UR1979_54 1623

1979/54. East Coast coal project gravity survey. Preliminary report Part 3. Second progress report, July 1979 - January 1980.

D.E. Leaman

Abstract

The regional gravity survey has been extended south of Avoca and Royal George to Lake Leake and now covers all the known and prime coal-bearing regions in eastern Tasmania. Appraisal of recent drilling results, density determinations and reflection soundings has permitted an upgraded qualitative interpretation and allowed 3D quantitative interpretation to commence. Continuation methods have been used to produce a uniform reference field free of terrain effects. Detailed gravity coverage of the Fingal Tier State Reserve has commenced.

INTRODUCTION

Previous data are described in Parts 1 and 2 of this report (Leaman 1978, 1979). This part should be considered an extension of the previous report and the figures have been numbered consecutively; thus Figures 1 - 13 refer to Parts 1 and 2 and Figures 14 - 26 refer to new figures included here. Some of the new figures replace previous figures due to area extension and consolidation of results.

Thus Figure 14 replaces Figure 2
Figure 15 replaces Figure 3
Figure 16 replaces Figure 4
Figure 17 replaces Figures 1, 11
Figure 24 replaces Figures 7, 13
Figure 25 replaces Figure 9

Figures 14, 15, 16, 17 and 24 summarise the observations of the regional survey and its implications. A comprehensive qualitative assessment is shown in Figure 24. Due to cost-processor conditions, only a core area is currently being quantitatively interpreted; this region is centred on the Fingal Tier State Reserve. Sufficient lateral detail is being included in the models to minimise edge effects.

It is anticipated that the quantitative interpretation of the regional coverage will provide a good starting base for the interpretation of the detailed coverage of the Reserve which will be complete early in 1980. The latter will permit better resolution of anomaly and source shapes.

Extension of the drilling network has not revealed any basic flaws in the initial interpretations given in Parts 1 and 2. Recent drilling results are summarised in Appendix 2. However, determination of coal measures density values has explained many large anomalies, while requiring a general and substantial revision of the size of all dolerite sheet structures.

Other geophysical methods are being systematically introduced to the area in order to provide better perspectives for gravity interpretation and to test general feasibility and usage. Other methods include seismic reflection, resistivity and magnetics.

SURVEY EXTENSION

The survey extension described in Part 2 has been completed and the results incorporated in Figures 14, 15, 16 and 17. Comparison with Figures 1, 2, 3 and 4 will indicate the scale of the extension south and east of Avoca. A residual separation basedon a 4 km x 4 km cell has been presented, as previous experience as detailed in Part 2 suggests that this is more useful when qualitatively evaluating shallow features (< 1 km).

The Bouguer anomalies (fig. 15) display a general south-west trend from a minimum value of about - 300μm/s^2 at Avoca to + 100μm/s^2 near Swansea. The gross distribution reflects the disposition of the southern end of the Scottsdale Batholith. The steep gradients common around Storys Creek, Merrywood and Lynes Sugarloaf are repeated south of Royal George. Superimposed on the broad trend are a small number of areally small but significant anomalies. These are discussed below.

Figure 4 presented the Regional Bouguer Anomaly as determined from the data from Part 1 of this survey and other sources; notably the BMR helicopter survey (Zadoroznyj, 1975). Data derived from such sources was shown by broken lines. Extension of the survey south of Royal George has enabled upgrading and revision of the regional deductions and Figure 16 presents the revised Regional Anomalies using the 4 km x 4 km grid filter. Comparison of Figures 4 and 16 will show that the principal gradient was reasonably located, but has a trend which is more southerly, and the broad bulbous anomaly south of Avoca is much larger than indicated by the helicopter data. In addition, the region of positive anomaly north of Swansea is more restricted than previously indicated. As noted above, the strong south-west gradient reflects the eastern edge of the Scottsdale Batholith (or its equivalent) with values of - 280μm/s^2 reflecting the root and + 120μm/s^2 a crustal section probably devoid of granite. Using typical density values for granite-Palaeozoic basement rocks (2.62 - 2.72 t/m^3) these anomalies suggest about 9 - 10 km of batholith at most.

Residual Bouguer Anomalies are presented in Figure 17 for the entire survey, including the Lake Leake extension. The bulk of the area is unchanged from Figure 11 and the discussions of Parts 1 and 2 apply, with the exception that the large negative anomalies described can be largely accounted for using the newly determined coal measures density values. The nature of anomalies observed in the extended area are very similar to other areas where there is interplay of dolerite and coal measures. Abrupt gradients and anomalies are common, but all fall in the range + 60 to - 60μm/s^2. Most features are - 25 to + 25μm/s^2.

Since the residual anomalies have been derived using a small grid filter, it may be assumed that the contribution of basement effects is minimal. In addition, the effect of granite protrusions to shallow depths will be minor, as the typical section in the region requires basement to be at least 500 m from the surface and granite contrasts are small. Consequently, and for the purposes of this discussion, the anomalies shown are due largely to the combination of dolerite and coal measures effects. As described previously substantial negative anomalies reflect thick sedimentary accumulations with negligible dolerite content or capping, while positive anomalies represent regions in which the capping is thick. Large positive anomalies imply an absence, locally, of the sedimentary succession.

Interpretation of extended area anomalies of - 50 to - 60μm/s^2 south of Royal George, along the West Swan [EP798610] and Cygnet Rivers [EP810576] reflect thick coal measures sections. Coal measures are exposed high on the escarpment south of Royal George from near Lochaber [EP810670] to south of Avoca [EP650630] but not elsewhere. However, the negative anomalies, which exceed - 30μm/s^2, in the headwaters of Brushy River [EP740510], the central region of the Cygnet River [EP810560], south-west of Snow Hill [EP690570] and around Gilbert Dick Hills [EP580530] certainly suggest a substantial sedimentary section is present. The capping may also be substantial and comparable with Fingal Tier.

Little drilling relevant to the region is extant, but two holes (AV8, AV9) by the Shell Company revealed more than 300 m of dolerite in the eastern portion. Anomalies of the order of 0, + 8μm/s^2 are related to these drill sites. Such results suggest that anomalies of + 15 to + 25μm/s^2 reflect thick or multiple dolerite sheets and/or possibly no sedimentary section. Other anomalies, in excess of + 30 to + 35μm/s^2, imply large dykes or feeders. Two anomalies exceed + 60μm/s^2 [EP770630, EP810625] and suggest either a large bulbous feeding dyke or two discrete large pipes. A substantial east-west alignment of positive anomaly incorporating the above anomalies suggests a dyke solution, with dyke axis 1 - 3 km south of the escarpment overlooking Royal George. Such a dyke would effectively terminate the coal measures section in this region as drilled by Investigator Coal Exploration (holes 78RG1, 2). South of this structure, the anomaly distribution is similar to that on Fingal Tier and the values are generally such that, with the exceptions of negative anomalies described previously, the capping must generally exceed 200 - 250 m. However, a substantial sedimentary section (200 - 300 m) can also be anticipated beneath the dolerite.

The Castle Cary fault structure can also be traced in the residual anomalies, but only south of Avoca. North of Avoca, as discussed in Part 1, the coverage is inadequate to define the structure. South of Avoca a distinctive south-trending negative anomaly may be observed with an appropriate orientation. The feature terminates the east-west feeding dyke before diffusing into the poorer defined anomaly pattern west of Lake Leake.

DENSITY DETERMINATIONS

One-hundred and ten samples of about 150 g were taken of the core from BH41 on Fingal Tier. This hole contains about 330 m of the Triassic coal measures section. Several samples were included from the Upper Permian rocks in which the hole terminated. Unfortunately only 94 determinations were made, as some samples disintegrated during the soaking process. No new measurements have yet been made of dolerite in the region. The results are summarised below (all bulk wet densities).

Rock Type	*Density range (t/m^3)*	*Average (t/m^3)*	
Sandstone	2.19 - 2.51	2.36	) 2.31
Mudstone/shale	2.12 - 2.54	2.35	) (Average
Sandstone, coal stringers	1.84 - 2.43	2.34	) all
Coal, carbonaceous mudstone	1.50 - 2.15	1.94	) results)
Permian siltstone	2.39 - 2.42	2.41	

The samples were taken in such a way as to reflect the proportions of the rock types in the core. Loss of some samples, especially mudstone, will have biased the sampling, but it appears that a value of 2.35 t/m^3 is the probable maximum value for the section as a whole and the real value could be much less if the section is dry. Even so the value of 2.35 t/m^3 is 0.12 t/m^3 less than the value previously assumed from other areas (p. 7, Part 1). In Part 2 (p. 4), a value of 2.4 t/m^3 was suggested in order to help account for large negative anomalies. In addition, the value previously presumed for the Permian rocks may also be too high, since the equivalent siltstone elsewhere has a density of about 2.5 t/m^3.

QUANTITATIVE INTERPRETATION

The procedure adopted for quantitative interpretation was described on page 4 and Appendix 1 of Part 2. As indicated, the process proved to be fairly expensive at commercial processing rates. There were three reasons for the initial expense. Firstly, although the area processed was reduced in size, the number of stations included still exceeded 1000. Secondly, the coverage in the area processed was not even and some large gaps persisted which reduced the efficiency of the convergence and increased the processor time. Thirdly, the relationship of the base level, at which the equivalent masses were to be calculated, and the topographic and geographic distribution of the stations could only be estimated given the variability in coverage and relief of the area.

Given these problems, it was decided to make a substantial test run using a likely base level of H = - 500m in order to check the programme, theory and convergence properties. Convergence was found to be surprisingly slow and divergent steps were common. The process was halted at a convergence of 518 having achieved a considerable reduction from 44495. The value of 518 is considerably higher than the theoretical value of about 200 thought desirable. Admittedly the uneven coverage must adjust the result since the theoretical value is based on a regular grid.

