

Pollution from Abandoned Metal Mines Remediation Feasibility Studies



Mine Site Information

February 2019

1. Introduction

A number of abandoned metal mine sites have been identified as major sources of pollution and four are being assessed for potential remedial measures. The purpose of this consultation document is to (1) inform you of the feasibility studies that have now commenced and (2) offer an early opportunity to consult on your views. This is not a statutory consultation, but we welcome:

- a) comments or information you may have with regard to the sites detailed below
- b) your comments on the sites' environmental baseline provided within the document as Appendix A.

Please respond, using the framework provided at paragraph 4.1, within three weeks of receipt of this document.

1.1. The issue

Abandoned metal mines are significant sources of metals pollution. Elevated levels of metals, primarily zinc, lead and cadmium, can have a detrimental impact on the ecology of our river systems, reducing fish populations and the diversity of invertebrate fauna. There are more than 1,300 abandoned metal mines in Wales polluting more than 600km of river reaches, making them the single biggest cause of water quality objective failures. Through this project we're looking at ways of reducing river pollution at the four sites identified below to help restore river health downstream.

1.2. Why you should know about the metal mines feasibility programme

As part of NRW's statutory duties, remedial works that progress as a result of these studies will directly contribute to the **sustainable management of natural resources** in Wales as detailed in the Environment (Wales) Act 2015 and the Well-being of Future Generations (Wales) Act 2015.

The involvement of statutory organisations, voluntary sector service providers and the general public will be essential to enable a comprehensive feasibility study and informed decision-making about the most suitable treatment options at each site.

In addressing the water quality issues through remedial works, there may also be opportunity for measures to be incorporated that benefit the health and well-being of local communities, local economies, the wider environment and preservation/promotion of local cultural heritage. We would welcome hearing about such opportunities you believe could be incorporated into the project.

1.3. What is happening now?

Natural Resources Wales (NRW) has commissioned the Coal Authority (CA) to carry out feasibility studies on four abandoned metal mines in Mid Wales. The possible remedial works to combat river pollution at each site are also outlined.

The implementation of remedial works will be subject to securing the required funding, permissions and all necessary landowner arrangements. It is our ambition that following prioritisation of these feasibility studies and stakeholder engagement; design works will initially be progressed at two of the four sites, leading ultimately to one commencing construction within two years.

It is recognised that some of these projects have previously been widely discussed and our present study will reflect that earlier consultation has taken place and information already gathered.

2. The four mine sites

- Cwm Rheidol, near Devil's Bridge, Ceredigion SN 72924 78159
- Frongoch-Wemyss, near Pont-rhyd-y-groes, Ceredigion SN 72178 74382
- Cwmystwyth, near Devil's Bridge, Ceredigion SN 80225 74460
- Dylife, near Staylittle, Powys SN 86070 93960

In developing NRW's metal mine programme, these sites provide the greatest potential opportunities for successfully implementing a scheme bringing significant local water quality improvement.

Each site has a combination of different methods to result in the betterment of water quality, including conveying surface water across mine workings at Dylife to active treatment of mine water at Cwmystwyth.

Each site is also unique, with risks and opportunities across a range of environmental aspects, most notably ecology, landscape and heritage. Some of these are similar for all sites (i.e. common themes) but each site also has its own specific environmental baseline value which will be taken into account as part of the measures proposed. A number of environmental designations are in place on and around the sites, which will be considered as part of the environmental assessment being integrated into each feasibility study.

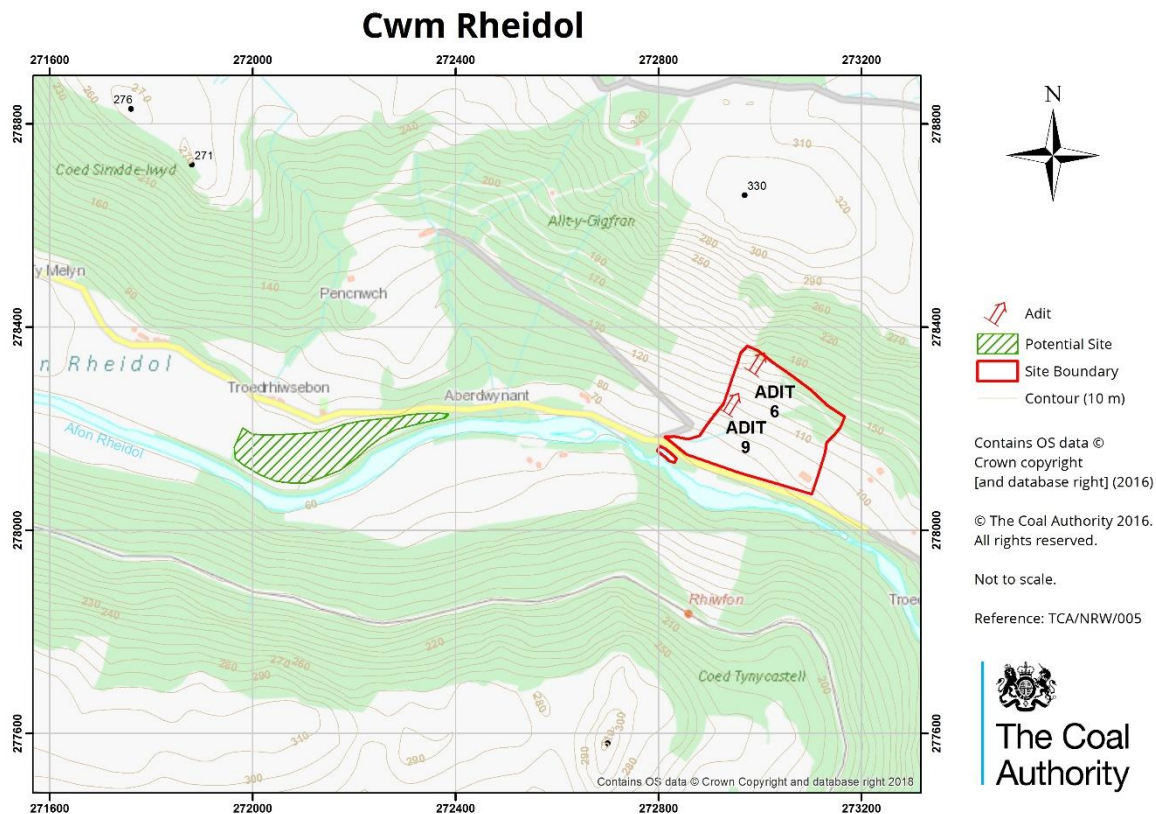
Appendix A provides environmental baseline summary tables – these outline information as currently known for the sites together with an early consideration of risks and opportunities associated with the area.

Cwm Rheidol

The Cwm Rheidol Mine is located in the spectacular steep-sided and wooded Rheidol valley, on the northern bank of the river, approximately 15km east of Aberystwyth. Two elevated adits on the hillside are point sources of heavily contaminated acidic mine water that drain the mines of Ystumtuen, Penrhiw, Bwlchgwyn and Llwynteifi. The adit discharges currently enter the Afon Rheidol via old, non-functional filter beds on the valley floor. Mine spoil drapes down the valley side to the former mineral dressing floor, where finer grained tailings show some evidence of erosion.

The adit water will need to be conveyed from the existing adits into a new treatment system. This could be the conventional style of passive treatment, though land availability is sparse, so an active treatment method may be preferable with a smaller footprint or using a combination of both active and passive systems. Understanding energy demand, waste disposal and land area requirement will be key. The site contains a rich historical mining landscape, which would ideally be preserved and/or incorporated into the design of the remedial work. The area benefits the Rheidol Railway, the Llywernog Mine Museum and the Statkraft visitor centre.





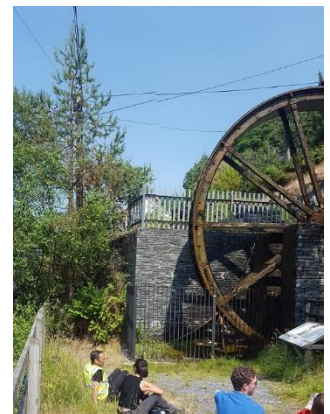
Frongoch-Wemyss

Frongoch-Wemyss mine site is located 2.5km northwest of the village of Pont-rhyd-y-groes. These two neighbouring mines became consolidated under one ownership and are connected underground. They are two of the largest contributors of metals to the Ystwyth catchment, the other major contributor being Cwmystwyth. Although works to construct a cap and drainage forming a Surface Water Management System have been implemented over the last few years on the Frongoch site, point sources of pollution in the form of three discharges remain. These include the discharges at the Frongoch Adit, two groundwater water drainage discharges beneath the former Frongoch spoil tips and additionally diffuse run-off from the large Wemyss spoil heap.



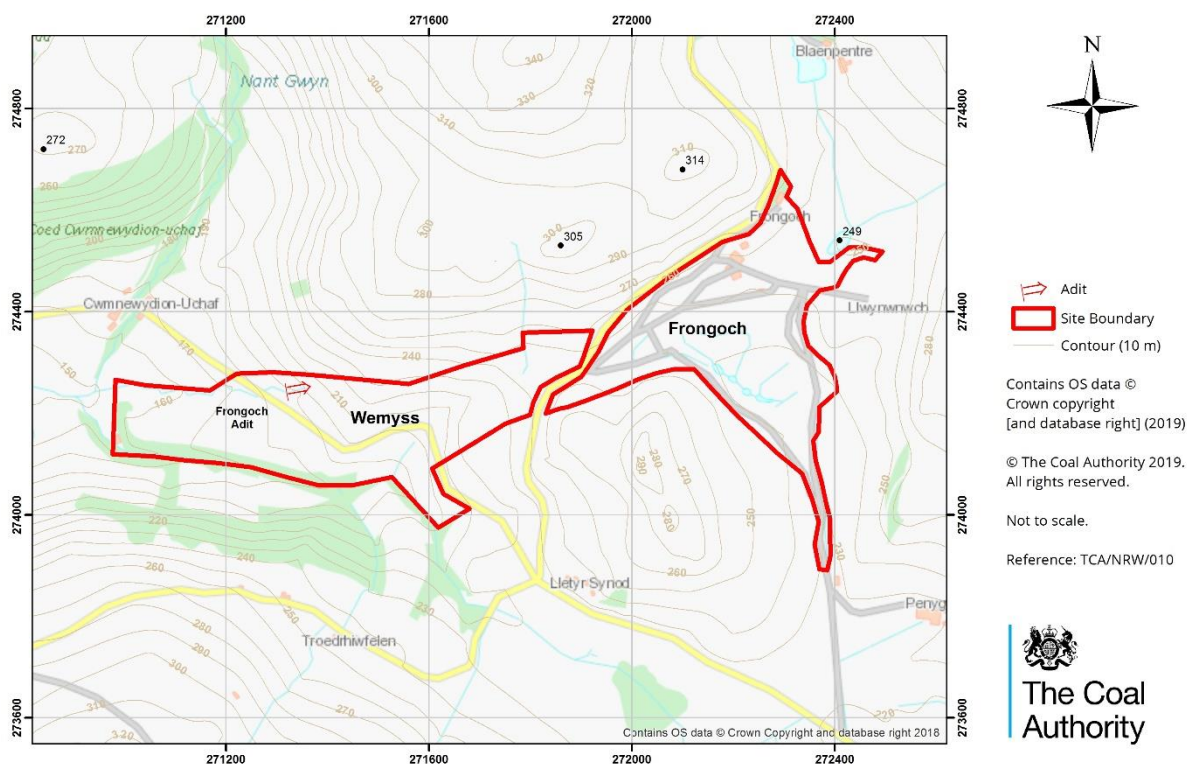
There is the potential for mine water from the Frongoch Adit to be treated using a Vertical Flow Pond as a passive treatment system. The two small but highly concentrated groundwater discharges could be treated by an active electrochemical treatment system with a polishing system adopting membrane technologies. LIFE Demine trials with Swansea University and Elentec will continue at the site during 2019. Prior to building a scheme at Frongoch Adit, further work to reduce or prevent surface water from entering the mine should be undertaken as this will reduce the schemes footprint required.

It is recommended that engineering options are considered, e.g. watercourse culverting, channelling with gabions or capping of the spoil heaps to alleviate impacts from erosion and infiltration of the Wemyss spoil heap. The site contains a rich historical mining landscape, which would ideally be preserved or incorporated into treatment designs. The area benefits a number of associated mining features in the community of Pont-rhyd-y-groes, like the Miner's Bridge, the



Count House, the water wheel serving Lefel Fawr and the mines of Logaulas, Penygist, Glogfach and Glogfawr; the Miner's Arms and village hall. The Llywernog Mine Museum is relatively close.

