The Coal Authority

Resolving the impacts of mining

Cyfoeth Naturiol Cymru
Natural Resources Wales

Cwmystwyth Metal Mine Remediation Scheme: Environmental Constraints and Opportunities Record (ECOR) – Part A

October 2020

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Because this is a live document that will be updated throughout the development of the project **it is important to maintain document control** and record the different versions.

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				Final Scoping
				Draft Impact Assessment
				Final Impact Assessment – for consenting

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PART A

1.0 Introduction

1.1 Background

The Coal Authority (CA) was commissioned by Natural Resources Wales (NRW) to undertake a feasibility study for remediation of pollution caused by abandoned metal mining at and around Cwmystwyth Mine, Ceredigion. This Environmental Constraints and Opportunities Report (ECOR – Part A) has been produced by the CA, on behalf of NRW as part of this feasibility study. Through the feasibility study an Outline Design of the 'Preferred Solution' for remediation of pollution arising from Cwmystwyth Metal Mine has been determined.

Environmental assessment (and management) is an iterative process that starts at the inception of a project and continues through project feasibility (options appraisal), detailed design, construction and operation. Good environmental assessment is an integrated process that influences and challenges project options and design, rather than being a standalone paper exercise. For reasons of transparency and justification of the decisions made and actions taken, the process needs to be appropriately documented, with that documentation being regularly updated as the scheme evolves and is ultimately implemented.

In accordance with NRW's environmental assessment procedures, this ECOR has been prepared to document the environmental appraisal undertaken to inform development of the schemes outline design to address the significant pollution emanating from the Cwmystwyth Mine site.

This ECOR (Part A) documents the environmental constraints and opportunities present within the study area (i.e. Environmental Baseline); how the environmental baseline has been appraised in development of the outline design (i.e. Option Appraisal); the scope of environmental assessment to be undertake going forward that will inform development of the scheme design (Environmental Assessment Screening and Scoping); and the potential wider environmental enhancements that could be delivered as part of the scheme (Multiple benefits).

The ECOR (Part A) is structured as follows:

- Section 1: Introduction – providing background to the proposed scheme and environmental appraisal / assessment;
- Section 2: Environmental Baseline – a description of the baseline scenario for each environmental topic and an overview of the studies undertaken to date;
- Section 3: Options Appraisal – an appraisal of the options considered to address pollution arising from the Cwmystwyth Metal Mine. Determination of the preferred solution and presentation of its outline design.

- Section 4: Environmental Assessment Scoping – identification of the scope of environmental assessment to be integrated into development of the schemes detail design.
- Section 5: Delivery of Multiple Benefits – an outline of wider opportunities and enhancements the project has potential to deliver.
- Section 6: Closing Note.

1.2 NRW responsibilities under the Environment Act and Well-being of Future Generations Act

NRW, in undertaking its work, is required to pursue the Sustainable Management of Natural Resources (SMNR) and to demonstrate the application of the principles of Sustainable Development (SD) generally. NRW considers the environmental assessment process well aligned with these principles, as demonstrated in **Table 1-1**. The environmental assessment process provides a systematic and transparent way of managing the environmental risks, avoiding, reducing or mitigating environmental impacts, thereby adhering to SMNR and improving sustainability. Thus identifying opportunities for delivery of multiple benefits.

Table 1-1: The role of environment assessment in demonstrating the principles of sustainable management of natural resources

SMNR (SD Principle)	Role of Environmental Assessment
Manage adaptively	Monitoring and audit of projects and their environmental effects with feedback into future projects. Continual improvement through the project lifetime.
Appropriate spatial scale	The options appraisal or consideration of alternatives determines the study area. Economic, technical and environmental aspects feed into this to ensure that the options/alternatives and their effects are considered at the appropriate scale.
Collaboration and engagement (Collaboration)	Internal and external stakeholder identification / engagement starts early, continuing throughout project development.
Public participation in decision making (Involvement)	Public engagement through drop in sessions at key stages in the project or engagement with community or user groups. Consenting route publicises project proposal.
Relevant evidence	Considers broad environmental baseline and trends with and without project implementation.
Take account of benefits and intrinsic value of natural resources and ecosystems	Identify ecosystem services provided by the natural resources in the study area (including through internal and external stakeholder engagement). The environmental assessment should seek to maximise

	wider benefits accruing to ecosystems and natural resources in the study area.
Short, medium and long-term consequences (Long-term)	Consider environmental effects throughout the life of the project. Planning, construction, operation & decommissioning. Taking into account the evolution of the baseline e.g. climate change.
Prevent significant damage to ecosystems (Prevention)	Identify ecosystem services provided by the natural resources in the study area (including through internal and external stakeholder engagement) and undertake appropriate assessment of potential impacts and provide for effective avoidance, reduction and mitigation of any negative effects; and the maximisation of any positive effects.
Building resilience of ecosystems	The environmental assessment must establish the current resilience of the local ecosystems when considering the impacts of a project. Then, through options appraisal and input to design, aim to avoid, reduce or mitigate negative effects and maximise positive effects (multiple benefits), which will protect and enhance resilience.

By applying these principles throughout the lifetime of projects, NRW can maximise its contributions to Well-being Objectives and fulfil its duty to enhance biodiversity (Section 6 of Environment Act) and the water environment (Water Framework Directive, as enacted locally).

NRW Well-being Objectives are:

1. Champion the Welsh environment and the sustainable management of Wales' natural resources
2. Ensure land and water in Wales is managed sustainably and in an integrated way
3. Improve the resilience and quality of our ecosystems
4. Reduce the risk to people and communities from environmental hazards such as flooding and pollution
5. Help people live healthier and more fulfilled lives
6. Promote successful and responsible business, using natural resources without damaging them
7. Develop NRW into an excellent organisation, delivering first-class customer service

1.3 Project Description

The Cwmystwyth mine is located in Ceredigion, Mid Wales, 24 km to the southeast of Aberystwyth (SN 801 744). The site is located on the northern slopes of the Ystwyth valley, adjacent to the Afon Ystwyth, and

has historically been mined for metals including lead, zinc and copper. The site was bought by the Cambrian Mines Trust (CMT) in 2013.

Figure 1-1 overleaf shows the location of the Cwmystwyth site in its context with other Ceredigion mine sites currently being considered for remediation (Cwm Rheidol and Frongoch & Wemyss).

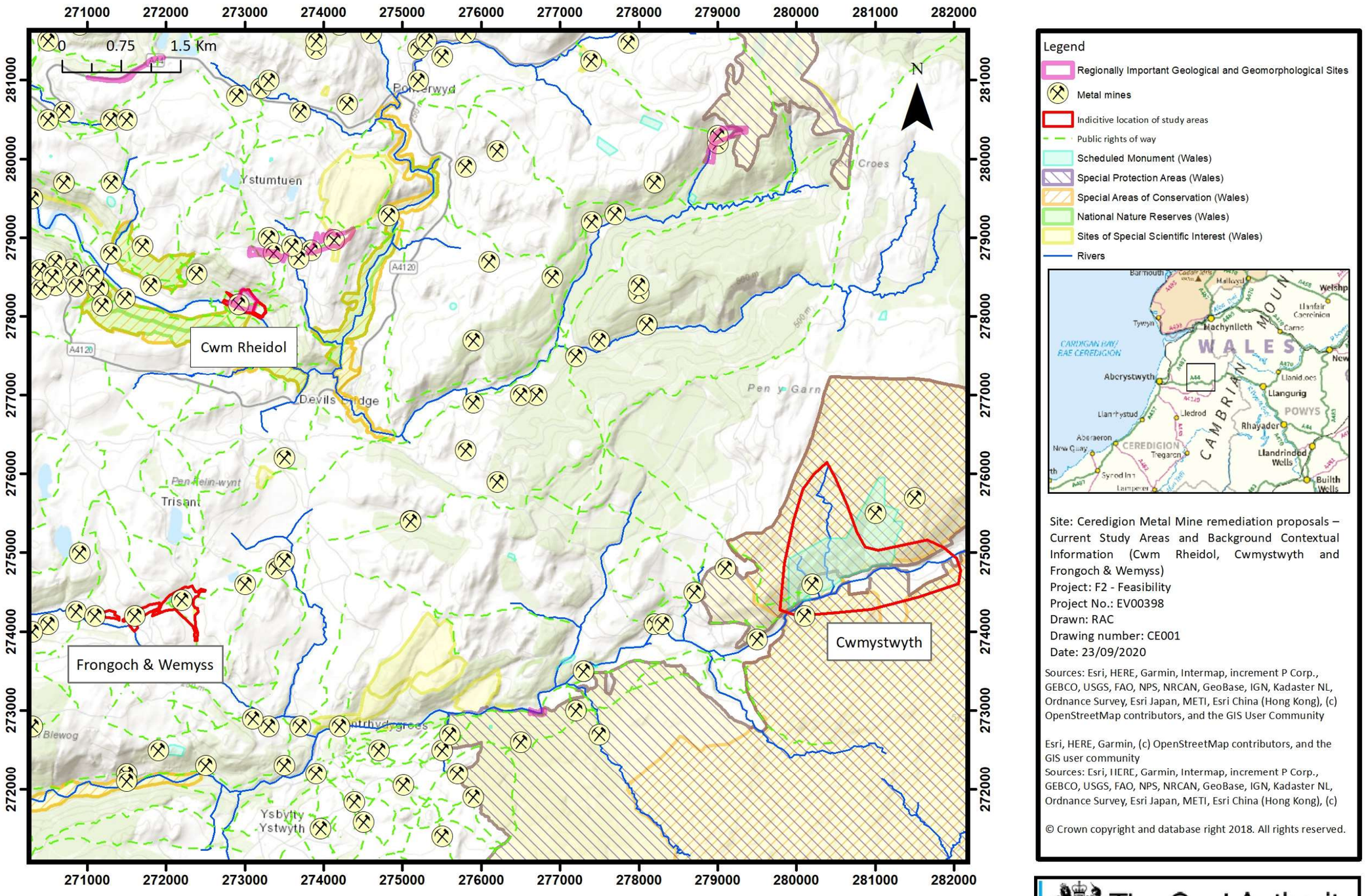
The mine lies in the upper catchment of the Afon Ystwyth, which is the main watercourse in the vicinity of the mine site. It flows southwest from the Cwmystwyth mine site before turning northwest to discharge into Cardigan Bay at Aberystwyth.

There are a number of designations on the site including Scheduled Monument, Special Area of Conservation (SAC) and Site of Special Scientific Interest (SSSI) status, as well as designations nearby (more details available within Section 2).

Cwmystwyth is a hydrologically complex site, with mining activity having a significant impact on the natural hydrology of the site. The Afon Ystwyth receives all surface and sub-surface drainage from Cwmystwyth, causing it to fail Water Framework Directive (WFD) standards for zinc, lead and cadmium. The subsurface workings are drained via Pugh's, Gill's Lower and Kingside adits. Pugh's Adit is the largest clearly identifiable point source of metals from the site. Gill's Lower Adit and Kingside Adit, additional point source contributors, are collapsed on the north side of the road and emerge as small upwellings on the south side.

A number of streams drain the plateau high above Cwmystwyth flowing down through the site, eroding and mobilising heavy metals from the extensive waste tips, especially during high flow events. These include the Nant y Gwaith, Nant y Graig, Nant y Watcyn and Nant yr Onnen. These watercourses are often lost to ground as they pass through the site.

Figure 1-1: Ceredigion Metal Mine Remediation Proposals – Current Study Areas and Background Contextual Information



Site: Ceredigion Metal Mine remediation proposals – Current Study Areas and Background Contextual Information (Cwm Rheidol, Cwmystwyth and Frongoch & Wemyss)
Project: F2 - Feasibility
Project No.: EV00398
Drawn: RAC
Drawing number: CE001
Date: 23/09/2020

Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community

Esri, HERE, Garmin, (c) OpenStreetMap contributors, and the GIS user community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c)

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Plate 1-1: View looking east towards Cwmystwyth site (2019)

Abandoned mines are the principle cause of waterbodies in Wales failing to achieve European WFD standards. The Metal Mine Strategy for Wales (Environment Agency Wales 2002) identified the 50 abandoned metal mines causing the greatest impact on rivers in Wales by the potential ease with which remediation works could be completed[1].

Mine water from the connected workings and elevated metal loadings from streams have been characterised by NRW as a major contributor to lead (Pb), zinc (Zn) and cadmium (Cd) loadings within the receiving waterbody, with Zn, Pb, Cu and Cd identified as Reasons For Not Achieving Good Status (RNAGS) in the latest WFD[2] based assessments.

[1] https://naturalresourceswales.gov.uk/about-us/what-we-do/water/metal-mine-water-pollution/

[2] WFD failures – specified waterbodies (typically sections of a larger surface water course) failing to achieve target statuses under criteria set out in the EU Water Framework Directive. Primarily enacted through the Water Environment (Water Framework Directive) (England and Wales) Regulations 2017 in Wales. Failure on the basis of ecological status and/or chemical status. This may be in the form of biological quality, hydromorphological quality, physical-chemical quality and/or chemical quality.

1.4 Project Objectives

The project seeks to reduce metal contamination entering the Afon Ystwyth thus delivering water quality betterment in the receiving waterbody and ecological benefits to the river and site area.

Through achieving this the project aims to also contribute to the following NRW Wellbeing objectives:

- Champion the Welsh environment and the sustainable management of Wales' natural resources
- Ensure land and water in Wales is managed sustainably and in an integrated way
- Improve the resilience and quality of our ecosystems
- Reduce the risk to people and communities from environmental hazards such as flooding and pollution
- Help people live healthier and more fulfilled lives

2.0 Environmental Baseline

Table 2-1 includes a summary of baseline environmental conditions for environmental receptors / topics associated with the Cwmystwyth study area (Error! Reference source not found.). To inform the environmental baseline a number of surveys have been undertaken of the study area, a list of these surveys is provided within Appendix B, copies of these survey reports are available on request from NRW.

Table 2-1 outlines the associated challenges and opportunities and references strategic level evidence that has been reviewed to determine these.

An Environmental Constraints and Environmental Opportunities Plan (Figure 2-1) has been prepared to visually portray key data within the study area. This outlines the Study Area boundary and key constraints and opportunities based on the baseline information presented in **Table 2-1**.

As part of this early data gathering stage, an informal consultation exercise with Key Planning and Environment Stakeholders has also been undertaken. This primarily involved an information cascade about the site, including provision of an earlier draft of **Table 2-1** to set context regarding the known environmental baseline at the site. Consultees were encouraged to review the information and provide an informal consultation opinion. A list of consultees and details of the responses received (April/May 2019) are contained in **Appendix A**.

