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AUSTMIN RESOURCES NL

ANNUAL REPORT ON EXPLORATION

EL12/88 MOUNT BLACK, TASMANIA

PERIOD SEPTEMBER 1989 TO AUGUST 1990

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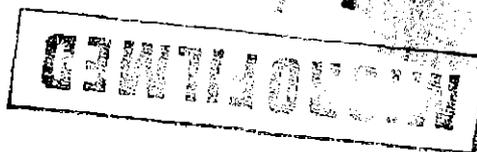
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S U M M A R Y

EL12/88, Mt Black, covers an area of Central Belt Volcanic rocks that are prospective for volcanogenic massive sulphide deposits. It also covers the northerly extension of the Rosebery Mine host stratigraphy.

Following negative diamond drilling results within the Central Volcanics sequence, attention has been shifted towards the northerly extension of the Rosebery Mine sequence, in the light of the development of an ore genesis model and the re-interpretation of the 1984 Dighem magnetic data.

A deep drilling programme is planned to test the projected northerly extension of the Rosebery Mine sequence, and this will be implemented by Pasminco Exploration Ltd, Austmin's new joint venture partner in the project.



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## 1. Introduction & Exploration Philosophy

EL12/88, known as the Mt Black area was acquired through the ETA tender system by a joint venture comprising Climax Mining Ltd and Austmin Resources NL, following an assessment of Open File data. It was concluded from the review that a number of unexplained UTEM anomalies, which were in part coincident with a broad zone of weakly anomalous Pb-, Zn- and Cu-in-soil, were possibly due to volcanogenic sulphide mineralization, and were worth drill testing.

A diamond drilling programme to test the anomalies, which were all located in steep, thickly forested country on the north-eastern slopes of Mt Black was drawn up on this basis and subsequently completed around July 1989, with negative results.

Following the drilling programme, a programme of vegetation rehabilitation on previous drill sites was commenced, and all previous exploration data for the area covering the northerly extension of the Rosebery Mine stratigraphy has been evaluated with a view to planning and conducting a deep diamond drilling programme.

The main target in EL12/88 is a gold-rich, volcanogenic, massive base metal sulphide deposit hosted by units of the Mount Read Volcanics. The target is expected to have similar character to the nearby deposits at Rosebery, Que River and Hellyer. The massive sulphide deposit may have a stockwork feeder zone in the stratigraphic footwall. Mt Lyell-style disseminated copper-gold, breccia hosted, and epithermal/hydrothermal gold deposits have also been considered as targets.

2. Title

EL12/88 of 23 square kilometres was granted on 2nd September, 1988 following the successful joint tender by Climax Mining Ltd and Austmin Resources NL ("Austmin"), for adjoining parts of ETA's 31, Rosebery and ETA 38, Marionoak River. The Licence area covers parts of three current mining leases, held by Pasminco Ltd ("Pasminco"), which surround the Rosebery mine (see Figure 1).

Climax withdrew from the joint venture during March 1990, leaving Austmin with outright ownership.

During June 1990, Austmin formed a joint venture with Pasminco whereby Pasminco has secured the right to confirm a 60 percent interest in EL12/88 by spending \$300,000 upon exploration.

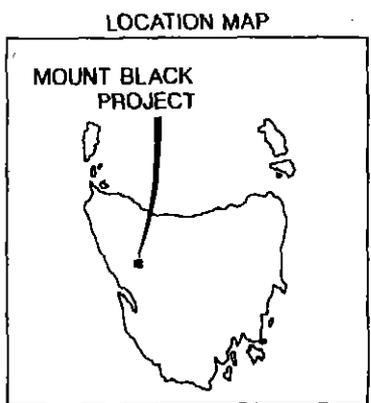
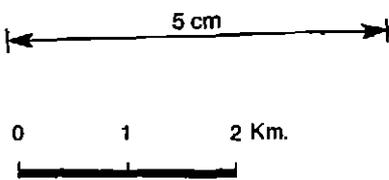
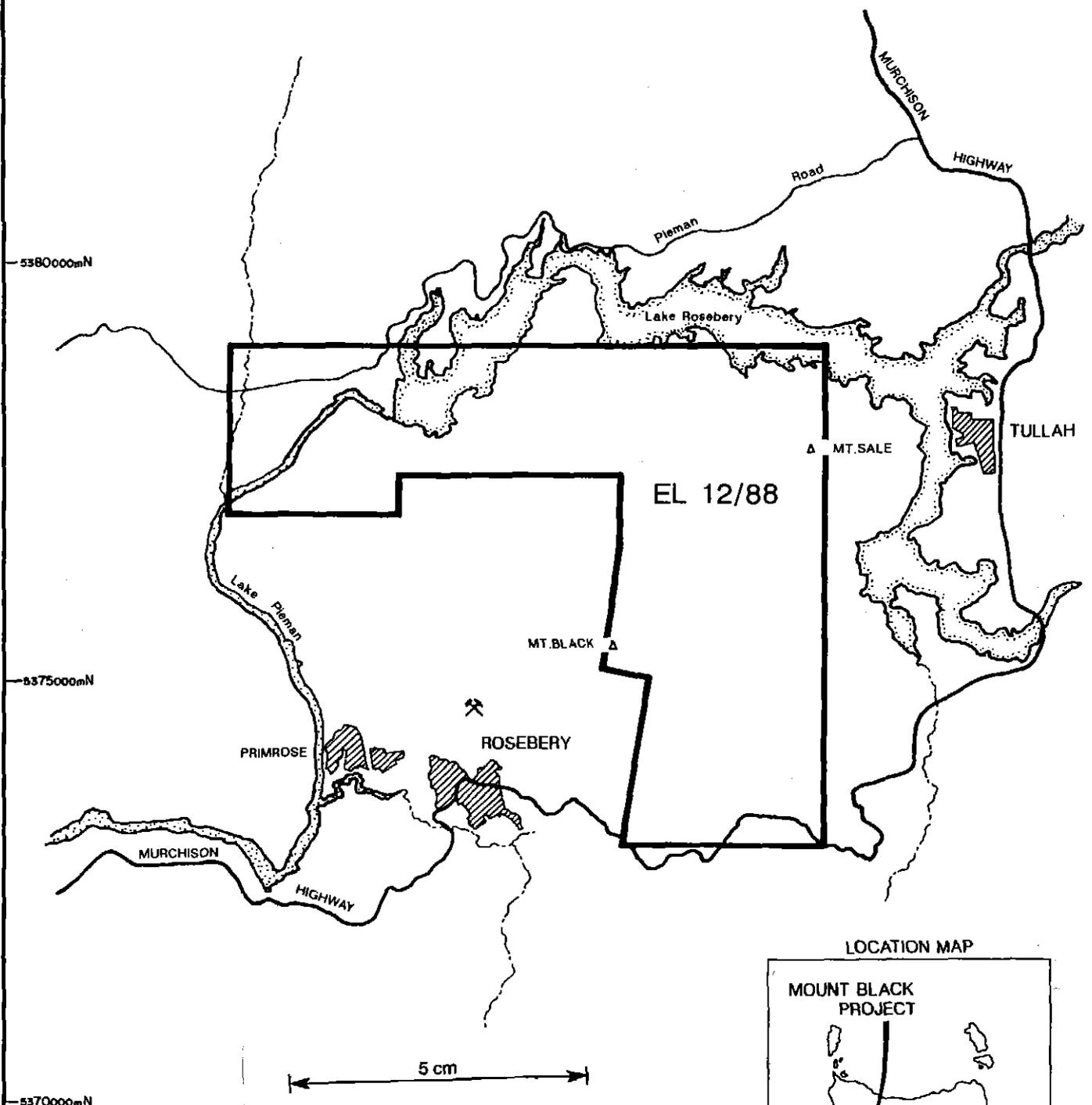
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**AUSTMIN RESOURCES NL**  
**TASMANIA**  
**MT. BLACK - EL 12/88**

**LOCATION MAP**

Figure 1

### 3. Previous Exploration

EL12/88 was once a part of EL1/62 originally held by the EZ Co and explored in the later years with assistance from joint venture partners Getty and Billiton Australia. Previous work, which included geological mapping, geochemical sampling, airborne and ground geophysical surveys, and drilling had generated a large data-base. This work is summarised in Table 1 and on Figs. 2 to 4.

The area is for the most part heavily vegetated and this, together with a local cover of glacial debris, has made it difficult for previous explorers to make meaningful detailed geological maps of all but relatively small grid areas. In general, exposure is so poor as to often render the interpretative maps meaningless.

Most recent work has been carried out on grid lines that were oriented AMG grid north and cleared for single file access. The base-line is 582,000 metres east and has been pegged at 100m intervals. East-west cross lines at spacing varying from 100 to 500 metres have been pegged and flagged at 50 metre intervals.

During the 1988/89 year Climax, on behalf of the Climax-Austmin joint venture, completed a programme of four diamond drill holes, aimed to test four coincident Utem-geochemically anomalous zones within the Mt Black volcanics sequence. No encouraging intersections were obtained. The drill hole locations for holes MBD1 to 4 are shown on Fig. 2.

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TABLE 1

## EL12/88 - SUMMARY OF PREVIOUS EXPLORATION

TCR	YEAR	COMPANY	WORK DONE	RESULTS
87-2752	1987	Billiton-EZ	UTEM, CSAMT Robbies Ck, 1 DDH RED87-1 (607m)	Intersect 41m shear zone with magnetite pyrite
86-2622	1986	Billiton-EZ	UTEM 22 loops over EL1/62, select SIROTEM, BLEG gravels	Numerous weak UTEM responses recorded
85-2516	1985	EZ-Getty	Mapping creek sampling VLF, mags-Mt Black; DDH's Cutty Sark, Bobadil	No significant mineralisation in DDH's; weak EM responses
85-2313	1984	EZ-Getty	Dighem III; UTEM, 2 DDH's-Cutty Sark; VLF - Mt Black; DDH - Bobadil;	No significant mineralisation in DDH's Best intercept 20m @ 0.32%Zn
82-1738	1981	EZ-Getty	IP, soil samples, pits at Mt Sale;	No significant anomalies recorded
80-1468	1980	EZ-Getty	Langdons, Mt Sale mapping; soils, grad. IP	
80-1411	1979	EZ-Getty	Aeromagnetics, photogeol; INPUT Rosebery IP, soils., mapping-Cutty Sark; mags, IP soils, map Mt Sale area	Soil anomalies, magnetic anomalies Cutty Sark
79-1366	1979	EZ	Dipole-dipole IP Mt Black	IP responses downgraded
79-1342	1979	EZ	Gradient array EIP, magnetics-Mt Black, Langdons, Mt Sale	Numerous IP responses recorded
75-1126	1975	EZ	IP, soil sampling Bobadil area	Cu, Pb, Zn anomalies recorded
73- 959	1973	EZ	Mapping, TURAM, IP, DDH's Rosebery area	Palaeogeographic model outlined
72- 864	1972	EZ	Selected Turair Airborne EM, magnetics	Several weak conductors defined
71- 785	1971	EZ	Geol. mapping; reg stream sampling Cu, Pb, Zn, Mn	Pb, Zn, Mn anomalies recorded; low density
65- 407	1965	EZ	Selected IP surveys	

#### 4. Work Completed

In the period September 1989 to August 1990, the following work has been undertaken:

- (a) Climax - Austmin joint venture (managed by Climax)
  - (i) Compilation and re-assessment of results from the previous drilling.
  - (ii) Planning of rehabilitation work on previous drill sites.
- (b) Austmin
  - (i) Re-assessment of Climax work and re-interpretation of available Utem geophysical data in the Rosebery North-Cutty Sark area.
  - (ii) Development of a conceptual model pertaining to ore genesis of Rosebery style mineralisation north of the Rosebery mine.
  - (iii) First phase rehabilitation of drill sites MBD1 to 4 inclusive.
  - (iv) Planning and commencement of a two year rehabilitation programme on previous drill site H5, with accompanying research/monitoring programme.
  - (v) Planning of a drilling programme along the northerly extension of the Rosebery mine sequence, and entering into joint venture with new partner Pasminco in respect of a work programme for the forthcoming year.
  - (vi) Re-compilation and commencement of a re-interpretation of pre-existing Dighem data in the light of the abovementioned conceptual model.

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## 5. Discussion of Results

Following re-appraisal of pre-existing Utem data in the area north of the Rosebery mine, and re-interpretation of available Dighem data, an interpretation of the position of the northerly extension of the Rosebery Mine host sequence was made (Fig. 5).

This information conforms generally with the ore genesis model developed for the Mt Black area and shown in Fig. 6.

Recompiled data from the 1984 Dighem survey are shown in Figs. 7 to 10 inclusive. This data is currently being re-interpreted.

On the basis of the above, a programme of diamond drilling along the interpreted northerly extension of the Rosebery Mine host sequence will be planned for the forthcoming summer season.

## 6. Environmental / Rehabilitation

Following completion of the 1988/89 drilling programme, an assessment of the disturbance and rehabilitation needs for drill site H5 was made. A report on the assessment is included as Appendix 1.

A rehabilitation / revegetation programme was subsequently commenced in April 1990, and a report documenting such work is included in Appendix 2.

A two year rehabilitation monitoring / research programme in the area of site H5 has commenced, with details included in Appendix 3. This programme will provide useful data on which future rehabilitation and related work programme decisions can be made.

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## 7. Conclusions and Recommendations

Following the drill testing of several geophysical / geochemical targets within the Mt Black Volcanics sequence, emphasis has been shifted to re-compiling pre-existing data and developing a programme for drill testing the interpreted northerly extension of the Rosebery Mine host stratigraphy.

Towards the end of this year of the EL, Pasminco farmed into the project area, and a drilling programme is being planned for this coming summer season.

8. Proposed Further Exploration

The following programme for continued evaluation of massive sulphide targets in EL12/88 is proposed:

- (a) Completion of re-interpretation of 1984 Dighem data.
- (b) Plan and drill one or two deep diamond drill holes into the interpreted northerly extension of the Rosebery Mine sequence.

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APPENDIX 1

Report on assessment of disturbance and  
rehabilitation needs of vegetation at  
drill site H5, and egress track

CLIMAX MINING CO. LTD.

DRILLING PROGRAMME EL 12/88

MT. BLACK EXPLORATION LEASE

REPORT ON

DISTURBANCE AND REHABILITATION OF VEGETATION  
AT DRILL SITE NO.5 AND EGRESS TRACK

By A.M. & D.J. Gray  
Environmental & Botanical Consultancy

April 1989.

