

# Abandoned Mine Case Study: Cwmsymlog Silver & Lead Mine



Cwmsymlog mine lies 12km northeast of Aberystwyth, Ceredigion. The mine workings extend for approximately 1km down the narrow Symlog valley from its head near the shore of Llyn Pendam. The Nant Symlog flows westerly through the site before joining the Nant Erfyn at Pen-bont Rhydybeddau, forming the Nant Silo. The Nant Silo continues westerly to join the Afon Stewi at Penrhyn-coch, forming the Afon Clarach.

Cwmsymlog is one of the most important mines in Mid-Wales having been one of the key silver-producers of the area, along with the nearby Daren, Cwmerfyn, Bwlch and Goginan mines. The date of the first workings at Cwmsymlog are uncertain, but there are historic records dating back to the 16<sup>th</sup> century. The greatest period of activity began in the 1620s under Sir Hugh Myddleton, from which time the mine was in almost continuous operation until its closure in 1901.

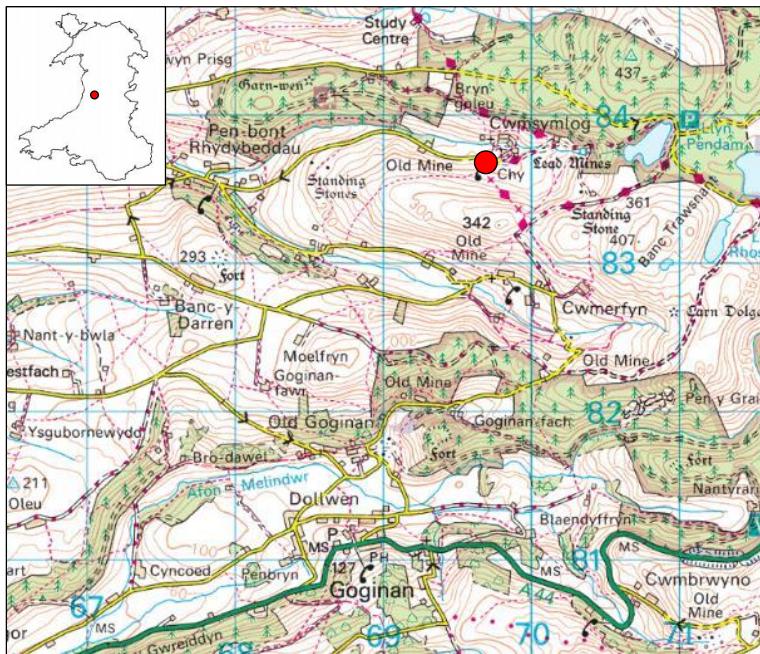
Much of the site is designated as a Site of Special Scientific Interest (SSSI) due to its considerable importance for rare species of lichen and fern. There are also two areas that have been designated as Scheduled Ancient Monuments (SAM), and in 2007 the 1855 Cornish Chimney was restored by the Spirit of the Miners project.

In the late 1970s concerns were raised regarding the impact of wind-blown particles from the extensive tailings tips on local people and livestock. Investigations found a marked movement of lead-rich dust nearly 2km westwards from the mine. In order to counter these problems the large tailings tips adjacent to the Nant Symlog were reclaimed by Ceredigion District Council and the Welsh Office in 1981. The tips were pulled back from the banks of the Nant Symlog and levelled. Rock-filled land drains were created to convey springs emerging from the base of the tips to the Nant Symlog. The levelled fine tailings were covered with coarser waste rock and locally sourced stony sub-soil before being sown with grass seed. A cut-off drain was also constructed to reduce the flow of water into the underground workings.

Although the threat of wind-blown pollution was reduced, monitoring showed that levels of zinc in the Nant Symlog had increased following the reclamation scheme. Today, Cwmsymlog remains a significant source of metal pollution to the Clarach catchment and is contributing to it failing to achieve the environmental quality standards for zinc, lead and cadmium required by the European Water Framework Directive (WFD).

The combination of extensive and ancient workings, with numerous adits, shafts and opencuts has resulted in a complex hydrological system and many sources of contamination. Bushell's adit is the lowest potential point of discharge from the underground workings. However, this is blocked near its portal and instead water discharges from an airshaft further along the level. This is believed to be the biggest single source of contamination from the mine, discharging approximately 180kg of zinc per year to the Nant Symlog.





### Impact on receiving watercourses

Length impacted:	12km
WFD water body ecological status:	
• Clarach – headwaters to tidal limit	Moderate

Flow in the Nant Symlog is lost to ground in a number of places, and can often run dry for stretches. Some of this flow is believed to re-emerge from the airshaft on Bushell's level, while some may re-emerge in the bed of the Nant Symlog as it passes over areas of collapsed workings, resulting in increased metal loading in the stream. Increases in metal loading are also seen in the Nant Symlog as it passes the area of reclaimed spoil tips. It is likely that the highly contaminated springs uncovered during the reclamation scheme continue to discharge to the Nant Symlog in this area.

### Monitoring data

	Nant Symlog		
	Upstream of mine	1.5km downstream of mine	Airshaft discharge
Flow (L/s)	14	60	15
pH	6.6	7.0	7.1
Zinc ( $\mu\text{g/L}$ )	17	160	380
Lead ( $\mu\text{g/L}$ )	53	120	120
Cadmium ( $\mu\text{g/L}$ )	<0.1	0.32	0.64
Zinc load (kg/yr)	20	297	178
Lead load (kg/yr)	66	226	56
Cadmium load (kg/yr)	0.6	0.6	0.3

### Benefits of remediation

- Over 400kg of harmful metals could be prevented from entering the Nant Symlog each year.
- Reduced contaminated sediment load to downstream watercourses.
- Reduced metal load to the Cardigan Bay Special Area of Conservation.
- The receiving water body will be more likely to achieve Good Ecological Status required by the WFD, although there are other mining pressures in the Clarach catchment that will also need to be addressed.

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