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GRAVITY SURVEY OF THE TAMAR REGION, NORTHERN TASMANIA

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ABSTRACT

A gravity survey, employing an average station spacing of 0.8 km, across central-northern Tasmania has shown the Tamar lineament to be a key structural feature with a long geological history. It has controlled Palaeozoic and Cainozoic sedimentation. More than 300 m of Tertiary sediments occupy graben-faulted and step-faulted basins.

At least one dolerite feeder has been located and some details of structure can be inferred in the wide belt of Lower Palaeozoic sedimentary rocks which have monotonous and confusing surface exposure. Granodiorite intrudes these latter rocks as irregular sheet-slab bodies. Gold mineralisation is related to local roof irregularities.

INTRODUCTION

The Tamar Region is designated as that area north of latitude 41°S and between longitude 146°30' and 147°30'E; it includes the Beaconsfield, Frankford, Launceston, Pipers River and Noland Bay geological atlas map sheets.

The region is dominated by the valley of the Tamar River with ranges of hills to the east and west. Apart from the Mt Barrow-Mt Arthur area the region is of moderately low relief. Vehicular access is excellent over much of the area.

Rocks ranging from Precambrian to Quaternary in age are represented in the area surveyed and which is of particular interest as some Bass Strait structure impinge on to mainland Tasmania.

The map is a compilation of surveys by Hinch (1965), Longman and Leaman (1971*a*) and the authors (see sources of data on fig. 1). The earlier surveys have been modified by the addition of a 19 km terrain correction. There has been little drilling to depths of more than 90 m in the region.

Other than the gravity surveys incorporated in the map little regional or other geophysical work has been undertaken with the exception of Project B.U.M.P., 1967 (Underwood, 1970) aimed at the determination of crustal structure in Bass Strait.

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GEOLOGY

The entire area has been mapped in detail by Longman *et al.* (1964), Marshall *et al.* (1965), Jennings (1967), Gee and Legge (1971) and Gulline *et al.* (1973). No unified structural interpretation of the region has been possible due to the complex geology and wide variation and age range of structures and rock types.

The Tamar trough separates two different structural regimes. To the west a folded Precambrian core is overlain by Cambrian, Ordovician and Siluro-Devonian rocks which were folded in Early-Middle Devonian times. Permian rocks irregularly overlie the folded rocks; their relationship with the Triassic rocks is not clear. The earlier rocks were then intruded by dolerite. To the east there is no Precambrian core, but a substantial thickness of folded Cambrian-Devonian miogeosynclinal rocks which are unconformably overlain by Permo-Triassic rocks intruded by dolerite.

Subsequently the whole region has undergone intensive faulting, most of this is concentrated along the line of the Tamar River. Although Tertiary deposits now conceal much of the structure there can be no doubt of the existence of an active major lineament along the Tamar line since at least the late Precambrian. This is evidenced by the lithological and structural asymmetry up to Middle Palaeozoic times, the concentration of dolerite intrusions during the Jurassic period, and a continuing disruptive history through the Tertiary.

Figure 3 presents the geology of the region in simplified form.

STRATIGRAPHY

Precambrian

Sandstone, slate and phyllite occur in the ranges south of Badger Head. The rocks are intensely folded and are of unknown thickness.

Cambrian

The Precambrian rocks are unconformably(?) overlain by a series of slate-chert-greywacke rocks. In the Beaconsfield area these rocks are intruded by keratophyres and a basic-ultrabasic complex. East of Port Sorell the series is more chertose, sandy and contains some dolomite, and pyritic, carbonaceous shale (see also Gee and Legge, 1971, 1974).

Ordovician

The lowermost Ordovician rocks are quartzose conglomerate and sandstone while the upper parts are dominated by limestone, *e.g.* near Flowery Gully. The series unconformably(?) overlies the Cambrian rocks. A more detailed account will be given in the Explanatory Report for the Frankford geological sheet.

The Mathinna beds, a series of sandstone and slate, possibly up to 15 km thick range in age from Cambrian to Lower Devonian. The oldest rocks are to be found near Lefroy and the youngest in the area about Scottsdale. These rocks are intensely folded.

Permian

Limestone, siltstone, sandstone and shale, which may be fossiliferous, unconformably overlie all older rocks. The basal surface is irregular and may have a relief of more than 100 m. The Permian rocks have a total thickness of about 600 m. Details of the Permian sequence are given by Longman (1966) and Marshall (1970).

Triassic

Up to 300 m of quartz sandstone and micaceous shale conformably(?) overlie the Permian rocks.

Jurassic

Dolerite has intruded principally Permian and Triassic rocks, as a series of dykes and sills. Little is known of the intrusion shape due to limited exposure or lack of stratigraphic detail. Longman (1966) has inferred a centre at Patersonia. No other centres have been postulated about the Tamar valley.

Tertiary

The dominant rock type is sand and clay which is often carbonaceous. The sequence also contains coarse sand and gravel and occasionally conglomerate. The sediments fill the structural, and partly erosional, depressions produced by faulting which commenced in Eocene(?) times or earlier, as suggested by leaf remains and basalts found low within the basins. Basalts are commonly found interbedded with, or overlying, the sediments (Sutherland, 1971). The sediments are probably derived from the weathering of the rocks surrounding the various basins and although fine-grained do not necessarily represent quiet deep-water deposition as they also contain laterites. The grain size probably reflects that of the source rocks and the material was probably deposited in the basin sub-aerially, or during times of flood.

Quaternary

The predominant Quaternary rocks are alluvial deposits in the river valleys and scree or talus deposits about some of the dolerite escarpments.

STRUCTURE

The region is dominated by the depression of the Tamar valley. The valley, itself is a reflection of the concentrated faulting and warping which has proceeded from late Precambrian to Recent times. To the east of the valley most movements terminated in Palaeozoic times, with relatively minor subsequent disruption. West of the Tamar a core of Precambrian rocks is irregularly overlain by Cambrian and Ordovician rocks. All are strongly folded and show unconformable relations. In addition the older rocks are intruded by a series of Cambrian ultrabasic rocks. The exposed rocks show a predominance of N-NW structural trends. Permian rocks unconformably overlie rocks of all the above-mentioned ages. The Permian sequence is both varied and discontinuous due to lapping on to older rocks. A series of faults which has disrupted the southern part of the fold belt must have been active in late Palaeozoic times in order to account for many of the variations (Gulline, 1973). In the south-west of the region there is blanket of Triassic rocks and dolerite, and only Tertiary disruptions are evident.

Figure 4 presents a simplified structural summary showing the principal features. Information about subsurface geology is negligible with the exception of the Launceston city area, and Port Sorell, where some boreholes have been drilled to moderate depths.

GRAVITY FIELD

SURVEY DETAILS AND ACCURACY

The gravity observations as presented have been reduced from the surveys of several workers using different gravity meters. Part of the survey by Hinch (1965), using Worden meter no. 169, scale factor 0.1010 mgal/divn is incorporated in the Launceston-Westbury portion of the region. Surveys about Port Sorell, Scottsdale and elsewhere were carried out with Worden meter no. 273, scale factor 0.1008 mgal/divn.

The base station for all surveys if BMR base 6491.0171 at Launceston Airport. The value of this station is 980.27564 gal. Some adjustment of survey units was necessary, in particular Hinch (1965) and Longman and Leaman (1971a). All stations have been corrected for instrumental drift and loop errors. Loop corrections have been made by the methods of Gibson (1941) and Green (1961). The accuracy of the observations is of the order of (±0.02 -0.04) mgal. No general corrections have been made for tides and any that were deemed necessary are incorporated within the drift correction.

Stations have been sited, where possible, on State Permanent Marks or Lands and Surveys Department survey spot heights. The elevation of many other stations has been determined using microbarometers. Using overlap control techniques and re-reading of intervals in association with tie elevations an accuracy of 1.5-2 m is possible. However Symonds (1971) used a base recorder and claimed an accuracy of 3 m for such observations. The accuracy of the Bouguer anomaly thus ranges from 0.02 mgal for surveyed stations to 0.3 mgal for most, up to 0.6 mgal for some stations north-east of Lilydale.

All stations have been located to a minimum accuracy of some 100 m, and some have been determined to 50 m using 1:31,680 and 1:15,000 maps. The error in the Bouguer anomaly is about ±0.5 mgal.

All stations have been terrain corrected to a radius of 19 km using the method of Hammer (1939). At this radius the effects of the earth's curvature become significant and the attraction in outer zones becomes constant for large blocks of stations. As a result no further calculation is worthwhile and any errors present are constant over the whole survey as the dimensions of the area covered became small compared with distances to significant features such as the continental shelf. The accuracy of the correction made is estimated at 5% or less resulting in an error of 0.02-0.10 mgal at most stations.

The R.M.S. accuracy of the observations at all stations excepting those of Symonds (1971) is 0.33-0.40 mgal, whilst for those of the latter area it is 0.50-0.60 mgal. A contour interval of 1 mgal is thus justified over the greater part of the region but may not be reliable in the north-east portion.

Stations have mostly been installed on roads and tracks, and also along the coastline at an interval of approximately 1.5 km. Access is generally good but some areas are almost inaccessible on foot; these are indicated on Figure 1. The station distribution and survey origin is also shown in Figure 1.

BOUGUER ANOMALIES

SPECIFICATION AND PRESENTATION

The results of the survey have been expressed in terms of the extended Bouguer anomaly, since this is the most direct and useful form of preliminary treatment leading to an interpretation of near-surface crustal features.

