

LUGANURE – HAWKROCK

Background information

Mine Name: Luganure & Hawkrock

Mine District: Glendalough

Alternative Names:

Elements of interest:

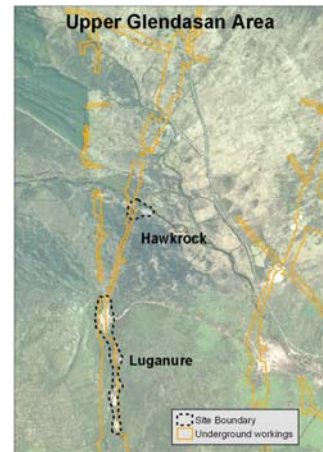
Pb, Zn, Cu, Cd

Project Prefix: GLD-

County:
Wicklow

Townland:
Camaderry

Grid Reference:
E309055, N198177 (Luganure)
E309195, N198887 (Hawkrock)



Site Description and Environmental Setting

Luganure and Hawkrock mine sites (top right and bottom left, respectively, in photo, right) are at the western end of the Glendasan Valley on the northern slopes of Camaderry Mountain. They lie directly south of Ruplagh and, like that site, include some of the most remote sites in the Glendalough district. The sites as defined for the HMS-IRC project cover a total of 4.3 ha, of which 3.4 ha is accounted for by Luganure and 0.9 ha by Hawkrock. In addition to the Luganure and Hawkrock mine sites themselves, smaller satellite sites include those around North Luganure Adit and Cape Horn Shaft (Fig. 1). The Luganure site as well as the workings at the North Luganure Adit and Cape Horn shaft were developed along the Luganure Lode while Hawkrock was developed along the southern part of the Ruplagh Lode.



The Luganure lode was the first to be exploited in Glendasan, possibly as early as 1800 and large-scale mining in the district in the 1820s and 1830s initially centred on this lode. Around 1859 the workings were driven through the south side of Camaderry Mountain to the Glendalough valley site where a crusher and other processing plant had been established. This allowed for greater efficiencies in processing the ore from Luganure. Access to the underground workings at Luganure was by a series of vertically stacked adits driven into the side of Camaderry Mountain from both the north (Luganure) and south (Glendalough) sides. The total vertical extent of the workings is approximately 270m, between the lowermost 2nd Adit and the uppermost Shallow Adit.

As is the case with the Ruplagh site, Luganure and Hawkrock are remarkable for an abundance of extant shafts and adits. The adits are in various states of collapse but their entrances are generally well defined. Some, such as the Luganure Adit (photo, right) or Hawkrock Adit, are accessible for a short distance. All of the shafts are collapsed and/or filled in or else they are flooded and of uncertain status. Both Luganure Adit and Hawkrock Adit discharge small flows of mine water. Reed-filled channels leading from both North Luganure Adit and Cape Horn Shaft suggest these two structures also discharge mine water although none was observed directly. All mine water discharged by shafts or adits ultimately flows into the stream that flows down from Lough Nahangan to the west.

