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HELLYER MINING & EXPLORATION PTY. LTD.

39 GRENFELL STREET,
ADELAIDE, S.A. 5000.

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EL 42/80
RINGAROOMA BAY
ANNUAL REPORT 1982
DECEMBER, 1982

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1. INTRODUCTION/TENEMENT DETAILS

EL 42/80 held by Blaxand Seadredge P/L covers 134 sq. km offshore in Ringarooma Bay, northeastern Tasmania (see Encl. 1). Hellyer Mining and Exploration P/L's option to acquire the right to earn a 75% interest in EL 42/80 in return for expending a total of $225,000 on exploration over a 12 month period, originally exercised on 17th July, 1981 has been extended for a further 12 months until 17th July, 1983. Application for renewal for a period of 12 months of the current title (which expires on 20th December, 1982) has been lodged with the Tasmanian Department of Mines.

2. PREVIOUS DATA

The only known sampling conducted in Ringarooma Bay has been a programme of 138 holes drilled by the Tasmanian Offshore Exploration 2ompany (T.O.E.C.) in 1966-67. This consortium was comprised of Ocean Mining A.G. (operator), Ocean Science and Engineering Inc., Anglo American Corp., Charter Consolidated, E.Z. Industries Ltd., and Bethlehem Steel Corp. TOEC roughly outlined about 23 million m^3 of unconsolidated sediments grading $150g/m^3$ tin metal (by contouring between drillholes and using a $75g/m^3$ ($2oz/yd^3$) tin metal cut-off) and concluded that the possibility existed whereby further closer spaced drilling could double the grade and the volume of the deposit.

The locations of the drillholes are not accurately known (though very approximate locations are given on Encl. 2) and there are no results or location records at all for 11 of the drillholes. The results of the TOEC drillholes however, have been divided (see Table 1 over) into the following 4 categories on the basis of tin content and thickness of tin-bearing intersection:

1. $\geq$ 100 g/m^3 Sn over $\geq$ 2m (10 holes)
2. $\geq$ 100 g/m^3 Sn over $<$ 2m (19 holes)
3. 34-99 g/m^3 Sn over $\geq$ 2m (8 holes)
4. 34-99 g/m^3 Sn over $<$ 2m (28 holes)

The remaining 62 holes (7 of which were not drilled to "bedrock", with 26 inside the 1981 seismic survey area and 36 outside) are essentially barren, i.e., all assayed intervals contained less than 34 g/m^3 (20g/t) tin (the 34 g/m^3 cut-off being used as a guide to tin distribution only).

3. RESULTS OF HELLYER WORK

3.1 JANUARY 1982 DRILLING PROGRAMME

The proposed offshore drilling programme planned for January 1982 was postponed due to the unavailability of a rig and vessel. Sea state conditions precluded consideration of any resumption of any programme until at least the following summer season between December, 1982 and March, 1983.

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(Ocean Mining Data).

TABLE 1

Hole No.	Tin-Bearing Intersection	Overburden	Tin-Bearing Intersection + Overburden
1. TOEC (1966-67) drillholes with intersections containing ≥ 100g/m^3 Sn over ≥ 2m (10 holes)			
79	3.32m at 186g/m^3	-	3.32m at 186g/m^3
103	4.23m at 319g/m^3	1.52m	5.75m at 235g/m^3
36	2.70m at 171g/m^3	-	2.70m at 171g/m^3
89	3.05m at 449g/m^3	1.22m	4.27m at 321g/m^3
	(1.22m at 867g/m^3 above +1.83m at 170g/m^3)		
109	2.25m at 114g/m^3	-	2.25m at 114g/m^3
21	2.55m at 153g/m^3	3.20m	5.75m at 68g/m^3
42	2.12m at 129g/m^3	-	2.12m at 129g/m^3
	and 0.75m at 68g/m^3	2.12m	2.87m at 113g/m^3
104	3.32m at 110g/m^3	2.44m	5.76m at 64g/m^3
125	est. 2.25m at 114g/m^3	est. 3.00m	est. 5.25m at 49g/m^3
85	0.60m at 107g/m^3	2.74m	3.34m at 20g/m^3
	and 2.11m at 103g/m^3	6.71m	8.82m at 33g/m
2. TOEC (1966-67) drillholes with intersections containing ≥ 100g/m^3 Sn of < 2m (19 holes)			
2	0.90m at 144g/m^3	-	0.90m at 144g/m^3
107	est. 0.75m at 167g/m^3	-	est. 0.75m at 167g/m^3
28	0.75m at 114g/m^3	-	0.75m at 114g/m^3
110	est. 0.75m at 131g/m^3	est. 2.25m	est. 3.00m at 34g/m^3
48	1.06m at 197g/m^3	-	1.06m at 197g/m^3
80	1.50m at 124g/m^3	7.92m	9.42m at 24g/m^3
	and 0.90m at 39g/m^3	1.21m	2.11m at 17g/m^3

Table 1 Cont'd:

