Tasmania Department Of Resources and Energy

Division of Mines and Mineral Resources — Report 1991/01

Regional Geological Mapping Section

SUBMISSIONS FOR FUNDS FOR MAPPING PROJECTS 1991/92

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INTRODUCTION

These submissions recognise that there will be two sources of funds for geological mapping in the Department of Resources and Energy, as at present, but that the amount of money that will be available in either fund is not yet known. During the 1990/91 financial year the Regional Geological Mapping Section received an appropriation of $501,700 from the State Geological Survey Fund and no moneys from the other fund for the thematic Mt Read Volcanic Project.

The Section consists of a Deputy Chief Geologist, three Senior Geologists and six geologists, two of whom are Project Leaders. Geological mapping requires a number of geologists working as a team to cover all the specialities (structure, stratigraphy, petrology, etc.) needed to adequately investigate the geology. Mapping is normally systematic and multipurpose for publication in the Geological Atlas 1:50 000 Series, although component investigations of surveys at any time can be grouped according to any particular theme or interest of society (mineral resources, soils for agriculture/forestry, etc.).

Mapping standards of the Regional Mapping Section are governed by deadline dates for completion and money allocation. It should be noted, however, that probably the most detailed mapping in Tasmania has been done during the production of maps of the Geological Atlas 1:50 000 Series, such as Devonport, Burnie, Table Cape, Beaconsfield, St Marys, Lyell, etc. (See Figure 1.1 for location).

With the present Government policy to partially recover costs one of the Section geologists, the Palynologist, is engaged in Launceston geodata mapping, and another, a sedimentologist, is in receipt of University funds for a University research project. The remaining geologists during the 1990/91 financial year continue a considerably reduced mapping program, due to severe budget cuts, and are preparing for publication maps and reports of more than $400,000 worth of completed field work.

The following project proposals for 1991/92 include estimates of the portions of salaries of geologists for only mapping and map compilation, and for field running expenses (field assistants, transport and travelling expenses). Costs of compilation of reports for field mapping are not included since this work will be carried out within programs of other office duties (see Table 1.1).

GROUPING OF PROJECTS

The $501,700 appropriation of the Geological Survey Fund in 1990/91 for the Section included $47,500 for field running expenses, which represents a 70% cut compared with the previous year, and as a basis for the following submissions it is assumed that this size of appropriation will be available in the 1991/92 budget. However, because of the many financial uncertainties, the submissions have been grouped into a number of options designed to make as much use as practicable of the abilities and experiences of the geologists of the Section, and to allow selection of the proposals depending on the amount of moneys available in both the Geological Survey Fund and the Mt Read Volcanics Project Fund. Indications are given in Figures 1.2 to 1.5 and in the financial estimates tabulated for each proposed project of partial cost recovery of salaries of geologists from the MRVP Fund should this be necessary.

The proposed projects take into consideration the necessity of obtaining a basic cover of 1:50 000 systematic, multipurpose maps of the Geological Atlas Series for the remaining virtually unmapped 40% of Tasmania, and to update by remapping selected, comparatively very old 1:50 000 map sheets.

All of the options of the proposed projects contain Hobart (SE, part of NE) 1:50 000 revision, Alberton and related

areas 1:50 000, and Zeehan 1:50 000 revision. The Hobart proposal, as shown in the submission, is in response to the pressing needs of engineering geology in city areas to correct significant errors in the old map, and to take advantage of very low field running expenses; Alberton 1:50 000 map sheet, which is of fundamental importance to gold exploration and widespread forestry operations, requires about a month's work at low costs to bring to completion a project that has involved a number of years of investigations; Zeehan map sheet is of central importance to mineral exploration and needs the last year of the three years program for completion.

In addition to the Hobart, Alberton and Zeehan projects, **Option 1** lists a proposal for the resumption of field work on the Trowutta 1:50 000 map sheet, which is already 45% complete. The Trowutta map is of importance to forestry assessments, supplies a basic framework for on-going mineral exploration operations, and is necessary to the mapping accord proposal (January, 1990) accepted by the Federal BMR for high-resolution deep seismic transects worth some $3.5M to the State. **Option 1A** (Figure 1.2) involves the financing of the first of a two year program to complete the map sheet to normal 1:50 000 Geological Atlas standard, whereas **Option 1B** (Figure 1.3) allows completion of the remaining 55% of the Trowutta sheet to an unsatisfactory reconnaissance standard only in one year.

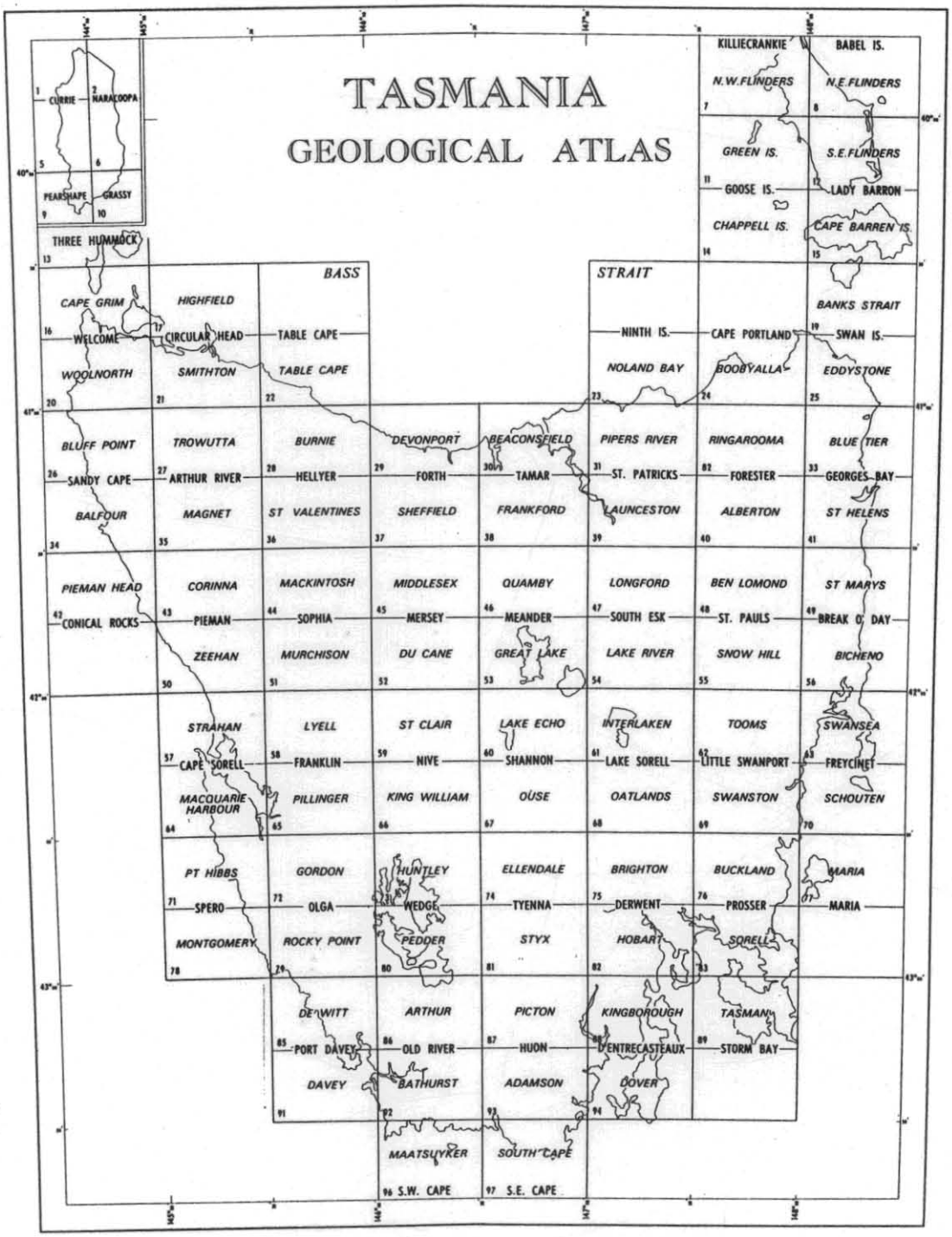
Option 2 (Figure 1.4) contains amongst the proposals one for the resumption of field work of the Pt Hibbs map for the completion within the financial year of the northern half, which is underlain by the western arm of the southern extension of rock units found in the Dundas Trough and the highly prospective Mt Read Volcanic belt of central, western Tasmania. Work in Pt Hibbs, as shown in the proposal, has already established the general nature of the large-scale structures governing the three dimensional distribution of these rock units in southwestern Tasmania, and further investigations will undoubtedly refine the knowledge of the geometry and development of the regional displacements.

Option 3 (Figure 1.5) incorporates a proposal for a one year program of detailed mapping, particularly structural, of the Mt Read Volcanics and associated rocks in highly prospective areas of the Sheffield (S) map sheet, which is 21 years old. The results of the project will be critical to attempts at tectonic reconstructions of western Tasmania, which are needed to predict the three dimensional distributions of rock units and the development of deformation.

Other proposals have been examined but it is not believed that they will contribute as much as those forwarded. One such proposal is for more detailed mapping of Lyell (SW). The Lyell 1:50 000 Geological Atlas sheet of this Section, however, was published as recently as 1987, and despite some weaknesses in Lyell (SW) (e.g. the low standard of information about the Owen Conglomerate of the Thureau Hills) the regional context of both the stratigraphy and structure of the Mt Read Volcanics is given in fair detail, and little more is anticipated from further mapping at present. It may be noted that in Tasmania the advance of geoscience is such that there is a general acceptance that about 20% of the geology of map sheets would be expected to need revision after five years, when it may be considered economic to do so.

N.B. SALARIES OF GEOLOGISTS (MAPPING AND MAP COMPILATION ONLY) IN FIGURES 1.2 TO 1.5 AND THE PROJECT FORMS ARE BASED ON AVERAGE PROPORTIONS OF 0.82 DAYS OFFICE COMPILATION FOR EACH FIELD DAY, AND FOR GOVERNMENT FUNDING ≈ FIELD DAYS/350 × ANNUAL SALARY × 1.82.

[6 February 1991]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BABEL IS.
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GOOSE IS.
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WELCOME
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CIRCULAR HEAD
TABLE CAPE
NINTH IS.
CAPE PORTLAND
19
SWAN IS.
WOOLNORTH
SMITHTON
TABLE CAPE
NOLAND BAY
BOOBYALLA
EDDYSTONE
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BLUFF POINT
TROWUTTA
BURNIE
DEVONPORT
BEACONSFIELD
PIPERS RIVER
RINGAROOMA
BLUE TIER
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SANDY CAPE
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ARTHUR RIVER
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HELLYER
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TAMAR
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ST. PATRICKS
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FORESTER
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GEORGES BAY
BALFOUR
MAGNET
ST VALENTINES
SHEFFIELD
FRANKFORD
LAUNCESTON
ALBERTON
ST HELENS
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PIEMAN HEAD
CORINNA
MACKINTOSH
MIDDLESEX
QUAMBY
LONGFORD
BEN LOMOND
ST MARYS
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CONICAL ROCKS
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PIEMAN
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SOPHIA
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MERSEY
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MEANDER
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SOUTH ESK
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ST. PAULS
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BREAK O' DAY
ZEEHAN
MURCHISON
DU CANE
GREAT LAKE
LAKE RIVER
SNOW HILL
BICHENO
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STRAHAN
LYELL
ST CLAIR
LAKE ECHO
INTERLAKEN
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SWANSEA
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CAPE SORELL
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FRANKLIN
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NIVE
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SHANNON
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LAKE SORELL
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LITTLE SWANPORT
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FREYCINET
MACQUARIE HARBOUR
PILLINGER
KING WILLIAM
OUSE
OATLANDS
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ROCKY POINT
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HOBART
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DE WITT
ARTHUR
PICTON
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TASMAN
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PORT DAVEY
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OLD RIVER
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HUON
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D'ENTRECASTEAUX
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STORM BAY
DAVEY
BATHURST
ADAMSON
DOVER
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MAATSUYKER
SOUTH CAPE
96 S.W. CAPE
97 S.E. CAPE
5 cm

