REHAB1997-03

ABERFOYLE RESOURCES LTD

SITE REHABILITATION PLAN

QUEEN HILL ZEEHAN

1997

Prepared By:
ABERFOYLE RESOURCES LTD

Aberfoyle Resources Ltd : site **rehabilitation** plan Queen Hill, Zeehan / prepared by **Aberfoyle** Resources Ltd 1997

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1. INTRODUCTION

1.1 HISTORICAL BACKGROUND

The Zeehan area has an extensive mining history. The area under consideration in this plan is 36 M/81, otherwise known as Queen Hill. This lease is jointly held by Aberfoyle Exploration Pty Ltd. and Gippsland Resources Australia NL. Lease boundaries are indicated in Figure 1.2. The lease lies approximately five kilometres west of Zeehan.

Mineral production in the Zeehan field was extremely high. This was also true of Queen Hill. In the years between 1902 and 1929, 16,532 tonnes of lead and 1,973,746 ounces of silver were taken from Queen Hill. See Table 1.1.

A Joint Venture began in 1972 between Aberfoyle Ltd. and Gippsland Oil and Minerals NL, both hoping to capitalise on the estimated large tin resource. Aberfoyle's Joint Venture interest totalled 70%. A comprehensive drilling programme established the size of the resource. Three separate bodies of mineralisation were identified with a total of 7.3 million tonnes at 0.7 % Sn.

A bulk sample was taken from the Queen Hill lease with the intention of investigating the feasibility of matt fuming as a tin extraction process. Following agreement with Western Mining Corporation Limited, a trial plant was constructed at the Kalgoorlie smelter operated by that company. This plant treated test parcels of material from the Queen Hill prospect.

The Queen Hill trial excavation was completed on October 31, 1980. A total of 1265 tonnes at 0.6% Sn was removed.

By 1983 the collapse of the tin price, and its predicted grim future, forced all work at Zeehan to come to a halt. Aberfoyle decided against pursuing any further tin projects.

1.2 WEST COAST CLIMATE

The climate of the West Coast Region is classified as temperate maritime. Close proximity to the Southern Ocean produces milder winters and cooler summers than in continental climates of the same latitude although this effect diminishes with altitude and distance from the coast. Temperatures range from an average of 8°C in winter to an average of 15°C in summer. Yearly rainfall is nearly 3000 mm. The climate should not have a detrimental effect on the rehabilitation of the site.

1.3 LEGISLATION AND REGULATIONS

The principle acts with relevance to the rehabilitation are:

Mining Act 1929
Mines Inspection Act 1968 and the 1992 Regulations
Environment Protection Act 1973
Environment Protection Regulations 1974
Environmental Management and Pollution Control Act 1994.

Table 1.1 PRODUCTION IN ZEEHAN FIELD

NAME	LEAD (tonnes)	SILVER (oz)	PRODUCTION YEARS
Montana Silver Lead	2,304	279,348	1899 – 1958
Zeehan Western	26,300	4,800,000	1901 – 1928
Junction	15	8,728	1888 – 1906
Zeehan – Montana	49,580	7,058,122	1892 – 1936
Oonah	11,724	2,050,135	1888 – 1925
Queen	16,532	1,973,746	1902 – 1929
Mt. Zeehan	1,540	166,850	1883 – 1893
Despatch	No recorded Production		
New Great Eastern	No ore produced		
Tasmanian Crown	113	15,737	1893 – 1956
Florence	10,200	1,400,000	1900 – 1910
Argent No.2	1,750	207,347	1899 – 1925
Argent No.5	1,100	170,000	1915 – 1917
Argent No.6	1,398	183,763	1920 – 1925
Spray Brittania Mt Zeehan	41,700	6,456,674	1893 – 1923
Nike	2,149	225,830	1896 – 1954
Grubbs Colonel North	1,534	127,225	1890 – 1909
Victoria Zeehan	15	850	
Nubeena	325	42,000	1894 – 1910
Montague No.1	115	1,500	1887 – 1894
Maxim	60	10,000	1890 – 1910
Watt & McAuliffs & North Austral	250	50,000	1901 – 1905
Austral Valley	800	33,000	1907 – 1913
Silver King	5,000	350,000	1887 – 1908
Zeehan Bell	600	27,500	1890 – 1908
Sunrise	36	4,760	1892 – 1910
Oceana	14,902	614,981	1893 – 1960
TOTALS	**19,042**	**26,258,096**	

From Aberfoyle Exploration, Summary Map showing known Silver – Lead Production in Zeehan Area, March 1981.