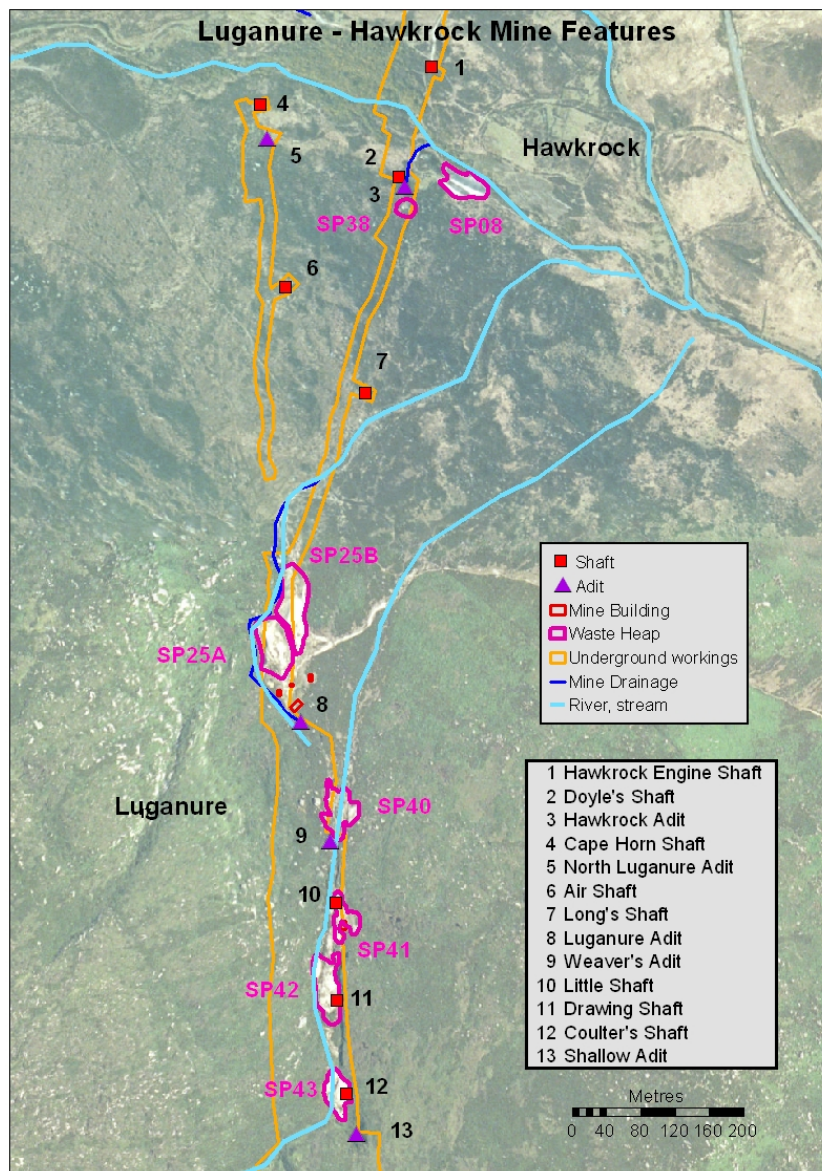


Fig. 1 Luganure and Hawkrock Mine Features

A number of ruined mine buildings still stand on the two sites. At Luganure the low stone-walled ruins of four mine buildings stand on the flat area north of Luganure Adit (photo, right). The largest of them is 12 x 6 m, divided into two rooms. Most appear to have been offices rather than crusher or other processing buildings. At Hawkrock, the ruins of two small buildings stand at the western end of the waste heaps – they are also likely to have been offices rather than processing buildings.



Substantial waste heaps remain on the Luganure and Hawkrock sites and, indeed, the line of the Luganure Lode can be followed southwards from heap to heap up the side of Camaderry Mountain. The waste is typically white or grey quartz- or granite-rich material, similar in appearance to waste elsewhere in the district. The largest waste heaps are those immediately below the Luganure Adit (photo, left). The front lobes of these heaps are around 10m in height. As far as is known, the ore mined at Luganure was not processed there. Initially a tramway ran to the Old Hero Processing site via what is now a walking track that links the two sites. In later years, the ore was taken out from the southern side of the mountain and processed at the Glendalough Valley site. The calculated area and volume of waste heaps are given in Table 1.



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Table 1 Area and volume of spoil heaps at Luganure and Hawkrock

Waste ID	Area (m²)	Volume (m³)
GLD-SP08	1343	1343
GLD-SP38	367	844
GLD-SP25A	2194	5485
GLD-SP25B	2443	6108
GLD-SP40	939	94
GLD-SP41	1656	1656
GLD-SP42	1943	3733
GLD-SP43	1210	3564

Geochemical assessment

Neither Luganure nor Hawkrock were subjected to detailed geochemical studies. Solid waste XRF analyses were not carried out at either site, owing to time constraints. Stream sediments and surface water were each sampled at two sites (Fig. 2).

1. Surface water

Water was sampled at two sites in Hawkrock in both winter and summer (Fig. 2). The Hawkrock adit discharges a steady if relatively low flow, estimated to be below 1 l/s. Flow was significantly higher during winter sampling than in summer. High concentrations of Pb, Zn and Cd were measured in the adit discharge (W040) in both winter and summer (Table 2). The concentrations of both Pb and Zn detected in the stream water downstream of the discharge (W041) in winter were high relative to upstream samples of stream water sampled elsewhere in the district (e.g. Ruplagh). The downstream sample collected in summer did not show significant contamination, possibly a reflection of the lower adit flow rate compared to the winter period. As is the case for all mine water discharges in the Glendasan area, pH is close to neutral in the Hawkrock Adit discharge.