Figure 1.1

REGIONAL GEOLOGICAL MAPPING SECTION

SUBMISSIONS FOR PROJECTS 1991/1992

OPTION 1A

	DAYS IN FIELD						
	NATIONAL MAP INDEX						
GEOLOGIST	HOBART 1:50 000 revision (SE, part of NE)	ALBERTON and related areas 1:50 000	TROWUTTA 1:50 000 Year 1 OF 2 years	TROWUTTA reconnaissance for 1 year completion	ZEEHAN 1:50 000 revision	SHEFFIELD (S)	PT HIBBS (N)
Dr A. V. BROWN			20		50		
M. J. CLARKE	100						
Dr M. P. McCLENAGHAN					50		
Dr R. H. FINDLAY		20			60		
Dr D. B. SEYMOUR			80				
J. L. EVERARD		8	66				
Dr B. GOSCOMBE					80		
SALARIES OF GEOLOGISTS for mapping and map compilation only	23 000	5800	34 185		48 803		
FIELD RUNNING EXPENSES Field assistants, transport and travelling expenses	1500	3396	27 641		30 190		
FUND	GEOLOGICAL SURVEY				MT READ VOLCANICS		

Figure 1.2

REGIONAL GEOLOGICAL MAPPING SECTION

SUBMISSIONS FOR PROJECTS 1991/1992

OPTION 1B

	DAYS IN FIELD						
	NATIONAL MAP INDEX						
GEOLOGIST	HOBART 1:50 000 revision (SE, part of NE)	ALBERTON and related areas 1:50 000	TROWUTTA 1:50 000 Year 1 OF 2 years	TROWUTTA reconnaissance for 1 year completion	ZEEHAN 1:50 000 revision	SHEFFIELD (S)	PT HIBBS (N)
Dr A. V. BROWN				10	50		
M. J. CLARKE	100						
Dr M. P. McCLENAGHAN					50		
Dr R. H. FINDLAY		20			60		
Dr D. B. SEYMOUR				80			
J. L. EVERARD		8		50			
Dr B. GOSCOMBE					80		
SALARIES OF GEOLOGISTS for mapping and map compilation only	23 000	5800		28 569	48 803		
FIELD RUNNING EXPENSES Field assistants, transport and travelling expenses	1500	3396		23 055	30 190		
FUND	GEOLOGICAL SURVEY					MT READ VOLCANICS	

Figure 1.3

REGIONAL GEOLOGICAL MAPPING SECTION

SUBMISSIONS FOR PROJECTS 1991/1992

OPTION 2

	DAYS IN FIELD						
	NATIONAL MAP INDEX						
GEOLOGIST	HOBART 1:50 000 revision (SE, part of NE)	ALBERTON and related areas 1:50 000	TROWUTTA 1:50 000 Year 1 OF 2 years	TROWUTTA reconnaissance for 1 year completion	ZEEHAN 1:50 000 revision	SHEFFIELD (S)	PT HIBBS (N)
Dr A. V. BROWN					60		
M. J. CLARKE	100						
Dr M. P. McCLENAGHAN							50
Dr R. H. FINDLAY		20			60		
Dr D. B. SEYMOUR					40		30
J. L. EVERARD		8			60		
Dr B. GOSCOMBE					20		50
SALARIES OF GEOLOGISTS for mapping and map compilation only	23 000	5800			50 625		24 300
FIELD RUNNING EXPENSES Field assistants, transport and travelling expenses	1500	3396			30 190		49 250
FUND	GEOLOGICAL SURVEY				MT READ VOLCANICS		

Figure 1.4

REGIONAL GEOLOGICAL MAPPING SECTION

SUBMISSIONS FOR PROJECTS 1991/1992

OPTION 3

	DAYS IN FIELD						
	NATIONAL MAP INDEX						
GEOLOGIST	HOBART 1:50 000 revision (SE, part of NE)	ALBERTON and related areas 1:50 000	TROWUTTA 1:50 000 Year 1 OF 2 years	TROWUTTA reconnaissance for 1 year completion	ZEEHAN 1:50 000 revision	SHEFFIELD (S)	PT HIBBS (N)
Dr A. V. BROWN					50	20	
M. J. CLARKE	100						
Dr M. P. McCLENAGHAN					20	50	
Dr R. H. FINDLAY		20			60		
Dr D. B. SEYMOUR					20	60	
J. L. EVERARD		8			10	60	
Dr B. GOSCOMBE					60	20	
SALARIES OF GEOLOGISTS for mapping and map compilation only	23 000	5800			44 819	40 600	
FIELD RUNNING EXPENSES Field assistants, transport and travelling expenses	1500	3396			30 190	27 300	
FUND	GEOLOGICAL SURVEY					MT READ VOLCANICS	

Figure 1.5

PROPOSED DUTIES OF REGIONAL MAPPING SECTION, 1990/91

The following main duties are in addition to the finally approved field mapping projects submitted in this report. At the present value of $A, salary scales and number of personnel at January 1991, the total funds required by the Section will be $513,000 to $559,000, depending on the field mapping option selected.

NAME	POSITION	DUTIES
Dr E. Williams	Deputy Chief Geologist	Management; Lyell 1:50 000 explanatory notes
Dr A. V. Brown	Senior Geologist	Corinna 1:50 000 explanatory notes; GIS application
M. J. Clarke	Senior Geologist/Palaeontologist	Bulletin on lower stages of Lower Parmeener Supergroup
Dr M. P. McClenaghan	Senior Geologist	Launceston 1:250 000 GIS map and notes; explanatory notes for Corinna and Alberton 1:50 000; Core library manager
Dr R. H. Findlay	Project Geologist	Ben Lomond/Snow Hill and Alberton 1:50 000 explanatory notes
Dr D. B. Seymour	Geologist	Lyell and Woolnorth 1:50 000 explanatory notes
J. L. Everard	Geologist	Lyell, Alberton and Ben Lomond/Snow Hill 1:50 000 explanatory notes
Dr. B. Goscombe	Geologist	Alberton 1:50 000 explanatory notes
S. M. Forsyth	Project Geologist	Launceston funded geodata mapping
C. R. Calver	Geologist	University funded research project

Table 1.1

REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:
HOBART 1:50 000 revision (SE, part of NE)

PROPOSERS (underline spokesperson)

Name	Position	Signature
S.M. FORSYTH	Project Geologist	Stephen M Forsyth.
M.J. CLARKE	Senior Geologist	M.J. Clarke.

PARTICIPANTS

Name	Position	Relevant experience
M.J. CLARKE	Senior Geologist	Authority in particularly Lower Parmeener biostratigraphy with 24 years relevant field and laboratory experience especially in neighbouring Kingborough map sheet.

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	23,000	23,000	
Field running (field assistants, transport, travelling allowance)	1,500	1,500	
Total	24,500	24,500	

PROPOSAL FOR REMAPPING THE HOBART 1:50 000 GEOLOGICAL MAP

S. M. FORSYTH and M. J. CLARKE

INTRODUCTION

The regional mapping program has sought to give a uniform coverage of geological information throughout Tasmania. A proposal to remap an area suggests that the existing data is no longer adequate to answer the geological questions being posed and that a need exists to upgrade the data. A remapping proposal also implies that the abilities exist to upgrade the mapping. Mapping priorities are to be set by the Advisory Committee, but all other things being equal, the low operating costs involved in remapping close to home base is of significance during a period of financial stringency.

This proposal is based on four main points:

1. The intensity of urban development in and about Hobart demands as good a geological map as possible.
2. The existing geological map is in need of revision.
3. Minimal operating costs are involved in remapping this area.
4. Optimum mapping results will only be achieved during the tenure of specialist staff.

DISCUSSION

Urban development needs

In areas of intense urban development, rock and soil conditions are important for numerous engineering projects. Usually the principles of engineering geology are used to translate geological data into engineering criteria to ensure safety in building foundation, safety in excavations, to enable forward planning and costing of projects. These projects may range from the largest engineering projects, e.g. bridges, reservoirs, highways and tower blocks, to projects smaller than an urban dwelling. Intermediate projects include pipe lines, tip sites and subdivision planning. Other forms of land use planning may also require detailed knowledge of the geological conditions, for example to prevent erosion.

Another role geological maps play in urban developments is in the location of suitable construction materials in the surrounding areas. An understanding of groundwater movement is also important in terms of slope stability, protection of groundwater resources, and preventing escape of toxic agents into the environment.

The requirement for engineering geology data is well recognised and recent geodata maps have been partly funded by councils. The starting point for the geodata maps, and in fact for most other engineering geology and other investigations, is the basic geology map. Currently this is the 1972 Hobart 1:50 000 geological map and derivatives.

To meet the needs of engineering geology it is important to refine stratigraphic mapping as much as possible, not only to indicate lithological change precisely and accurately but to further locate faults and other structural features important to the engineering geologist. In the light of recent problems involving landslip development it is clear that geological maps should go further towards identifying features related to Tertiary and Quaternary history, such as clayey residuals of Tertiary weathering surfaces and pockets of Tertiary sediments against steep fault scarps.

The existing map is in need of revision

Regional geology maps achieve much of their value by virtue of being mapped by a small coherent group of geologists specialising in the rocks being mapped and working over a short time interval. This ensures uniformity of standards and definitions of rock units, and the collection of data in surrounding areas to solve problems where critical outcrop may be absent. With time, new rock exposures often indicate that previous interpretations were incorrect, or new knowledge or techniques indicate refinements could be made to existing maps. New base maps or surveys may require repositioning of boundaries.

The existing Hobart map sheet was published in 1972 and compiled in 1969, some 22 years ago. This does not reflect the true age of some of the mapping, for much of the map is based on work done between 1957 and 1965 by students of the University of Tasmania. Furthermore, the Late Carboniferous to Late Triassic strata of the Parmeener Supergroup which forms much of the exposed rock units is presented in the light of the comparatively elementary stratigraphic knowledge of that time. Subsequent *ad hoc* investigations have revealed significant errors in the position of geological boundaries, the identification of rock units, and consequently the location of faults.

With the passage of time the stratigraphy of the Parmeener Supergroup has been substantially revised and refined in neighbouring areas, and stratigraphic drilling in the Hobart map sheet has shown how some of these revisions affect the stratigraphy in the Hobart area. The degree of mismatch between the geology along the boundary between the Hobart and Kingborough maps highlights some of the revisions required in the Hobart map sheet.

Small unmapped traces of Tertiary rocks, such as silicastone and ferricrete, and areas of deep weathering occur in the Hobart area. Mapping of these features would

be useful for determining Tertiary land surfaces. Many superficial deposits of Quaternary age are not depicted on the current map. In other cases it has become apparent that Tertiary age strata occur hidden in places beneath Quaternary deposits. Landslip damage to houses has occurred in two such areas, whereas in a third area, a road overpass has required additional support structures. It is desirable to have a greater knowledge of the type and extent of Quaternary and Tertiary strata.

Operating costs are minimal

The following costs normally associated with field mapping will not be incurred:

1. Travelling expenses

2. Vehicle expenses (home base-field base component)

Field assistants would seldom be required.

Efficiency would be improved by operating on a daily rather than a weekly basis, enabling more flexible scheduling.

Optimum mapping results

The best mapping result for the Parmeener strata will be achieved by a combination of lithostratigraphic and biostratigraphic mapping. M. J. Clarke and S. M. Forsyth are leading specialists in these fields, with a combined experience of over 45 years. To achieve comparable mapping results using other staff would require a lead in time of 10 – 20 years for retraining. Clarke and Forsyth are also highly suited for investigating the remaining stratigraphic units and Jurassic dolerite, as they possess considerable experience in mapping these rock units and in Tertiary biostratigraphy. The need for additional expertise in Tertiary basalt would be assessed during mapping.

TIME TABLE OF WORK

Three years are considered necessary to complete the project. The map would be divided into quarter areas with each quarter assigned 50–75% of one man year for completion. As S. M. Forsyth is occupied on other duties until into the 1992/93 financial year work would be commenced by Clarke alone.

1991/92: Clarke complete SE quarter map sheet and part of NE quarter

1992/93: Clarke and Forsyth complete NE quarter and most of NW quarter

1993/94: Clarke completes NW quarter, Forsyth SW quarter

Work program would include additional logging, biostratigraphy and clay analysis of existing bore core sampling through the Upper Parmeener, namely Lenah Valley and Knocklofty bores.

The proposed project would lead to a compiled map ready for presentation for cartography and does not include preparation of a report within the given time table. A report would follow as time permitted.