A density value of 2.67 g/cm^3 has been used throughout the reduction. The density of pre-Permian rocks and continental crustal rocks in general approximates this figure. Deviations in such rocks or in high level younger rocks can be accounted for during residual interpretation.

Total Bouguer anomalies are presented in Figure 1, with a contour interval of 1 mgal.

REGIONAL SEPARATION

The total Bouguer anomalies show that the gravity field shows a general decrease to the south due principally to crustal thickening. The term regional is here applied to that component of the field derived from the core, mantle and lower crust. An averaging procedure was adopted. Initial averaging was based on squares with sides 4 km in length. Each square included an average of 8 stations. The averages obtained were then recalculated using squares of 16 times the area. This is a crude but effective filter (for theory see St John, 1967). A uniform distribution of points is desirable for the most effective filtering. Two major problems with the method involve selection of the area-average factor and edge effects. In this case edge effects west, south and north-east of the area have been overcome by referring to data by Sheehan (1969), Longman and Leaman (1971*a*) and Symonds (1971) respectively. The regional field obtained by this method is shown in Figure 2, and will be seen to contain significant variation in gradient and trend. West of the area the gradient is directly N-S (Sheehan, 1969), whilst to the south and east the gradient sweeps from SSW to WSW (Longman and Leaman, 1971*a*). Only part of these effects can be seen in the region covered here. North and east of Scottsdale the gradient again trends N-S (Symonds, 1971). An interpretation of this confused gradient is given on page 9.

DESCRIPTION OF RESIDUAL ANOMALIES

Figure 3 presents the residual Bouguer anomaly field as obtained from the total field (fig. 1) by removal of the regional component (fig. 2). Several features may be noted. The major lineament is the Tamar Trough. Most of the anomalies are moderate (-4 to -10 mgal) and related to pockets of Tertiary sedimentation. Similar results are noted for the sediments at Port Sorell and Westbury.

East of the Tamar River there are broad bands of positive and negative anomalies with boundaries approximating the Pipers and Little Forester Rivers. The anomalies become equidimensional peaked south of Lilydale where Permian and Triassic rocks intruded by dolerite overlie the Cambrian-Devonian 'Mathinna Beds' association. West of the River Tamar anomalies are generally broader but approximately equidimensional and in the range +2 to -5 mgal.

INTERPRETATION

ROCK DENSITIES

The results of density determinations for rock formations occurring throughout the district are presented in Table 1. Most averages are based on 10-20 samples. Determinations have been made on water saturated, fresh core samples of up to 2 kg, unless otherwise indicated.

METHODS OF INTERPRETATION

Only indirect, comparative interpretation methods have been employed, as direct methods entail more complexity of calculation, precision and detail of specification of anomalies than is possible in regional surveys of this type.

The regional Bouguer anomaly which displays marked trend variations across this relatively small region has been interpreted using three-dimensional methods since there is no simple means of adjusting two dimensional methods. The method used incorporated the mass-line assumption. The

Table 1. BULK WET DENSITIES

Rock unit	Density range g/cm^3	Average density g/cm^3	Weighted average[a] g/cm^3
Tertiary			
clay, sandy clay	1.82 - 2.00	1.92	
sand	2.00 - 2.20		
volcanics (solid basalt)	2.90 - 3.10		
Jurassic			
dolerite	2.75 - 3.20	2.90*b*	
Triassic			2.45
quartz sandstone	2.30*c*- 2.43	2.37	
quartz mudstone	2.44 - 2.54	2.49	
Permian			2.55
Upper Permian	2.46 - 2.58		
Lower Permian	2.37 - 2.67		
Devonian			
granodiorite	2.69 - 2.70	2.70	
granite, adamellite	2.59 - 2.65	2.62	
Ordovician			
Gordon limestone	2.70 - 2.74	2.72	
Other siliceous rocks	2.50 - 2.65	2.60	
Cambrian			
Sedimentary rocks	2.60 - 2.74		
Basic/ultrabasic rocks	2.43 - 3.20		
Cambrian-Devonian			
'Mathinna Beds'	2.44*c*- 2.82	2.67	
Precambrian			
dolomite	2.84 - 2.91		
quartz, phyllite, schist	2.59 - 2.70	2.65 - 2.67	

a : weighted average based on the proportions of rock types in the sequence.

b : average for sill Jaeger (1964), of Leaman (1972).

c : weathered.

assumption required is that the mass of a vertical prism with square section is concentrated in a line through the axis of the prism (see Heiskanen and Vening Meinesz, 1958, p. 182). The vertical attraction at a point *P* is then

$$g = G\rho a^2 \left(\frac{1}{r_1} - \frac{1}{r_2}\right)$$

where G = gravitational constant

ρ = density of the prism

a = length of prism side

r_1, r_2 = distances from a point P to the centre top and bottom of the prism.

The method has a number of deficiencies, the principal ones being the errors introduced when the calculation point is close to the prism, particularly if the prism top is near the same level as that point. In order to overcome this the sectional area of the prisms may be reduced thereby requiring more prisms. As an alternative the crustal models can be made up in two parts. A near surface two-dimensional slab of which the attraction will be accurately known and a large number of prisms related to the crustal structures proposed. In this way, provided that the thickness of the slab is not less than the length of the side of the prisms used, the whole may be calculated with an error not more than 3-5%.

Although many residual anomalies are slightly extended equi-dimensional features a two dimensional interpretation has been imposed as a first order estimate. The method used is qualitatively outlined in Leaman (1972) and the detailed method is shown by Longman and Leaman (1971*b*). The equation upon which such two-dimensional interpretation is based is stated below:

$$\Delta g = 2G\delta[x\ln\frac{r_1\ r_4}{r_2\ r_3} + b\ln\frac{r_2}{r_1} + D(\phi_2 - \phi_4) - d(\phi_1 - \phi_3)]$$

where x is distance from calculation point to trailing edge of prism,

d is depth to top surface,

D is depth to bottom surface,

b is breadth of prism,

r_1 is the distance from corner 1 to calculation point and

ϕ_1 the angle subtended by r_1 from the surface.

All interpretation has been made from the ground surface and is thus a two-part process since the base level is sea level.

LIMITATIONS INHERENT IN INTERPETATION

Many conclusions of direct value are possible, although interpretations of the gravity field are basically ambiguous. Care must be taken not to 'overinterpret' as the survey detail does not in general match the known geological detail, at least near the surface. The principal application of the interpretation has been to major features with subsidiary reference to smaller structures.

REGIONAL ASSUMPTIONS

It is assumed that the regional gradients, as shown in Figure 2 are valid. Detailed interpretation of the regional anomalies would be little affected by slight changes in magnitude and position. However, the residual anomalies could be significantly altered as the form of the regional anomalies are such that changes of only 1 mgal could cause considerable displacement in the residual separation.

DENSITY ASSUMPTIONS

The validity of the density values stated in Table 1 is assumed. The variations noted may be significant, especially in the case of the granitic rocks and the Cambro-Devonian Mathinna-type sediments. Comments on variations of values used are outlined in the appropriate discussions.

INTERPRETATION DIFFICULTIES

Realism of structure and anomaly distribution may not be approached, particularly in regard to the difficulties inherent in specification and treatment of thick sedimentary sequences, reduction of density differential with depth and recent overburden.

INTERPRETATION OF STRUCTURE: REGIONAL

The 'normal' regional anomaly west of this region, as shown by Sheehan (1969) has a smooth N-S gradient. Recent work east of this region (Leaman and Symonds, 1974) shows a broad arcuate trend to the east while surveys to the south (Longman and Leaman, 1971*a*) have shown a sweeping trend to the south. The distortion apparent in this region is only partly indicated in work to the south and can only be resolved when work to the east is also considered.

Sections of the region appear to possess near normal gradients and trends; south-west of Bridport and south-west of Beaconsfield. Elsewhere there are major linking gradients. In every case the source for the gradient cannot exceed a depth of 10 km.

Two positive and two negative distortions are evident. South of Port Sorell there is a small positive belt which extends to Deloraine. It appears to be related to the western edge of the Precambrian block and accreted Lower Palaeozoic rocks possessing approximate N-S trends. The second positive area extends south from Bridport and Weymouth and may in fact represent normal crust as indicated below.

The most obvious negative distortion is bounded by the Tamar River in the east and Beaconsfield in the north. It may be due to a large slab of light crust, perhaps related to the Precambrian block, or to granites. The negative effect on the eastern edge of the map can be directly related to the Scottsdale-Blue Tier Batholith complex (for full discussion see Leaman and Symonds, 1974). This latter effect persists as far south as Campbell Town where the positive or normal block becomes very narrow. As it has been suggested that the average crustal density used was some 0.02 g/cm^3 too heavy it might be expected that the Bouguer anomalies quoted over blocks of old crust would be too low. This could account for the trends visible south of, and especially obvious south-west of, Longford (Longman and Leaman, 1971*a*).

Residual anomalies have been calculated assuming the regional reduction to be valid and interpretation ignores possible variations in crustal density or nearness of batholiths. The interpretation is thus only valid for structures within 4-6 km from the surface. A complete structural interpretation of the crust will be given in a later Paper incorporating surveys for the whole of this part of Tasmania (Leaman and Symonds, 1974).