1.4 CONTEXT OF REHABILITATION PLAN

This plan has been prepared by Aberfoyle Resources Limited for submission to the Department. It presents a rehabilitation plan for the Lease area. The Rehabilitation Plan has been drawn up using the best knowledge available at the time; as the work progresses circumstances found and/or changing ideas may dictate modifications to the Plan.

It is understood some surrounding areas may be of historical value and so rehabilitation is to be limited only to the area disturbed by the Joint Venturers.

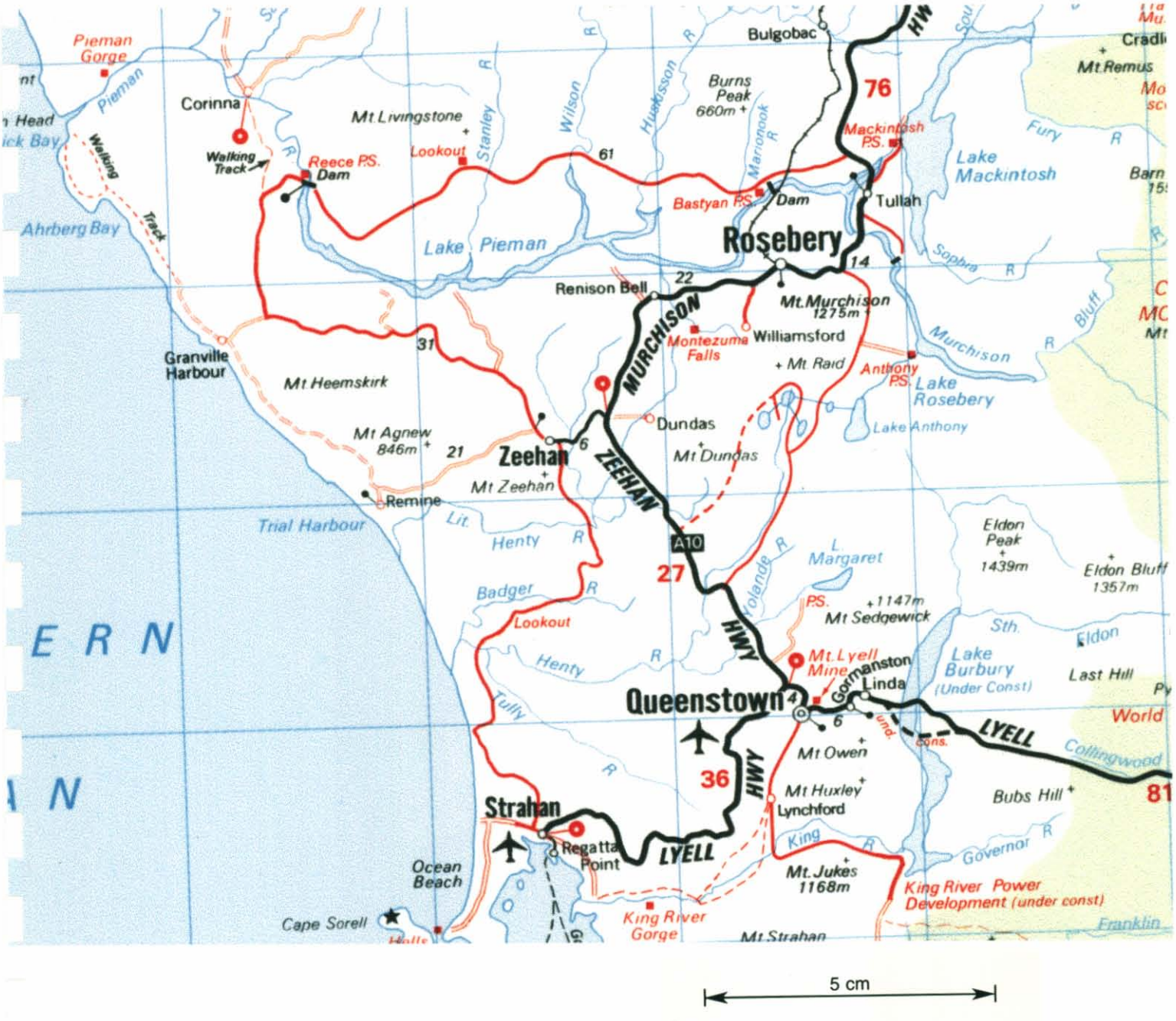
1.5 PLAN OBJECTIVES

The broad long term rehabilitation objective is, after stabilising disturbed areas, to provide an environment which assists and promotes ecological succession and stability.