After this experience it was decided to test the data, in its imperfect distributed form, by running short test runs, up to a prescribed processor time limit, with various H values and so test the rate of convergence. Figure 18 presents the results of these tests and shows that the maximum rate of convergence occurs for H $\sim$ - 350m. Having determined this condition for the data, processing was again continued to a low convergence factor but at much less cost and with fewer divergences. Processing was again halted at a factor of about 500 and the results plotted. No abnormalities were noted and the plots for continuations, from the calculated equivalent masses at 850, 1000, and 2500 m are shown in Figures 19, 20 and 21. The continuation at 2500 m may be considered to show regional effects, while those at 850 and 1000 m include both local and regional effects. Residuals for 850 and 1000 m continuations are shown in Figures 22 and 23 and were obtained by direct subtraction.

It will be noted that the area covered by the processing includes the Fingal Tier State Reserve as a core area, but with a several kilometre marginal band in order to account for edge effects and avoid spurious effects in the region of greatest interest. Edge effects may be especially noted along the coast where control is lacking.

At the time of preparation of this report only the initial 3D model has been produced. Creation of this model has fully exposed many of the gaps in the general geological knowledge of the area even though the base level for modelling is only - 350m. The model is in six parts:

(1) land surface to base level presumed to be 100% dolerite;
(2) land surface or base dolerite to base level presumed 100% coal measures;
(3) land surface or base coal measures to base level presumed 100% Permian rocks;
(4) land surface or base Permian rocks to base level presumed 100% Mathinna Beds;
(5) land surface or base Mathinna Beds to base level presumed 100% granite;
(6) dolerite feeder pipes with appropriate contrasts at each level.

The effects of parts (2) to (6) are added or subtracted as required from part (1) and the relevant result at each layer stage. Densities presumed are:

(1)	dolerite: 2.9 t/m^3	stage contrast: (to air)	2.9
(2)	coal measures: 2.35 t/m^3	(to 1)	- 1.1
(3)	Permian rocks: 2.45 t/m^3	(to 1 + 2)	+ 0.2
(4)	Mathinna Beds: 2.67 t/m^3	(to 1 + 2 + 3)	+ 0.44
(5)	Devonian granite: 2.62 t/m^3	(to 1 + 2 + 3 + 4)	- 0.1
(6)	dolerite: 2.9 t/m^3	(to 2)	+ 1.1
		(to 3)	+ 0.9
		(to 4)	+ 0.56
		(to 5)	+ 0.46

The stage contrasts are double the actual density contrast, as the old material must first be subtracted and then the new added (algebraically) in its place. The prototype model and its derivatives will be discussed in the next progress report.

COMMENT ON PREVIOUS RECOMMENDATIONS

Recommendations have been listed on p. 17, Part 1, and p. 5, Part 2.

Rec. 1	*re* densities: Coal measures determined. Dolerite to be sampled.
Rec. 2,3	In progress to nominal 250 - 400 m spacing.
Rec. 4,5	No progress
Rec. 6	As Appendix 2 shows two further holes have been drilled, one unfinished pending rig availability. Other holes are pending.
Rec. 7	Some reflection soundings have been made at Nine Mile Beach and Seymour for control purposes. In addition a test traverse at Seymour is pending processing and evaluation.
Rec. 8	In progress
Rec. 9	There has been no progress in relevant mapping of key areas covered by this survey.
Rec. 10	No progress.

NOTES ON REFLECTION SURVEY RESULTS AND LOGISTICS

Interpretation control soundings: Nine Mile Beach

Three sites have been occupied along Nine Mile Beach in order to provide an independent guide to the scale of the Tertiary structures. These targets were chosen because previous experience with the method suggested that good analogue results could be expected, so obviating the need for processing.

Site 1: 0.7 km west of road loop at Coles Bay end of Nine Mile Spit [EP996392]
Gravity anomaly: - 70$\mu m/s^2$
Shot offset: 15 m; geophone spacing (groups of 6) 3m; 28Hz
All geophones buried. Best results were obtained (in windy conditions) using LL input filters at 2000 samples/sec.
Interpreted reflectors at 52, 77, 102, 114, 126, *166*, 184, 204, *230*, 260, *280*, *300*, *340*, possible 390 ms.
Typical shallow refractor velocity: 1800 m/s.

The major events at 280, 300 and 340 ms probably represent basal deposits within the Tertiary basin and one or more the base of the deposit. These travel times would be equivalent to depths of 252, 270 and 306 m respectively. If we then assume a section containing 250 m of Tertiary sediments (ρ = 2.00 t/m^3); 100m dolerite (2.90 t/m^3); 100 m Permian rocks (2.50 t/m^3) the resultant two dimensional anomaly would be - 69 + 9.5 - 7.1 $\mu m/s^2$ or - 66.6 $\mu m/s^2$. Given that the feature is three dimensional and that the peak anomaly value is

- 90 μm/s², it seems likely that the Tertiary thickness is greater, probably over 300 m even allowing for some variation in the amount of dolerite included: *e.g.* 300 m Ts + 100 m Jdl + 100 m P = - 80.4 μm/s²
300 m Ts + 100 m P = - 89.9 μm/s²

Site 2: On beach at end of short road spur to the access point at the centre of the spit [EP950394]
Gravity anomaly: + 10μm/s²
Shot offset: 40 m; geophone group spacing 5 m; 28Hz.
All geophones buried. Best results obtained with input filtering (LL) and output filters (LH, HH) at 1000 samples/sec.
Interpreted reflectors at 40, 65, *90,* 110, *150,* 170, *200,* 215, *245,* 255, 270, 305, 360 and 410 ms. The event at 90 ms is large and compound and probably represents the base of the Tertiary sediments (at ∿ 81 + m). The gravity anomaly could be accounted for by 81 m Ts + 350 m Jd + 100 m P (equivalent to site 1 section total depth) = - 22.4 + 33.2 - 7.1 μm/s² = + 3.7 μm/s².
In the seismic section, similar values could be obtained if the 200 ms reflector is the base of the dolerite and the 245 ms reflector the base of the Permian.
Dolerite thickness at 5500 m/s (55 ms half time) = 303 m
Permian thickness at 4500 m/s (22 ms half time) = 99 m
Using these values and a surface corrected upper layer (63 m) the calculated anomaly would be + 4.5 μm/s².

Site 3: Swansea end of Nine Mile Beach at end of track to mouth of Meredith River [EP885370]
Gravity anomaly: - 10 to 25 μm/s², steep gradient.
Shot offset: 40 m; IF = LL; OF = HH best results.
Very windy conditions. Interpreted reflectors at *120, 205,* 270, 310 and 370 ms. The reflectors at 120 and 205 ms are compound and probably represent base Tertiary/top dolerite; base dolerite. With surface corrections, these values yield thicknesses of 90 m and 231 m respectively and a section of
90 m Ts + 231 m Jd + 100 m P = - 10 μm/s². Given the gradient conditions and exact anomaly location, these results are certainly consistent.

Logistics

The sounding tests and the traverse at Seymour have clarified several logistical considerations relating to reflection surveys.

(1) Shot holes should be prepared in advance of the survey, even if augering is an adequate process. At least two days or 25 holes of drilling should be in hand before commencement. This is adequate lead for 4 or 8 fold traversing. For lesser coverage the lead should be substantially increased since the idle time awaiting shot holes escalates.

(2) A crew of two on shot hole drilling, at least three are required for the survey (operator, cable organiser, geophone organiser) and at least one shotfirer. Total 6.

(3) Shot preparation is critical and should be as deep as possible. Certainly below soil or deeply weathered rock. The shot should be small (< ½ 25 mm gelignite stick) and very well tamped. Preparation of such shots is another time demanding aspect and further reason for advance drilling.

(4) Single geophones are probably preferable. Certainly, they are much easier to handle, carry and locate.

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LEAMAN, D.E. 1979. East Coast coal project gravity survey. Preliminary report. Part 2. First progress report, December 1978 - June 1979. *Unpubl.Rep.Dep.Mines Tasm.* 1979/15.

ZADOROZNYJ, I. 1975. Reconnaissance helicopter gravity survey, New South Wales, Tasmania and South Australia 1973/74. *Rec.Bur.Miner.Resour. Geol.Geophys.Aust.* 1975/85.

[18 December 1979]

APPENDIX 1

Gravity survey tie stations

Place & Number	*Description*	*Observed gravity (m/s^2)*	*Elevation (m)*
Lake Leake Road 7551-9417	Foot signpost, road junction Lake Leake Road and TPFH Road	9.802414	
Lake Leake 7551-9418	Concrete slab, foot signpost Lake Leake Road and Lake Road	9.802313	
Fingal Tier 7551-9419	Foot of carved wooden steps, old Mines Department store shed, high point, road junction, Fingal Tier.	9.801646	841

APPENDIX 2

Drilling records summary

The listing given below is a continuation of Appendix 2 of the preceding parts of this report. The data is in the form of a skeletal log and full details are available in departmental files.

