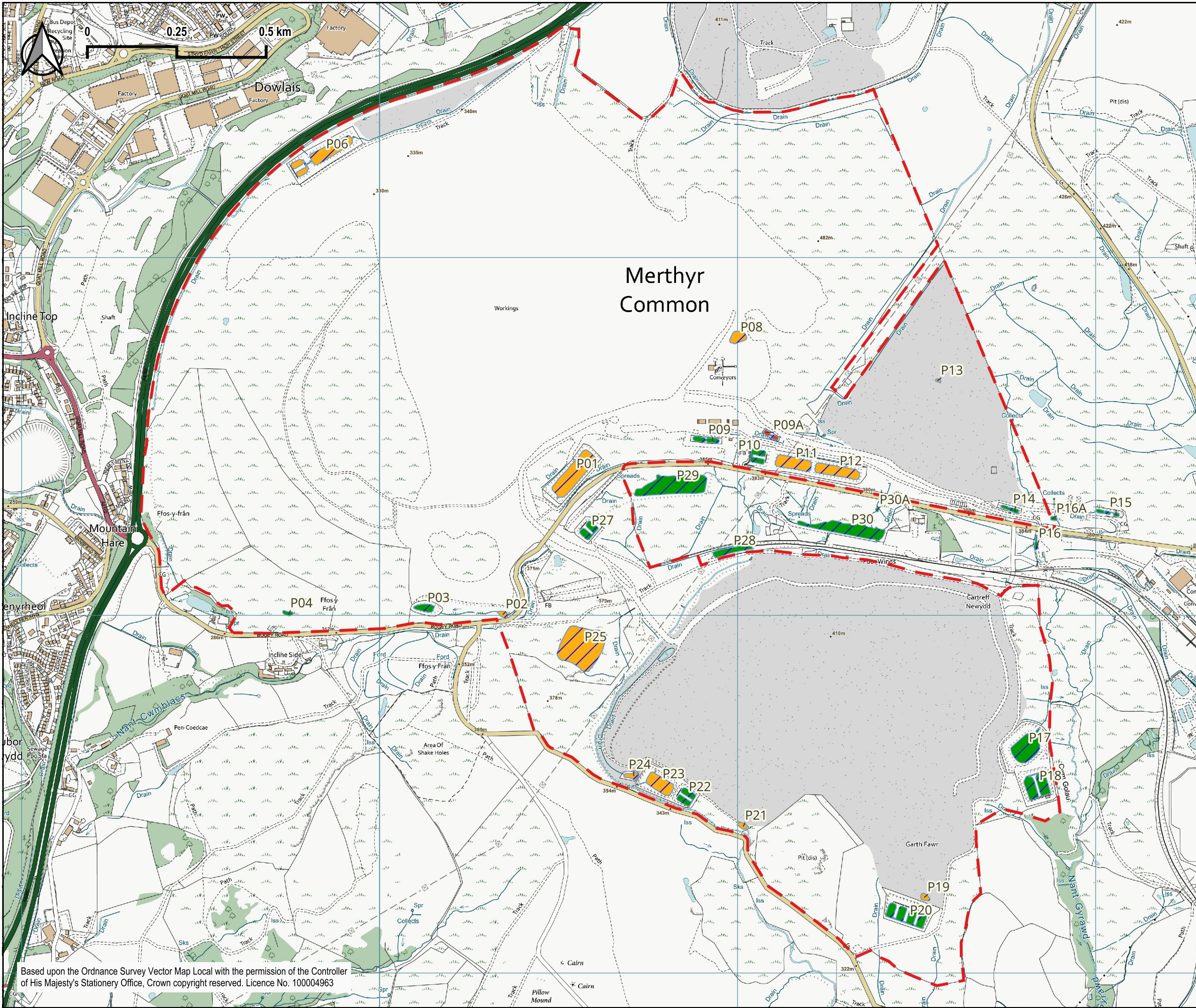
LEGEND

Site Boundary

Historic_Flood_Map

CLIENT:			
Merthyr (South Wales) Ltd			
www.waterco.co.uk			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
NRW Historic Flood Risk Data accessed Augst 2024			
PLOT STATUS:			
FINAL			
DATE:			
19-08-2024			
DRAWN:			
MJW			
CHECKED:			
AW			
APPROVED:			
MW			
PLOT SCALE AT A3:			
1:13000			
PLOT NAME:			
15840_NRW_Historic_Flood_Risk			
REVISION:			
-			

Appendix G GCN Survey



Cleient / Client:

**MERTHYR
(SOUTH WALES)
LIMITED**

Enw project / Project name:

**FFOS-Y-FRAN FINAL RESTORATION
OUTLINE RESTORATION STRATEGY**

Teitl lluniad /
Drawing title:

**GCN Surveys
Pond Location Plan**

Eglurhad / Key:

Site Boundary

Results Void

Negative GCN DNA result

Positive GCN DNA result

Nodiau/Notes:

P05, access limited, HSI only
P07, no longer exists, no HSI
P26, only has water in winter months, no HSI

WORK IN PROGRESS

Graddfa / Scale (A3):
1:10,000 @ A3

Dyddiad / Date:
June 2024

Defnyddio gan:
Drawn by:
RLJ

Gwiriwyd gan:
Checked by:
AEL

Rhif lluniad / Drawing number:
3274-RML-DR-E-13

Cwybodaeth:
Revision:
02

Darparwyd gan / Prepared by:

© Crown, Cwt Y Ddwr, Ffordd Cym, Rhyd, Denbighshire, LL15 1ND
Rif Ffôn/Tel: +44 (0)1824 704566, Ffôn/Fac: +44 (0)1824 705450
e-bost/e-mail: info@rml.co.uk, www.rml.co.uk

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Technical Note

Job name: Ffos y Fran Restoration Strategy Our ref: 3274/03/Ecology
 Job no: 3274 Date of note: 2024/07/26
 Date of review:

Note by: R. Jones Reviewed by: Adam Lynch

Ref.	Description	Image
P01	Settlement lagoon with riparian zone consisting of a combination of colliery silt and small pebbles, almost devoid of vegetation with the exception of three saplings of <i>Salix spp.</i> growing on extruding silt deposits. Patches of <i>Potamogeton spp.</i> are present in the centre and toward the margins, covering approximately 10% of surface area. eDNA result: Negative HSI Score: 0.58 (below average) Lined (y/n): No	
P02	At the time of surveying (June) this pond was almost entirely vegetated, with minimal open water and had taken on the characteristics of marshy grassland. The dominant plants were rushes such as <i>Juncus effusus</i> and <i>Typha spp.</i> During the winter months it is likely that the water level increases, forming a more typical pond. eDNA result: Negative HSI Score: 0.50 (Poor) Lined (y/n): No	
P03	The riparian zone/banks were entirely of exposed pond liner with no vegetation. Approximately 20% of the eastern end of the pond area was composed of a solidly vegetated mat. This mat consisted of a diverse range of grasses (such as common Bent, <i>Agrostis capillaris</i>; crested dog's-tail, <i>Cynosurus cristatus</i> and Sweet Vernal-grass, <i>Anthoxanthum odoratu</i>), sedges (primarily <i>Carex spp.</i>), numerous saplings of eared willow (<i>Salix aurita</i>) and some small gorse. Submerged vegetation was dominated by <i>Elodea spp.</i> Which covered almost the entire bottom of the pond. Approximately 40-50% of the surface area was comprised of <i>Potamogeton spp.</i> eDNA result: Positive HSI Score: 0.75 (Good)	

	Lined (y/n):	Yes	
P04	Set within a previously restored area of grazed grassland, the majority of the riparian zone was free of vegetation, consisting of bare stoney ground, with the exception of a single stand of <i>Juncus spp.</i> This species also comprised the only vegetation within the pond itself, in the form of an emergent stand of less than 5% of the area		
	eDNA result:	Positive	
	HSI Score:	0.51 (Below average)	
	Lined (y/n):	No	
P06	The banks of the largest of the three sub-divisions was formed of exposed liner and free of vegetation. At the northeastern end was a small strip of densely matted vegetation (primarily <i>Juncus spp.</i>) which formed approximately 5% of the pond area. Minimal aquatic vegetation was observed. The banks of the two adjacent smaller sub-divisions also consisted of exposed liner, though the degree of exposure was significantly less than the larger pond. Marginal vegetation in both these ponds was comprised of <i>Typha spp.</i> (less than 10% of the total area) and floating vegetation in the form of <i>Potamogeton spp.</i> covered approx. 20-30% of the surface of each.		
	eDNA result:	Negative	
	HSI Score:	0.47 (Poor)	
	Lined (y/n):	Yes	
P08	This pond contained minimal vegetation with the exception of coltsfoot (<i>Tussilago farfara</i>) growing within the colliery spoil which forms the banks and surrounding area. No aquatic vegetation was observed.		
	eDNA result:	Negative	
	HSI Score:	0.30 (Poor)	
	Lined (y/n):	No	

P09 This pond was comprised of two adjacent sub-divisions. Both were surrounded by a short strip of exposed liner which transitioned into an area of silt deposit before the waters edge. Of the easterly of the two were several small overhanging bushes (*Salix spp.*) forming approximately 40% of the margin. The surface of this pond was largely covered by *Potamogeton spp.* interspersed with emergent *Juncus spp.* Leaves and a stand of *Typha spp.* The more westerly pond was largely of the same composition but contained significantly more *Juncus*, which formed a dense strip around approximately 40% of the margin.



eDNA result: Positive

HSI Score: 0.45 (Poor)

Lined (y/n): Yes

P09a This washout lagoon was heavily coloured by ochre and contained no submerged or floating vegetation. There were small patches of *Juncus* and *Tussilago farfara* around the margins, making up less than 5%.



eDNA result: Inconclusive

HSI Score: 0.43 (Poor)

Lined (y/n): No

P10 The margins of both sub-divisions were well vegetated with a composition of sedges (primarily *Carex spp.*), rushes (*Juncus spp.*), reedmace (*Typha spp.*), *Salix* saplings and *Elodea spp.* The surface was covered by *Potamogeton spp.*



eDNA result: Positive

HSI Score: 0.64 (Average)

Lined (y/n): No

P11 Banks were dominated by short, patchy graminoids and forbs. These included various grasses, rushes, sedges, horsetail (*Equisetum*), coltsfoot, thistles, red sorrel (*Rumex acetosella*). Vegetation was most dense where silt had accumulated at the outflow. Here there were taller stands of *Typha*, *Equisetum*, *Juncus* and *Salix* saplings.

eDNA result: Negative

HSI Score: 0.43 (Poor)

Lined (y/n): No



P12 Largely similar to the adjacent pond 11, with the exception of dense marginal patches of *Equisetum* in the corners.

eDNA result: Negative

HSI Score: 0.44 (Poor)

Lined (y/n): No



P13 A shallow pond with minimally discernible banks on the top of OB2, much of the margin and surface was dominated by emergent *Juncus* interspersed with patches of algae.

eDNA result: Negative

HSI Score: 0.45 (Poor)

Lined (y/n): No



P14 Adjacent to wheel wash when approaching Bogey Road crossing point. Limited Vegetation but connectivity to better ponds and wider foraging areas to East.

No Image

eDNA result: Positive

HSI Score: 0.65 (Average)

	Lined (y/n):	No	
P15	The margins of this pond were very well vegetated, primarily by <i>Equisetum</i> interspersed with <i>Juncus</i> and <i>Carex</i> as well as a few small <i>Salix</i> saplings. Submerged vegetation was limited but there were areas of <i>Elodea</i> spp. and some floating <i>Potamogeton</i> patches.		
	eDNA result:	Positive	
	HSI Score:	0.74 (Good)	
	Lined (y/n):	No	
P16	Approximately 50% of the area was predominantly exposed silt with a narrow channel of shallow water draining into a deeper section at the other end. The margins were well vegetated, primarily by grasses, a single gorse bush and patches of <i>Juncus</i>, with <i>Equisetum</i> occasionally protruding through the exposed silt deposits.		
	eDNA result:	Positive	
	HSI Score:	0.43 (Poor)	
	Lined (y/n):	No	
P16a	Well vegetated with 50% of the margin consisting of a dense <i>Typha</i> stand with the remaining area comprised primarily of short grasses and small patches of <i>Juncus</i>. The majority of surface area consisted of a dense mat of <i>Potamogeton</i>.		
	eDNA result:	Positive	
	HSI Score:	0.64 (Average)	
	Lined (y/n):	No	
P17	Wide banks covered with short and patchy grasses and mosses interspersed with coltsfoot. The margin was largely dominated by a thin strip of <i>Juncus</i> with occasional overhanging <i>Salix</i> bushes. Much of the surface area was covered by a thin mat of <i>Potamogeton</i>.		