INTERPRETATION OF STRUCTURE: RESIDUAL

General comments

South south-east of Bridport a belt of negative anomalies up to -5 mgal in magnitude is related to the Tertiary lead systems of the Brid and Forester Rivers. In the present area the deepest points, or those where the greatest thickness of Tertiary sediments remain, are near Jetsonville. As demonstrated by Leaman and Jordan (1973) the leads pass to the sea toward the north-east (see also Moore, 1972). The anomalies present (-4 to -5 mgal) are equivalent to a sediment thickness of 150-160 m. Such thicknesses have been demonstrated by drilling and seismic surveys near Jetsonville.

A broad, generally N-S belt of positive anomaly extends from West Double Sandy Point to the Mt Arthur-Mt Barrow massif. In detail these anomalies are related to the Bridport granodiorite and related rocks. Anomalies up to +2 to +3 mgal occur on granodiorite from Jetsonville to Tayene and also near Bridport and Lisle. The 0 mgal contour west of Nabowla closely delimits the small western outcrops of these rocks. As the granodiorite has been demonstrated to be slightly denser than the surrounding slate, mudstone and sandstone (see Table 1) it is likely that the whole belt of positive anomaly is due to a large subconcordant(?) granodiorite mass which cannot be thicker than 2 km, assuming a contrast of no more than 0.05 g/cm^3, and which in general is probably no thicker than one kilometre. The peaking of anomaly west of the main outcropping mass suggests either a thickening of the intrusion or a shelving to depth, or both. The axis of such a feature is N-S through East Double Sandy Point. The small outcrops at Lisle and West Nabowla are west of this axis and the peaked, localised nature of the anomalies suggests that these bodies are small and generally disconnected from the main mass at shallow depth.

A further N-S anomaly belt occurs east of Bellingham. Anomalies are negative (up to -3 mgal) and are related to Cambro-Devonian sedimentary rocks. The negative anomalies suggest that the rock density is less than 2.67 g/cm^3. However, no reliable estimate can be placed on the thickness of these rocks as the actual density is unknown.

The region south of Weymouth and east of George Town is marked by substantial positive anomalies (up to +6 mgal). The principal anomalies occur along a SE-trending axis parallel to the Tamar trough between George Town and Lefroy. The anomaly over the region of the Lefroy-Back Creek goldfield is +4 to +5 mgal and, by analogy with the Lisle-Golconda goldfield to the east, it is likely that the anomalies reflect a substantial mass of granodiorite at relatively shallow depth. The steep gradients associated with the east side of the 6 mgal anomaly parallel to, and on one side of, the Tamar trough suggests a possible source region with the intrusion shelving to the east as was implied in the case of the main eastern intrusion. Alternatively this effect could be produced by a belt of denser folded rocks superimposed on a region intruded by granodiorite.

The major anomaly of the region, along the Tamar trough, is composed of the effects from two sources. The basic anomaly is due to some structure of at least Permian or pre-Permian age. Superimposed upon this are the sharp effects of Tertiary sediments. This separation of two components is best seen in the North Tamar around George Town. The -5 mgal contour describes very closely the main basin of Tertiary sedimentation. However, there is a substantial bench in the negative anomalies to the east. North-east of George Town the 0 mgal contour approximates the eastern margin of the Permian sediments and dolerite. Thus anomalies up to -4 mgal occur in regions where there is more than 100 m of dolerite and about 100 m of Permian rocks. The total anomaly that these materials could produce is +0.5 mgal. This means that sub-Permian rocks are here contributing at least -4.5 mgal. Further south near Hillwood (-4 mgal), south of Lilydale (-6 mgal) and at Nunamara (-4 mgal) the same effects are seen. Substantial negative anomalies appear to characterise the eastern margin of the trough and are always related to non-Tertiary materials. The corrected 'basement' anomalies for the latter examples are -4.5, -4.6, -4 mgal respectively. Thus the sub-Permian anomalous material contributes -4 to -4.5 mgal consistently over a wide area, but the effect is terminated close to the boundary between Permian and older rocks which suggests either a basin edge, fault step or synclinorium of light

Mathinna rocks along a south-east alignment (see also comments on page 16). On the western side of the trough the same effect is seen only in one small area at West Head.

The more obvious anomalies along the Tamar River are associated with thick deposits of Tertiary sediments. Although there is a series of apparently isolated anomalies there is no reason to believe that the basins or lakes were not interconnected. The lower saddles displayed in the anomaly pattern probably reflect channel constrictions or bars (see Richmond basin in Leaman, 1971). Two very distinct bars occur along the river; one near Youngtown south of Launceston (+3 mgal) and the other between Hillwood and Robigana. The latter is particularly interesting as it occurs at a point where the anomaly pattern changes from broad, deep and symmetrical to somewhat more asymmetrical and narrower. Mapped faulting changes in character also, from single-sided graben faulting in the south (Longman, 1966) to double-sided graben faulting in the north (Sutherland, 1971, Gee and Legge, 1971). In the south the deepest Tertiary sediments are at the western fault edge. A further constriction occurs near Legana where the channel deposition becomes very narrow and lake-like with minor tributary channels also evident.

South of Hillwood negative anomalies separate into two bands. The first, discussed previously, is on the east side of the dolerite range near the edge(?) of Upper Palaeozoic deposition. The second is directly related to the Tertiary rocks along the river course. Between these two, positive anomalies range up to 4 mgal with broad areas of +1 to +2 mgal. The latter figures are equivalent to 200-250 m of dolerite sill in Permian rocks, which is in agreement with mapping (Longman, *et al.* 1964). The peak of +4 mgal at Nelsons Creek siding would imply very thick dolerite or a fold structure of denser basement material. The simple match of mapped geology and anomaly in this region of positive anomaly also shows that the negatively anomalous area to the east is just a zone and does not reflect a structure common to the entire trough. Significant terminations of anomaly trends at, and south-east of Hillwood suggest some major E-W structures which are probably related to the main Tamar structure.

Reliable estimations of the thickness of Tertiary material in the West Head to Hillwood section of the trough are impossible without drilling control. However, assuming that the anomaly from -4 to -10 mgal is directly attributed to Tertiary rocks, *i.e.* 6 mgal, then the likely thickness will be 200-250 m assuming the absence of basalt. As basalts are known to be interbedded this would be a minimum figure. Only in the Hillwood-Launceston part of the trough has any significant drilling been undertaken. In addition the anomalies are controlled by, and completely referable to, Tertiary sedimentation. The maximum thickness appears to be generally of the order of 200 m.

The western edge of the Tamar trough is clearly defined, at least between Badger Head and Exeter, by the marked anomaly gradient to the immediate east of the Lower Palaeozoic and Precambrian core. The simplified geology shows clearly the abrupt nature of this core on its north-eastern side, and also how it diffuses and disappears to the south. The random gradients south of Exeter reflect this disappearance.

The Lower Palaeozoic rocks, especially near Beaconsfield, are intruded by an ultrabasic complex. As only a small anomaly (+2 mgal) occurs over this complex it may be concluded that it is either very small or has a low density contrast with the intruded slates. There is much surface evidence of serpentinisation. The complex is intruded at or near the boundary of Cambrian and Precambrian rocks. The eastern part of the Lower Palaeozoic block is characterised by a NW-trending positive anomaly of +3 to +5 mgal which appears to be directly related to Cambrian slate and greywacke. The small depression in this trend at Beaconsfield is related to Ordovician quartz sandstone and conglomerate. All rocks dip fairly steeply to the east. A similar positive anomaly occurs east of Port Sorell and is related to a suite of Cambrian(?) rocks. This particular anomaly has a distinct N-S trend and persists from Port Sorell to Parkham, south of the Frankford Highway. North of Parkham it is not possible to verify the association of the anomaly with Cambrian rocks because of the cover of Permian rocks, although the inference is clear. A problem does arise as to why the anomaly maximum is situated at Parkham. Possibly there is a basic intrusion in the sequence at this point or the rocks are thicker and perhaps more tightly folded. In view of the localisation of the anomaly peak the former is suggested (compare Longman and Leaman, 1971*a*, p. 14).

South of Elizabeth Town the Cainozoic rocks of the north-western part of the Oaks-Westbury basin (Longman and Leaman, 1971*a*) control the anomaly pattern. The northern part of the same basin is to be seen near Rosevale. Additional observations north of Westbury (Longman and Leaman, 1971*a*, Map 2) have indicated a bar of positive anomaly at about 41° latitude across the basin. This may be due either to thick basalt accumulations or a dolerite bar between the Rosevale sediments and those of the Oaks-Westbury basin to the south. The negative anomaly of up to -6 mgal which corresponds with the Tertiary sediments extends northward across an area with thick cover of Permo-Triassic rocks intruded by dolerite. The dolerite is generally thin in this region, north of Selbourne and west of Rosevale, and the anomalies of -2 to -3 mgal could be directly attributable to these rocks assuming no interference from older rocks.

However at Winkleigh there is a further major positive anomaly (up to +5 mgal). This covers such a large area that it dominates the effects from other sources. The anomaly lies in a region in which little other than Permian rocks is exposed. Some quartzite and slate is to be seen near Winkleigh, but the exposures are minor. The major exposures of similar rocks to the north and west are not related to similar anomalies. In addition this anomaly is offset from the Cambrian-produced NW-trending feature passing west of Beaconsfield. However, localisation of such a massive anomaly away from anomaly-producing rocks does imply a basic intrusion or a considerable thickening of Lower Palaeozoic rocks. It is perhaps significant that the termination of the NW-trending anomaly belt at Beaconsfield and the displacement of positive anomaly to the south-west towards Winkleigh occurs in the region of the E-W bar across the Tamar trough which itself is associated with the offset in trend of the Launceston arm of the trough and the older trough to the east (fig. 3, 4). A major ENE-WSW structure is implied from Holwell to Hillwood.

