

# TASSAN

## Background information

**Mine Name:** Tassan

**Mine District:** Monaghan

**Alternative Names:**

**Elements of interest:**

Pb, Zn, As

**Project Prefix:** TAS-

**County:**  
Monaghan

**Townland:**  
Tassan

**Grid Reference:**  
E279228, N326112



The Tassan mine is located 1.4 km northeast of Annayalia, a small village on the N2 road north of Castleblayney. Lead and silver were produced here in the mid 19<sup>th</sup> century in what was the most substantial mine in the Monaghan district. Tassan also has the most significant remaining mine features of any site in Monaghan, although these are modest by the standards of mines elsewhere in the country.

## Production and Mining History

The exact starting date of the mine is uncertain but production figures for 1849-51 listed in *Mineral Statistics* (Morris 1984; Morris *et al.* 2002) suggest it may have been in the late 1840s. The mine went through several changes of ownership and breaks in production but appears to have been a successful operation until 1865 or 1866 after which there are no further mentions in production statistics. Total production for the period was 742 tonnes of ore, including 546 tonnes of lead and 37,478g (1322 oz) of silver (Morris 1984). According to Hallissy (1914) the ore consisted of galena (PbS) and sphalerite (ZnS) in a quartz-calcite matrix. An analysis of one sample of galena yielded 190 mg/kg Ag.



The mineralization was hosted by two lodes, each striking northnorthwest and dipping eastwards (Morris 1984), concordant with the regional fracture pattern. The mine appears to have extended to a depth of 160m (90 fathoms) below surface (Morris *et al.* 2002). The site contained a combined engine and crusher house (left) as well as mine offices, workshops and at least five shafts (Fig. 1) (Morris *et al.* 2002).

## Site Description and Environmental Setting

The Tassan site today is largely grassed over (Fig. 1). A large solid waste heap marks the eastern boundary of the site on the west shore of Tassan Lough. Immediately west of this is a sloping field that was once the dressing floor. A low masonry wall below an overgrown mound marks the site of the engine / crusher house (photo, above). Table 1 provides an estimate of solid waste volumes on the site, for the heaps drawn in Fig. 1. Of the shafts marked on the 1857 OS 6-inch map there is no trace. A water-filled depression beside the spoil heap near the lake resembles a filled-in shaft but does not correspond to the location of any shaft marked on the OS maps and may be a recent feature. The most substantial mine feature is the old office building (photo, right). This was in use as a family home until the 1940s but of late has been used as a farm out-building and is in a state of disrepair, with collapsed walls and sagging roof (Morris *et al.* 2002).