COSTING

	Vehicle expenses	* Field Assistant Salary	Palynology Laboratory	** Clay Analysis	** Gemco Shallow Drilling	Geologist
Year 1	$1,500					$23,000
Year 2	$2,800	$2,000	$300			$47,000
Year 3	$2,000	$2,000	$300	50 samples	30 m/$30,000	$38,000
	$6,300	$5,000	$600		$30,000	$108,00
					Total	$149,900

Note: Costing does not include some internal use of Agency facilities, e.g. lapidary and X-ray analysis.

*Field Assistant includes hand-held power auger operator

**Optional

Methods of Map Revision

Over the last twenty years considerable advances have been made in the litho- and bio-stratigraphy of the Parmeener Supergroup (Clarke and Forsyth, 1989). These advances will be applied and be especially refined as applicable to remap the Parmeener of the Hobart Sheet. Concurrently lithological boundaries will be more carefully located and positioned on improved base maps. Known errors will be corrected. For example limited biostratigraphic studies already show some confusion between the Bundella Mudstone and the Cascades Group. The occurrence of the Deep Bay Formation on the Hobart Sheet and omitted occurrences of the Risdon Sandstone will be depicted. The Cygnet Coal Measures will be mapped using the revised concept of Farmer (1985). Middle Triassic rock units will be differentiated.

Mapping of Jurassic dolerite will collect additional texture and grain-size data, and add further to the nature and position of boundaries. Tertiary strata and basalt will be studied in greater detail with the aim of obtaining a better knowledge of Tertiary structural, depositional, volcanic and weathering history. This will involve greater differentiation of Tertiary rock units, their attitudes, and probably limited drilling and biostratigraphic studies.

Morphological and compositional mapping of Quaternary deposits will be carried out, aided by shallow auger drilling. Within the time limits areas of poor outcrops of older rocks will be mapped and augered to locate 'hidden' relict weathering profiles and poorly consolidated Cainozoic deposits.

Time permitting, an emphasis could be place on small structural features to aid major structural interpretation and to increase engineering geology data bases. Ground magnetic traverses could be conducted to locate boundaries of igneous rocks.

References

CLARKE, M. J.; FORSYTH, S. M, 198. Late Carboniferous–Triassic, *in:* BURRETT, C. F.; MARTIN, E. L. (Ed.). Geology and Mineral Resources of Tasmania. *Spec. Publ. geol. Soc. Aust.* 15:293–338.

FARMER, N. 1985. Geological Atlas 1:50 000 series. Sheet 88 (8311N). Kingborough. *Explan. Rep. geol. Surv. Tasm.*

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REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

ALBERTON AND RELATED AREAS 1:50 000

PROPOSERS (underline spokesperson)

Name	Position	Signature
R.H. Findlay J.L. Everard	Project Leader Geologist	R. H. Findlay J. L. Everard.

PARTICIPANTS

Name	Position	Relevant experience
R.H. Findlay	Project Leader	Three seasons work on Mathinna Beds of Alberton Quadrangle. Mapped Ben Lomond Granite in Ben Lomond Quadrangle.
J.L. Everard	Geologist	Mapped Ben Lomond - Royal George Granite on Snow Hill Quadrangle (1988/89) Currently (early 1991) mapping granites on Alberton Quadrangle. Author of reports on Tertiary basalts on St Valentines, St Helens and Sorell quadrangles. Currently studying Tertiary basalts on Lake River Quadrangle.

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	5 800	5 800	
Field running (field assistants, transport, travelling allowance)	3 396	3 396	
Total	9 196	9 196	

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Proposal for studies during the 1991-92 financial year in the Alberton 1:50 000 sheet area and adjacent areas.

Preamble

The appended three proposals concern geological studies in the Alberton Quadrangle and parts of the adjacent Ben Lomond and Snow Hill Quadrangles. The three proposals cover the structural geology of the auriferous Mathinna Beds, the geochemistry of the tin- and tungsten-bearing Ben Lomond granite, and the geochemistry of the Tertiary basalts underlying some of the richer farmland in NE Tasmania. The work will be carried out in the 1991–92 financial year by R. H. Findlay and J. L. Everard, and will require appropriate support from the field, lapidary, cartographic and typing staff employed by the Department of Resources and Energy. Each proposal has been costed separately.

The work represents the continuation to completion of current 1:50 000 geological mapping in the Alberton and Snow Hill Quadrangles, and further support of work published in the Ben Lomond Quadrangle.

GEOLOGICAL MAPPING AND STRUCTURAL GEOLOGICAL ANALYSES WITHIN THE ALBERTON–LEGUNIA GOLDFIELD

R.H. Findlay

Proposal

To carry out 20 days geological mapping in the Alberton goldfield and adjacent regions for:

(1) completion of 1:50 000 geological mapping in the Alberton quadrangle;

(2) delineation of the geological structures controlling gold mineralisation;

(3) sampling for metamorphic studies to 'fingerprint' the type of quartz vein carrying gold in the Alberton goldfield.

Justification

This project represents the completion of three winter seasons fieldwork on the geological structure of the Mathinna Beds of NE Tasmania. This study has delineated the major folds in the Mathinna Beds and has brought to light hitherto unknown post-cleavage mega-kinks. Widespread sampling of vein quartz has been undertaken and fluid inclusion studies are suggesting that the introduction of the gold-bearing quartz veins occurred during a low-grade regional metamorphic event after folding. It is the present contention that extension during wrench faulting has controlled the formation of the gold-bearing quartz veins, but further work is required to demonstrate this. This work would be carried out in the Alberton–Ringarooma–Legunia district of the north-eastern part of the Alberton 1:50 000 quadrangle.

Publications

To be included in the Alberton 1:50 000 Geological Atlas Series map with additional results to be published in the explanatory notes to accompany the 1:50 000 geological map of the Alberton Quadrangle.

Costs

	$
Travel allowance for geologist and field assistant (40 man-days)	1964
Vehicle running at 15c per km (4 x 4 Nissan)	250
Salaries of permanent geologist and support staff including lapidary	Not costed
Total	2214

Benefits

Knowledge of the structural geological control of auriferous quartz veins, and the possibility of distinguishing these from barren veins by application of structural modelling and fluid inclusion studies, is important for planning exploration programmes. Knowledge of the tectonics of this key goldfield will enhance gold-exploration programmes elsewhere in NE Tasmania.

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GEOCHEMISTRY OF BEN LOMOND–ROYAL GEORGE GRANITE

J. L. Everard and R. H. Findlay

Summary

Geochemical and petrological studies of this granite body, economically important particularly for tin-tungsten mineralisation, are required to define its relationships with other Tasmanian granitoids. The project is a logical continuation of recently completed mapping of the granite. Some sampling and preliminary laboratory work has already been done, but has been curtailed due to lack of funds. Allocation of about $1100, additional to normal departmental operating costs and salaries, is required to complete the project.

Justification for the project

The Ben Lomond–Royal George Granite lies in the Rossarden–Avoca–Royal George district in north-eastern Tasmania. It has been of considerable economic importance to the State, hosting or being associated with major tin-tungsten mines at Aberfoyle, Storys Creek and Royal George, and numerous smaller mines and prospects. Minor deposits of base metals and other commodities are also associated with the granite.

The granite has been recently mapped in detail by geologists Dr R. H. Findlay (Ben Lomond map sheet, 1988) and J. L. Everard (Snow Hill map sheet, in press). As follow-up work, so far 24 granite samples from the Snow Hill Quadrangle have been submitted for chemical analysis, but only seven from the more extensively exposed part of the mass in the Ben Lomond Quadrangle. A few earlier Geological Survey and company analyses, which do not include a full range of elements, particularly trace elements, are available. Therefore, further sampling is necessary to provide an adequate, balanced geochemical characterisation of the granite.

In addition to the obvious benefits for the assessment of prospectivity for Sn-W and other metals in the immediate area, the proposed geochemical sampling program would have long-term benefits of a more regional nature. For example, the data would allow the relationships of the Ben Lomond/Royal George granite to other Tasmanian granitoids to be more confidently defined. Senior geologist Dr M. P. McClenaghan (10th Australian Geological Convention, Hobart, 1990) considers the most closely related granitoids to be those of the Mt Stronach suite, to the north in the Scottsdale Batholith, which in turn are considered to be derived by extreme fractionation of the Russell Road suite. However, the granitoids of the Scottsdale Batholith are entirely I-type and are associated with only minor known mineralisation, whilst the tin-tungsten mineralisation of the Ben Lomond/Royal George Granite suggests that this mass is an S-type granitoid.

Details of project

To provide adequate time, both for analytical work by the divisional laboratories, and for interpretation of data, it is considered necessary that sampling be conducted in 1991. Due to the nature of weathering processes in granitoids, the use of explosives is required to ensure fresh samples are obtained. It is envisaged that the sampling team would consist of geologists R. H. Findlay and J. L. Everard, and senior field assistant B. Cox. It is estimated that collection of about 20 samples would take about three days, necessitating two overnight stays.

Laboratory work would include thin section preparation and examination, whole-rock chemical analyses for major and trace elements, and limited electron microprobe analyses of constituent minerals, at the University of Tasmania. Together with assessment and interpretation of data, it is estimated that this work would take a single geologist approximately 50 working days, but be interspersed with other duties. Results would be published with the Ben Lomond/Snow Hill map sheet explanatory notes, planned for a Geological Survey Bulletin.

Costings

	1. Additional funds	$
(a)	Travelling allowance, 3 employees, 2 overnights = 6 x $98.20	589.20
(b)	Petrol and vehicle running expenses, explosives; say	100.00
(c)	Electron microprobe analyses; 4 hours @ $100/hr (subject to negotiation of contract with University)	400.00
	Total	1089.20

	2. Nominal costs, normally absorbed by recurrent Geological Survey budget. Evaluated at consulting rates for outside organisations.	$
(a)	Preparation of 20 standard thin sections@ $20 each	$400.00
(b)	20 chemical analyses, major and trace elements @ $150 each	$3000.00
	Total	3400.00

N.B. Salaries not included in above.

Conclusions

This project will provide valuable new geochemical data of an economically important granite body, well constrained by recent field work, at low cost.

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GEOCHEMISTRY OF TERTIARY BASALTS, SNOW HILL QUADRANGLE

J.L. Everard

Summary

Further petrographic and geochemical studies of the Tertiary basalts of this region, located in the northern Midlands, are a natural continuation of the recently completed Snow Hill map project. Results would have direct benefits in the study of the district's soils, and would provide some constraints on the largely concealed deep geological structure of the region. The core of the project could be completed for as little as $500 direct additional cost to the Geological Survey. There is some possibility of alleviating the cost of any additional work by collaborating with external organisations.

The project

At present this area, located in the Campbell Town–Avoca–Lake Leake district, represents a major gap in our knowledge of the widespread Tasmanian Tertiary basalts. Recently, the quadrangle has been geologically mapped by geologists A. B. Gulline (deceased), S. M. Forsyth, W. L. Matthews and J. L. Everard, and the 1:50 000 map will be published in 1991. However only a few samples of basalt were taken during mapping. Currently only two chemical analyses, both of which are more than 20 years old and neither of which include trace element data, are available from the area.

The Tertiary basalts to the west, in the Lake River Quadrangle, have recently been systematically sampled by J. L. Everard, and petrographic and petrological studies of these are in progress.

The Tertiary basalts of the Snow Hill Quadrangle crop out mainly in agricultural areas on the floor of the South Esk and St Pauls valleys, and around Campbell Town. However there are a number of smaller, intriguing areas of unusual basalt types at higher elevations. Further knowledge of the basalts, including major and trace element chemical analyses, could obviously have benefits in the study of the soils of the district. In addition, the chemistry of the basalts provides clues to the existence of major crustal features such as lineaments, faults and grabens which may be concealed beneath superficial cover; the lithology of the pre-Parmeener Supergroup basement, which is almost entirely concealed in the Midlands; and ultimately the nature of the Tasmanian lithosphere (e.g. F. L. Sutherland, 1989, *in:* Geology and Mineral Resources of Tasmania. *Spec. Publ. geol. Soc. Aust.* 15:395).

It is envisaged that systematic sampling of the basalts could be completed by a single geologist working alone, over approximately five days. Laboratory studies would involve thin section preparation and description of about 50 samples, chemical analysis (major and trace elements) of a subset of 15 to 20 samples, and assessment of the results.