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## 1.0 INTRODUCTION

On 12/4/89, A.M. & D.J. Gray of Environmental and Botanical Consultancy were engaged by Mr. R. Hine, Senior Geologist, of Climax Mining Co. Ltd. to conduct an examination of a work site on their exploration lease at Mt. Black, near Rosebery, Western Tasmania.

The overall area is illustrated by the 1:25000 map, fig.I.

The object of the examination was to inspect and ascertain the extent and degree of damage to the forest environment, specifically at Site 5 as alleged in a communication from the Dept. of Mines, Tas., and received by the Climax Mining Co. Ltd. on April 7, 1989.

The Company had been advised verbally, on site, by officers of the Dept. of Mines as to details of clearing and construction of sites and an egress track from site 5.

A follow-up inspection of the sites by an officer of the Dept. of Mines, on February 22, 1989, had resulted in the Dept. declaring the extent and degree of track and site clearing operations, by the Company, to be excessive and at variance with their instructions.

This report addresses the matters of disturbance to and rehabilitation of vegetation etc. at Drill Site, No.5 and the 'Egress' track therefrom.

WITHOUT PREJUDICE

## 2.0 SITE EXAMINATION

### 2.1 General

The area examined is located approx. 6km. N.N.E. of Mt. Black, within the 700-750m altitude range; the coordinates of Site 5 are: 81235E, 77000N-Tullah 1:25000 series, sheet 3837.

The short track extending from the end of the older existing track to Site 5 is herein termed the "Egress" track in accordance with its intended purpose, i.e. as a clear-way by which drilling machinery will be removed at the cessation of operations. Otherwise its present purpose is for foot-traffic-only access to Drill test site 5 (heli-pad 3) - herein termed "Site 5".

The Egress track and Site 5 details are shown in Fig. II, various aspects are also shown in the colour prints at the end of this report.

### 2.2 The Egress Track

This track is approx. 250m long and between 3 and 4m wide. It has been formed, for the most part, across the general contour of the hill and has been cut through the vegetation and humus layers to mineral soil (which is very shallow in places), and bedrock. Construction to a width suitable to accommodate the vehicle to be used to exit machinery has resulted in a close approach to 15 - (18) mature *Athrotaxis* trees and some other large trees of *Nothofagus* and *Phyllocladus*.

### 2.3 Existing Track

The existing track is that portion of track extending from the township of Rosebery to the commencement of the egress track. Approx. 1½-2 kms. of the upper limits of this track from its meeting with the egress track were also inspected closely, as is relevant to this report.

According to information given to the author, the existing track was constructed approx. 15 years ago; the track was also cut to mineral soil and bedrock. Just prior to the construction of the egress track the existing track was re-cleared, graded and re-drained. The upper ½ km of this track is also cut across the contour line and to within very close proximity of numerous *Athrotaxis* specimens, and other trees.

### 2.4 Site 5

Site 5 occupies an area of approx. 2250m<sup>2</sup>, or 50m ave. dia. The area, which slopes toward the S.E., has been cleared of all forest and the layers of matted stems, roots and humus have been "homogenised" and smoothed out to a more-or-less even surface by machine. Excess humus

and vegetation material has been stockpiled at the N. and N.W. boundary of the clearing.

In the centre of the clearing a 7x12m rectangular pad of crushed rock has been levelled and firmed to accommodate drilling machinery; between the pad and the egress track an area of mineral earth has been exposed to facilitate the turning of the drill rig removal machine.

The Site 5 cleared area is such as would allow for the approach, landing, departure and manoeuvring of a helicopter, with some safety margin.

## 2.5 Vegetation

The vegetation of the area in question has, of course, been determined by on-site survey and examination. To further ascertain and qualify any variations of pattern or component over the area, colour aerial photographs were scrutinized per means of stereoscopic equipment; this study confirmed that the areas examined for this report were all within the forest type as described hereafter:

The vegetation community is defined as Thamnic Rainforest, combining the categories T1a, T1c and T3a (after Jarman, Brown & Kantvilas, 1984). It comprises *Athrotaxis selaginoides* with *Phyllocladus aspleniifolius*, *Eucryphia lucida* and *Nothofagus cunninghamii*. The *Athrotaxis* are approx. 7-10-(15) metres high and are largely emergent above the canopy formed by the latter species; *Atherosperma moschatum* is infrequent and scattered.

*Anodopetalum biglandulosum* is abundant throughout the association and forms locally dense thickets of intertwined stems and branches especially nearer ground(?) level. Other species include *Agastachys odorata*, *Anopterus glandulosus* and *Cenarrhenes nitida* in areas of relatively higher light intensity; also occurring in such areas are some *Gahnia grandis* and *Blechnum wattsii*. Small shrubs of *Trochocarpa gunnii* and *Coprosma nitida* are scattered and infrequent.

Epiphytes include *Prionotes cerinthoides* and the ferns *Hymenophyllum rarum* and *Apteropteris applanata*, the latter being restricted to the trunks of the *Athrotaxis*.

Actual ground level is difficult to define due to the accumulation of live, and dead-decaying stems of *Anodopetalum* and other species, combined with masses of leaf litter etc. in varying stages of decomposition.

This mass forms the substrate for numerous bryophytes etc; as well, it contains a large volume of the root-mass of the surrounding forest species.

A majority of the *Athrotaxis* trees, perhaps as many as 95%+, show extensive incidences of distal crown-death or die-back. The death of the upper portion of the crowns would appear to have occurred 75-100(?) years ago and might be the result of an episode (or episodes) of severe air frost, with the air temperatures falling to values below  $-7^{\circ}$  to  $-10^{\circ}\text{C}$ . The condition of the crowns is unlikely to have been due to droughting or pathogenic causes and there is no evidence of any fire.

Two large specimens of *Athrotaxis*, at some distance from Site 5, were observed to have charring in the upper trunk and crown. This has been explained as lightning strike, as there is no evidence of fire on the lower trunks or surrounding vegetation.

### 3.0 OBSERVATION STATEMENTS

The following observations and statements are the result of assessments of the environmental situation and conditions as evident at Site 5, the egress track and relevant portions of the original track.

The author's opinions and suggestions etc. have been formulated and presented objectively and without bias.

The colour plates at the end of this report illustrate relevant situations.

#### 3.1 The Egress Track

##### 3.1.1 Contour Alignment

The egress track has been constructed over the shortest practicable route between the existing track and Site 5.

Had this track been formed to coincide (in a practicable sense) with the contours, it is estimated that the length of formation required to reach Site 5 would have been, at the very least, double that of the present track.

A number of facts emerge from this theoretical alternative:

- (a) A great many more trees of *Athrotaxis*, and others, would have had to have been removed or "root damaged" than have been affected by the present "shorter" track.
- (b) A greater length of track might have increased the possibility of its being visible from areas of habitation or access.

N.B. The present track is not visible from areas of habitation etc. as far as can be determined.

- (c) A significantly greater area of disturbed ground would have required re-covering and rehabilitation following the completion of operations.

##### 3.1.2 Erosion

It is inevitable that, no matter how efficient a system of drains is constructed, some washouts and random channels will form. Any slope at all presents problems in this regard, especially with such basic, roughly constructed, temporary tracks as these.

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The anticipated re-spreading of humus and litter etc. will, in this instance, completely ameliorate any erosion problems that may occur and, following stabilisation and revegetation, erosion will cease to be any problem at all.

### 3.1.3 Root Damage

The 15-(18) trees of *Athrotaxis*, as well as other species, have suffered root damage to within close limits of the trees but they have NOT been under cut. Notwithstanding the obvious root damage, the following points are worthy of consideration:

- (a) The roots of the trees scarcely penetrate the mineral soil, much less the bedrock! Rather, they proliferate in the layers of humus and other "stable" decomposed material which, in places, varies between c.30cm to 100cm+ and which constitutes the "soil" layer. Any disturbance of this material would inevitably cause some damage to living root systems.

It is not at all clear as to how a track might be constructed here, in such a way as to cause NO damage to living root systems, and yet be constructed or formed physically "even and level", without major obstacles, for the practical and safe towage, carriage or sledding of machinery.

- (b) The construction of the existing access track, some 15 years previously, resulted in clearing and excavating to mineral soil/rock in a similar fashion to the much newer egress track. *Athrotaxis* trees (and others), were also "close-shaved" and had their root systems cut and otherwise damaged, (see photo. prints).

Close scrutiny of those trees during the on-site examination failed to reveal any *Athrotaxis*, or other tree species, along the edges of the existing track, to have visibly suffered or died as a result of the obvious damage to their root systems, some 15 years ago. The poor condition of almost all *Athrotaxis* crowns throughout this forest has been discussed earlier and there appears to be no difference in condition between the track-side specimens and those quite remote from any track making operations.

That the *Athrotaxis* trees recently damaged by root disturbance/destruction along the 'new' egress track, are "doomed" to inevitable death, is considered to be somewhat speculative - unless signs of decline or death have yet to manifest themselves after a time in excess of 15 years, a period already survived by trees along the existing track!

#### 3.1.4 Track Rehabilitation

Following the cessation of operations at Site 5 and the removal of machinery via the egress track, it has been specified that some humus, litter and other vegetable "strippings", presently heaped at the side of the track, and at Site 5, will be replaced onto and over the temporary egress track formation.

Following the execution of this procedure the author suggests that the following events will be likely to occur.

- (a) Any scarring, whether presently visible or not, will be camouflaged by the replaced vegetable material.
- (b) This material will be an ideal medium into which new roots from nearby trees and other plants might re-establish - enhancing the survival prospects of those trees, (if relevant)!
- (c) The replaced material will be an ideal "seed bed" substrate for germination and re-establishment of all local plant species.
- (d) That seed of surrounding trees will fall in large amounts into this material and germinate is certain and the re-establishment of all species present is inevitable!

Throughout the entire portion of the upgraded, existing track, which was examined in addition to the two other areas, recruit seedlings of all local species were immediately apparent. These seedlings were found to be growing in mineral soil, along the edges of the track as well as in the median area, between recent wheel ruts.

There are no reasons at all to indicate that similar, if not more prolific species recruitment will not occur in the significantly more conducive environment of the humus/litter

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material to be replaced over the temporary egress track.

### 3.2 Site 5

#### 3.2.1 Clearing

The vegetation at Site 5 has been cleared by machine, and the spoil then having been scraped and placed into large stockpiles at the boundary of the site. Portion of this spoil is "earmarked" for future recovery and in the rehabilitation of the egress track and the site. The large piles of spoil contain trunk, stump and limb material as well as the crowns of all tree species that originally occupied the site, including *Athrotaxis* material. Mixed with this spoil are significant amounts of humus and other decomposed vegetable material.

The removal of salvagable timber could not be undertaken, given that conditions specified that no vehicle access was permitted to the site other than that vehicle which will eventually remove the drilling equipment.

It is not at all clear as to what else might have been done with larger stumps, trunks and limbs apart from leaving them piled on top of the root mat, and each other, after having been felled by chainsaw.

The random falling and piling of the trees with inevitable "criss-crossing" of trunks, limbs and leafy crowns would form an environment much less than conducive for the germination and establishment of future recruit seedlings, due to the smothering effect and the preclusion of necessary light. Falling trees en masse also smothers or otherwise damages many seedlings and smaller plants in the immediate vicinity.

Many seedlings or small plants, having escaped actual damage from the falling trees, would encounter difficulty in surviving in the dense debris surrounding and, in many instances, overtopping them.

The author is aware that had Site 5 been cleared by chainsaw as specified, the stumps of all felled trees and larger shrubs would have remained in situ. Some of the species do regenerate via sprouting from the stump, particularly *Eucryphia lucida*, *Atherosperma* and *Nothofagus*; most of the minor species also have this capability, as long as the stumps are not disturbed and have not been covered with crown debris. Although *Athrotaxis* and *Phyllocladus*

have been observed to regenerate vegetatively such a situation is infrequent.

Attention in this issue seems to be centred on damage to *Athrotaxis selaginoides*. Whereas satisfactory regeneration of that species by re-sprouting from stumps would be quite unlikely, regeneration by in-seeding on Site 5 is almost certain, even if long term.

It is worthy of considerable emphasis that the risks of fires either starting or escaping at Site 5 are minimal due to the virtual absence of highly flammable fuels, i.e. tree crowns etc. This may not have been the case should the site have been cleared by chainsaw and slashing. *Athrotaxis* species do not regenerate after bushfire!

At Site 5 most of the larger trees, limbs, crowns and other debris has been moved aside and the remaining humus, root mat and other vegetable material has been "mixed" and spread out to a more-or-less even surface over the site, forming an IDEAL seed bed.

Less than 10% of the total area has been cleared to mineral ground, that small area having been so cleared for reasons mentioned earlier (see 2.4).

Given that a fairly large helicopter will be required to manoeuvre and place heavy machinery, the 50M dia. (ave.) of this clearing would seem reasonable and not excessive.

### 3.2.2 Visibility

Site 5 is not visible from any place of habitation and the only possible views of the clearing would either be from the air or from remote and distant mountain ranges to the south-east.

### 3.2.3 Erosion

Due to the covering of humus and other vegetable material and the stable nature of this covering, erosion is not seen as a problem here, despite the slope.

### 3.2.4 Site Rehabilitation

Under the heading 3.1.4 Track Rehabilitation, there is set out a series of events which appear certain to occur following the re-covering of the egress track with stockpiled spoil (humus etc.).

Similarly, after the removal of machinery from Site 5 (should there be no significant "strike"!!), and the re-spreading of humus and similar material over the work areas, as specified later, natural in-seeding by all species including *Athrotaxis* will undoubtedly occur.

The seed of *Athrotaxis*, *Eucryphia*, *Nothofagus*, *Agastachys*, *Anopterus* and *Atherosperma* are all dispersed by the aid of the wind and given the right conditions all of the species are capable of scattering seed over distances of 20-30m+ from the parent tree. Site 5 being approx. 50m in dia. is entirely within "reach" of the seed of all species representative of and surrounding the site. It was noted during the site examination that many nearby *Athrotaxis* trees were bearing ripening seed cones!

#### 4.0 REHABILITATION

##### 4.1 Impact of Site Clearing

It is understood that Site 5 and the egress track have been cleared in a manner perhaps contrary to D.O.M. specifications. However it would seem to be of minor consequence whether the forest had been cleared by means of chainsaw and slashing or by machine, for in neither case is there such a degree as "minor" environmental impact.