eDNA result: Positive

HSI Score: 0.68 (Average)

Lined (y/n): No



- P18 The banks of both sub-divisions were well vegetated, consisting mostly of very short grasses and forbs. Marginal vegetation was minimal with the occasional small stand of *Juncus* and *Typha*. Floating vegetation was also relatively minimal, with some small areas of *Potamogeton* toward the margins where the water was shallower.

eDNA result: Positive

HSI Score: 0.65 (Average)

Lined (y/n): No



- P19 50% of the margin comprised a sheer wall where material has slipped from the adjacent OB3. The accessible margin showed no discernible bank, transitioning from grassland directly to shallow water, followed by a steep drop off into deep, clear water. Around the shallow marginal strip was submerged grass with emergent *Juncus* and the occasional *Typha*. Over the deepest section a mat of *Potamogeton* was evident.

eDNA result: Negative

HSI Score: 0.58 (Below average)

Lined (y/n): No



- P20 The banks of both sub-divisions were sparsely vegetated by short, dry and patchy grasses and mosses interspersed with lichen. Marginal vegetation was limited to small patches of *Juncus*. The dominant feature was the presence of large over-hanging bushes around much of water's edge, predominantly *Salix* and *Betula* with the occasional *Buddleja*.



eDNA result: Positive

HSI Score: 0.68 (Poor)

Lined (y/n): No

- P21 Fed by Bargod taf stream and formed in a depression at the foot of OB3. A high-quality and heavily vegetated pond with clear water. Much of the riparian zone is dominated by large *Salix* bushes surrounded by *Juncus* and tall ruderals such as rosebay willowherb (*Chamaenerion angustifolium*) and foxglove (*Digitalis purpurea*). The margins are dominated by a dense mat of *Equisetum* interspersed with *Juncus*, *Carex* and grasses (mainly *Cynosurus cristatus* and *Anthoxanthum odoratu*). The surface of the pond is largely covered by *Potamogeton* with emergent *Typha* and *Equisetum* scattered throughout.



eDNA result: Negative

HSI Score: 0.75 (Good)

Lined (y/n): No

- P22 Both sub-divisions have similar characteristics, with banks dominated by *Salix* bushes and occasional *Buddleja*. The majority of the margins consist of a thin covering of *Typha*. Submerged and floating vegetation were not observed.



eDNA result: Positive

HSI Score: 0.70 (Good)

Lined (y/n): No

- P23 The banks were dominated by mosses and short grasses interspersed with *Tussilago farfara*, hawksbit (*Leontodon spp.*), thistles (*Cirsium spp.*) and *Equisetum*. Numerous

self-set *Salix* and *Buddleja* bushes were also present along the banks. Marginal vegetation was generally minimal, with the exception of dense *Typha* stands growing on a silt deposit at the western end. Sparse mats of *Potamogeton* were present on the surface over much of the area.

eDNA result: Negative

HSI Score: 0.60 (Average)

Lined (y/n): No



- P24 Banks consist mainly of coal spoil and fine gravel, with some areas of larger rubble deposits, thinly covered by short grasses and *Tussilago*, with self-set *Salix* saplings dotted throughout. *Typha* covers nearly the entire margin, with some small patches of *Juncus* growing on transitional silt deposits. The eastern half of the pond is largely un-vegetated open water, with the northern half divided equally between exposed silt followed by dense *Typha*.

eDNA result: Negative

HSI Score: 0.66 (Average)

Lined (y/n): No



- P25 A large pond with characteristics of a small lake, set within a moorland habitat of grasses (Yorkshire fog, *Halcus lanatus*; Purple moor-grass, *Molinia caerulea*; Cotton grass, *Eriophorum angustifolium*), rushes (mainly *Juncus effusus*) and sedges (mainly yellow sedge, *Carex demissa*). Banks were shallow and poorly defined, dominated by *Juncus* transitioning into a rocky bed. Submerged vegetation was primarily of *Elodia spp.* and floating vegetation was absent.

eDNA result: Negative

HSI Score: 0.47 (Poor)

Lined (y/n): No



- P27 The banks were dominated by a sparse mixture of *Equisetum*, *Juncus*, Hawkbit (*Leontodon*), Bird's-foot trefoil (*Lotus corniculatus*) and white clover (*Trifolium repens*), interspersed with spear-thistle (*Cirsium vulgare*) and self-set *Salix* of varying sizes. A small strip of pond liner was exposed adjacent to the water's edge and marginal vegetation was largely absent. The more southerly of the two sub-divisions contained a thin mat of *Potamogeton* over approximately 20% of the area,

whereas aquatic vegetation was absent from the more northerly sub-division.

eDNA result: Positive

HSI Score: 0.61 (Average)

Lined (y/n): Yes



- P28 The pond is formed in a narrow depression along the route of the old railway track. The western edge is largely un-vegetated and of bare ground and small pebbles. The northern, eastern and southern banks are covered mainly by *Juncus*, with bracken (*Pteridium*) and spear-thistle (*Cirsium vulgare*). The pond itself was free of aquatic vegetation. In addition to the pond, a narrow drainage channel, with some open water, dominated by *Typha*, *Juncus* and *Eriophorum* runs adjacent to the northern edge.

eDNA result: Positive

HSI Score: 0.68 (Average)

Lined (y/n): Unknown



- P29 Within the central ecological zone, the northern and western edges of this large pond show no discernible bank, with dense *Juncus* transitioning into open water. This area is also interspersed with *Carex*, *Typha*, *Eriophorum* and large *Salix* bushes. The southern and eastern edges are defined by a grassy bank with *Pteridium*. Aquatic vegetation was limited to sparse areas of *Elodea* around the margins.

eDNA result: Positive

HSI Score: 0.77 (Good)

Lined (y/n): No



- P30 A large pond within the central ecological zone, very similar in composition to Pond 29, with the exception of a significant amount of *Equisetum* interspersed with *Juncus* and ground flora of *Sphagnum*. The bank along the eastern and southern edges contains some bushes of gorse (*Ulex*) and hawthorn (*Crataegus monogyna*) in

addition to the *Salix*. The eastern and western margins are dominated by dense stands of *Typha*.

eDNA result: Positive

HSI Score: 0.77 (Poor)

Lined (y/n): No



P30a A smaller pond within the central ecological zone with poorly defined banks covered by *Carex*, *Juncus*, *Eriophorum* and *Equisetum*. *Typha* grows around the margins and is sparsely emergent throughout the rest of the surface area.

eDNA result: Positive

HSI Score: 0.62 (Average)

Lined (y/n): No



Appendix H Site Visit and Photographic Record

Photo No.1	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Watercourse flowing south at approximate NGR: 308840, 206216	

Photo No. 2	15840 – Ffos Y Fran
Date: 11/09/2024 Description: The upstream are of the watercourse at approximate NGR: 308831, 206278. Some iron staining observed.	