Frongoch and Wemyss



Cwmystwyth

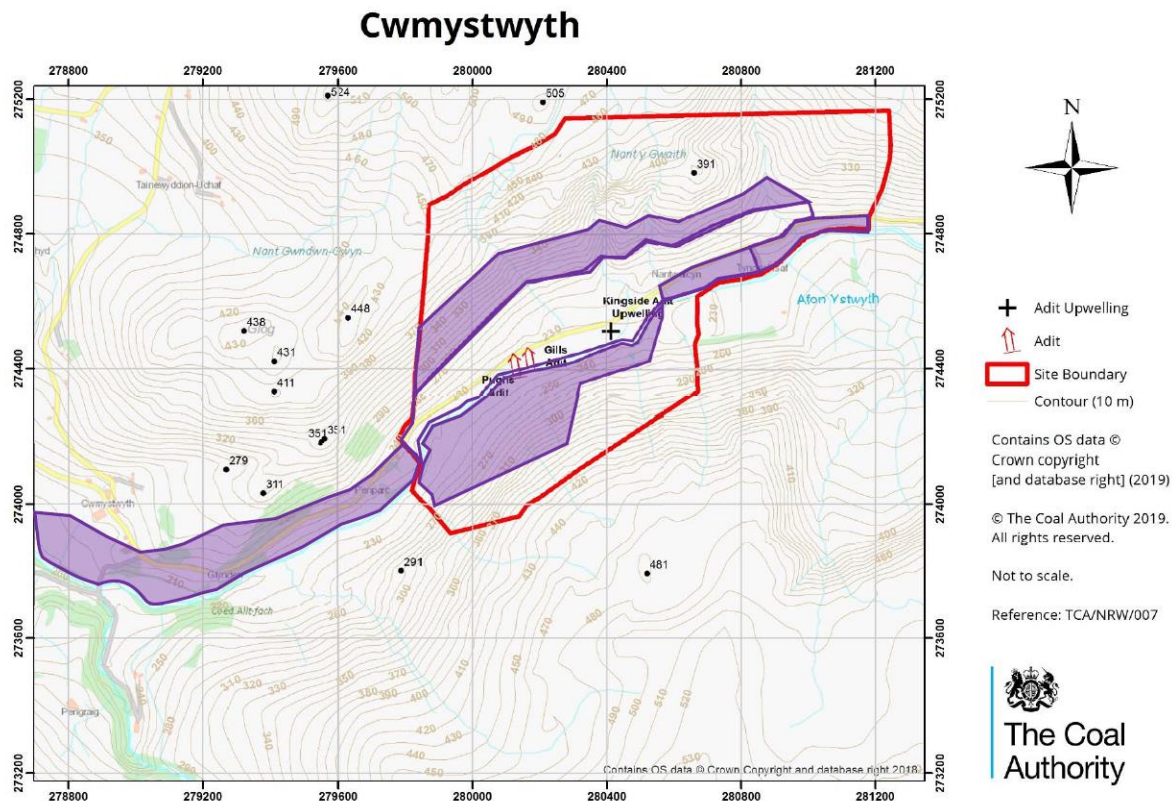
The Cwmystwyth mine is located in Ceredigion, 24km broadly to the east of Aberystwyth. The Afon Ystwyth receives all surface and sub-surface drainage from the mine, causing it to fail European Water Framework Directive (WFD) standards for zinc, lead and cadmium.

It is likely works will involve active treatment of the mine water from Pugh's and Gill's adits (two point sources on the valley floor). There are opportunities for community engagement and heritage tourism under the ownership of Cambrian Mines Trust, as well as the potential implementation of a micro-hydro power scheme using existing infrastructure on site.

There are also passive treatment opportunities for some discharges. The potential, however for transferring water downstream from the mine site to other areas of relatively flat land is perceived less favourable. Should this scheme progress to feasibility stage then such passive options will be revisited, albeit with the focus on new active treatment at the site, which currently appears more viable.



The area has a rich classical mining history extending back to the Bronze Age in a stunning landscape on the mountain road from Rhayader to Aberystwyth, hosting fibre optics as a utility (an interesting communications feature for research). It is upstream of the community of Pont-rhyd-y-groes and could benefit related historical/mining footpaths associated with the Cambrian Mines Trust. It is reasonably close to the Llywernog Mine Museum.



Nb Purple shading denotes areas of habitat and heritage interest within the site and outside a potential area of interest for feasibility, should a passive treatment system be favourable.

Dylife

The Dylife mine is on the mountain road from Llanidloes to Machynlleth. The Afon Twymyn and the Nant Dropyns flow across the mine site and the thick mineral lodes that have been worked extensively. The water courses are ephemeral dependent on the severity of rainfall events, as they are lost to the ground and become contaminated as a result of leaching mineral salts from the former mine workings before re-emerging from the mine workings downstream more highly concentrated in metals.

A recent report (AECOM, 2018) identified that the principal source of metal loading was from the Great and Hirnant Tips to the south of the road embankment, but erosion of the dressing floor at the confluence of the Twymyn and Dropyns was also significant as was the loss of the watercourses to the mine workings and re-emergence.

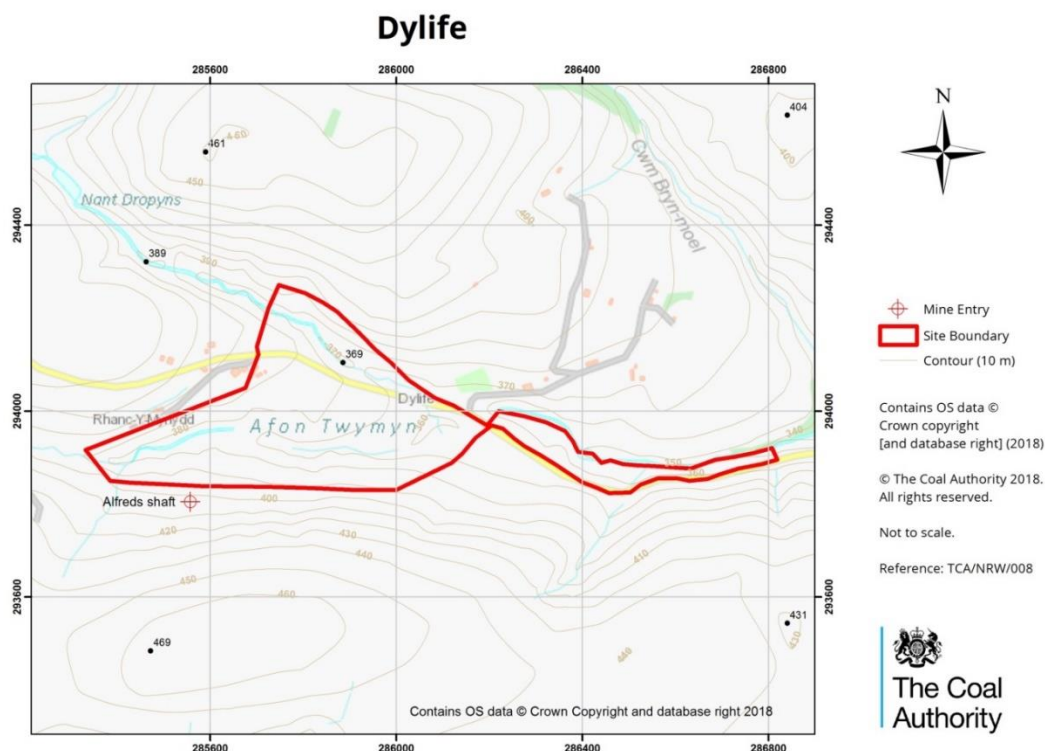
Toe drainage of the tips is a likely requirement as there are highly concentrated discharges that may need to be captured and conveyed to an active treatment system. The Ffrwd Fawr waterfall and impressive Twymyn Gorge limits land availability for an alternative passive system. Some stabilisation and protection of the dressing floors is required to prevent the loose mine sediments being washed away. It is likely that works will also involve conveying the Afon Twymyn and Nant Dropyns across the mine workings, thus significantly reducing the volume of water coming into contact with the underground workings and mine waste.



A micro-hydro power scheme could be put in place to take advantage of these diverted flows. The viability of this scheme has been assessed in a separate report (Coal Authority 2019). The conclusions are that the hydro scheme is only likely to be beneficial if all power is used on site for residual mine water

treatment after the main stream diversions. The sustainable management of natural resources adopting micro-hydro for treatment will reduce total energy demand, offsetting carbon and offer well-being benefits.

Dylife hosts the Penycrocbren Roman Fortlet and with other important mines in the district, there could be added community value. The location is within the Dyfi Biosphere and has outstanding natural beauty served by Glyndwr's Way and the popular Sustrans cycle route. The Star Inn offers a charming retreat and the community of Staylitle is within four miles.



3. Feasibility Completion

Following this consultation, additional desk studies and site surveys will be undertaken to further develop our baseline knowledge of the site. The information gathered will enable a preferred option to be identified and recorded within a feasibility report, which is currently programmed for Autumn 2019. We intend to undertake further consultation prior to completion of the feasibility report in order that consultees have an opportunity to provide comment on the optioneering and scope of the environmental assessment.

On completion of the feasibility study, the scheme (or schemes) to be taken forward to detailed design would need to obtain the necessary funding and permissions.

4. What Now?

Response requested within three weeks of receipt.

Metal mine water treatment feasibility studies.

If you have comments or information about this feasibility study please make them here. Then, copy this text box or page and return as an email attachment to:

Environmental.Assessment.Team@NaturalResourcesWales.gov.uk

- a) Do you have any additional baseline information you would be willing to share with us for these sites?

- b) Do you know of any other local opportunities we should be exploring for these sites?

- c) Do you have general concerns, queries or comments about the project?

Please use as much space as you need and attach any other information you feel relevant in your reply.

My name, body/organisation and email contact address

(Your contact details will only be held in relation to NRW and metal mine water

5. Contact details

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Appendix A – Environmental Baseline Tables

Table A1 – Dylife Environmental Baseline: Current Baseline Information (to be expanded through feasibility study work in 2019)

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities
Population & Human Health	<ul style="list-style-type: none"> The site is located in a Biosphere Reserve (Dyfi Biosphere); Site is also within the Summit to Sea project area; Receptors close to the Study Area include Y Star Inn Hotel and other residential properties in the south of Rhyd-wen; Public footpaths and bridleways cross the site. The Glyndwr’s Way National Trail runs along the road adjacent to site; A number of open shafts are present across the former mining site. There is ground instability due to mining activity and movement of materials around the site. Hidden crevices are concealed by waste, spoil or water, and there are unstable buildings with weak or unstable flooring. 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. Salmon and trout are not able to recolonise the river above Pennant, due to the high zinc concentrations. The 'black tail' syndrome of trout below the Pennant has also been attributed to these high zinc concentrations. The low calcium content of this soft water means that trace metal toxicity is present at lower levels than in hard water. This limits fisheries potential in waters downstream of the study area (past the Ffrwd Fawr waterfall). 	<ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The Well-being of Future Generations (Wales) Act 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: <ul style="list-style-type: none"> A globally responsible Wales; A resilient Wales; A healthier Wales; A Wales of vibrant culture [and thriving Welsh language]. NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf ; Objective 4 of the NRW Wellbeing 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 “<i>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.)</i>” Aims of this above include for NRW to “<i>Encourage outdoor recreation and learning at our own facilities and in the wider environment,</i>” and “<i>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</i>”. Powys Wellbeing Plan (Towards 2040) http://www.powys.gov.uk/en/community-development/well-being-in-powys/towards-2040-the-powys-well-being-plan/ The wellbeing plan notes that 58% of adults in the region are obese. It also confirms that there are 80 Sites of Special Scientific Interest in the region. The following Local Objectives may be of particular relevance to this project: <ul style="list-style-type: none"> People in Powys will enjoy a sustainable and productive environment; People in Powys will be healthy, socially motivated and responsible; People in Powys will be connected by strong communities and a vibrant culture. These objectives tie into the overarching wellbeing goals: A prosperous Wales; A healthier Wales; A More equal Wales; a Wales of cohesive communities and a globally responsible Wales. National Trail news (e.g. new surfacing trials, wardens in place etc.) https://www.nationaltrail.co.uk/glyndwrs-way/news No specific threats identified at present to the trail on this website, wardens currently being sought (Oct 2018) to help maintain the trail. The "Summit to Sea" project http://www.summit2sea.wales/ Summit to Sea (O’r Mynydd i’r Môr) is a chance to show that there can be a different future for the land and sea [of Mid Wales], that works for both people and nature. It’s an initiative that aims to restore flourishing ecosystems and a resilient local economy, on a scale never before seen in Britain. Summit to Sea will involve:

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		<ul style="list-style-type: none"> restoring natural processes that provide the ecological functions on which we all depend; bringing communities together to create a shared vision for the future; supporting the local economy to diversify and establish new nature-based enterprises. <ul style="list-style-type: none"> Dyfi Biosphere Reserve http://www.dyfibiosphere.wales/ <p><i>"The UNESCO Biosphere Reserve status offers the area recognition and opportunity rather than constraint, because the designation is voluntary rather than statutory. People, businesses and organisations take advantage of it by getting involved. The coordinating Partnership has no funding of its own, but partners can act in its name. Sometimes they bring new resources into the area such as funding and expertise."</i></p> <p><i>"UNESCO's Biospheres inspire communities to work together in creating a future we can all be proud of, connecting people with nature and cultural heritage, while strengthening local economy."</i></p> <p><i>"Biosphere Reserves explore locally how sustainable livelihoods, vibrant cultures and robust economies can be based on healthy environments."</i></p> <p><i>"Biosphere Reserves are places of learning. The Dyfi Biosphere supports research to understand its environment and community."</i></p>
Biodiversity & Resilience of Ecosystems	<ul style="list-style-type: none"> Salmon and trout are not able to recolonise the river above Pennant, due to the high zinc concentrations. The 'black tail' syndrome of trout below the Pennant has also been attributed to these high zinc concentrations. The closest international wildlife designation to the Dylife site is Coedydd Llawr-y-glyn SAC, approximately 5.5 km to the south-east (designated primarily for its notable oak woodland habitat). The spoil heaps within the Study Area are designated as a SSSI (Dylife mine) - the mine waste provides an important and highly specialised habitat for a number of metal tolerant lichens. The next closest SSSIs to the site are Ceunant Twymyn SSSI approximately 280 m to the east of the site and Pumlumon (Plynlimon) SSSI approximately 2 km to the west. Pumlumon is noted (SSSI citation) as 'one of the most important upland areas for nature conservation in Wales, being of special interest for its vegetation types and bird fauna'. Bird species listed as present in this designation including merlin, red kite, peregrine, short-eared owl. "Rivers and Streams" (a Section 7 habitat) are found on site, other Section 7 habitats may also be present. Floating water plantain was noted as potentially present in two of the waterbodies on site (notes taken by Coal Authority during October 2018 visit). Chough and pine marten (UK protected species) known to have been present within 2km of site historically (desk study record provided in Entec Dylife Feasibility Report 2009). Report also notes that there are several small waterbodies within 500m of the site with some [likely limited] potential for amphibians. There could also be potential on site for roosting bats. Bog/grassland habitat on site is suitable for use by ground nesting bird species (Coal Authority notes October 2018). Short-eared owl known to be present in the area (Pumlumon SSSI citation) and could make use of this habitat. Notable species (Section 7 and/or BAP priorities) including brown hare, Pine Marten, Chough, Pearl-bordered fritillary, Small heath and lichen (<i>Usnea florida</i>), present within 2km of site historically (desk study record provided in Entec Feasibility Report 2009). The metal mine spoil (in particular within the geological SSSI) provides an important and highly specialised habitat for a number of metal tolerant lower plants (principally lichens). A Survey of Calaminarian Grassland in Mid-Wales, Dr Janet Simkin MCIEEM, Natural Resources Wales Evidence Report No: 061 notes that <i>"Some of the most important lichens noted [in the MMS] appear to have been lost as the structures and gravelly spoil they were on have become overgrown, but there are still large populations of Lecanora epanora and Lecanora handellii, and Stereocaulon condensatum and</i> 	<ul style="list-style-type: none"> Local Biodiversity Action Plan / Targets. https://customer.powys.gov.uk/article/2553/Local-Biodiversity-Action-Plan <p>Habitat Action Plans in place for 'Rivers and Streams' – specific reference on bank degradation, sedimentation and water quality.</p> <p>Species Action Plans in place for the following species likely to be encountered within the Study Area:</p> <ul style="list-style-type: none"> Floating water-plantain – targets include to undertake surveys to ensure that the current distribution of floating water-plantain is fully understood and Promote best practice with regard to land management next to watercourses, in order to maintain and improve water quality within the catchments of watercourses and lakes where the species is found. The Plan also states <i>"it is thought that the species intolerance to competition is a major factor limiting its distribution. Floating water-plantain is most successful in situations where other plants are for various reasons disadvantaged, enabling floating water-plantain to colonise."</i> Red Kite – persecution is still considered the main threat for this species. Local Development Plan Biodiversity Policies - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p>Policy DM2 – The Natural Environment</p> <p><i>"Development proposals shall demonstrate how they protect, positively manage and enhance biodiversity and geodiversity interests including improving the resilience of biodiversity through the enhanced connectivity of habitats within, and beyond the site."</i></p> A Survey of Calaminarian Grassland in Mid-Wales, Dr Janet Simkin MCIEEM, Natural Resources Wales Evidence Report No: 061 identifies the main threat on this site as being <i>"Spoil is still being taken from the large spoil heap in the lower valley, presumably for use as road stone, and there is some disturbance by bikes and other vehicles. Considerable disturbance has recently been caused to the track and lower area by works to dredge the stream."</i> Given its location in proximity to Pumlumon SSSI, the Pumlumon Project may be of relevance to the Dylife project http://www.iucn-uk-peatlandprogramme.org/projects/pumlumon-project <ul style="list-style-type: none"> <i>"The Pumlumon Project (PP) is a flagship project of the Wildlife Trusts (WT), lead by the Montgomeryshire Wildlife Trust (MWT), pioneering an upland economy built around wildlife, ecology and long-term sustainability across 40,000ha of the</i>

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	<i>Gyalideopsis crenulata are now well established."</i>	<p>Cambrian Mountain range.</p> <ul style="list-style-type: none"> At the core of the project is the 5,000ha Pumlumon SSSI, but the entirety of the project area supports a mosaic of habitats including blanket bog, heathland, acid grassland, gully woodland, semi-improved and improved grassland and conifer plantation." "the PP delivers a number of ecosystems service benefits, including safeguarding the store of carbon locked in upland peat soils, carbon sequestration from more rapid growth of restored bogs and tree planting, reductions in flood risk through increased water storage, improved water quality through erosion control, enhanced ecosystem function and biodiversity through more appropriate management, production of conservation-grade food, improved access and interpretation for visitors and residents and the creation of new wildlife-based visitor attraction, increasing spend in the local area." https://www.montwt.co.uk/projects/pumlumon-project
Land (for example: land take)	<ul style="list-style-type: none"> The mining industry here has been completely abandoned, and most of the land is derelict/not used. There are various landowners in the area, which use the land for agriculture. The geology of the area comprises shales and mudstones of the Frongoch Formation, part of the Upper Llandovery Series of Silurian Age. The superficial deposits in the area comprise predominantly made ground (mine waste) of varying composition and thickness. Also present are thin soils observed where slippage has occurred, with localised boggy areas with peat deposits inferred. There are three main mineral lodes in the area; these are the Esgairgaed lode (east to northeast trend), the Llechwedd Ddu lode (west to east trend) and the Dylife lode that trends west to east. The main workings were carried out on the Llechwedd Ddu lode. Mineralisation includes copper, lead, zinc and silver. Crownholes are present on site, and there is potential for more to appear e.g. following a heavy rainfall event. The spoil heaps are designated as a SSSI (Dylife mine), predominantly because the spoil tips provide a good demonstration of vein textures and common vein minerals. In addition, the mine waste provides an important and highly specialised habitat for a number of metal tolerant lichens (in preparation of declassification of being a SSSI, the site has also been registered as a RIGS); Ceunant Twymyn SSSI present approximately 280 m to the east of the site is also predominantly designated for its Geological value - no direct (or indirect) impacts are anticipated here. Site within Cambrian Mountains Environmentally Sensitive Area (ESA). 	<ul style="list-style-type: none"> RIGS and SSSI documentation do not identify any specific threats to the spoil heaps.
Soil (for example: organic matter, erosion, compaction, sealing)	<ul style="list-style-type: none"> Soil quality unknown at this stage. Previous use of site (lead mine) will have resulted in significant ground contamination; A large volume of spoil has been deposited in the valley floors, side slopes and surrounding land, as a result of the long history of surface mining, underground mining and mineral processing / reprocessing. There is significant erosion of materials on site during high flow events. 	<ul style="list-style-type: none"> Local Development Plan - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p>Policy DM10 – Contaminated and Unstable Land <i>"Development proposals on contaminated or unstable land will be permitted where they do not:</i> <i>1. Result in any additional problems of ground instability or contamination either on or off site and shall remediate the contamination / instability.</i> <i>2. Unacceptably adversely affect public health and safety, nature conservation, historic or archaeological interests."</i></p>
Water (for example: hydromorphological changes, quantity and quality)	<ul style="list-style-type: none"> Adjoining waterbodies noted as: <ul style="list-style-type: none"> Twymyn – upper (GB110064048320), Cycle 1 Baseline overall status (2009) Poor. Latest (2013) Ecological Status: Moderate. Latest (2013) Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 name and status remain as above. Twymyn – lower (GB110064048370), Cycle 1 Baseline overall status (2009): Moderate. Latest (2013) Ecological Status: Moderate. Latest (2013) Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 name and status remain as above. Dyfi - tidal limit to Afon Twymyn, Cycle 1 Baseline overall status (2009): Moderate. Latest (2013) Ecological Status: Moderate. Latest Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 referred to as Ystywth - confluence with the Nant Cell to Tidal Limit (overall status Moderate; chemical status Fail; ecological status Moderate). NB Cycle 2 name remains as above; status as above other than ecological status: Good. 	<ul style="list-style-type: none"> WFD - https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 <ul style="list-style-type: none"> Twymyn – upper reason for failure noted as abandoned mines and contaminated land, acidification and barriers to natural fish migration. Failing elements noted as Zinc, Fish - Zinc, Fish - zinc, Fish - pH, Fish - Morphology, Copper. Has an overall objective of "Good Status by 2027"; however this is also noted as "technically infeasible. Cycle 2 drivers of EcoQE Fish, Zinc, Copper. Twymyn – lower reason for failure noted as abandoned mines and contaminated land. Failing elements noted as Copper, Zinc. Has an overall objective of "Good Status by 2027"; however this is also noted as "technically infeasible. Cycle 2 drivers of EcoQE Zinc. Dyfi - tidal limit to Afon Twymyn reason for failure noted as abandoned mines and contaminated land. Failing elements noted as Copper, Zinc. Has an overall

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	<p>https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6</p> <ul style="list-style-type: none"> The Dylife study site is located at the top of the 15 km long Afon Twymyn catchment, both the Afon Twymyn and the Nant Dropyns pass through the former mine workings and spoil. The Afon Twymyn joins with the Nant Dropyns at grid reference SN 863940. There are parts of each river which stop becoming visible from the surface and pass through workings. These rivers do not appear to be classified as main rivers at this location; Under the Welsh Metal Mines Strategy (2002), EAW ranked the site as 6th overall, out of all mine sites in Wales, in terms of impact and potential non-compliance with the Water Framework Directive. This ranking was based on reported EQS failures for zinc and copper at the Afon Twymyn WFD compliance point at Bont Dolgadfan. The high concentrations of metals in the Afon Twymyn, as it leaves the Dylife site, is contributing to the excess metal concentrations at Bont Dolgadfan and further downstream (~20km to the confluence with the Dyfi). In order to reduce concentrations to meet the WFD EQS targets, concentrations leaving the Dylife site will need to be reduced. There are some small bodies of water e.g. ponds across the site. Any diversion may result in these drying up. Wash-out on site during high rainfall events likely to be a contributing factor to siltation (and potentially flooding) downstream. Part of the site (south-eastern area) is within Flood Zone 2 and 3 – risk of flooding from rivers. There is also a high risk on site of flooding from surface water. 	<p>objective of “Good Status by 2027”; however this is also noted as “technically infeasible”. Cycle 2 drivers of EcoQE Phosphate, Macrophytes and Phytobenthos Combined.</p> <ul style="list-style-type: none"> Local Development Plan - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p><u>Policy DM5 – Development and Flood Risk</u> <i>"Development proposals must be located away from tidal or fluvial flood plains unless it can be demonstrated that the site is justified in line with national guidance and an appropriate detailed technical assessment has been undertaken to ensure that the development is designed to reduce / avoid the threat and alleviate the consequences of flooding over its lifetime. In addition the development must not increase flood risk elsewhere, and shall where possible allow floodplains to provide water storage to reduce flooding in the catchment, unless:</i> <i>1. The development is of a very minor nature such as an extension to a dwelling; or</i> <i>2. There is an overriding need in the public interest for the development."</i></p> <p><u>Policy DM6 – Flood Prevention Measures and Land Drainage</u> <i>"Development proposals must avoid unnecessary flood risk by assessing the implications of development within areas susceptible to all types of flooding; any development that unacceptably increases risk will be refused."</i></p> <ul style="list-style-type: none"> Materials are eroded from site and carried downstream as a result of wash-out in high rainfall events.
Air	<ul style="list-style-type: none"> Baseline data not obtained at this stage. 	<ul style="list-style-type: none"> Local Development Plan - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p>Policy DM14 – Air Quality Management <i>"Development proposals will only be permitted where any resultant air pollution does not cause or lead to an unacceptable risk of harm to human health or the natural environment. Proposals will need to demonstrate that measures can be taken to overcome any significant adverse risk, with particular attention being paid to:</i> <i>1. National Air Quality Strategy objectives and any Air Quality Management Areas.</i> <i>2. The critical levels for the protection of habitats and species within a European site or Site of Special Scientific Interest in accordance with Policy DM2."</i></p>
Climate (for example: greenhouse gas emissions, impacts relevant to adaptation)	<ul style="list-style-type: none"> To be confirmed when more is known regarding proposals 	<p>Powys recognises seven Wellbeing Goals for Wales https://en.powys.gov.uk/article/5807/7-Well-being-goals-for-Wales including:</p> <p><i>"A resilient Wales- A nation which maintains and enhances a biodiverse natural environment with healthy functioning ecosystems that support social, economic and ecological resilience and the capacity to adapt to change (for example climate change)."</i></p> <ul style="list-style-type: none"> Local Development Plan - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p>The Monitoring Framework for the LDP includes the following objective of relevance to Climate: <i>Objective 4 – Climate Change and Flooding</i> <i>To support the transition to a low carbon and low waste Powys through all development, including the reduction of waste to landfill and by directing development away from high flood risk areas and, where possible, to reduce or better manage existing flood risk for communities, infrastructure and businesses.</i></p>
Material assets	<ul style="list-style-type: none"> Access to site is via the unclassified road that runs through site and on tracks associated with the mines. Access to the locations further from the highway would likely require temporary access across open ground. Public footpaths and bridleways cross the site. The Glyndwr’s Way National Trail 	