Section AB

The terminal points of the section which runs E-W across Port Sorell, are indicated on Figure 3. The western portion of the area crossed is covered by a variable thickness of Tertiary sediment. Drilling in the Port Sorell region has indicated up to 250 m of such sediment overlying dolerite. No holes have penetrated through the dolerite or encountered older rocks.

Significant amounts of Tertiary rocks are only to be found west of Port Sorell. Elsewhere they occur as a thin cover on other rocks. The anomaly pattern around Port Sorell is dominated by the effects of dolerite. Where present in large amounts there is a considerable peaking of anomaly. No dolerite crops out along the section but the shape of the anomalies confirms along-strike trends and that the overburden cover is slight. As the thickness of dolerite proved by drilling is more than 200 m a body at least 250 m thick has been included in the model. Little definite control can be placed on either the thickness of light sediments or of dolerite as the drilling is relatively sparse and some erosion of dolerite is likely. Indeed, the drilling results would suggest that the Tertiary sediments are deposited in a fault-produced trough which has suffered considerable erosion. The section presents a balanced state in terms of the required attraction. The position of the faults is placed on the limits of dolerite ridge outcrops which trend N-S across the region.

In the Port Sorell portion of the section 80 m of Permian rocks and a wedge of Cambrian rocks has also been included. The actual thickness of Permian rocks present is unknown but is not great. In addition the gravitational effect of such rocks is very slight (contrast - 0.10 g/cm^3). The Cambrian rocks have been wedged out to the west on the following grounds:

(1) They are absent south of Latrobe along the Mersey River where only Precambrian rocks crop out.

(2) They are different in either facies or type from Cambrian rocks west of the Mersey River suggesting either lensing or separation.

(3) The known amounts of Tertiary sediments in the best controlled part of the section, in conjunction with the proved minimum amount of dolerite account for most of the observed anomaly. Assuming that the regional gravity is not greatly in error this can only mean that there is only a minor amount of positively attracting material, such as Cambrian, beneath.

East of Port Sorell the major exposures are of carbonaceous, pyritic and cherty shale, siltstone and sandstone. Such rocks are overlain by a thin cover of Permian and Tertiary rocks. In general, the cover has been neglected in interpretation. Gee and Legge (1971) regard the dense shale-siltstone series as Cambrian(?). As has been remarked previously these rocks are unlike proved Cambrian rocks to the west or, indeed, those at Beaconsfield. A positive anomaly of more than 5 mgal is related to the series in the region of the section. The profile has been built up assuming a density contrast with the basement of +0.10 g/cm^3. Such a value may be too great although it is certain that the rocks are denser than 2.67 g/cm^3.

The range of properties and composition makes assessment difficult but a value of 2.75 g/cm^3 is probably not unreasonable. In view of the contrast employed, the amount of material proposed to account for the anomaly must be regarded as a minimum.

Precambrian rocks of the Dazzler Range occupy the remainder of the section. As these rocks have an average density of 2.65-2.67 g/cm^3 and consequently should be essentially non-anomalous; the presence of substantial anomalies indicates some denser materials at depth. The only possible dense (*i.e.* more dense than Precambrian) rocks known in the area are the supposed Cambrian rocks of Port Sorell. The presence of these rocks at depth beneath the Dazzler Range implies either of the following:

(1) There is a substantial east-dipping thrust with the Precambrian rocks riding over the Cambrian rocks. Although all the rocks in the area are tightly folded the general structure, as may be interpreted from the map of Gee and Legge (1971), is not incompatible with such a conclusion although there is no

surface evidence for such a structure. The requirements of a thrust are shown in the section, although interpretations of the gravity field in such a situation are far from unique.

(2) Alternatively the two series are conformable or approximately so, with the rocks to the west being older.

In either case, the denser rocks must lens out to the east (at B) as reflected in the diminishing anomaly. Further east the anomaly pattern is affected by the belt of folded Palaeozoic rocks at Beaconsfield.

Section BC

The end points of the profile are indicated on Figure 3. Point B is common to Section AB while C is north-east of George Town. The western portion of the profile passes across the eastern side of Dazzler Range. The observed anomaly at this end of the profile lies between 0 and 1 mgal. This suggests that:

(1) The density assumed for rocks of the Dazzler Range (considered Precambrian) is too low, or

(2) that the structure inferred in Section AB persists eastward maintaining a positive anomaly, or

(3) that the regional assumptions are in error, or

(4) there is some carry-over of anomaly from the features on the Precambrian-Cambrian boundary to north and south.

The first two of these possibilities are unlikely, since the density assumed is probably slightly too great and any continuance of the structure shown in Section AB would cause real problems in structural disposition. The third and fourth possibilities are likely with the last the most probable.

From the Precambrian-Cambrian boundary to the Tamar River the structure is reasonably controlled by surface indications and is based on the map of Gee and Legge (1971). The wedges of Ordovician quartzite and limestone are clearly indicated, as is the block-faulted character of the region. The unknowns include the total thickness of Ordovician and Cambrian rocks and their extent. All that is certain is that such rocks either lens eastward or undergo a major facies change to Mathinna Beds type materials.

The models ignore the intense folding within the slabs of material, thus giving only the effects of the basin and thickness of deposition. The shapes given in the models are thus envelopes. In Model 1 a uniform thickness of Cambrian rocks is assumed. It is also assumed that these rocks exceed the density assumption by at least 0.10 g/cm^3. In view of the latter assumption, which may have limited validity, it is possible that much more Cambrian material could underlie the section and yet not affect the resultant calculated anomaly. Similar comments may apply to the Ordovician rocks which have been assumed to have a density contrast of -0.10 g/cm^3 with respect to the Bouguer assumption. This value is valid only in those cases where siliceous rocks dominate the succession and will be too low where much limestone is present. The thickness of Ordovician materials indicated should be regarded as a minimum. The calculated curve on this basis is too high west of the Tamar River. Model 2 contains a lesser thickness of positively attracting Cambrian and more of the lighter Permian and Ordovician rocks. In addition the small rise in anomaly over the dolerite body adjacent to the river probably reflects a dyke-like extension and a 200 m wide dyke has been included. Model 3 contains less Cambrian material. None of the models approximates the anomaly dip to -6 mgal west of the dolerite dyke. However examination of the areal distribution of anomaly shows this part of the profile is based on re-entrants of -5 and -6 contours. The true value is probably about -4 mgal. Assuming this to be so, the additional attraction of the dyke is still necessary to support the gradient and its position in this region. However, with regard to the density ambiguities in this part of the section, one positive and one negative, it is considered that the total thickness and disposition of the Lower Palaeozoic rocks is as shown in Model 3 which utilises all surface inferences and is internally consistent across the whole profile.

The Tamar Trough. The trough, reflected by the -10 mgal anomaly, is the principal unknown quantity. It is the obvious axis of Palaeozoic and Cainozoic deposition whilst also being the boundary zone between the west and east coast type Lower Palaeozoic rocks. Dips in Permian rocks are toward this zone. In addition the total thickness of Tertiary rocks present is unknown. Thus with such a large number of variables and unknowns and no other controls it is not possible to provide a conclusive answer. The three models here form a set of alternatives of which Model 3 is preferred. Model 3 is the only version to have the eastern fault properly placed. The anomaly match to the east of the trough and the simpler and better controlled density distribution with the known rocks tends to exclude denser (Cambrian) rocks at depth (compare Models 1 and 2). Model 3, with no Cambrian rocks at depth under the trough, shows the effect of such a restriction at depth with shallowing of the Tertiary basin to a depth comparable with that at Port Sorell which probably has a comparable base level of erosion into the structure.

Model 3 shows a zone of undifferentiated Lower Palaeozoic rocks beneath a regular thickness of Permian rocks. There is no definitive evidence for substantial thickening of rocks of the Permian System although the solution presented does not exclude this condition since the section allows for further light material. The presumed density of 2.57-2.61 g/cm^3 is probably a minimum and thereby gives maximum contrast. Without reflection seismic studies and drilling little further comment can be made.

East of the Tamar. As mentioned above the sequence of Mathinna-type materials overlain by Permian rocks, which dip westward and which are intruded near the Triassic boundary by dolerite, forms a much simpler picture. Provided there is no complication in the form of dense rocks at depth and a correct placement of the boundary fault there is excellent match of the observed and calculated profile. As the Precambrian basement and Mathinna Beds type sedimentary rocks have comparable densities it is not possible to detect the initial wedging zone of the latter rocks and it is sketched only on Model 3.

At C there is positive anomaly with maximum value of +6 mgal. This anomaly has a NW-SE trend and is a distinct ridge superimposed on a large regional positive anomaly extending eastward to Pipers River. This anomaly could have been produced by an intrusion of granodiorite or by variations in the Mathinna Beds. The presence of gold in the Lefroy, Back Creek region implies a nearby intrusion and, or, susceptible host rocks for mineralising fluids. Comparison with anomalies at Bridport and in the Lisle-Golconda goldfield suggests that a granodiorite is present in order to produce the wide spread of positive anomaly. There is no evidence to suggest areal variations in the Mathinna Beds of this scale. However the mapping of Marshall *et al.* (1965) and Gee and Legge (1971) shows a belt of pelitic rocks, slate, phyllite trending north-west toward the coast which are folded into a synclinorium with a width of about 7 km.