Further work, such as radiometric dating, electron probe microanalyses of constituent minerals and isotope studies, whilst desirable, are probably beyond the resources of the Geological Survey in the current financial climate. However, preliminary discussions have been held with Dr F. L Sutherland of the Australian Museum, who is the recognised leader in the study of the Tasmanian Tertiary basalts. He has expressed interest in collaborating in this project, and may be able to arrange additional work, such as radiometric dating, at little or no cost to the Geological Survey of Tasmania.

In order to allow sufficient time for analytical work and assessment of data, it would be necessary to complete sampling in 1991. Laboratory and office work by the geologist associated with the project is estimated to require about thirty working days, but would be interspersed with other duties.

Results of the project could be published in the Geological Survey Bulletin mooted to jointly accompany the Snow Hill 1:50 000 map sheet and the recently published Ben Lomond 1:50 000 map sheet.

Costing

(1) Additional funds essential to the project:	$
(a) Geologists travelling allowance: 4 overnights @ $98.20	392.80
(b) Petrol and vehicle running expenses: say	100.00
Total, say	492.80 500.00

(2) Additional funds not essential to the project:	$
(a) Two radiometric (K-Ar) dates @ $750 each	1500
(b) Five hours electron microprobe work @ c. $100/hr	500
Total	2000

(3) **Nominal costs** normally absorbed by recurrent Geological Survey operating budgets. Evaluated at consulting rates for outside organisations.	$
(a) Preparation of 50 standard thin sections @ $20 each	1000
(b) 20 chemical analyses, major and 20 trace elements, at c. $150 each	3000
Total	4000

N.B. Salaries of project geologist, draftsman and publications officers not included in above.

Conclusions

This is essentially a small, inexpensive, laboratory-oriented project which is a natural extension of recent systematic 1:50 000 geological mapping of the Snow Hill Quadrangle.

REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

TROWUTTA 1:50 000 MAP SHEET

Year 1 of 2 years

PROPOSERS (underline spokesperson)

Name	Position	Signature
Dr A.V. Brown	Senior Geologist	
Dr D.B. Seymour	Geologist	
J.L. Everard	Geologist	

PARTICIPANTS

Name	Position	Relevant experience
Dr A.V. Brown	Senior Geologist	Mapping in sheet area at times during 1988-90; mapping mafic/ultramafic and Eocambrian-Cambrian volcano-sedimentary units of western Tasmania during 18 years; specialisation in mafic/ultramafic rocks (including Ph.D.).
Dr D.B. Seymour	Geologist	Mapping in sheet area at times during 1986-90; 13 years mapping of sedimentary, volcanic and mineralised folded terrains; specialisation in structural analysis of fold belts (including Ph.D.).
J.L. Everard	Geologist	Mapping in sheet area at times during 1987-90; mapping igneous/volcanic/low grade metamorphic rocks during 10 years; specialisation petrography and petrology.

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	34 762	34 762	
Field running (field assistants, transport, travelling allowance)	27 641	27 641	
Total	62 403	62 403	

REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

TROWUTTA 1:50 000 MAP SHEET

reconnaissance for 1 year completion

PROPOSERS (underline spokesperson)

Name	Position	Signature
Dr A.V. Brown	Senior Geologist	
Dr D.B. Seymour	Geologist	
J.L. Everard	Geologist	

PARTICIPANTS

Name	Position	Relevant experience
Dr A.V. Brown	Senior Geologist	Mapping in sheet area at times during 1988-90; mapping mafic/ultramafic and Eocambrian-Cambrian volcano-sedimentary units of western Tasmania during 18 years; specialisation in mafic/ultramafic rocks (including Ph.D.).
Dr D.B.Seymour	Geologist	Mapping in sheet area at times during 1986-90; 13 years mapping of sedimentary, volcanic and mineralised folded terrains; specialisation in structural analysis of fold belts (including Ph.D.).
J.L. Everard	Geologist	Mapping in sheet area at times during 1987-90; mapping igneous/volcanic/low grade metamorphic rocks during 10 years; specialisation petrography and petrology.

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	29 146	29 146	
Field running (field assistants, transport, travelling allowance)	23 055	23 055	
Total	52 201	52 201	

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PROPOSAL FOR THE COMPLETION OF THE TROWUTTA 1:50 000 MAP SHEET

A. V. Brown, D. B. Seymour and J. L. Everard

Summary

There are a number of compelling reasons to give priority to the resumption of field work on the Trowutta (fig. 1.1) map project.

(1) The project, which commenced in 1986 as a winter map sheet, is 45% complete.

(2) Most of the area of the map sheet is accessible by forestry roads and tracks, allowing for low logistical costs. However, in 1989/90, approximately $9500 was spent on cut-lines to poorly-accessable areas, in readiness for the 1990/91 summer field season which did not proceed due to financial constraints. If mapping is not resumed shortly these tracks will become overgrown and the expenditure wasted. Similar considerations apply to other useful tracks recently cut by Geopeko Ltd.

(3) The geology of this area, and indeed of most of the broader Arthur–Pieman district, is very poorly known. The area includes rock units of considerable potential for mineralisation, most obviously those within the Smithton Basin and within the Arthur Lineament, which have not far so far been thoroughly explored.

Most of the quadrangle falls within current Exploration Licences, particularly those held by Geopeko.

(4) The Trowutta Quadrangle contains the northern extension of the economically important Arthur Lineament, the middle section of which is covered by the Magnet Quadrangle (the next map sheet to be done in this area) and the southern section by the Corinna Quadrangle (currently in press).

(5) The southern part of the map sheet includes areas of potential new World Heritage Area nominations. An improved geological knowledge of the area is essential to ensure that these areas are assessed on an informed basis, as well as to assist in future land management of the area.

(6) The forestry resources of the area are of considerable economic importance. A detailed geological map is needed to assist in determining soil types and evaluating land stability for logging operations. The information will also assist management of the small, but highly productive, agricultural areas around Roger River and Trowutta in the north-west of the map sheet.

(7) Together with the Bluff Point, Woolnorth, Smithton, Table Cape and Burnie map sheets, this project is an essential part of a larger scale study, including the production of a series of transects across the Rocky Cape Block. The latter study will provide important constraints to interpretations of the tectonic development and structure of N W Tasmania, including major deep crustal structures and possible thrust sheet repetition of geological units.

Ultimately, the work will provide essential background to the proposed Deep Seismic Reflection Traverse (under the National Geoscience Mapping Accord, BMR, January 1990), which is expected to test such concepts.

(8) Whilst important in its own right, the Trowutta map sheet is an integral part of the systematic Geological Atlas 1:50 000 series, a long term multipurpose project which itself is approximately 60% complete.

(9) If refunded in the 1991/92 financial year, this map sheet could be completed and compiled, at normal 1:50 000 standard, by June 1993 allowing publication in the 1993/94 financial year.

(10) To complete, field work would be undertaken, interspersed with other duties, during a 21 month period from July 1991 to March 1993, at a total cost, over and above geologists salaries, of approximately $40,000. This would involve ~ $28,000 and three geologists during the 1991/92 financial year, and ~$12,000 and two geologists during 1992/93.

LOCATION, GEOLOGICAL AND GEOPHYSICAL BACKGROUND

Introduction

The Trowutta Quadrangle covers an area of approximately 42 × 28 km, south of Smithton in far north-western Tasmania. It includes the middle sections of the Arthur River and the Rapid River, and a portion of the Arthur Lineament.

The country largely consists of low, densely forested, rolling hills, with settled areas restricted to farmland around Trowutta and Roger River in the north-west of the quadrangle. Approximately 80% of the quadrangle is State Forest and a further 10% unallocated Crown Land.

Previous Geological Work

Because of lack of access and dense vegetation, previous geological work in the area was of a reconnaissance nature. Hence detailed geological knowledge of the area is very limited.

Before the project commenced, information relating to regional geology was contained in brief reports, with associated reconnaissance maps, produced by the Department of Mines some 30 years ago. The reports were compiled from a few weeks work from helicopter-supported base camps. Part of the Trowutta Quadrangle was included in a photo-geological interpretation by Carey (1981), but this review is considered too speculative to be of any specific use in the production of the 1:50 000 map.

Previous geophysical work

The entire Trowutta Quadrangle is covered by the recently flown aeromagnetic survey of north-western Tasmania. The results of this survey are particularly useful in determining the extent of the areas of Eocambrian basalt and features within the Arthur Lineament.

Gravity coverage within the region is, however, of reconnaissance standard and more stations are needed before this technique can be used to assist mapping.

General geology and potential for mineralisation

As a result of work over the last twenty-five years, by members of the Geological Survey, other organisations and individuals, good progress has been made in understanding the geological structure of north-western Tasmania.

The Geological Survey has produced, as part of the Geological Atlas 1:50 000 Series, the Table Cape (1966); Burnie (1967); Smithton (1982) and Woolnorth (in prep.) map sheets, which lie to the north-west, north and north-east, and east of the Trowutta Quadrangle.

The geology of the Trowutta Quadrangle, as known from both recent work and the earlier mapping of Matthews and others, appears to be a continuation of the sequences in these neighbouring areas, and continues into the Magnet Quadrangle to the south.

Although in the past relatively little mineral exploration has been undertaken in the far north-west, at present nearly the entire Trowutta Quadrangle is held under Exploration Licences. An improved, detailed, geological map and report of the area is needed to assist and further stimulate exploration work.

Precambrian Successions

Much of the central part of the Trowutta Quadrangle is underlain by a dominantly clastic, shallow-marine, shelf sequence of Precambrian age assigned to the Rocky Cape Group. The western part of the sequence is typified by black fissile siltstone interbedded with fine siltstone and quartzite, which is correlated with the Cowrie Siltstone, the lower-most exposed formation of the Rocky Cape Group. In one area of the quadrangle siltstone is being quarried for roofing slate. To the east of the Cowrie Siltstone, cross-bedded quartz sandstone, a correlate of the Detention Subgroup, occurs.

Within the Trowutta Quadrangle rocks belonging to the Rocky Cape Group have been deformed by gentle to moderate folding along a NNE-trending axis. A predominance of south-easterly or easterly dips in the south–central area of the quadrangle suggests westerly vergence, in contrast to the more symmetrical folding to the north in the Smithton Quadrangle; this discrepancy has yet to be explained.

The Cowrie Siltstone appears to provide a suitable, strongly reducing, environment for stratabound base metal sulphide mineralisation. During the mapping so far completed, secondary copper mineralisation (malachite) has been observed within the black pyritic facies in the north–central part of the quadrangle. However, apart from recent work by Geopeko Ltd, little exploration has been done.

The Cowrie Siltstone has been intersected by a swarm of NNE-trending dykes of dolerite, locally containing sulphide, which start at the north coast, in the Smithton Quadrangle, pass through the Trowutta Quadrangle, and extend south to the Magnet Quadrangle. The affinities of the dykes in the Trowutta Quadrangle are poorly known. Brown, in the Explanatory Notes for the Smithton 1:50 000 Map Sheet, has shown that at least four chemically different types of dykes occur within the Smithton Quadrangle, none of which are similar to the Cooee Dolerite in the Burnie Quadrangle to the east, but one of which could be the source for felsic volcanic detritus found in a conglomerate unit near the base of the Eocambrian succession. Further work on the dykes within the Trowutta Quadrangle is required to help ascertain the source of the felsic volcanism and any associated mineralisation.

Further east in the Trowutta Quadrangle the intensity of deformation and metamorphism of rocks within the Rocky Cape Group increases, probably gradationally, with the rocks becoming phyllitic as the Arthur Lineament is approached. The Arthur Lineament is a belt of quartz-mica schist, chloritic schist, amphibolite and minor dolomite which extends from near Wynyard to the Corinna district. Although poorly understood, the Arthur Lineament is of considerable economic importance, particularly as it hosts the Savage River iron-ore mine.

Within the northeastern part of the Trowutta Quadrangle, gossan, which contains the small, abandoned, Victory copper mine and several magnesite prospects, lies within the Arthur Lineament. There are several alluvial gold occurrences within the area and these are most probably locally derived, but current exploration is hampered by the absence of an adequate geological map.