Fingal Tier drilling

Hole 32	0 - 40 m	Dolerite talus
	40 - 256 m	Coal Measures
	256 - 274 m	Permian siltstone
Hole 34A	0 - 65 m	Coal Measures
Hole 34B	0 - 47 m	Coal Measures
Hole 35	0 - 94 m	Dolerite talus - abandoned
Hole 37	0 - 49 m	Dolerite talus
	49 - 309 m	Coal Measures
	309 - 311 m	Permian siltstone
Hole 38	0 - 340 m	Dolerite
	340 - 552 m	Coal Measures
	552 - 558 m	Permian siltstone
Hole 39	0 - 296 m	Dolerite
	296 - 519 m	Coal Measures
	519 - 522 m	Permian siltstone
Hole 40	0 - 236 m	Dolerite
	236 - 461 m	Coal Measures
	461 - 465 m	Permian siltstone
Hole 41	0 - 228 m	Dolerite
	228 - 570 m	Coal Measures
	570 - 584 m	Permian siltstone
Hole 42	0 - 340 m	Dolerite
	340 - 571 m	Coal Measures
	571 - 576 m	Permian siltstone
Hole 43	0 - 316 m	Dolerite
	316 - 506 m	Coal Measures
		(abandoned in quartzose sandstone)
Hole 46B	0 - 200 m	Dolerite
	200 - 260 m	Coal Measures (to be continued)
Hole 49	0 - 165 m	Dolerite talus
	165 - 409 m	Coal Measures
	409 - 415 m (approx.)	Permian siltstone
Hole 46A	0 - 37 m	Dolerite - abandoned
Hole 44	0 - 178 m	Dolerite
	178 - 401 m	Coal Measures
	401 - 407 m	Permian siltstone

Drilling by Investigator Coal Exploration Pty Ltd (EL 16/77)
Details: refer open file 55/8

78RG1	0 - 17 m	Dolerite scree
	17 - 200 m	Coal Measures
78RG2	0 - 12 m	Dolerite scree
	12 - 203 m	Coal Measures including very small dolerite intrusions
78RG3	0 - 11 m	Dolerite scree
	11 - 43 m	Dolerite
	43 - 185 m	Coal Measures (including minor intrusions)
78RG4	0 - 24 m	Dolerite scree
	24 - 113 m	Coal Measures

Drilling by Shell Co. (Aust.) Ltd (EL 18/77)
Details: refer open file 62/1

AV8	0 - 300 m	Dolerite
AV9	0 - 299 m	Dolerite

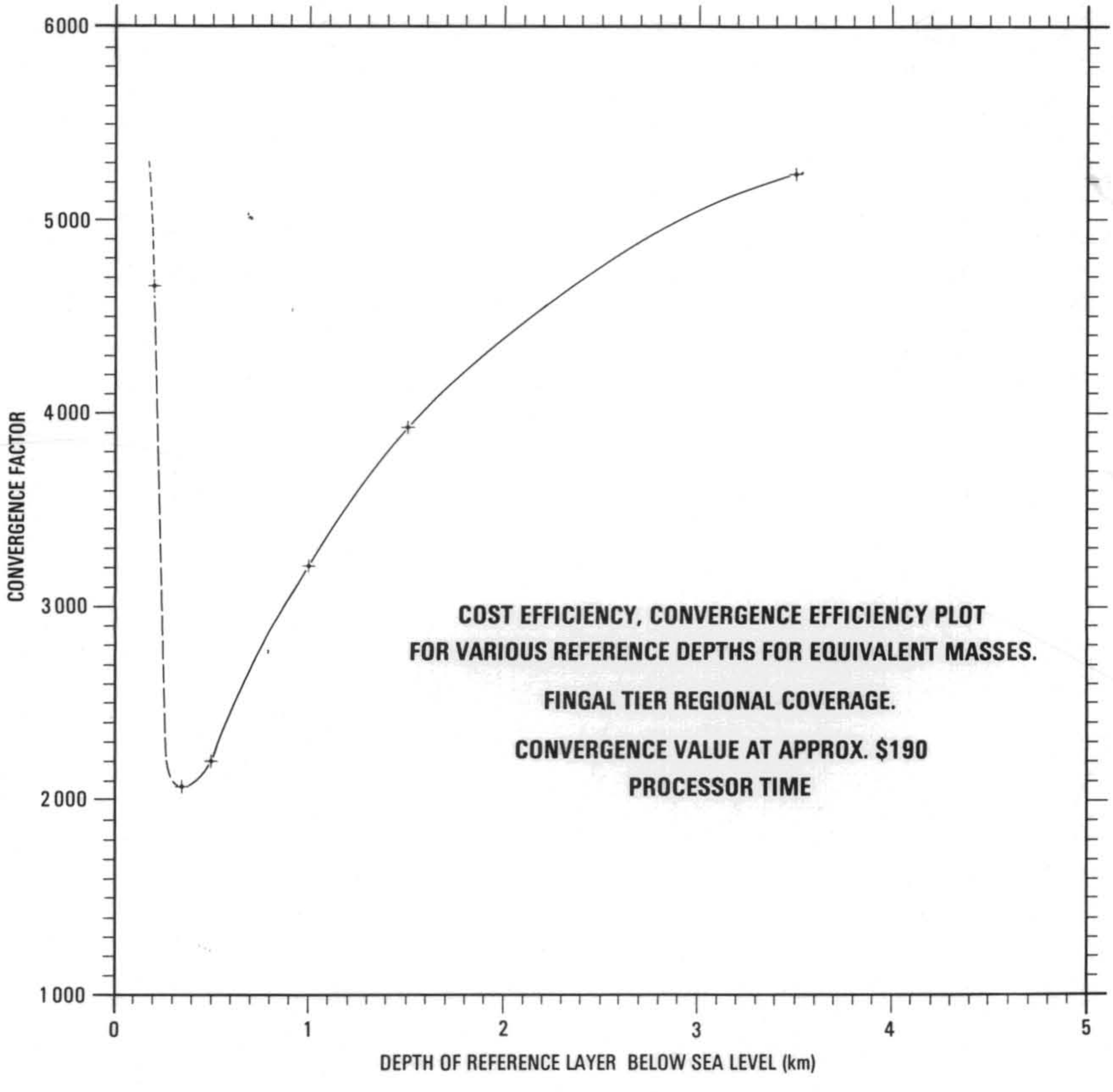
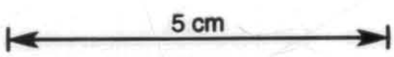
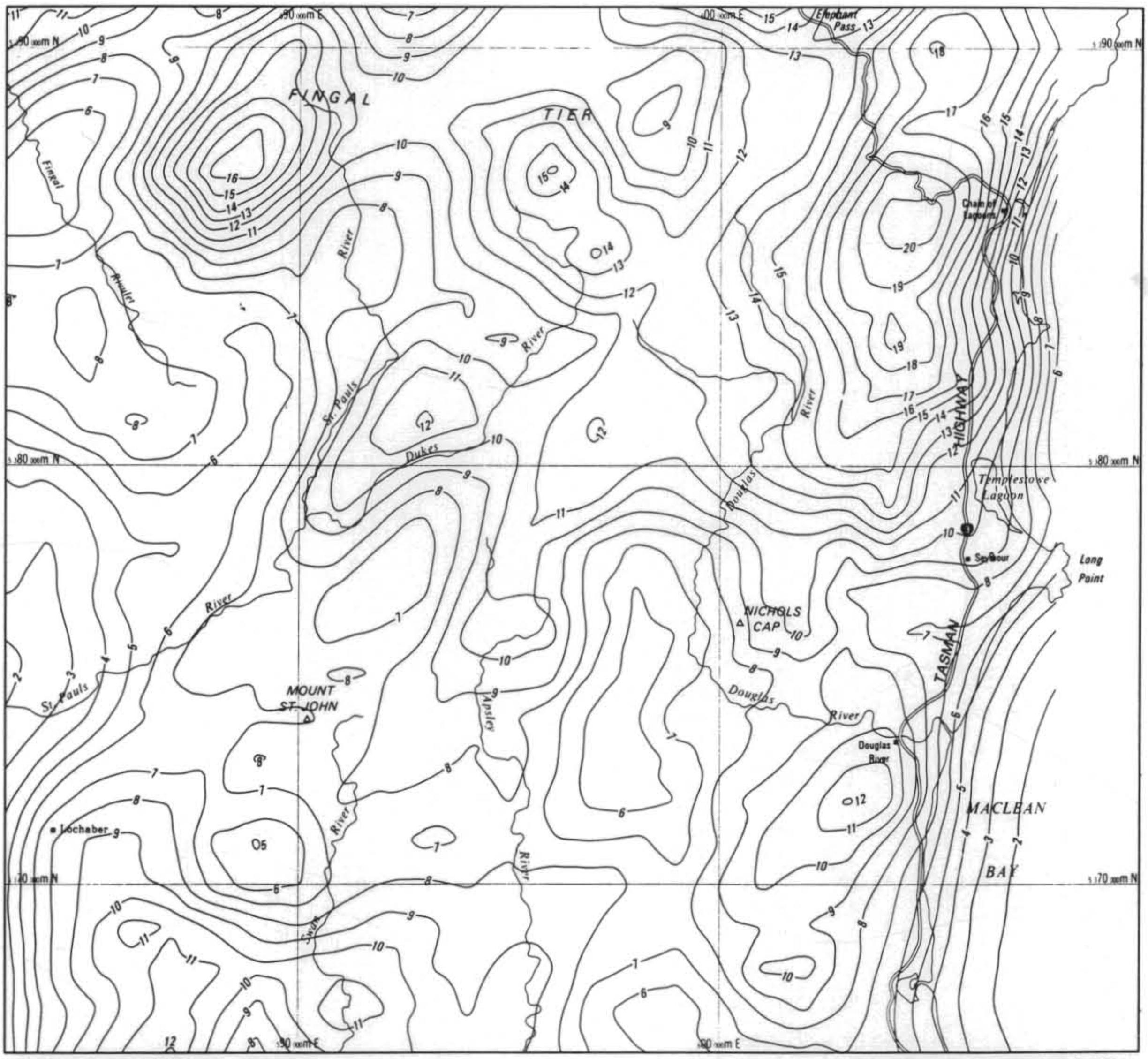

6000
5000
4000
3000
2000
1000
CONVERGENCE FACTOR
0
1
2
3
4
5
DEPTH OF REFERENCE LAYER BELOW SEA LEVEL (km)
COST EFFICIENCY, CONVERGENCE EFFICIENCY PLOT
FOR VARIOUS REFERENCE DEPTHS FOR EQUIVALENT MASSES.
FINGAL TIER REGIONAL COVERAGE.
CONVERGENCE VALUE AT APPROX. $190
PROCESSOR TIME

Figure 18.