Model 1 shows the cupola-like structure of a batholith top. A triang-

triangular section 5,000 m in height, at the depth shown is required to produce half the anomaly observed. A horizontal slab of material 4,400 m thick is the minimum required to produce an anomaly of 5-6 mgal. However a narrow feeder dyke, with a sheet slab at shallow depth passing eastward could produce the anomaly pattern with the anomaly peak to the western side. Analogy with the Bridport anomaly on granodiorite suggests that this might not be an impossible thickness provided it is at not too great a depth. Alternatively the anomaly could be produced by the folded pelitic synclinorium. The density of these rocks is generally in the range 2.67-2.80 g/cm^3 compared to the general Mathinna Beds sediments which have densities of 2.62-2.70 g/cm^3; with some siliceous arenaceous units even lighter. If the assumed overall density of 2.67 g/cm^3 is in error then it is possible to have positive anomalies above such pelites. Model 3 shows an alternative structure based on the folded pelite belt. While Model 3 fits the particular anomaly best it is likely that a combination of a granodiorite intrusion and folded, denser pelitic material is the full solution in order to provide the anomaly spread to Pipers River (granodiorite sheet) and ridge anomaly peak (pelite fold belt). It is to be noted that the ridge anomaly narrows and decreases in magnitude southward and at Bangor extends beyond the broad anomaly produced by intrusives to correlate closely with the narrowing pelite fold lens.

Section DE

This section (fig. 6) is based on the mapping and structure deduced by Longman *et al.* (1964). The thickness of the Tertiary sediments suggested is based on limited drilling information. A primary unknown to be established is the thickness of dolerite concealed in the valley. The section shows 300 m of dolerite. Variations of the level of the intrusion have little effect on the calculated attraction as the Permian rocks have a relatively small contrast. The thickness of dolerite and intrusion levels throughout the remainder of the section are based on interpretation of the Launceston map sheet (Longman *et al.* 1964). Good agreement is observed with the exception of those parts of the section west of Mt Arthur, east of Rocherlea and west of the Trevallyn Fault. The anomaly discrepancies are small and positive in the latter two cases but large and negative in the former case. The positive anomalies could be related to thicker dolerite. However, it will be noted that the sheet thickness indicated is such that little more dolerite could be assumed. Further, the spread of anomaly is so broad that a feeder to the sheet could not be a solution as this would locally increase the anomaly but would not give broad effects. While it is possible that the profiles pass close to feeder anomalies it is more likely that non-average basement densities are responsible (see section BC). Local lenses of pelitic rocks in the Mathinna Beds basement could produce this effect.

The negative anomaly at Lilydale, is a linear feature extending some distance to the south. There is no evidence to suggest that sudden thickening of the Permian rocks occurs and thus the source of the anomaly must be sub-Permian. The basement rocks in this area are the Cambro-Devonian Mathinna Beds. As described in section BC there is a lensing zone of positive anomalous pelitic materials on this same trend. It is likely that the belt of pelitic materials is cut off by E-W structures in this area and that the more easterly lighter rocks are juxtaposed. Group of samples taken west of Scottsdale and at Mathinna show densities in the range 2.52-2.63 g/cm^3. These rocks are coarser in texture and more siliceous. Assuming an average density of 2.63 g/cm^3 which presumes that lighter samples were weathered, the structure would be as indicated. If the material were lighter lesser amounts would be needed.

Section FG

This section (fig. 6) was drawn across the negative anomaly belt in Mathinna Beds, and the granodiorite in order to demonstrate more effectively than was possible in sections, BC, DE the form of the granodiorite and the nature of negatively attracting zones in the apparently uniform Mathinna Beds.

The residual Bouguer anomaly field west of Scottsdale bears little correlation to surface geology and lies in the range -2 to +2. It is difficult to interpret this area due to:

(1) Variation in the density of the Mathinna Beds, and
(2) lack of resolution due to low density contrasts.

Closures of the +2 mgal line south of Golconda correspond to outcrops of granodiorite, which has a density contrast of +0.03 g/cm^3 with the basic assumption. Local closures are due to undulations in the roof bringing it closer to the surface, or to thickening of the intrusion as a whole. Both effects are clearly shown in the section. Little should be said about the model proposed since there is no independent control on the form of the structures present. However, a sheet-like slab with an average thickness of 1.5 km must be present. Local patches of Tertiary sediments either along or near the section line exert great influence on the anomalies. The continuation of the positive anomalies west of the intrusion margin, an effect observed from Bridport to Diddleum Plains, implies that there is an intrusion roof extending, and dipping, westward (see also Marshall, 1970).

The negative anomalies in the west of the section can only be due to a belt of Mathinna Beds lighter than average or normal for a succession. Assuming a contrast of -0.10 g/cm^3 up to one kilometre of such sediments are implied, folded in a broad synclinorium.

CONCLUSIONS

The fundamental character of the Tamar lineament has been clearly indicated by the displacement of the gravity field. The displacement of the field would suggest the presence of a major dextral NW-SE wrench. Two other major features, both N-S, occur some distance away at Port Sorell-Deloraine and Bridport-South Scottsdale. Each feature has been activated many times throughout its history and has exerted significant control on sedimentation (at Port Sorell) and intrusion (at Bridport). Figure 4 summarises the structural units present.

The Tamar trough contains more than 300 m of Tertiary materials in a graben at George Town and about 200 m in a step-faulted erosional basin toward Launceston. A major E-W structure at Deviot separates the two basin types. The Tertiary materials at Port Sorell are deposited in graben structures which have suffered some erosion.

Deposition of Lower Palaeozoic rocks west of the Tamar River has been very patchy as reflected by significant, but isolated swells of anomaly. The major basin of Cambrian rocks lies south of Port Sorell. A portion of the Precambrian Dazzler Range mass has been overthrust upon the Port Sorell basin. The alternative solution of more dense (>2.67 g/cm^3) Precambrian materials is considered unlikely.

Belts of heavier and lighter Mathinna Beds materials east of the Tamar may reflect age, environment or structural considerations. Granodiorite intrusions in the Bridport-Scottsdale region are essentially sheet-like with local roof irregularities, with which the occurrence of gold is related.

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APPENDIX 1

GRAVITY DATA: SELECTED TIE STATIONS

Station	Location	Observed gravity (*gal*)	Altitude (*m*)
BEACONSFIELD 7051-9101	Road Jn NW corner road edge. Beauty Point Rd and street link to Kelso Rd.	980.28184	27.73
BELL BAY 7051-1084	NW edge. Road junction, E. Tamar Highway, Bell Bay Rd.	980.269403	45.11
BRIDPORT 7151-9004	Fireplace, bridge on Bridport-Waterhouse road.	980.27263	3.04
EXETER 6751-0507	BM4538	980.27424	53.64
HILLWOOD 7051-9102	Step, bus shed, just N of cross roads on hill top.	980.26401	78.02
LEFROY 7051-9104	West entrance road and junction with old Launceston road, 100 m S of shop.	980.26905	107.89
PIPERS BROOK 7051-9105	Road junction. Golconda, Pipers River, Bellingham roads.	980.26264	106.68
ROCHERLEA 6751-0206	SPM1455	980.27906	96.01
TARGA 7051-9109	Road junction immediately east of Seven Time Creek, Tasman Highway.	980.21599	395.63
WESTERN JUNCTION 6751-1088	Rail crossing.	980.27734	161.80