In a forest such as this whatever means that might be employed to clear an area sufficient for safe helicopter access and the accommodation of drilling machinery, there must be manifest impact, albeit over a very restricted area as here.

If visibility and aesthetical considerations are at all relevant here, both means of clearing present equally dismal scenes of intrusion and disruption.

From the consideration of future revegetation, Site 5 cleared as it is of larger logs, tree crowns and other debris, and spread over with soil and humus etc., presents the most favourable conditions for both short and long term rehabilitation by natural processes, as mentioned elsewhere.

##### 4.2 Timing of Rehabilitation

It is clearly obvious that little, if anything, in the way of "contrived" revegetation/rehabilitation can be effected until all work has ceased, all machinery etc. taken from the site and all trampled and exposed areas respread with humus and other materials from nearby stockpiles. Due to a number of factors, it would seem that to be required to nominate a specific timing for this event would be extremely difficult, from the point of view of any party; also, one is tempted to ask as to how a significant mineral discovery would affect the situation here!

Regeneration will be taking place in that interval between the present and that time when "pull-out" occurs. Whereas most activity and disruption will be concentrated around the drill hole and rig, the outer perimeters of the site and elsewhere will probably suffer little further disturbance other than that caused by the downdraught from occasional helicopter activities.

Some seed will already have fallen or otherwise be present in the matrix of humus etc; germination and establishment of seedlings are just a matter of "nature" and time. Activities may disturb some of these events but in other areas revegetation is and will take place with little hindrance.

#### 4.3 Procedures

The following points are recommendations and guidelines for rehabilitative activities at Site 5 and the egress track when all work has finished and all machinery has been removed. Obviously, no allowance has been made for such circumstances, say, as the discovery and confirmation of a major ore body and any implications concerned therewith.

##### 4.3.1 Spreading of Humus and Other Material

At completion of works and withdrawal of machinery a small, tracked excavator machine, with wide, toothed bucket, should be employed on the site for final spreading and preparation of the humus seed bed.

The tracks and all other relevant parts of this vehicle should have been thoroughly washed prior to transport to the area, in accordance with D. o. M. Guidelines, Sect. III (7).

Larger logs and other debris in the stockpiles should be sorted, if possible, from smaller material and placed over the vacated drill pad - this having first been "ripped" and loosened. The machine should lightly firm the larger material before commencing to over-spread finer humus and similar material - this should also be lightly firmed.

Areas trampled, compressed or possibly contaminated with oils (e.g. fuel dump), and some areas down-slope from the rig, should be "loosened" by bucket to allow aeration and drainage. These areas are then to be spread with a further shallow layer of humus and lightly firmed.

If at all practicable, some larger debris might also be taken to and placed in strategic dumps along the egress track, as base material. Following this, the area adjacent to the large stockpile, i.e. that area used to manoeuvre the drill rig removal machine etc., should be surface ripped along the contour, spread with larger debris then a covering of finer material spread and lightly firmed.

No further intrusion should be permitted at Site 5, the area now being left to recover by natural means. N.B. advice under 5.0 'Precautions'.

After the completion of re-spreading work at Site 5 the machine should work down hill and out along the egress track, surface ripping

along the contour, filling in, or providing drainage to, any depressions which may hold and stagnate water, then spreading larger debris overall. Continuous with these operations the humus material heaped at the side of the track should be pulled over the base material and lightly firmed. Great care must be exercised during the latter operation to prevent any further or undue interference to relatively undisturbed track-side humus, root-mass and plant life!

At the junction of the egress track and the original track, the replacement material should be spread out to exhaustion. Light 'ripping', across contour and depression filling and drain clearing operations should be considered for the original track, however, no disturbance should be caused to the stabilised track sides.

#### 4.3.2 Reseeding, Replanting

There are four methods by which Site 5 and the egress track might be revegetated, and these are considered:

- (a) Natural in-seeding, by windthrow, from surrounding trees. This is a process which will occur over time, with seeding being more prolific in some years than in others.

Over a long time, given the exclusion of influences such as fire or the invasion of the site by "alien" species (among other factors), a process of natural selection and species - competition will see a pattern of sequences gradually returning the area to a revegetated state. This process is NOT rapid and will take some decades to establish.

Seedlings of *Eucryphia* and *Nothofagus* will tend to be prolific but, in many instances, suffer a relatively higher mortality rate than seedlings of *Athrotaxis* and *Phyllocladus* which will be fewer in number. Seedlings of *Athrotaxis* should benefit from the high light intensity and the humus rich seed bed at Site 5. Other species i.e. *Anodopetalum*, *Anopterus*, *Agastachys*, *Cenarrhenes*, *Trochocarpa* etc. will also recruit naturally from plants in the surrounding undisturbed forest.

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- (b) Collection of seed of local species and scattering by hand over the site.

This would be of little benefit as natural in-seeding will be continuous as described above.

Hand collection of seed would be difficult, costly, time consuming and actually wasteful. In most instances seed-bearing limbs occur high in the outer portions of the trees, making collection impracticable - unless limbs are cut from the tree, or the tree is felled. Neither alternative is desirable, or acceptable!

- (c) Obtaining seed of similar species from other sources and/or the use of quicker growing, 'colonising' species not natural to the area. Section IV(7) of D.o.M. Guidelines states, in part, that "...where re-vegetation is proposed it should be noted that local species of local provenance should be used unless approval has been given for other species to be employed".

- (d) Transplanting seedlings from nearby localities. Seedlings of all local species proliferate in nearby areas, in earlier disturbed ground, at the side of the original track and other 'openings' etc.

It is possible to select and cull numbers of small seedlings from such localities and transplant these into the humus/soil at Site 5 etc. However, such an operation raises the objection that regeneration/re-establishment plants are being removed from areas equally in need of rehabilitation and many plants would be required. A further objection to this method is that many of the seedlings would inevitably die due to any of a number of causes, for instance, root damage, improper digging, improper re-planting procedures, drying out, etc.

In order that some success might result from this operation the numbers of seedlings of each species required would have to be assessed, located and then transplanted by very experienced plant "handlers" or by others under EXPERT SUPERVISION.

An alternative to the direct removal and transplanting of seedlings in a single operation, is the digging and potting of selected seedlings.

Such an operation, should option (d) be acceptable to all parties, can be initiated earlier than, and independent of, final site preparations.

Potted seedlings can be tended in an area set aside for their nurture (watering etc.). Plants will either establish in the pot, or die. Thus the final mortality rate as compared with direct transplanting is significantly less; as well, a potted plant suffers far less disturbance trauma when planted out than does an open-rooted plant!

The introduction of established (potted) seedlings of local species from other provenances falls into the situation as stated at the end of option (c) above!

#### 4.3.3

##### Recommendation

It is hereby recommended that of the four options outlined above, option (a) be first considered, i.e. that natural revegetation be encouraged to "take its course".

However, it is also recommended that the Company gives serious consideration to an investigation into the possibilities suggested by option (d).

This option would obviously require the consideration by and concurrence of the Dept. of Mines in liaison with other relevant Government departments, e.g. Forestry Commission and Lands, Parks and Wildlife.

It is worthy of particular note that, should option (d) be accepted and considered as a viable procedure, there are sources of planting and caring expertise available from some less radical conservation organisations; in particular, The Society for Growing Australian Plants (Inc.), Tas. Region.

N.B. Whatever revegetation methods are considered, the area should NOT be subjected to any application or introduction of artificial fertilisers. There are multiple combinations of such chemicals and the effects of these on native forests such as this have not been at all adequately researched.

## 5.0 PRECAUTIONS

### 5.1 Alien species

Inevitably, there will be some incursion of "alien" species or invasion by local "opportunists". These plants are introduced by such agencies as wind, animals (birds) and on footwear and machinery.

Cleared sites such as this "invite" the establishment of plants other than those considered desirable.

Botanical expertise or instruction may be necessary to identify potential "invaders" and provide advice on their control and/or eradication.

The proliferation of one plant in particular is considered undesirable. This is the Cutting grass, or Cut rush, *Gahnia grandis*, a plant which is among the species in the forests around Site 5 etc. but which may rapidly spread and colonise the disturbed, cleared ground in large numbers, potentially to the exclusion of other plants - or the potential higher incidences of other plants.

This plant is not difficult to identify or recognise and is easily removed when small. Control by hand pulling and removal is neither difficult nor particularly time consuming. Control by weedicides cannot, under any circumstances, be recommended!

### 5.2 Fire

Site 5 does not present a situation of high fire-ignition potential due to the manner in which it has been cleared. However, the risk of accidental (?) fires is still real and all precaution and vigilance must be exercised to prevent or control any outbreaks of fire here and elsewhere in this forest.

Wildfires, here, would cause catastrophic damage to the environment and radically alter revegetation patterns throughout.

### 5.3 Disease

The introduction of pathogenic diseases is always a possibility in disturbed areas. Mention has already been made of the necessity of disinfecting machinery as a precaution against the introduction of the potentially devastating root disease *Phytophthora cinnamomi*.

### 5.4 Further Plant Damage

A mention is made here, in re-iteration of a comment made earlier, regarding the care that must be taken when recovering of the egress track is carried out.

The machine operator must be aware, or be so instructed, of the need to replace track side humus stockpiles without further damaging the undisturbed soil, rootmasses or plants in close proximity of the track.

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## 6.0 CONCLUSIONS/SUMMARY

The area and extent of egress track damage might have been at least double, had an alternative route been selected.

The area cleared at Site 5 is a reasonable, safe working space (amid 10m high forest), for a helicopter.

Trees of *Athrotaxis*, and others, root-damaged by track making operations appear unlikely to die IF other trees, damaged in a similar fashion, some time in the past, are any guide.

The Site 5 area, although at this early stage presenting a scene of devastation, appears to be no more real or potentially "damaged" than had it been clear-felled by chainsaw, and slashed. It has NOT been scraped and exposed to mineral earth overall; those small areas which have been so are to be re-covered by soil and humus at the completion of exploration activities. The site is not visible from any area of human habitation or travel, apart from the air.

Revegetation of Site 5 and the egress track will occur, albeit over a lengthy time span. The rehabilitation of the site may be enhanced by "artificial" means, as outlined in this report. The use of artificial fertilisers is not recommended.

Precautions will be required to limit invasive species; to exclude fire; to limit the possibility of disease introduction and, to minimise any further damage by works or rehabilitation proceedings.

7.0 SPECIES ENCOUNTERED IN EXAMINATION AREAS  
(In alphabetical order)

<u>Botanical Name</u>	<u>Family</u>	<u>Common Name</u>
Agastachys odorata *	PROTEACEAE	White Waratah
Anodopetalum biglandulosum *	CUNONIACEAE	Horizontal
Anopterus glandulosus *	ESCALLONIACEAE	Native Laurel
Apteropteris applanata *	HYMENOPHYLLACEAE	Skeleton filmy-fern
Atherosperma moschatum *	MONIMIACEAE	Sassafras
Athrotaxis selaginoides *	TAXODIACEAE	King Billy Pine
Blechnum wattsii	BLECHNACEAE	Hard water-fern
Cenarrhenes nitida *	PROTEACEAE	Pt. Arthur plum
Coprosma nitida	RUBIACEAE	Native currant
Eucryphia lucida *	EUCRYPHIACEAE	Leatherwood
Gahnia grandis	CYPERACEAE	Cutting grass; Cut rush
Grammitis sp	GRAMMITIDIACEAE	Finger fern
Hymenophyllum rarum	HYMENOPHYLLACEAE	Narrow filmy-fern
Nothofagus cunninghamii	FAGACEAE	Myrtle; Myrtle-beech
Phyllocladus aspleniifolius *	PHYLLOCADACEAE	Celery-top pine
Prionotes cerinthoides *	EPACRIDACEAE	Climbing heath
Trochocarpa gunnii *	"	-

\* Endemic in Tasmania.