Figure 2-1: Cwmystwyth - Environmental Constraints Plan

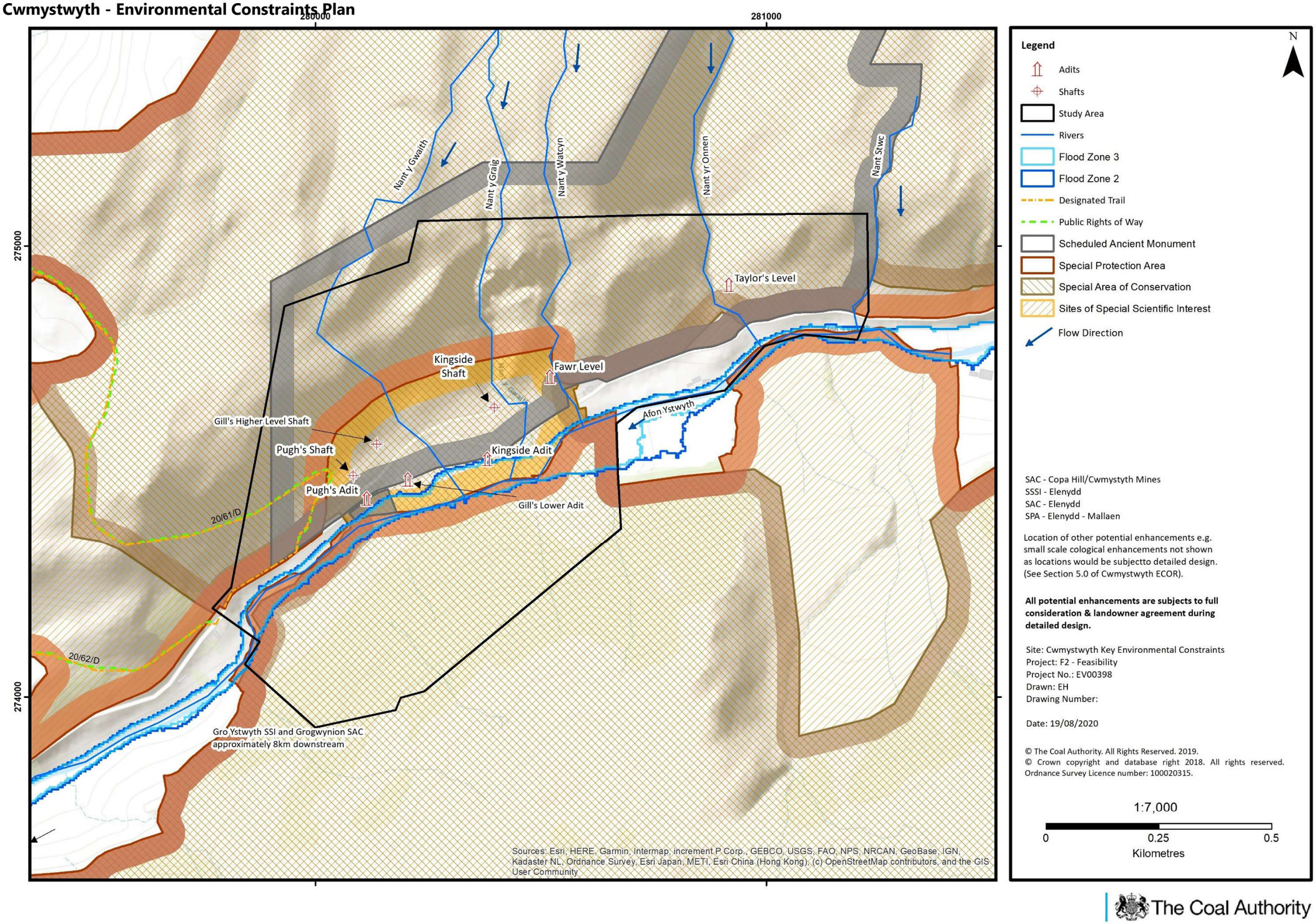


Table 2-1: Baseline Condition including Challenges and Opportunities

Topic – Receptor / Resource	Summary of Current Baseline Information	Local Challenges, Trends and Opportunities
Population & Human Health	• Site is owned by the Cambrian Mines Trust (CMT). • The site is accessed from the minor road that runs along the bottom of the valley on the northern side of the Afon Ystwyth, which links the B4574 to Rhayader to the southeast. • The nearest receptor is a farm alongside the minor road/site at its eastern extent. Other isolated farm buildings are present in the general area. The small village of Cwmystwyth lies to the west. • The site is crossed by numerous footpaths and is located within a 'right to roam' area. • One Public Right of Way (PRoW) passes through the feasibility study area. PRoW 20/61/D – this footpath extends north from the road up the valley side through the study area before turning westwards and out of the study area. This route connects with a moderately dense PRoW network beyond western parts of the study area (*Lingard Farrow Styles: NRW Metal Mine Feasibility, Preliminary Landscape Appraisal, Cwmystwyth, Ceredigion, Prepared for: Natural Resources Wales on behalf of The Coal Authority Ref: 2997, February 2019*). • The Borth to Devil's Bridge to Pontrhydfendigaid Trail (also known as Mal Evans Way) is marked on OS mapping following the route of PRoW 20/61/D through the study area. This designated trail is promoted via tourism website 'Discover Ceredigion' (http://www.discoverceredigion.co.uk/English/what/walking/Pages/Cambrian-Mountains-Walks.aspx) . The trail includes way-marking signs within and in the vicinity of the study area. The section passing the study area (section 4) is supported by a leaflet, namely 'Devil's Bridge to Pontrhydygroes' by Ceredigion County Council Tourism Service. This section is ~18km in length and with regard to mining at Cwmystwyth notes: (*Lingard Farrow Styles, 2019*). *'a fascinating view up into the valley, scarred by man's activity for thousands of years. This celebrated mine has no less than 30 lodes (veins of ore) and 84 surface features (shafts, adits and stopes). Copa Hill, in the distance, was the site of bronze age open cast mining… …Take the track to the right that climbs below the oaks past spoil heaps and mine workings now overgrown with lichens and mosses. On the hillside opposite the ruins of many miners' cottages and a plethora of tracks and adits can be seen'.* • The Cambrian Way and Cistercian Way pass through Cwmystwyth village to the west of the study area. • National Cycle Route 81 passes alongside the site (along the minor road through the study area) connecting Aberystwyth and Wolverhampton. • Much of the central and western parts of the study area are designated as Open Access Land, including the main mining complex, valley sides and part of the valley bottom. These areas of Open Access Land extend beyond the study area to cover much of the surrounding uplands. A number of tracks pass through the central mining areas but these have been closed to vehicular access where they join the road (*Lingard Farrow Styles, 2019*). • Historically there has been an issue on the site from disturbance as a result of off-road vehicles and fly-tipping *(The Core Management Plan (Including Conservation Objectives) incorporating Elenydd-Mallaen Special Protection Area Elenydd Special Area for Conservation (SAC) Coetiroedd Cwm Elan SAC Cwm Doethie Mynydd Mallaen SAC (Countryside Council for Wales (CCW), 2013)).* • Due to the steep slopes, loose mining waste and subsurface workings over much of the former mine area, large areas of the site are considered unstable and unsafe for general access. • The River Ystwyth receives all surface and sub-surface drainage from the mine, causing it to fail European Water Framework Directive (WFD) standards for zinc, lead and cadmium. Improvements could lead to fisheries potential.	• Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The Well-being of Future Generations (Wales) Act 2015 is about improving the social, economic, environmental and cultural well-being of Wales. The Act puts in place seven well-being goals. Those with most relevance for this project being: o A globally responsible Wales; o A resilient Wales; o A healthier Wales; o A Wales of vibrant culture [and thriving Welsh language]. • NRW Well-being Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf ; Objective 4 of the NRW Well-being Statement is to "Help people live healthier and more fulfilled lives". This in turn contributes to the 'healthier Wales' Wellbeing Goal where it is noted that "Natural resources make a significant contribution to the physical health and mental wellbeing of people in Wales. (For example, trees help to absorb pollutants and improve air quality; access to nature and greenspace has positive impacts on physical and mental health.)" Aims of this above include for NRW to "Encourage outdoor recreation and learning at our own facilities and in the wider environment," and "Increase opportunities for local access to the natural environment that help bring communities together, while also offering learning and development to help foster community pride and a sense of place". • Ceredigion Well-being plan (*Ceredigion Local Well-being Plan 2018-2023 - Agreed by Ceredigion Public Services Board 16 April 2018 Published 1 May 2018*) https://www.ceredigion.gov.uk/media/3956/local-well-being-plan-2018-2023.pdf Population of 74,600 people, 23.2% of 4-5 year old children are overweight or obese in region, high proportion of the population are over 65 (23% and increasing) and young people of University age (17%). Fourteen SACs, 100 SSSIs and seven National Nature Reserves. The Ceredigion Well-being documents Community Resilience Action plan notes a medium term aspiration to (among other items) promote nature connectedness. The Individual Resilience Action also makes reference to a medium term promotion of community initiatives that encourage healthy behaviours with the longer term aim being to promote a prevention agenda for individuals using the opportunities provided by community initiatives, such as community gardens and active lifestyles. The following two guiding principles in the Ceredigion Well-being Plan may be of particular relevance to this project: o Create conditions for communities to support individuals from all backgrounds to live fulfilling, independent lives. Develop and sustain social networks, and cultural and linguistic opportunities in order to enhance well-being and maintain independence. o Create environmentally responsible and safe communities that can adapt and respond to the effects of climate change. Support communities to enhance their relationship with the natural environment and prepare for extreme weather events. • CMT aspirations for the future document (undated) http://www.cambrianmines.co.uk/Cambrian%20Mines%20Trust%20Wish%20List%20-%20FINAL%20VERSION.pdf • DAT Cwmystwyth Management and Protection Plan (2014) http://www.cambrianmines.co.uk/Cwmystwyth%20Mines%20Management%20and%20Protection%20Plan%20FINAL%20VERSION%20(small).pdf

		The above documents provide a brief summary of the CMT aspirations for future works at the Cwmystwyth Mines site. Item 8 in the document provides an aspiration to work with NRW for any future water treatment works at the site. Other aspirations (many of which are of relevance to population/human health) in the documents include: o ITEM 1: Signage to indicate ownership; o ITEM 2: Improved interpretation panels and signage; o ITEM 3: Improvement of the area adjacent to the B4574 to the south of the mill (including access); o ITEM 4: Improved Car Parking across the site area; o ITEM 5: Re-opening of the original track to the mine yard; o ITEM 6: Restoration of the portal to Level Fawr and improvement of underground access; o ITEM 7: Restoration and improvement to the packwall entranceway and portal to Taylor's Level; o ITEM 9: Rebuilding of Neville Place and Staff House; o ITEM 10: Hydro-Electric Scheme; o ITEM 11: Establishment of a 'Mid Wales Mining Trail' • Sustrans Review of the National Cycle Network 2018 https://www.sustrans.org.uk/sites/default/files/file_content_type/ncn_review_report_paths_for_everyone.pdf • Sustrans Review and Action Plan for Wales 2018 https://www.sustrans.org.uk/sites/default/files/file_content_type/ncn_review_action_plan_walesbilingual_web_2.pdf Cycle Route 81 is not one of the current 'activation' projects being progressed in Wales. No specific threats noted to this trail in available documentation. However, signage issues are noted as being common to the Network. Split into three main areas (all may be of relevance to this study) – Signage issues that need fixing/amending; Signage that promotes the Network (including education information); and Signage that directs users towards the Network (including from train stations). There is potential for the project to deliver against the above through exploring opportunities relating to access improvement, community engagement, signage/promotion of existing (and potentially new) networks and provision of additional signage/interpretation panels. It will also be important to work closely with CMT regarding their aspirations to understand what may be achievable through the remediation scheme and what the remediation scheme could potentially facilitate for future implementation. Consideration should also be given to engaging CMT and their volunteer network where possible to support with on site activities as part of a community engagement strategy. Any public access etc. would also need to be undertaken in reference to the significant heritage, ecological, landscape and geological interest on site with appropriate consultation/consenting in place.
Biodiversity & Resilience of Ecosystems	• The Ystwyth sea trout fishery is currently classified as 'at Risk' (NRW Know Your River – River Ystwyth Salmon and Sea Trout Catchment Summary Note 2015). In the case of the Ystwyth, there are "low" reported rod catches of salmon. Designated Sites *On Site* • Elynydd SAC entirely covers the Cwmystwyth site. Qualifying Annexe I habitats within the designated site and wider Cwmystwyth study area being – Calaminarian grasslands (developed as a result of the mining heritage), blanket bogs, European dry heaths, and Oligotrophic to mesotrophic standing waters of the *Isoeto- Nanojuncetea*. Floating water-plantain *Luronium natans* an Annexe II habitat is also present. Old sessile oak woods and *Tilio-Acerion* forests of slopes, screes and ravines are also present within the SAC but not within the study area. • Of the above, the Calaminarian grasslands are most critical to this baseline understanding of the likely remediation proposals as they are present throughout the site and of high value; • Two SSSIs are present on site – they are part of the SSSI network underpinning the international designations: Mwyngloddfa Cwmystwyth and the larger Elynydd SSSI. • The verges along both sides of the road through the study area (B4574) are designated as a roadside verge reserve (non-statutory designation). http://map.ceredigion.gov.uk/connect/?mapcfg=PROTECTED_VERGES . *Off Site* • Elenydd - Mallaen Special Protection Area (SPA) has a similar boundary to the SAC; however, it excludes the former lead mine workings at Cwmystwyth (the site) running adjacent to the former mine working extent. The following Annexe 1 species are known to breed within the SPA: Merlin, Peregrine Falcon and Red Kite.	• Core management plan (including conservation objectives) Incorporating: Elenydd – Mallaen Special Protection Area (SPA) and Elenydd SAC and underpinning SSSIs - 17 April 2008: https://www.naturalresources.wales/media/671965/Elenydd_cSAC_core_English.pdf The above document outlines conservation objectives for the special features of this large designated site. This does not include specific actions for qualifying bird species (of the SPA) but provides habitat related actions. Conservation management issues across the designation vary but include air pollution, overgrazing, invasive species (e.g. rhododendron), fertiliser use etc. Due to the extent of the designation many of these are not applicable to the study area itself. Specific reference is made to the fact that "*Disturbance from off-road vehicles and fly tipping are on-going issues*" within the Cwmystwyth Mine site. • http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012928.pdf Identified threats and pressures on the Elenydd SAC are identified as: o HIGH risk (both inside and outside of the site) from air pollution/air-borne pollutants; o MEDIUM risk (inside site) from grazing and other ecosystem modifications;

- Grogwynion SAC lies approximately 8 km southwest of the study area. This designation is hydrologically linked to the Cwmystwyth site with the Ystwyth flowing directly from the study area before passing through the SAC. This SAC is of relevance for this study due to the reliance of its lower plant interest on metal loading in the ground and hydrological connection to the Cwmystwyth site. The SAC is under pinned by Gro-Ystwyth SSSI Units.
- The Gro-Ystwyth SSSI citation https://naturalresources.wales/media/665763/SSSI_1636_Citation_EN001db99.pdf notes there is "*A rich and unique assemblage of lichens is found at Grogwynion, including species associated with metal-rich habitats*." and that "*Parts of the now abandoned Grogwynion and Gwaithgoch metal mines are included in the site. On the abandoned spoil heaps and remains of buildings there has developed a rich metallophyte lichen flora, including a number* of nationally scarce species such as Vezdaea acicularis, Gyalidea subscutellaris and Thelocarpon impressellum."
- The Grogwynion SAC register entry https://naturalresources.wales/media/631171/SAC_UK0030160_Register_Entry001.pdf confirms the primary reason for designation as being the presence of Annex 1 Calaminarian grassland of the *Violetalia calaminariae* and dry heaths. The core management plan states "*the section of the river Ystwyth known as Grogwynion SAC is the largest known area of such communities in England and Wales. They comprise open areas of bare shingle and heather, rich in lichen species, (the SAC features Calaminarian grassland and European dry heath) amongst bands of great wood- rush, acid grassland, scrub, marshy grassland, broadleaved woodland, and small streams and backwaters*." And that "*The river deposits and spoil heaps and buildings of abandoned metal mines at Grogwynion support a rich assemblage of rare lichens, including a number of species that are specially adapted to the concentrations of heavy metals, known as metallophyte lichens. Lichen species that are normally montane are present at low altitudes at this site and contribute to making this lichen assemblage unique. One species, Epigloea filifera, found at Grogwynion, is known nowhere else in Britain*." https://naturalresources.wales/media/672442/Grogwynion%20SAC%20Plan%20English%20(edit).pdf
- The Cwmystwyth mine site is also hydraulically linked to the West Wales Marine (Gorllewin Cymru Forol) SAC and the Northern Cardigan Bay (Gogledd Bae Ceredigion) SPA albeit approximately 29 km away. The qualifying features of these designations being harbour porpoise (SAC) and red-throated diver (SPA). The mine is not the only (or majority) contributor to metal pollution in the Ystwyth which discharges into the SAC/SPA.

<u>Habitat Types</u>

- A number of European priority interests are present at and around the site including Calaminarian grasslands (on the exposed mine spoil), European dry heaths, Blanket Bogs, and *Luronium natas* (floating water plantain).
- The 2019 study area (Pryce Consultant Ecologists, 2020) including a western extension from the main mine site was noted as supporting a mosaic of vegetation types including mine spoil, bare rock and scree (all potentially including Calaminarian grassland), broad-leaf woodland, gorse-dominated dry-heath, acid grassland, species-poor acid grassland, improved grassland, stands of Bracken, and water courses. All except species-poor acid grassland and improved grassland are of ecological significance and qualify as Habitats of Principal Importance for Conservation of Biological Diversity under section 7 of the Environment (Wales) Act 2016.
- Of greatest significance is the presence of Calaminarian grasslands over much of the mine site itself – see lower plant interest below.
- Japanese knotweed known to be present along the Ystwyth catchment (Pryce Consultant Ecologists, 2020); however, none recorded at site to date.