5 cm



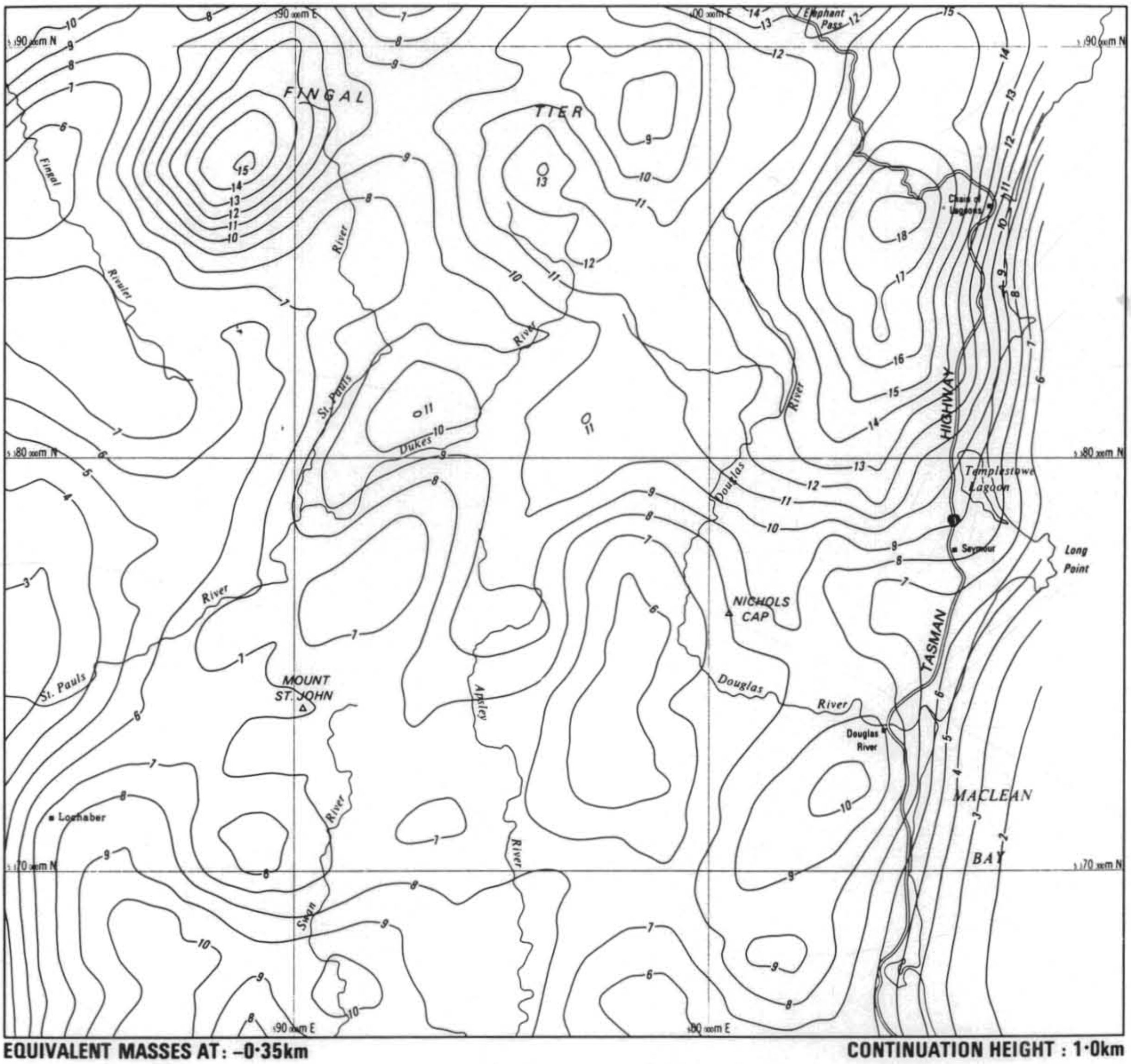
EQUIVALENT MASSES AT: -0·35km **CONTINUATION HEIGHT: 0·85km**

UPWARD CONTINUATION

FINGAL TIER REGIONAL COVER

Figure 19.

5 cm



EQUIVALENT MASSES AT: −0·35km

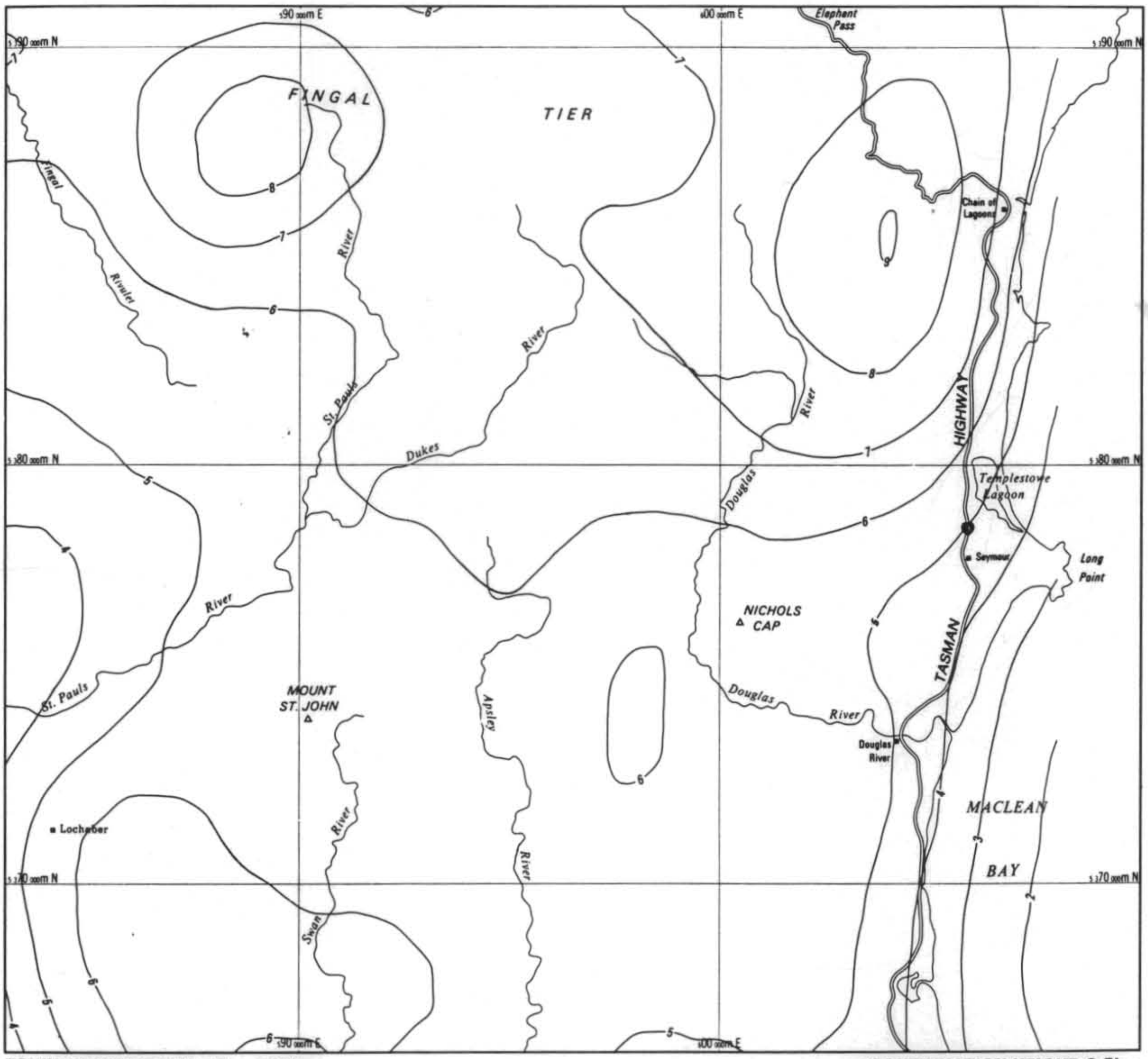
CONTINUATION HEIGHT : 1·0km

UPWARD CONTINUATION

FINGAL TIER REGIONAL COVER

Figure 20.