Photo No.3	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert at approximate NGR: 308833, 206276	

Photo No. 4	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Wheel wash lagoons. A closed system. Located at approximate NGR: 308791, 206290 (facing west)	

Photo No.5	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Water Treatment Area (WC1). Attenuation Lagoon Approximate NGR: 308372, 206416 (facing south-west)	

Photo No.6	15840 – Ffos Y Fran
Date: 11/09/2024 Description: WC1. Second attenuation lagoon. Approximate NGR: 308209, 206452 (facing south-west)	

Photo No.7	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Watercourse upstream. Water ponding before entering a culvert. Approximate NGR: 308142, 206510 (facing north-east)	

Photo No.8	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert outlet. Open watercourse channel before being culverted beneath the road to WC1. Approximate NGR: 308132, 206490 (facing south-west)	

Photo No.9	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Settlement lagoons as part of WC1. Approximate NGR: 308097, 206481 (facing south-west)	

Photo No. 10	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Barrel Wash Treatment Ponds. A close system at approximate NGR: 307947, 206501	

Photo No.11	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Quarry void. Photo taken from viewing platform at approximate NGR: 307676, 206582	

Photo No. 12	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Watercourse on northern site boundary, flowing in an easterly direction. Concrete channel. Approximate NGR: 307559, 207676	

Photo No.13	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert on northern site boundary at approximate NGR: 307549, 207667.	

Photo No. 14	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Concrete channel. Dry at time of visit. Photo taken at approximate NGR: 307543, 207631	

Photo No.15	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Culvert inlet at approximate NGR: 307542, 207626 (facing north-east)	

Photo No. 16	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Swale/ depression along northern boundary. Approximate NGR: 307365, 207550 (facing west)	

Photo No.17	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Attenuation lagoon as part of WB Approximate NGR: 306931, 207344 (facing west)	

Photo No. 18	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Overflow pipe from WB. Discharge to ditch along the northern boundary. Approximate NGR: 306778 , 207301	

Photo No.19	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Settlement ponds as part of Water Treatment Area (WB) Approximate NGR: 306758, 207240	

Photo No. 20	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert conveying flows from the site under the A4060 Approximate NGR: 306366, 206572	

Photo No.21	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Open watercourse channel along the north-western site boundary conveying flows to the culvert Approximate NGR: 306369, 206575 (facing north-east)	

Photo No. 22	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Potential overflow culvert at approximate NGR: 306361, 206561	

Photo No.23	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert conveying flows from the site under the A4060 Approximate NGR: 306591, 207113	

Photo No. 24	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Open watercourse channel along the north-western site boundary conveying flows to the culvert Approximate NGR: 306595, 207116 (facing north-east)	

Photo No.25	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Sump hole in the north-western extent of the site. Approximate NGR: 306463, 206797	

Photo No. 26	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Excavated channel (dry at time of visit) at approximate NGR: 307099, 206061	

Photo No.27	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Lined lagoon in the south-western extent of the site at approximate NGR: 307097, 206062	

Photo No. 28	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Culvert under road Approximate NGR: 307356, 206045	

Photo No.29	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Wetland at approximate NGR: 307350, 206040 Receives flows from the ditch which is culverted beneath Bogey Road	

Photo No. 30	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Watercourse originating within the central ecological area and flowing south Approximate NGR: 308044, 206178 (facing north)	

Photo No.31	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Pond located at approximate NGR: 308034, 206178	

Photo No. 32	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Water Treatment Area WG Attenuation Pond Located south-east of OB3 at approximate NGR: 308733, 205634 (facing east)	

Photo No.33	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Water Treatment Area WG Settlement ponds Photo taken at approximate NGR: 308781, 205553	

Photo No. 34	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Water Treatment Area WF. Comprises 4no. lagoons. Photo taken at approximate NGR: 308499, 205200 (facing south-west)	

Photo No.35	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Penstock regulating the water flow into the water treatment area. Approximate NGR: 308474, 205188	

Photo No. 36	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Wide vegetated channel conveying flow to the Bargoed Taff 308404, 205234. 2no. outlets discharge to this channel.	

Photo No.37	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Discharge point for the 4no. lagoons at Water treatment area WF Approximate NGR: 308403, 205165	