<u>Lower Plant interest</u>

- The study area is of particular significance for Calaminarian grassland and this is appreciated by the SAC designation covering the area.
- *Mapping the extent of Calaminarian grassland at Mwyngloddfa Cwmystwyth SSSI, C. Forster Brown, S.P. Chambers, NRW Evidence Report No: 203 (2017)* provides a map showing Cwmystwyth Mine Calaminarian and associated communities together with a species list. The Cwmystwyth site was found during this survey to comprise of a mix of the Calaminarian 'communities' (as previously defined by Simkin (2014)). Two categories were found to be particularly dominant at the site – AM (open stony ground with one or more metallophytes) and BM (open grassland with one or more metallophytes). Some small areas (few in number) were categorised as HM (Calaminarian heath with one or more metallophytes) or as DM (Bryophyte communities with one or more metallophytes). Eighteen locations on site were found to be particularly important for metallophyte species (and by extension, the Calaminarian), these are detailed and mapped in the 2017 report. The report also notes that what perhaps marks the site out in comparison with other metal mine sites, is the sheer extent of the Calaminarian. Whilst it is patchy, it is widespread, and also covers a large overall area due to the spread of the former workings.
- A number of lichens (30+ species) are supported by this habitat, including a number of rare species; this is the only known British location of the lichen, *Placythiella hyporhoda*. One rare metallophyte moss (*Ditrichum plumbicola*) identified at the site is listed in the Red Data Book and is a UK BAP priority species, as are three 'noteworthy' species of fern.
    - MEDIUM risk (both inside and outside of the site) from fire and fire suppression;
    - LOW risk (inside site) from outdoor sports and leisure activities, recreational activities; and
    - LOW risk (both inside and outside of the site) from invasive non-native species.

- http://jncc.defra.gov.uk/pdf/SPA/UK9014111.pdf

  Identified threats and pressures on the Elenydd - Mallaen SPA are identified as:
    - MEDIUM risk (inside site) from forest and plantation (management and use), fire and fire suppression and grazing;
    - MEDIUM risk (both inside and outside of the site) from hunting and collection of wild animals and renewable energy use;
    - LOW risk (inside site) from improved access to the site; and
    - LOW risk (both inside and outside of the site) from outdoor sports and leisure activities, recreational activities, changes in abiotic conditions and problematic native species.

- Core management plan (including conservation objectives) for the Grogwynion SAC – 10 March 2008: https://naturalresources.wales/media/672442/Grogwynion%20SAC%20Plan%20English%20(edit).pdf

  The above document outlines conservation objectives for the special features of the SAC. Conservation management issues include mainly successional vegetation changes and in particular scrub, gorse & Japanese knotweed encroachment.

  http://jncc.defra.gov.uk/protectedsites/sacselection/n2kforms/UK0030160.pdf

  Identified threats ,pressures and activities with impacts on the Grogwynion SAC are identified as:
    - HIGH risk (both inside and outside of site) from invasive non-native species and problematic native species;
    - MEDIUM risk (inside site) from 'other; ecosystem modifications;
    - MEDIUM risk (both inside and outside of the site) from air pollution/air-borne pollutants

- Local Biodiversity Action Plan / Targets. http://www.ceredigion.gov.uk/resident/coast-countryside/conservation-and-wildlife/ceredigion-biodiversity-action-plan/

  Chough have a local species action plan which notes that "*The species is highly reliant on the availability of these specialised nest sites and also on the presence of short coastal heath, acid grassland and cliff slopes in which to forage*." One of the factors identified as affecting the species being "*Low availability of suitable nest sites as the unstable nature of rock faces in much of Ceredigion, results in the rapid collapse and subsequent loss of some suitable nest sites.*"

  Pipistrelle bats also have a local species action plan – two of the factors identified as affecting this species include "*The degradation and destruction of bat habitats in the countryside and the loss of natural roosting sites e.g. trees with hollows, splits, flaking bark and ivy and feeding areas such as sheltered hedges and waterside habitats*" and "*Health and safety measures to remove damaged, diseased or unstable trees from next to roads, footpaths and buildings can damage bat habitats.*"

  Roadside verges also have an action plan which notes that "*A number of 'Roadside Reserves' have been identified because they contain uncommon plant species or groups of plants.*" This plan sets a number of targets but these lead up to the date 2010 only.

- Local Development Plan Biodiversity Policies - https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng

  Policy DM14: Nature Conservation and Ecological Connectivity
  "*Development will be permitted where it protects and, where possible, enhances biodiversity, geodiversity and ecological connectivity across Ceredigion, including local sites and local priority species and habitats. Where it is appropriate to the scale and location of the development and opportunities exist, development should incorporate nature conservation education and access, providing the site's ecological or geological integrity can be safeguarded*."

  "*Biodiversity enhancements could be achieved through increasing/restoring habitats or increasing/improving opportunities for species. These enhancements should aim to contribute to Local BAP (LBAP) targets and/or improving*

	• The Elenydd SAC Core Management Plan confirms that the extent of the mine spoil tips at Mwyngloddfa Cwmystwyth are not decreasing in height or area except as a result of the natural process of weathering and erosion. All the rare lichen species recorded at this site that are characteristic of soils or rocks with a high metal content, are present with their populations either stable or increasing. The open sward of lichen-rich grassland includes characteristic grass species such as common bent, sheep's fescue, silvery and early hair-grass. Yorkshire fog is only occasional within the sward and perennial rye-grass is absent. • The 2019 Pryce Consultant Ecologists (Pryce Consultant Ecologists, 2020) survey confirmed the extent and value of the mine site for lower plants. An indication of the areas identified (from previous surveys and 2019 work) as being of highest sensitivity for lower plants are shown on Figure 2-1. <u>Protected/Notable Fauna</u> • The underground mine workings are important for migrating and hibernating bats (species known to be present including Daubentons, whiskered, Brandt's, Natterer's, brown long-eared and the lesser horseshoe), The Core Management plan notes that *"Access for hibernating bats in the system of underground workings is maintained. All four species previously recorded from the site, namely Daubenton's, Natterer's, Brown longeared and Whiskered bats are present during the winter months*." • The Pryce Consultant Ecologists (2020) report confirms the potential for bats to roost within the mine shafts, adits and old buildings on the mine site. • Peregrine Falcons have nested in the area for many years and chough are likely to use the site for nesting (Environment Agency Wales remedial design for Cwmystwyth mine, Ceredigion, Wales - feasibility study November 2006. Parsons Brinckerhoff Ltd). SPA adjacent with species that are likely to move between the SPA and mine site. • The Pryce Consultant Ecologists (2020) report notes that otter are known on the Ystwyth catchment and may therefore pass through the site; use of streams higher up within the mine by otters is less likely. The report also notes potential for amphibians to use ephemeral pools along this river corridor; however, due to water quality and inundation potentially low-quality habitat for these species. Reptiles could be present on site, in particular along margins with heathland vegetation. Notable invertebrates could make use of the site.	*ecological connectivity. Depending on the proposal, it may be more appropriate in some cases to provide enhancements to a statutory/non-statutory site."* Policy DM15: Local Biodiversity Conservation *"Development will be permitted where:* *1. A step-wise approach is adopted to ensure there will be no significant negative effects to biodiversity and ecological connectivity both on-site and off-site;* *2. Appropriate species, habitats and wildlife corridor/stepping stone enhancements have been incorporated into the development through good landscape and building design, or where applicable will be carried out offsite;* *3. With regard to developments affecting LNRs, sites that meet SINC criteria and priority species and habitats, there is an overriding social, economic or environmental need for the development that outweighs the losses to biodiversity (after mitigation), the development could not reasonably be located elsewhere and these losses can be readily and fully compensated within the local area; and* *4. Where necessary, management plans are produced and agreed with the LPA and developments phased to take into account mitigation and compensation measures."* <u>There is potential for the project to deliver against the above through delivering ecological benefits to the river catchment as a result of the treatment scheme. The work however also poses a threat to the ecological interest of the designations both on and downstream of the Study Area (in particular Calaminarian grassland communities) which will need full consideration.</u>
Land (for example: land take)	• Land historically used for metal mining; no current or future extraction anticipated. • The area is built of rocks of Silurian and Ordovician age, and the landform is typical of the 'slate uplands' of south-central Wales, with plateau separated by steep-sided valleys; • Mwyngloddfa Cwmystwyth SSSI (on site) is designated both for its geological and biological value. The geological interest at this site lies both in the spoil tips and in the underground workings and is contiguous with an area of national mineralogical importance located at Graig Fawr and Copa Hill, in the adjacent Elenydd SSSI. Some impacts currently on geological value associated with wash-out in high flow events. • Site lies within Cambrian Mountains Environmentally Sensitive Area (ESA).	
Soil (for example: organic matter, erosion, compaction, sealing)	• Exposed spoil throughout study area; • Combination of Grade 4 (poor), 5 (very poor) and non-agricultural in the local area. • Previous use of site (lead mine) will have resulted in significant ground contamination. • Significant erosion in the south of the site during high rainfall events.	• CMT 'aspirations for the future' document (undated) http://www.cambrianmines.co.uk/Cambrian%20Mines%20Trust%20Wish%20List%20-%20FINAL%20VERSION.pdf • DAT Cwmystwyth Management and Protection Plan (2014) http://www.cambrianmines.co.uk/Cwmystwyth%20Mines%20Management%20and%20Protection%20Plan%20FINAL%20VERSION%20(small).pdf Item 3A of the above, relates to improvement of the area adjacent to the B4574 to the south of the mill - specifically Item 3A: Managing the stream course. This details the aspiration to prevent ongoing erosion in this area. <u>There is potential for the project to reduce wash out through appropriate surface water management.</u>
Water (for example: hydromorphological changes, quantity and quality)	• Adjoining waterbodies noted as: ○ Ystwyth - headwaters to conf with Cwmnewydion (GB110063041720). Cycle 1 Baseline overall status (2009) Moderate. Latest (2013) Ecological Status: Moderate. Latest (2013) Chemical Status: Good. Latest (2013) Overall Status: Moderate. NB Cycle 2 name corrected to Ystwyth - headwaters to the confluence with the Nant Cell (overall status Moderate; chemical status Fail; ecological status Moderate). ○ Ystwyth - conf with Cwmnewydion to tidal limit (GB110063041710). Cycle 1 Baseline overall status (2009) Moderate. Latest (2013) Ecological Status: Moderate. Latest Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 name corrected to Ystwyth - confluence with the Nant Cell to Tidal Limit (overall status Moderate; chemical status Fail; ecological status Moderate). https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6	• WFD -https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 ○ Ystwyth - headwaters to conf with Cwmnewydion [Nant Cell] reason for failure noted as abandoned mines and contaminated land, acidification, forestry and natural conditions. Failing elements noted as zinc, pH, fish and copper. Has an overall objective of "Good Status by 2027"; however, this is also noted as "technically infeasible. Cycle 2 Drivers of EcoQE pH, Zinc, Copper. ○ Ystwyth - conf with Cwmnewydion [Nant Cell] to tidal limit reason for failure noted as abandoned mines and contaminated land, agricultural pollution, septic tanks, Failing elements noted as Zinc, Phytobenthos, Invertebrates, Copper, Morphology, Lead and its Compounds, Fish, Cadmium and its compounds. Has a noted overall objective of "Good Status by 2027"; however, this is also noted as "technically infeasible". Cycle 2 Drivers of EcoQE Zinc, Fish

	• Cwmystwyth Mine lies in the upper catchment of the Afon Ystwyth. The Afon Ystwyth flows southwest from Cwmystwyth, turning northwest before discharging into Cardigan Bay at Aberystwyth; • The northern slopes of the Ystwyth Valley are drained by four tributary streams: Nant y Gwaith, Nant y Graig, Nant Watcyn and Nant yr Onnen into the Afon Ystwyth, although the Nant y Gwaith is lost to ground from a point directly behind the dressing mill during all but the highest flow conditions. The steep nature of the Ystwyth valley has led to the development of incising watercourses and a waterfall (Nant y Graig). • Site is in an exposed valley, flow of tributary streams sensitive to high rainfall events. Run-off rates variable. High run-off rates also have an effect on diffuse pollution entering the Afon Ystwyth and erosion of geological, heritage and ecological features; • The Afon Ystwyth receives all surface and sub-surface drainage from the mine, causing it to fail European WFD standards for zinc, lead and cadmium. • The Ystwyth catchment falls within the Western Wales River Basin District for which 44% of its water bodies have 'Good' or 'High' ecological status/potential (2018 interim classification). • The main contaminants of concern to water quality in this study are zinc, lead, copper and cadmium. • No Groundwater Source Protection Zones present in area. • Sea trout fishery downstream on Ystwyth is classed as "at risk". • There are some small bodies of water e.g. ponds across the site. Any diversion for an active treatment scheme may result in these drying up. • Part of site (nearest river – south of the minor road) is within Flood Zone 3 and Flood Zone 2. There does not appear to be risk of surface water (or reservoir) flooding on the site; although there are locations in proximity at risk. • The River Ystwyth is not considered a main river at the location of the study area (main river classification starting west of the B4343 approximately 7 km downstream).	• Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng Policy DM11: Designing for Climate Change "*The LDP will help ensure that development addresses the implications of climate change by requiring that:* *1. justified development in the flood zone is resilient and adaptable to the effects of flooding; and* *2. the long term sustainability of the development has been taken into account.*" • CMT 'aspirations for the future' document (undated) http://www.cambrianmines.co.uk/Cambrian%20Mines%20Trust%20Wish%20List%20-%20FINAL%20VERSION.pdf • DAT Cwmystwyth Management and Protection Plan (2014) http://www.cambrianmines.co.uk/Cwmystwyth%20Mines%20Management%20and%20Protection%20Plan%20FINAL%20VERSION%20(small).pdf Item 3A of the above, relates to improvement of the area adjacent to the B4574 to the south of the mill - specifically Item 3A: Managing the stream course. This details the aspiration to prevent ongoing erosion in this area and as a result to prevent further erosion of the slimes dump on the southern side of the road which is directly polluting the River Ystwyth. It is noted that the project is an essential element of an integrated programme required to deliver WFD objectives. SIMCAT modelling suggests treating Pugh's and Gill's adits will provide: 30% removal of zinc, 8% Pb removal, 21% Cd and 2% Cu. Treating the point and diffuse sources to 100% removal would result in a reduction of 46% zinc, 43% lead, 42% Cd and 100% Cu (Coal Authority, 2019).
Air	• Baseline data not obtained at this stage.	• A press release from Ceredigion County Council in 2004 stated that concentrations of most of the priority air pollutants in Ceredigion are low and overall air quality in the County is very good.
Climate (for example: greenhouse gas emissions, impacts relevant to adaptation)	• Site is unlikely to be a significant carbon sink. • Study area includes land with known river flood risk (land closest to river south of minor road).	• Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng Policy DM11: Designing for Climate Change "*The LDP will help ensure that development addresses the implications of climate change by requiring that:* *1. justified development in the flood zone is resilient and adaptable to the effects of flooding; and* *2. the long term sustainability of the development has been taken into account.*"
Material assets	• The site is accessed from the minor road that runs along the bottom of the valley on the northern side of the Afon Ystwyth, which links the B4574 to Rhayader to the southeast. • The site is crossed by numerous footpaths and is located within a 'right to roam' area. • National Cycle Route 81 passes alongside the site. • Utilities currently unconfirmed. • No railway/canal crossings or in proximity. • No current proposals for minerals extraction.	• Local Development Plans
Cultural heritage (including architectural and archaeological aspects)	• Rich heritage value on site. Site owned by CMT who have a Management and Protection plan and as part of this an aspirations list. • Work at the Cwmystwyth Mines can be dated back as far as the Bronze Age (c.2300 BC - c.800 BC), and continued intermittently over many centuries until all activity finally ceased in around 1939 and was later abandoned in 1950 (*HRS Wales: Cwmystwyth Lead Mine, Cwmystwyth, Ceredigion. Richard Scott Jones (BA, MA, MCIfA), Report No: 206, February 2019, Cultural Heritage & Archaeological Feasibility Study*). • Entire site north of minor road (& small area to south) is included within the Copa Hill/Cwmystwyth Lead, Copper and Zinc Mines Scheduled Ancient Monument (entered as Reference Cd145 on 2nd December 1997). The citation for the site notes that "*the monument comprises the remains of a lead mining complex, which also produced copper and zinc. Work at the Cwmystwyth Mines can be dated back as far as the Bronze Age (c.2300 BC - c.800 BC), and continued intermittently over many centuries until all activity finally ceased in around 1939. The visible features within the scheduled area include numerous shaft and adit entrances, areas of opencast working, water-management and transport systems, extraction and dressing processes with their power systems, as well as remains of office and residential buildings, garden plots and even an early 20th-century tennis court*".	• CMT 'aspirations for the future' document (undated) http://www.cambrianmines.co.uk/Cambrian%20Mines%20Trust%20Wish%20List%20-%20FINAL%20VERSION.pdf • DAT Cwmystwyth Management and Protection Plan (2014) http://www.cambrianmines.co.uk/Cwmystwyth%20Mines%20Management%20and%20Protection%20Plan%20FINAL%20VERSION%20(small).pdf The above documents provide a brief summary of the Cambrian Mines Trust aspirations for future works at the Cwmystwyth Mines site. Item 8 in the document provides an aspiration to work with NRW for any future water treatment works at the site. Other aspirations which are of particular relevance to cultural heritage (both in terms of its protection and as part of a thriving local culture) and the threats on the Scheduled Monument in the documents include: ○ ITEM 2: Improved interpretation panels and signage; ○ ITEM 3: Improvement of the area adjacent to the B4574 to the south of the mill (including access); ○ ITEM 4: Improved Car Parking across the site area;