5 cm



EQUIVALENT MASSES AT : -0·35km

CONTINUATION HEIGHT: 2·5km

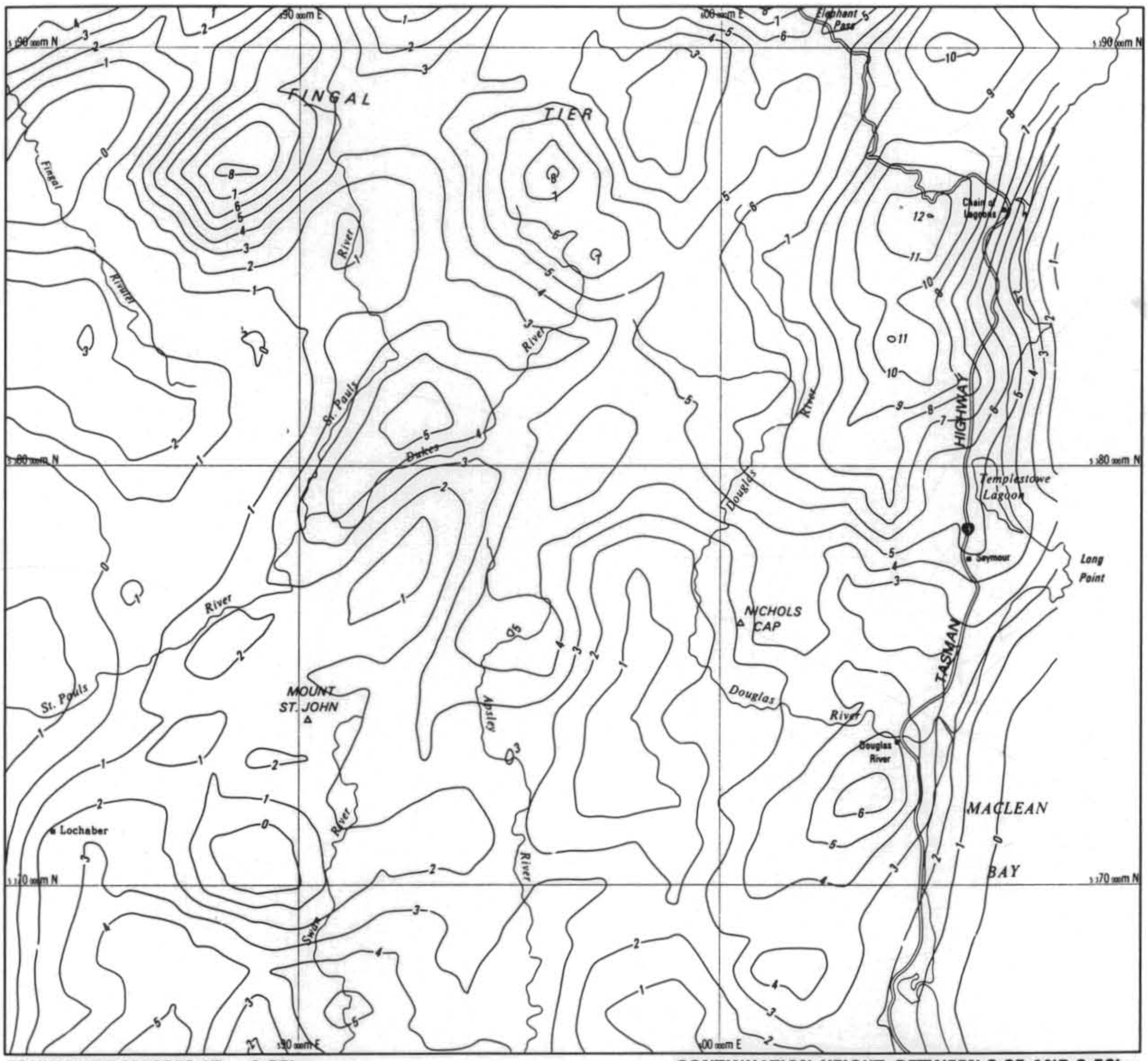
UPWARD CONTINUATION

FINGAL TIER REGIONAL COVER

Figure 21.

5 cm

M 1581



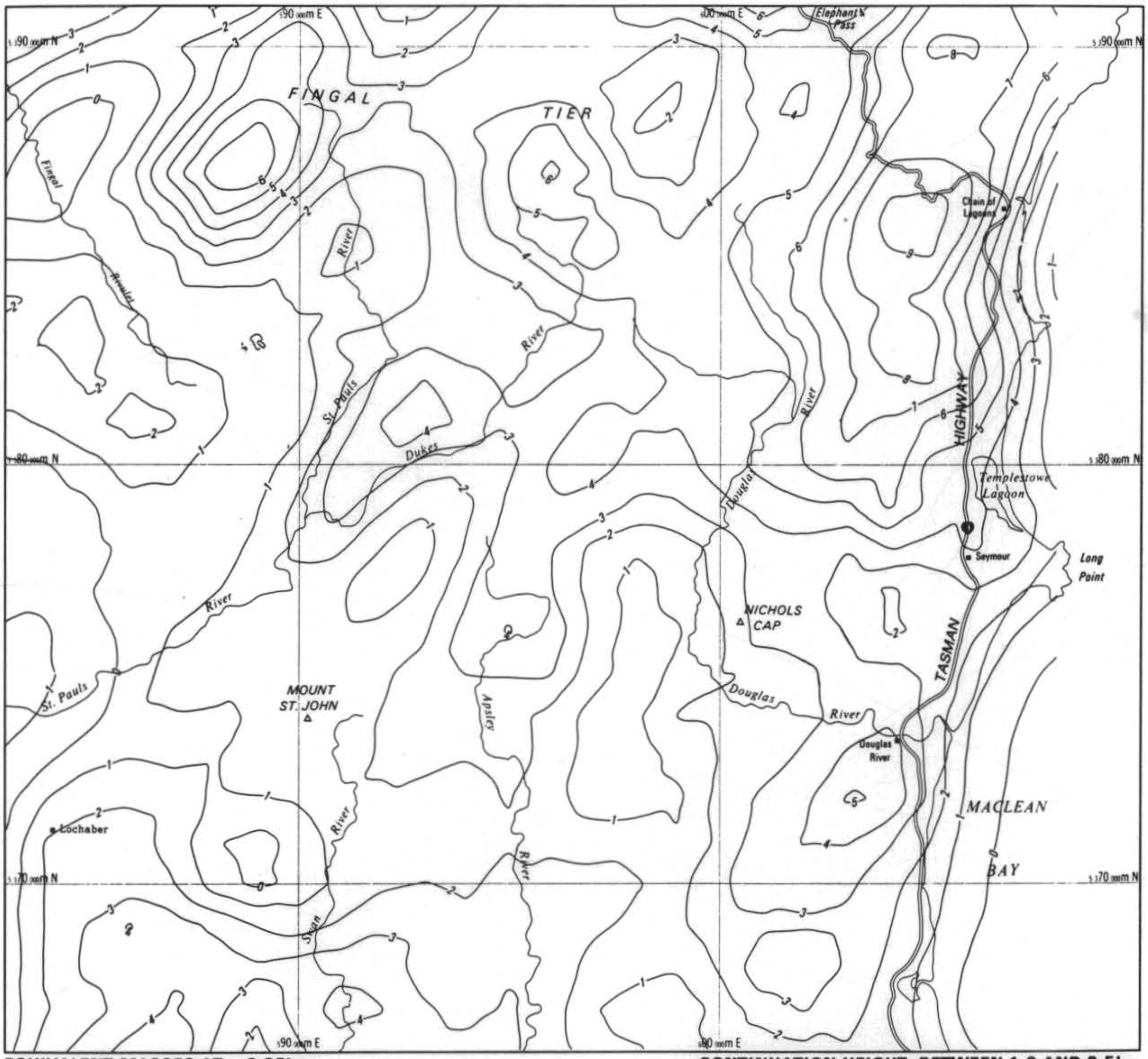
EQUIVALENT MASSES AT : −0·35km **CONTINUATION HEIGHT: BETWEEN 0·85 AND 2·50km**

RESIDUAL ANOMALY AFTER UPWARD CONTINUATION

FINGAL TIER REGIONAL COVER

Figure 22.

5 cm



EQUIVALENT MASSES AT: −0·35km

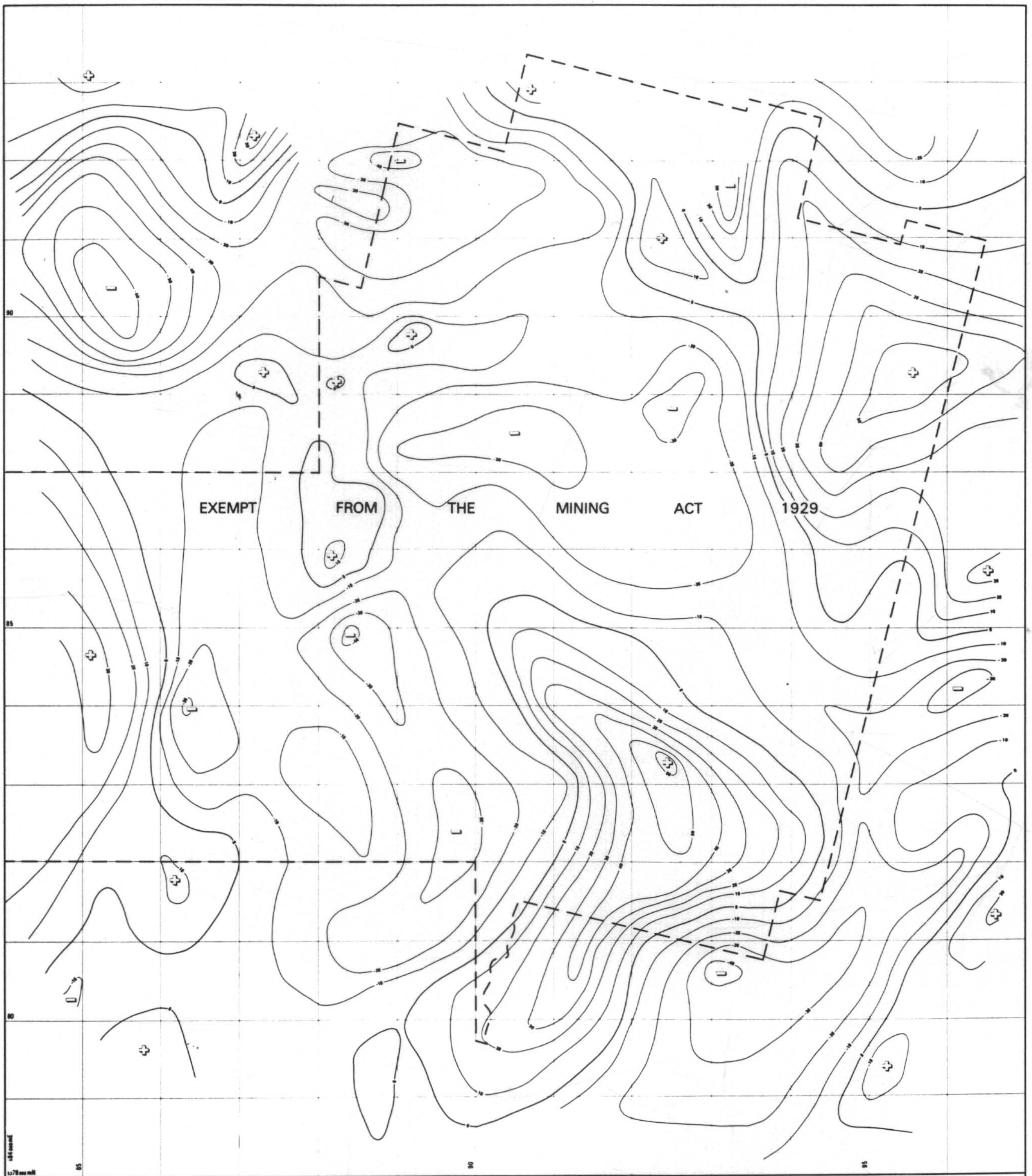
CONTINUATION HEIGHT: BETWEEN 1·0 AND 2·5km

RESIDUAL ANOMALY
AFTER UPWARD CONTINUATION

FINGAL TIER REGIONAL COVER

Figure 23.