Eocambrian-Cambrian Successions

In the western part of the Trowutta Quadrangle, the Rocky Cape Group is unconformably overlain, or in faulted contact, with rocks of an Eocambrian-Cambrian volcano-sedimentary succession, which occupies the Smithton Basin. The gross stratigraphy of the Smithon Basin has been established in the Smithton and Woolnorth Quadrangles by Geological Survey and Company personnel. The succession consists of four main sequences: the basal Black River Dolomite, consisting of a quartz clastic unit followed by dolomite/chert; a complex volcaniclastic sequence containing tholeiitic basalt, similar to those in the Crimson Creek Group in the Renison area of western Tasmania; a second dolomitic sequence, the

Smithton Dolomite; a Middle to Late Cambrian, fossiliferous greywacke-siltstone sequence. All sequences have gradational contacts with the following sequence.

Although only minor mineralisation is known from these sequences, the Smithton Basin can be considered prospective for volcanogenic base metal sulphide and gold mineralisation. As the cassiterite-chalcopyrite vein deposit at Balfour, which is probably related to a subsurface extension of the Interview Granite, lies just to the south-west of the Quadrangle, there may also be the potential for Renison-type tin-tungsten or sulphide mineralisation in the lower dolomite sequence.

Other commodities of interest in the area include dolomite, silica, chromite and other heavy minerals, and construction materials.

Permo-Carboniferous and younger successions

The Precambrian rocks in the eastern part of the quadrangle are partially concealed beneath the Lower Parmeener Supergroup, which includes the Permian Preolenna Coal Measures, and thin, but extensive, Tertiary basalt flows.

FURTHER APPLICATIONS OF THE PROJECT: Forestry; National Estate; World Heritage; Agriculture; Groundwater; Construction Materials

Forestry is currently the main economic activity over most of the area covered by the Trowutta Quadrangle. As the underlying rock type is the most important determinant of soil type, which in turn is a major control on the type and quality of the forest, an adequate geological map is needed for forestry assessments.

A detailed geological map is also required to help determine land stability and to identify potential problems, such as erosion and karst development, in areas underlain by dolomite. Similarly, such a geological map is needed to assist in the study of soils in the small, but highly productive, agricultural areas, and in the assessment of areas suitable for road and construction materials. It is vital in determining groundwater potential.

Large areas in the south-east and south-west of the quadrangle are listed in the Register of the National Estate and have been suggested as possible new World Heritage Area nominations, mainly as examples of temperate rainforest. An improved knowledge of the geology of the area is considered essential before long-term decisions affecting land tenure and availability of land for mineral exploration are made.

In relation to the above it has been reported that *Epacris curtisae*, a small plant restricted to a few localities in north-west Tasmania, is known from two localities in the quadrangle, where it is a component of heathland vegetation on peaty soils. These 'peaty soils' overlie chert developed by silicification of the Black River Dolomite.

More generally, a reliable and detailed geological map is needed for all land management purposes.

Present status of the project

Geological mapping of the Trowutta Quadrangle commenced in 1986 as a winter project. Some of the more inaccessible areas in the south of the area have been mapped as part of summer work. By April 1990, some 45% of the map sheet was completed. This included most of the area underlain by rocks of the Smithton Basin, on the western side of the quadrangle, as well as mapping of structures within the Cowrie Siltstone and the distribution of the dolerite dyke swarm.

Work in the eastern part of the map sheet, including the area of the Arthur Lineament, is at a relatively early stage. A preliminary compilation of the areas so far mapped has been completed.

Two walking tracks were cut by contractors in the summer of 1989/90, at a cost of approximately $9500, to provide access into otherwise nearly inaccessible parts of the quadrangle. However these tracks have both yet to be fully used and are in danger of becoming overgrown. Similar considerations apply to tracks cut recently by Geopeko Ltd in the Keith River–Lyons River area. These will be of immense value to future mapping in the area by the Geological Survey.

As a result of the State Government's and thus the Department's financial position in July 1990, the Trowutta Project was suspended and a decision made to continue work on the Zeehan and Alberton Quadrangles, which were perceived to be of immediate economic importance. With the completion of the Alberton map in June 1991, staff and resources will be available, from July 1991, for the resumption of work on the Trowutta Quadrangle.

Personnel

Three regional geologists were allocated to this project, their areas of responsibility reflecting the different specialisations of each officer. It is envisaged that these officers will continue with the project as their specialisations are required to complete the map sheet. The officers are: A. V. Brown, with experience in Eocambrian-Cambrian volcano-sedimentary rock successions of western Tasmania and mafic volcanism; J. L. Everard, with experience in igneous/metamorphic rocks and greenschist facies metamorphism; and D. B. Seymour, with experience in regional field mapping and structural analysis of mineralised Proterozoic fold belts.

FUNDING REQUEST

Introduction

The following funding request is for completion of the field work for the Trowutta 1:50 000 Map Sheet as part of the ongoing systematic Geological Atlas Series. Geologists salaries are not included in the calculations as they will be part of the Divisions salary vote. It is estimated that mapping and map compilation will occupy 55% of a geologists allocated time on the project.

Compilation of field data would be completed by June 1993 at no additional cost to geologists salaries. The

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subsequent Explanatory Notes would be written as soon as possible after compilation of the map.

Internal funding, over and above that given below, will be required for chemical analysis, and thin section and polished section production. For the preparation of the Explanatory Notes additional funding for external works, e.g. for Rare Earth Element analyses and Electron Microprobe work, will be required. However, this cost cannot be estimated until mapping is complete and the number of samples required for such work selected.

Two proposals have been costed:

(1) Completion of the remaining 55% of the map sheet to normal 1:50 000 Geological Atlas standard. Compilation by end of June 1993.

Cost — $39,434:- $27,641 during 1991/92; $11,793 during 1992/93.

(2) Completion of the remaining 55% of the map sheet to reconnaissance standard. Compilation by end of December 1992.

Cost — $23,055 during the 1991/92 financial year.

A breakdown of these costs follows.

(1) Completion of map to Geological Atlas standard

Time required:

23 field trips over a period of 21 months from 1 July 1991 to 30 March 1993. The work and costs would be divided as shown.

(a) **1991/92 financial year**

The program in 1991/92 would allow completion of most of the western half of the map sheet (thereby showing, for example, the distribution of rock units in the Smithton Basin, structures in the Rocky Cape Group basement, and basement/cover structural relationships). A substantial part of the eastern half of the map sheet would also be completed, particularly areas within the Arthur Lineament.

(b) **1992/93 financial year**

Completion of the 1992/93 program, in addition to the 1991/92 program, would allow completion of the whole map sheet to 1:50 000 standard.

Total cost for completion of whole map sheet to 1:50 000 standard:	$ 39,434

1991/92 financial year	$	$
A. V. Brown: 2 x 10-day field trips (hotel, no assistant)		
Allowances (Geologist)	2,000	
Transport	500	
Sub Total		2,500
J. L. Everard: 6 x 11-day field trips (1 hotel, 5 camp, assistants for all trips)		
Allowances (Geologist)	1,899	
Allowances (Assistant)	1,899	
Salary (Assistant)	8,352	
Transport	1,104	
Sub Total		13,254
D. B. Seymour: 8 x 10-day field trips (4 hotel, 4 camp, assistant for camp trips)		
Allowances (Geologist)	4,313	
Allowances (Assistant)	778	
Salary (Assistant)	5,140	
Transport	1,656	
Sub Total		11,887
Total for 1991/92 financial year		27,641

1992/93 financial year	$	$
J. L. Everard: 3 x 11-day field trips (1 hotel, 2 camp, all with assistant)		
Allowances (Geologist)	1,302	
Allowances (Assistant)	1,302	
Salary (Assistant)	4,176	
Transport	458	
Sub Total		7,238
D. B. Seymour: 4 x 10-day trips (hotel, no assistant)		
Allowances (Geologist)	3,535	
Transport	1,020	
Sub Total		4,555
Total for 1992/93 financial year		27,641

(2) Completion to reconnaissance standard.

Time required:

14 field trips over a 12 month period from 1 July 1991 to 30 June 1992.

	$	$
A. V. Brown: 1 x 10-day field trip (hotel, no assistant)		
Allowances (Geologist)	1,000	
Transport	200	
Sub Total		1,200
J. L. Everard: 5 x 10-day field trips (1 hotel, 4 camp all with assistant)		
Allowances (Geologist)	1,700	
Allowances (Assistant)	1,700	
Salary (Assistant)	6,960	
Transport	996	
Sub Total		11,356
D. B. Seymour: 8 x 10-day field trips (6 hotel, 2 camp, assistant for camp trips)		
Allowances (Geologist)	5,692	
Allowances (Assistant)	389	
Salary (Assistant)	2,570	
Transport	1,848	
Sub Total		10,499
Total cost of completion of remaining 55% of map sheet to reconnaissance standard		23,055

Conclusion

Resumption and completion of the Trowutta Project will fill in a major gap in the knowledge of the geology of north-western Tasmania. It will provide benefits to the State in terms of mineral exploration targets, forestry, agriculture and land management.

Although it is possible to abbreviate the project and complete the remaining areas of the map sheet to reconnaissance standards only, it is considered that completion to full 1:50 000 standard is desirable for effective used of the data, as it will enable appropriate attention to be paid to the economically important Arthur Linement.

Completion to 1:50 000 standard will provide a sound base for future work in the economically important Magnet Quadrangle, as well as to the Balfour and Bluff Point Quadrangles to the west.

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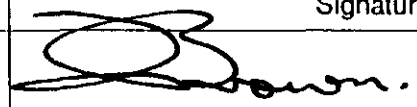
REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

ZEEHAN 1:50 000 MAP SHEET

Completion of Revision

PROPOSERS (underline spokesperson)

Name	Position	Signature
Dr A.V. Brown	Senior Geologist	

PARTICIPANTS

Name	Position	Relevant experience
Dr A.V. Brown	Senior Geologist	Mapping in sheet area during 1989-91. Mapping mafic/ultramafic and Ecambrian-Cambrian volcano-sedimentary units of western Tasmania during 18 years. Specialisation in mafic/ultramafic rocks (including Ph.D.).
Dr R.H. Findlay	Geologist	Mapping in sheet area during 1989-91. Field mapping in adjacent areas in structural geology and sedimentation during 5 year period. Ph.D. in Structural Geology.
Dr B.D. Goscombe	Geologist	Mapping in sheet area during 1991. Specialisation of 7 years on structure and metamorphism, including Ph.D.
Dr D.B. Seymour	Geologist	Mapping in sheet area during 1991. Mapping in similar areas during 4 year period. 13 years specialisation on structural analysis, including Ph.D.
Dr M.P. McClenaghan	Senior Geologist	See over

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	44,819-50,625	≤ 50,625	≤ 21,262
Field running (field assistants, transport, travelling allowance)	30,190	-	30,190
Total	75,009-80,815	≤ 50,625	≤ 51,452

Dr M.P. McClenaghan	Snr Geologist	Mapping on sheet area during 1989-90. Mapping in similar areas during 10 years. Specialisation of 14 years, including Ph.D., on felsic and related volcanic rocks.
J.L. Everard	Geologist	Mapping igneous/volcanic/lowgrade metamorphic rocks in adjacent areas during 10 years. Specialisation petrography and petrology.

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PROPOSAL FOR THE CONTINUATION OF THE REVISION OF THE ZEEHAN 1:50 000 MAP SHEET

A. V. Brown

Summary

It is estimated that $30,190 and four geologist summer seasons (or equivalents) will be required during the 1991/92 financial year to complete the revision mapping for the new Zeehan 1:50 000 Map Sheet. Compilation of the sheet will be completed by the end of June 1992.

Mapping for the original One inch to One Mile Zeehan Map Sheet occurred during the late 1950's and early 1960's. The map was published during 1962. As the half life of a geological map sheet is estimated as ten years, after 30 years the original map was deemed well out of date, and a project was started in the 1989/90 summer field season to produce a 'revised' 1:50 000 map sheet.

A target of 75% remapping of the quadrangle was set for the revision to 1:50 000 Geological Atlas standard. The revision was programmed over three summer seasons, with a full time equivalent of five geologist years (10 summer season equivalents), and a compilation date of end of June 1992.

After an internal review, due to the financial cut backs in the 1990/91 budget, revision of the Zeehan Quadrangle was considered to be of immediate economic importance and the project was allowed to continue, albeit on reduced funding. To complete the revision a further summer season with four geologists (or equivalents) is required.

During the 1989/90 season, 3 geologists worked on the project. During the 1990/91 season, 2 geologists were on the project full time and 2 part time, being an overall equivalent of 3 geologist summer seasons. The remapping is on schedule.