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Cultural heritage (including architectural and archaeological aspects)	<ul style="list-style-type: none"> runs along the road adjacent to site; The Dylife mine site has a history of lead mining which dates back to at least the Roman times with evidence of more recent workings dominating the landscape. Three mineral lodes were worked at the site for galena, lead sulphide. Later, tip material was reworked for lead and zinc as galena and sphalerite. No current proposals known for minerals extraction. Site lies within Clywedog Valley Registered Historic Landscape – specifically in the Dylife Historic Landscape Character Area noted as being “<i>Upland plateau dissected by streams which formed part of medieval monastic grange, with early encroachments possibly originating from seasonal settlements, partly subject to parliamentary enclosure in the early 19th century, with possible Roman and medieval and more extensive 19th-century metal-mining remains and associated settlement evidence.</i>” http://www.cpat.org.uk/projects/longer/histland/clywed/clyint.htm Rich heritage value on site, although no formal designations (e.g. Scheduled Monuments or listings). Village at one time thriving at Dylife with chapels, St David’s Church and vicarage, a school, which were all in existence by the 1850s, as well as a smithy and several inns (the Star Inn still being present today). Significant cultural heritage value. There are also folklores associated with the village and mine site. Nearest Scheduled Monuments are >500 m from site and include Pen y Crogben Round Barrow and Earthwork (Roman), Bryn y Fedwen Round Barrows (Bronze Age) and Dyfngwm/Castle Rock Lead Mine (Early Lead Mine). No listed structures in the vicinity of site. Mine workings at Dylife dates from Roman times or possibly earlier, however the bulk of the mining occurred in the 19th century. The mine site originally included three engine houses, a dressing mill, ten working shafts, earthworks, two small reservoirs and sundry stores, offices etc. The remains of a number of buildings may exist under mine spoil. The previous leat locations can still be noted in places. CADW (2005) state that ‘although not scheduled, this is an archaeologically and historically important site with extensive sensitive remains that require further archaeological assessment’. Welsh Archaeological Trusts’ Historic Environment Records list Dylife Mine, Dylife Mine Reservoir systems, Dylife Mine wheel pit I, Dylife Mine wheel pit II, Dylife Mine wheel pit III, Dylife Mine engine House, Dylife Flint Chipping Floor, Dylife Church yard and Dylife Church as being on site (Clwyd-Powys Archaeological Trust). The National Museum Archaeology Collection also note a find spot within the site - undated stone spindlewhorl at Dylife. Archaeology can be seen on surface, and it is highly likely that other areas of buried archaeology could be encountered during the construction phase. Areas of high, medium and low archaeological potential have been identified and mapped digitally by the Clwyd-Powys Archaeological Trust (Clwyd – Powys Archaeological Trust 2016 Dylife Lead Mine Archaeological Assessment). The principal areas of high potential are the collection of shafts, adits and associated workings focusing on the two main veins, known as Esgairgaed, in the Nant Dropyns valley, and Llechwedd Ddu in the Afon Twymyn valley. The latter area has more extensive remains and includes a large dressing floor area which contains the more contaminated waste material. Mines Preservation Trust involvement on site and previous preservation/conservation work undertaken e.g. 2007 project to remove dumped material from the wheel pit on site and excavation of the adjacent winding house. 	<ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The wellbeing goal of most relevance here being - a Wales of vibrant culture [and thriving Welsh language]. NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf As part of the above NRW have committed to “<i>protect Wales’ cultural heritage and archaeology across the land and water we manage</i>” and “<i>Promote the cultural importance of our landscapes and seascapes as part of Wales’ heritage</i>” Powys Wellbeing Plan (Towards 2040) http://www.powys.gov.uk/en/community-development/well-being-in-powys/towards-2040-the-powys-well-being-plan/ The Local Objective “People in Powys will enjoy a sustainable and productive environment” will look to contribute to the following Wellbeing Goal – “<i>A Wales of vibrant culture and Welsh language: The environment will support and promote local culture and heritage by protecting and valuing local sites</i>”. “<i>Guide to good practice on using the register of landscapes of historic interest in Wales in the planning and development process</i>”, Revised (2nd) edition including revisions to the Assessment process (ASIDOHL2), 2007. All landscape areas identified on the Register (including Clywedog Valley) are of national importance in the Welsh context. There are three key principles underpinning the identification of historic landscape areas: <ul style="list-style-type: none"> 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 “<i>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</i>”. It is also noted that “<i>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</i>”. http://www.cpat.org.uk/projects/longer/histland/clywed/1187.htm notes that “<i>there are visible remains of most of the mining and working processes though the processing areas are now relatively poorly preserved.</i>” Mines Preservation Trust information regarding recent work at the site http://welshminetrust.org/dylife/ “<i>In 2007 local mine historian and author Michael Brown, launched a project to remove some of the dumped material from the 60 foot wheel-pit of the Martha Wheel at Dylife, this was the largest in Mid Wales. The wheel-pit was cleared to a depth of about 8 feet and the remaining infill was covered with mine waste. We then began a project to</i>

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		<p><i>excavate the winding house alongside the wheel-pit, where some interesting artefacts were found.”</i></p> <ul style="list-style-type: none"> The Clwydd – Powys Archaeological Trust 2016 Dylife Lead Mine Archaeological Assessment notes that <i>“the condition of the Red Wheel wheelpit and drawing house which, since being excavated, are now in need of remedial works to consolidate the exposed masonry and prevent collapse.”</i> There is ongoing loss/exposure of features of archaeological interest as a result of wash-out on the site during high rainfall events.
Landscape	<ul style="list-style-type: none"> The site is not within an AONB or National Park. Landmap confirms the site is within the following: <ul style="list-style-type: none"> Bryn Moel-Dylife-Tir Gwyr Geological Landscape (MNTGMGL654) noted as upland plateau; Mosaic Landscape Habitat (MNTGMLH041); Clywedog Upland Grazing Visual and Sensory Landscape (MNTGMVS457) Glasllyn Historic Landscape (MNTGMHL503) Clywedog Valley Cultural Landscape (MNTGMCL016) Site lies within Clywedog Valley Registered Historic Landscape. Landscape value mainly associated with heritage setting of site itself as well as nearby designations and Historic Environment Record (HER) locations. 	<ul style="list-style-type: none"> NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>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.</p> <ul style="list-style-type: none"> Landmap notes the following key threats/management recommendations of relevance to the study area: <ul style="list-style-type: none"> Geological Landscape – <ul style="list-style-type: none"> <i>“Ensure that no features or natural systems of geological or geomorphological significance in the area are lost or damaged (e.g. due to development or forestry). Ensure that SSSI features are maintained in favourable condition by implementation of management plans and ensure that RIGS are safeguarded using Local Plan policies and constraint mapping.”</i> A significant threat is also noted for this landscape <i>“SSSI areas and pRIGS may be at risk from infill, removal or development and scientifically important specimens, including fossils and minerals, are at risk from irresponsible or casual collecting. Non such loss of important features or specimens should be considered acceptable)”</i> Visual and Sensory – <ul style="list-style-type: none"> Key elements to be conserved include the “industrial heritage adjacent Dylife - important landscape character and makes a distinct character change from the other upland grazing areas within the study area”. Key elements to be enhanced being <i>“Mining heritage and public access”</i> Local Development Plan - https://customer.powys.gov.uk/article/4898/Adopted-LDP-2018 <p>Policy DM4 – Landscape <i>“Proposals for new development outside the Towns, Large Villages, Small Villages and Rural Settlements defined in the Settlement Hierarchy must not, individually or cumulatively, have an unacceptable adverse effect, on the valued characteristics and qualities of the Powys landscape. All proposals will need to:</i></p> <ol style="list-style-type: none"> <i>1. Be appropriate and sensitive in terms of integration, siting, scale and design to the characteristics and qualities of the landscape including its: topography; development pattern and features; historical and ecological qualities; open views; and tranquillity; and</i> <i>2. Have regard to LANDMAP, Registered Historic Landscapes, adjacent protected landscapes (National Parks and Areas of Outstanding Natural Beauty) and the visual amenity enjoyed by users of both Powys landscapes and adjoining areas.</i> <p><i>Proposals which are likely to have a significant impact on the landscape and/or visual amenity will require a Landscape and Visual Impact Assessment to be undertaken.”</i></p> <ul style="list-style-type: none"> The landscape area statement for Mid Wales https://cdn.naturalresources.wales/media/685441/as-mid-wales-landscape-final-april-2018.pdf?mode=pad&rnd=131722327710000000 lists a number of threats/opportunities to landscape change in the region. The one with most potential relevance to this project being: <ul style="list-style-type: none"> Positive improvements such as from landscape partnership schemes and projects.

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities

Table A2 – Cwmystwyth Environmental Baseline: Current Baseline Information (to be expanded through feasibility study work in 2019)

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Population & Human Health	<ul style="list-style-type: none"> Site is owned by the Cambrian Mines Trust. The nearest receptor is a farm alongside the main 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 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 south west. The site is crossed by numerous footpaths and is located within a 'right to roam' area. National Cycle Route 81 passes alongside the site. 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. 	<ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The Well-being of Future Generations (Wales) Act 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: <ul style="list-style-type: none"> A globally responsible Wales; A resilient Wales; A healthier Wales; A Wales of vibrant culture [and thriving Welsh language]. NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf ; Objective 4 of the NRW Wellbeing 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 Wellbeing plan (<i>Ceredigion Local Well-being Plan 2018-2023 - Agreed by Ceredigion Public Services Board 16 April 2018 Published 1 May 2018</i>) 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 Special Areas of Conservation, 100 Sites of Special Scientific Interest and seven National Nature Reserves. The Ceredigion Wellbeing 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 Wellbeing Plan may be of particular relevance to this project: <ul style="list-style-type: none"> 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. 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. Cambrian Mines Trust '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 <p>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</p>

