

13. Gravity survey of the Moonah area.

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The survey was undertaken to introduce the gravity technique to the first and last named authors and to evaluate the supposed Tertiary valley of the River Derwent through Moonah. Most of the field work and reductions have been made by the first named author.

SURVEY

The survey was undertaken using Worden meter 913 which has a scale constant of $0.94 \mu\text{m/s}^2$ per division. A station spacing of about 250 m was used. Tie stations 9325 and 9338 of the Hobart survey (Leaman, 1972) were used.

Figure 36 shows the station distribution, the total Bouguer anomaly, the geology and the residual Bouguer anomaly. The residual field was reduced using the regional gradient of Leaman (1972). A density of 2670 kg/m^3 was used in the reduction.

INTERPRETATION

A significant gravity anomaly of -30 to $-40 \mu\text{m/s}^2$ is related to the belt of Tertiary materials in the area. However, the anomaly pattern is not completely straightforward and significant negative anomalies are also related to the coal-bearing rocks at New Town. The presence of basalt does not appear to significantly alter the anomaly pattern except in east Moonah where a vent is suggested by the restricted closures.

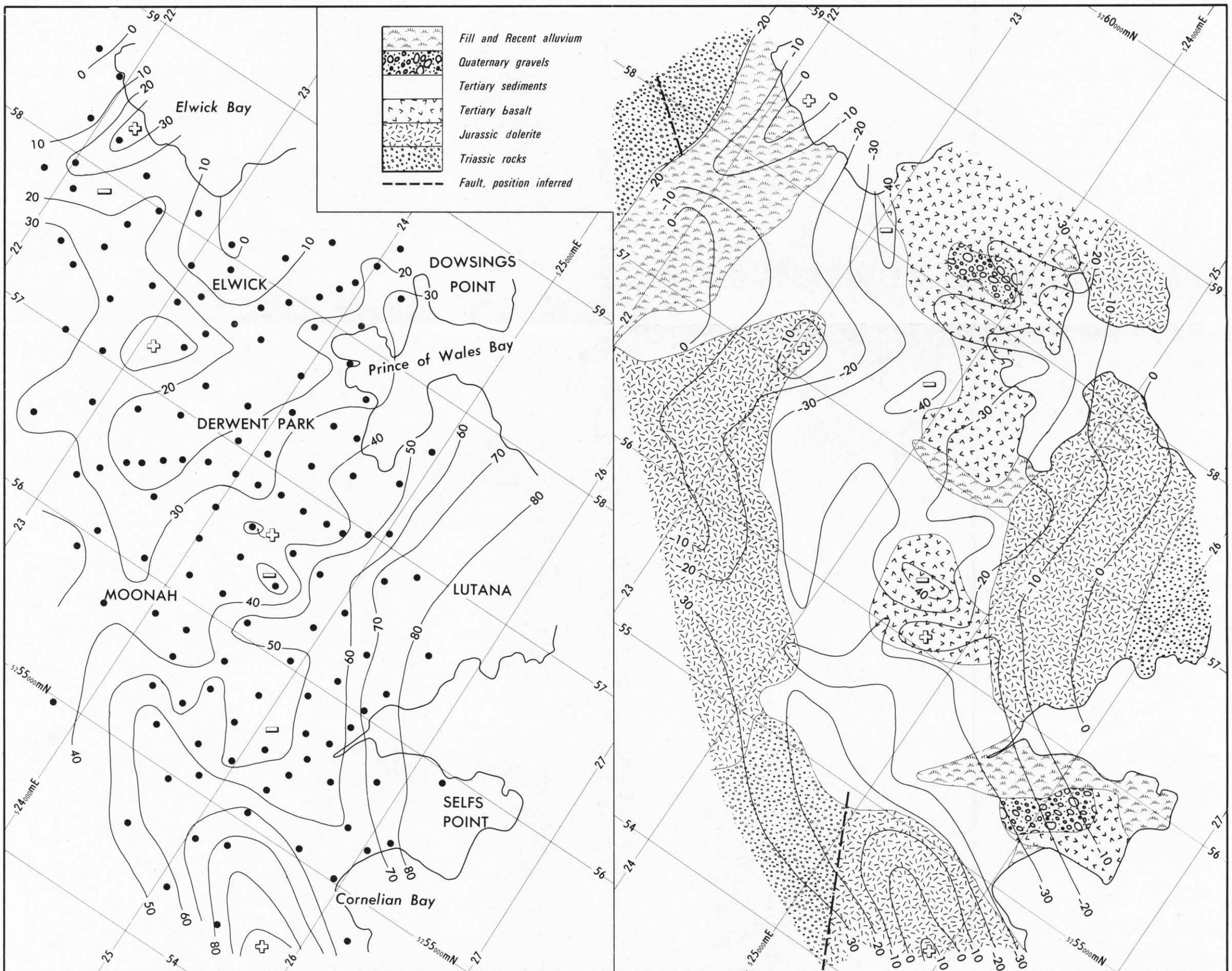
Qualitatively the survey demonstrates that a reasonable thickness of Tertiary materials occurs in the area but quantitative attempts to evaluate the thickness have not been completely satisfactory.

Calculations have been based on a dolerite density of 2900 kg/m^3 ; basalt, 2800 kg/m^3 ; Triassic rocks, 2450 kg/m^3 ; Tertiary sediment, 2000 kg/m^3 and show that the thickness of Tertiary sediments must be at least 150-170 m at Elwick, 100-120 m at Derwent Park, 150 m at Moonah and more than 200 m at Cornelian Bay. The variations are partly due to uncertainties in structural relationships posed by underlying rocks. In each case the thickness would be increased if allowance were made for basalt flows which could occur in the succession. A minimum figure of 150 m could be accepted throughout the region from Moonah to Elwick, but this estimate cannot satisfy the anomaly profile at Cornelian Bay. The Domain dolerite markedly affects the field in this region and the anomaly trough is also very narrow. Even allowing for a substantial thickness of basalt to the east a very deep narrow notch is required, possibly of the order of 300 m. Such a thickness seems inordinately large but on the present information cannot be reasonably reduced. The overall distribution of the field in the region precludes most other negative influences.

CONCLUSION

The survey shows that a Tertiary valley does pass from Elwick Bay to Cornelian Bay via Moonah as inferred from mapping and the regional gravity survey. The base level of this valley is at least 150 m below present sea level and may in part be considerably more than 200 m.

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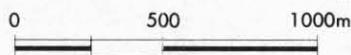
MOONAH GRAVITY SURVEY

STATION DISTRIBUTION
AND TOTAL BOUGUER ANOMALY

GEOLOGY AND
RESIDUAL BOUGUER ANOMALY

Contour interval $10\mu\text{m/s}^2$

● Gravity station



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Contour interval $10\mu\text{m/s}^2$

$\rho = 2670 \text{ kg/m}^3$