5 cm

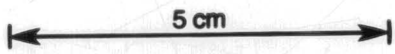


RESIDUAL BOUGUER ANOMALY FINGAL TIER STATE RESERVE

D. E. LEAMAN JANUARY 1980

Contour interval 10 μm/sec² Bouguer density 2.67 t/m³

Figure 26.



M 1681

18/23

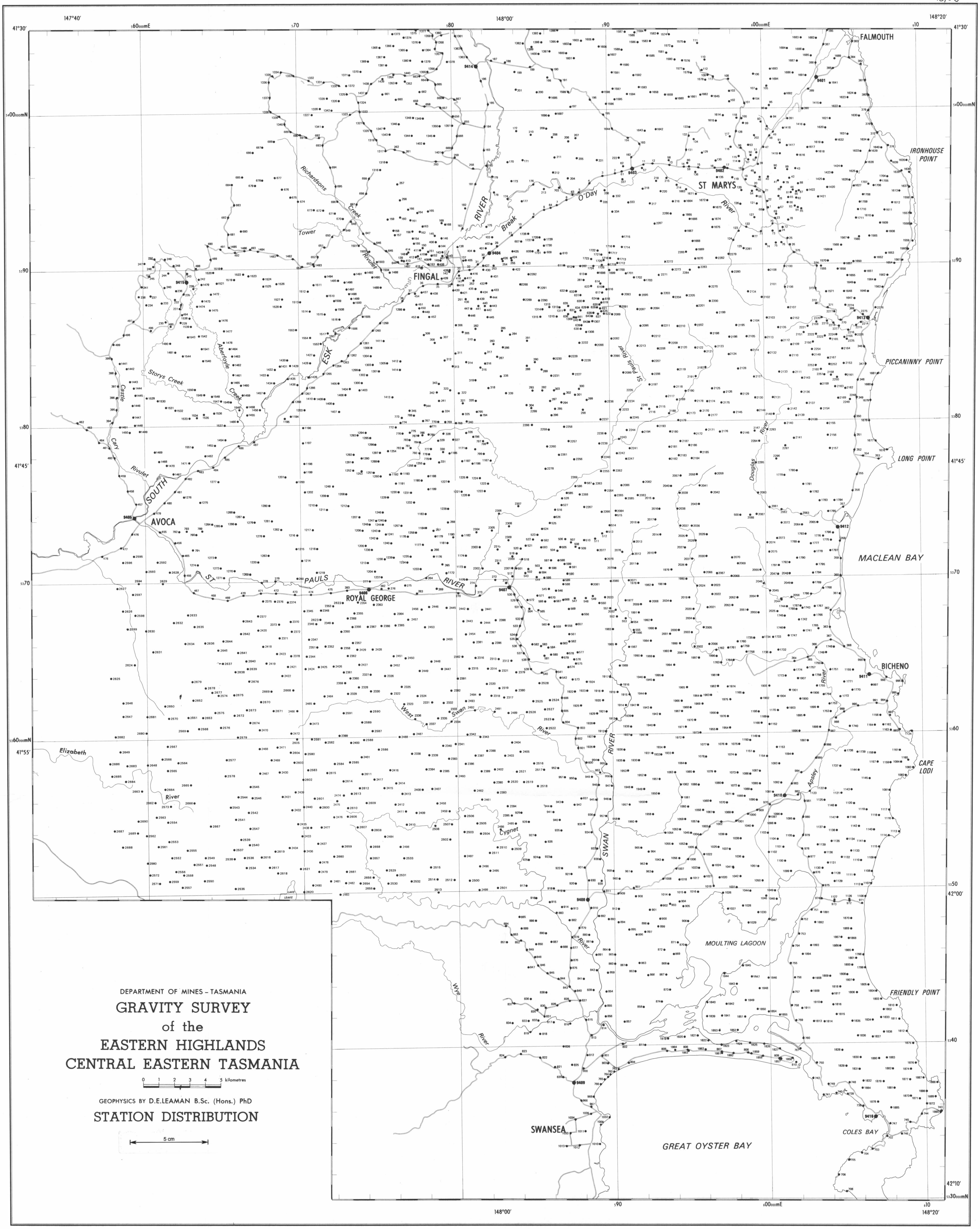
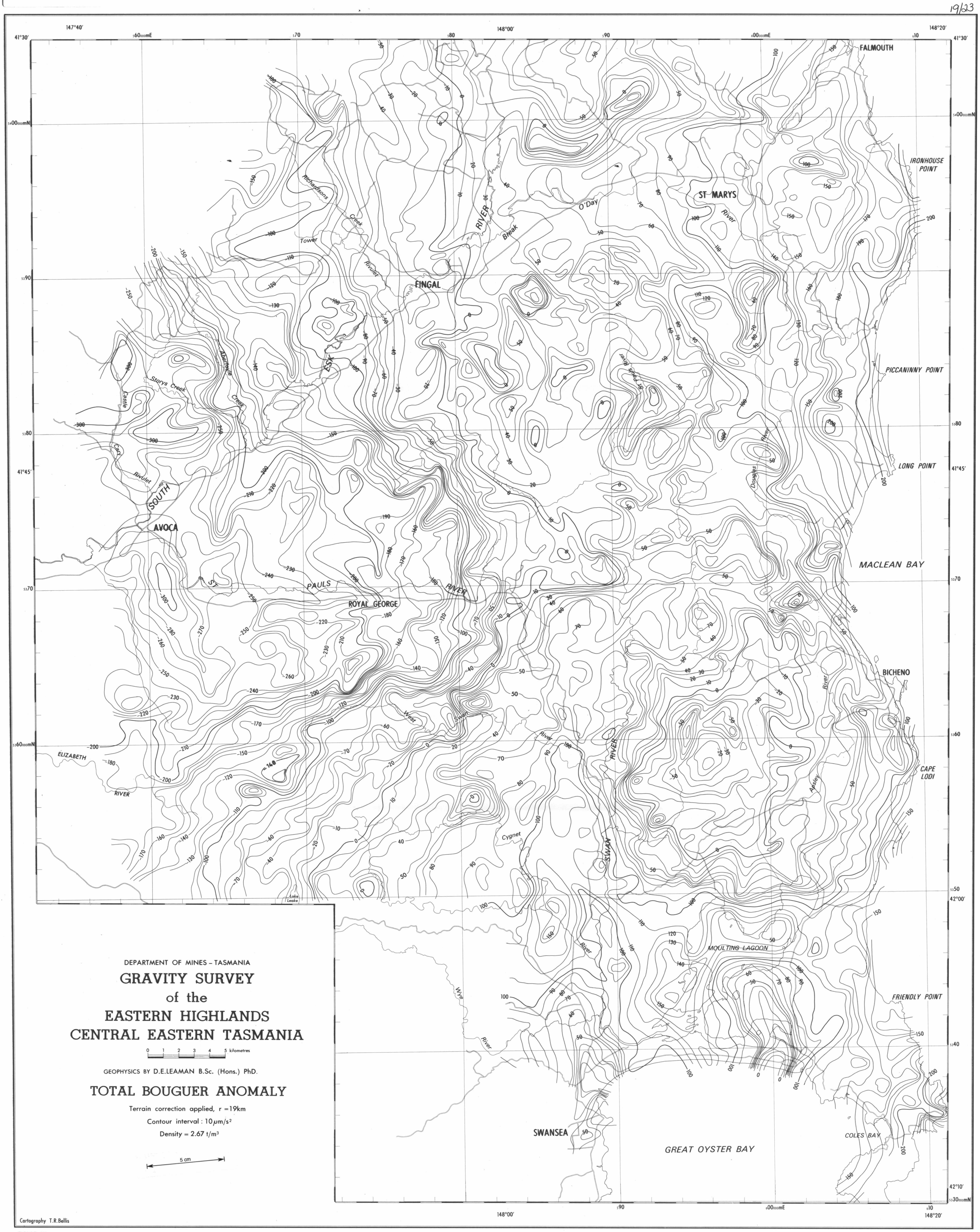


Figure 14

1979/54 Fig. 14 (4516-14)

4516

19/23



DEPARTMENT OF MINES – TASMANIA

GRAVITY SURVEY of the EASTERN HIGHLANDS CENTRAL EASTERN TASMANIA

0 1 2 3 4 5 kilometres

GEOPHYSICS BY D.E.LEAMAN B.Sc. (Hons.) PhD.