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		<p>work with NRW for any future water treatment works at the site.</p> <p>Other aspirations (many of which are of relevance to population/human health) in the documents include:</p> <ul style="list-style-type: none"> ITEM 1: Signage to indicate ownership; 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; 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' <ul style="list-style-type: none"> 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_wales_bilingual_web_2.pdf <p>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).</p>
Biodiversity & Resilience of Ecosystems	<ul style="list-style-type: none"> 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. Elenydd Special Area of Conservation (SAC) covers the Cwmystwyth site entirely. Qualifying Annexe I habitats within the site being – Calaminarian grasslands (developed as a result of the mining heritage), blanket bogs, European dry heaths, and Oligotrophic to mesotrophic standing waters of the <i>Isoetes- Nanojuncetea</i>. Floating water-plantain <i>Luronium natans</i> an Annexe II habitat is also present. Old sessile oak woods and <i>Tilio-Acerion</i> forests of slopes, screes and ravines are also present within the SAC but not within the Study Area. 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. Two SSSIs are present on site – they are part of the SSSI network underpinning the international designations: Mwyngloddfa Cwmystwyth and the larger Elenydd SSSI. Blanket bogs which are known to be present on the site are in the Section 7 habitat list; 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/?mapcfq=PROTECTED_VERGES . A number of European priority interests are present at the site including Calaminarian grasslands, European dry heaths, Blanket Bogs, and <i>Luronium natans</i> (floating water plantain). 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, <i>Placythiella hyporhoda</i>. One rare metalophyte moss (<i>Ditrichum plumbicola</i>) identified at the site is listed in the Red Data Book and is a UK BAP priority species, as are three 'noteworthy' species of bryophyte (fern). 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), whilst Peregrine 	<ul style="list-style-type: none"> Core management plan (including conservation objectives) Incorporating: Elenydd – Mallaen Special Protection Area (SPA) and Elenydd Special Area for Conservation (SAC) and underpinning SSSIs - 17 April 2008: https://www.naturalresources.wales/media/671965/Elenydd_cSAC_core_English.pdf <p>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.</p> <p>Specific reference is made to the fact that "<i>Disturbance from off-road vehicles and fly tipping are on-going issues</i>" within the Cwmystwyth Mine site.</p> <ul style="list-style-type: none"> http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012928.pdf <p>Identified threats and pressures on the Elenydd SAC are identified as:</p> <ul style="list-style-type: none"> HIGH risk (both inside and outside of the site) from air pollution/air-borne pollutants; MEDIUM risk (inside site) from grazing and other ecosystem modifications; 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. <ul style="list-style-type: none"> http://jncc.defra.gov.uk/pdf/SPA/UK9014111.pdf <p>Identified threats and pressures on the Elenydd - Mallaen SPA are identified as:</p> <ul style="list-style-type: none"> MEDIUM risk (inside site) from forest and plantation (management and use), fire and

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	<p>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).</p> <ul style="list-style-type: none"> Mapping the extent of calaminarian grassland at Mwyngloddfa Cwmystwyth SSSI, C. Forster Brown, S.P. Chambers, Natural Resources Wales 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. 	<ul style="list-style-type: none"> fire suppression and grazing; <ul style="list-style-type: none"> 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. Local Biodiversity Action Plan / Targets. http://www.ceredigion.gov.uk/resident/coast-countryside/conservation-and-wildlife/ceredigion-biodiversity-action-plan/ <p>Chough have a local species action plan which notes that “<i>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.</i>” One of the factors identified as affecting the species being “<i>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.</i>”</p> <p>Pipistrelle bats also have a local species action plan – two of the factors identified as affecting this species include “<i>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</i>” and “<i>Health and safety measures to remove damaged, diseased or unstable trees from next to roads, footpaths and buildings can damage bat habitats.</i>”</p> <p>Roadside verges also have an action plan which notes that “<i>A number of 'Roadside Reserves' have been identified because they contain uncommon plant species or groups of plants.</i>” This plan sets a number of targets but these lead up to the date 2010 only.</p> Local Development Plan Biodiversity Policies - https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&lang_token=eng <p>Policy DM14: Nature Conservation and Ecological Connectivity “<i>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.</i>”</p> <p>“<i>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 ecological connectivity. Depending on the proposal, it may be more appropriate in some cases to provide enhancements to a statutory/non-statutory site.</i>”</p> <p>Policy DM15: Local Biodiversity Conservation “<i>Development will be permitted where:</i></p> <ol style="list-style-type: none"> <i>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;</i> <i>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;</i> <i>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</i>

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities
		<p>4. Where necessary, management plans are produced and agreed with the LPA and developments phased to take into account mitigation and compensation measures.”</p>
Land (for example: land take)	<ul style="list-style-type: none"> 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 Copper Hill, in the adjacent Elenydd SSSI. Some impacts currently on geological value associated with wash-out in high flow events. May be potential to reduce this through the proposals. Site lies within Cambrian Mountains Environmentally Sensitive Area (ESA). 	<ul style="list-style-type: none"> Cambrian Mines Trust '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 <p>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.</p>
Soil (for example: organic matter, erosion, compaction, sealing)	<ul style="list-style-type: none"> 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. 	
Water (for example: hydromorphological changes, quantity and quality)	<ul style="list-style-type: none"> Adjoining waterbodies noted as: <ul style="list-style-type: none"> 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 referred to as 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). Cyle 1 Baseline overall status (2009) Moderate. Latest (2013) Ecological Status: Moderate. Latest Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 referred to as Ystywth - 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 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 Water Framework Directive (WFD) standards for zinc, lead and cadmium. The Ystwyth catchment falls within the Western Wales RBD 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 GSPZs 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) 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. 	<ul style="list-style-type: none"> WFD - https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 <ul style="list-style-type: none"> 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 Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&lang_token=eng <p>Policy DM11: Designing for Climate Change “<i>The LDP will help ensure that development addresses the implications of climate change by requiring that:</i></p> <ol style="list-style-type: none"> <i>justified development in the flood zone is resilient and adaptable to the effects of flooding; and</i> <i>the long term sustainability of the development has been taken into account.”</i> Cambrian Mines Trust '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 <p>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.</p>
Air	<ul style="list-style-type: none"> Baseline data not obtained at this stage. 	
Climate (for example: greenhouse gas)	<ul style="list-style-type: none"> To be confirmed when more is known regarding proposals 	<ul style="list-style-type: none"> Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&lang

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emissions, impacts relevant to adaptation)		<p>token=eng</p> <p>Policy DM11: Designing for Climate Change “<i>The LDP will help ensure that development addresses the implications of climate change by requiring that:</i></p> <ol style="list-style-type: none"> <i>1. justified development in the flood zone is resilient and adaptable to the effects of flooding; and</i> <i>2. the long term sustainability of the development has been taken into account.”</i>
Material assets	<ul style="list-style-type: none"> 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 south west. 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. 	<ul style="list-style-type: none"> Local Development Plans
Cultural heritage (including architectural and archaeological aspects)	<ul style="list-style-type: none"> Rich heritage value on site. Site owned by Cambrians Mines Trust who have a Management and Protection plan and as part of this an aspirations list. Copa Hill/Cwmystwyth Lead, Copper and Zinc Mines Scheduled Ancient Monument - SAM (entered as Reference Cd145 on 2nd December 1997) is located within the site. 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”. The site is within the eastern section of the Upland Ceredigion Landscape of Historic Interest. The Cwmystwyth area of this landscape is noted as “<i>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.</i>” http://dyfedarchaeology.org.uk/HLC/uplandceredigion/uplandceredigioneast.htm#cwmystwyth 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; It is highly likely that other areas of buried archaeology could be encountered during the construction phase. 	<ul style="list-style-type: none"> Cambrian Mines Trust '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 <p>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.</p> <p>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:</p> <ul style="list-style-type: none"> 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; 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’ <p>The above document also notes that “<i>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.</i>”</p> <ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The wellbeing goal of most relevance here being - a Wales of vibrant culture [and thriving Welsh language]. NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>As part of the above NRW have committed to “<i>protect Wales’ cultural heritage and archaeology across the land and water we manage</i>” and “<i>Promote the cultural importance of our landscapes</i></p>

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		<p><i>and seascapes as part of Wales’ heritage”</i></p> <ul style="list-style-type: none"> Ceredigion Wellbeing 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 <p>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.</p> <ul style="list-style-type: none"> “<i>Guide to good practice on using the register of landscapes of historic interest in Wales in the planning and development process</i>”, Revised (2nd) edition including revisions to the Assessment process (ASIDOHL2), 2007. <p>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:</p> <ul style="list-style-type: none"> 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. <p>As part of this there is an expectation that there is a “<i>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</i>”.</p> <p>It is also noted that “<i>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</i>”.</p> <ul style="list-style-type: none"> 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 “<i>in a perilous condition</i>”. Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&lang_token=eng <p>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.”</p> <p>Local heritage interest in site and extensive local knowledge of workings and their importance/threats to them</p>
Landscape	<ul style="list-style-type: none"> The site is not within an AONB or National Park. Landmap confirms the site is within the following: <ul style="list-style-type: none"> 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) 	<ul style="list-style-type: none"> NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>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.</p> <ul style="list-style-type: none"> Landmap notes the following key threats/management recommendations of relevance to the study area: <ul style="list-style-type: none"> Geological Landscape – “<i>Ensure that no features or natural systems of geological or geomorphological significance in the area (incl. mines) are lost or damaged (e.g. due</i>

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	<p>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</p> <p>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”.</p> <ul style="list-style-type: none"> The site is within the north-western section of the Upland Ceredigion Landscape of Historic Interest. 	<p><i>to development or forestry”;</i></p> <ul style="list-style-type: none"> Historic Landscape – Acknowledgement that “<i>management of mining related features is problematic for a variety of reasons, including issues of access, safety, damage, degradation, conservation and pollution.</i>” Principle Management recommendation being to “<i>Conserve historic landscape elements where possible, work towards developing short and long term management strategy.</i>” 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 “<i>selective reconstruction/consolidation of important features</i>” <ul style="list-style-type: none"> 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 “<i>Landscapes designated as a SLA may be unique, exceptional or distinctive to the local authority area.</i>” <p>“<i>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).</i>”</p> <p>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 “<i>promote development that enhances local landscape character, distinctiveness and landscape quality</i>”.</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> 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 <p>Policy DM17: General Landscape “<i>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:</i></p> <ol style="list-style-type: none"> <i>causing significant visual intrusion;</i> <i>being insensitively and unsympathetically sited within the landscape;</i> <i>introducing or intensifying a use which is incompatible with its location;</i> <i>failing to harmonise with, or enhance the landform and landscape; and /or</i> <i>losing or failing to incorporate important traditional features, patterns, structures and layout of settlements and landscapes.</i> <p><i>Where possible development should enhance these qualities and special character. ”</i></p> <p>Policy DM18: Special Landscape Areas (SLAs) “<i>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.</i>”</p>

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities
		Policy DM19: Historic and Cultural Landscape <i>"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."</i>

Table A3 – Cwm Rheidol: Current Baseline Information (to be expanded through feasibility study work in 2019)

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities
Population & Human Health	<ul style="list-style-type: none"> Rheidol Dam visitor centre approximately 3 km to west of study area along road/cycle route. Vale of Rheidol Railway Rhiwfron Station 300 m to south (across river). Rheidol Falls station further (2 km+) to west but accessible from study area potentially along road/bridge/paths. Rheidol Cycle Trail through study area (ends at site) – recent cycle event promoted by Sustrans (28/05/18) along this route; Borth to Devil’s Bridge to Pontrhydfendigaid walking trail skirts around the study area. Other formal/informal footpaths also present in area including two Public Rights of Way (footpaths) and one bridleway. Riparian zone and area around Cwm Rheidol used for walking and hiking, picnicking, dog walking and nature / mining appreciation related activities. Health and wellbeing opportunities exist on and around site with footpaths through/around site linked with nearby heritage sites, cycleway to Aberystwyth passing through study area and Vale of Rheidol Railway nearby. Previous investigation identified, described and positioned many of the shafts and adits; many of these are unfenced and in some cases easily and inadvertently accessible. River is used by canoeists which involves water contact and /or immersion. Metal levels in the Afon Rheidol are impeding spawning leading to a limited number of sea trout and salmon entering the river system. This in-turn impacts the number of anglers using this stretch of the river. The site is unique in Wales in terms of its diverse environmental geochemistry and educational potential due to the unusually high iron sulfide content of the ore which is rare for mid-Wales. 	<ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The Well-being of Future Generations (Wales) Act 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: <ul style="list-style-type: none"> ○ A globally responsible Wales; ○ A resilient Wales; ○ A healthier Wales; ○ A Wales of vibrant culture [and thriving Welsh language]. NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf ; Objective 4 of the NRW Wellbeing 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 “<i>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.)</i>” Aims of this above include for NRW to “<i>Encourage outdoor recreation and learning at our own facilities and in the wider environment,</i>” and “<i>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</i>”. Ceredigion Wellbeing 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 Special Areas of Conservation, 100 Sites of Special Scientific Interest and seven National Nature Reserves. The Ceredigion Wellbeing 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 Wellbeing Plan may be of particular relevance to this project: <ul style="list-style-type: none"> ○ 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. ○ 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. Sustrans Review of the National Cycle Network 2018 https://www.sustrans.org.uk/sites/default/files/file_content_type/ncn_review_report_pdfs_for_everyone.pdf Sustrans Review and Action Plan for Wales 2018