Table 2 Chemistry of water samples, Hawkrock

µg/l	Winter (total metal)				Summer (total metal)			
Sample	Pb	Zn	Cu	Cd	Pb	Zn	Cu	Cd
W040	76	2500	23	26	96	2958	46	31
W041	32	414	25	3	4	73	15	1

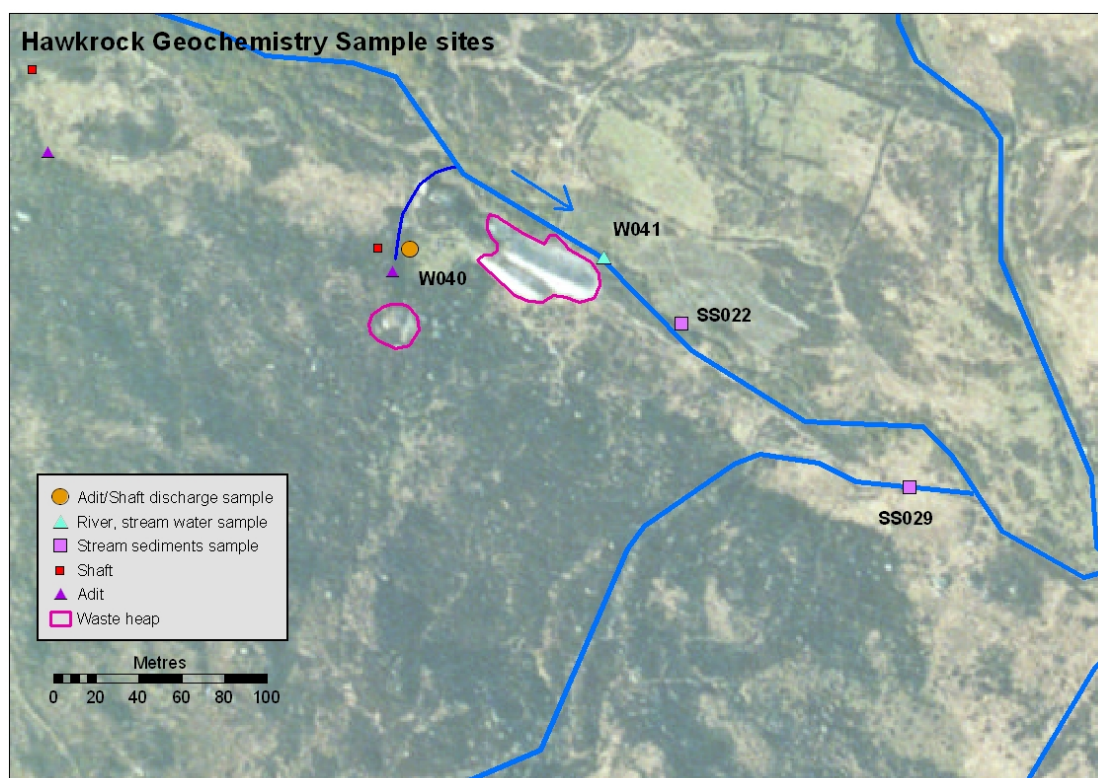


Fig. 2 Geochemical sample sites, Hawkrock

2. Groundwater

No groundwater sources were sampled for the HMS-IRC project nor were any leachate tests carried out.

3. Stream sediments

Stream sediment samples were taken downstream of the Hawkrock site on the stream that flows past it (SS022) and from the stream that is fed by the Luganure Adit discharge (SS029) (Fig. 2). The sediment downstream of Hawkrock had 223 mg/kg Pb, 278 mg/kg Zn and 30 mg/kg Cu, suggesting significant contamination from either solid waste or the adit discharge. The sediment downstream of the Luganure Adit and site had much higher metal concentrations: 562 mg/kg Pb, 1580 mg/kg Zn and 24 mg/kg Cu.

4. Solid Waste

No field XRF analyses were carried out at Luganure or Hawkrock. Data from waste heaps at Ruplagh have been used to score these heaps in the HMS-IRC Site Scoring system.

5. HMS-IRC Site Score

The total site score for Luganure-Hawkrock is 48 (Table 3). The solid waste contributes 44, or over 90%, of the score. The relatively small score for the adit discharge compared to discharges elsewhere in Glendalough reflects the low flow rate and low metal concentration relative to other adit discharges.