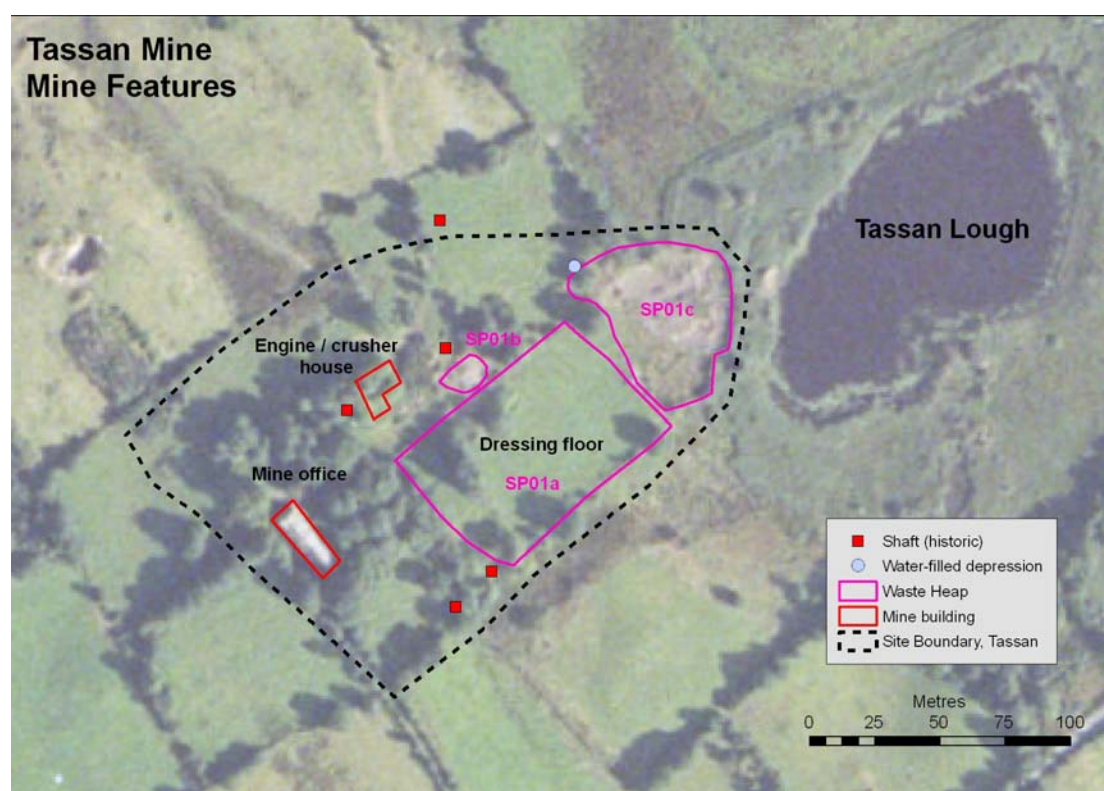


Fig. 1 Tassan Mine Features

Table 1 Area and Volume of solid waste heaps, Tassan

Waste ID	Area (m <sup>2</sup> )	Volume (m <sup>3</sup> )
TAS-07-SP01a	4904	981
TAS-07-SP01b	163	163
TAS-07-SP01c	2125	1062

## Geochemical Assessment

### 1. Surface water

No surface water samples were collected at Tassan. Although it is located beside a small lake there are no streams in the area of the mine and no discharges of water from it.

### 2. Groundwater

Groundwater samples were not collected in the Tassan area. Leachate from a composite sample taken from the main spoil heap beside the lake had low levels of dissolved metals: 16 µg/l Pb and 20 µg/l Zn. The Pb concentration exceeds the limit set by the Draft EC Surface Water Regulations (7.2 µg/l).

### 3. Stream sediments

A regional stream sediment geochemical survey was conducted in the Longford-Down Inlier in 1984. Four samples were collected in the vicinity of the Tassan deposit (Fig. 2), two downstream of it (sites 1 and 2 on Fig. 2) and two from streams that do not appear to drain any known mine sites. Table 2 summarizes the results for the four samples. All samples have concentrations of Pb and Zn that exceed expected background values, as indicated by the median concentrations for all samples taken from the Longford-Down Inlier. Those from streams draining the Tassan site or its immediate vicinity have significantly higher concentrations of both Zn and Pb, with 610 mg/kg Pb and 2865 mg/kg Zn 750m downstream of Tassan Lough. None of these concentrations exceed the limits for Pb (1,000 mg/kg) or Zn (5,000 mg/kg) used for this project. These limits are based on exposure levels considered safe for livestock.

**Table 2 Stream sediment geochemistry, Tassan**

mg/kg	Pb	Zn	Ag
Site 1 (750m d/stream)	610	2865	< 0.1
Site 2 (1300m d/stream)	396	1422	< 0.1
Site 3	134	859	< 0.1
Site 4	213	925	< 0.1
Longford-Down median (n=386)	55	213	< 0.1