- The HRS Wales 2019 report notes "*The monument is of national importance for its potential to enhance and illustrate our knowledge and understanding of mining technology from the Bronze Age and as such it represents one of the earliest and best studied known metal mining sites in the British Isles*".
- The site is within the eastern section of the Upland Ceredigion Landscape of Historic Interest. The Cwmystwyth area of this landscape is noted as "*an old industrial landscape. The remains of metal mining are spread across the floor and sides of the steep-sided, craggy valley of the Ystwyth.*" http://dyfedarchaeology.org.uk/HLC/uplandceredigion/_uplandceredigioneast.htm#cwmystwyth
- Given the above the HRS Wales 2019 report notes that "*all features associated with the mine are high value heritage assets*".
- The HRS Wales 2019 report also notes "*Archaeological work at the Cwmystwyth Mines has been very extensive over the years with key published works ..... This sub surface exploration work has revealed an extraordinary level of preservation from continuous mining at the site from the Bronze Age up to 1950 when the mine was finally abandoned.*"
- Recorded archaeology on site comprises remains directly associated with the metal mining industry, including finds of Roman date, or remains indirectly associated with the industry such as abandoned worker cottages. This is a well-defined area comprising the industrial archaeology of the metal mining industry. Bronze age findings also to the east at Banc Tynddoll;
- There are no listed features on the Cwmystwyth site. The nearest are located at Cwmystwyth (Briwnant Cottage and Attached Cottage – Grade II) located approximately 1.5km southwest and Ty Llwyd and Outbuilding at Ty Llwyd located approximately 2.1km to the northeast).
- Due to the rich heritage value of the site, presence of above and below ground archaeology and its national importance the entirety of the Cwmystwyth site has been noted in the HRS Wales 2019 report as being of 'high' archaeological sensitivity.

    - ITEM 5: Re-opening of the original track to the mine yard;
    - ITEM 6: Restoration of the portal to Level Fawr and improvement of underground access;
    - ITEM 7: Restoration and improvement to the packwall entranceway and portal to Taylor's Level;
    - ITEM 9: Rebuilding of Neville Place and Staff House;
    - ITEM 10: Hydro-Electric Scheme;
    - ITEM 11: Establishment of a 'Mid Wales Mining Trail'

The above document also notes that "*A number of factors are contributing to the deterioration of the site. These include misuse of the site by off road vehicles, fly tipping and vandalism. Further damage has occurred through the digging out of spoil tips for building materials. These can all cause significant damage to the designated features and habitats. Damage through erosion is also being caused by flash flooding, where streams are exposing archaeological remains, undermining structures and also eroding some of the contaminated fines and slimes dumps on the site, which leads to polluted material draining straight into the River Ystwyth. Below ground, the mine workings are also noticeably deteriorating through natural decay and movement. Underground revetment walls are failing and timber artefacts (supports, ladders, launders etc) are rotting.*"

- Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en
  The well-being goal of most relevance here being - a Wales of vibrant culture [and thriving Welsh language].

- NRW Well-being Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf

  As part of the above NRW have committed to *"protect Wales' cultural heritage and archaeology across the land and water we manage"* and *"Promote the cultural importance of our landscapes and seascapes as part of Wales' heritage"*

- Ceredigion Well-being plan (Ceredigion Local Well-being Plan 2018-2023 - Agreed by Ceredigion Public Services Board 16 April 2018 Published 1 May 2018) https://www.ceredigion.gov.uk/media/3956/local-well-being-plan-2018-2023.pdf

  The delivery of the Ceredigion Well-being Plan includes a period of asset mapping – this will research further how communities work, how people see the relationship between themselves and the places where they live, work and visit, and will investigate how the assets (including cultural), contribute to well-being.

- "*Guide to good practice on using the register of landscapes of historic interest in Wales in the planning and development process*", *Revised (2nd) edition including revisions to the Assessment process (ASIDOHL2), 2007.*

  All landscape areas identified on the Register (including Upper Ceredigion) are of national importance in the Welsh context. There are three key principles underpinning the identification of historic landscape areas:
    - the conservation of the key characteristics of historic landscapes as those landscapes evolve;
    - the conservation of historic landscapes ensuring the transfer of maximum historic meaning and value when contemplating landscape change; and
    - key historic characteristics within historic landscapes, like historic buildings or archaeological sites, are irreplaceable.

  As part of this there is an expectation that there is a *"need to assess the potential effects of a development, in terms of any lasting alteration it will cause, in relation to the whole of the historic landscape on the Register, not just the elements or characteristics directly affected in the 'footprint' area*".

  It is also noted that "*The effects of direct, physical impacts are irreversible, but equally damaging, indirect impacts can occur through the severance or disruption of the functional or visual connections between elements, or through the consequential degradation of the visual or other amenity of elements, or through a combination of these factors*".

- http://dyfedarchaeology.org.uk/HLC/uplandceredigion/cwmystwyth.htm notes that the stone built structures (including industrial) in the Cwmystwyth part of the Upland Ceredigion Historic Landscape Character area are "*in a perilous condition*".

		• Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng Policy DM19: Historic and Cultural Landscape "Development affecting landscapes or buildings which are of historical or cultural importance and make an important contribution to the character and interest of the local area, will be permitted where the distinctive appearance, architectural integrity or their settings will not be significantly adversely affected. Where possible development should enhance these qualities and special character." Local heritage interest in site and extensive local knowledge of workings and their importance/threats to them. There is potential for the project to deliver against the above through working with the CMT to support their aspirations for the site in relation to preservation of its cultural heritage. These include exploring opportunities for consolidation of existing structures on site, providing new viewpoint locations and education through interpretation panels and improved access. Recording and evaluation during site works will also provide additional baseline information to add to the wealth of knowledge regarding the historic interest of this site.

Landscape	• The site is not within an AONB or National Park.
	• Landmap confirms the site is within the following:
	  ○ Cwmystwyth Geological Landscape (CRDGNGL278) which is noted as a glacial mountain valley;
	  ○ Ponterwyd upland grassland mosaic Landscape Habitat (CRDGNLH038);
	  ○ Upper Ystwyth Valley Visual and Sensory Landscape (CRDGNVS331), noted as open upland valleys;
	  ○ Cwmystwyth Historic Landscape (CRDGNHL102);
	  ○ Lead Mining Landscape (cultural landscape – CRDGNCL036).
	• The study area falls within the Upper Highlands Special Landscape Area (SLA - 12) (Local Development plan – Proposals Map 4) https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51583&langtoken=eng and https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=52053&langtoken=eng An SLA being a non-statutory designation applied by the local planning authority to define areas of high landscape importance within their administrative boundary. The area is noted as *"An extensive upland area, centred upon Pumlumon forming the eastern edge of Ceredigion……Includes a number of SSSIs and the Elenydd SAC and Elenydd-Mallaen SPA"*.
	• The site is within the north-western section of the Upland Ceredigion Landscape of Historic Interest.
	• Lingard Farrow Styles (*NRW Metal Mine Feasibility, Preliminary Landscape Appraisal, Cwmystwyth, Ceredigion, Prepared for: NRW on behalf of CA Ref: 2997, February 2019*) note that "*residents are unlikely to readily obtain views [to any finalised scheme in] the mining area from their properties due to building orientation and screening by vegetation and topography*."
	• There are significant views into the site form the minor road that passes through it and Cycle 81 which follows the road.
	• Lingard Farrow Styles in the 2019 study also note that there is an "*impressive view*" into the mine from along the Borth to Devil's Bridge to Pontrhydfendigaid Trail/PRoW 20/61/D as it passes to the west of the site (before it turns westwards).
		• NRW Well-being Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf
		
		The above states that landscapes have played a significant role in the development of distinct cultural practices, such as local building techniques which use local materials and locally specific art and literature.
		
		• Landmap notes the following key threats/management recommendations of relevance to the study area:
		  ○ Geological Landscape – "*Ensure that no features or natural systems of geological or geomorphological significance in the area (incl. mines) are lost or damaged (e.g. due to development or forestry)*";
		  ○ Historic Landscape – Acknowledgement that "*management of mining related features is problematic for a variety of reasons, including issues of access, safety, damage, degradation, conservation and pollution.*" Principle Management recommendation being to "*Conserve historic landscape elements where possible, work towards developing short and long term management strategy.*"
		  ○ Cultural Landscape – it is noted that the condition of the landscape is "Improving (- through the efforts of community-based regeneration and the Welsh Mines Preservation Trust and the Welsh Mines Society.)" The principal management recommendation being to provide "Support for community-based regeneration initiatives, the Welsh Mines Preservation Trust and the Welsh Mines Society." As well as "*selective reconstruction/consolidation of important features*".
		
		• The LANDMAP Guidance Note 1: LANDMAP and Special Landscape Areas 2017 https://cdn.naturalresources.wales/media/680613/landmap-guidance-note-1-landmap-slas-2017.pdf?mode=pad&rnd=131472694160000000 notes that "*Landscapes designated as a SLA may be unique, exceptional or distinctive to the local authority area."*
		
		"*The SLA designation can be used to raise awareness of the special characteristics, qualities and importance of a locally valued landscape so that it can be promoted as a positive management tool for targeted landscape management guidelines and grant bids. It can also help raise awareness and recognition for valued landscapes outside those that are nationally designated (e.g. National Parks and AONBs)."*
		
		SLA-specific design guidance may be available from the local authority (to be confirmed). This guidance where available is intended to aid planners and developers to "*promote development that enhances local landscape character, distinctiveness and landscape quality*".
		
		• Specific policy/management issues noted for SLA 11 that are of most relevance to this project (https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=52053&langtoken=eng) include:
		
		  ○ Management of historic landscape elements.
		  ○ Management of habitats – both in terms of those with statutory protection and increase in variety elsewhere.

		○ Management and enhancement of key habitats and species (Section 42 and Local Biodiversity Action Plan). ○ Ecosystem approach should be incorporated into development. ○ Potential for landscape scale initiatives and biodiversity enhancements. ○ Reinforcement of a sense of 'bro' through appropriate design measures. • Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng Policy DM17: General Landscape *"Development will be permitted provided that it does not have a significant adverse effect on the qualities and special character of the visual, historic, geological, ecological or cultural landscapes and seascapes of Ceredigion, the National Parks and surrounding area by:* *1. causing significant visual intrusion;* *2. being insensitively and unsympathetically sited within the landscape;* *3. introducing or intensifying a use which is incompatible with its location;* *4. failing to harmonise with, or enhance the landform and landscape; and /or* *5. losing or failing to incorporate important traditional features, patterns, structures and layout of settlements and landscapes.* *Where possible development should enhance these qualities and special character. "* Policy DM18: Special Landscape Areas (SLAs) *"Proposals for development within Special Landscape Areas (SLAs) will be assessed in relation to scale and nature of development and their ability to be accommodated without significant damage to, and where possible the enhancement of the valued visual, historic, geological, ecological and cultural characteristics of the SLA."* Policy DM19: Historic and Cultural Landscape *"Development affecting landscapes or buildings which are of historical or cultural importance and make an important contribution to the character and interest of the local area, will be permitted where the distinctive appearance, architectural integrity or their settings will not be significantly adversely affected. Where possible development should enhance these qualities and special character."* There is potential for the project to deliver against the above through exploring sensitive design of proposed infrastructure and considering opportunities for access improvements, signage/interpretation panels and new viewpoint locations. The prominent views of the site (from the road, cycle way and PRoW 20/61/D) in particular should be considered. The scheme should not detract from the current iconic views of the site.
Cumulative effects	• Other NRW led remediation projects at metal mines in Ceredigion include Frongoch-Wemyss, Cwm Rheidol, Abbey Consols and Esgair Mwyn • With the exception of the Frongoch-Wemyss site all are on different catchments to the Cwmystwyth scheme however there may be cumulative benefits as a result of the works that should be considered for these (e.g. linked heritage trails and signage). • The Cwmystwyth, Frongoch and Wemyss mine sites all discharge into the River Ystwyth. Cwmystwyth discharges into the river directly at site; Frongoch via the Nant Cell; and Wemyss (encompassing Wemyss site, Wemyss tips and Frongoch Adit) via the Nant Cwmnewydion and the Afon Magwr. • The Cwmystwyth Mine lies approximately 7.5 km upstream from the confluence of the Nant Cell (discharge from Frongoch) and Ystwyth. The Ystwyth then flows downstream a further 1.8 km before passing through the Grogwynion SAC (Calaminarian grassland). The Afon Magwr joins the Ystwyth approximately 5.2 km downstream of the SAC (although it is upstream from one of the Gro Ystwyth SSSI units). • Cumulative and in-combination effects on the Grogwynion SAC will require consideration as proposals develop. • Cumulative and in combination effects on marine designations as a result of all schemes may also need to be considered. • Baseline information regarding other projects (proposed/in construction) and plans, has not been obtained at this feasibility stage.	Identified threats, pressures and activities with impacts on the Grogwynion SAC are outlined in the biodiversity section above.

3.0 Summary of options

3.1 Introduction

Through site non-intrusive investigations and assessments, as outlined within the **Cwmystwyth Metal Mine Feasibility Report** (Coal Authority, 2020), key pollution sources and pathways to the Ystwyth River have been identified for the site. These include (see Figure 2.1 for site feature locations):

- Pollution emanating from Pugh's Adit, as well as from Gill's Lower Adit and Kingside Adit.
- The Nant y Gwaith disappears in sections across the dressing floor, and the culvert under the road is blocked by stone washed down by the river. The Nant y Gwaith picks up contamination from the tips as it flows across the dressing floor.
- Scour of the bank of the Nant y Graig is causing contamination of the stream and making the channel unstable. The Nant y Graig is also receiving contamination from the tips.
- Spoil adjacent to the Nant y Watcyn and Nant yr Onnen is being eroded and undercut and is contaminating the streams.
- Spoil heaps are located throughout the site with slimes (extra fine spoil) present adjacent to, and causing contamination of, the Afon Ystwyth.

For long-term management of the above mine legacy pollution and to achieve the project objectives (ECOR Section 1.4), interventions are needed to address the above referenced pollution sources and pathways to the Ystwyth River. Through workshops and site discussions by technical specialists from NRW, the Coal Authority and other technical partners, three broad interventions were identified as needing to be delivered:

1: Preventing clean water from Afon Ystwyth tributaries (Onnen, Watcyn, Gwaith, Graig) picking up contamination from running over/through extensive mine spoil.

2: Dealing with contaminated runoff and drainage from the adits and extensive areas of exposed mining spoil in proximity to Afon Ystwyth and tributaries.

3: Creation of long term stable spoil deposits within mine site, prevent encroachment onto public road and associated drainage.

A number of options have been considered in which to deliver each of the three broad interventions, this section of the ECOR discusses and documents the appraisal of these options, before presenting the preferred option and its outline design.