Introduction

The Zeehan Quadrangle covers the Zeehan–Renison Bell mining fields of western Tasmania, with rocks of the Mt Read Volcanic Belt occuring along the eastern side of the quadrangle.

The geology of the Zeehan Quadrangle was first published as a 1:63,360 scale map in 1962, being the first such detailed geological map to have been produced in the mineralised 'Dundas Trough' region of the Tasmanian west coast. As such, both the map and accompanying Explanatory Notes have become the definitive description of much of Tasmania's west coast geology.

The area is well known for extensive lead-zinc and tin mineralisation, with subsidiary amounts of gold, iron, nickel, asbestos and PGE's. With new information gained during the revision mapping, a number a different exploration models can be suggested, including one which would suggest that the whole of the area covered by the Oonah Formation to the west of, and in the vicinity of, Zeehan is prospective for Pb-Zn-Cu(?) mineralisation below depths of 150 metres.

Recently completed work in the Macquarie Harbour and Montgomery Quadrangles has confirmed that the simple concept of a 'layer cake' stratigraphy proposed in the original Zeehan work no longer holds. Consequently, it became necessary to re-study the three-dimensional distribution of the rock units in the Zeehan Quadrangle. This work, begun during the 1989/90 summer season, has already confirmed major anomalies in the earlier interpretations of the geological structures, and initial work during the 1990/91 season has re-affirmed such structural irregularities to the point where large areas of country, formerly deemed economically barren, may be widely prospective for base metals.

Due to the work to date it is essential, both from the local geological as well as regional interpretative viewpoints, to complete the re-mapping to allow a full understanding of the 3-D rock unit distribution in the Zeehan area and the consequent re-interpretation of the structural geology of adjacent mineral-rich areas within the Mt Read Volcanic belt.

It is estimated, based on the past two summer seasons, that 240 field days, i.e. 6 x 10 field trips for each of 4 geologists, will be required during the 1991/92 season to complete the revision. Of this time approximately 100 days, or 10 x 10 day trips (42% of the time), will be required to complete the revision of the western edge of the Mount Read Volcanic belt and the structural relationships within and between these successions and the successions to the west. Structurally, the contact zone between the Mount Read Volcanic belt and rocks to the west extends as far west as the Zeehan township.

Personnel

The personnel for the completion of the revision during the 1991/92 summer season will depend on which other projects are funded. However, due to the specialities required, A. V. Brown, R. H. Findlay and B. Goscombe should continue on the project with varying contributions from D. B. Seymour, M. P. McClenaghan and J. L. Everard.

During the 1989/90 summer season three geologists worked on the project; one specialising in the geology of granitic rocks, one in structural geology, and one in mafic–ultramafic and associated sedimentary rocks. During 1990/91, one geologist full time and one for half the season worked on regional structural geology and structure of the Oonah Formation; one geologist worked

full time on further areas of mafic–ultramafic and associated sedimentary rocks; and a fourth geologist worked for half a season on the structure and sedimentation of the Late Cambrian to Ordovician successions.

For the 1991/92 summer season two geologists are required to complete the regional geological structure and internal structure of the Oonah Formation; one geologist to complete areas of mafic igneous and associated sedimentary rock successions, their boundary with the Mt Read Volcanic belt and the MRV rocks in the south-eastern corner of the map sheet; and a fourth geologist to study the structure and sedimentation of the Siluro-Devonian and younger rocks.

FUNDING REQUEST

Introduction

The following funding request is for completion of field work for the revised Zeehan 1:50 000 Map Sheet as part of the ongoing systematic Geological Atlas Series. Geologist's salaries are not included in the calculation, as they will be part of the divisions salary vote. It is estimated that mapping and map compilation will occupy 55% of a geologist's allocated time on the project. 42% of field time during the 1991/92 season will be spent on the structural relationship between rock sequences belonging to the Mount Read Volcanic belt and those to the west.

Compilation of field data is due to be completed by the end of June 1992 at no additional cost to geologist's salaries. The subsequent Explanatory Notes would be written as soon as possible after the compilation of the map.

Internal funding, over and above that given below, will be required for chemical analysis and thin section and polished section production. For the preparation of the Explanatory Notes, additional funding for external works, e.g. for Rare Earth Element analyses and Electron Microprobe work, will be required. However this cost cannot be estimated until mapping is completed and the number of samples required to be analysed is selected.

The following breakdown of costs is given on the basis of the time and field asssistance required to complete the project, and not on the basis of specific amounts for individual geologists.

	$	$
Time required: 24 x 10 day field trips, by 4 Geologists		
Allowances (Geologist)		
12 Camping (12 x 9 x $22.5)	2,430	
12 Hotel based (12 x 9 x 100)	10,800	
Transport (12 x $200)	2,400	
Field Assistant — locally employed (assuming 8hr/day for 6 days plus double time for 2 days). Salary (14 trips, 80 hrs/trip, $13/hr)	14,560	
Total Cost for completion of revision during 1991/92		30,190

REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

SHEFFIELD (South)

PROPOSERS (underline spokesperson)

Name	Position	Signature
J.L. Everard	Geologist	
Dr D.B. Seymour	Geologist	

PARTICIPANTS

Name	Position	Relevant experience
Dr D.B. Seymour	Geologist	13 years mapping of sedimentary, volcanic and mineralised folded terrains; specialisation in structural analysis of fold belts, including Ph.D. in adjacent area.
J.L. Everard	Geologist	Mapping Mt Read Volcanics, granitoids and skarn during 10 years; specialisation petrography and petrology including felsic/mafic volcanic rocks.
Dr M.P. McClenaghan	Senior Geologist	Mapping of granitoids, Cambrian volcanic rocks and structural geological investigations during 18 years; specialisation granitoids and felsic volcanic rocks (including Ph.D.)
Dr A.V. Brown	Senior Geologist	Mapping of mafic/ultramafic and Mt Read Volcanic associated rock-units during 18 years; specialisation in mafic/ultramafic rocks and associated mineraliation (including Ph.D.)
Dr B. Goscombe	Geologist	5 years mapping of rock-unit structure and metamorphism (including Ph.D.)

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	40 600	≤40 600	≤40 600
Field running (field assistants, transport, travelling allowance)	27 300	-	27 300
Total	67 900	≤40 600	≤67 900

Sheffield Quadrangle (South)

J. L. Everard and Dr D. B. Seymour

Summary

Geological mapping, particularly structural, of the southwestern and southeastern quadrants of the Sheffield quadrangle (fig. 1.1), where the existing regional geological map is more than thirty years old, will greatly improve our understanding of this poorly-known section of the highly mineralised Mt Read Volcanics, and associated rocks. The project, which requires expertise in stratigraphy, volcanology, petrology, sedimentology and especially structural geology, will require five geologists from the Regional Geology Section and approximately 210 geologist-days of field work, which can be completed by the end of June 1992. Because of the easy logistics in the field area, the project is considered highly cost-effective, and will require field running funds of about $27,300. It is suitable for funding from the specially allocated MRVP moneys. It is envisaged that two 1:25 000 colour geological maps and an explanatory report would be published at the conclusion of the project. In addition to the obvious benefits to the mineral exploration industry, the project has wider advantages in the tectonic interpretation of north-western and western Tasmanian geology, and in the proposed BMR deep seismic transect.

Introduction and previous work

Geological mapping of the Mt Read Volcanics and associated rocks in the Sheffield–Wilmot districts in northwestern Tasmania is most desirable and cost effective.

Although the project area is already covered by the 1:63 360 Sheffield sheet, this map was published in 1959 and is therefore one of the earliest of the systematic One Mile (now 1:50 000) series maps. Thus it belongs to a previous era, predating modern tectonic concepts. Ideas in structural geology, sedimentology, volcanology and petrology have changed and advanced greatly since the map was produced. Additionally, in the past thirty years, geological work elsewhere in the State has greatly increased our understanding of Tasmanian geology, particularly of rocks of Cambrian–Eocambrian age which dominate the geology of this region. Improvements in technical fields, such as the method of rock analysis, geophysical techniques and quality of base maps, have also occurred. A re-examination of the geology of the Sheffield district, with application of these modern ideas, knowledge and techniques, is now highly desirable.

About 10% of the Sheffield Quadrangle, in the southwest corner, has already been re-mapped as part of MRVP map 9 (Geology of the Winterbrook–Moina area, 1989). Some idea of the improved lithological subdivision which can now be achieved can be obtained by comparing this map with the relevant portion of the Sheffield 1:63 360 map.

Explanatory Notes to accompany the Sheffield map were published in 1979. Although the economic geology of individual mines and prospects is discussed in some detail, discussion of the structural geology and regional stratigraphy, including the correlates of the Mt Read Volcanics, is relatively brief. Another gap in our knowledge of Mt Read Volcanics and associated rocks in this region is the paucity of chemical analyses (e.g. Geology and Mineral Resources of Tasmania, 1989, *Spec. Publ. Geol. Soc. Aust.* 15:107–110).

Similar considerations also apply to the Middlesex 1:63 360 Geological Atlas sheet, published in 1958, which lies immediately south of the area of the proposal.

Large areas of sparse or vague structural data are a shortcoming of all existing maps in the region, and it is envisaged that the proposed project will have a strong, but not exclusive, emphasis on structural geology. An advantage of commencing the project in 1991 is that detailed structural work by academic geologists in northwestern Tasmania will soon be available. Dr Nicholas Woodward, funded by a U.S. National Academy of Science award, and Dr Colleen Elliott and Dr David Gray, both from Monash University and funded by the Australian Research Grants Scheme, will complete their work during the 1990-91 summer. Although limited to the detailed examination of selected narrow traverses, this work will be invaluable to the mapping of the project area.

The proposed project will provide a still firmer foundation for the National Geoscience Mapping Accord proposal (January, 1990) for a high-resolution deep seismic reflection transect, intended to resolve important deep crustal structures in the region implied by recently obtained gravity and magnetic data. The Federal Bureau of Mineral Resources, Geology and Geophysics will be undertaking the geophysical work on the transect, which will be worth some $3.5 million to Tasmania. The transect was proposed by the Department of Resources and Energy, the University of Tasmania, Goldfields Exploration Pty Ltd, Aberfoyle Exploration Ltd, and CRA.

General geology

The major tectonic element in the project area is the Fossey Mountain Trough, which is contiguous in the west with the meridional Dundas Trough, and extends ESE to the south of Sheffield, tapering towards the Golden Valley south of Deloraine. The gross stratigraphy, although similar in at least some respects to that within the Dundas Trough, is poorly known and confused, particularly in the pre-Late Cambrian rocks.

Directly, and in places unconformably, underlying the Late Cambrian siliciclastic conglomerate in the south of the Sheffield Quadrangle is a unit of dominantly felsic volcanic rocks, termed the Minnow Keratophyre, which

consists largely of quartz-feldspar porphyry (Jennings, 1979, Sheffield Explanatory Notes). In turn, this appears to be underlain, probably gradationally, or to interfinger with a sequence of greywacke, siltstone, conglomerate and argillaceous chert, the Gog Range Greywacke. Both rock units are correlates, at least in part, of the Mt Read Volcanics. However, the undoubtedly complex stratigraphic, volcanological and structural relationships between them and their constituent members remain largely unknown, as does any correlation with sequences elsewhere in the volcanic belt. The Bull Creek Formation and the Lorinna Greywacke are other, very poorly understood 'formations' with affinities to the Mt Read Volcanics.

Associated with, and possibly basal to the Gog Range Greywacke, are mafic to intermediate lavas and pyroclastic rocks known as the Beulah Formation, thought to be equivalent to the Motton Spilite further north. It has been speculated in numerous publications by many geologists that these rocks are the equivalent of the Crimson Creek or Cleveland–Waratah association basalts in the Dundas Trough, or they may represent a mafic phase of the Mt Read Volcanics. However little field, petrographic or chemical data is available.

The relationships between all of these sequences and any correlations with known host rocks in the Dundas Trough must be determined, in order to fully evaluate the prospectivity of the region for new mineral discoveries. An improved understanding of the region is also critical to any attempt at the tectonic reconstruction of Tasmania in Eocambrian-Cambrian time, which is probably the greatest challenge facing geology in Tasmania at present. In turn, this will greatly assist in the formulation of new ideas on exploration targets and metallogenesis in the region.