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8.0 REFERENCES

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Egress Track

Site 5

Original Track

CROWN ISLAND

LAKE ROSEBERY

MOUNT BLACKY

Sterling Inlet

ZEEHAN 33

MORAGU

ROSEBERY 2 km

MURCHISON HIGHWAY  
STATE RESERVE

90 FIG. 1

EL 12/88  
Location of Site 5  
and Egress track etc  
SCALE: 1:25 000

5 cm



HEC

HEC

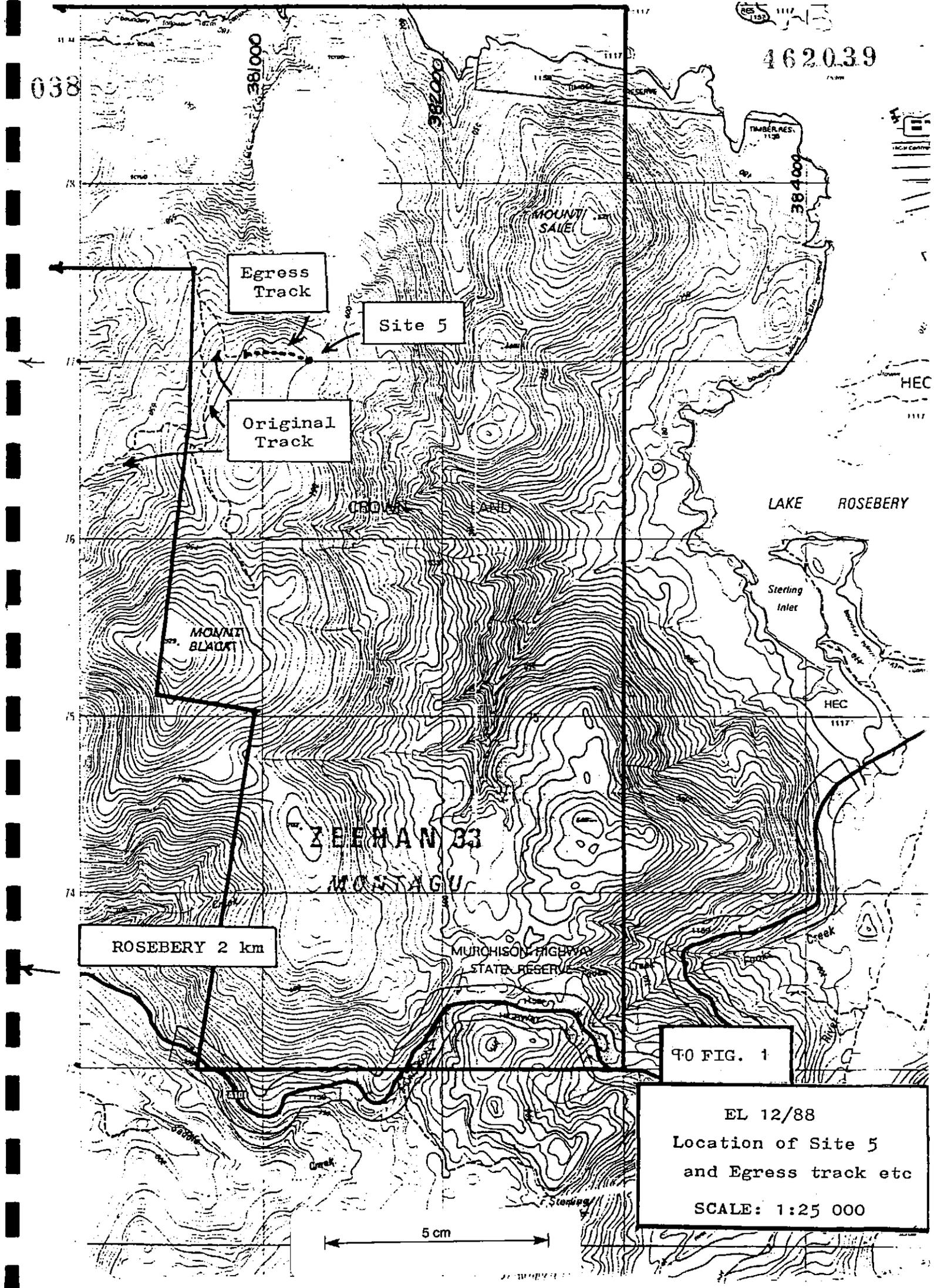
Creek

Creek

Creek

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Creek



10.0 COLOUR PLATES (4 pages)PRINT

1. Egress Track, near junction with original track.
2. Egress Track, near junction with Site 5.
3. Site 5, looking N. Bared area is vehicle manoeuvring space, Large stockpile of humus and other vegetable matter in background.
4. Site 5, looking S.E. Drill-rig 'pad' at centre left. Remainder of area covered with humus seedbed.
5. Original Track. N.B. healthy crown of mature *Athrotaxis* centre and proximity of trunk, roots, etc. of specimen on far R. to track.
6. Original Track. *Athrotaxis* with crown dieback but otherwise showing no effect of earlier root interference.
7. Original Track. Seedlings of *Athrotaxis* and *Eucryphia* growing in mineral soil at side of track.
8. Original Track. Seedlings of *Athrotaxis* and, at lower L., seedling of *Phyllocladus*. Other plants are *Olearia* and *Blechnum* spp. All growing between wheel ruts!

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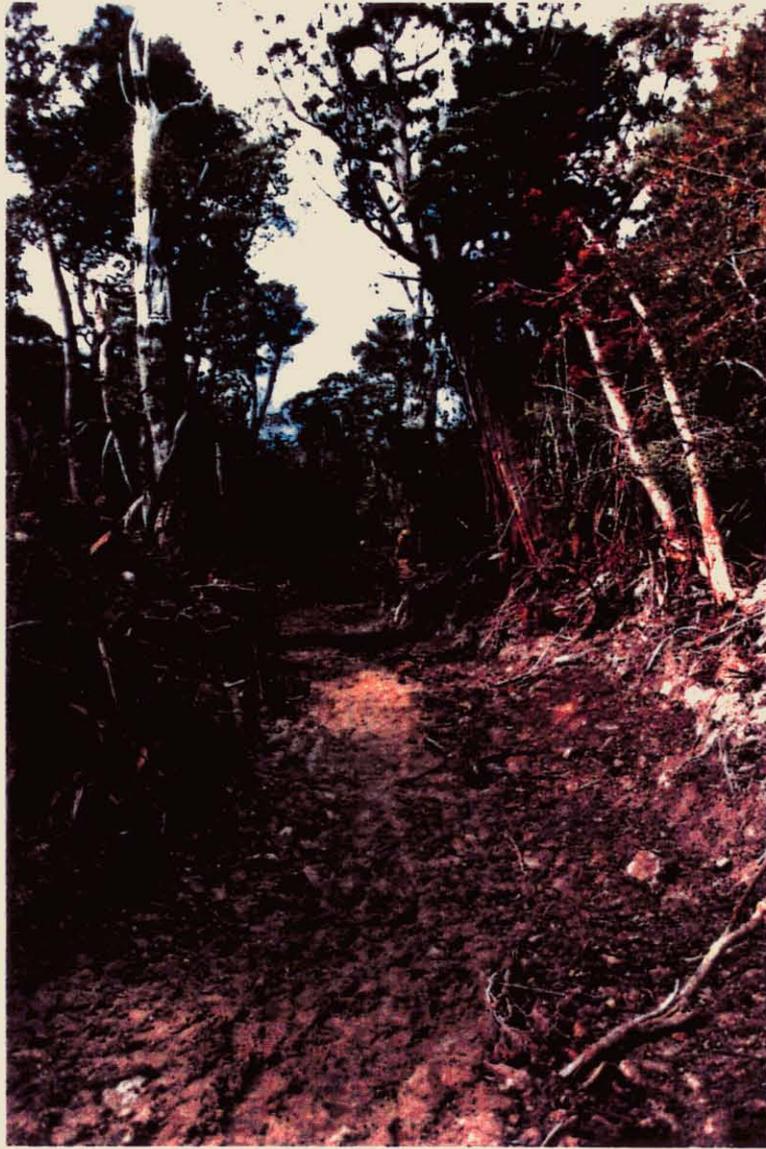


PLATE 1

PLATE 2



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041



PLATE 3



PLATE 4

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PLATE 5



PLATE 6

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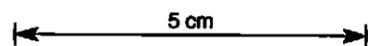
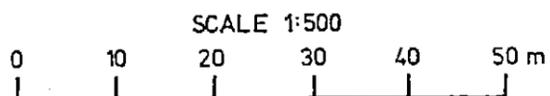


PLATE 7

PLATE 8



9.0 FIG 11  
DRILL SITE 5 (HELIPAD 3)  
AND EGRESS TRACK  
EL 12/88  
MT BLACK TAS.



EGRESS TRACK

SITE 5

STOCKPILE  
HUMUS, DEBRIS ETC

AREAS RESPREA'  
WITH HUMUS

VEHICLE TURNING AREA

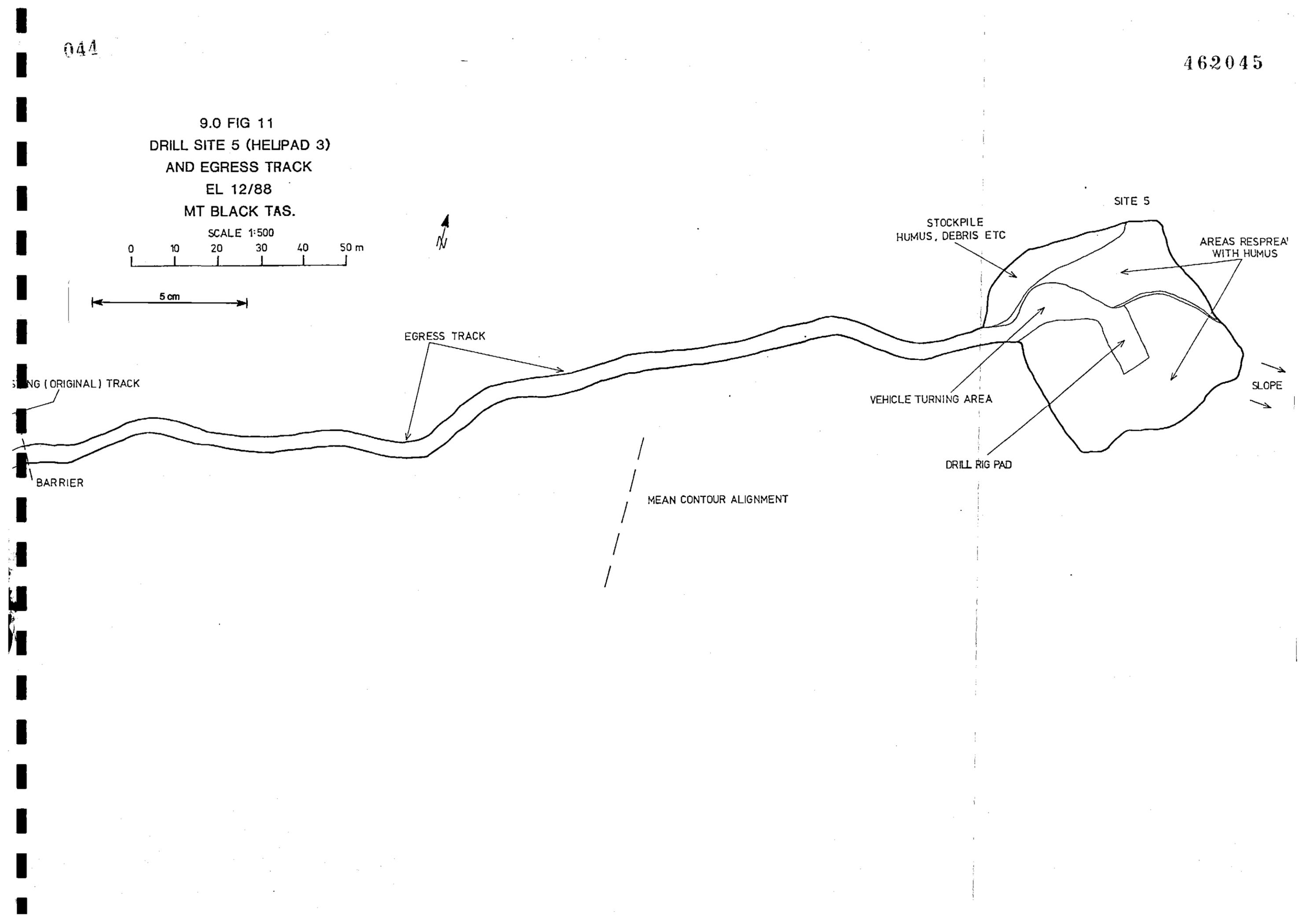
DRILL RIG PAD

SLOPE

MEAN CONTOUR ALIGNMENT

ORIGINAL TRACK

BARRIER



APPENDIX 2

Report on initial programme of rehabilitation  
and revegetation at drill site H5, and egress track.

CLIMAX MINING CO. LTD.

DRILLING PROGRAMME EL 12/88

MT. BLACK EXPLORATION LEASE

REPORT ON

REHABILITATION/REVEGETATION AT  
DRILL SITE NO 5. AND EGRESS TRACK

By A.M. & D.J. Gray  
Environmental & Botanical Consultancy

April 1990

The reader is referred to a report on "DISTURBANCE AND REHABILITATION OF VEGETATION AT DRILL SITE NO.5 AND EGRESS TRACK" ( A.M. & D.J. Gray, April 1989).

In that report the Authors set out various options for the rehabilitation of the site following cessation of all operations, see: 4.3.1 Spreading of Humus and Other Material, and: 4.3.2 Reseeding, Replanting.

The Company received instructions from The Tasmanian Department of Resources and Energy, (Division of Mines, etc.) in March 1990, to effect restoration measures as outlined under option "D" of Section 4.3.2 of the above Report. This option involved the removal and transplanting of seedlings of appropriate species from areas approximate to the Site, the operations to be carried out under proper supervision, following the replacement of humus and other debris over the Site and the Egress track.

The Consultants responsible for the Report of April 1989 were approached by Mr. R. Hine of Climax Mining Ltd. to undertake the supervision of the Site rehabilitation operations in March 1990.

**PROCEDURES:** On March 30 1990 a tracked excavator machine commenced the respreading and replacement of soil, humus and other material which had been stockpiled at the perimeter of the Site. Prior to the machine being driven to the Site, all parts were thoroughly sprayed and disinfected with ABF-42 fungicide as a precaution against the possible introduction of plant pathogens, e.g: Phytophthora, as recommended by the Consultants and directed by The D.O.M.

The operator of the machine was given clear instructions as to the manner in which the respreading was to be effected. Accordingly, this rather delicate operation was carried out to the satisfaction of the supervising Consultant, as well as to the satisfaction of the Officer representing the Environmental Management section of the D.O.M., who was present for a significant part of the time during the earlier stages of the respreading operation, and some replanting procedures.

During the respreading operations, work proceeded on the location, removal and transplanting of a number of seedlings of locally occurring species, including:

- Athrotaxis selaginoides - King Billy pine
- Phyllocladus aspleniifolius - Celery-top pine
- Nothofagus cunninghamii - Myrtle beech
- Eucryphia lucida - Leatherwood
- Anopterus glandulosus - Native laurel

## 2.

The plants selected were within a range of between 5 and 20 centimetres tall and were removed with as much soil as possible still attached to the roots. They were placed in small trays and transported to the newly re-spread areas where they were carefully replanted by operators who had previously been shown the correct procedure and technique for this operation.

An estimated 350 plants, comprising the species listed above, were transplanted into the freshly replaced humus and other material. Overall, this is not a great number, given the area involved, and more could have been transplanted. There are two important reasons why a greater number of plants were not transplanted:

1. The stockpiled material contained large quantities of stem, branch, twig and other similar debris, causing a significant proportion of actual humus and other suitable planting medium to be left suspended in clumps, often well above the actual ground surface, despite skilful machine operation. Manipulation of the matrix per means of the machine bucket was very time consuming and tended to compact the material to an unworkable consistency.

Planting into such suspended material was considered a waste of time and valuable plant specimens, as the subsidence and other movements of the matrix, over time, would cause the disruption and possible demise of the plants placed therein.

2. Some of the stockpiles of humus and other plant material had been heaped to 3 metres or greater and during the twelve months or more that these had lain without movement or other disturbance, some "pockets" of this material had compacted and as a consequence had become anaerobic, a condition which is lethal to most plant life. Again, it was considered pointless to plant into areas so affected.

It must be pointed out that the above conditions, whilst rendering a proportion of the Site and the Egress track unsuitable for immediate replanting, are only temporary! Following a "normal" winter with good rainfall, most suspended humus etc. will have been washed or otherwise moved to situations of relative stability and should, during such movement or weathering, "sweeten" and aerate to a stage conducive to plant re-establishment, naturally!