TOTAL BOUGUER ANOMALY

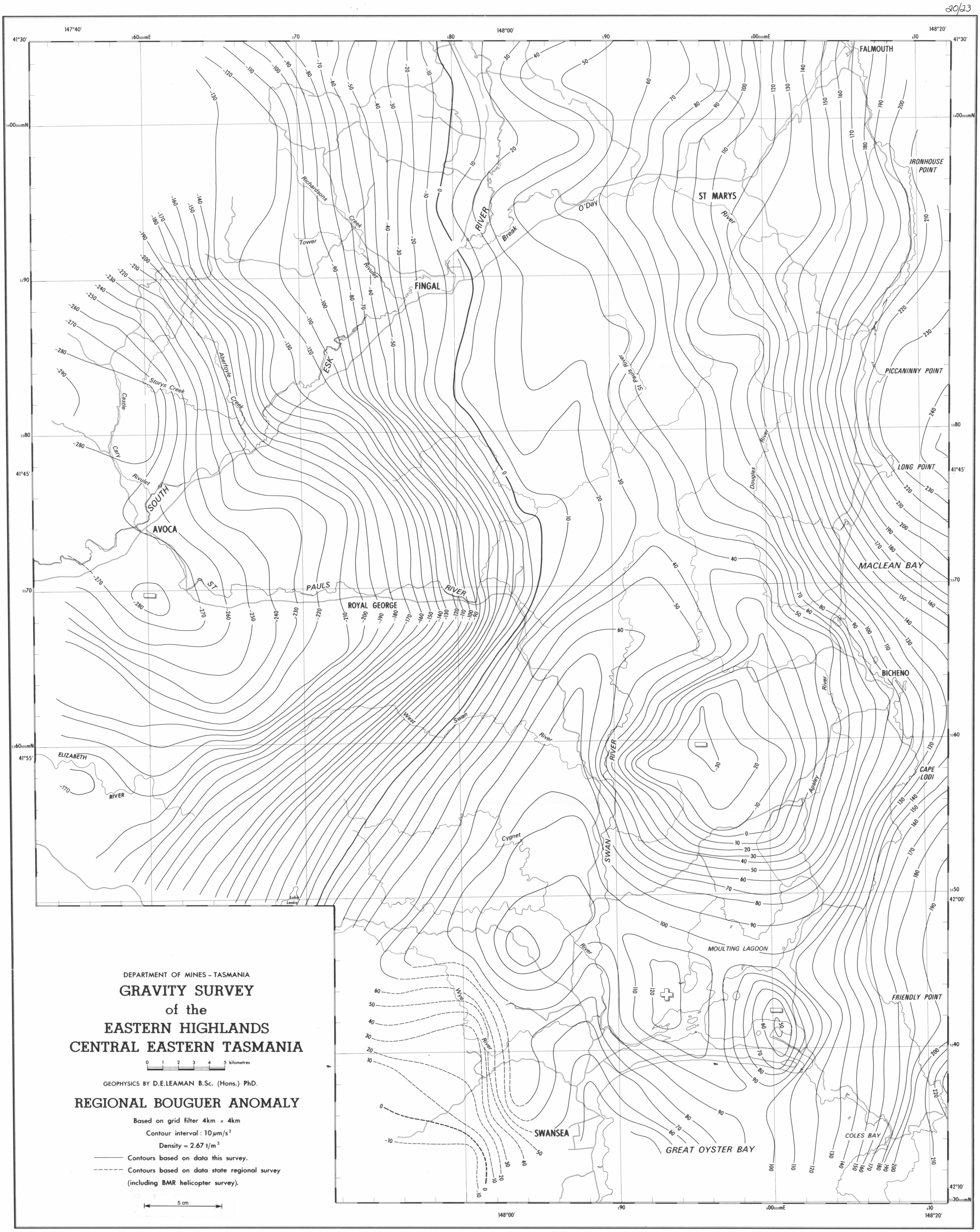
Terrain correction applied, r = 19km

Contour interval : 10 μm/s²

Density = 2.67 t/m³

5 cm

FIGURE 15



DEPARTMENT OF MINES – TASMANIA

GRAVITY SURVEY of the EASTERN HIGHLANDS CENTRAL EASTERN TASMANIA

0 1 2 3 4 5 kilometres

GEOPHYSICS BY D.E.LEAMAN B.Sc. (Hons.) PhD.

REGIONAL BOUGUER ANOMALY

Based on grid filter 4km × 4km

Contour interval : 10 $\mu m/s^2$

Density = 2.67 t/m^3

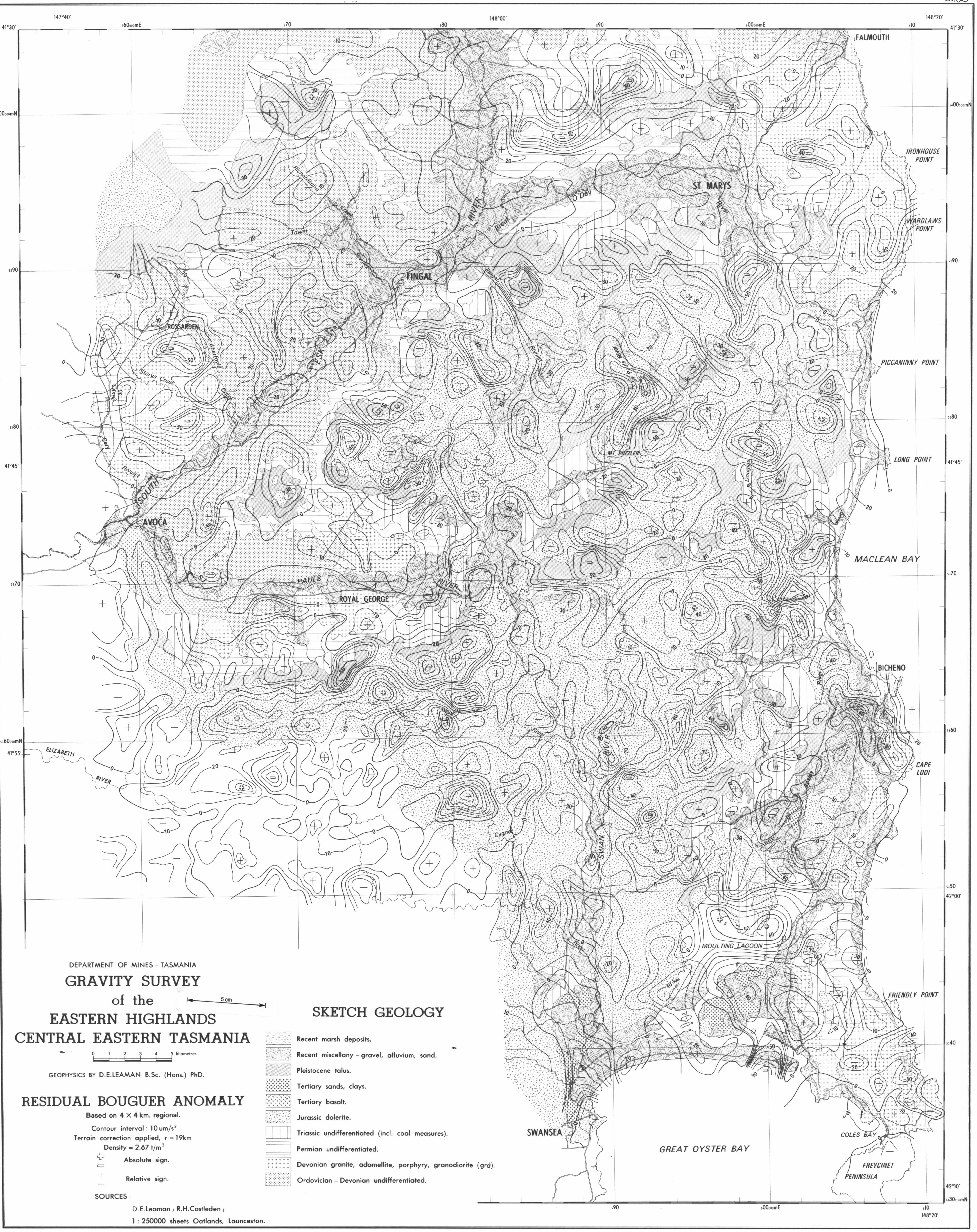
——— Contours based on data this survey.

– – – Contours based on data state regional survey (including BMR helicopter survey).

5 cm

Figure 16

21/23



DEPARTMENT OF MINES – TASMANIA

GRAVITY SURVEY of the EASTERN HIGHLANDS CENTRAL EASTERN TASMANIA

0 1 2 3 4 5 kilometres

GEOPHYSICS BY D.E.LEAMAN B.Sc. (Hons.) PhD.

RESIDUAL BOUGUER ANOMALY

Based on 4 × 4 km. regional.

Contour interval : 10 um/s²
Terrain correction applied, r = 19km
Density = 2.67 t/m³
Absolute sign.
Relative sign.

SOURCES :
D.E.Leaman ; R.H.Castleden ;
1 : 250000 sheets Oatlands, Launceston.

SKETCH GEOLOGY

- Recent marsh deposits.
- Recent miscellany – gravel, alluvium, sand.
- Pleistocene talus.
- Tertiary sands, clays.
- Tertiary basalt.
- Jurassic dolerite.
- Triassic undifferentiated (incl. coal measures).
- Permian undifferentiated.
- Devonian granite, adamellite, porphyry, granodiorite (grd).
- Ordovician – Devonian undifferentiated.