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		<p>https://www.sustrans.org.uk/sites/default/files/file_content_type/ncn_review_action_plan_walesbilingual_web_2.pdf</p> <p>Rheidol Cycle Trail 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).</p>
Biodiversity & Resilience of Ecosystems	<ul style="list-style-type: none"> • Zinc concentrations in the Afon Rheidol are above the standard for freshwater supporting salmonid fish at times and consequently the Afon Rheidol is considered a poor river for these species, although salmon and sea trout are known to spawn along the Afon Rheidol above and below the Cwm Rheidol study site. • The south-western corner of the Cwm Rheidol study area is approximately 35 m south of the Coedydd a Cheunant Rheidol SSSI and SAC. (UK0012748 - Annex 1 habitat Western Acidic Oak Woodland). The eastern part of the study area is approximately 30 m to the north of another section of this SSSI/SAC across the Afon Rheidol. The quality and importance of this site being that it is an old sessile oak woods with Ilex and Blechnum in the British Isles for which this is considered to be one of the best areas in the United Kingdom. • The above area is also designated as the Coed Rheidol National Nature Reserve, consisting of semi-natural sessile oak woodland and covers the south-eastern corner of the Cwm Rheidol site, is of 'national' nature conservation value. • Potential Tree Preservation Orders associated with Coed Rheidol (Arup: Cwm Rheidol Metal Mine Remediation, 2006) – detailed information not yet obtained for this study. • Bats are likely to be the key protected fauna constraint both with potential in adits and disused structures with a known roost record near the crushing mill (local record obtained to inform Atkins: Cwm Rheidol Mine Water Remediation: Ecological Constraints Report 2005 – no details provided re species/date etc.). Surveys undertaken in 2006 did not confirm any roost sites (Arup: Cwm Rheidol Metal Mine Remediation, 2006). 2005 ecological study at site noted that otters were likely to be present along the Afon Rheidol and the south bank and surrounds were the most likely holt locations. • Arup: Cwm Rheidol Metal Mine Remediation, 2006 noted that red kite are likely to be breeding on site. Chough also known to breed in area – Atkins: Cwm Rheidol Mine Water Remediation: Ecological Constraints Report 2005 noted a known record of breeding from a shaft at Ystumtuen. A range of nesting birds likely to be present across the site due to habitat mosaic. • Pine Marten being reintroduced to Mid Wales (https://pine-marten-recovery-project.org.uk/about-us/wales) - habitats at Cwm Rheidol are suitable for use by this species; • Cwm Rheidol Site known as top 5 mines in Mid Wales for metallophyte lichens (over 27 species) (Arup: Cwm Rheidol Metal Mine Remediation, 2006). • A Survey of Calaminarian Grassland in Mid-Wales, Dr Janet Simkin MCIEEM, Natural Resources Wales Evidence Report No: 061 notes that <i>"livestock and people are excluded from the whole site so it is completely undisturbed, and as a result has large areas of mature calaminarian communities rich in lichens and bryophytes"</i>. The 2015 study identified 25 plants, 18 bryophytes and 71 lichens and lichenicolous fungi in the calaminarian areas at Cwm Rheidol. These include a large population of <i>Silene uniflora</i> around the crusher house buildings. The lichens and lichenicolous fungi include 12 metallophytes, one with a conservation status of near-threatened, two nationally rare and nine that are nationally scarce. • Invertebrate interest throughout site – the Atkins: Cwm Rheidol Mine Water Remediation: Ecological Constraints Report 2005 provides a record for five spotted ladybirds at the site - recorded at the base of the scree/spoil slopes (Nationally rare, only found in Wales) 	<ul style="list-style-type: none"> • http://jncc.defra.gov.uk/ProtectedSites/SACselection/n2kforms/UK0012748.pdf <p>Identified threats ,pressures and activities with impacts on the Coedydd a Cheunant Rheidol SAC are identified as:</p> <ul style="list-style-type: none"> ○ HIGH risk (inside and outside of site) from invasive non-native species and air pollution; ○ MEDIUM risk (inside site) from forest and plantation (management and use) and improved access to site; ○ LOW risk (inside site) from grazing and use of biocides, hormones and chemicals. <ul style="list-style-type: none"> • A Survey of Calaminarian Grassland in Mid-Wales, Dr Janet Simkin MCIEEM, Natural Resources Wales Evidence Report No: 061 identifies the main threat on this site as being <i>"In the absence of grazing, and now with reduced erosion by mine water, scrub is encroaching rapidly on the spoil. The conifer seedlings are a particular threat, due to the effects of shade and needle drop on the vegetation and soil."</i> • Local Biodiversity Action Plan / Targets. http://www.ceredigion.gov.uk/resident/coast-countryside/conservation-and-wildlife/ceredigion-biodiversity-action-plan/ <p>Chough have a local species action plan which notes that <i>"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."</i> One of the factors identified as affecting the species being <i>"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."</i></p> <p>Pipistrelle bats also have a local species action plan – two of the factors identified as affecting this species include <i>"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"</i> and <i>"Health and safety measures to remove damaged, diseased or unstable trees from next to roads, footpaths and buildings can damage bat habitats."</i></p> <ul style="list-style-type: none"> • Local Development Plan Biodiversity Policies - https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>Policy DM14: Nature Conservation and Ecological Connectivity <i>"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."</i></p> <p><i>"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 ecological connectivity. Depending on the proposal, it may be more appropriate in some cases to provide enhancements to a statutory/non-statutory site."</i></p> <p>Policy DM15: Local Biodiversity Conservation <i>"Development will be permitted where:</i></p>

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		<p>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;</p> <p>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;</p> <p>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</p> <p>4. Where necessary, management plans are produced and agreed with the LPA and developments phased to take into account mitigation and compensation measures.”</p>
Land (for example: land take)	<ul style="list-style-type: none"> Land historically used for metal mining; no current or future extraction anticipated. Cwm Rheidol is proposed as a Regionally Important Geological Site (RIGS) by the National Museum and Galleries of Wales (NMGW); The site is unique in Wales in terms of its diverse environmental geochemistry and educational potential due to the unusually high iron sulfide content of the ore which is rare for mid-Wales. (potential for educational activities); Access to the sites is predominantly along a single lane minor road. The minor road forms part of a cycle route (the Rheidol Cycle Trail) which runs through the study area. Site within Cambrian Mountains Environmentally Sensitive Area (ESA) (unlikely to be of significance given landuse within study area). 	<ul style="list-style-type: none"> Local Development Plan policies of relevance https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>Policy DM16: Regionally Important Geodiversity Sites (RIGS) “Development will be permitted where a step-wise approach is adopted to minimise negative effects to the main features of RIGS and access to the sites. Where significant negative effects remain, the development will only be permitted if there are social, economic or environmental needs for development that outweigh the losses and the development could not reasonably be located anywhere else. Where appropriate, opportunities for enhancement should be taken.”</p> <ul style="list-style-type: none"> RIGS documentation (to be obtained).
Soil (for example: organic matter, erosion, compaction, sealing)	<ul style="list-style-type: none"> Combination of Grade 4 (poor), 5 (very poor) and non-agricultural in the local area; It is anticipated that much of the surface geology will be made ground as a result of the past land use. High levels of metal contaminants are anticipated given that much of this made ground is likely to be spoil resulting from the mining and associated processing in the area. Peaty substrate at Upper Plateau. 	
Water (for example: hydromorphological changes, quantity and quality)	<ul style="list-style-type: none"> Adjoining waterbody noted as the Rheidol- confluence with Castell to tidal limit – ID GB110063041570. Cycle 1 Baseline Overall Status (2009): Moderate. Latest (2013) Ecological Status: Moderate. Latest (2013) Chemical Status: Fail. Latest (2013) Overall Status: Moderate. NB Cycle 2 name and status remains as above. (https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f) & https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 Within the Rheidol catchment there is a long history of metalliferous mining and the impacts from these past activities are having a detrimental impact upon water quality of the Afon Rheidol. Discharges from Cwm Rheidol Mine contribute to the Afon Rheidol failing European Water Framework Directive (WFD) standards for zinc and cadmium for 18km downstream of the mine to its tidal limit. Comparison of 35208 upstream and 35209 downstream of Cwm Rheidol Mine indicates that the mine is increasing concentrations of zinc in the Rheidol by 144% and cadmium by 107%. There are also minor increases in copper and lead; however, the latter still remains below EQS at 3.59µg/l. Other surface water features comprise a number of areas of peat and marshland spread across the study area. These are fed by surface water runoff and in turn provide storage for the surface water courses and potentially groundwater. Various works have already been completed to minimise inflow of surface water and erosion of spoil by the adit discharges. The geology beneath this site has been classed as being a non-aquifer. There are 	<ul style="list-style-type: none"> WFD - Reason for [Rheidol- confluence with Castell to tidal limit] reason for failure noted as abandoned mines and contaminated land. Failing elements noted as cadmium and its compounds, pH, copper, zinc. https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f has a noted overall objective of “Good Potential by 2027”; however, this is also noted as “technically infeasible”. Cycle 2 Drivers of EcoQE Zinc, Mitigation Measures Assessment. https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>Policy DM11: Designing for Climate Change “The LDP will help ensure that development addresses the implications of climate change by requiring that:</p> <ol style="list-style-type: none"> justified development in the flood zone is resilient and adaptable to the effects of flooding; and the long term sustainability of the development has been taken into account.”

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	<ul style="list-style-type: none"> no source protection zones within 1 km of this site. Previous blow out affected Aberystwyth harbour. Potential contributor to metal load in the Cardigan Bay Special Area of Conservation. Flood Zone 2 and 3 (river flooding) present at lower levels of valley close to reservoir. Reservoir flood risk and surface water flood risk also present at lower levels. 	
Air	<ul style="list-style-type: none"> 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)	<ul style="list-style-type: none"> To be confirmed when more is known regarding proposals 	<ul style="list-style-type: none"> Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>Policy DM11: Designing for Climate Change “<i>The LDP will help ensure that development addresses the implications of climate change by requiring that:</i></p> <ol style="list-style-type: none"> <i>1. justified development in the flood zone is resilient and adaptable to the effects of flooding; and</i> <i>2. the long term sustainability of the development has been taken into account.”</i>
Material assets	<ul style="list-style-type: none"> Access to the sites is predominantly along a single lane minor road. The minor roads forms part of a cycle route which ends approximately 400m from the proposed pilot system site at Cwm Rheidol (the Rheidol Cycle Trail which links to Aberystwyth). There are 3no Public Rights of Way in vicinity of works (2no. footpaths and 1no. bridleway). Borth to Devil’s Bridge to Pontrhydfendigaid trail skirts around part of site. Utilities currently unconfirmed. No railway/canal crossings within or in proximity. No current proposals for minerals extraction. Statkraft offices and works in proximity to site. Statkraft also own the ‘filter beds’ which fall within the project study area. Statkraft is “<i>a leading company in hydropower internationally and Europe’s largest generator of renewable energy</i>” – they manage the nearby power station at Cwm Rheidol. 	
Cultural heritage (including architectural and archaeological aspects)	<ul style="list-style-type: none"> The site is within the north-western section of the Upland Ceredigion Landscape of Historic Interest. The Cwm Rheidol area of this landscape is noted as “<i>The remains of the metal mining industry, dispersed 19th century worker houses, scattered farms and a 20th century hydro-electric scheme squeezed into the narrow valley floor and lower, steep valley sides of the Rheidol, characterise the Cwm Rheidol historic landscape character area.</i>” http://dyfedarchaeology.org.uk/HLC/uplandceredigion/uplandceredigionnorthwest.htm#cwmrheidol The Cwm Rheidol mine complex (including those at Ystumtuen, Penrhiw, Bwlchgwyn, and Llwyn Teifi) are a series of ancient metal mines worked up until the late 19 and early 20 centuries. Cadw have previously advised that care should be taken to ensure that any works proposed on site are sympathetic to the preservation of the remains of the mining industry. Three scheduled ancient monuments within ~1km (Castell Bwa-Drain camp (iron age), Tan-y-fford hillfort (iron age) & Round Barrow south-west of Pen-Rhinlas (bronze age) Remains at Ystumtuen and Temple are likely to be proposed for scheduling; The closest listed structure to the study area is Gelli Fach - SN 71478 78560 (~1.5km SE) Buried archaeology within the study area not investigated in detail previously but likely due to ancient mine site and nearby presence of bronze and iron age forts/camps; Likely to be prehistoric funerary sites and medieval upland settlements in area; Numerous National Monuments Record for Wales and Welsh Archaeological Trusts' Historic Environment Records in area; Inherent value of site for mining history and local cultural heritage. 	<ul style="list-style-type: none"> Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en <p>The wellbeing goal of most relevance here being - a Wales of vibrant culture [and thriving Welsh language].</p> NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>As part of the above NRW have committed to “<i>protect Wales’ cultural heritage and archaeology across the land and water we manage</i>” and “<i>Promote the cultural importance of our landscapes and seascapes as part of Wales’ heritage</i>”</p> Ceredigion Wellbeing 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 <p>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.</p> “<i>Guide to good practice on using the register of landscapes of historic interest in Wales in the planning and development process</i>”, Revised (2nd) edition including revisions to the Assessment process (ASIDOHL2), 2007. <p>All landscape areas identified on the Register (including Upper Ceredigion) are of national</p>