Further to the above it's also important to note that treatment of dissolved metals present in surface water runoff and from mine discharges at adits have been considered for the site. However, the development of such a treatment plant is subject to findings post implementation of the broad interventions listed above, for that reason its design isn't being progressed at this stage.

3.2 Options Appraisal

Table 3-1 portrays the shortlist of options in relation to the three broad interventions. For each option the key environmental benefits and constraints have been considered, enabling the appraisal of each option with a view to identify a preferred option for each broad intervention.

Decisions on the most environmentally favourable option have been based on the options which avoid or are likely to minimise negative effects on the highest importance receptors. Particular attention has been paid to Calaminarian habitats which are a feature of the Elynydd SAC and to the landscape and cultural heritage value of the Scheduled Monument and historic mining features.

Table 3-1: Summary of Short List Options

Intervention Measure	Description of Option	Key benefits and opportunities	Key risks and constraints	Decision
1: Preventing clean water from Afon Ystwyth tributaries (Onnen, Watcyn, Gwaith, Graig) picking up contamination from running over/through extensive mine spoil. **Items 3 and 4 shown on Figure 3-1**	1a: Existing Channels - Erosion protection such as rock roll or gabion baskets for stream banks and channel lining with impervious liner to separate clean water from contaminated ground/ground water.	Smaller overall works footprint, minimised disruption to high value Calaminarian habitats (Elyndd SAC). Reduced erosion of Calaminarian habitats. Reinstatement of historical surface water features, including historical stone lined channels. Potential for hydropower installation which could reduce carbon cost of treatment.	Introduces urbanising elements into natural stream bed which would be visually discordant within a rural setting and reduce landscape value. Access tracks likely to result in temporary disturbance of Calaminarian habitats within Elynydd SAC.	Option 1a most closely maintains the existing hydrological regime for soils on site, whilst 1b may degrade quality of water dependent habitats. Whilst option 1b offers potential to restore function of historical mining features on the site this comes at the cost of likely widespread disturbance during construction. **Therefore it is currently anticipated that option 1a offers the best overall environmental outcomes.**
	1b: Redirect uncontaminated water from tributaries along historical leat to wheel pit	Created flow may be sufficient to create micro-hydropower plant which could be sited at old wheelpit to reduce carbon cost of treatment. Restoration of existing leat could enhance the historic mining context of the landscape.	Increased footprint of disruption within sensitive site (SAC/SPA) to create/reinstate leat. Very difficult terrain for works, requiring multiple access tracks through sensitive areas. Significant alteration of existing site hydrology with potential effects on moisture dependent habitats in the Elynydd SAC.	
2: Dealing with contaminated runoff and drainage from the adits and extensive areas of exposed mining spoil in proximity to Afon Ystwyth and tributaries. **Items 1, 5 and 6 shown on Figure 3-1**	2a: Phytostabilisation / vegetative capping, artificial capping and reprofiling / relocation / contouring of existing spoil deposits with additional drainage.	Material remains in situ reducing/removing need to transport off site and alleviating demand for landfill capacity.	Permanent loss of mining heritage appearance of capped spoil. Permanent loss of Calaminarian habitats in treated areas. Ongoing maintenance of capped areas will require periodic construction works with associated disturbance for Elynydd-Mallaen SPA and Elynydd SAC.	Although option 2a likely offers most complete remediation of contaminated runoff this approach is likely to be most detrimental to existing cultural landscape and Calaminarian habitats and cause significant change on the site. Options 2b and 2c would be most likely to maintain the current appearance of historic mining features and Calaminarian habitats. Option 2c would require monitoring of Calaminarian habitats. **Therefore it is currently considered that option 2b is likely to offer the best overall environmental outcomes.**
	2b: As above except use of enhanced profiling and active drainage to avoid use of capping / vegetation of spoil surfaces.	Material remains in situ reducing/removing need to transport off site and alleviating demand for landfill capacity. Allows establishment of metallophyte plant species (incl Calaminarian habitat). Maintains mine heritage visual appearance and open spoil Calaminarian habitat	Potential reduced effectiveness of pollution mitigation. Residual seepages will require capture and increase requirements of active treatment with associated energy and chemical inputs.	
	2c: Remove contaminated / eroding spoil from Ystwyth functional floodplain, tributary channels and reprofiling / relocation / contouring of retained spoil.	Restores capacity of Afon Ystwyth floodplain. Maintains mine heritage visual appearance and open spoil Calaminarian habitat	Potential for large quantities of waste affecting local landfill capacity. Change in distribution of metal contaminated wastes across site has possible effects on distribution of Calaminarian habitats across the site.	
3: Creation of long term stable spoil deposits within mine site, prevent encroachment onto public road and associated drainage. **Items 7, 8 and 9 shown on Figure 3-1**	3: Reprofiling and relocation of spoil from the roadside to form stable landforms and produce stand-off zone along road. Upgrade road drainage / separate from spoil contamination.	Protects road carriageway and drainage. Potential to provide improved parking and turning areas, formalise access to Scheduled Monument (pedestrian and vehicular). Improves / protects visual appearance / mining heritage. Prevents ongoing erosion of sensitive habitats and heritage features.	Requires engineering within Scheduled Monument. Handling and reposition of contaminated materials.	
4: Do Nothing	4: Continue to observe degradation of spoil habitats, significant impacts	No temporary disturbance of habitats associated with statutory designations (SSSI,SPA,SAC).	Ongoing erosion from surface waters will increase flood risk downstream from sediment movement and also	**Considered unacceptable in current legislative and policy framework.**

Intervention Measure	Description of Option	Key benefits and opportunities	Key risks and constraints	Decision
	on local and distant surface waterbodies / environment.	No interference or disturbance of either extent buildings and undiscovered archaeological remains associated with the Scheduled Monument.	continue to degrade on-site heritage features. Continued erosion may be long term threat to integrity of Elyndd SAC through wash out of metal contaminated sediment and spoil.	

3.3 Preferred Option / Outline Design

Further to consideration of the key positive and negative environmental aspects, along with technical feasibility and costs of each option. The preferred options for delivering the broad interventions that will reduce metal loading into the Afon Ystwyth and subsequently deliver water quality betterment, are listed below:

Broad Intervention 1 (Items 3 and 4 shown on Figure 3-1): Preventing clean water from Afon Ystwyth tributaries (Onnen, Watcyn, Gwaith, Graig) picking up contamination from running over/through extensive mine spoil.

Preferred option:

- Nant y Gwaith Channel Engineering - reinstate the former stone channel and culvert beneath the road. The stone channel is to be lined with an impervious liner to keep the stream water separate from the contaminated ground water.
- Nant y Graig Channel Engineering - lining of the channel (on the lower section of the Nant y Graig) to keep stream water separate from contaminated groundwater. As well as this, stream to be diverted through 2x large diameter pipes to the road culvert. Pipes are to be covered with stone. Riprap to be placed at the ends in the stream. Include a small French drain to drain the contaminated run-off from the spoil tip in a separate pipe (Measured length = 50m).

Broad Intervention 2 (Items 1, 5 and 6 shown on Figure 3-1): Dealing with contaminated runoff and drainage from the adits and extensive areas of exposed mining spoil in proximity to Afon Ystwyth and tributaries.

Preferred Option:

- Adit Mine Water Capture and Diversion - Construction of capture structures and diversions from Pugh's Adit, and Gill's Lower Adit upwelling to a potential mine water treatment site. Kingside Adit mine water to be diverted to potential mine water treatment site via a French drain, which will also bring spoil and slime heap run-off to the scheme for treatment.
- Nant y Watcyn Erosion Protection - engineering works for erosion protection, in the form of "rock roll" stone filled baskets.
- Nant yr Onnen Erosion Protection - engineering works for erosion protection, in the form of "rock roll" stone filled baskets.

Broad Intervention 3 (Items 7, 8 and 9 shown on Figure 3-1): Creation of long term stable spoil deposits within mine site, prevent encroachment onto public road and associated drainage.

Preferred Option

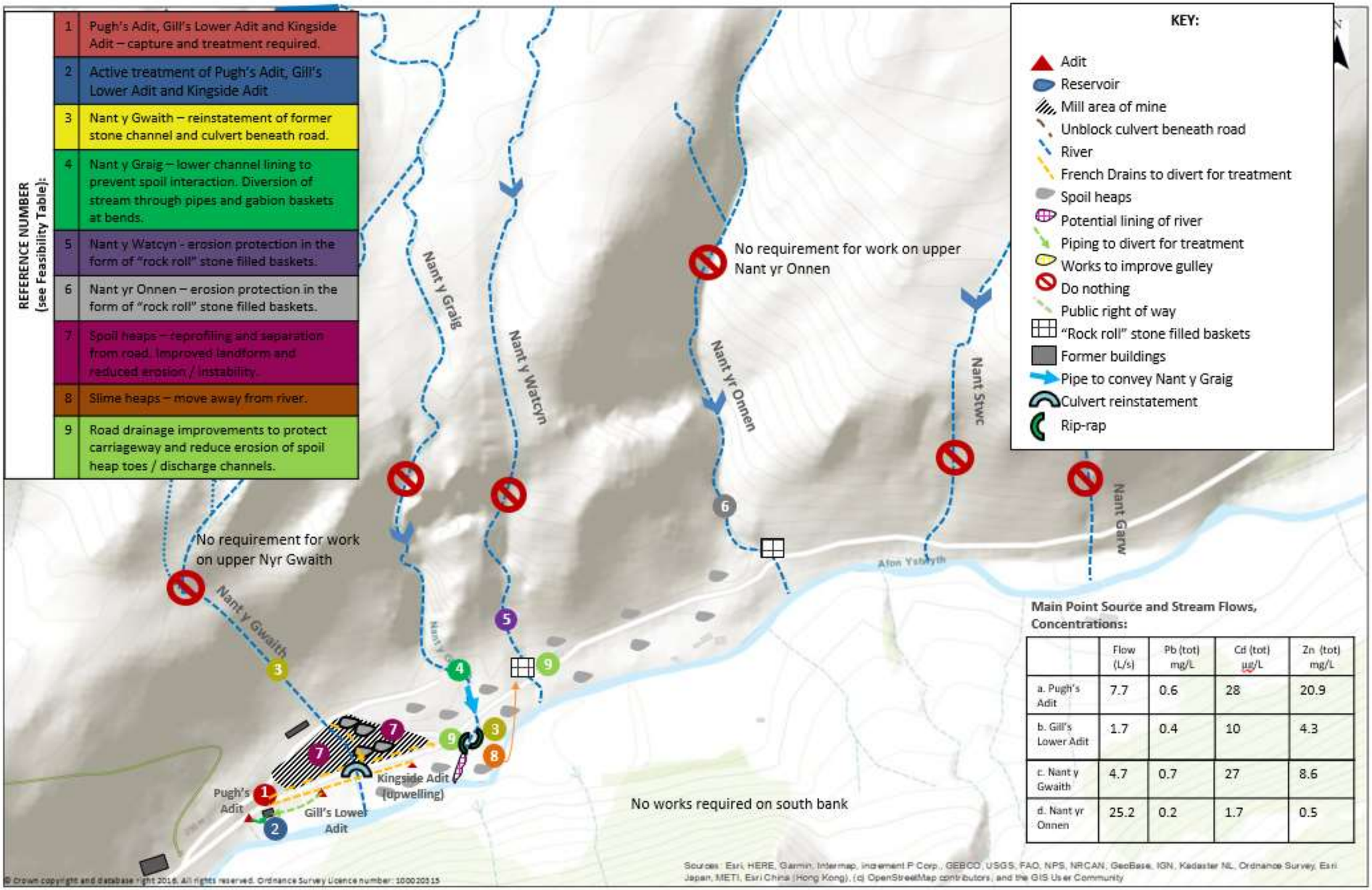
- Spoil heap re-profiling - Potential targeted movement of spoil with preference being to retain on site but move to a location which minimises erosion. French drains to be installed around spoil heaps to improve site drainage and take surface water run-off to treatment facility.

- Slime heap re-profiling – re-profiling of slime (extra fine spoil) heaps to create separation from the river; French drains to be installed around heaps to improve site drainage and take surface water run-off to treatment facility.

- Road Drainage - French drains to be installed along road to improve road drainage and take surface water run-off to treatment facility.

Together the series of above measures will capture pollution discharges from the various adit locations; improve management of surface water on site; lining/piping of streams to keep stream water separate from the contaminated groundwater; use of riprap in existing channels to prevent scour and other erosion protection measures. **Figure 3.1** portrays the outline design of these measure.

Figure 3-1: Conceptual Site Model (refer to feasibility report)



4.0 Environmental Impact Assessment Screening (EIA)

4.1 Introduction

It is the opinion of the project team that this project constitutes Permitted Development as defined in The Town and Country Planning (General Permitted Development) Order 1995 (as amended) and falls within the remit of Schedule 2, Part 14 and/or Part 15. This has yet to be confirmed by the local planning authority, the projects team intend to consult the local planning authority in due course. Should it be determined that the project does not constitute Permitted Development and that planning consent is required under the Town and Country Planning Regulations 2017.

Utilising the permitted development rights of the General Permitted Development Order (GDPO) Schedule 2, Part 14 and/or Part 15 means that the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 2017 (hereafter referred to as EIA Land Drainage Regs) apply. Therefore, NRW is responsible, under section 4 of those regulations, for determining whether the proposed works are likely to have significant effects on the environment. Should it be determined that Permitted Development does not apply, the project would then need to be screened under the Town and Country Planning (Environmental Impacts Assessment (Wales) Regulations 2017.

The following sections shall determine whether the project is likely to result in significant effects by considering the selection criteria within Schedule 2 of the EIA Land Drainage Regs.

4.2 Characteristics of the Improvement Works

The characteristics of the project in relation to its effects on the environment and natural resources are described in **Table 4-1**.

Table 4-1: Description of the main characteristics of the improvement works.

Area occupied by the Project: (Inclusive of temporary compounds and access arrangements)	The total area occupied by the works will be approximately 8.5 hectares.
Cumulative effects with other existing or approved projects:	These works are part of a programme of works to improve the water quality in the Afon Ystwyth. No other known projects at this time that do not form part of this programme.
Use of natural resources:	Construction activities are unlikely to require large quantities of natural resources.
Production of waste:	Materials balance on the project is likely to be broadly neutral. Mine spoil will be redistributed on site rather than disposed of at landfill.
Pollution and nuisances:	The project will reduce levels of water-borne pollution. Construction activities may cause some noise which could

	affect local residents, but this will be limited to certain activities and temporary in duration.
Risk of major accident or disasters relevant to the improvement works, including those caused by climate change:	Low risk, no works activities would likely result in major incidents in the event of an accident.
Risks to human health:	None anticipated.

4.3 Location of the Improvement Works

Refer to Table 2-1 which describes the environmental baseline and identifies the sensitivities of the geographical area in proximity of the improvement works.

4.4 Characteristics of the Potential Impact

In order to determine whether any of the characteristics of the proposed works are likely to have a significant effect on the surrounding environment the magnitude of effect caused by the project is considered in conjunction with the importance of environmental receptor, as shown in Table 4-2. For the purposes of this assessment any effect exceeding "slight" in severity has been considered a "significant" effect.

Table 4-2: Matrix for determining significance of environmental effects.