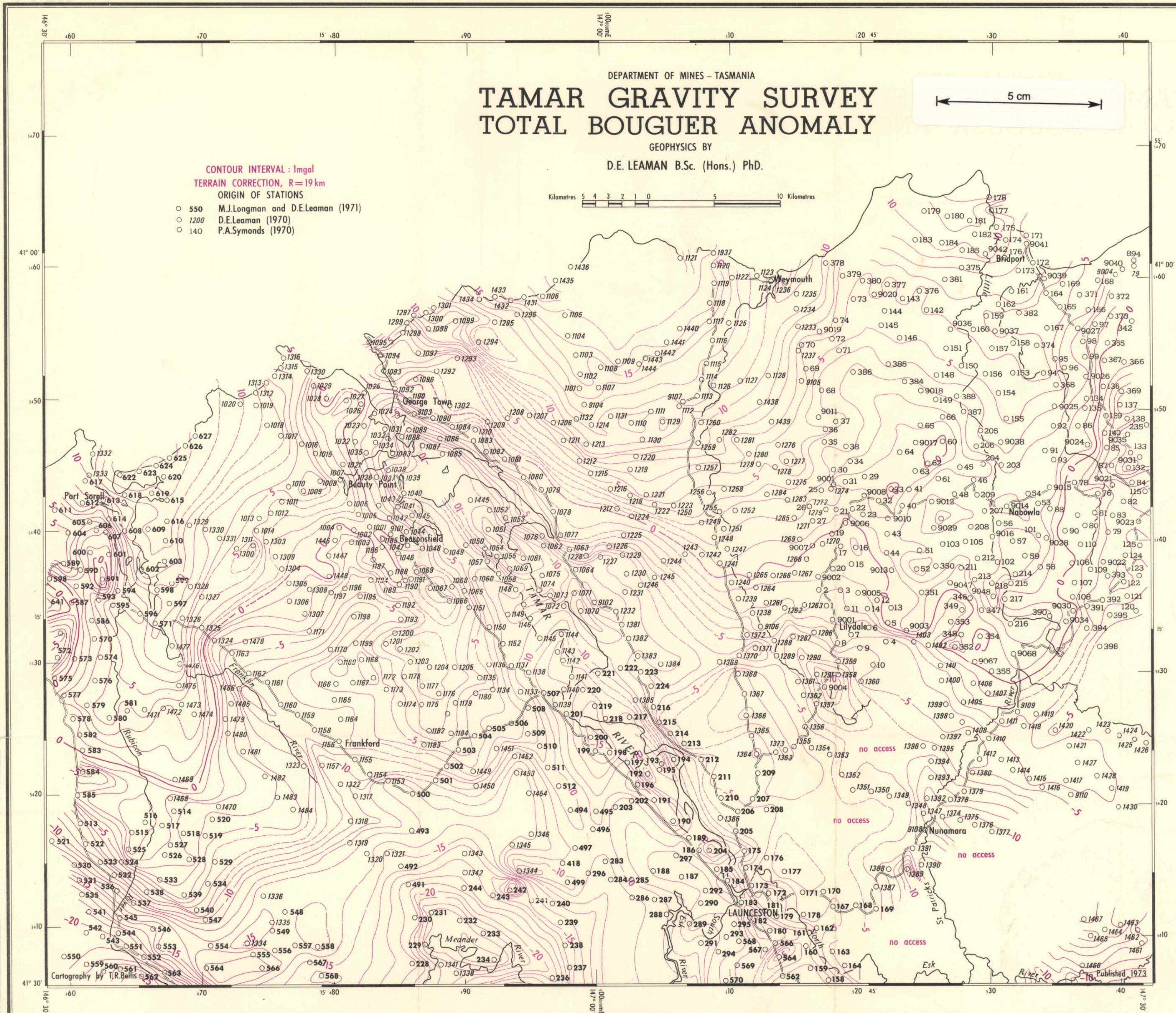

DEPARTMENT OF MINES – TASMANIA
TAMAR GRAVITY SURVEY
TOTAL BOUGUER ANOMALY
GEOPHYSICS BY
D.E. LEAMAN B.Sc. (Hons.) PhD.
5 cm
CONTOUR INTERVAL : 1mgal
TERRAIN CORRECTION, R = 19 km
ORIGIN OF STATIONS
550 M.J.Longman and D.E.Leaman (1971)
1200 D.E.Leaman (1970)
140 P.A.Symonds (1970)
Kilometres 5 4 3 2 1 0 5 10 Kilometres
Port Sorell
George Town
Beauty Point
Beaconsfield
Frankford
Weymouth
Bridport
Nabowla
Lilydale
Nunamara
LAUNCESTON
TAMAR
RIVER
Franklin
Rubicon
River
Meander
Little
St Patricks
Esk
South
North
no access
Cartography by T.R.Bellis
Published 1973
146° 30'
147° 00'
147° 30'
41° 00'
41° 30'

Figure 1

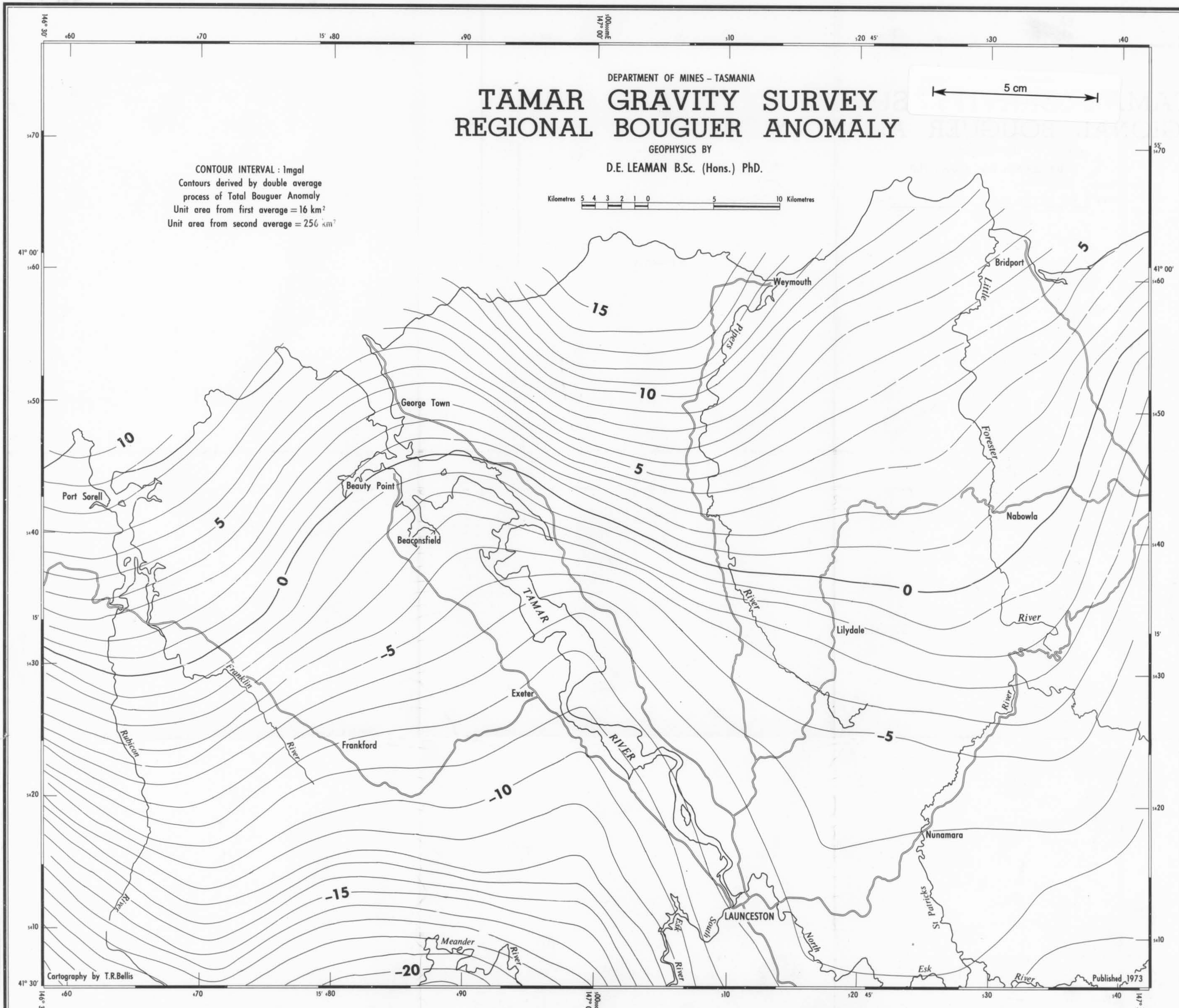

DEPARTMENT OF MINES – TASMANIA
TAMAR GRAVITY SURVEY
REGIONAL BOUGUER ANOMALY
GEOPHYSICS BY
D.E. LEAMAN B.Sc. (Hons.) PhD.
5 cm
Kilometres 5 4 3 2 1 0 5 10 Kilometres
CONTOUR INTERVAL : 1mgal
Contours derived by double average
process of Total Bouguer Anomaly
Unit area from first average = 16 km²
Unit area from second average = 256 km²
Port Sorell
George Town
Beauty Point
Beaconsfield
Weymouth
Bridport
Nabowla
Lilydale
Exeter
Frankford
Nunamara
LAUNCESTON
TAMAR
RIVER
Pipers
River
Little
Forester
River
Franklin
River
Rubicon
River
Meander
River
Esk
River
South
North
Esk
River
St Patricks
15
10
5
0
-5
-10
-15
-20
Cartography by T.R.Bellis
Published 1973
146° 30'
147° 00'
41° 00'
41° 30'