The specific objectives of the plan are to leave disturbed areas in a condition which achieve the following:

- Environmental Stability – The long term stabilisation of all disturbed surfaces to prevent on-going contamination of the environment. Covering, revegetation, and erosion protection will achieve this.
- Satisfy Statutory Obligations – To revegetate all disturbed surfaces to the satisfaction of the Director of Environmental Control and the Director of Mines.
- Minimise Visual Impact – To minimise the visual impact of disturbed areas from the major vantage points. This will be achieved by revegetation and screening.
- Public Safety – To ensure the disturbed areas are safe for anticipated after uses of these areas.
- Compatible Land Use – To return the disturbed land to a compatible land use. Rehabilitation plans acknowledge potential future land uses, one of which may be mining.

Figure 1.1 Approximate Location of Mining Lease 36M/81



MINOPS
35M/72

JUNCTION
low grade
flux ore

Galena ore
Average assay as

CONAH
BROADSHAWS
Open Cut

CONAH

ZEEHAN
MONTANA MINE

MONTANA No 1

No.5 QUEEN

CROWN

DESPATCH

RENISON LTD
68M/73
SAND & STONE
LEASE

No 2
MONTANA

QUEEN

STORMSDOWN
Open Cut

No.2 QUEEN

No.3 QUEEN

No.4 QUEEN

PAYNES
Open Cut

QUEEN EXT

NEW MT ZEEHAN
50M/76

KING EXT'D

WILLIAM
SHAFT

CONSOLIDATED LEASE
36M/81

No 4 ARGENT

QUEEN EXT'D

FLORENCE

FLAHERTY

ARGENT

No 2 ARGENT

No 3 ARGENT

No 5 ARGENT

No 6 ARGENT

FLORENCE

SILVER
QUEEN

ASTLES
SHAFT

MANGANESE

MOYLES

No 1 SPRAY

49M/75 J.D. CLARK
SPRAY

MT ZEEHAN (TAS.)

5 cm

Figure 1.2 Consolidated Lease 36/M 81

Aberfoyle Exploration Pty Ltd

Drawn: P.J.E	NORTH WEST TASMANIA	Location code:
Traced: P.J.E	CONSOLIDATED LEASE 36M/81	Date: March, 1990
Checked:	Summary Map showing known Silver-Lead Production - Zeehan area	Scale: 1:10,000
Revised by: Date		Plate No: QH 151

2. SITE DESCRIPTIONS

2.1 REHABILITATION AREAS

2.1.1 BENCHED AREA OF HILLSIDE

The area is approximately 120m in length. The south end has six benches, each approximately 5m in width and 40m long. The total area to be rehabilitated is approximately 0.5 ha. The surface is barren rock or is covered with oxidised mullock containing sulphides. There is no soil and consequently revegetation is almost non existent. Drainage is uncontrolled and causing erosion in places.

The slopes consist of broken rock fragments of varying sizes consisting for the most part of quartzite and black shale, which constitute the bedrock under the slopes. Apart from these relatively unreactive host rocks, blocks of mineralised rock containing sulfide minerals are present, which are in a state of advanced physical weathering. The fragmentary nature of this material increases the available surface area for oxidation and the production of acid drainage.[1]

Rehabilitation

Drainage for the area must be addressed. At present, there exist incisions made by small streams cutting through the waste. Steep slope angles and the absence of vegetation makes these slopes prone to fluvial erosion. In times of strong rainfall a lot of surface runoff occurs in a large number of small streams, some of which have cut quite deeply into the surface.[2]

Recontouring of the area will be undertaken. The benches will be recontoured to a slope fitting to the surroundings. This should also aid revegetation. On the disturbed area there remain several spoil heaps. A decision must be made whether it is more beneficial to push these over and risk exposing more sulphide material or to leave the piles. It would seem appropriate to push and spread the heaps over a small area to enable the placement of a clay cover as a growth medium.

Application of growth medium. Following the recontouring of the area a growth medium shall be applied. The disturbed area is a very harsh environment for plant establishment. The acid conditions and the associated presence of toxic levels of trace elements and low availability of major nutrients as well as the poor physical characteristics of the spoil are the major reasons for the lack of vegetation establishment. Topsoil is not readily available in the area and peat obtained from the Hellyer minesite has been considered for the area should no closer source be found.