		Magnitude of change				
		Major	**Moderate**	**Minor**	**Negligible**	**No change**
Environmental Value Or Sensitivity	**Very high**	Very Large	Large or very large	Moderate or large	Slight	Neutral
	High	Large or very large	Moderate or large	Slight or moderate	Slight	Neutral
	Medium	Moderate or large	Moderate	Slight	Neutral or slight	Neutral
	Low	Slight or moderate	Slight	Neutral or slight	Neutral or slight	Neutral
	Negligible	Slight	Neutral or slight	Neutral or slight	Neutral	Neutral

Table 4-3: Characteristics of potentially significant impacts by environmental topic area

Environmental Topic or Receptors	Sensitive Sites or Receptors	Potential for Significant Effects and Environmental Opportunities	Avoidance and Mitigation Strategy	Significance Level and Scope of Further Environmental Assessment
Population and Human Health	4no. Residential dwellings within 300m. Public Right of Way – 20/61/D National Cycle Route 81	Construction noise and vehicular access routes have potential to create nuisance for local residents and users of PRoW. Improvement of interpretation panels and signage along with upgrading car parking facilities will contribute to Cambrian Mines' Trust aspirations to improve the recreational and educational use of the site.	It is expected that standard construction good practice will be employed to minimise nuisance caused by noise and visual intrusion will be employed on site. These requirements will form part of the project EAP. Temporary closure of PRoW will require further consultation with Ceredigion Council PROW Officer.	Residual environmental effect: Slight adverse Significant effects are considered unlikely.
Biodiversity and Resilience of Ecosystems	Elynydd SAC & SSSI, Mywngloddfa Cwmystwyth SSSI Elynydd-Mallaen SPA & SSSI Grogwynion SAC & Gro Ystwyth SSSI Protected and notable species: • Bats • WCA Schedule 1 Birds – Chough, Peregrine • Otter WFD ecological status of the Afon Ystwyth.	Changes to surface water drainage and redistribution of mine spoil will affect distribution of Calaminarian habitats on site. This is likely to result in temporary loss of very high value habitat. Changes in hydrology due to new surface water drainage will potentially permanently alter distribution of lower plant species on site. Stabilisation of mine spoil prevents loss by erosion processes and secures physical features supporting Calaminarian habitats from longer term degradation. Leading to potentially longer term positive effect. These habitats are a key feature of Elynydd SAC and therefore effects are expected on a site of international importance. Preventing erosion of mine spoil on site is likely to reduce volumes of contaminated sediment entering the Afon Ystwyth. Reducing deposition of contaminated sediment further down the Ystwyth catchment has potential to cause long term decline of Calaminarian habitats which are very high value and a key feature of the Grogwynion SAC. However, a poor understanding of the physical processes underlying the function of the Grogwynion SAC leaves a large degree of uncertainty on the likelihood of impact. Therefore the precautionary principal has been applied and it has been assumed that a major negative effect is likely on Grogwynion SAC. Construction activities have potential to affect protected species: Works to Adits or shafts are likely to cause disturbance which could affect any bats or chough present by temporary disturbance or permanently prevent access to resting places. Works to river banks have potential to affect otters due to temporary anthropogenic disturbance. Although beyond the boundary of the site, anthropogenic disturbance from construction activities may effect bird species which are key features of the Elynydd-Mallaen SPA. Reduction of pollution pressures within Afon Ystwyth likely to reopen previously supressed ecological niches for recolonization.	Further detailed ecological impact assessment of the potential effects is required, and will be undertaken as follows: Habitats Regulations Assessment (HRA) is required to determine any likely significant affects upon Elynydd SAC, Elynydd-Mallaen SAC and Grogwynion SAC. Significant effects will be addressed through Appropriate Assessment and any required measures to avoid, minimise or mitigate impacts will be reported and incorporated in the detailed design. Residual effects on Natura 2000 sites will require consideration of IROPI declaration. SSSI assent will be sought for any work within or adjacent to the SSSI. Disruption of Calaminarian habitats will be minimised as follows: • Detailed mapping of Calaminarian habitats • Design to avoid or minimise areas of Calaminarian habitat affected. • Produce a method statement for lower plants to be implemented in the construction phase including temporary translocation to maximise recolonization following works. • Measures from method statement will be incorporated into works EAP. • Monitoring of distribution on Calaminarian habitats following construction. Works to Adits will be further assessed for any potential to affect bats and their roosts, or chough nesting sites. Presence/absence surveys to be undertaken as required. Modifications to Adits will consider access and microclimate conditions for bats and any temporary measures to deliver works will be included within EAP. Breeding bird surveys to be undertaken to identify potential nesting sites for Chough and Peregrine, with any further actions required to prevent disturbance and damage to nest sites incorporated into detailed design and construction phase documentation. Temporary anthropogenic disturbance due to construction activities will be minimised using industry standard methodologies.	Residual environmental effect: Very large adverse to Large beneficial **Potentially significant negative environmental effects have been identified.** Further work required: 1. HRA followed by Appropriate Assessment of impacts for Natura 2000 sites. 2. SSSI assent for work 3. Bat presence/absence survey 4. Breeding birds survey 5. Lower plants (bryophyte & lichens) survey 6. Lower plants method statement

Environmental Topic or Receptors	Sensitive Sites or Receptors	Potential for Significant Effects and Environmental Opportunities	Avoidance and Mitigation Strategy	Significance Level and Scope of Further Environmental Assessment
Land	Mwyngloddfa Cwmystwyth SSSI (geological)	Redistribution of the spoil heap will cause temporary disturbance of the spoil material which is feature for the SSSI is designated. However, this movement will eliminate or greatly reduce erosion at the site which is a long term threat to the site's geological integrity.	Overall effect anticipated to be positive due to reduction of threat from erosion processes. SSSI assent will be sought for any work within or adjacent to the SSSI.	Residual environmental effect: Moderate beneficial Significant effects are considered unlikely. Further work required: 1. SSSI assent
Soil	Considerable heavy metal contaminated ground present throughout the site. Agricultural Land Classification Grade 4 and Grade 5 land.	Soils on site are of poor agricultural value. Potential for release of contaminants as a result of spoil movement on site.	Although the nature of the site means materials are highly contaminated, suitable measures can be implemented and controls put into place via the EAP and Materials Management Plan (MMP).	Residual environmental effect: Neutral Significant effects are considered unlikely. No further environmental assessment required.
Water	Afon Ystwyth (GB110063041710: fail status) (GB11063041720: moderate status) Associated Flood Zone 2 and 3	Risk of acute pollution from contaminated silt-laden run-off as a result of spoil movement activity on site. Temporary works at outfalls of an ordinary watercourse which may affect the incidence or severity of flooding at a local scale. Permanent alteration of surface water runoff regime with potential to increase the incidence or severity of flooding. Permanent improvement of water quality in the Afon Ystwyth water bodies as a result of reducing metal contamination.	A CEMP will be in place to ensure controls for contaminated surface water runoff and management of mine water flows during construction. This is expected to employ industry best practise (e.g. NetRegs Guidance for Pollution Prevention 5). Undertake WFD Compliance Assessment. A Flood risk assessment to be undertaken and attenuation measures to be incorporated into detailed design of drainage as required. Works to ordinary watercourses will require Ordinary Watercourse Consent (OWC) from the Lead Local Flood Authority.	Residual environmental effect: Moderate or large positive Significant effects are considered unlikely. Further work required: 1. WFD Compliance Assessment will be required due to the modification of discharge and possible outfall works. 2. Ordinary Watercourse Consent (OWC) requirements to be screened with Ceredigion Lead Local Flood Authority. 3. Flood Risk Assessment
Air	No AQMA notified in Ceredigion. 4no. Residential dwellings	No potentially significant effects identified.	Not required due to lack of potential effect.	Residual environmental effect: Neutral Significant effects are considered unlikely. No further environmental assessment required.
Climate	No significant carbon sinks within study area. River with capacity for flooding (Flood zone 2 and 3).	No known flooding issues which could be affected. Construction activities and utilisation of products and materials will result in temporary carbon release.	Any drainage will be design to incorporate additional storm storage capacity for changes due to climate change. Measures to reduce construction activities carbon footprint to be incorporated into EAP.	Residual environmental effect: Neutral Significant effects are considered unlikely.

Environmental Topic or Receptors	Sensitive Sites or Receptors	Potential for Significant Effects and Environmental Opportunities	Avoidance and Mitigation Strategy	Significance Level and Scope of Further Environmental Assessment
				No further environmental assessment required.
Material Assets	Minor road following valley floor. Building remains from previous mining activities.	Changes to surface water channels and drainage has potential to increase the incidence or severity of flooding on a local road.	Flood risk assessment is to be carried out and include risk of flooding to infrastructure. Culverts to be designed in accordance with requirements of Local Highway Authority and Lead Local Flood Authority.	Residual environmental effect: Neutral Significant effects are considered unlikely. Further work required: 1. Flood Risk Assessment
Cultural Heritage	Scheduled Monument: Copa Hill/Cwmystwyth Lead, Copper and Zinc Mines (CD145). Upland Ceredigion Landscape of Historic Interest. All superficial geology is of high archaeological sensitivity. Historic mining industry features: buildings and spoil tips.	Potential for construction activities to disturb, damage or destroy previously unstudied heritage features and archaeological evidence within the scheduled monument. Works will make permanent modifications to the curtilage and setting of ruined mining buildings which are part of the scheduled monument. The scheduled monument is of national importance and assigned high value. An opportunity exists to enhance and preserve the mining heritage features of the scheduled monument as follows: • Record and consolidate the remaining mining structures on site. • Erosion protection will preserve the mining spoil heaps and prevent further deterioration of the heritage asset. • Reinstatement of former stone channels and culverts will restore a historic feature of the scheduled monument which is currently in poor status.	Further detailed heritage impact assessment (HIA) of the potential effects on cultural heritage assets is required, and will be undertaken as per the following methodologies: • Assessment of the Significance of the Impact of Development on Historic Landscapes (ASIDOHL2) • Full desk based archaeological assessment with Written Scheme of Investigation and working method statement. Measures for reducing or mitigating effects identified by the assessments will be incorporated into the detailed design and Pre-Construction Information for inclusion in a CEMP to be employed by the contractor on site. All assessment results and control/mitigation measures will be compiled into a request for Scheduled Monument Consent from Cadw. It is anticipated that the project is compatible with the preservation of the primary features of the historic designations and that negative effects can be reduced by sensitive design.	Residual environmental effect: Slight adverse to Moderate beneficial Significant effects are considered unlikely. Further work required: 1. Desk based archaeological assessment, WSI and method statement 2. ASIDOHL2 3. Building survey 4. Scheduled Monument Consent
Landscape	The site forms a part of the following landscape designations: • Upper Highlands Special Landscape Area (SLA 12) • Upland Ceredigion Landscape of Historic Interest. The site is also a prominent element in view from the following receptors: • 4no. residential dwellings • Public Right of Way – 20/61/D • National Cycle Route 81	Temporary visual and sensory effects from construction activity, plant and vehicles are likely to reduce tranquillity and visual amenity for recreational users of PRoW, National Cycle Route and local residents. Enhancement of the historic context of the site can be achieved by designing channel lining and erosion in keeping with historic mining stone channel design and materials. Minor alterations of landform due to redistribution of mining spoil and slime heaps is localised and likely to have negligible effect on landscape context or views.	Measures to avoid and reduce effects on the cultural heritage aspects of the landscape have been described in the previous section. Measures to avoid, reduce and mitigate sensory effect for residents and recreational visitors to the location are included within Population and Human Health topic above.	Residual environmental effect: Neutral Significant effects are considered unlikely.

Environmental Topic or Receptors	Sensitive Sites or Receptors	Potential for Significant Effects and Environmental Opportunities	Avoidance and Mitigation Strategy	Significance Level and Scope of Further Environmental Assessment
Cumulative Effects	Grogwynion SAC & Gro Ystwyth SSSI	In combination with other projects forming part of the NRW Metal Mines Programme this project would reduce inputs of contaminated sediments within the Afon Ystwyth catchment. The Grogwynion SAC and associated SSSI is potentially dependent on the disposition of contaminated sediments to arrest successional change and maintain habitat for metallophyte lower plant interest which is a key feature of the site.	Strategic HRA is required across NRW metal mines programme to ensure combined effects of metal mine remediation within the Ystwyth catchment on the long term status of Grogwynion SAC is understood. Any potential conflict between the objectives of the Water Framework Directive and Habitats Directive must be resolved.	Residual environmental effect: Very large adverse **Potentially significant negative environmental effects have been identified.** Further work required: 1. HRA followed by Appropriate Assessment of impacts for Natura 2000 sites.

4.5 Screening

The project has been screened against the criteria described in Schedule 2 of the EIA (Land Drainage Improvement Works) Regs 2017 as detailed in sections 4.1, 4.2 and 4.3 above.

The screening has identified potential for significant effects on the environment, as a result of which an EIA will now be completed and an Environmental Statement produced. The Scope of the Environmental Impact Assessment will be to assess the schemes impact upon Biodiversity and Resilience of Ecosystems, as well as associated cumulative impacts (i.e. the Environmental Receptor within Table 4.1 for which it has not been possible to conclude no potential for significant effect). The EIA and delivery of an Environmental Statement will be undertaken during the schemes design phase to fully identify the severity of potential impacts with a view to identify measures to avoid, reduce or compensate those impacts. . The following assessments and surveys will be undertaken to inform the statutory EIA and development of the Environmental Statement:

- A Habitats Regulations Assessment of effects on Elynydd SAC, Grogwynion SAC and Elyndd-Mallaen SPA
- SSSI Assent
- Bat presence/absence survey
- Breeding bird surveys
- Lower plants (bryophyte & lichens) survey and lower plants method statement

Whilst other Environmental Topics / receptors have not been scoped into the proposed statutory Environmental Impact Assessment, this does not imply that these Environmental Topics / Receptors will not be considered further. Risks and opportunities associated with these Topics / Receptors will be managed through targeted environmental surveys and assessment that will allow for appropriate mitigation/controls to be outlined in the schemes Environmental Action Plan (EAP). The targeted assessments and surveys proposed include:

Water

- WFD Compliance Assessment
- Flood Risk Assessment, including effects on fluvial flooding and risk of flooding to infrastructure
- Ordinary Watercourse Consent (OWC) requirements to be screened with Ceredigion Lead Local Flood Authority.

Land

- SSSI assent for Mwyngloddfa Cwmystwyth

Cultural Heritage

- Desk based assessment, WSI and method statement
- ASIDOHL2
- Building survey
- Scheduled monument consent

The Environmental Statement, Environmental Actions Plan and an Environmental Constraints and Opportunities Plan (ECOP) will document findings of the environmental assessment having been undertaken for the scheme. All requirements set out within thin these documents will be complied with through construction, an Environmental Clerk of Works will be in place to monitor progress and ensure compliance.

5.0 Delivery of Multiple Benefits

In line with NRW's duty under the Environment Act they seek to deliver multiple benefits through their projects.

A draft list of potential environmental enhancements that could be accommodated as part of the remediation works at Cwmystwyth is provided in **Table 5-1**. They are also shown where appropriate on the Environmental Opportunities Plan (**Figure 5-1**). These have been identified where the scheme has potential to further deliver against those set objectives noted within **Section 1.4** "Project Objectives", therefore promoting the SMNR and meeting both NRW and the local Public Services Boards Well-being Objectives/Priorities.

Table 5-1 has been developed through stakeholder liaison (April/May 2019), a project innovations workshop (May 2019) and the feasibility study process itself.

We will seek to embed enhancements into the design of the project as far as possible and work collaboratively in their delivery; however, it is not within the scope of this remediation project to deliver all enhancements listed. This list will be refined as the project progresses; it is likely that most will not be achievable as part of this particular proposal. Future schemes or projects at the site could look to re-consider remaining opportunities.

Wider/Strategic Opportunities are outlined separately in **Appendix C**. These are opportunities that will continue to be considered by NRW (in parallel to detailed design) but are unlikely to be feasible as part of the remediation proposals alone. They are likely to require strategic partnerships and proposals to be pulled together.