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	<ul style="list-style-type: none"> Previous Cwm Rheidol mine exhibits are displayed at Ceredigion Museum. 	<p>importance in the Welsh context. There are three key principles underpinning the identification of historic landscape areas:</p> <ul style="list-style-type: none"> 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. <p>As part of this there is an expectation that there is a <i>"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"</i>.</p> <p>It is also noted that <i>"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"</i>.</p> <ul style="list-style-type: none"> Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>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."</p> <ul style="list-style-type: none"> Local heritage interest in site and extensive local knowledge of workings and their importance/threats to them
Landscape	<ul style="list-style-type: none"> The site is not within an AONB or National Park. Landmap confirms the site is within the following: <ul style="list-style-type: none"> Cwm Rheidol (Devil's Bridge) Geological Landscape (CRDGNGL300) which is noted as upland gorge; Cwm Rheidol woodland Landscape Habitat noted as Dry (Relatively) Terrestrial Habitats/Woodland & Scrub/Broadleaved Woodland (CRDGNLH041); Devils Bridge Visual and Sensory Landscape noted as Upland/Upland Valleys/Wooded Upland Valleys (CRDGNVS878); Rheidol Valley Historic Landscape (CRDGNHL216); Lead Mining Landscape (cultural landscape - CRDGNCL036). The study area falls within the Rheidol Valley Special Landscape Area (SLA - 11) (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 <p>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 "A key valley within northern Ceredigion which contains a range of landscape, habitat, historic and cultural landscape elements".</p> <ul style="list-style-type: none"> The site is within the north-western section of the Upland Ceredigion Landscape of Historic Interest. Potential Tree Preservation Orders associated with Coed Rheidol (Arup: Cwm Rheidol Metal Mine Remediation, 2006) – detailed information not yet obtained for this study. 	<ul style="list-style-type: none"> NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>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.</p> <ul style="list-style-type: none"> Landmap notes the following key threats/management recommendations of relevance to the study area: <ul style="list-style-type: none"> Geological Landscape – "Ensure that no features or natural systems of geological or geomorphological significance in the area are lost or damaged (e.g. due to development or forestry). Ensure that SSSI features are maintained in favourable condition by implementation of management plans and ensure that RIGS are safeguarded using Local Plan policies and constraint mapping." Landscape Habitat – "Species records used in the study are not comprehensive and the absence of species in an area may well be an indication of incomplete records rather than a true lack. Land managers, developers, planners and other land users will need to satisfy themselves as to the occurrence of such species within the area if existing land management or management changes might affect these species in the future. A first step to procuring this data will be to consult with the local biodiversity records centre." Visual and Sensory – no specific threats noted but in relation to condition it is noted that there is "Development intrusion from tourism. Coniferous plantations replacing deciduous" Historic Landscape – no specific threats however noted that "most of the historic landscape components in this area are in a reasonable state of preservation" and that the most appropriate management is to "maintain as existing". Cultural Landscape – it is noted that the condition of the landscape is "Improving (- through the efforts of community-based regeneration and the Welsh Mines

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		<p>Preservation Trust and the Welsh Mines Society.)” The principal management recommendation being to provide <i>“Support for community-based regeneration initiatives, the Welsh Mines Preservation Trust and the Welsh Mines Society.”</i> As well as <i>“selective reconstruction/consolidation of important features”</i></p> <ul style="list-style-type: none"> 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 <i>“Landscapes designated as a SLA may be unique, exceptional or distinctive to the local authority area.”</i> <p><i>“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).”</i></p> <p>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 <i>“promote development that enhances local landscape character, distinctiveness and landscape quality”</i>.</p> <ul style="list-style-type: none"> 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: <ul style="list-style-type: none"> Management of designated sites and areas, including biodiversity and historic landscapes. Management and enhancement of key habitats and species (Section 42 and Local Biodiversity Action Plan). Ecosystem approach should be incorporated into development. Potential to increase public access to the lower valley area. 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 <p>Policy DM17: General Landscape <i>“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:</i></p> <ol style="list-style-type: none"> <i>1. causing significant visual intrusion;</i> <i>2. being insensitively and unsympathetically sited within the landscape;</i> <i>3. introducing or intensifying a use which is incompatible with its location;</i> <i>4. failing to harmonise with, or enhance the landform and landscape; and /or</i> <i>5. losing or failing to incorporate important traditional features, patterns, structures and layout of settlements and landscapes.</i> <p><i>Where possible development should enhance these qualities and special character. ”</i></p> <p>Policy DM18: Special Landscape Areas (SLAs) <i>“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.”</i></p> <p>Policy DM19: Historic and Cultural Landscape <i>“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</i></p>

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		<i>special character.”</i>

Table A4 – Frongoch and Wemyss: Current Baseline Information (to be expanded through feasibility study work in 2019)

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Population & Human Health	<ul style="list-style-type: none"> • Frongoch part of site previously used for off road bikes- measures have been made to reduce this activity due to the impact of the bikes on site. • The site is 2.5 miles south of Devil’s bridge (following existing footpaths). • The site is 2.3 miles (if travelling on public footpaths) south south-west of the Devil’s Bridge Water falls or 2.5 miles if travelling by road. A passenger steam train (Rheidol Railway) runs from Aberystwyth to Devil’s Bridge. The steam train's original primary purpose was to carry timber (for pit props in the South Wales valleys) and lead ore from the Rheidol Valley to the sea. This is within the general area of the site. • OS maps show several footpaths cross the site. At the Frongoch site two footpaths are classified as 'roads used as public paths'. A third footpath passes north/south past the old saw mill. On the Wemyss site a track appears to run to the spoil tips. It is not marked as a right of way. • The site is located in a rural area. There are two residential properties close to the site. • Access to the site is via minor roads upon leaving the A4120 at Devil's Bridge. 	<ul style="list-style-type: none"> • Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en The Well-being of Future Generations (Wales) Act 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: <ul style="list-style-type: none"> ○ A globally responsible Wales; ○ A resilient Wales; ○ A healthier Wales; ○ A Wales of vibrant culture [and thriving Welsh language]. • NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf ; Objective 4 of the NRW Wellbeing 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 “<i>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.)</i>” Aims of this above include for NRW to “<i>Encourage outdoor recreation and learning at our own facilities and in the wider environment,</i>” and “<i>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</i>”. • Ceredigion Wellbeing plan (<i>Ceredigion Local Well-being Plan 2018-2023 - Agreed by Ceredigion Public Services Board 16 April 2018 Published 1 May 2018</i>) 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 Special Areas of Conservation, 100 Sites of Special Scientific Interest and seven National Nature Reserves. The Ceredigion Wellbeing 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 Wellbeing Plan may be of particular relevance to this project:

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		<ul style="list-style-type: none"> ○ 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. ○ 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.
Biodiversity & Resilience of Ecosystems	<ul style="list-style-type: none"> • Fish population surveys carried out by Environment Agency Wales in 2009 confirmed Nant Cwmnewydion was virtually fishless until its confluence with Afon Magwr, approximately 3.5km downstream of Frongoch Adit. Fish were also absent in the Frongoch Stream and in Nant Cell downstream of its confluence with Frongoch Stream (2km downstream of Frongoch Mine) when they were surveyed in 2013. • Mwyngloddfa Frongoch Site of Special Scientific Interest (SSSI), which is primarily designated on account of its geological interest is present in the eastern part of Frongoch. • Distances of other designations from study area are (estimates only): Cae'r Meirch SSSI 2km to the east of the site. Elenydd SSSI/ SPA (Special Protection Area) 3.8km east of the site. Grogwynion SAC (Special Area of Conservation) 2.1km south of site- Calaminarian grasslands being a primary reason for designation (Annex 1 habitat), other Annex 1 habitats present being dry heath. Grogwynion SAC is underpinned by part of the Gro Ystwyth SSSI. • Of most relevance to any proposals within the Study Area would be the Grogwynion SAC due to the reliance of its plant interest on metal loading in the ground. There is also a hydrological connection. • No known Local Nature Reserves or habitats protected by planning policy from 2012 assessment work – update desk study to be undertaken to confirm. • In 2012 a lichen/bryophyte survey of Frongoch (Frongoch lichen Survey, Forster Brown and Chambers, 2012) noted that <i>"Frongoch mine is an important site for metallophyte lichens. Whilst it lacks some of the rarest species, it has a good representation of both obligate and facultative metallophytes. These are however, almost exclusively confined to the four key areas outlined above. Indeed, the whole of the large central expanse is devoid of any lichens. A small number of species (e.g. Vezdaea rheocarpa) are known from this site and only a very few other metal mines in mid Wales. The four [key] areas identified constitute important examples of the Section 42 (NERC Act) mine site community. All contain a range of metallophyte species and all are therefore examples of the S. 42 mine site community."</i> • It should be noted the above survey was undertaken prior to remediation works being completed at Frongoch (including capping/seeding). • In 2016 a lichen/bryophyte study of Wemyss (2016 Wemyss Lower Plant Survey, Chambers & Forster-Brown) noted that <i>"Wemyss mine is an important site for metallophyte lichens. Metallophyte interest is particularly associated with south-facing heath, particularly in the more northerly section of Compartment WEM14. There is also metallophyte interest associated with the remains of buildings at various locations in the site, particularly between the main building and the road. Bryophyte interest at this site is limited. Small patches of Weissia controversa var. densifolia were recorded, which, though characteristic of old mine sites, are widespread and of little conservation value. The areas of spoil and heath in compartments WEM 14 and areas close to and on built structures constitute examples of the Section 42 (NERC Act) mine site community. They all contain a range of metallophyte species and are therefore examples of the S. 42 mine site community."</i> • A further lower plant survey was undertaken by NRW at Wemyss in 2016 specifically to look for Lead Moss (<i>Ditrichum plumbicola</i>) as photographs in previous reports indicated habitat suitable for this species (Survey for <i>Ditrichum plumbicola</i> Lead Moss on three disused mines in eastern Ceredigion. Sam Bosanquet, NRW Non-vascular Plant Ecologist 2016). During this survey <i>Ditrichum plumbicola</i> was identified within the Wemyss site – specifically at the top of the 	<ul style="list-style-type: none"> • Core management plan (including conservation objectives) for the Grogwynion Special Area for Conservation (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: <ul style="list-style-type: none"> ○ 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 • A Survey of Calaminarian Grassland in Mid-Wales, Dr Janet Simkin MCIEEM, Natural Resources Wales Evidence Report No: 061 identifies the main threat on this site as being that <i>"This site has already been severely damaged by the activities of the sawmill in the NW corner, and by the remediation works in the southern half. The remaining small patches of calaminarian heath are important as this habitat is scarce, and they should be protected from disturbance as the remediation works proceed"</i> • 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 <i>"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."</i> <i>"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 ecological connectivity. Depending on the proposal, it may be more appropriate in some cases to provide enhancements to a statutory/non-statutory site."</i> Policy DM15: Local Biodiversity Conservation <i>"Development will be permitted where:</i> <i>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;</i> <i>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;</i>