Table 3 HMS-IRC Site Scores, Luganure - Hawkrock

Waste	SP08	SP25a	SP25b	SP38	SP40
1. Hazard Score	20	24	24	19	21
2. Pathway Score					
<i>Groundwater</i>	0.84	0.98	1.01	0.69	0.85
<i>Surface Water</i>	6.79	8.03	8.22	3.19	3.79
<i>Air</i>	0.04	0.04	0.04	0.00	0.04
<i>Direct Contact</i>	0.29	0.29	0.29	0.03	0.29
3. Site Score	8	9	10	4	5

Waste	SP41	SP42	SP43	W040	Total
1. Hazard Score	18	22	22	19	189
2. Pathway Score					
<i>Groundwater</i>	0.79	0.92	0.92	0.46	7.46
<i>Surface Water</i>	1.45	1.70	1.69	3.80	38.65
<i>Air</i>	0.01	0.06	0.06		0.29
<i>Direct Contact</i>	0.03	0.29	0.29		1.79
3. Site Score	2	3	3	4	48

Fig. 3 shows the contribution of the different pathways to the total site score at Luganure-Hawkrock. Pathways are the routes by which receptors are exposed to the hazard. As is the case for most sites in the Glendalough District, the surface water pathway (80.2%) is the main contributor to the site score. This reflects proximity of all heaps to the stream system or to drains that link them to the stream system, as well as the fact that concentrations of some metals in the stream at Hawkrock exceed the surface water standard. In addition, the remoteness of the site reduces the influence of the groundwater pathway (15.5%) because the low population density means there are few wells and few inhabitants that can be affected by contaminated groundwater. The Direct Contact pathway is low in spite of the ready accessibility of the site and the popularity of the area with tourists and walkers. This is mainly a consequence of the relatively low metal concentrations in the waste –

there are no accumulations of metal-rich processing waste at Luganure-Hawkrock - and the relatively low surface area of the heaps.

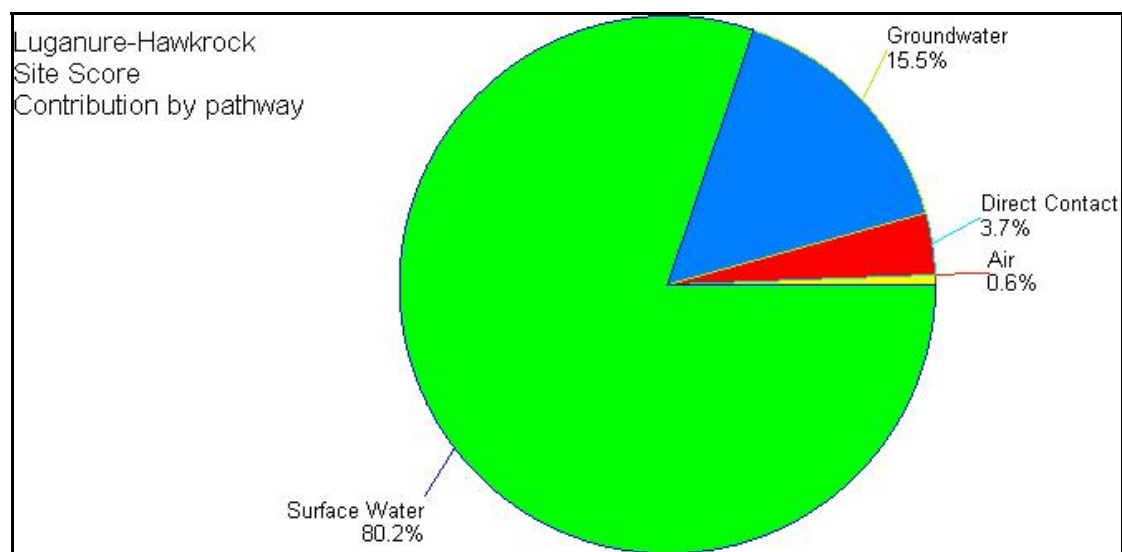


Fig. 3 HMS-IRC Site Score, Luganure-Hawkrock: contribution by pathway

6. Geochemical overview and conclusions

High concentrations of Pb, Zn and Cd were measured in the Hawkrock adit discharge and stream water downstream of the mine site had relatively high concentrations of Pb (32 µg/l) and Zn (414 µg/l), at least in winter. As is the case for all mine water discharges in the Glendasan area, pH is close to neutral in the Hawkrock Adit discharge. The Luganure-Hawkrock site contains several solid waste heaps scattered along the line of the Luganure lode. The largest are found on the main Luganure mine site, in front of the Luganure Adit. These have the highest HMS-IRC scores of any waste in Luganure-Hawkrock. Nevertheless, the total score for Luganure-Hawkrock (48) is among the lowest recorded in the district.