Seeding with local provenance seed will ensure the stability of the site and limit visual disturbance. Some native vegetation reclamation has occurred around the disturbed area. This appears to have been restricted by the lack of soil and nutrients. Following the preparation of the area as described above, local natives should begin colonising the area and establishing themselves quite well.

Species to be sown will be selected from the following:

Acacia dealbata	Callistemon pallidus
Acacia melanoxylon	Cassia aculeata
Acacia mucronata	Eucalyptus delegatensis
Acacia verticillata	Eucalyptus nitida
Leptospermum glaucescens	Leptospermum nitidum
Leptospermum scoparium	

If, through inspection, it is deemed necessary an application of fertiliser shall occur.

2.1.2 OLD STOCKPILE AREA

The old stockpile area is roughly L shaped and covers about 0.5Ha. The ground is near flat and has one large and four small remnant mullock or ore dumps.

Adjacent to this area is a naturally formed wetland. The vegetation in this wetland area mostly consists of Restio tetraphyllus, an extremely acid tolerant plant. All rehabilitation work done in the area will be considerate of this wetland area. It is this wetland which receives runoff from the minesite and the relatively insignificant flows from the adit.

Rehabilitation

Deep ripping the area will be necessary. The ground has become quite compacted through trafficking and its use as a stockpile area. Ripping assists plant development by aerating the soil, increasing water infiltration and removing the physical barrier to the plant roots. Cultivation of the site should lead to less erosion as there will be no free running surface flows.

Application of growth medium. The stockpile area is nutrient and structurally poor. Peat or clay, as a growth medium will be applied to the area. Peat has a much greater capacity to support and sustain plant growth without continual maintenance. Clay may be obtainable locally. If not, this medium is likely to be obtained from the Hellyer site and trucked to Zeehan.

Seeding. Local native seed will be sown on the disturbed area. Some native vegetation reclamation has occurred around the disturbed area. The seed should be of the same mix as that applied to the hillside area. The seed will be collected from the area surrounding the disturbed site.

2.1.3 ADIT ENTRANCE

The entrance to the old adit is approximately 2 x 1.2m and is approached along a 20m long trench. The adit is discharging approximately 0.2L/s of clear but acidic water.

Rehabilitation

Drainage. Once it has been established the adit is not home to wildlife it is intended that this adit be filled in with inert free draining aggregate. Though the amount of water flowing from the adit is quite small it would seem more appropriate to continue to allow this water to flow rather than risk a build up of water behind an impermeable barrier.

Recontouring. The ground will be recontoured to blend with the surroundings. The fill will consist of approximately 50m^3 of free draining basalt.

Application of growth medium. Upon establishment of the final landform, the area shall undergo revegetation. This shall consist of the placing of a growth medium on the area to provide nutrients and an appropriate structure for root stability. Once again the growth medium is likely to be peat unless a local source of topsoil can be accessed.

Seeding. The area will be sown with local provenance seed to ensure the stability of the fill and limit the visual disturbance.

2.1.4 DRILL SITES

Numerous drill holes exist within the lease area. Many of these predate Aberfoyle's occupancy. Standard practice for exploration drilling, in the 1970s to early 1980s, was to leave an exposed collar pipe after drilling was completed. None of the existing holes were capped or rehabilitated. The native vegetation has reclaimed many of these small areas of disturbance.

Rehabilitation

Rehabilitation of remaining exposed drill sites will consist of:

Capping. The exposed collar pipe will be plugged with concrete or if possible have a removable lid fitted for future access.

Recontouring. If the area surrounding the drill hole has not been colonised by surrounding species the site will be recontoured to blend with the surroundings.

Application of growth medium. If the site remains accessible, and it would not cause further disturbance, a layer of topsoil or peat shall be applied to assist in the establishment of vegetation.

Seeding. The site will be sown with native, local species such as those mentioned earlier for the rehabilitation of benched areas.

2.1.5 ACCESS ROAD

The access road is to be the final area to undergo rehabilitation. The road runs off Trial Harbour Road into the bulk sample area, approximately 500 metres.

Rehabilitation

Drainage for the area is to be incorporated into the drainage for that of area 1.

The access road will require ripping because of the compaction sustained over the years. This will be undertaken in the same manner as area 1 (hillside area).