## 3.

The 350 plants that were placed throughout the area were all planted only in locations deemed by the Consultant as amenable to plant survival and establishment. The number does represent a fair distribution and coverage providing that a survival rate of C.75% is realised. Despite all care and consideration applied during the transplanting operations, there can be no guarantee of plant survival or the quantity of that survival.

The "direct transplant" approach applied to this rehabilitation task can best be regarded as an augmentation and stop-gap effort in the eventual revegetation sequences which will occur naturally at Site 5 and the Egress track.

The authors of this brief account regarding the rehabilitation measures undertaken at the above site are satisfied that all work was carried out according to the prescriptions recommended and with the concurrence of the relevant authorities representing the Tasmanian. Dept. of Resources & Energy, Div. of Mines etc., Environmental Management.

A. M. & D. J. Gray

ENVIRONMENTAL & BOTANICAL CONSULTANCY

APPENDIX 3

Programme for the establishment of revegetation  
monitoring station at EL12/88, Mt Black.

**PROGRAMME FOR THE ESTABLISHMENT OF  
REVEGETATION MONITORING STATIONS AT  
EL12/88 - MT BLACK, TASMANIA**

**AUSTMIN RESOURCES NL**

**26th July, 1990**

PROGRAMME FOR THE ESTABLISHMENT OF  
REVEGETATION MONITORING STATIONS AT  
EL12/88 - MT BLACK, TASMANIA

- 1.0 Establishment of the monitoring stations (quadrats).
- 1.1 At evenly spaced intervals around the perimeter of the site, six 1 metre square quadrats will be established and marked. These quadrats will be located inside the perimeter at a distance of one times mean tree height from the "drip line" of the undisturbed trees at the edge. See diagram A.
- 1.2 Each quadrat of one square metre will be marked by four slender galvanised steel pegs. One of those pegs will have a coloured plastic ribbon attached thereto. Identification details will be marked on the ribbon ends. See 1.5.1 & 2 and diagram B for details regarding the datum for quadrat locations.
- 1.3 At a distance of three times mean tree height, four additional 1 metre square quadrats will be located. These will be sited equidistant from each other and from the outer quadrats. These quadrats will be marked in a similar way to those described in 1.2 above.
- 1.4 At three evenly spaced localities along the egress track three 1 metre square quadrats will be established, along the centre line of the track and identified as already described.
- 1.5 It is not anticipated that marking pegs and ribbons will suffer disturbance from weather or human interference. However, as insurance against such possibility the following procedures may be prudent: (See also diagram B).
  - 1.5.1 Select two healthy trees, well spaced from each other on the site perimeter. Take two compass sightings from those base trees across the estimated centre of the site and establish the centre by means of a peg driven flush with the surface (treated wooden peg).
  - 1.5.2 From this centre datum point, record distances and bearings of the centres of each quadrat, as shown in diagram B. All locations and measurements to be recorded on a plan of the site.

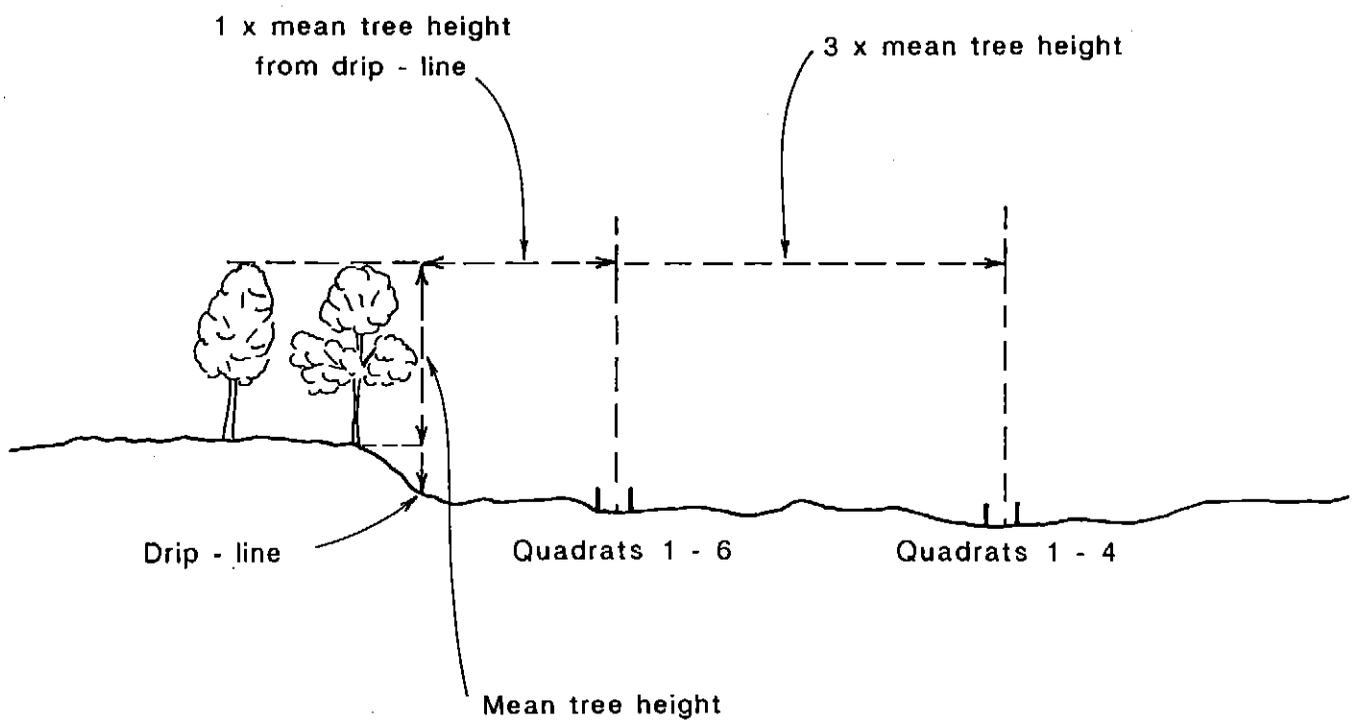
(Note that the proposed photographic record will also facilitate relocation of quadrats should primary markings be dislocated.)
- 1.6 Of the small plants transplanted in April 1990, twenty specimens will be selected at random but even distribution. These will not all be King Billy Pines but will include some representatives of the other species also transplanted. Each will be marked with a ribbon and peg, the ribbon to be a different colour to that used for quadrat identification. Each plant will be assessed for height and apparent health, the latter condition being a subjective determination but nevertheless relevant. Selected individuals will be marked and photographed for more objective comparison.

PROGRAMME FOR THE ESTABLISHMENT OF  
REVEGETATION MONITORING STATIONS AT  
EL12/88 - MOUNT BLACK, TASMANIA

- 2.0 Proposed Assessment ("scoring") procedures.
- 2.1 At four monthly intervals, Site 5 will be visited and each quadrat examined. At the time of the establishment of each quadrat, all living vegetation occurring within will be identified and recorded with each plant being located by means of a small, coloured, plastic peg. This marking will enable new recruits, as well as "casualties", to be immediately obvious at subsequent assessment visits and thus recorded.
- 2.2 Each quadrat will be scanned by using a straight-edge, advancing this from one side of the quadrat to the opposite side. As this line is advanced, new recruits, as well as any deaths or absences will be recorded.
- 2.3 Using one corner of each quadrat as a "stance point", a photograph will be taken at each assessment. All camera settings will be noted and depending on conditions of light, similar settings will be used at each subsequent visit. These photographs will enable such factors as litter accumulation and soil subsidence to be determined and compared.
- 2.4 Wide angle photographs from at least three selected stances around the perimeter of the site, and three locations along the egress track, should also be undertaken (see 1.5.2).
- 2.5 The establishment and subsequent assessment of selected transplants has already been discussed under 1.6 above.
- 2.6 All recordings of recruitments, casualties and growth increments etc, will be tabulated, compared and detailed in the report which will follow each Site visit. Where relevant, photo-prints will be included as supplementary information.
- 3.0 Incidental Matters:
- One-metre square quadrats have been selected in preference to five metre squares because of the far greater simplicity of management and assessment of the smaller area.
  - All ribbon marking etc. will involve the smallest pieces practicable.
  - All pegs, ribbons and any other items of identification will be easily removable following the completion of site monitoring work.
  - As well as the monitoring procedures, as above, assessments of standing trees around the site's perimeter will be made at each visit and features such as the development of potential and real seed crops will be recorded. This may permit determination of correlation between seed presence/fall and seedling emergence in the assessment quadrats etc.

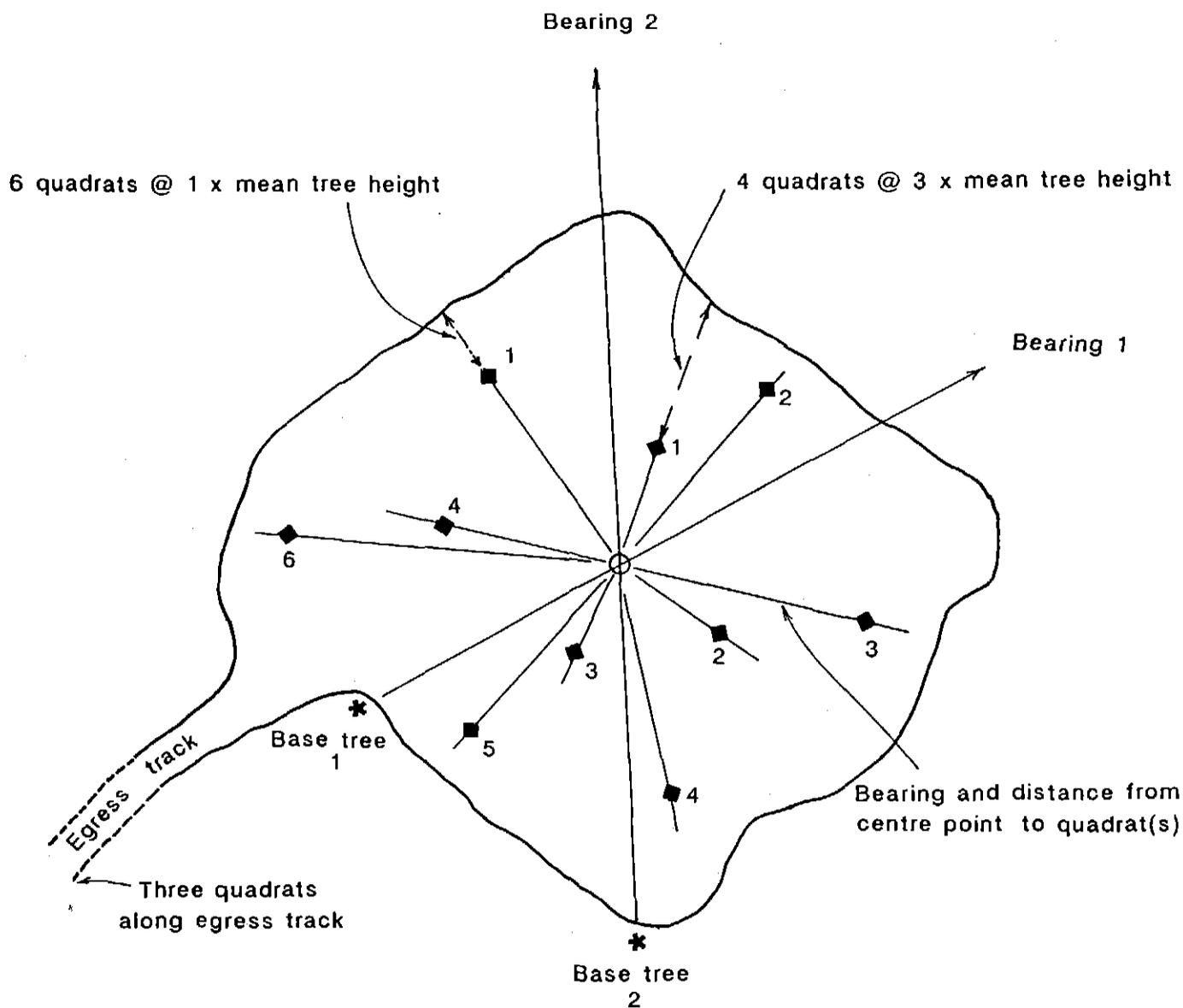
PROGRAMME FOR THE ESTABLISHMENT OF  
REVEGETATION MONITORING STATIONS AT  
EL12/88 - MOUNT BLACK, TASMANIA

- At each visit further seedlings of relevant species will be dug from the original track-sides etc. These will be taken to a nursery, potted, established and then returned to the site and egress track for transplanting.
- The possible presence of weed species will be kept in mind and the area checked for same. Any occurrence of weed species will be dealt with by means of removal by hand.