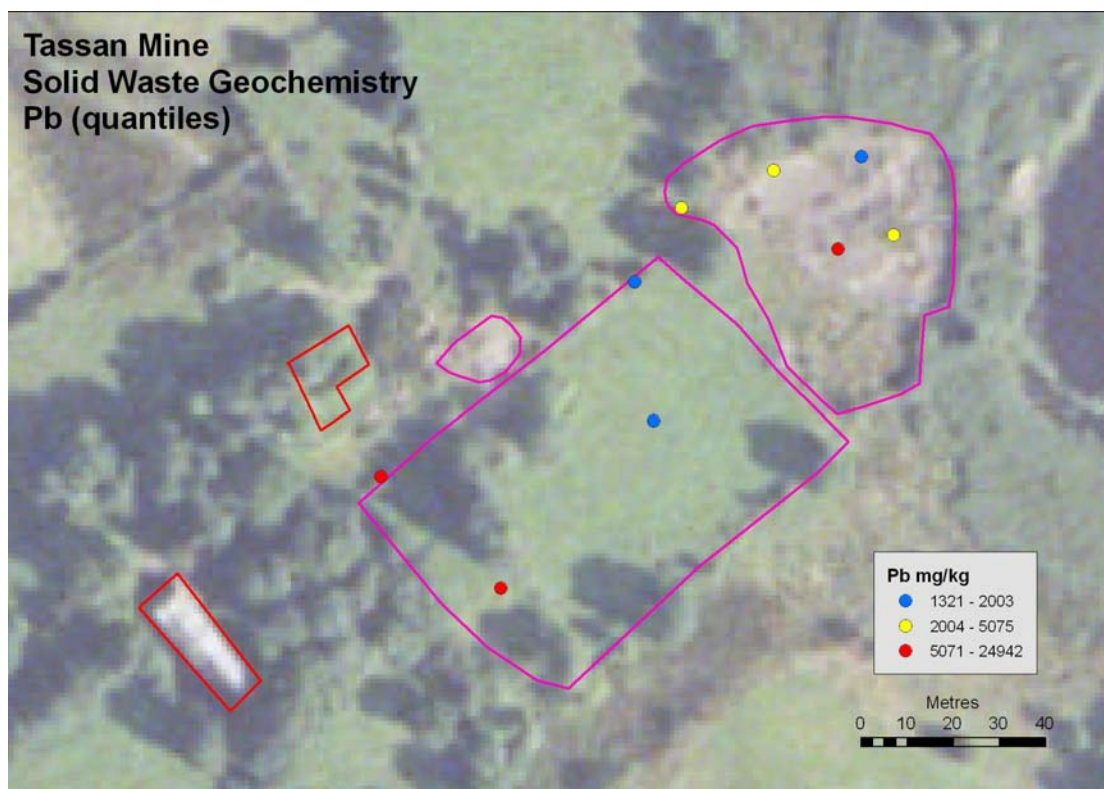
Fig. 2 Tassan stream sediment sample sites

#### 4. Solid waste

Nine *in situ* XRF analyses were carried out on the Tassan site, five on the main spoil heap beside the lake and four on the former dressing floor (Fig. 3; Table 2). The spoil heap comprises 100-300mm-sized clasts of light brown greywacke in a clay-sand matrix. One sample had a measured Pb concentration of 2.5% but the remainder generally had 5,000 mg/kg Pb or less. Zn concentrations did not exceed 9000 mg/kg. The maximum As concentration was 217 mg/kg. Most other elements were present in low concentrations and Ag, a product of mining, was not detected in any sample. In the case of the dressing floor, the grass sod was removed and analysis carried out on the soil at the base of the root zone. Fragments of spoil, including quartz, were clearly visible in the clay below the grass. Measured element concentrations were generally lower than those on the spoil heap except for one sample that had more than 1% Pb, 3090 mg/kg Zn and 320 mg/kg As.