Application of growth medium. Peat or clay, as a growth medium, will be applied to the area. Peat has a much greater capacity to support and sustain plant growth without continual maintenance. Again, this medium is likely to be obtained from the Hellyer site and trucked to Zeehan.

Seeding with local provenance seed will ensure the stability of the site and limit visual disturbance. Seed mixes for this area shall be as those for the benched area of the hillside.

Figure 2.1 View of Benched Area of Hillside

Figure 2.2 Stockpile Area (at base of hill)

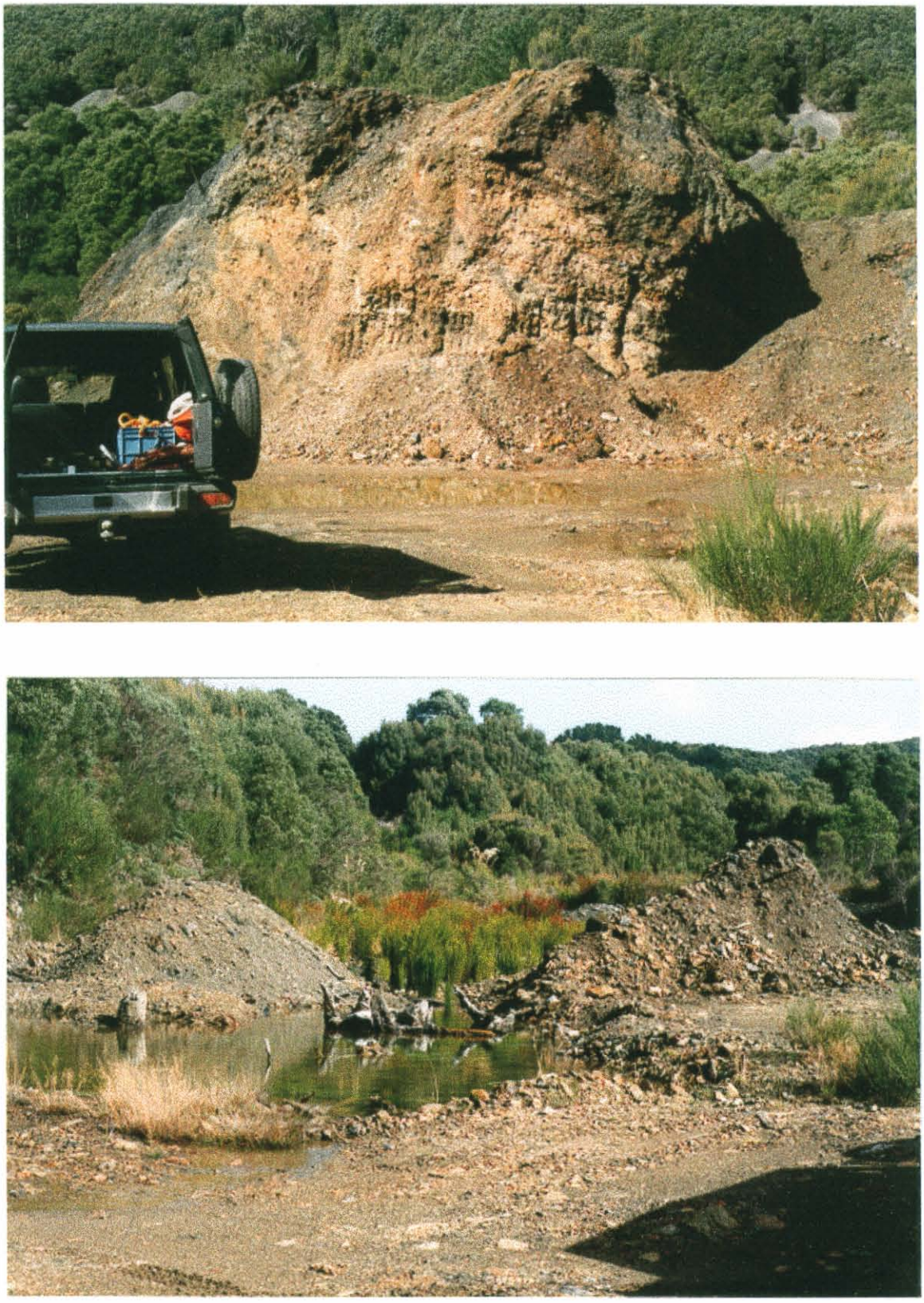


Figure 2.3 Stockpile Area Showing Remnant Mullock Heaps

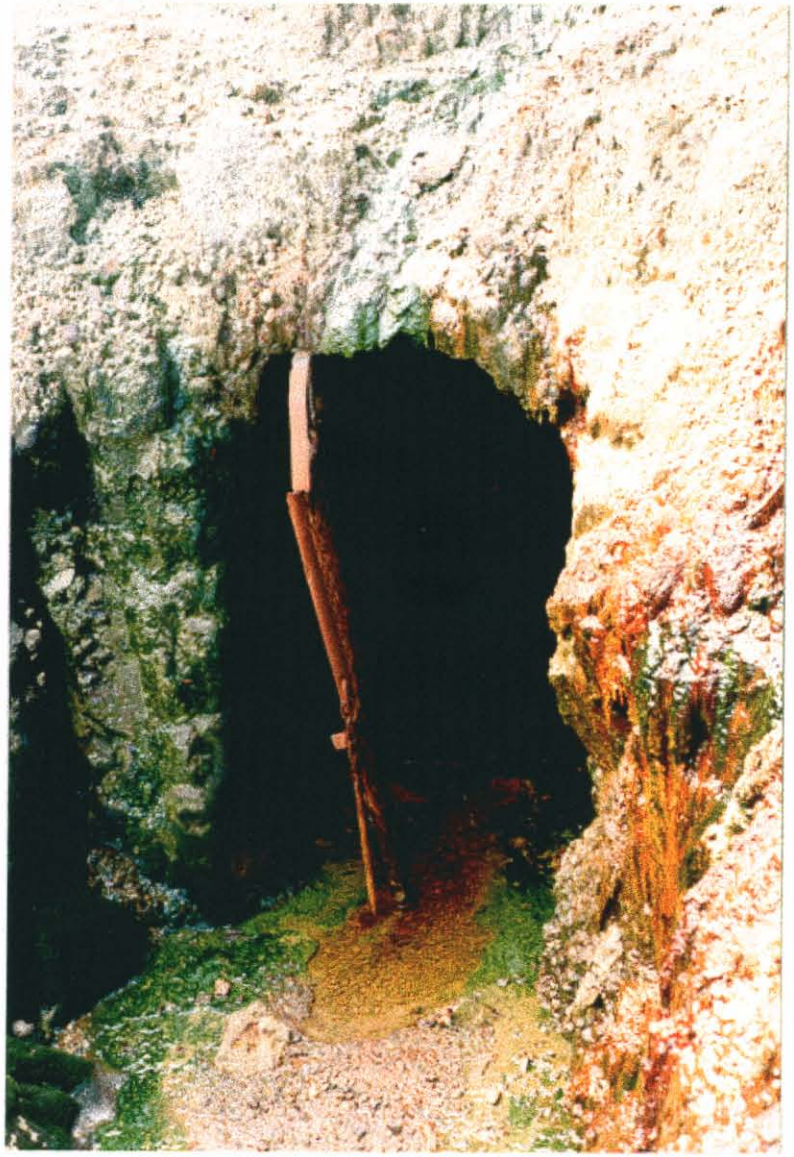


Figure 2.4 Queen Hill Adit

Figure 2.5 Winter Flow From Queen Hill Adit

3. MONITORING AND MAINTENANCE

3.1 MONITORING

Monitoring will be required; firstly to establish the success of the rehabilitation work, secondly to determine any follow up maintenance required, and thirdly to determine whether the rehabilitation is satisfactory for the purposes of relinquishing the lease.

Monitoring will include revegetation success and also stability.

3.2 MAINTENANCE

The task of stabilising and then establishing a permanent self-sustaining vegetation cover will be followed by a maintenance period. Aberfoyle is proposing to retain a Mining Lease over the area until the rehabilitation is complete.

The maintenance programme will need to take into account the following:

- Erosion control and stability – affected areas impacting on water quality may need remedial works.
- Soil quality degradation – areas which have been affected by oxidation may require amendment.
- Replanting / Reseeding – areas which have failed to revegetate will require a follow up treatment.
- Fertiliser application – a single application is unlikely to be sufficient to maintain the plant nutritional needs in some areas.

ENDNOTES

[1] Ladiges, Sven, "Heavy Metal Level in Stream Waters, Vegetation, Soil and Soil Solutions in an Evolving Wetland, Zeehan, Tasmania.

[2] Ladiges, Sven, "Heavy Metal Level in Stream Waters, Vegetation, Soil and Soil Solutions in an Evolving Wetland, Zeehan, Tasmania.