Note : Diagram not to any scale

Diagram ' A '



EL 12/88 SITE 5

SCALE 1:500

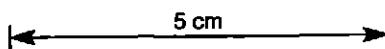
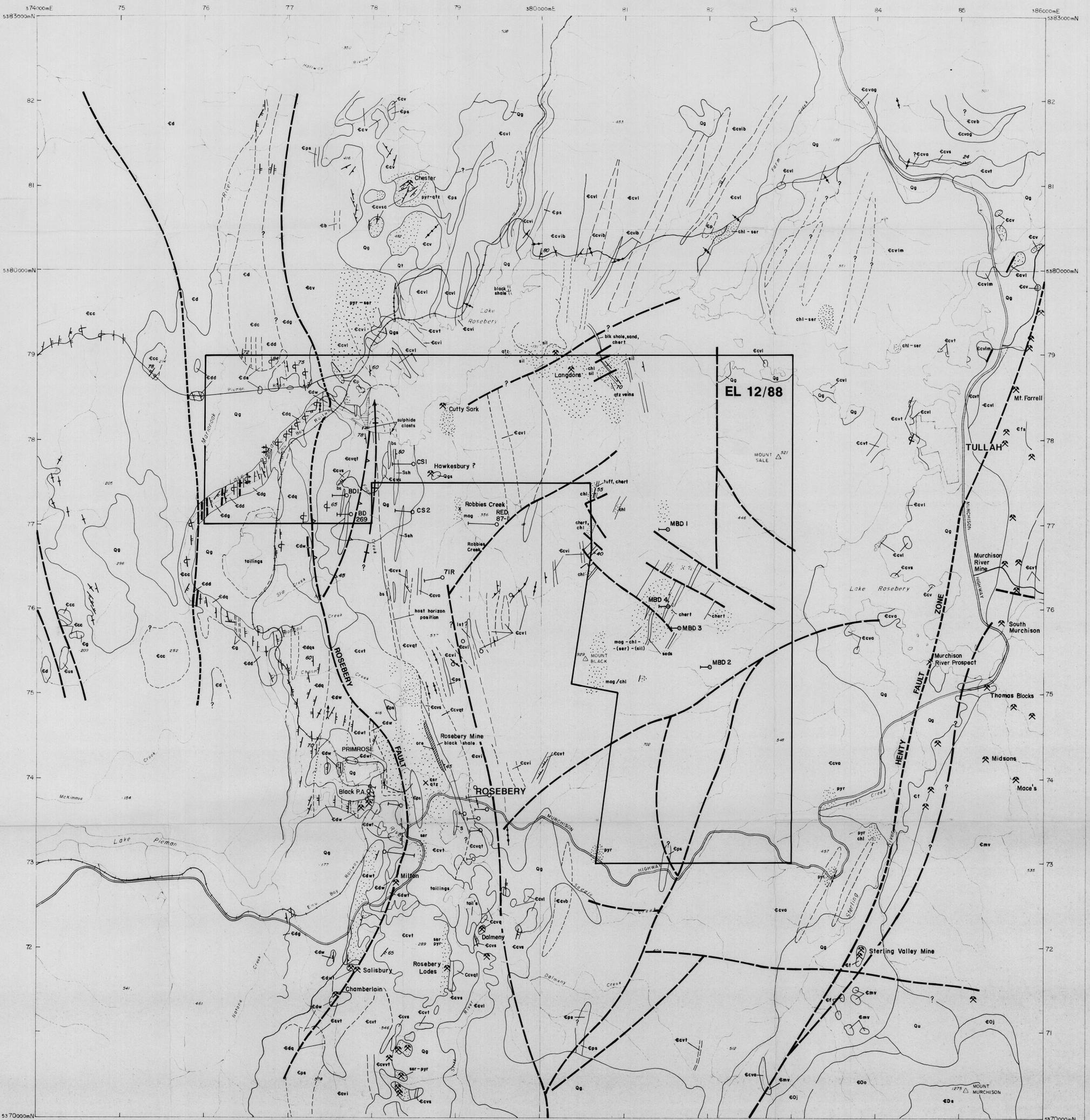


Diagram ' B '

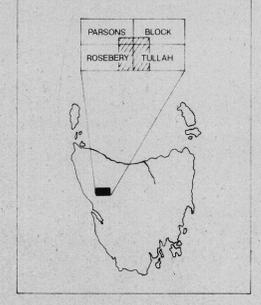


QUATERNARY	Qg	Talus and scree deposits
	Qt	Glacial deposits, mostly till
EARLY-MIDDLE CAMBRIAN	E00	Volcaniclastic conglomerate, sandstone, breccia, minor siltstone - correlate of Jukes Conglomerate
	E01	
CAMBRIAN	E0	Quartz-feldspar porphyry
	Eps	Felsic intrusive, commonly spherulitic feldspar-qtz-phyrlic
	Eg	Gabbro-diorite
	Eb	Basalt
	Eus	Ultramafic rocks and serpentinite
	Ecd	Conglomerate, polymict, with tuffaceous clasts in some units
	Edd	Dolomitic siltstone and sandstone with minor conglomerate
	Eds	Dominantly shale and siltstone, usually micaceous
	E0q	Quartzwacke interbedded with black phyllitic mudstone, grey siltstone, minor conglomerate (E0q). Some dominantly siltstone units (E0qs)
	E0w	Lower sequence of interbedded lithic wacke, siltstone, mudstone and quartz-feldspar-phyrlic tuff of White Spur Formation (E0w). Some tuff units (E0wt) indicated.

CAMBRIAN	Ecvl	Felsic pyroclastic rocks, including tuff, breccia, vitric ash. Generally feldspar-phyrlic (Ecvl)
	Ecv0	Flame-bearing autaxitic tuff of ignimbrite type. Some block-and-ash flow units shown (Ecv0)
	Ecv1	Lithic breccia and agglomerate
	Ecv2	Crystal tuff, crystal-lithic tuff, commonly bedded
	Ecv3	Fine grained vitric tuff
	Ecv4	Quartz-feldspar-phyrlic tuff, often with lithic clasts
	Ecv5	Shale, siltstone, minor tuff units of chert or chert-pyrite rock as indicated (Ecv5)
	Ecv6	Dominantly feldspar-phyrlic lava of rhyolitic dacitic or andesitic composition (Ecv6). Some units of andesitic lava (Ecv6a). Sequence of hornblende-phyrlic lava and minor tuff at Mackintosh Bridge area (Ecv6m)
	Ecv7	Basaltic lava
	Ecv8	Slate, sandstone and tuff sequence of Farell Slates (E8). Some dominantly slate units (E8s)
CAMBRIAN	E0t	Felsic volcanics, dominantly quartz-feldspar-phyrlic of Murchison Gorge area (E0t)
	E0v	Some units of dominantly tuff (E0vt)
	ser	sericite
	pyr	pyrite
chl	chlorite	
qtz	quartz	

- Geological boundary - accurate or approximate
- Geological boundary - inferred or concealed
- Fault - accurate or approximate
- Fault - inferred
- Fault - concealed
- Major fold - axial surface trace
- Strike and dip of bedding - facing known, overturned, facing unknown, vertical
- Banding in volcanic or igneous rock
- Minor fold with plunge
- Diamond Drill Hole
- Mine
- Dyke or vein
- Geology compiled from:
- Corbett & McNeil 1966, Geological Survey of Tasmania - Rosebery - Mt. Black area.
  - Bilton (Aust.), 1986, TCR 85/2622.
  - EZ Co. 1979, TCR 82/1738.
  - EZ Co. 1985, TCR 85/2516

LOCATION MAP SHOWING 1:25,000 SHEET INDEX



**AUSTMIN RESOURCES NL**

TASMANIA  
MOUNT BLACK PROJECT  
EL 12/88

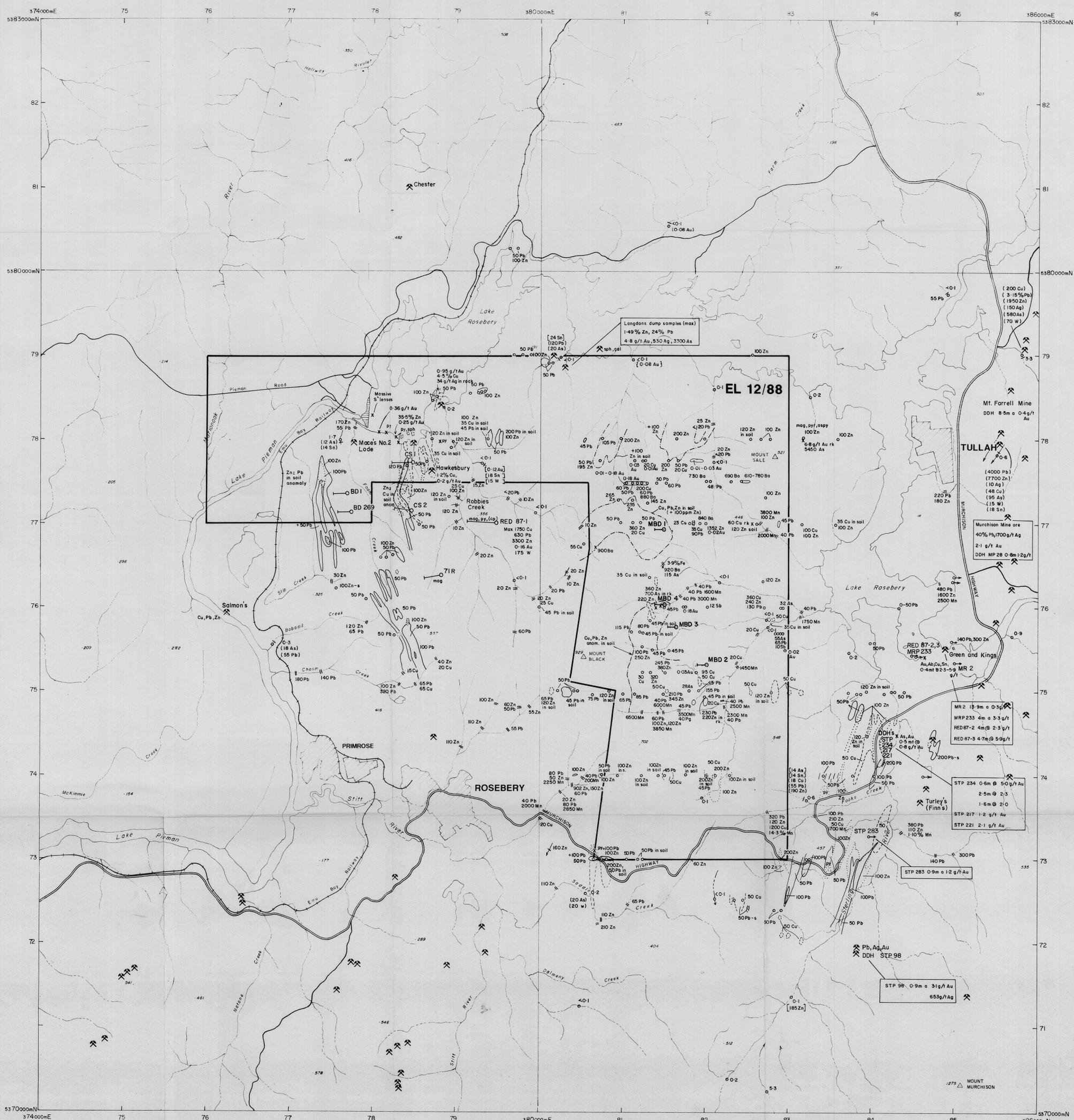
462058

**GEOLOGY**

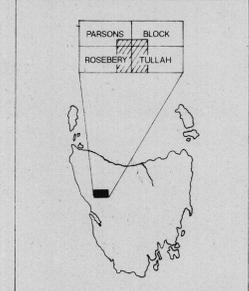
**90-3156.**

5 cm

AUTHOR: R.Hine	DATE: September, 1988	PROJECT No.:
SCALE: 1:25,000	DRAWN BY: W.H.S.	Figure 2



LOCATION MAP SHOWING 1:25,000 SHEET INDEX



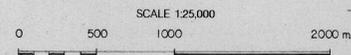
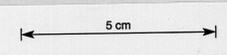
**AUSTMIN RESOURCES NL**

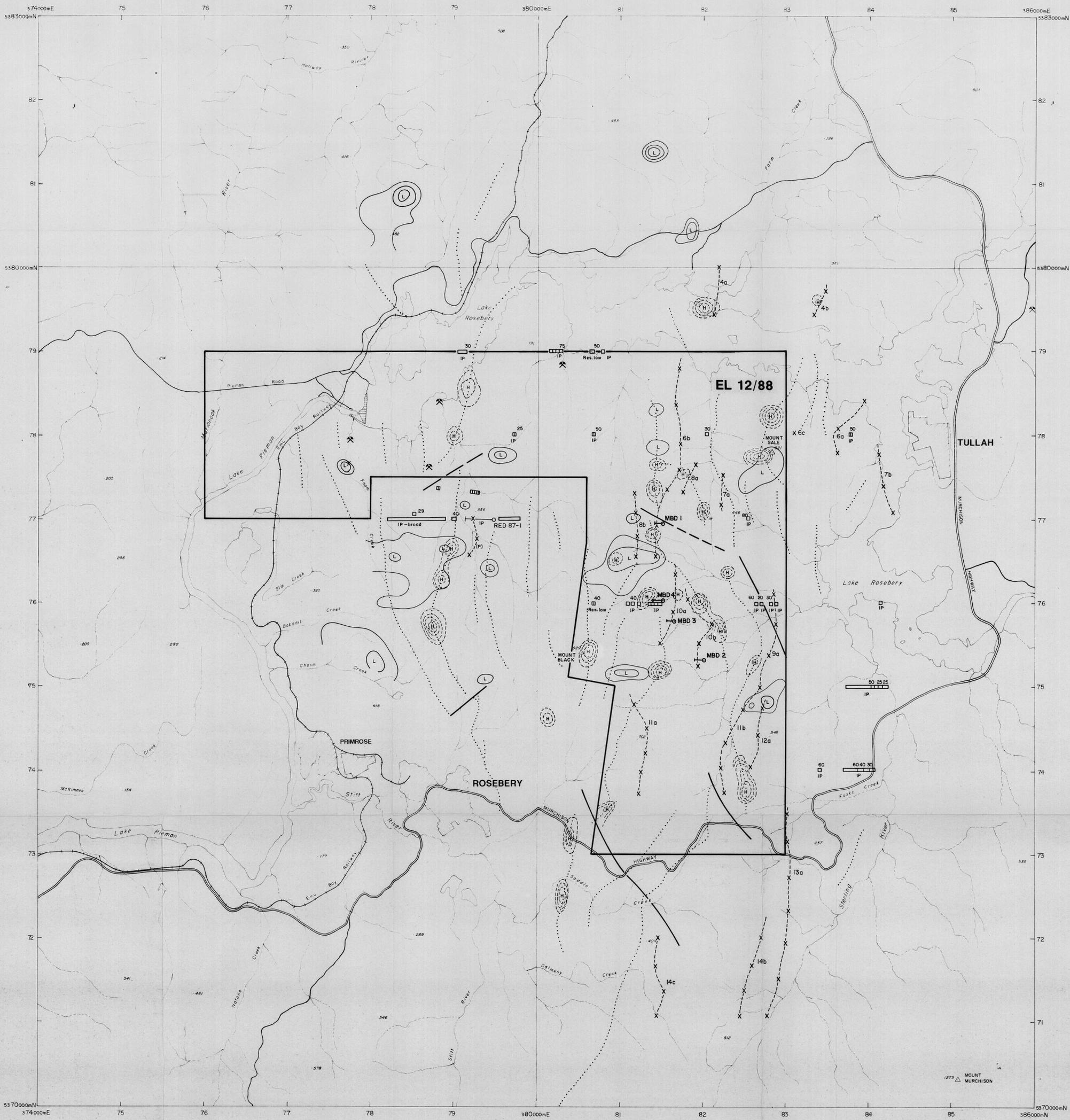
TASMANIA  
MOUNT BLACK PROJECT 462059  
EL 12/88