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	<p>wheel pit. <i>"In addition, a large population of a leafy liverwort with very toothed leaves was present at the foot of the wall of the wheel pit at Wemyss Mine; this is believed to be the Section 42 species Cephaloziella nicholsonii Greater Copperwort, which has only been found at four other Welsh sites (one of which is Cwmystwyth Mine, where it grows on a wall). Confirmation from the national referee for the genus will be sought. The uncommon liverwort Cephaloziella stellulifera is also present at Wemyss Mine, where it was overlooked as the commoner C. divaricata..... Tetraplodon mnioides, was also recorded at Wemyss."</i></p> <ul style="list-style-type: none"> 2012 and 2013 studies (Environment Agency 2012 - Frongoch Metal Mine Remediation Environmental Report and NRW 2013 Frongoch Metal Mine Remediation Project (Phase 2)) found Frongoch not to be of value to invertebrates or amphibians due to the acidic water and lack of vegetation. It was also noted that this site does not contain any habitats suitable for dormice, water vole or badgers. It was considered possible that otters may pass through the site up Frongoch Stream but no areas suitable for otter holts were identified. The site was considered unlikely to support a significant population of reptiles although it was noted that there was some suitable habitat around the periphery and within the spoil and rubble piles. Scrub habitat on the site was noted as likely to support a limited number of nesting birds typical of upland habitat. The buildings and underground tunnel within the site were assessed as having low potential for supporting roosting bats, being exposed and damp. Area of Acid Dry Dwarf Shrub Heath along the north west boundary of Frongoch and along the southern access track. Sea Campion <i>Silene Maritime</i> is present at Frongoch. There are known areas of Japanese knotweed at Frongoch (identified during 2012/2013 surveys and still noted on site during October 2018 visit). These are sprayed annually as part of ongoing management on site. 	<p>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</p> <p>4. Where necessary, management plans are produced and agreed with the LPA and developments phased to take into account mitigation and compensation measures."</p> <ul style="list-style-type: none"> <i>Frongoch Lead and Zinc Mine Remedial Works Phase 2 Landscape Clerk of Works Final Report. 27/10/2015</i> - A number of actions are listed in this Clerk of Works report that would be of landscape benefit and could be considered for future projects such as this current study. These include measures such as creation of rock piles to provide crevices and shelter for invertebrates, small mammals, reptiles and amphibians. Use of different substrates on site. Introduction of occasional logs and branches for invertebrates and to provide bird perches. Nest boxes (e.g. barn owl boxes on poles). Native planting to wetland areas. Safeguarding and if possible extending high value ecological habitats e.g. Calaminarian grassland.
Land (for example: land take)	<ul style="list-style-type: none"> Land historically used for metal mining; no current or future extraction anticipated. SSSI present on site primarily of value for secondary mineralisation - Mwyngloddfa Frongoch SSSI. 	
Soil (for example: organic matter, erosion, compaction, sealing)	<ul style="list-style-type: none"> The majority of the site is Grade 4 or Grade 5 agricultural land. To the east and south of the site there are areas of Grade 3b agricultural land. Previous use of site (lead and zinc mine) will have resulted in significant ground contamination. 	
Water (for example: hydromorphological changes, quantity and quality)	<ul style="list-style-type: none"> Adjoining waterbodies noted as: <ul style="list-style-type: none"> Magwr - headwaters to confluence with Ystwyth (GB110063041680). Cycle 1 Baseline overall status (2009) Poor. Latest (2013) Ecological Status: Poor. Latest (2013) Chemical Status: Fail. Latest (2013) Overall Status: Poor. NB Cycle 2 continues to be referred to as Magwr – headwaters to confluence with Ystwyth (overall status Poor; chemical status Fail; ecological status Poor). Cwmnewydion - headwaters to conf with Ystwyth (GB110063041670). Cycle 1 Baseline overall status (2009) Moderate. Latest (2013) Ecological Status: Good. Latest (203) Chemical Status: Good. Latest (2013) Overall Status: Good. NB Cycle 2 referred to as Nant Cell - headwaters to confluence with Ystwyth (overall status Poor; chemical status Good; ecological status Poor). 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 referred to as 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 The site straddles two river catchments so mine water from the site drains in both a western and eastern direction. Water draining from Frongoch Mine via underground workings or surface run-off 	<ul style="list-style-type: none"> WFD - https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=a5ee986133c14b998f82e10bd06e987f https://nrw.maps.arcgis.com/apps/webappviewer/index.html?id=2176397a06d64731af8b21fd69a143f6 <ul style="list-style-type: none"> Magwr - headwaters to confluence with Ystwyth reason for failure noted as abandoned mines and contaminated land. Failing elements noted as Copper, Zinc, Fish. Has a noted overall objective of "Good Status by 2027"; however, this is also noted as "technically infeasible". Cycle 2 Drivers of EcoQE Fish. Cwmnewydion [Nant Cell] - headwaters to conf with Ystwyth reason for failure noted as abandoned mines and contaminated land, forestry and acidification. Failing elements noted as pH. Has a noted overall objective of "Good Status by 2027"; however, this is also noted as "disproportionately expensive". Cycle 2 Drivers of EcoQE Fish. 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 "technical infeasible". Cycle 2 Drivers of EcoQE Zinc, Fish.

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	<p>contains elevated concentrations of metals, notably zinc, lead and cadmium. Surface water and direct rainfall flows across and/or infiltrates through the mine waste dumps. Some or all of the water infiltrating through the mine waste drains into the Frongoch Stream via a drainage culvert that runs beneath the mine waste to the eastern side of the site. Contaminated surface water also flows directly into the stream following heavy rainfall. The Frongoch Stream then joins the Nant Cell, a tributary of the River Ystwyth.</p> <ul style="list-style-type: none"> • Surface water flowing into underground mine workings, e.g. via stopes or shafts, also becomes contaminated with dissolved metals and then drains into the Nant Cwmnewydion via the Frongoch Adit. The Nant Cwmnewydion then joins the Afon Magwr, another tributary of the River Ystwyth. • The Wemyss mine catchment drains in a general east to west direction, with the Nant Cwmnewydion originating from an area of boggy land approximately 1km to the southeast of the Wemyss mine site. The Nant Cwmnewydion flows through the mine waste at the Wemyss site and is joined by mine water emanating from the Frongoch adit downstream of the mine site (2010 Atkins Frongoch and Wemyss). • Based on the 2015 classification, all of the watercourses downstream of Frongoch Mine are failing to achieve the environmental quality standards required by the WFD mainly due to elevated concentrations of zinc. Frongoch Mine is the primary cause of the zinc failures in Frongoch Stream, Nant Cell, Nant Cwmnewydion and Afon Magwr. It is also one of the two major sources of zinc in Afon Ystwyth, the other being Cwmystwyth Mine. • The site has had extensive work to reduce the metal contamination and site run off • Surface flows entrain metals from spoil heaps etc. • No GSPZ zones near to site. • There is a reconstructed Mill Pond on the Frongoch part of the study area as well as several settlement ponds intended to catch site run off and allow for sediments to fall from suspension. • Previous works at the site have required a 1/100 year flood assessment. 	
Air Climate (for example: greenhouse gas emissions, impacts relevant to adaptation)	<ul style="list-style-type: none"> • Baseline data not obtained at this stage. • To be confirmed when more is known regarding proposals 	<ul style="list-style-type: none"> • Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=eng <p>Policy DM11: Designing for Climate Change “<i>The LDP will help ensure that development addresses the implications of climate change by requiring that:</i></p> <ol style="list-style-type: none"> <i>1. justified development in the flood zone is resilient and adaptable to the effects of flooding; and</i> <i>2. the long term sustainability of the development has been taken into account.”</i>
Material assets	<ul style="list-style-type: none"> • The site is accessed from the minor road that runs west of the site which links to the B4343 to the east of the site. • The site is privately owned and has in recent years been used as a sawmill and more recently the landowner has used it for vehicle storage. • The site is crossed by numerous paths. • Utilities currently unconfirmed. • No railway/canal crossings within study area or in proximity. • No current proposals for minerals extraction. 	
Cultural heritage (including architectural and archaeological aspects)	<ul style="list-style-type: none"> • Fron Goch Lead Mine Scheduled Monument on site - Post-Medieval, SN72118 74450. Many of the structures within the Scheduled Monument are collapsing and falling into disrepair. • Castell Grogwynion Hillfort close to site, Prehistoric, SN72125 72495 • Listed structures within 2km of Wemyss part of site - Capel Trisant Chapel- SN71699 75755 (1.3km), Telephone call-box to SE of Capel Trisant- SN71735 75749 (1.3km), Cwmnewydion Ganol House- SN70026 74286 (1.km), Glanrhos House- SN71252 73046 (0.995km), Rockview Mining shop and stores- SN7275073356 (1.2km), Ty Capel House- SN71701 75768 (1.39km) • The Study Area is within the north-western section of the Upland Ceredigion Landscape of Outstanding Historic Interest – spanning the Llety Synod & Frongoch Historic Landscape Character (HLC) area and the Cwmnewidion HLC. The Llety Synod & Frongoch area of this landscape is noted as consisting “<i>of a hilly</i> 	<ul style="list-style-type: none"> • Future Generations Act https://gov.wales/topics/people-and-communities/people/future-generations-act/?lang=en <p>The wellbeing goal of most relevance here being - a Wales of vibrant culture [and thriving Welsh language].</p> <ul style="list-style-type: none"> • NRW Wellbeing Statement https://naturalresources.wales/media/681164/nrw-well-being-statement.pdf <p>As part of the above NRW have committed to “<i>protect Wales’ cultural heritage and archaeology across the land and water we manage</i>” and “<i>Promote the cultural importance of our landscapes and seascapes as part of Wales’ heritage</i>”</p>

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	<p>landscape, between 220m and 340m, of dispersed farms and the remains of the metal mining industry. These industrial remains are a strong component of the historic landscape and at Frongoch they include probably the best collection of 19th century mine buildings in Wales". The Cwmnewidion area is noted as supporting "farms dispersed along a steep-sided valley floor, small fields of improved pasture and the substantial remains of 19th century metal mines are the main components of the Cwmnewidion historic landscape".</p> <ul style="list-style-type: none"> • Frongoch metal mine is a nationally important archaeological site where programmed archaeological investigation has revealed the remarkable survival of structural remains below ground. "The open area excavation recorded in detail a number of well-preserved mining features including buddles, rectangular slime pits or settling tanks and wooden launders; all representative of dressing floor processes in the 19th and 20th centuries." "Excavation of a number of areas at deeper depths within the excavation area [also] proved that remains of earlier ore processing structures including possible slime pits lay below the recorded circular buddles." (Frongoch metal mine, Ceredigion, Archaeological fieldwork, 2014-2015 – DAT). • Many of the structures and features discovered during the remediation works the Frongoch part of the site had not been recorded on map sources. As archaeological features were revealed at varying depths, the removal of any deposit has the potential to expose or damage archaeological features. • 30 recorded non-designated archaeological sites listed within the Historic Environment Record (HER) and National Monument Record (NMR). A further 15 sites were uncovered as part of the Wemyss Archaeological Assessment in 2016 (Metal Mines Remediation Project Part 3: Wemyss Archaeological Assessment, DAT 2016). • Areas of high. Medium and low archaeological potential were drawn up for the 2016 Wemyss Archaeological Assessment. There are also records from previous remediation work at Frongoch. It is understood that buried archaeology was re-covered during the previous works at Frongoch; however items that were already exposed were left exposed and are visible at the surface. 	<ul style="list-style-type: none"> • Ceredigion Wellbeing 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 <p>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.</p> <ul style="list-style-type: none"> • Collapse of the structures within the Fron Goch Scheduled Monument area is a key threat to this site. • Previously found archaeology that was left exposed at Frongoch (as found exposed during remediation works) is suffering degradation due to rabbit burrowing. • The 2014-15 Archaeological Investigations identified remains of earlier ore processing structures within the Frongoch site including possible slime pits below previously recorded circular buddles. "This new evidence of additional deeply stratified archaeological deposits in this area led National Resource Wales to modify the remediation scheme to avoid further disturbance and preserve in situ these well-preserved mining features". (Frongoch metal mine, Ceredigion, Archaeological fieldwork, 2014-2015 – DAT). This is of relevance to any future work at the site (and Wemyss area also). • <i>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.</i> <p>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:</p> <ul style="list-style-type: none"> ○ 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. <p>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".</p> <p>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".</p> <ul style="list-style-type: none"> • http://dyfedarchaeology.org.uk/HLC/uplandceredigion/lletysynod.htm notes that the "Frongoch mine buildings are of national importance, though in a poor state of preservation." • Local Development Plan https://www.ceredigion.gov.uk/oldicm/utilities/action/act_download.cfm?mediaid=51572&langtoken=enq <p>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</p>

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Landscape	<ul style="list-style-type: none"> The site is not within an AONB or National Park. Landmap confirms the site is within the following: <ul style="list-style-type: none"> Devil's Bridge-Cwmnewyddion Geological Landscape (CRDGNGL271) and Fron Ddu Geological Landscape (CRDGNGL269); Ponterwyd upland grassland mosaic Landscape Habitat (CRDGNLH038); Trysant surrounds Visual and Sensory Landscape (CRDGNVS472), noted as hill and lower plateau grazing; Llety Synod and Frongoch Historic Landscape (CRDGNHL132) and CWMNEWIDION Historic Landscape (CRDGNHL215); Lead Mining Landscape (cultural landscape – CRDGNCL036) and Upland Landscape (cultural landscape - CRDGNCL028). 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, important for its prehistoric and mining features 	<p>special character.”</p> <ul style="list-style-type: none"> NRW Wellbeing 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: <ul style="list-style-type: none"> 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)”; Visual and Sensory – “Conserve variety of features relating to lead mining, including lakes, buildings, inclines, tips.”; Historic Landscape – “there is outstanding potential for future study and interpretation of this landscape, plus outstanding recreational potential” 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” 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: <ul style="list-style-type: none"> Management of designated sites and areas, including biodiversity and historic landscapes. Management and enhancement of key habitats and species (Section 42 and Local Biodiversity Action Plan). Ecosystem approach should be incorporated into development. Potential to increase public access to the lower valley area. 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: <ol style="list-style-type: none"> causing significant visual intrusion; being insensitively and unsympathetically sited within the landscape; introducing or intensifying a use which is incompatible with its location; failing to harmonise with, or enhance the landform and landscape; and /or 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

Topic – Receptor / Resource	Summary of Current Baseline Information (to be expanded through feasibility study work in 2019)	Local Challenges, Trends and Opportunities
		<p><i>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.”</i></p> <ul style="list-style-type: none">• <i>Frongoch Lead and ZincMine RemedialWorks Phase 2 Landscape Clerk of Works Final Report. 27/10/2015</i> - A number of actions are listed in this Clerk of Works report that would be of landscape benefit and could be considered for future projects such as this current study. These include measures such as ecological habitat protection, creation, provision of nest boxes, rock piles etc. but also suggested use of bioengineering techniques and advice regarding soil profiles.