The younger Wurawina Supergroup rocks overlying the volcanic rocks mainly comprise the Late Cambrian siliciclastic Roland Conglomerate and Ordovician Moina Sandstone, which crop out well in the south and east of the project area. Mapping of these rocks, including their stratigraphic subdivision, will be important in defining structures which may be less obvious in the less competent underlying volcanic sequences. Folds related to the interfering Loongana–Wilmot and Deloraine–Railton Devonian fold trends, any other fold trends, and associated faults and thrusts will need to be identified and traced into the older rocks, and balanced structural cross-sections constructed. Only then can the question of the nature and significance of any earlier deformation be addressed, and the three-dimensional relationship between rock units, particularly Mt Read Volcanics correlates, be determined.

Although relatively small in terms of surface exposure, the Devonian Dolcoath Granite and Beulah microgranite also deserve some attention, as geophysical evidence indicates that they are much larger at depth, and that the former at least is closely associated with mineralisation around Moina. Chemical and petrographic data on these bodies is very sparse.

Permian rocks and Jurassic dolerite are restricted to small areas in the east of the project area, and are not considered to be of major interest in the context of this proposal, although they should be swiftly mapped to accurately determine the trends and nature of late faulting affecting all rocks in the region. Tertiary basalt flows conceal the underlying geology over about one-third of the project area (with the possibility of 'deep leads' in some areas). Scree and talus blanket the lower slopes of mountains.

Potential for mineralisation

The region includes areas of known high prospectivity, particularly for base metals and gold. There are numerous abandoned mines and prospects, most of which represent small vein deposits probably emplaced during Devonian deformation, but some may have remobilised from originally Cambrian volcanogenic deposits. Other deposits, particularly in the Round Mount and Moina areas, are related to Devonian granitoids which, although unroofed in only a few areas, have been shown by gravity data to be extensive at shallow depths. Such deposits include veins, skarns, greisens and related alluvial occurrences, variously bearing gold, tin, tungsten, molybdenum, copper, silver-lead-zinc and bismuth. Industrial minerals known to occur in the region include limestone, clay, barite, fluorite, beryl, lithium minerals, garnet, topaz, magnetite, monazite and wollastonite. The fact that most of the obviously prospective ground is held by major exploration companies, attests to the potential of the region. However, as outlined above, an improved geological understanding is necessary before the prospectivity of the region can be properly evaluated.

Details of the project

Essentially, the study area for the proposed project consists of the southwestern and southeastern quarter-sheets of the Sheffield Quadrangle of the Geological Atlas Series. However, MRV map 9 provides an excellent coverage of the rock-type distribution for about half of the southwestern quarter-sheet, and thus further work in that area could probably be limited to a re-examination of structural relationships, particularly those that impinge on the interpretation of the geology to the east. On the other hand, the structure of the siliciclastic sequences of the Gog Range, along the northern margin of the adjoining Middlesex Quadrangle, would need to be determined for their bearing on the older volcanic rocks to the north.

Field work would be undertaken by five geologists, and is estimated to require approximately 210 field days (including travelling) over twelve months, ending in June 1992. Logistically, an advantage of the proposal is the mostly easy terrain, good access, and light to moderate vegetation over much of the region. Therefore, expensive helicopter support will not be required, field work can be carried out at any time of the year, and many areas can be mapped without the use of field assistance. The cost-effectiveness of this proposal therefore compares favourably with those for mapping in more remote regions. With the present financial constraints facing the Department this must be considered a major advantage.

Laboratory work associated with the project would include thin section preparation and petrographic examination, and chemical analyses of selected fresh samples, mainly lavas and intrusives within the volcanic rocks. This could be done within the Division of Mines and Mineral Resources at no additional cost. However, if funds are forthcoming

there may be some scope for further work such as rare-earth analyses, electron microprobe analyses, and radiometric dating, if suitable samples can be obtained. This would have to be performed in external laboratories at additional cost.

It is envisaged that the project would produce two colour geological maps at 1:25 000 scale, detailed structural balanced profiles of areas of good outcrop, and an explanatory report or bulletin. Although this is necessarily a one-year project, there remains the possibility of extending the mapping northward to the critical Preston, Barrington and Railton areas, thus completing revision of the Sheffield map sheet of the Geological Atlas Series. In this case, the option exists of producing the southern quarter-sheets as black-and-white 1:25 000 maps, and later producing a fully revised Sheffield 1:50 000 map in colour.

The availability of particular geologists for the proposal depends on many factors, particularly whether or not other proposed projects proceed. However, the proposed project team is: Dr D. B. Seymour, J. L. Everard, Dr M. P. McClenaghan, Dr A. V. Brown and Dr B. N. Goscombe.

COSTINGS

A. Additional costs associated with the project

Based on 21 x 10 day trips (7 camping, with field assistant, 14 hotel without field assistant).

(1) Travelling allowance, geologists: 14 trips x 9 overnights x $98.20	$12,373.20
(2) Camping allowance, geologist & field assistant: 2 x 7 trips x 9 overnights x $21.60	$2,721.60
(3) Field assistant salary (includes double time at weekends) 7 trips x (10 + 2) days x 9 hrs/day x $11.90/hr	$8,996.40
(4) Petrol: Calculated on Hobart–field area distance of 270 km, plus average daily travelling of 0 km/day 21 trips x [(2 x 270) + (8 x 60) km] x 15c/km	$3,213.00
(5) Additional geochemical work (rare-earth analyses, electron microprobe analyses, radiometric dating), say	$2,500.00
TOTAL	$29,804.20
say	$30,000.00

B. Nominal costs associated with the project, normally internal to Division of Mines

(1) Lapidary: approximately 500 thin sections @ $20 each	$10,000
(2) Chemical analyses: approx. 60 chemical analyses (major and trace elements) @ $150 each	$9,000
TOTAL	$19,000

Salaries of permanent staff, and other costs associated with cartography and publication production, are not included.

This proposal is suitable for funding as part of the Mt Read Volcanics Project, from the special allocated funds.

Conclusion

This proposal is for much-needed and very cost-effective mapping in what is now one of the least well known parts of the highly mineralised Mt Read volcanic belt. An additional attraction is that it integrates well with the parallel systematic multipurpose 1:50 000 geological mapping program, by laying the foundation for full revision of one of the oldest and most important Geological Atlas series maps, the Sheffield 1:63 360 sheet. Ultimately, revision of the Devonport sheet to the north and much of the Middlesex sheet to the south will be highly desirable.

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REGIONAL GEOLOGICAL MAPPING SECTION
DEPARTMENT OF RESOURCES AND ENERGY

PROJECT TITLE:

Pt Hibbs (N) map sheet

PROPOSERS (underline spokesperson)

Name	Position	Signature
M.P. McClenaghan	Senior Geologist	Marcus McClenaghan

PARTICIPANTS

Name	Position	Relevant experience
M.P. McClenaghan	Senior Geologist	Mapping in adjacent areas during 10 years; specialisation of 14 years, including Ph.D., on felsic and related volcanic rocks.
D.B. Seymour	Geologist	Mapping in Pt Hibbs region during 4 year period; 13 years specialisation on structural analysis, including Ph.D.
B.D. Goscombe	Geologist	Mapping in adjacent area for 1 year; specialisation of 7 years on structure and metamorphism, including Ph.D.

FINANCIAL ESTIMATES

		FUND	
		Geological Survey	MRVP
Geologists' salaries (field mapping and map compilation only)	24,300	≤ 24,300	≤ 24,300
Field running (field assistants, transport, travelling allowance)	49,250		49,250
Total	73,550	≤ 24,300	≤ 73,550

Proposal for the completion of mapping of the northern half of the Pt Hibbs 1:50 000 Map Sheet

M. P. McClenaghan

Summary

A large part of the northern part of the Pt Hibbs map sheet has already been mapped, and a network of tracks and helicopter pads has been established which will remain useable for a limited time. The cost of mapping so far has been approximately $123,500 and the cost of completion of the mapping will be $73,500. The area contains the southern extension of rock units found in the Dundas Trough and the Mt Read Volcanic belt of central, western Tasmania. Work on the area will increase the understanding of the large-scale structural features of the Macquarie Harbour–Elliott Bay area and the three dimensional distribution of highly prospective rock units. This will be important for platinum group elements and base metal exploration. Information on the large-scale structures in the area will also have implications for the structure of other highly prospective parts of western Tasmania. The work can be carried out by three geologists during the 1991/92 summer field season.

Introduction

Geological mapping has been carried out on the Pt Hibbs map sheet as part of the systematic multipurpose mapping program of the Geological Survey. The map sheet lies on the West Coast between the Macquarie Harbour (McClenaghan and Findlay, 1989) and Montgomery (Brown, 1988) map sheets of the 1:50 000 Geological Atlas Series. Both these sheets have recently been published, so mapping of the northern part of the sheet will almost complete the detailed mapping of a substantial area of previously poorly known country in western Tasmania. Work on the area started during the 1986/87 field season with one geologist, and continued during the subsequent three field seasons with the addition of two geologists during the 1989/90 season. Mapping was concentrated in the northern half of the map sheet and a substantial proportion (see fig. 5.1) of that part of the sheet is now complete. It is proposed that the mapping of the northern half of the Pt Hibbs map sheet be completed during the 1991/92 field season using three geologists who are experienced in working in that general area and have the necessary specialist skills. Results will be published in a map at 1:50 000 scale with explanatory notes. Copies of field map sheets of scale 1:25 000 will be made available on request.

Discussion

This area contains southern extensions of the rock units of the Dundas Trough and Mt Read Volcanic Belt of central western Tasmania. Figure 5.2 shows a simplified geological map of the area, with the geology of the Pt Hibbs area based on mapping so far and interpretation of aerial photographs and geomagnetic data.

Results of mapping so far

The mapping in the northern part of the Pt Hibbs map sheet has provided detailed information on the areal distribution of the various ultramafic and gabbroic bodies, and the structural geometry of the enclosing sequences. Ground access has enabled sampling of these rocks for later petrological examination and geochemical analysis. This will help characterise the units and allow detailed comparisons with similar units in the Dundas Trough of the Rosebery–Zeehan–Queenstown region. This information will have implications for exploration for platinum group elements.

Two distinct suites of volcanics have been mapped. One consists of intermediate lavas and breccias and the other of acid pyroclastic rocks, probably including ashflows, interbedded with clastic sedimentary sequences. These rocks are correlated with acid–intermediate volcanic rocks mapped on the Macquarie Harbour and Montgomery map sheets. Geochemical and petrographic data from the latter areas shows that they are correlates of the Mt Read Volcanics (MRV) of the type area of Mt Read. MRV rocks have long been recognised for their prospectivity, so detailed information on the distribution of these rocks is useful for base metal exploration.

Detailed mapping of coastal sections in the northern part of the Pt Hibbs map sheet has enabled close examination of the three dimensional geometry of major thrust faulting which dominates the tectonics of the area. Conclusions arising from this work should have important implications for regional tectonics. This follows on from the recognition of thrust faulting by Carey and Berry (1988) in the Pt Hibbs area and McClenaghan and Findlay (1989) in the Macquarie Harbour area. Samples from the fault zone will enable detailed fault movement analysis to be done. Gold mineralisation along the Henty fault zone indicates that major fault zones are often the site of mineralisation, and should be studied in detail.

Detailed structural work has been carried out on the Precambrian rocks in the northwest part of the map sheet and on their eastern boundary, where they are faulted against Cambrian rocks. This information will have an important bearing on the structural history of the area.

Ar/Ar dating of a lamprophyre dyke suite present in the Pt Hibbs area has given a middle Devonian age, suggesting that it is related to the Devonian granitoids. Sampling of this suite for palaeomagnetic measurements may yield important evidence on the polar wandering path.

Anticipated results of continued mapping

Completion of mapping of the northern half of the Pt Hibbs map sheet will provide data which will increase the geological understanding of the Macquarie Harbour–Elliott Bay region by indicating the structural control of the three dimensional distribution of the MRV correlates and associated rocks, and will build on the work already done for the Macquarie Harbour and Montgomery sheets.

The detailed mapping of rock distribution will provide important information for the planning of mineral exploration as some of the rock units present are highly prospective, such as the acid–intermediate volcanic rocks correlated with the MRV of the Mt Read region. The rock distribution and detailed work on small scale and microstructures (especially in fault zones) will provide information on the major structures and the three-dimensional shape of the rock units. This information is important for mineral exploration regionally. A proper understanding of the major structures of the area will have implications for the structure of other highly prospective parts of western Tasmania. The identification of major low-angle thrust faulting in the Macquarie Harbour area has prompted a reassessment of the structures even as far afield as the region of the Zeehan map sheet, which is currently being revised.