**GEOCHEMISTRY / MINERALIZATION**

AUTHOR: R.Hine	DATE: September, 1988	PROJECT No.:
SCALE: 1:25,000	DRAWN BY: W.H.S.	Figure 3

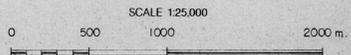
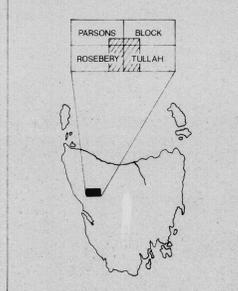
- 50 Pb, EZ Pb in soil
  - 100 Pb, EZ Pb in soil
  - 100 Zn, EZ Zn in soil
  - 35 Cu, EZ Cu in soil
  - x 900 Ba Rock sample site
- Bulk cyanide leach Au results in ppb
  - Stream sample site results in ppm
  - ( ) = -20 + 40#
  - [ ] = -40 + 80#
  - EZ stream sample site (TCR 71/785)
  - Anomalous results (-80#) (TCR 82/1738)





- UTEM Anomaly (p) projected
- Dighem Magnetic anomalies and trends
- CSAMT Conductive zone
- Dighem Resistivity contours
- TURAIR Anomaly (TCR 72-864)
- IP Anomaly with depth to source metres

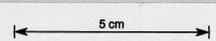
LOCATION MAP SHOWING 1:25,000 SHEET INDEX



**AUSTMIN RESOURCES NL**

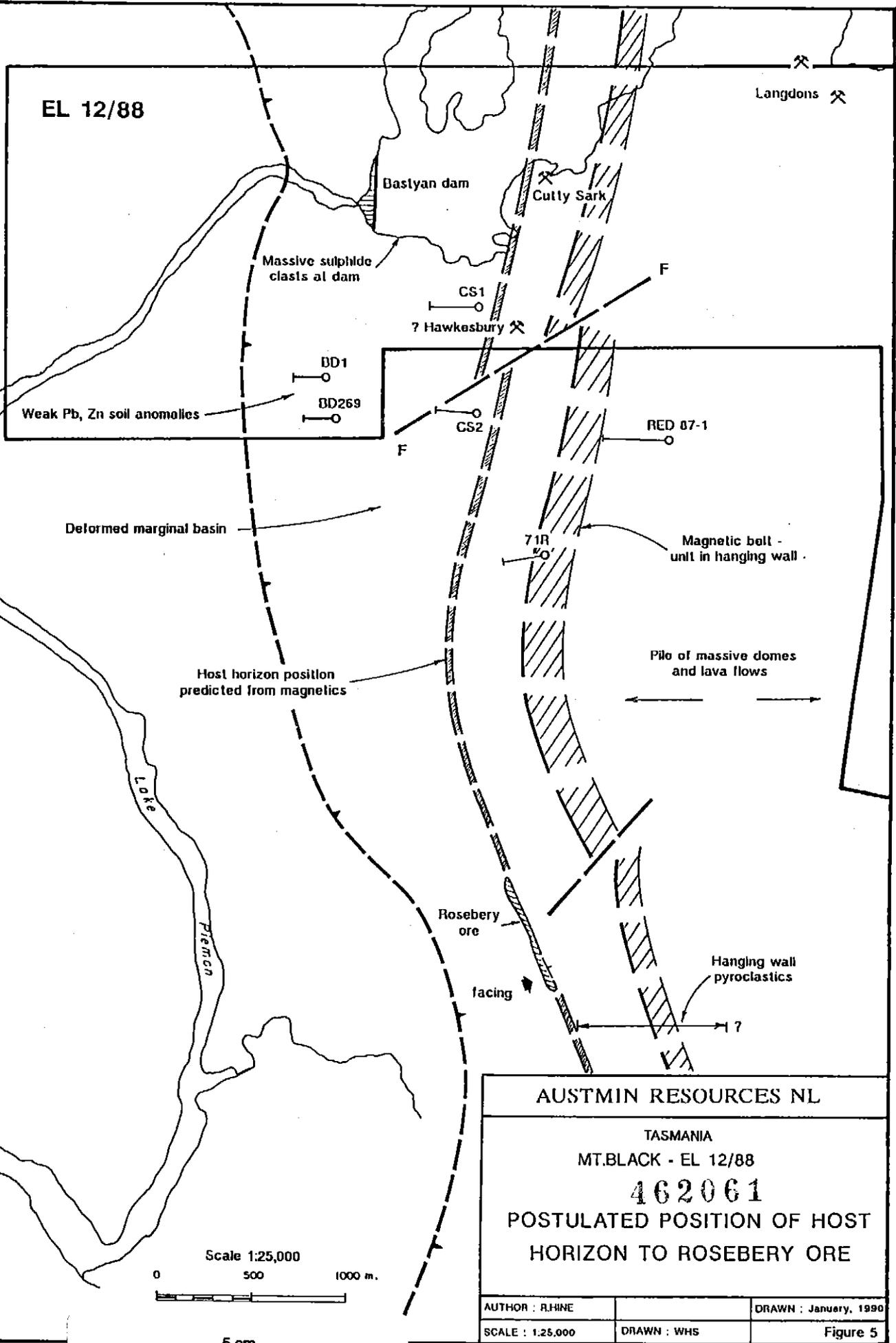
TASMANIA **462060**  
 MOUNT BLACK PROJECT  
 EL 12/88

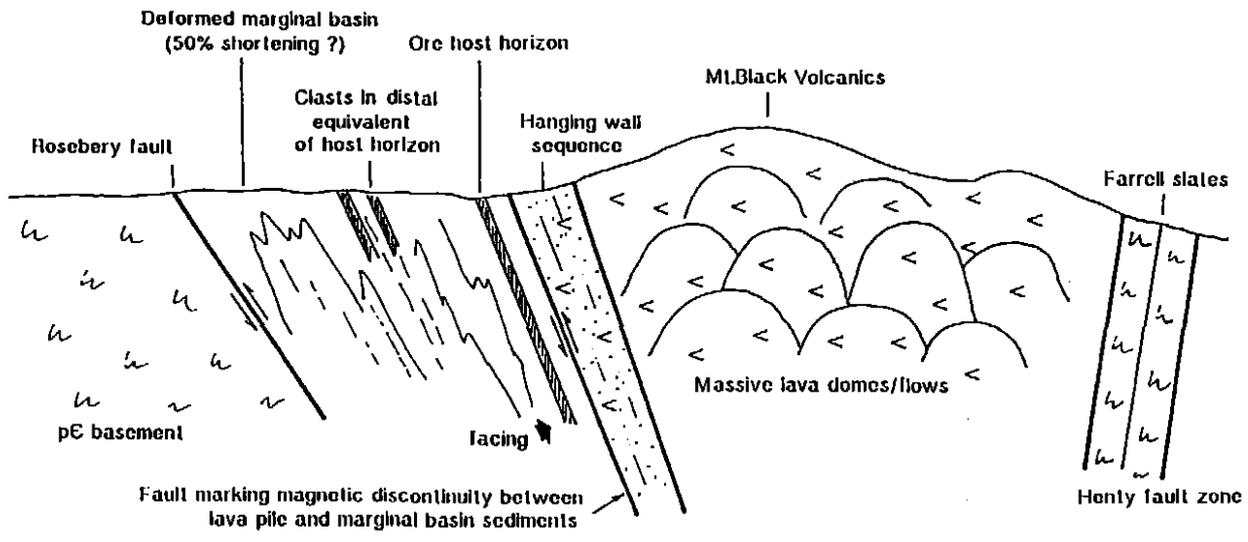
**GEOPHYSICS**



AUTHOR: R.Hine	DATE: September, 1988	PROJECT No.:
SCALE: 1:25,000	DRAWN BY: W.H.S.	Figure 4

9578



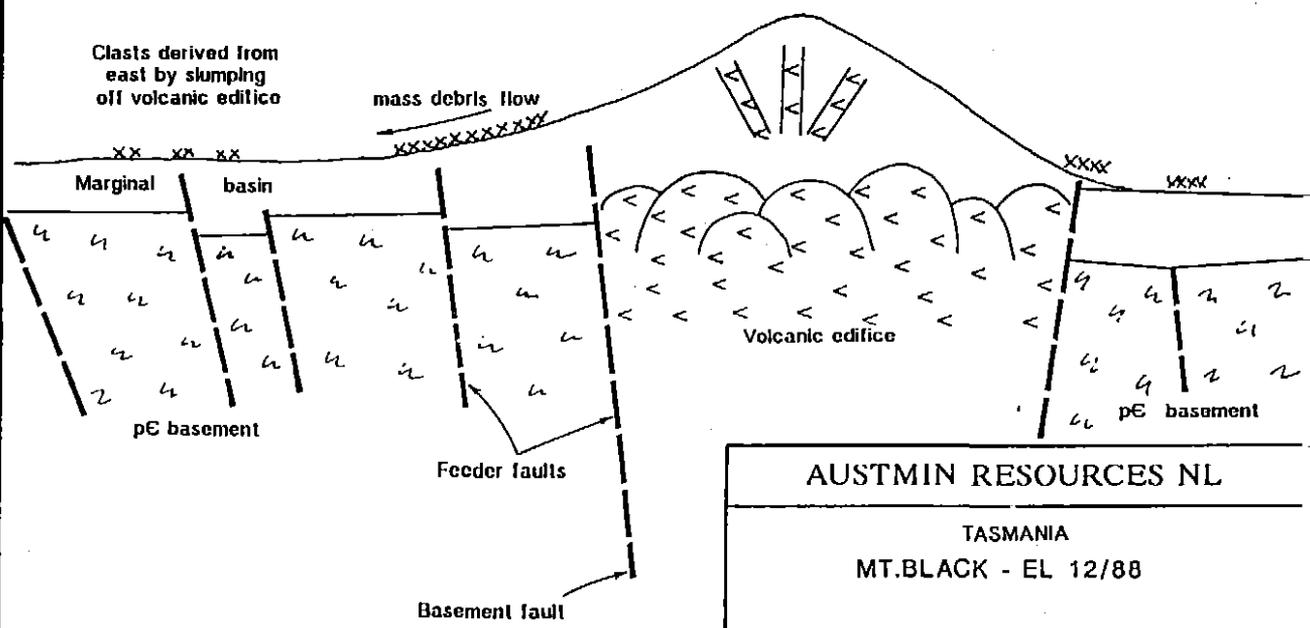


Uplift, erosion of cover

Deformation (2 main phases)-remobilisation of ore in Devonian (Langdons, Home Rule, Farrell Ore Bodies)

Cessation of volcanism

Hanging wall pyroclastic/epiclastic sequence deposited



AUSTMIN RESOURCES NL

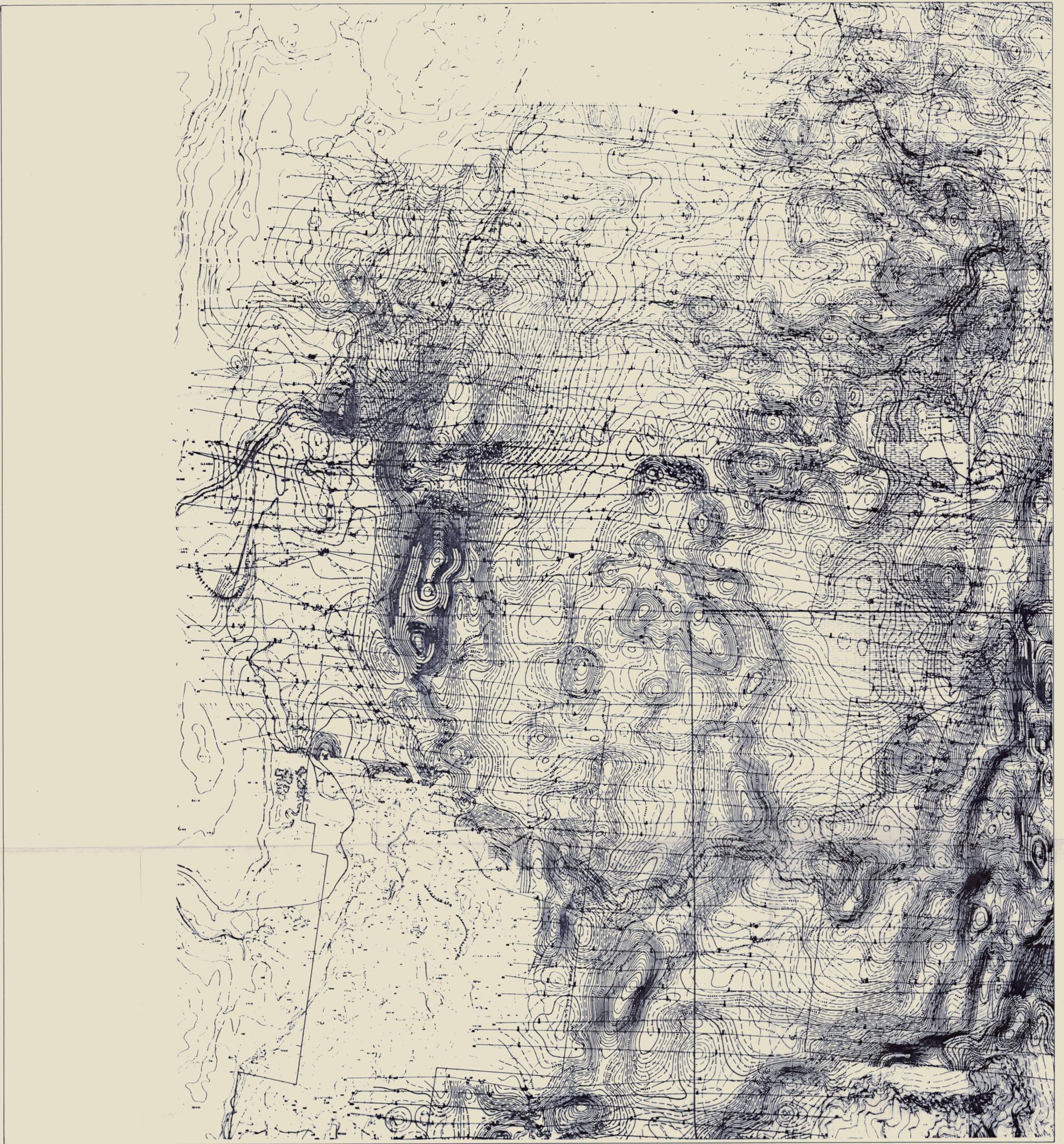
TASMANIA

MT.BLACK - EL 12/88

SCHEMATIC SECTION / ORE GENESIS MODEL

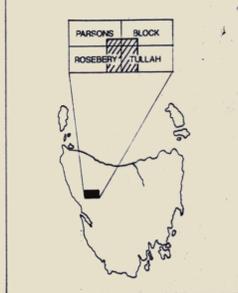
AUTHOR : R. Hine	DRAWN : WHS	DRAWN : January, 1990
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Figure 6



462063

LOCATION MAP SHOWING 1:25,000 SHEET INDEX



SCALE 1:25,000  
0 500 1000 2000 m.