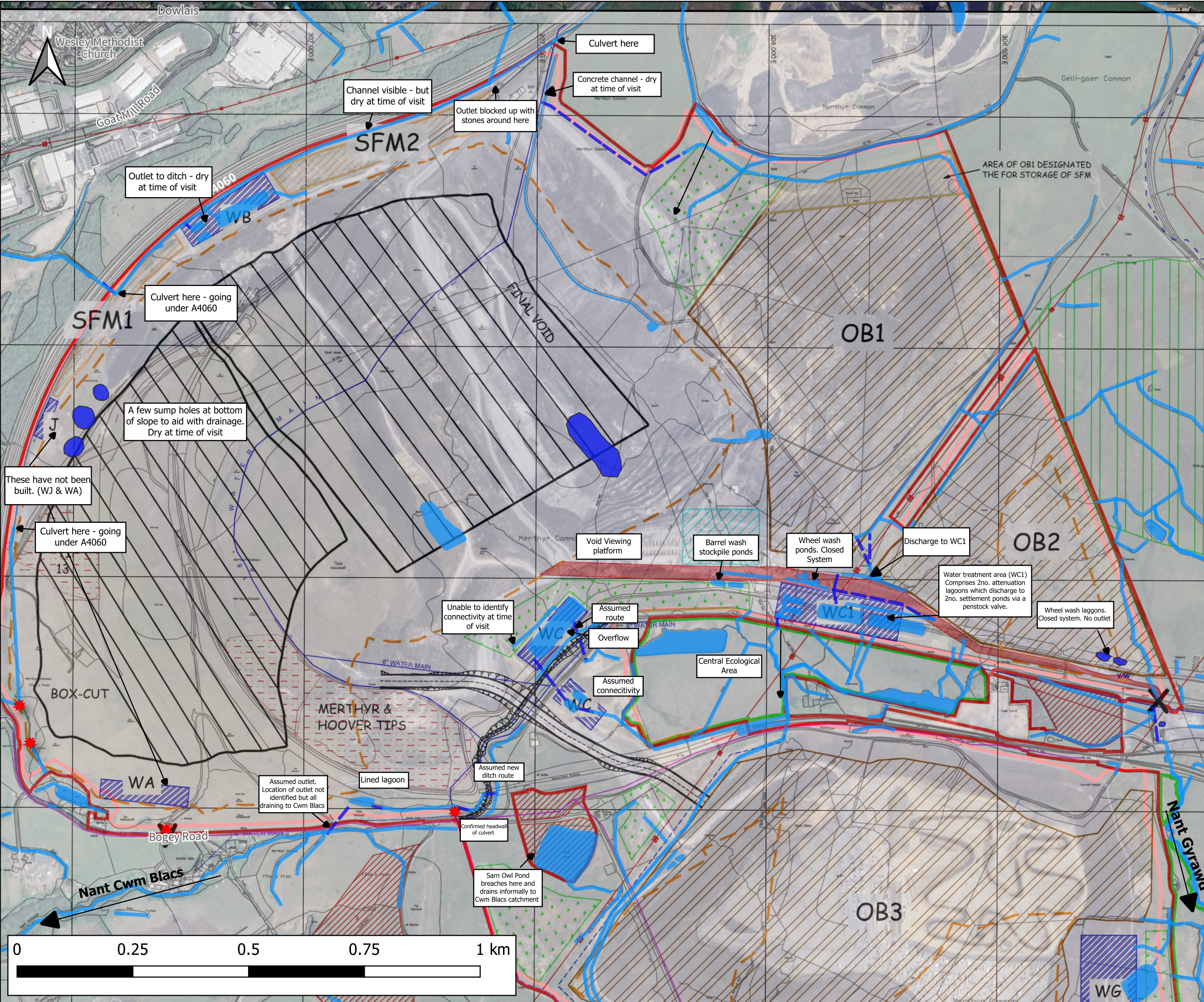
Photo No. 38	15840 – Ffos Y Fran
Date: 11/09/2024 Description: Photograph showing settlement pond. Approximate NGR: 307731, 205565	

Photo No.39	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Photograph showing discharge to the Bargoed Taff. Approximate NGR: 307655, 205541	

Photo No.40	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Photograph showing Sarn Howell Pond from the south. Approximate NGR: 307566, 205848	

Photo No.41	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Photograph showing breach location to the west of Sarn Howell Pond. Approximate NGR: 307510, 205935	

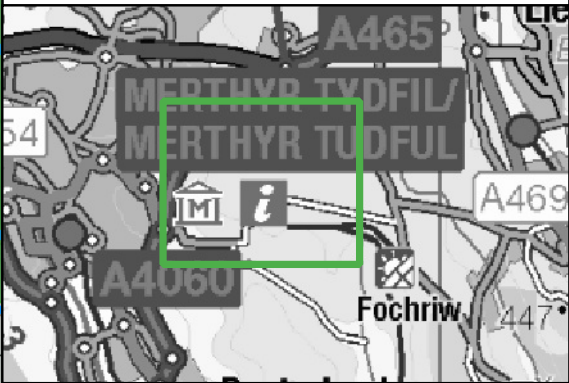
Photo No.42	15840 – Ffos Y Fran
Date: 11/09/2024	
Description: Photograph showing assumed culvert which discharges towards the Bargoed Taff. Approximate NGR: 307675, 205810	



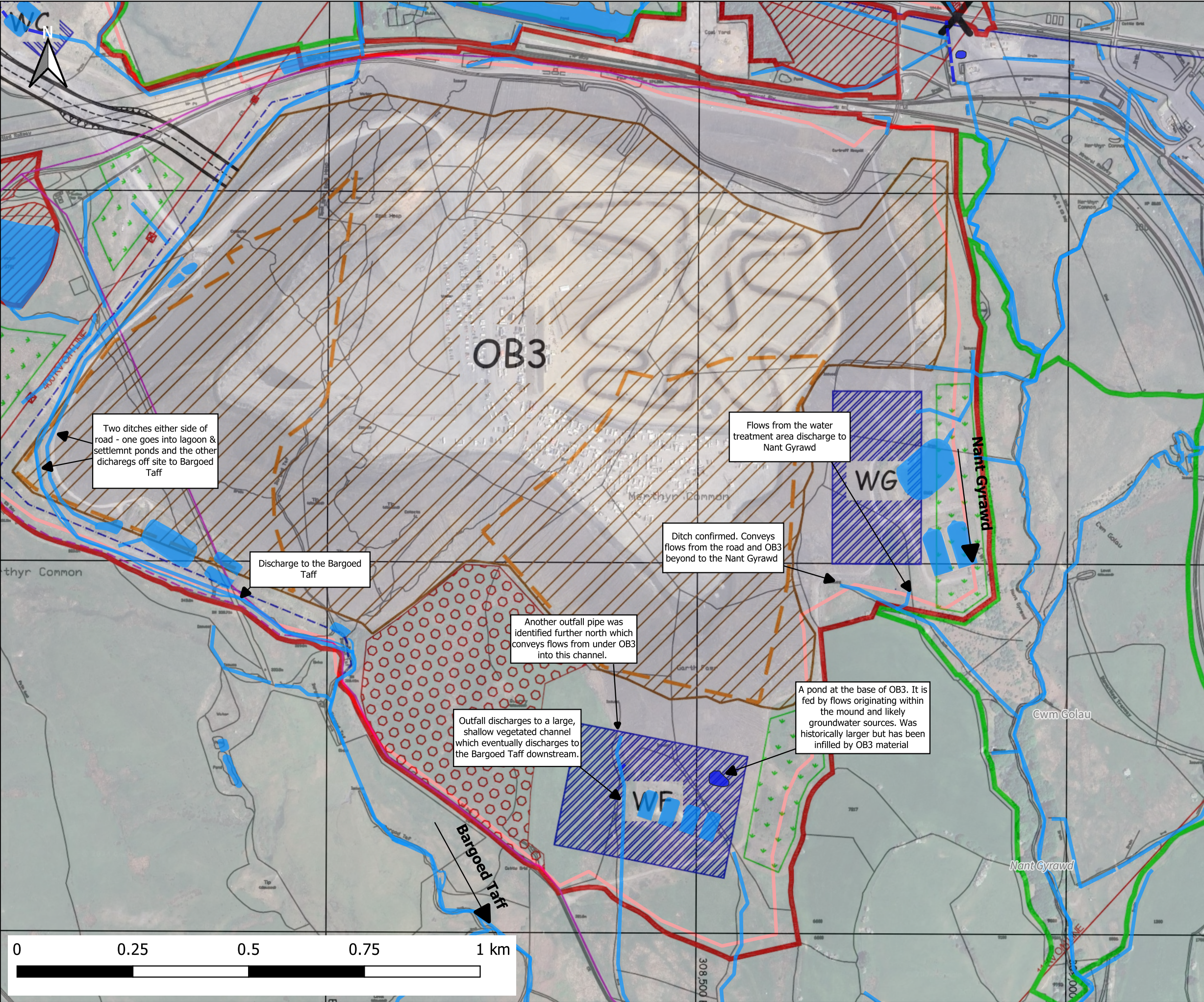
Notes:
The information provided within this drawing is based on anecdotal information from the Client