Geochemical sampling of igneous rocks from the Macquarie Harbour and Montgomery map sheets has provided important new data on the tectonic setting of Cambrian rock units. This give insights into the geological evolution of western Tasmania during Cambrian times, which will have an important bearing on mineral exploration. High Mg andesite and low Ti basalt have been identified from the Macquarie Harbour area. These rock types are associated with the early evolution of island arcs, and are also found in the Dundas Trough. The tholeiitic basalts from the Macquarie Harbour and Montgomery areas show a strong petrological and geochemical resemblance to the tholeiitic basalts present in the MRV near Queenstown. It is probable that these units extend into the Pt Hibbs map sheet in the areas not yet mapped. Further geochemical sampling of all of the igneous rock units, including the MRV correlates, should provide additional information.

Costings

Access to the map sheet is difficult and is generally by helicopter although a small part, in the northeast of the sheet, may be reached by fishing boat. The central part of the map is covered by thick forest whereas the northwest and eastern areas have button grass cover. Useful outcrops are generally confined to the coast and streams. Due to the difficult access in the forest areas a number of tracks and helipads were cut during the previous mapping (fig. 5.1) which can be further used.

The geologists to be used for this work will be M. P. McClenaghan, D. B. Seymour and B. D. Goscombe. D. B. Seymour has been working in this area since the start of mapping and is a specialist structural geologist having obtained his Ph.D. for work in northwest Tasmania. He was joined during the 1989/90 field season by B. D. Goscombe, who has specialised in structural and metamorphic geology. M. P. McClenaghan was responsible for the mapping of part of the adjoining Macquarie Harbour map sheet, and started work in the Pt Hibbs area during the 1989/90 field season. M. P. McClenaghan is a specialist in acid and intermediate volcanic rocks.

The southern part of the area will be mapped by M. P. McClenaghan during five ten-day field trips based at four field camps (camps 1 - 4, fig. 5.1). Two field trips will be based at camp 1, which is at a helipad established during a previous season. This will allow the upper part of McCarthy Creek to be mapped, together with the small creeks joining it. Camps 2–4 are on open button grass areas close to the eastern margin of the forest, and will be used for the remaining three trips to cover the button grass area and to traverse the small creeks extending west into the forest. It is anticipated that all the most important creeks will be visited, and that this will provide an adequate coverage of the geology.

The central part of the area has already been partly mapped by D. B. Seymour, and he will complete it with two ten-day field trips put in by helicopter at camp 1 and camp 5 (see fig. 5.1) and one ten-day trip at camp 6, put in by fishing boat.

The northern part of the area has been partly mapped by B. D. Goscombe, and he will complete it with four ten-day field trips put in by helicopter at camps 6–9 (see fig. 5.1) and one ten-day field trip at camp 10, put in by fishing boat.

In order to save costs, the field trips by B. D. Goscombe and D. B. Seymour to be put in by fishing boat will take place at the same time so that they can use the same boat. Helicopter use will also be synchronised to save costs.

Costs have been calculated on the following assumptions and are based on present costs:

- Two hours flying time from Strathgordon to field area per field trip.
- Two hours flying time to bring helicopter to Strathgordon and return it to Cambridge.
- Cost of helicopter reservation per day $900 and cost per flying hour $690.
- Camping allowance $21.6 per day
- Travel allowance $98.2 per day
- Field assistant salary $95 per day
- Vehicle costs $0.15 per kilometre
- Boat cost per field trip $600.

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	$	$
M. P. McClenaghan: Five ten-day helicopter field trips		
Field assistant salary (60 days)	5700	
Camp allowance (100 days)	2160	
Vehicle cost	360	
Helicopter cost (10 hrs)	6900	
Sub Total		15,120
B. D. Goscombe: Four ten-day helicopter field trips, one ten-day boat field trip		
Field assistant salary (60 days)	5700	
Camp allowance (99 days)	2138	
Travel allowance (2 days)	196	
Vehicle cost	393	
Helicopter cost (8 hrs)	5520	
Boat cost	300	
Sub Total		14,247
D. B. Seymour: Two ten-day helicopter field trips, one ten-day boat field trip		
Field assistant salary (36 days)	3420	
Camp allowance (54 days)	1166	
Travel allowance (6 days)	589	
Vehicle cost	249	
Helicopter cost (4 hrs)	2760	
Boat cost	300	
Sub Total		8,484
Fixed helicopter costs (5 days)		11,400
Geologist's salaries		24,292
Total		73,543

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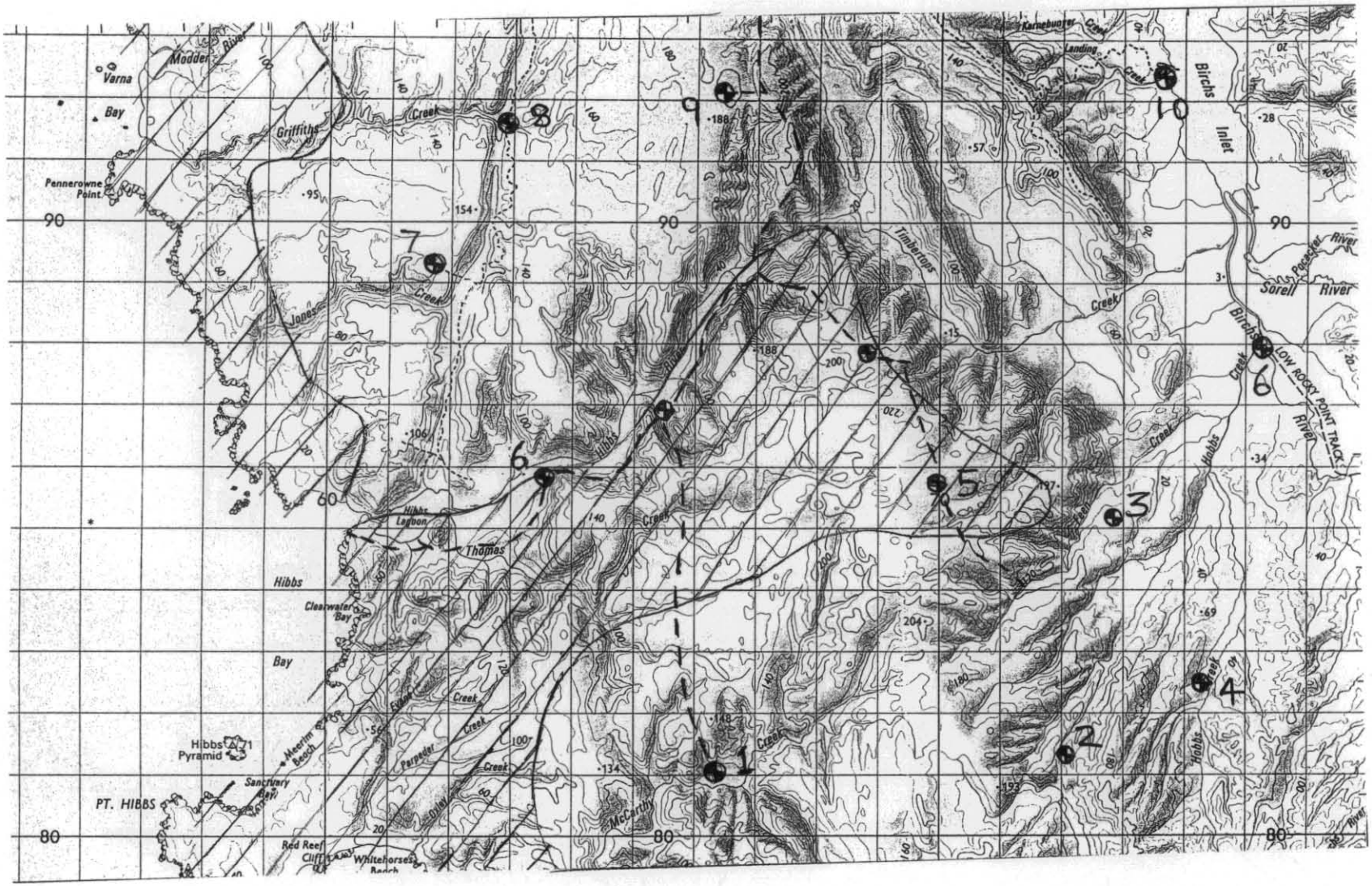

Key

Helipad/camp site

Cut track

Area already mapped

Figure 5.1

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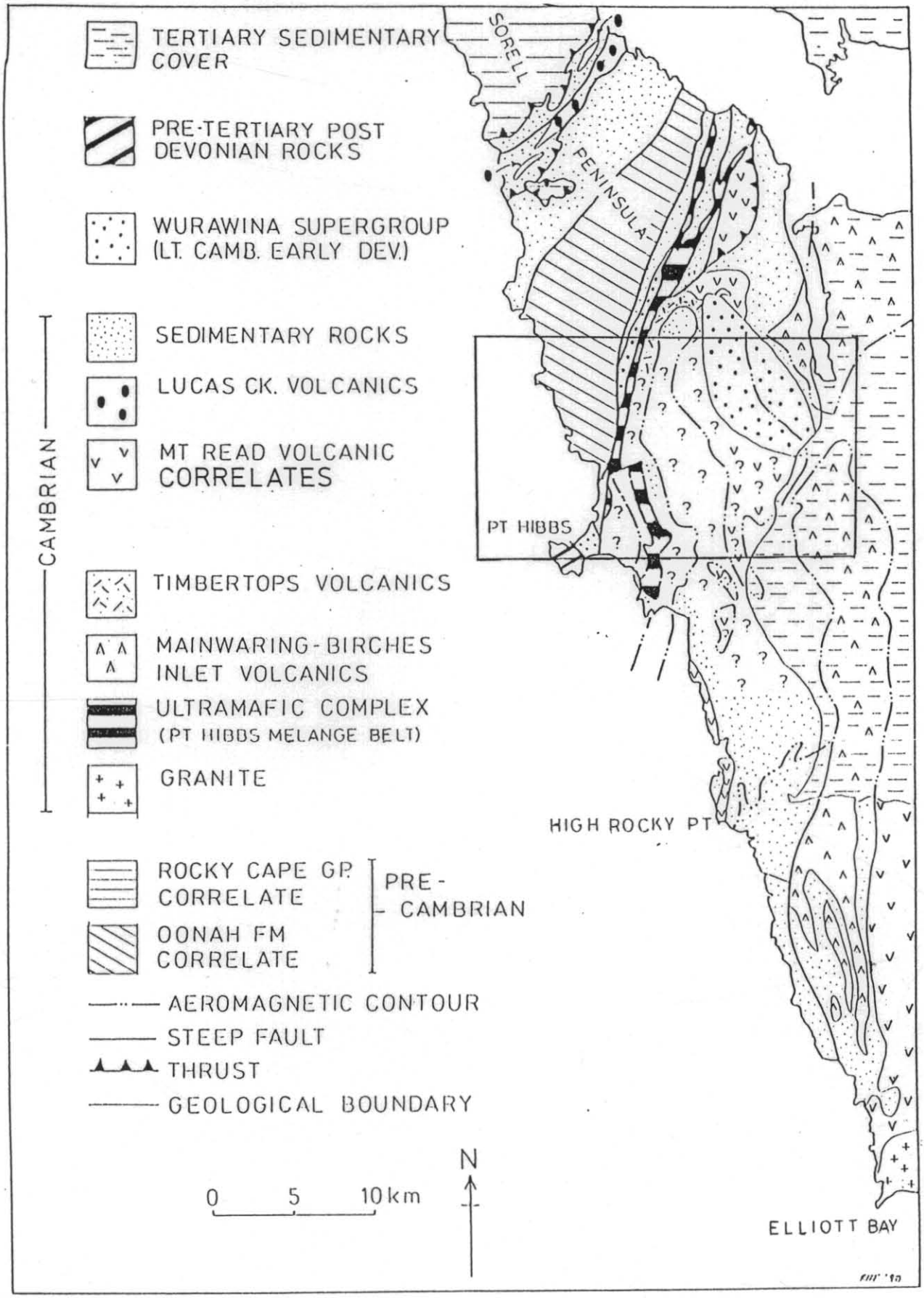

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Figure 5.2