Figure 2

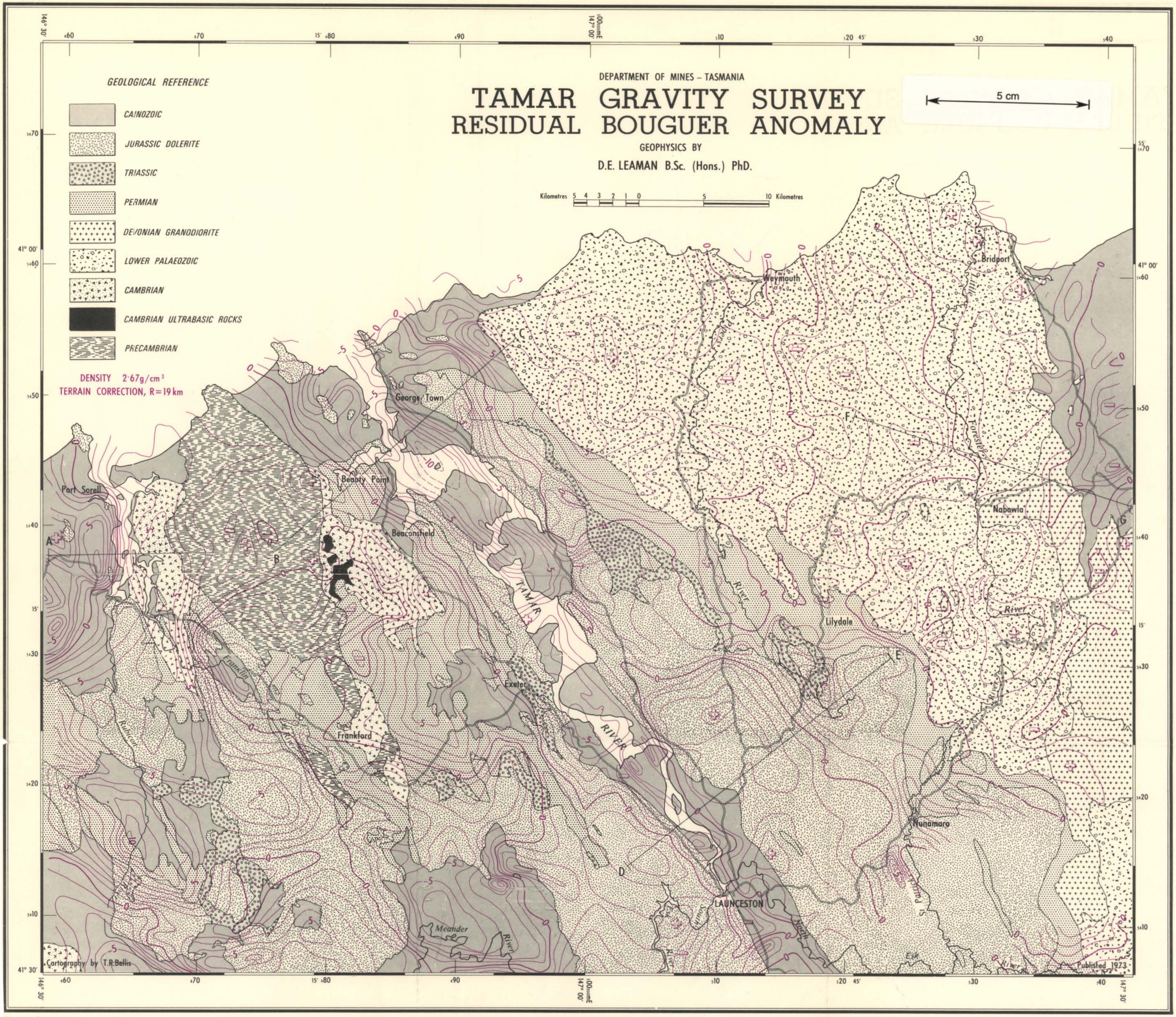

DEPARTMENT OF MINES – TASMANIA
TAMAR GRAVITY SURVEY
RESIDUAL BOUGUER ANOMALY
GEOPHYSICS BY
D.E. LEAMAN B.Sc. (Hons.) PhD.
5 cm
Kilometres 5 4 3 2 1 0 5 10 Kilometres
GEOLOGICAL REFERENCE
CAINOZOIC
JURASSIC DOLERITE
TRIASSIC
PERMIAN
DEVONIAN GRANODIORITE
LOWER PALAEOZOIC
CAMBRIAN
CAMBRIAN ULTRABASIC ROCKS
PRECAMBRIAN
DENSITY 2·67g/cm³
TERRAIN CORRECTION, R=19 km
Port Sorell
George Town
Beauty Point
Beaconsfield
Weymouth
Bridport
Nabowla
Lilydale
Exeter
Frankford
Nunamara
LAUNCESTON
TAMAR
RIVER
Meander
Forester
Cartography by T.R.Bellis
Published 1973
146° 30'
147° 00'
147° 30'
41° 00'
41° 30'

Figure 3

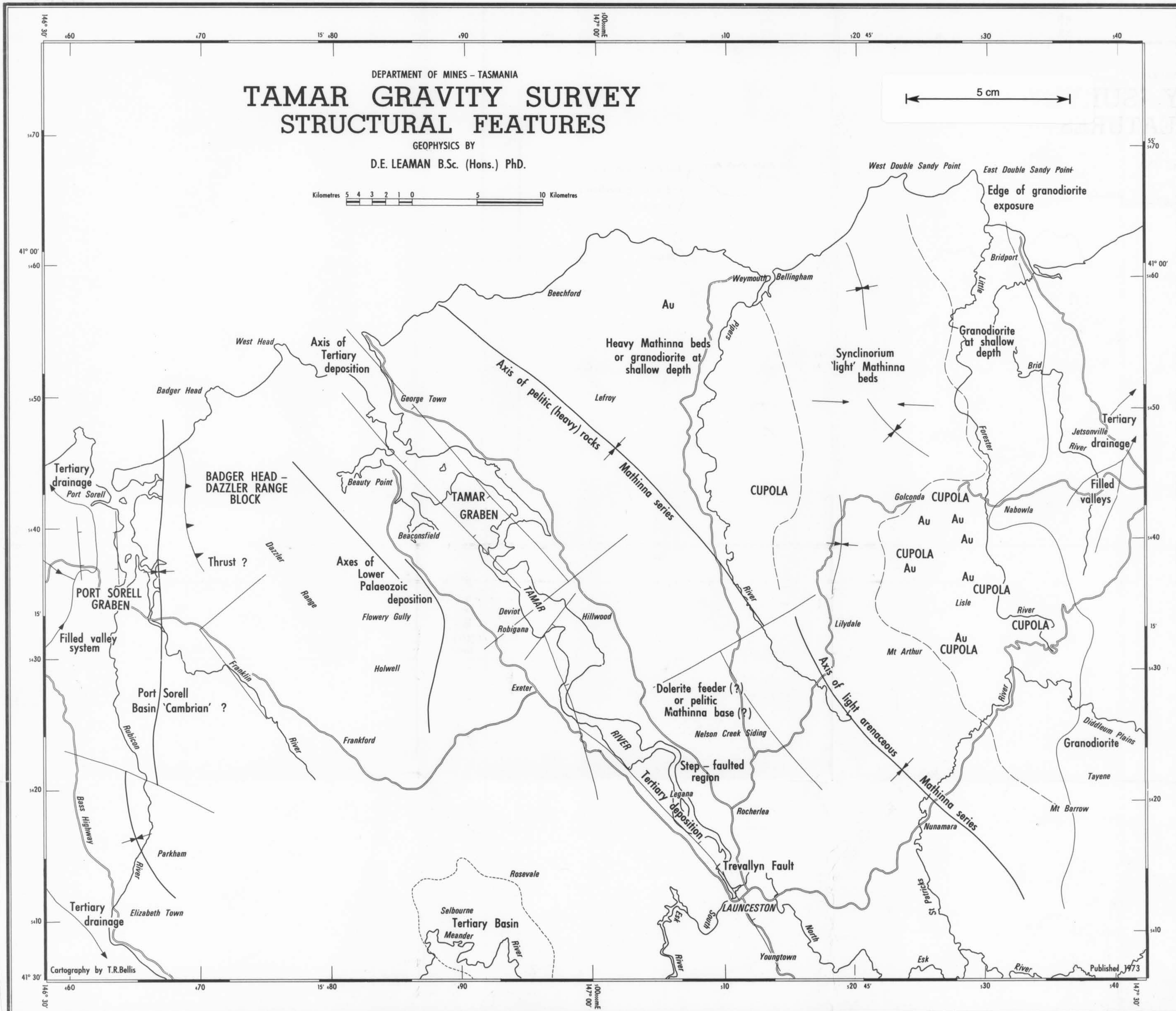
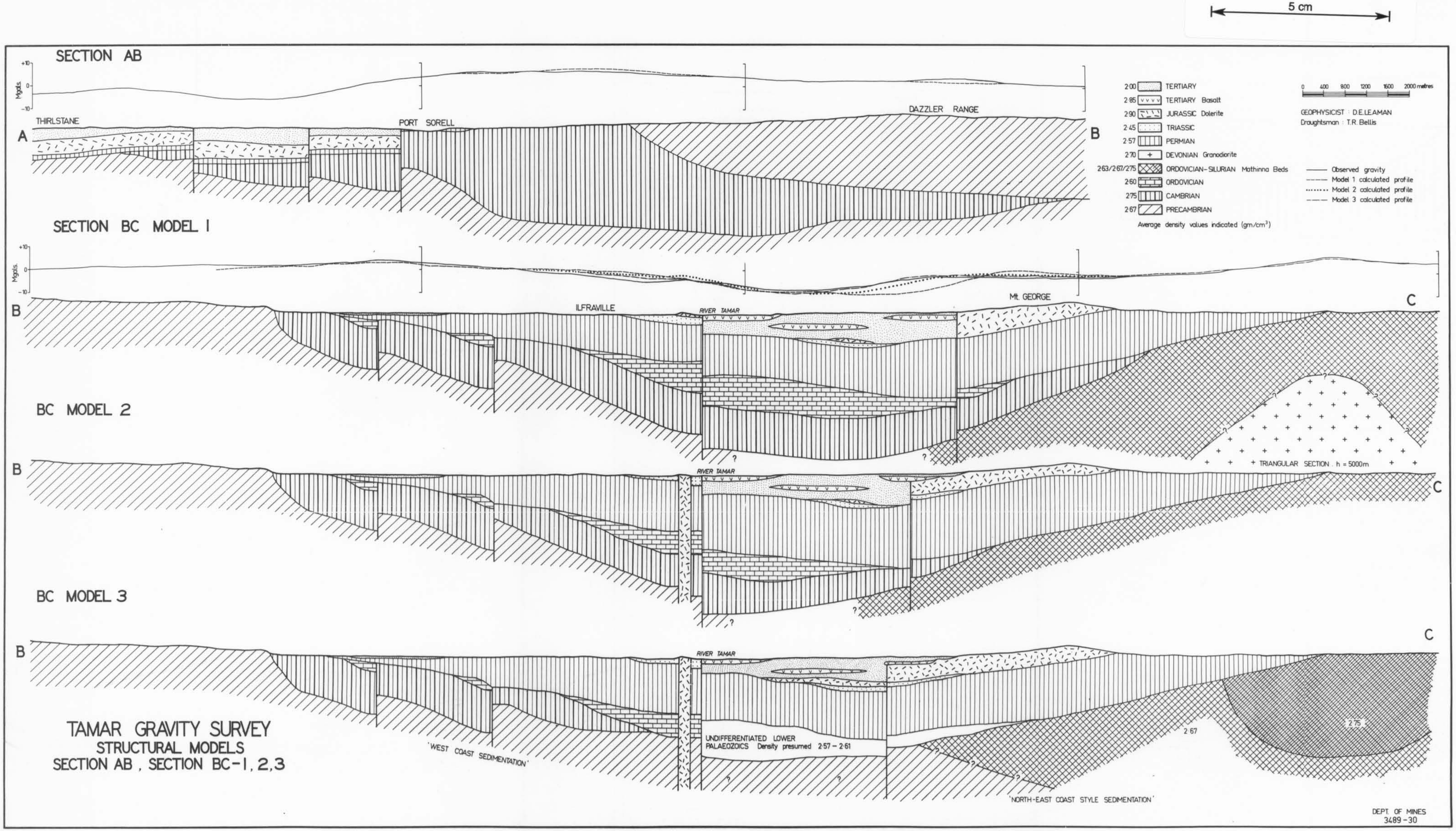