LEGEND

- Site Boundary
- Watercourses
- Waterbodies
- ASSUMED CULVERTS
- Identified waterbodies on site
- Identified watercourses on site

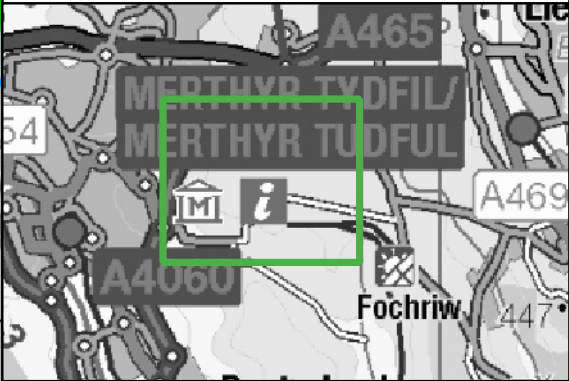


CLIENT:			
Merthyr (South Wales) Ltd			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
Site Visit Record			
PLOT STATUS:			DATE:
FINAL			26-11-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:8000
PLOT NAME:			REVISION:
15840_Site_Visit_Record			-



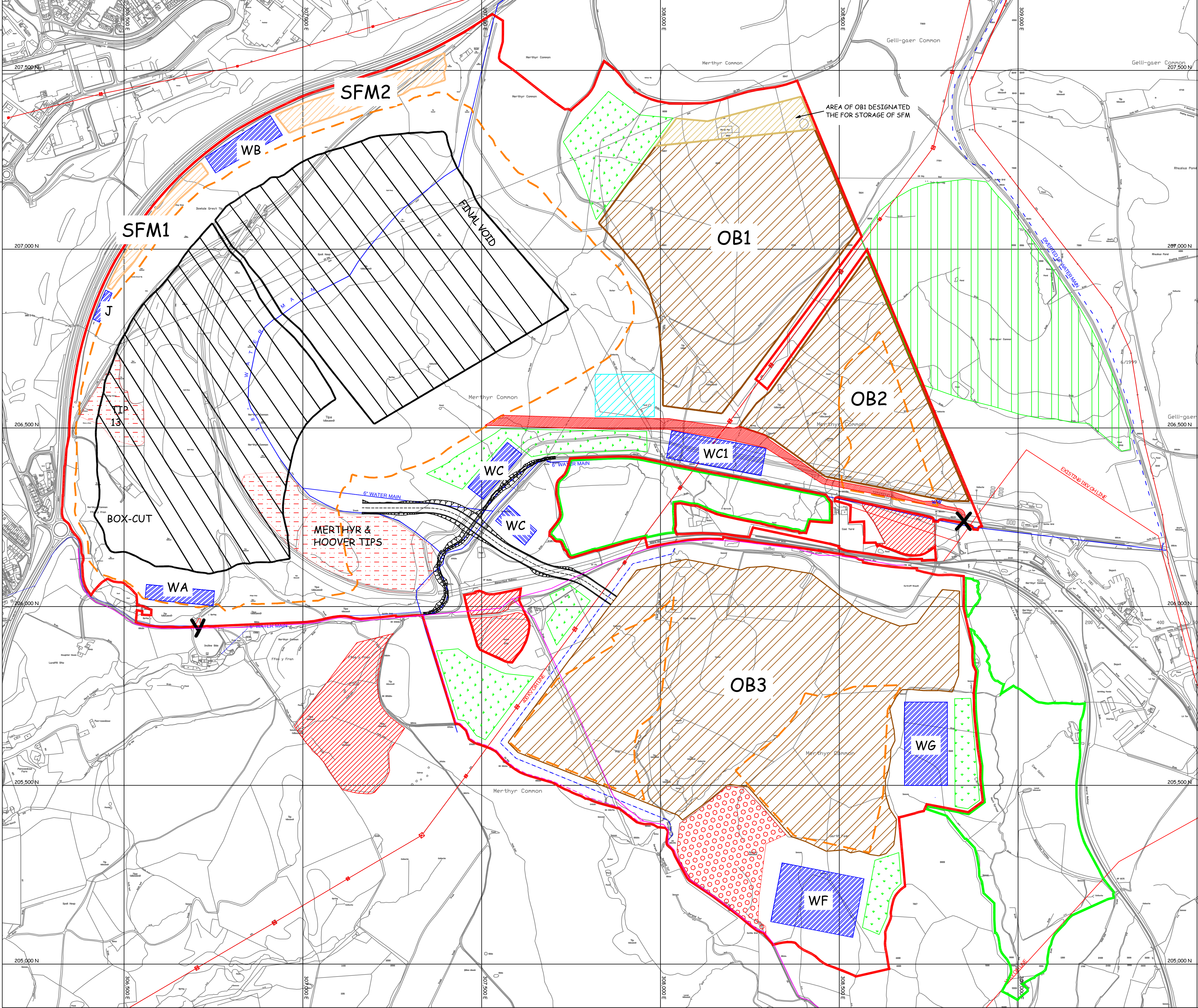
Notes:
The information provided within this drawing is based on anecdotal information from the Client