Table 5-1 Potential Environmental Enhancements (multiple benefits)

Potential environmental enhancement (to be considered further during detailed design stage)	Effectiveness at providing environmental improvement	Timescales	Strategic Drivers
	High / medium / low	*Long-term (10+ years)* *Medium-term (5-10y)* *Short-term (1-5years)*	*e.g. NRW well-being objective 2, WFD, Core Management Plan*
Water quality enhancements arising as a direct result of the proposed options. In turn, this could benefit a number of habitats and species along the river corridor.	High	Long-term	WFD NRW Well-being Objectives 2, 3 and 4
Involve CMT and their volunteer network with on-site activities as part of a community engagement strategy.	Medium	Short-term	NRW Well-being Objectives 1 and 5
Potential detour from existing long-distance trail. The Borth to Devil's Bridge to Pontrhydfendigaid Trail passes through part of the study area and there is an opportunity for additional waymarking of a detour towards the main mine building complex. This opportunity for a waymarked detour to the main mine building complex also applies to the Cambrian Way and Cistercian Way further west.	Medium	Medium-term	Future Generations Act Goal 5 'A Wales of Cohesive Communities'
Safety improvements on site that could be provided as part of the remediation works (e.g. signage/fencing/grilles over adits etc.) may help facilitate CMT providing trails through site at a later stage – i.e. working towards providing a safer site for them to consider making more open to public in future etc. This would need to tie into a Site Management Plan with targeted objectives agreed as to what could be included in the remediation project and what is a wider strategic aim.	Medium	Medium-term	NRW Well-being Objective 5
Potential for a heritage trail through site. Provision of a circular heritage walk around the site (incorporating land south of river if it would be feasible for a bridge or suitable alternative to be constructed in future). Consideration to be given to provision of wheelchair access on main site etc. Websites, leaflets, signage etc. would be required to promote to trail. Potential to make access routes required for the remediation works themselves suitable for long-term use to support CMT's aspiration for more accessible pathways through site & future educational facilities. May not provide a full walking route as part of the remediation work itself but would potentially make this an easier achievement for CMT longer term if some infrastructure is left in place following remediation work. Consideration to be given to what may be appropriate as design develops.	Medium	Medium-term	NRW Well-being Objective 5
Re-opening of original track to mine yard. Consider whether work access is required during the remediation that would facilitate CMT ITEM 5: Re-opening of the original track to the mine yard or whether this could be incorporated into proposals even if no remediation works access is required through this point. CMT ITEM 5 notes "*The present track way entrance is located adjacent to Nevill Place and has been blocked off with dumps of stone to prevent unauthorised access. It is proposed that these are removed and a gated entrance constructed. Boulders would also be strategically to prevent off-road access.*" If no remediation works access is required at this location, then this may need to form part of the wider strategy for the site.	Medium	Medium-term	NRW Well-being Objective 5
Provision of a dedicated path to the mill area. Consider whether work access is required during the remediation that would facilitate CMT ITEM 3b: Managing access to the mill area of the site. This considers "*construction of a dedicated pathway on the northern side of the B4574 to direct pedestrians from the parking area to the south of the road up to the mill area. The proposed route would run along the eastern edge of the former stores building that lies to the south of the mill.*" If remediation works access is required through this location, then any access provision could be made suitable for longer term use as a pedestrian footway. If no remediation works access is required at this location, then this may need to form part of the wider strategy for the site.	Medium	Medium-term	NRW Well-being Objective 5

Consider whether the remediation works could include provision of signage on site (either end of site on road) denoting ownership by CMT – tying in with CMT ITEM 1 (Signage to indicate ownership)	Low	Medium-term	
Cycle Route 81 signage. Consider signage improvement to tie in with Sustrans general aims for improving signage across the network: - Fix/amend existing signage along sections of Cycle Route 81 in/close to site; - Add educational signage along Cycle Route 81 (also see CW Op12).	Low	Medium-term	NRW Well-being Objective 5
Interpretation Panels. Replace/update existing boards along Cycle Route 81/ road. Provide new information boards: - Borth to Devil's Bridge to Pontrhydfendigaid Trail (also PRoW 20/61/D) at its eastern-most point as it passes through the site where there is an impressive view of the workings and up the valley to the east. - At new car parking provision (CW Op21) Consider installation of interpretation boards at other locations identified by CMT ITEM 2 (Improved interpretation panels and signage). Include information about the remediation works themselves (as part of the wider story re mining legacy), heritage value of site (what can be seen/old photographs etc.) and ecological/geological interest as well as information regarding health and safety risks present at former mine workings.	Medium	Medium-term	NRW Well-being Objective 5 Future Generations Act goal 6 'A Wales of vibrant culture and thriving Welsh language'
It may be appropriate to undertake consolidation work at the former Crusher House (close to Pugh's Adit) during works at this location. Opportunity to restore (& potentially utilise) the building as part of a treatment facility that may be required (may need an extension) to promote its long-term preservation and also screen new infrastructure that is required for treatment. This would be subject to appropriate consultation with DAT and Cadw and Scheduled Monument consent however. This would also tie in with Landmap Management Objectives for the local area in particular "*selective reconstruction/consolidation of important features*"	High	Medium-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Pugh's Adit and Gill's Lower Adit Improvement Works. During remediation works at this location consideration could be given (through appropriate consultation with CMT and other bodies) to improvements at these locations both in terms of visual improvement and health and safety/access measures.	Medium	Medium-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Kingside Adit Stabilisation Works – consideration of stabilisation works that may be appropriate at this feature.	Medium	Medium-term	NRW Well-being Objective 2
Potential to support CMT ITEM 7: Restoration and improvement to the packwall entranceway and portal to Taylor's Level "*To improve the outward appearance of this adit level by removing the existing inappropriately placed grill.*"	Medium	Medium-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Potential to support CMT ITEM 6: Restoration of the portal to Level Fawr and improvement of underground access. "*To restore the portal entrance and erect a replica plaque above the entrance. Facilitate materials and equipment being able to be taken into the mine.*"	Medium	Medium-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Potential to support CMT ITEM 3A which suggests "*Re-routing part of the stream outflow into the former Mill Tailrace, following archaeological investigation to confirm its route on the northern side of the road.*" Consider whether this could be incorporated into surface water management proposals at this location.	Medium	Medium-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Potential to support CMT ITEM 3A which suggests "*Dry stone revetment walls adjacent to eroding fines and slimes dumps could be constructed [*to the south of the mill area*] to mitigate against further erosion of these sources of contamination into the River Ystwyth*." Consider whether this could/is appropriate to form part of the remediation/surface water management proposals for the site.	Medium	Long-term	NRW Well-being Objective 2 Future Generations Act Goal 6 'A Wales of vibrant culture and thriving Welsh language'
Potential to provide permanent car park provision close to road (north side) as a result of spoil repositioning and to enable site compound during remediation works etc. This could tie in with CMT ITEM 4 (Improved Car Parking across the site area).	Medium	Long-term	NRW Well-being Objective 5

Provision of localised ecological enhancements where appropriate during works in particular considering Local Biodiversity Action Plan species in locality (e.g. pipistrelle bat and chough) and SPA/SAC qualifying habitats/species. Consultation with appropriate bodies to determine appropriate measures. For example, project could consider installing bat roost boxes if suitable locations can be identified (bats already known to roost on site so could add to opportunities for species present). E.g. installation of underground roost chambers which could be incorporated into any slopes created or could incorporate roost boxes into structure consolidation works (e.g. at the Crusher House – CW Op13) subject to appropriate consultation/consenting. Consider the designated roadside verge through the site and whether any additional survey/distribution mapping is required and any specific enhancement that could be incorporated into the remediation works for the verge/key species present.	Medium	Medium-term	NRW Well-being Objective 3 Biodiversity Action Plans SPA/SAC/SSSI Management Plans
Visual improvements possible through spoil heap reprofiling to the north of the road.	Medium	Medium-term	NRW Well-being Objectives 2 and 3
Hydro-power optioneering and design. If active treatment is required at this site there is opportunity to incorporate a hydro-electric scheme into the remediation proposals to generate the necessary energy required. This will need consideration as feasibility develops. Could also consider re-use of historical leat system as part of this opportunity. This ties in with CMT ITEM 10: Hydro-electric scheme which considers allowing a private company to use the site for a hydro-electric scheme with a view to this creating a fund source for CMT to enable stream culverting and footpath creation.	High	Long-term	NRW Well-being Objective 1
Bury 'Treatment' Facilities. Re-profiling of soil north of the road may give an opportunity to bury storage containers for use as the active treatment facility – would only then need to see the 'door' and could be angled appropriately.	Medium	Long-term	NRW Well-being Objective 2
Support to CMT in identifying or using match to leverage potential funding sources for their work. Support with applications etc.	Medium	Medium-term	NRW Well-being Objective 2
Potential for re-use of waste materials. Provision of waste from treatment to other facilities which could make use of them – e.g. source of zinc. Any potential for iron exchange on site (using surplus power if on site generation) so that CMT have metal to sell?	Medium	Medium-term	NRW Well-being Objective 2
Realtime Data Capture. Installation of monitoring on site that could then make use of broadband (along road) to provide a live feed to the site for educational facilities.	Medium	Long-term	NRW Well-being Objectives 1 and 7
Lime mortar use in restored buildings which could create new habitat for lichens and ferns.	Low	Medium-term	NRW Well-being Objective 2
Use of metal pipes that will 'age' for any exposed pipework NRW NRM Team Ceredigion (Senior Conservation Officer) May 2019 Consultation response includes "It was also thought that there was the potential to enhance the historic landscape eg by using metal pipes that quickly rust"	Low	Medium-term	NRW Well-being Objective 2
Promotion of remediation works and cultural value of site at local education facilities – 6th form colleges, Universities, schools etc. Presentations, information drop etc.	Low	Short-term	NRW Well-being Objectives 1 and 7
Provision of material to groups such as Russell Society or National Museum. If any material is being removed/relocated this provides a potential rescue collecting opportunity for the National Museum and/or groups such as the Russell Society. Consultation would be beneficial with these groups if this is required.	Low	Medium-term	NRW Well-being Objectives 1 and 7

6.0 Closing Notes

This ECOR has recorded the site's environmental baseline, documented the options appraisal and identification of the preferred option, as well as having outlined the scope of environmental assessment to be taken forward during the schemes detail design stage.

An outline design has been developed that includes introducing a series of measures that will:

- capture pollution discharges from the mines various adits;
- improve management of surface water on site;
- line stream beds to keep stream water separate from the contaminated groundwater;
- use erosion control measures to prevent scour of contaminated soils/spoil.

The outline design has been screened against the Environmental Impact Assessment (Land Drainage Improvement Works) Regulations 2017, at this stage we have concluded that the scheme will require a statutory Environmental Impact Assessment (EIA) and preparation of an Environmental Statement. The scope of which will include Biodiversity and Resilience of Ecosystems, as well as associated cumulative effects. The following surveys and assessments will inform the statutory EIA:

- HRA of effects on Elynydd SAC, Grogwynion SAC and Elyndd-Mallaen SPA
- SSSI assent
- Bat presence/absence survey
- Breeding bird surveys
- Lower plants (bryophyte & lichens) survey and lower plants method statement

Whilst scoped out of the statutory EIA, the following topics/receptors will be further considered via delivery of targeted surveys and assessments. Any actions arising from which, will be documented within the schemes Environmental Action Plan.

Water

- WFD Compliance Assessment
- Flood Risk Assessment, including effects no fluvial flooding and risk of flooding to infrastructure
- Ordinary Watercourse Consent (OWC) requirements to be screened with Ceredigion Lead Local Flood Authority.

Land

- SSSI assent for Mwyngloddfa Cwmystwyth

Cultural Heritage

- Desk based assessment, WSI and method statement
- ASIDOHL2
- Building survey
- Scheduled monument consent

This draft Environmental Constraints and Opportunities Record (ECOR - Part A) is being issued for consultation to key stakeholders. Once received consultee responses will be recorded within Appendix A, and the ECOR (Part A) updated where relevant.

Appendix A – Responses from the Environmental and Planning Consultees (informal consultation phase), April/May 2019 relating to the Cwmystwyth Site

Consultee Organisation / team	Consultee Response (excerpt relevant to this site only taken from full consultation response)	Feasibility Stage Response
Cadw	a) Do you have any additional baseline information you would be willing to share with us for these sites? NRW are regularly provided with up-dated GIS mapping showing the location of scheduled monuments. The documentation submitted to Cadw demonstrates that NRW has identified designated assets and undesignated historical assets potentially impacted by the proposed water treatment works. The main repositories for reports etc. are with the local archaeological trusts (Historic Environment Record - HER) and RCAHMW (National Monuments Record - NMR). Cadw receives information as a result of consented work at scheduled monuments, which is also copied to the HERs and NMR. [Cadw has numerous reports for Cwmystwyth; to avoid duplication we suggest that NRW provides us with a list of their existing sources / information and we can fill in any gaps.} b) Do you know of any other local opportunities we should be exploring for these sites? The Royal Commission on the Ancient and Historic Monuments of Wales may have other information held in the National Monument Record https://rcahmw.gov.uk/ Local historic societies may have relevant information which has not been deposited with the RCAHMW or local archaeological Trusts. c) Do you have general concerns, queries or comments about the project? It is vital that Cadw are consulted at an early stage regarding any proposed works located within a scheduled area which might damage a scheduled monument. Such 'works' include disturbance or building up of the ground surface (e.g. watercourse culverting, channelling with gabions, capping of the spoil heaps excavation, installation of stakes or posts, replacement fencing or new fencing, pipework, gabions etc.), new additions (e.g. equipment, structures or buildings), and work to historic buildings/structures (e.g. repairs, restoration or conversion). These works require Scheduled Monument Consent (SMC): https://cadw.gov.wales/historicenvironment/help-advice-and-grants/makingchanges/schedmonconsent/?lang=en The local archaeological trusts should be contacted to discuss potential impacts on undesignated assets.	Table 5 includes liaison with CADW regarding reports they hold for the site.
Dyfed Archaeological Trust	Thank you for your email, dated 12th April 2019, regarding the Metal Mine Feasibility Study. This report notes that the three mine sites in our area: Cwm Rheidol, Frongoch-Wemyss and Cwmystwyth, are all rich in heritage and we recommend that an archaeological desk-based assessment (DBA) of each site should be undertaken and these should help inform the scope of further archaeological mitigation required within each scheme. The DBAs should adhere to the standards and guidance provided by the ClfA (2014, updated 2017).	Heritage appraisal undertaken as part of this feasibility study. Consideration of further assessment outlined in Section 4 above.
NRW NRM Team Ceredigion	For any groundworks I would like to see restoration to a more natural/in-keeping habitat, not improved grassland and our goal should be Calaminarian grassland as per my comments for Frongoch. I don't like the reference to the use of gabions, even in seasonal water features. I think we should be looking for something more in keeping and look to replicate the stone and clay lined channels that they would have utilised in the 19th century. While it would be nice to have stone arched culverts, we should at least have the portals arched rather than plastic twin-wall pipe. There may be wider protected species interest, notably bats, but this will depend on the more detailed proposals.	Concept design has sought to consider these comments – to be explored further at detailed design stage.
NRW NRM Team Ceredigion (Senior Conservation Officer)	Comments in relation to the biological interest of Cwm Ystwyth Mine SSSI/SAC a. Do you have any additional baseline information you would be willing to share with us for these sites? Whilst the most important report is the one that you identify by Forster Brown and Chambers in 2017, there is also an older survey: Dyfed Wildlife Trust Wales Metal Mine Survey 1992-93. In DMS here: https://cyfoethnaturiolcymru.sharepoint.com/teams/landmanps1/psce/mwcws/Science/Flora/SN87%20Cwmystwyth%20survey.aspx	