Table 3 Summary statistics, *in situ* XRF analyses, Tassan

mg/kg	Pb	Zn	As
n	9	9	9
Minimum	1321	596	0.0
Maximum	24942	8889	320
Median	4772	3093	47
Mean	6728	4329	96



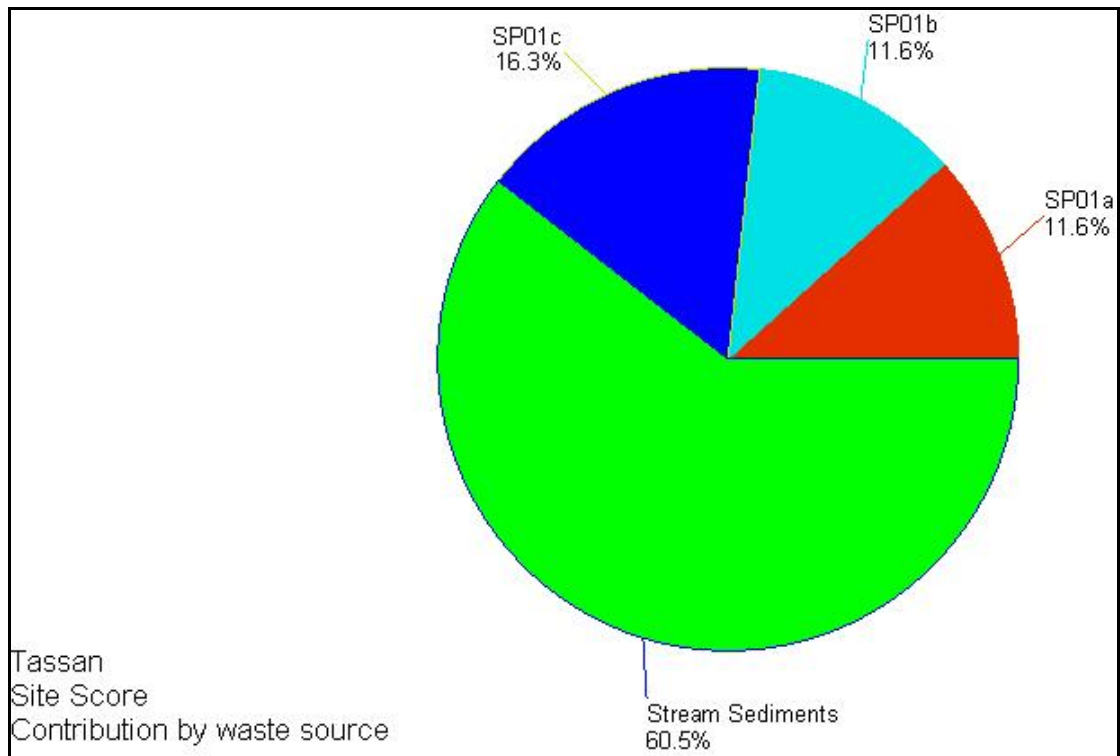
**Fig. 3** Distribution of Pb in solid waste samples, Tassan

## 5. HMS-IRC Site Score

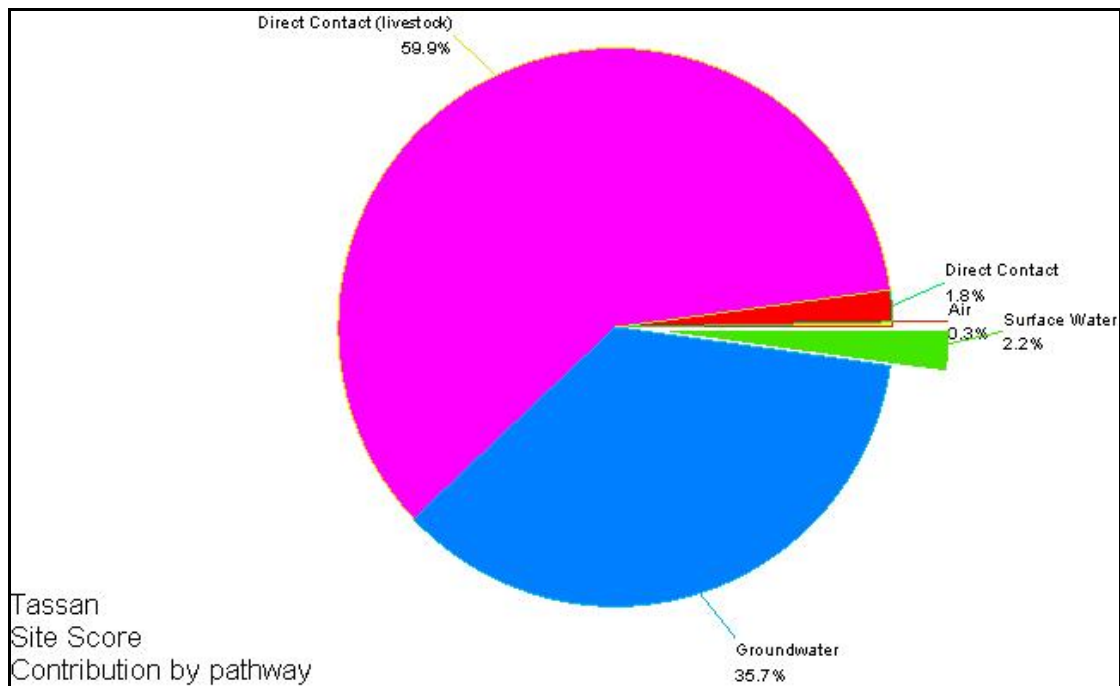
The total HMS-IRC Site Score for Tassan is 43, with contributions from the solid waste (17) and the stream sediments (26) (Table 4). The relatively high score for stream sediments (60% of the total; Fig. 4) reflects the extent of contamination of the stream system downstream of Tassan.