- LEGEND**
- Site Boundary
 - Watercourses
 - Waterbodies
 - ASSUMED CULVERTS
 - Identified waterbodies on site
 - Identified watercourses on site



CLIENT:			
Merthyr (South Wales) Ltd			
SCHEME:			
Ffos-y-Fran, Merthyr Tydfil			
PLOT TITLE:			
Site Visit Record			
PLOT STATUS:			DATE:
FINAL			26-11-2024
DRAWN:	CHECKED:	APPROVED:	PLOT SCALE AT A3:
MJW	AW	MW	1:5000
PLOT NAME:			REVISION:
15840_Site_Visit_Record			-

Appendix I Conditions Plan



LEGEND

Site Boundary (inside of symbol to be taken as boundary)

Excavation Area

Basal Seam Extraction Area

Existing Power Lines

Existing Water Mains

Diverted Water Main

Existing British Telecom lines

Diverted British Telecom Lines

XBogey Road Crossing Point

YSecondary Access Point for Abnormal Loads Only

WWWheelwash

Area of Waste Tips

Overburden Mounds

Baffle Embankment (Soil Forming Material)

Soil Mound (Soil Forming Material)

Soil Mound (Topsoil or Subsoil)

Water Treatment Areas

Plant Maintenance Area

Coerphilly cSINC

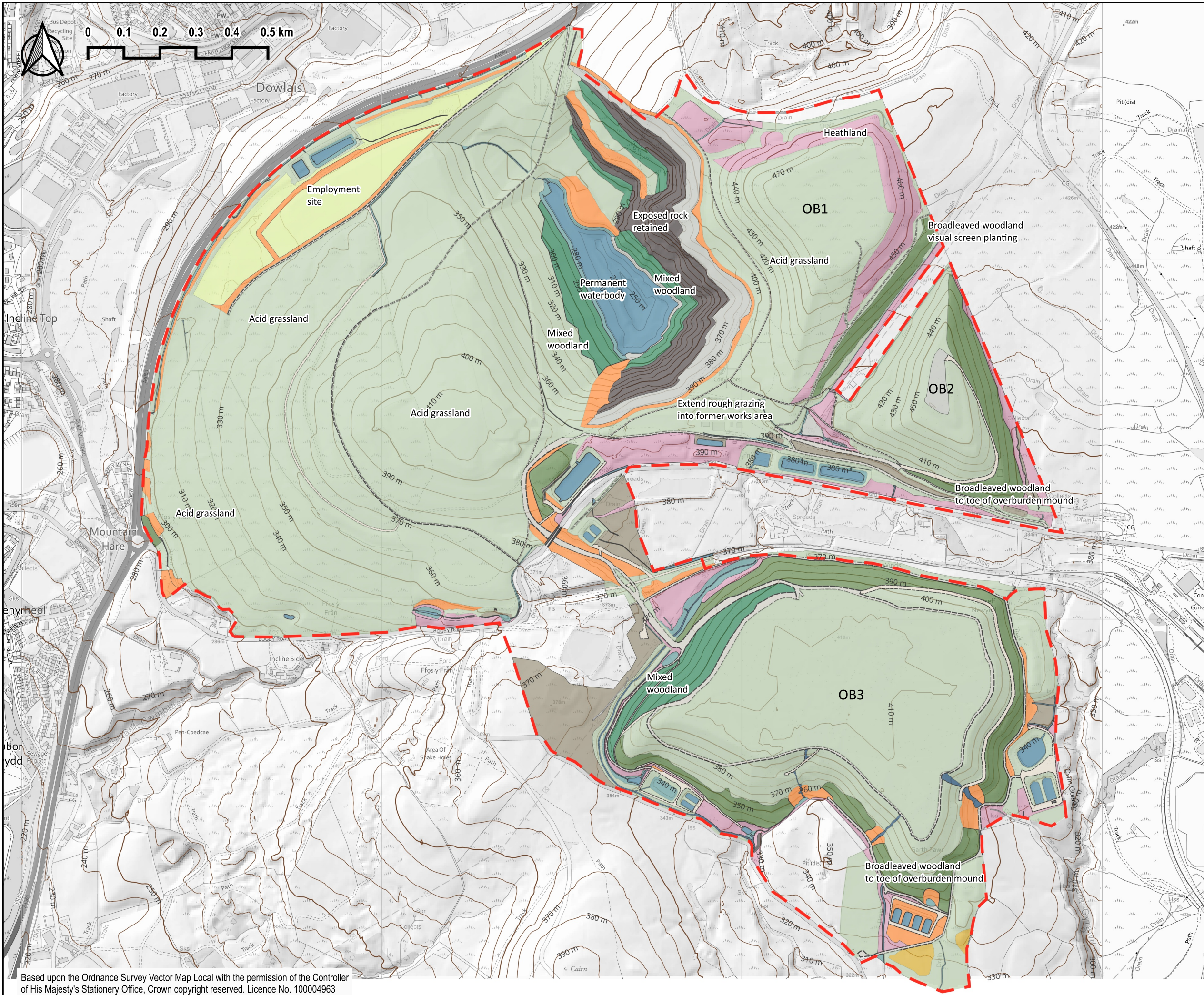
Ecological Areas Outside the Site Boundary

CADW Scheduled Ancient Monuments

GGAT Iron Age Settlement

Rev	Description of revision	Auth	Chkd	App	Date
Miller Argent (South Wales) Limited Cwmbaroged Disposal Point Fochriw road Merthyr Tydfil CF48 4AE Tel: 01685 844381 Fax: 01685 845029					
FFOS Y FRAN LAND RECLAMATION SCHEME					
TITLE CONDITIONS PLAN					
CONSULTANT					
Designed DM		Drawn DM		Checked	
CAD/Dos filename:					
Scale 1:5,000		Size A1	Date 02/10/06		
Drawing No. MA/CON/01		Rev.	Contract Drawing No. N/A		
mill argent Reproduced from Land-Line © 1:1250/1:2500 scale data by permission of Ordnance Survey © on behalf of The Controller of Her Majesty's Stationery Office. © Crown copyright (2002). All rights reserved. Licence No. AL 100038467					