FIGURE 17

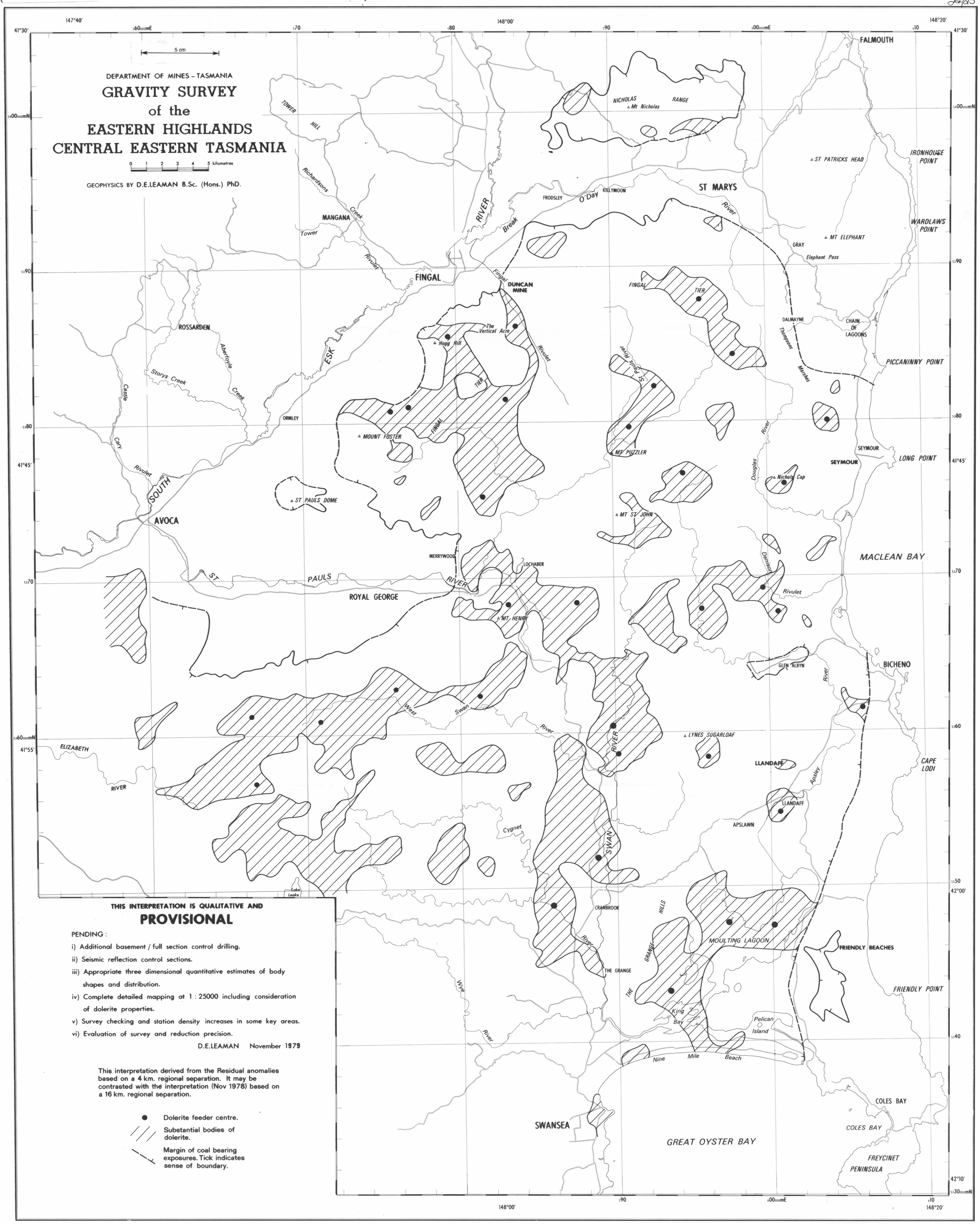


FIGURE 24

1979/54 Fig. 24
(4516-24)

4516-A

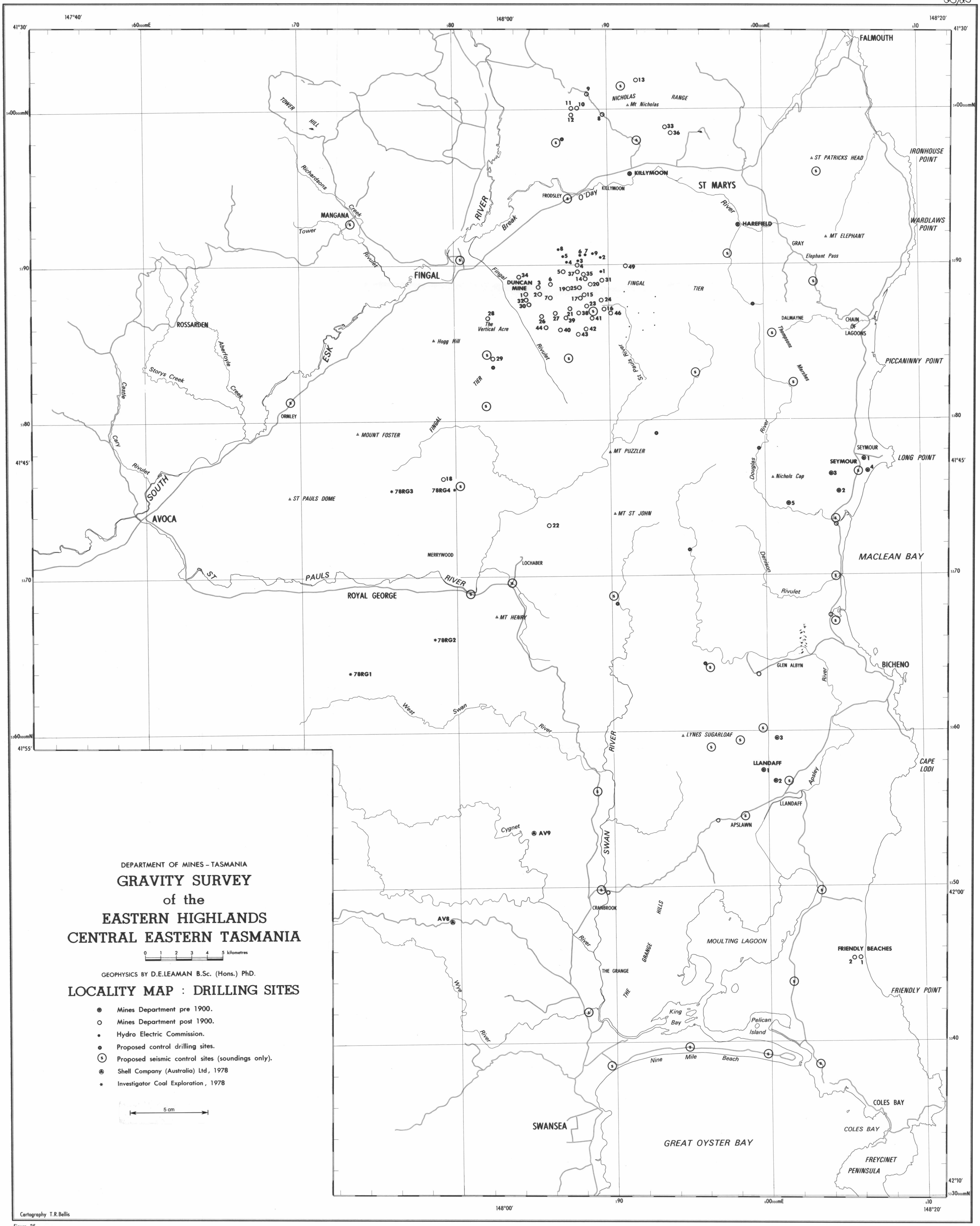

DEPARTMENT OF MINES – TASMANIA
GRAVITY SURVEY of the EASTERN HIGHLANDS CENTRAL EASTERN TASMANIA
0 1 2 3 4 5 kilometres
GEOPHYSICS BY D.E.LEAMAN B.Sc. (Hons.) PhD.
LOCALITY MAP : DRILLING SITES
Mines Department pre 1900.
Mines Department post 1900.
Hydro Electric Commission.
Proposed control drilling sites.
Proposed seismic control sites (soundings only).
Shell Company (Australia) Ltd, 1978
Investigator Coal Exploration, 1978
5 cm
Cartography T.R.Bellis
147°40′
148°00′
148°20′
41°30′
41°45′
41°55′
42°00′
42°10′
FALMOUTH
NICHOLAS RANGE
Mt Nicholas
TOWER HILL
Richardsons Creek
MANGANA
Tower Rivulet
KILLYMOON
ST MARYS
FRODSLEY
O'Day
Break
RIVER
ST PATRICKS HEAD
IRONHOUSE POINT
WARDLAWS POINT
HAREFIELD
MT ELEPHANT
GRAY
Elephant Pass
FINGAL
DUNCAN MINE
FINGAL TIER
ROSSARDEN
Aberfoyle Creek
Storys Creek
Castle Cary Rivulet
ESK
The Vertical Acre
Hogg Hill
St Pauls River
DALMAYNE
Thompsons Marshes
CHAIN OF LAGOONS
PICCANINNY POINT
ORMLEY
MOUNT FOSTER
MT PUZZLER
Douglas River
SEYMOUR
LONG POINT
Nichols Cap
SOUTH
AVOCA
ST PAULS DOME
78RG3
78RG4
MT ST JOHN
MACLEAN BAY
MERRYWOOD
LOCHABER
ST PAULS RIVER
ROYAL GEORGE
Denison Rivulet
MT HENRY
78RG2
78RG1
BICHENO
GLEN ALBYN
West Swan River
LYNES SUGARLOAF
LLANDAFF
CAPE LODI
Apsley
APSLAWN
SWAN RIVER
Cygnet
AV9
AV8
CRANBROOK
THE GRANGE HILLS
MOULTING LAGOON
FRIENDLY BEACHES
THE GRANGE
FRIENDLY POINT
Wye River
King Bay
Pelican Island
Nine Mile Beach
COLES BAY
SWANSEA
GREAT OYSTER BAY
FREYCINET PENINSULA

Figure 25