Consultee Organisation / team	Consultee Response (excerpt relevant to this site only taken from full consultation response)	Feasibility Stage Response
	b. Do you know of any other local opportunities we should be exploring for these sites? You note the possibility of a micro hydro scheme. We previously looked at the potential for this and thought that with careful design, damage to the biological interest could be avoided and there was the potential for enhancement eg by re-construction of buildings using traditional lime mortar which could create new habitat for lichens and ferns. It was also thought that there was the potential to enhance the historic landscape eg by using metal pipes that quickly rust. c. Do you have any general concerns, queries or comments about the project? As shown in the Forster Brown – Chambers report, there are Calaminarian grassland communities within the feasibility study area and careful siting of any works will be needed to avoid damage to this SAC habitat. Expert advice from a lichenologist with specialism in metallophyte lichens will be needed. The landscape and historic interest of the site is very high. Any new works will need sensitive design.	
NRW Conservation Geologist	I'm writing to let you know that I do not have any issues from an Earth science perspective over any of the potential remediation proposals. Indeed, from an environmental perspective, remediation of all four mines would be very welcome.	
NRW Geomorphologist	From a fluvial geomorph perspective we need to ensure that the proposals pose either beneficial or minimal impact to the physical form and processes (e.g. sediment conveyance through the reach, plus the ability of the river to naturally move laterally) of the rivers and their riparian zones. Not being an expert in mine remediation at present I think the proposals would benefit from elaboration on the types of treatment (both the "active" and "passive" forms) that are potential options. Alternatively involving us at the "long list" Options stage would be useful in order that we can provide feedback on the potential options and then a more informed preferred option can be subsequently developed. We are generally very happy to meet up on site to discuss options and find ways to work around constraints. For example I note that channelling with gabions, or culverting, is proposed at Frongoch – this is something that would generally go against NRW policy, but alternatives using river restoration techniques to provide the same (and more) benefits are often possible following discussion at an early engagement site meeting. As I have discussed Dylife with old colleagues, and agree that a hydropower scheme appears to be the best solution here. However, the scheme would either need to be designed to continue to convey upstream sediments to downstream reaches in times of high flow (and is this acceptable from a contamination point of view), or a sediment budget is undertaken to put in place a management plan that mechanically moves this material on a regular basis. As mentioned, many thanks for the engagement, but I think further discussion/meetings are required to inform and flesh out the potential options at each location.	Geomorphologist to be consulted as design progresses.
NRW Landscape officer	The consultation document is extremely interesting, really clear and very comprehensive. It's great to see the landscape and historical landscape issues featuring so strongly. I can't think of anything to major to add. Due to the potentially high landscape impacts, I would be really glad to be kept up to date and would be keen to attend a site visit is any are arranged. I would also be interested to see the specific landscape reports that you mention are due. I will let my 'virtual landscape' colleagues know that the work is ongoing in case they hear of any other relevant initiatives in the area. It is good to see links already made to the Source to the Sea, Pumlumon project etc. The only minor point I could add at the moment would be that it would be useful to identify in a little bit more detail the expected end use of the restored sites. This could include who will be responsible for them and identify any budgets going forward. On Frongoch Phase 1 this did not seem to have been agreed (although I appreciate landowner issues were a problem) It is helpful in the design stage to have this in mind though. If possible avoiding 'over engineered' and 'over tidy' design solutions can help the sites to develop a more interesting habitat. Considering micro topography can also be helpful.	2019 Landscape Report (*Lingard Farrow Styles: NRW Metal Mine Feasibility, Preliminary Landscape Appraisal, Cwmystwyth Mine, Ceredigion, Prepared for: Natural Resources Wales on behalf of The Coal Authority Ref: 2997, February 2019*) provided to NRW for cascade to landscape officer in June 2019. NRW Landscape Officer to be included in consultation through project duration. Concept design has sought to avoid 'over engineered' and 'over tidy' design solutions – to be explored further at detailed design stage. Consideration of end use of site has been included in Table 5. See also Wider Opportunities table in Appendix C.
NRW Lower Plant Species Specialist	The Coal Authority report looks generally accurate (although at one stage they say "bryophytes (ferns)" which is wrong), but the way it is written downplays the ecological importance of the mines. The fact Cwmystwyth is SAC for its Calaminarian is mentioned rather in passing, but is potentially a showstopper and really does need to be spelled out in no uncertain terms: whatever remediation works take place will need to avoid damage to the SAC and SSSI feature, that will not be easy, and this international importance frankly trumps issues with the local fish population.	Baseline amended to highlight importance of on-site SAC and Calaminarian grassland.

Consultee Organisation / team	Consultee Response (excerpt relevant to this site only taken from full consultation response)	Feasibility Stage Response
	I'm sure we can come up with solutions if we all work together, perhaps even with a win-win.	
NRW Protected Sites	*No comment provided at this stage*	
NRW Protected Species	*No comment provided at this stage*	
NRW Public Service Board member	*No comment provided at this stage*	
NRW WFD Co-ordinator	*No comment provided at this stage*	
Wildlife Trust of S & W Wales	*No comment provided at this stage*	
Ceredigion Council - Ecology	*No comment provided at this stage*	
Ceredigion Council - Enterprise	*No comment provided at this stage*	
Ceredigion Council - PRoW Officer	*No comment provided at this stage*	
Ceredigion Council - Land Drainage	*No comment provided at this stage*	
Ceredigion Council - Landscape	*No comment provided at this stage*	
Ceredigion Council - Planning	*No comment provided at this stage*	
Ceredigion Council - Public Service Board	*No comment provided at this stage*	
Ceredigion Council - Public Service Board	*No comment provided at this stage*	
Sustrans Wales	*No comment provided at this stage*	
National Waterfront Museum	*No comment provided at this stage*	
National Museums & Galleries of Wales	*No comment provided at this stage*	
Royal Commission on the Ancient and Historical Monuments in Wales (RCAHMW)	*No comment provided at this stage*	
Russell Society	a) Do you have any additional baseline information you would be willing to share with us for these sites?	Table 5 includes the potential rescue collecting opportunity noted by the Russell Society.

Consultee Organisation / team	Consultee Response (excerpt relevant to this site only taken from full consultation response)	Feasibility Stage Response
	AC-NMW holds suites of mineral specimens representative of the ore, gangue minerals and perhaps more importantly the dump-formed post-mining minerals for which a number of the mine dumps are of international importance. All of the specimens are available for study. These include 190 samples from Frongoch Mine, 133 from Cwmystwyth Mine, 58 from Dylife Mine and just 2 from Cwmrheidol Mine. The reason for the low number from Cwmrheidol Mine is due to the unstable (decaying) nature of the sulphides (in particular marcasite and pyrite) resulting in very little having been available to collect. AC-NMW also hold information regarding the mineralogy of these sites some of which is available on our mineralogy of Wales website at https://museum.wales/mineralogy_of_wales/ and also within publications and our collections database. The Russell Society membership have extensive knowledge of the mineralogy of these mine dumps – in particular the range of internationally rare post mining dump-formed secondary minerals. b) Do you know of any other local opportunities we should be exploring for these sites? If it is agreed that any of the mine dumps are to be removed/relocated this would provide a potential rescue collecting opportunity for the National Museum and/or groups such as the Russell Society. It would be advantageous to involve these groups/organisations in any plans involving dump removal/disturbance. c) Do you have general concerns, queries or comments about the project? Cwmystwyth Mine is less of a concern mineralogically depending on which part of the site is affected	
Cambrian Mines Trust	a) Do you have any additional baseline information you would be willing to share with us for these sites? I know Wemyss, Dylife and Cwmystwyth well, both above and below ground and have carried out geological studies at each - you are welcome to any of these results b) Do you know of any other local opportunities we should be exploring for these sites? No c) Do you have general concerns, queries or comments about the project? 1- the purple 'heritage value' land on the map needs to include the area to '351' NW of Penparc which is a Bronze Age site 2 - it could have been mentioned that most of the site N of the road is a SAM as well as an SSSI 3 - I think the approach is correct; deal with Pugh's and the Kingside and then see what difference is made before going wild on other schemes. 4 - there are numerous M.Sc-type studies of metal loading in the streams here, they need to be collated and reviewed critically	

Appendix B

References

References are provided below for existing Cwmystwyth documentation that was reviewed/used to gather baseline information as part of this study:

- Atkins. (2010). Technical Memo – Review of Cwmystwyth Monitoring Data to end 2009 and the 2008 Monitoring Summary Report Recommendations.
- Coal Authority (2020). Cwmystwyth Metal Mine Remediation Feasibility Report
- Dyfed Archaeological Trust (2014). Cwmystwyth Mines Ceredigion: Management and Protection Plan.
- Environment Agency (2012) Frongoch Metal Mine Remediation Project Habitat Regulations Assessment (Stage 2)
- HRS Wales (2019): Cwmystwyth Lead Mine, Cwmystwyth, Ceredigion. Richard Scott Jones (BA, MA, MCIfA), Report No: 206, February 2019, Cultural Heritage & Archaeological Feasibility Study
- Hughes., Simon (1981): The Cwmystwyth Mines
- Lewin J., Davies B. E. and Wolfenden P. J. (1977) Interactions between channel change and historic mining sediments. In: Gregory K. (ed.) River Channel Changes. Wiley and Sons, Chichester, 353-367
- Lingard Farrow Styles (2019): NRW Metal Mine Feasibility, Preliminary Landscape Appraisal, Cwmystwyth, Ceredigion, Prepared for: Natural Resources Wales on behalf of The Coal Authority Ref: 2997, February 2019
- Parsons Brinckerhoff Ltd. (2006). Scoping Consultancy for Remediation Design of Former Metal Mines in Wales – Cwmystwyth Feasibility study.
- Simkin., Janet: A Survey of Calaminarian grassland in mid-Wales - 2015 - Evidence rpt 061
- C. H. Swain, P. A. Brewer, M. G. Macklin & J. Simkin (2005) The ecological, geomorphological and geochemical controls on river shingle heath development on the Afon Rheidol and Afon Ystwyth, Ceredigion. University of Wales, Aberystwyth CCW Contract Report No. RE0492
- Miller Research Evaluation Consulting: Upland Regeneration Study Pentir Pumlumon Final Report July 2017 (study approved by Cynnal y Cardi Local Action Group and commissioned by Ceredigion County Council)
- Natural Resources Wales: Metal Mine Remedial Programme – Cwmystwyth: Environmental Screening Advice Note (2017)
-
- C. Forster Brown & S.P. Chambers (2017): Mapping the extent of Calaminarian grassland at Mwyngloddfa Cwmystwyth SSSI; Natural Resources Wales Evidence Report No: 203

Online sources that formed part of the Environmental Desk Study (review of online publicly available information) are listed below:

- https://cdn.naturalresources.wales/media/679801/cwmystwyth-mine-case-study_2016_06.pdf?mode=pad&rnd=131596369420000000

- https://gov.wales/topics/health/publications/healthier-wales/?lang=en
- https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en
- https://magic.defra.gov.uk/MagicMap.aspx
- https://naturalresources.wales/guidance-and-advice/environmental-topics/wildlife-and-biodiversity/find-protected-areas-of-land-and-seas/designated-sites/?lang=en
- http://lle.gov.wales
- https://www.biodiversitywales.org.uk/Environment-Wales-Bill
- http://www.ceredigion.gov.uk/resident/coast-countryside/conservation-and-wildlife/ceredigion-biodiversity-action-plan/
- http://naturenet.net
- https://naturalresources.wales/media/681496/know-your-river-river-ystwyth-salmon-and-sea-trout-catchment-summary.pdf
- https://beta.gov.wales/agricultural-land-classification-predictive-map
- https://www.naturalresources.wales/evidence-and-data/maps/long-term-flood-risk/?lang=en
- https://historicwales.gov.uk
- http://cadw.gov.wales/historicenvironment/protection/historiclandscapes/?lang=en
- https://landmap-maps.naturalresources.wales/

Appendix C

Wider/Strategic Opportunities

Opportunity	Description
Review/Update of Site Wide Management Plan (including consideration of Strategic Links/Partner Opportunities)	The Cambrian Mines Trust (CMT - site owners) already have a Management and Protection Plan in place for this Site (*Cwmystwyth Mines, Ceredigion: Management and Protection Plan, 2014 prepared by Dyfed Archaeological Trust (DAT) for CMT*). It may be appropriate to support an update of this to review aspirations and consider funding/partnering opportunities for any consolidation/improvements work that form part of this and potential tie in with local Wellbeing Strategy, Tourism and other initiatives. Due to the presence of international wildlife sites and the Scheduled Monument on Site full consultation would be required with NRW, CADW and DAT. Other partners/strategic links may be identified through local consultation and as the project progresses. Pentir Pumlumon (Plynlimon Tourism) initiated an Upland Regeneration Study in 2017 covering the Ceredigion uplands which includes a cultural/heritage action plan (among other actions) which could be referred to in any Site management plan. (*Upland Regeneration Study Pentir Pumlumon Final Report July 2017, Miller Research Evaluation Consulting*). The study was approved by Cynnal y Cardi Local Action Group and commissioned by Ceredigion County Council. Remediation works & associated enhancements likely to be a part of this wider management plan rather than be the driver/funding source. It should be noted that ITEM 8 in the CMT document provides an aspiration to work with NRW for any future water treatment works at the site. As part of this plan there would ideally be a key message and targeted objective of what can be achieved within the scope of remediation works.
Potential Strategic Link/Partnering/Funding Opportunities	• Cambrian Mines Trust – promotion, signage, long-term masterplanning, support with funding opps etc. • Pentir Pumlumon (Plynlimon Tourism) commissioned an Upland Regeneration Study in 2017 covering the Ceredigion uplands which includes a cultural/heritage action plan (among other actions) which should be referred to in any Site management plan. (Upland Regeneration Study Pentir Pumlumon Final Report July 2017, Miller Research Evaluation Consulting). The study was approved by Cynnal y Cardi Local Action Group and commissioned by Ceredigion County Council. • Sustran links & promotion of site (including detours) • STW & Welsh Water tie in at board level re clean water/catchment management • Ceredigion CC for promotion of trails & funding etc. (masterplan engagement also) • Long term management of site – local community opportunities etc. • Growing Mid Wales (Ceredigion & Powys joined initiative supported by Welsh Government) • Mid Wales Tourism Forum • Central Wales Economic Forum • HLF • Elan Links • Summit to Sea • Wildlife Trust • Other strategic links/partners may be identified through local consultation and as the project progresses.
Consolidation of Structures in Scheduled Monument	Potential to undertake essential consolidation work at other buildings within the Scheduled Monument to minimise risk of collapse. Would require substantial consultation/on site meetings with Cadw and DAT and agreement about funding/mechanism/long-term maintenance etc. Scheduled Monument consent would be required.

	This would also tie in with Landmap Management Objectives for the cultural landscape value of the local area "selective reconstruction/consolidation of important features". For example, CMT ITEM 9: Rebuilding of Neville Place and Staff House.
Education Potential on Site	Consideration of how the site could be utilised in future for educational purposes. Formal/informal.
Ceredigion Well-being plan Asset mapping	The delivery of the Ceredigion Wellbeing Plan includes a period of asset mapping – this will research further how communities work, how people see the relationship between themselves and the places where they live, work and visit, and will investigate how the assets (including cultural), contribute to well-being. Potential for Cwmystwyth (and other local mine sites) to tie into this in terms of cultural heritage value etc. Strategic link opportunity?
Incorporate Site into a Long Distance Mining Trail	Incorporate the Cwmystwyth Site into a long-distance heritage trail through the wider landscape tying in with other Metal Mines (and other heritage assets) in the locality. This would tie in with ITEM 11 of the CMT Site Management and Protection Plan: *Establishment of a 'Mid Wales Mining Trail'* Could most likely make use of existing designated trails through and tie in with 'Spirit of the Miners' walking routes but additional trails/signage may be required. Would most likely require footpath improvements, signage, educational material and suitable publication (online and through leaflets etc.). The Miller Upland Regeneration Study (on behalf of Pentir Pumlumon) comments: *"There is a rich range of historic sites to explore around the mining history of the [Ceredigion] Uplands area. Although work has been done through earlier initiatives to draw attention to this, there remains scope to devise networked trails with guides or interpretation materials to build an understanding of the industrial history of the Uplands."*
Provision of Local Heritage Trail	Utilise the existing public right of way network and identify suitable viewpoints from this towards points of interest within the Site. At these viewpoints there may be located interpretative signage and mining artefacts from the site such as metalwork and geological samples. Any route would benefit from appropriate way-marking and promotional material such as a website entry and/or leaflet. Appropriate seating may also be considered.
Large scale hydro power generation	Potential for power generation using head from upper limits of catchment. Would require a partner to enable/facilitate the works – remediation could benefit from use of the power; owners could benefit from financial rewards & power for on-site visitor centre etc. Remediation works to consider potential for future use of Site in this way (even if not in place for works themselves) and to design infrastructure to enable this in future (resilience/future potential etc.).
Visitor Centre	Provision of a Visitor Centre on Site?
Commercial Enterprise	Provision of commercial enterprise opportunities on site through restoration of buildings and use of hydro power etc. E.g. pottery, metal work etc.
Link to Elan Valley Visitors Centre	Promotion of site through information provision at this location. Signage towards site from here?
Elan Links	Potential to tie in with the Elan Links project work – two key tie in's "protecting/restoring historic sites" and "increasing access, recreation opportunities etc."

Other renewable energy sources	Consider potential for other renewable energy sources on site – e.g. solar.
Wider Mining Information Cascade	Maximise exposure within workshops/conferences through presentations/information boards etc. about the remediation proposals – e.g. NAMHO. In particular any cultural heritage aspect the projects are bringing etc.
Public Goods Payments	Potential for funding for landowners/managers of the Sites depending on assets present/created – additional guidance due 2019.
Information Download to Local Educational Facilities	Promotion of remediation works and cultural value of Site at local education facilities – 6th form colleges, Universities, schools etc. Presentations, information drop etc. Potential for calibrated measurements to be provided in real time to educational facilities. Chemistry, flow etc.

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