Appendix J Proposed Scheme Plans



Cleient / Client:

MERTHYR
(SOUTH WALES)
LIMITED

Enw project / Project name:

FFOS-Y-FRAN FINAL RESTORATION

Teitl lluniad / Drawing title:

Proposed Development Plan
(indicative only)

Eglurhad / Key:

Site boundary

Restoration contour (10 m interval)

Land cover (indicative) [acres]

Improved grass [2.20]

Unimproved grass [600.34]

Mixed woodland [27.92]

Broad-leaved woodland [48.90]

Shrub [32.72]

Heathland [52.22]

Bog [24.12]

Inland rock [22.75]

Standing water [25.92]

Running water [2.66]

Freshwater marsh [11.72]

Other built structure [0.14]

Metalled roadway [23.61]

Pathway [13.11]

Multiple surface [27.36]

Bare surface [18.59]

WORK IN PROGRESS

Graddfa / Scale (A3):
1:10,000 @ A3

Dyddiad / Date:
Oct 2024

Derfnydded gan:
RhE

GWilydd gan:
JS

Rhif lluniad / Drawing number:
3274-RML-DR-L-39

Cwriad / Revision:
02

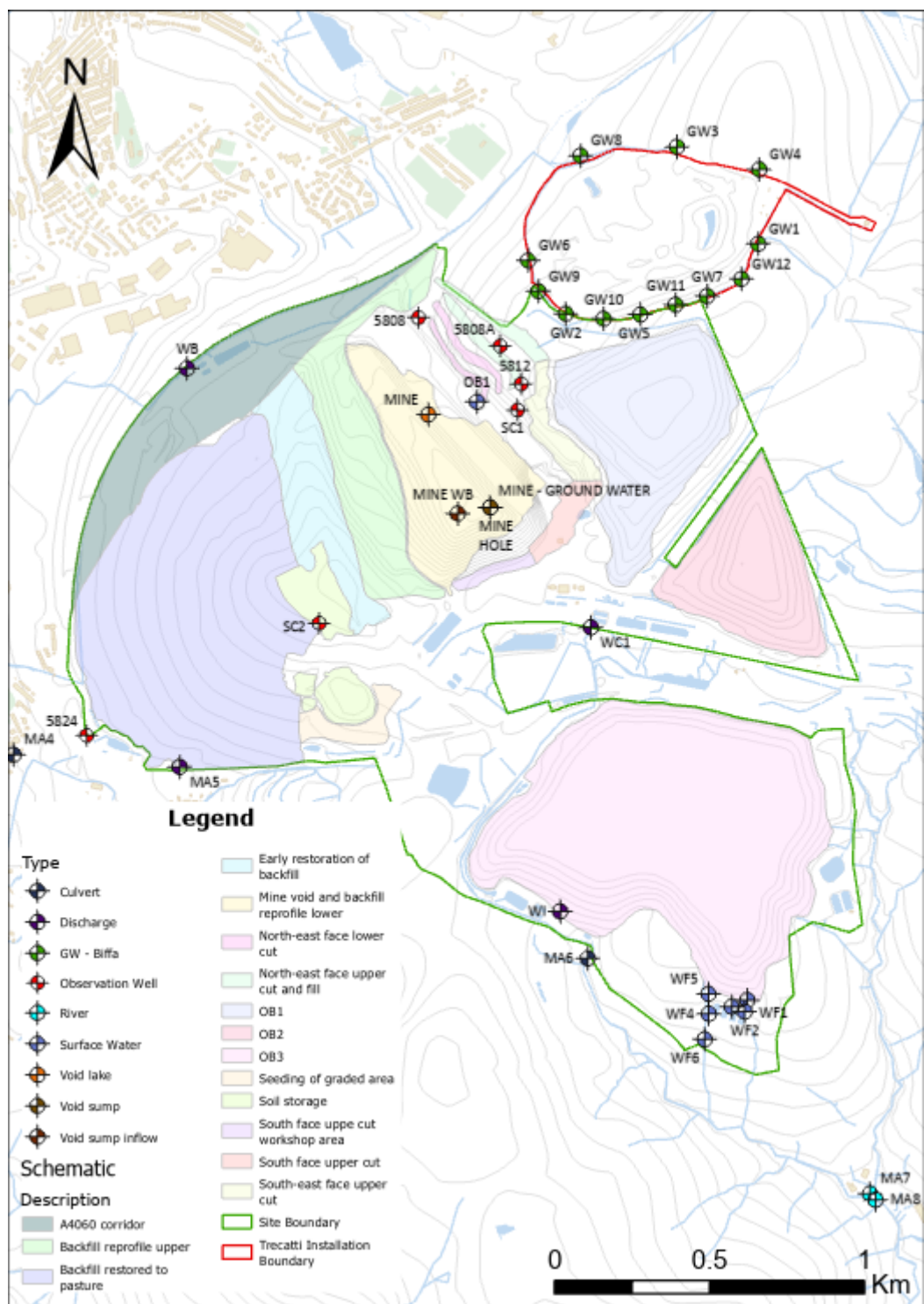
Darparwyd gan / Prepared by:

RML

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Appendix K Map of Water Quality Sampling Points



Appendix L Pollution Control Measures

Typical pollution control measures to be considered during the restoration phase; the list below is best practice, is not exhaustive and reference to the appropriate and relevant guidance should also be undertaken on more complex schemes:

- Potentially contaminating materials should be stored correctly. Minimise the potential for accidental release but protecting from the elements (wind & rain) and from vandalism and theft.
- Potentially contaminating liquids, such as oils and fuel, should be stored in a suitably bunded container if present in a bulk container. Smaller container volumes should be stored on a drip tray or in a closed storage unit when not in use.
- Equipment should be regularly checked to ensure that leakage from hydraulic lines and engines does not occur.
- Bank excavation /restoration where possible should be carried out operating from the bank rather than the watercourse
- Spill kits should be available on site at all times and operatives should be trained in how to use them.
- Any soils contaminated during the course of the works should be excavated and disposed of correctly in accordance with current waste disposal legislation. Where gross contamination occurs, professional advice should be sought immediately.
- Bins should be provided on site for debris.
- Cleaning of tools /equipment will be carried out in water not draining directly to the watercourse.
- In any event of expected heavy rain pouring concrete and other activities which increase the risk of contaminating runoff and should not be undertaken.