DEPARTMENT OF MINES – TASMANIA
TAMAR GRAVITY SURVEY
STRUCTURAL FEATURES
GEOPHYSICS BY
D.E. LEAMAN B.Sc. (Hons.) PhD.
Kilometres 5 4 3 2 1 0 5 10 Kilometres
5 cm
West Double Sandy Point
East Double Sandy Point
Edge of granodiorite exposure
Bridport
Weymouth
Bellingham
Beechford
Au
Heavy Mathinna beds or granodiorite at shallow depth
Synclinorium 'light' Mathinna beds
Granodiorite at shallow depth
West Head
Axis of Tertiary deposition
Axis of pelitic (heavy) rocks Mathinna series
Badger Head
George Town
Lefroy
Tertiary drainage
Port Sorell
BADGER HEAD – DAZZLER RANGE BLOCK
Beauty Point
TAMAR GRABEN
Beaconsfield
CUPOLA
Golconda
Nabowla
Filled valleys
Thrust ?
Dazzler Range
Axes of Lower Palaeozoic deposition
PORT SORELL GRABEN
Filled valley system
Flowery Gully
Deviot
Robigana
Hillwood
Lilydale
Lisle
Mt Arthur
Holwell
Exeter
Port Sorell Basin 'Cambrian' ?
Franklin River
Rubicon
Dolerite feeder (?) or pelitic Mathinna base (?)
Axis of light arenaceous Mathinna series
Nelson Creek Siding
Frankford
Step – faulted region
Diddleum Plains
Granodiorite
Tayene
Legana
Tertiary deposition
Rocherlea
Bass Highway
Mt Barrow
Nunamara
Parkham
Rosevale
Trevallyn Fault
Tertiary drainage
Elizabeth Town
LAUNCESTON
Selbourne
Tertiary Basin
Meander
Youngtown
Esk
Cartography by T.R.Bellis
Published 1973

Figure 4



5 cm
SECTION AB
Mgals.
THIRLSTANE
PORT SORELL
DAZZLER RANGE
A
B
SECTION BC MODEL 1
ILFRAVILLE
RIVER TAMAR
Mt. GEORGE
C
BC MODEL 2
TRIANGULAR SECTION : h = 5000m
BC MODEL 3
UNDIFFERENTIATED LOWER PALAEOZOICS Density presumed 2·57 – 2·61
'WEST COAST SEDIMENTATION'
'NORTH-EAST COAST STYLE SEDIMENTATION'
2·67
2·75
2·00 TERTIARY
2·85 TERTIARY Basalt
2·90 JURASSIC Dolerite
2·45 TRIASSIC
2·57 PERMIAN
2·70 DEVONIAN Granodiorite
2·63/2·67/2·75 ORDOVICIAN-SILURIAN Mathinna Beds
2·60 ORDOVICIAN
2·75 CAMBRIAN
2·67 PRECAMBRIAN
Average density values indicated (gm/cm³)
0 400 800 1200 1600 2000 metres
GEOPHYSICIST : D.E. LEAMAN
Draughtsman : T.R. Bellis
Observed gravity
Model 1 calculated profile
Model 2 calculated profile
Model 3 calculated profile
TAMAR GRAVITY SURVEY
STRUCTURAL MODELS
SECTION AB , SECTION BC-1, 2, 3
DEPT. OF MINES
3489-30

Figure 5

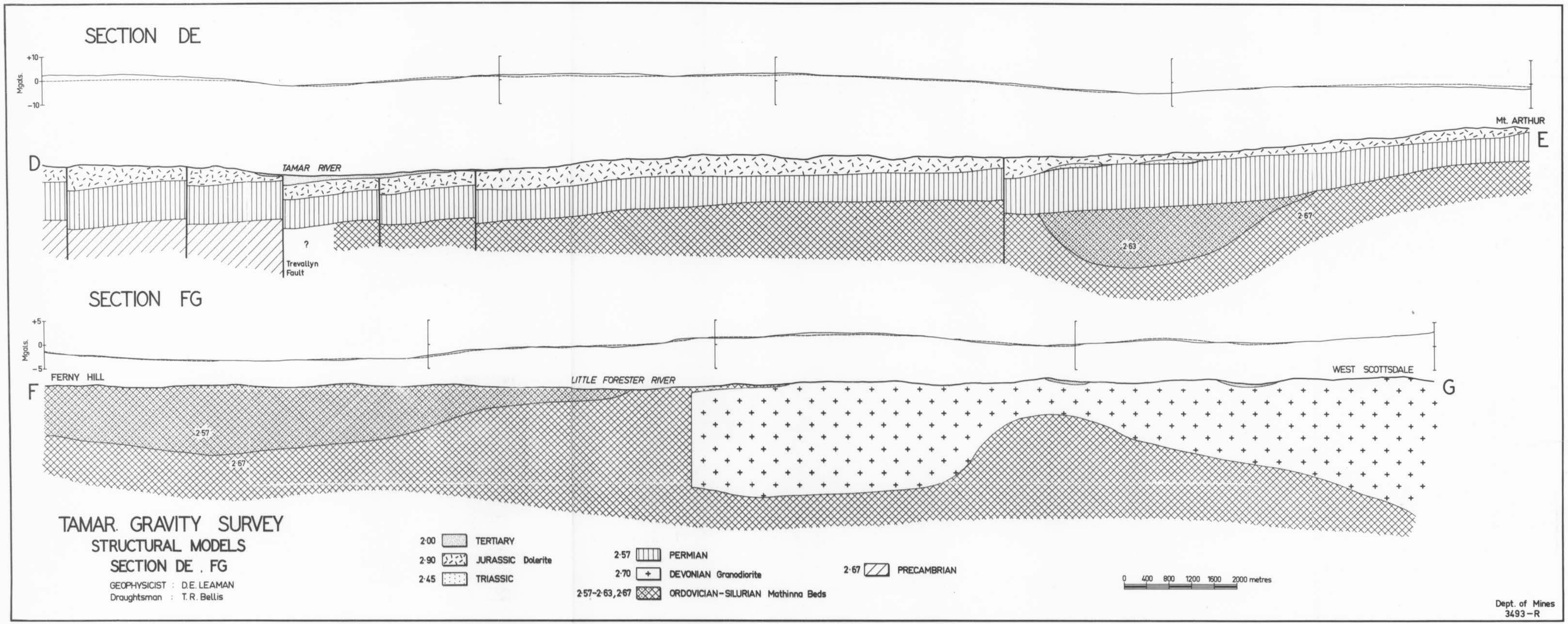

SECTION DE
+10
0
-10
Mgals.
Mt. ARTHUR
D
E
TAMAR RIVER
2·67
2·63
?
Trevallyn
Fault
SECTION FG
+5
0
-5
Mgals.
FERNY HILL
LITTLE FORESTER RIVER
WEST SCOTTSDALE
F
G
2·57
2·67
TAMAR GRAVITY SURVEY
STRUCTURAL MODELS
SECTION DE . FG
GEOPHYSICIST : D.E. LEAMAN
Draughtsman : T.R. Bellis
2·00 TERTIARY
2·90 JURASSIC Dolerite
2·45 TRIASSIC
2·57 PERMIAN
2·70 DEVONIAN Granodiorite
2·57–2·63, 2·67 ORDOVICIAN–SILURIAN Mathinna Beds
2·67 PRECAMBRIAN
0 400 800 1200 1600 2000 metres
Dept. of Mines
3493–R

Figure 6

5 cm