AUSTMIN RESOURCES NL

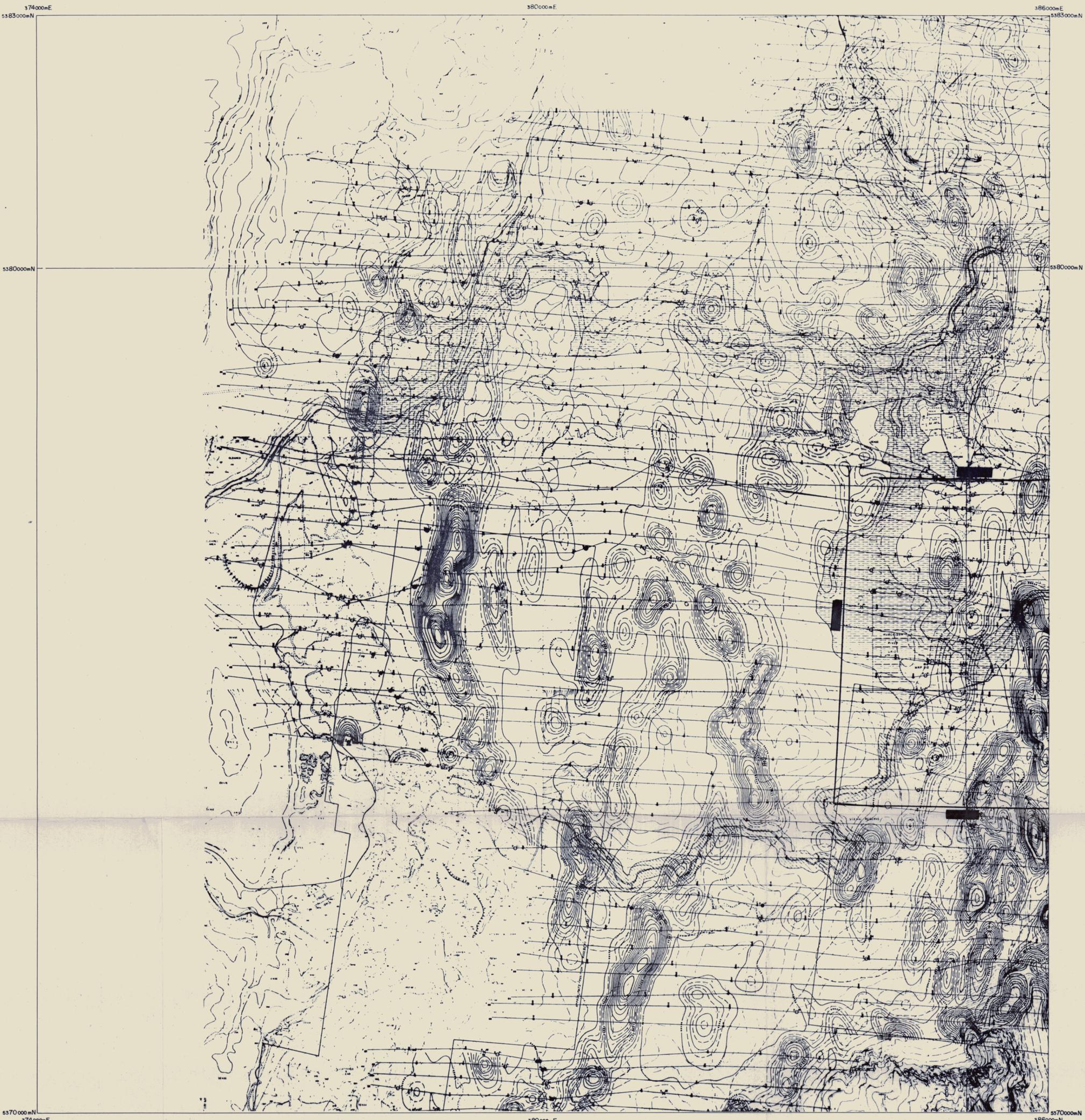
TASMANIA  
MOUNT BLACK PROJECT  
EL 12/88

TOTAL FIELD MAGNETICS

5 cm

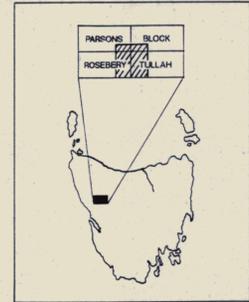
AUTHOR :	DATE :	PROJECT No. :
SCALE : 1:25,000	DRAWN BY :	Figure 7

90-3156.



462064

LOCATION MAP SHOWING 1:25,000 SHEET INDEX



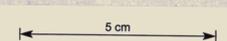
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0 500 1000 2000 m.

**AUSTMIN RESOURCES NL**

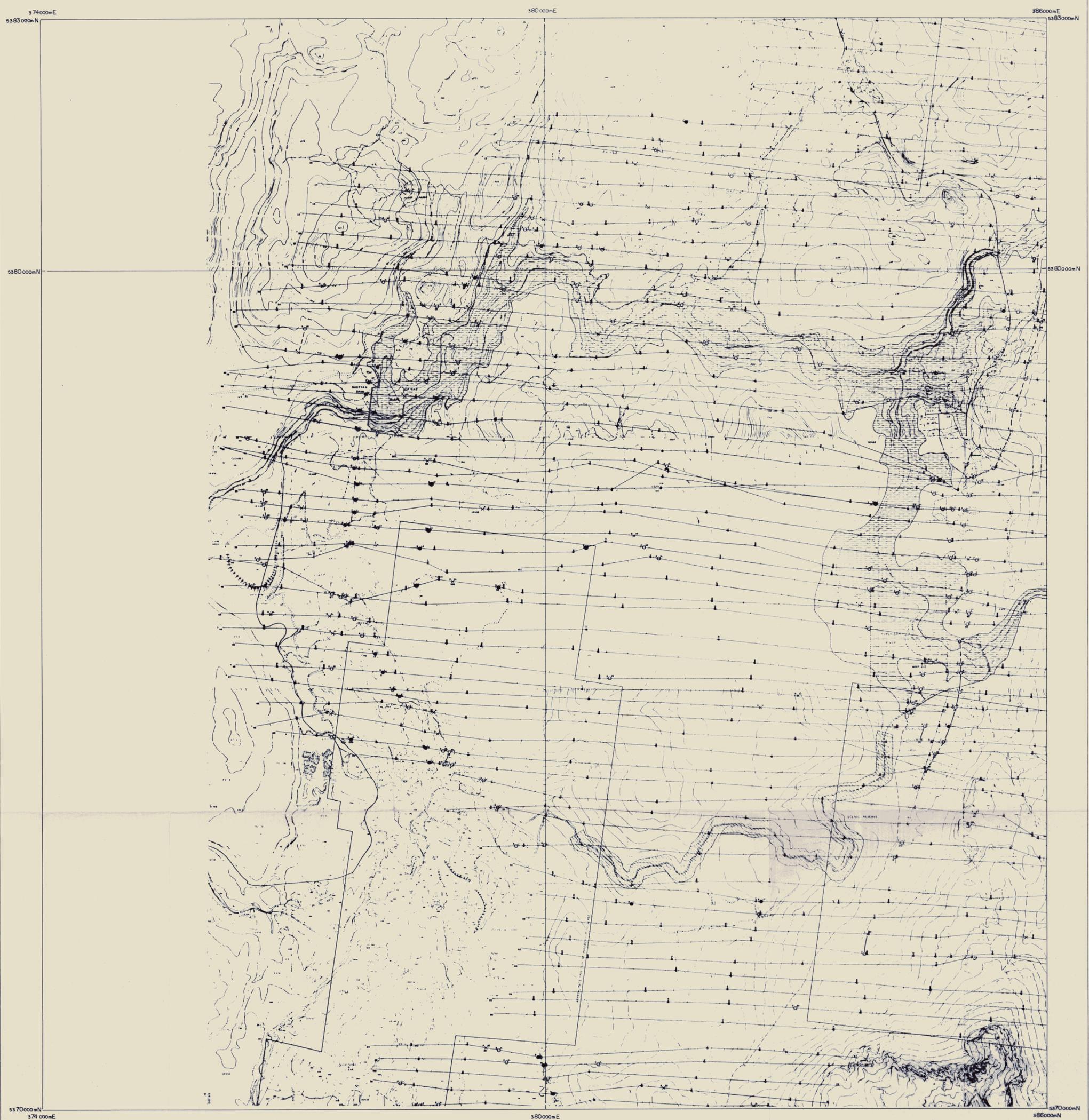
TASMANIA  
MOUNT BLACK PROJECT  
EL 12/88

**ENHANCED MAGNETICS**



AUTHOR :	DATE :	PROJECT No. :
SCALE : 1:25,000	DRAWN BY :	Figure 8

90-3156.



462065

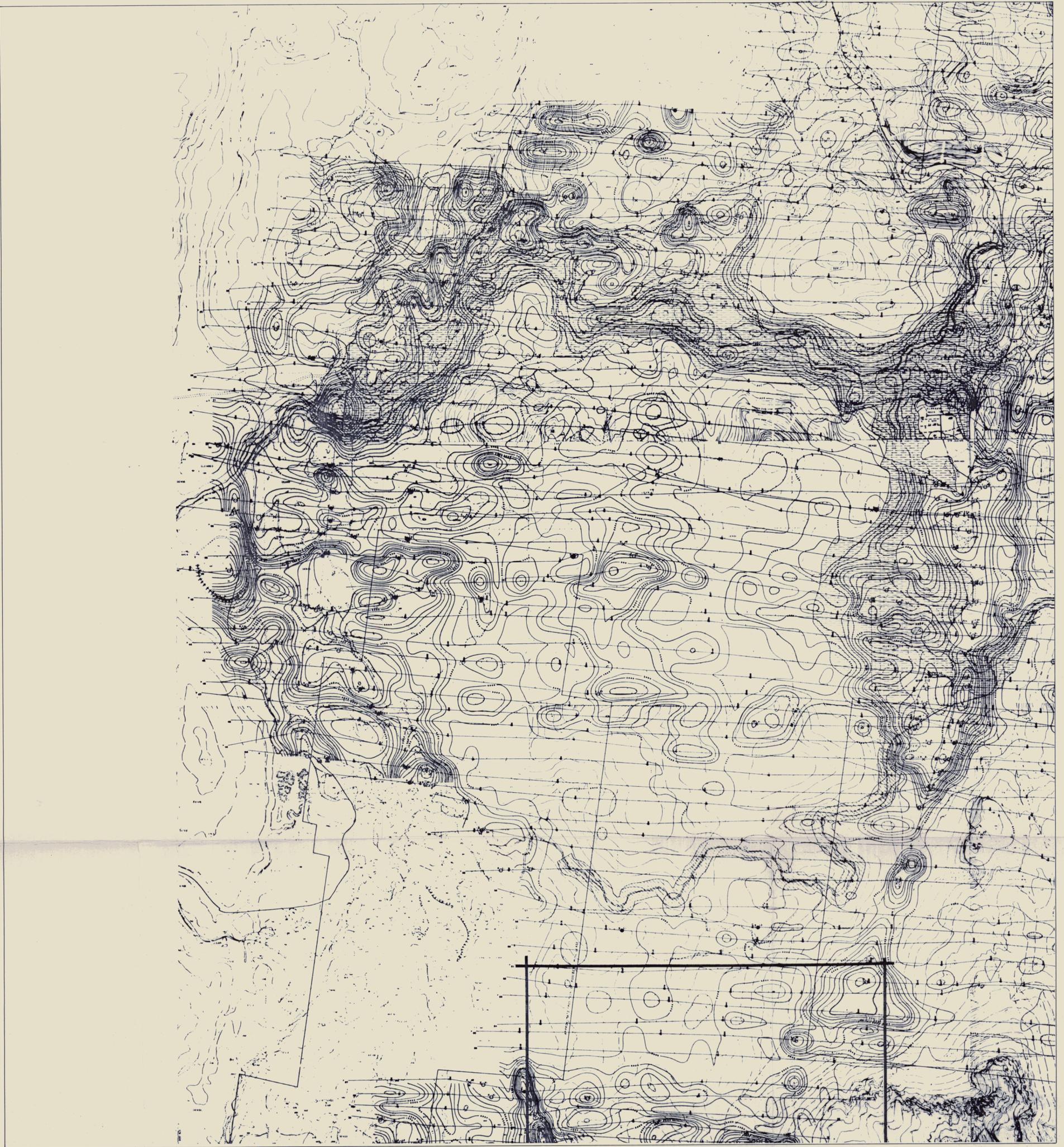
**AUSTMIN RESOURCES NL**

TASMANIA  
MOUNT BLACK PROJECT  
EL 12/88

**ELECTROMAGNETIC ANOMALIES**

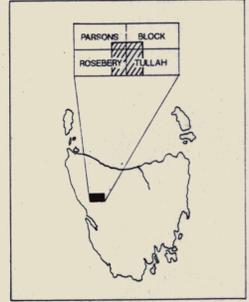
5 cm

AUTHOR :	DATE :	PROJECT No. :
SCALE : 1:25,000	DRAWN BY :	Figure 9



462066

LOCATION MAP SHOWING 1:25,000 SHEET INDEX



SCALE 1:25,000  
0 500 1000 2000 m.

AUSTMIN RESOURCES NL

TASMANIA  
MOUNT BLACK PROJECT  
EL 12/88

RESISTIVITY

5 cm

AUTHOR :	DATE :	PROJECT No. :
SCALE : 1:25,000	DRAWN BY :	Figure 10

90-3156.1