**Table 4** HMS-IRC Site Score, Tassan

Waste	SP01a	SP01b	SP01c	Stream Sediment	Total
<b>1. Hazard Score</b>	22	22	24	131	199
<b>2. Pathway Score</b>					
<i>Groundwater</i>	4.67	5.22	5.71		15.60
<i>Surface Water</i>	0.13	0.13	0.70		0.96
<i>Air</i>	0.01	0.00	0.12		0.13
<i>Direct Contact</i>	0.43	0.04	0.33		0.81
<i>Direct Contact (livestock)</i>				26.16	26.15
<b>3. Site Score</b>	<b>5</b>	<b>5</b>	<b>7</b>	<b>26</b>	<b>44</b>



**Fig. 4 Tassan Site Score: contribution by waste source**



**Fig. 5 Tassan Site Score: contribution by pathway**

The large relative score for stream sediments means that the Direct Contact (livestock) pathway comprises 60% of the total pathway score for Tassan. The lack of any stream near or direct surface water drainage from the Tassan site means that the surface water pathway comprises a very small proportion (2.2%) to the overall site score, only slightly more than the Direct Contact pathway (Fig. 5). The groundwater pathway contributes 35.7% or most of the rest of the total pathway

score for the site (Fig. 5). The dominance of the Direct Contact (livestock) score is somewhat unusual. Without any stream sediment score at Tassan, the groundwater pathway would comprise almost 90% of the total pathway score.

## **6. Geochemical overview and conclusions**

Tassan mine was the largest and most productive of the Monaghan District mines. Concentrations of Pb and Zn in the sediments of streams draining the site are much higher than regional medians and suggest a direct input from mining. However, sediments elsewhere in the area, in streams not directly draining the mine site, also have Pb and Zn concentrations well above regional median values, though they are considerably lower than those downstream of the mine. Very high (2.5%) concentrations of Pb have been measured in solid waste on the surface of the site as well as in soil on top of the former dressing floor. Concentrations of other elements are generally moderate, except perhaps for As which has been measured at concentrations exceeding 300 mg/kg. A leachate test on the spoil at Tassan suggests very limited potential for groundwater contamination.

## **References**

Morris, J.H. (1984). The Metallic Mineral Deposits of the Lower Palaeozoic Longford-Down Inlier, in the Republic of Ireland. Geological Survey of Ireland Report Series RS 84/1 (Mineral Resources), pp72.

Morris, J.H., Lally, P. and Cowman, D. (2002). A history and survey of mine buildings at the Tassan mine, Co. Monaghan. Journal of the Mining Heritage Trust of Ireland, 2, 41 – 49.