

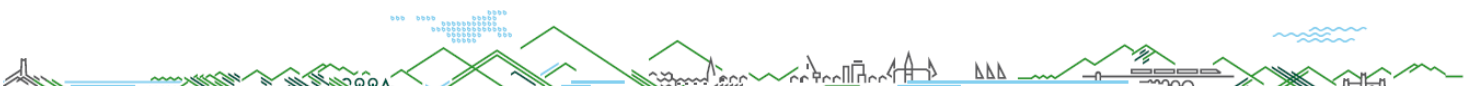
# Abandoned Mine Case Study: Cwm Mawr Lead & Zinc Mine



Cwm Mawr Mine, also known as Fairchance or Cwm Mawr No. 1, lies approximately 500m northeast of the village of Pontrhydfendigaid, Ceredigion. The mine is one of three known to have an impact on water quality in the Afon Teifi upstream of Cors Caron (Tregaron Bog) Special Area of Conservation (SAC). The other significant mines in this area are Abbey Consols and Esgair Mwyn. The presence of Cwm Mawr is first recorded in 1753 and was subsequently worked intermittently, at varying degrees of profitability, until its closure in 1917. Today, the minimal evidence of the area's past industrial importance includes the remains of buildings, shafts, small waste tips and the collapsed portal of the deep adit level.

Cwm Mawr Mine lies within the catchment of the Nant Lluest/Nant y Cwm, a south-westerly flowing minor tributary of the Afon Teifi. The hydrology of the site has been altered due to its mining and agricultural history, resulting in a bifurcation of the Nant Lluest upstream of the mine site, creating the Cwm Mawr Stream. The majority of flow in the Cwm Mawr Stream is diverted towards a nearby farm for agricultural purposes, with the remaining flow passing along a heavily incised channel before entering an open mine shaft. It is believed to re-emerge both through seepages approximately 135m downstream of the shaft, and from the Cwm Mawr Adit 350m southwest of the shaft. The re-issued discharges into the Cwm Mawr Tributary which flows south-westerly, being joined by the adit discharge before entering the Nant Lluest. After this point, the Nant Lluest is referred to as the Nant y Cwm, which continues south-westerly to join the Afon Teifi at Pontrhydfendigaid. The two re-emerging groundwater sources contain elevated concentrations of zinc, lead and cadmium sufficient for the Nant y Cwm to fail European Water Framework Directive (WFD) standards for all three metals.

We commissioned Enviro Ltd to carry out a scoping study in 2008, which reviewed information on the upper Afon Teifi including Cwm Mawr and Abbey Consols mines. This study recommended further water quality and flow monitoring, which was carried out in 2009/10. In 2010 we commissioned Atkins Ltd to carry out a further study to assess the feasibility and benefits of diverting the Cwm Mawr Stream away from the mine shaft. Four potential diversion options were considered and a preferred option was identified, utilising a current farm drainage system. A Swansea University MSc project also completed in 2010 concluded that of the three primary mines in the upper Teifi catchment, Cwm Mawr was the least significant in terms of metal loads discharged. Water quality modelling undertaken in 2012 for our WFD Abandoned Mines project suggested that Cwm Mawr alone is causing the Teifi to fail WFD zinc standards for approximately 10 km.



## Impact on receiving watercourses

- Length of watercourses impacted: 11 km
- Waterbody ecological status:
  - GB110062043540, Teifi – headwaters to confluence with Meurig: Moderate
- Cwm Mawr Mine also impacts on the following downstream waterbodies:
  - GB110062043520, Teifi - Meurig to Fflur: Moderate
  - GB110062043500, Teifi - Fflur to Camddwr: Good\*

\*not assessed for metals or biological elements.

- Average minewater flow and quality:

	Cwm Mawr Adit	Cwm Mawr Tributary*
Flow (litres/sec)	4.0	4.3
Zinc (µg/l)	770	950
Lead (µg/l)	19	69
Cadmium (µg/l)	1.7	1.7
Zinc load (kg/year)	97	130
Lead load (kg/year)	2.4	9.3
Cadmium load (kg/year)	0.2	0.2

\*receives discharge from groundwater seepages.

## Benefits of remediation

- Over 200 kg of harmful metals (mainly zinc) could be prevented from entering the Afon Teifi each year. The Teifi is one of the most important salmon and sea trout fisheries in Wales and is designated as a Special Area of Conservation for a number of habitats and species including salmon, otter, bullhead and the three UK lamprey species.
- The receiving waterbody and those further downstream will be more likely to achieve Good Ecological Status, although there are other mining pressures on these waterbodies that will need to be dealt with to achieve this status.
- Reduced heavy metals load to the Cardigan Bay Special Area of Conservation.
- The proposed solution is sustainable as it needs no energy and little or no maintenance.
- There may be opportunities for pond creation (BAP priority habitat).
- Opportunity to enhance existing habitat for water vole in the near locality and create/enhance proposed diversion watercourse.
- Potential to develop partnerships with important stakeholders.

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