Hole No.	Tin-Bearing Intersection	Overburden	Tin-Bearing Intersection + Overburden
77	1.20m at 124g/m^3	-	1.20m at 124g/m^3
	and 0.60m at 41g/m^3	1.83m	2.43m at 72g/m^3
59	0.60m at 226g/m^3	1.21m	1.81m at 76g/m^3
71	1.21m at 111g/m^3	-	1.21m at 111g/m^3
18	1.50m at 149g/m^3	0.75m	2.25m at 100g/m^3
92	1.21m at 199g/m^3	-	1.21m at 199g/m^3
	and 0.60m at 53g/m^3	1.21m	1.81m at 151g/m^3
73	1.83m at 46g/m^3	6.71m	8.54m at 11g/m^3
	and 0.60m at 224g/m^3	9.45m	10.05m at 23g/m^3
63	0.45m at 403g/m^3	4.27m	4.72m at 39g/m^3
84	0.90m at 246g/m^3	3.66m	4.56m at 49g/m^3
	and 0.60m at 85g/m^3	9.14m	9.74m at 29g/m^3
83*	0.60m at 37g/m^3	9.75m	10.35m at 3g/m^3
	and 0.90m at 133g/m^3	10.35m	11.25m at 13g/m^3
23$^+$	est. 1.50m at 132g/m^3	est. 8.84m	est. 10.34m at 20g/m^3
65$^+$	1.50m at 116g/m^3	7.32m	8.82m at 21g/m^3
114$^+$	est. 0.75m at 243g/m^3	est. 6.86m	est. 7.61m at 25g/m^3
	est. 0.75m at 41g/m^3	est. 7.61m	est. 8.36m at 26g/m^3
126$^+$	est. 0.75m at 124g/m^3	est. 7.61m	est. 8.36m at 12g/m^3

3. TOEC (1966-67) drillholes with intersections containing 34-99g/m^3 Sn over $\geq$ 2m (8 holes)

45	2.70m at 65g/m^3	-	2.70m at 65g/m^3
88	3.01m at 58g/m^3	-	3.01m at 58g/m^3
	and 0.90m at 85g/m^3	7.62m	8.52m at 30g/m^3

Table 1 Cont'd:

Hole No.	Tin-Bearing Intersection	Overburden	Tin-Bearing Intersection + Overburden
62+	2.11m at 87g/m³	-	2.11m at 87g/m³
	and 0.90m at 99g/m³	5.79m	6.69m at 41g/m³
95	2.22m at 42g/m³	-	2.22m at 42g/m³
	and 1.50m at 56g/m³	4.57m	6.07m at 30g/m³
111	est. 3.00m at 29g/m³	est. 3.00m	est. 6.00m at 15g/m³
127	est. 0.75m at 34g/m³	est. 3.00m	est. 3.75m at 8g/m³
and	est. 3.75m at 47g/m³	est. 6.00m	est. 9.75m at 21g/m³
72	2.11m at 77g/m³	7.01m	9.12m at 19g/m³
56+	2.74m at 72g/m³	-	2.74m at 72g/m³
	and 1.20m at 47g/m³	3.66m	4.88m at 52g/m³

4. TOEC (1966-67) drillholes with intersections containing 34-99g/m³ Sn over < 2m (28 holes)

51	1.21m at 65g/m³	-	1.21m at 65g/m³
	and 0.60m at 39g/m³	3.96m	4.56m at 23g/m³
106	est. 0.75m at 43g/m³	est. 0.75m	est. 1.50m at 22g/m³
20	0.60m at 92g/m³	3.96m	4.56m at 13g/m³
76	0.90m at 68g/m³	-	0.90m at 68g/m³
118	est. 0.75m at 44g/m³	est. 4.50m	est. 5.25m at 9g/m³
97	0.90m at 32g/m³	1.83m	2.73m at 11g/m³
117	est. 0.75m at 48g/m³	est. 1.50m	est. 2.25m at 17g/m³
98	0.60m at 48g/m³	7.32m	7.92m at 5g/m³
47	0.45m at 80g/m³	-	0.45m at 80g/m³
9	0.60m at 37g/m³	5.64m	6.24m at 4g/m³
39+	1.52m at 36g/m³	3.96m	5.48m at 11g/m³
75	0.60m at 75g/m³	3.96m	4.56m at 11g/m³
78	0.90m at 68g/m³	1.21m	2.11m at 30g/m³

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Table 1 Cont'd:

Hole No.	Tin-Bearing Intersection	Overburden	Tin-Bearing Intersection + Overburden
57	1.80m at $51g/m^3$	-	1.80m at $51g/m^3$
19	0.75m at $73g/m^3$	-	0.75m at $73g/m^3$
38	1.21m at $36g/m^3$	-	1.21m at $36g/m^3$
	and 1.95m at $80g/m^3$	3.51m	5.46m at $37g/m^3$
96	1.21m at $46g/m^3$	-	1.21m at $46g/m^3$
	and 1.21m at $51g/m^3$	5.18m	6.39m at $19g/m^3$
37	1.65m at $63g/m^3$	4.72m	6.37m at $17g/m^3$
74	0.90m at $73g/m^3$	0.90m	1.80m at $37g/m^3$
93	1.80m at $60g/m^3$	3.96m	5.76m at $19g/m^3$
115	est. 0.75m at $37g/m^3$	est. 8.38m	est. 9.13m at $4g/m^3$
113	est. 0.75m at $58g/m^3$	est. 0.75m	est. 1.50m at $30g/m^3$
64	1.52m at $34g/m^3$	-	1.52m at $34g/m^3$
8	0.60m at $49g/m^3$	3.20m	3.80m at $9g/m^3$
	and 0.75m at $65g/m^3$	6.86m	7.61m at $11g/m^3$
44	0.75m at $39g/m^3$	-	0.75m at $39g/m^3$
108	est. 0.75m at $36g/m^3$	-	est. 0.75m at $36g/m^3$
100	0.90m at $70g/m^3$	-	0.90m at $70g/m^3$
32	0.60m at $73g/m^3$	2.14m	2.74m at $17g/m^3$

+ outside survey area
* did not reach bedrock

3.2 ASSESSMENT OF DECEMBER 1981 SEISMIC, MAGNETIC AND HYDROGRAPHIC SURVEYING

Hellyer has not undertaken any further sampling in Ringarooma Bay, but has completed an assessment of the report by HydroSets interpreting the seismic, magnetic and hydrographic surveying carried out in the 1981 EL in December last year, together with a detailed analysis and re-interpretation (in part) of the original seismic records.

In conjunction with the TOEC (1966-67) drilling, the surveying has allowed the subdivision of most of the licence area (as well as the area between the southern and eastern boundaries of the EL and the coast of Tasmania) into 8 geomorphologically distinct sub-areas (as indicated on Encl 3.) These sub-areas can be classified into highly prospective (2), prospective (4), uneconomic (1) and unprospective (1) zones on the basis of sediment volume calculations, grade estimations (where available), water depths and overburden thicknesses:

Area 1 - nearshore channelling in the southeast of the EL and the proposed northward continuation of the channelling.

Four, possibly five erosional channels occur in the southeast of the EL. A main channel is clearly evident on the seismic line 3N between position fixes 23 and 25 cutting through the base of an old? sediment wedge (see Encl. 5). A maximum of 11m of unconsolidated sediments overlie the channel on this line. The sediment appears to consist of up to 5m of basal channel fill deposit separated by an erosional unconformity from a 2-5m thick deposit filling the channel to the rim and 3-4m of blanket deposit. The channelling shallows on its eastern side between lines 3N and 5AN. TOEC drillhole 2 which grades $144g/m^3$ in the top 0.90m of sediments intersected, appears to be located in this zone.

Two similar, but less well defined channels appear to exist to the immediate east of this "main channel" (see Encls. 3 and 4). A very broad northwesterly-trending depressional feature probably representing a channel is defined by the depth to bedrock contours beneath the nearshore/beach sediment buildup adjacent to Boobyalla Beach and is best depicted on line 2AN between position fixes 447.0 and 448.85 where it is some 800m wide and overlain by 8m of infill? and nearshore buildup sediments.

A third westerly or west-northwesterly trending channel is quite evident between position fixes 426 and 427 on line 20E as a broad, shallow feature with 4m of channel infill material. It appears to be orientated papallel to lines 4N and 5N but located between them, so that seismic coverage is limited. A nearby deep infilled channel 250m wide between position fixes 33.0 and 33.5 on line 5N at the foot of the old? sediment wedge appears to be the continuation of either the 2nd or 3rd nearshore channel, just prior to converging with the main channel above. Similar channels may well occur elsewhere along the coast outside the survey area, "coming off" the nearshore sediment buildup.

Two northerly-trending minor channels (coincident with the very broad, arcuate depression forming the present sea floor north of the mouth of the Ringarooma River) occur to the west of the 3 nearshore channels noted above. Both are about 175m wide and contain about 4m of sediments. There is a thin veneer of interchannel sediments. The channels appear to converge and enter the western side of the main channel in the vicinity of lines 5-7N; the interchannel sediments thickening in this area to 3-4m.

The 3 nearshore channels would appear to converge in the vicinity of the intersection of lines 19E and 5N near the base of the old? sediment wedge. The channelling emerges from the base of the wedge as a broad, very shallow, often "braided" northward-trending system between lines 5 and 7N (i.e., an undulating erosional base with one or more relatively deeper channellways of varying widths (covered by 4-6m of sediments) between interchannel highs (covered by 2-3m of sedments only). North of line 7N, the channel narrows slightly, the infill sediments progressively thicken the channel banks become more pronounced and the number of interchannel highs lessen to a point (position fixes 104 to 107 on line 11N) at which the channel becomes quite clear cut and contains a uniform 6 to 6.5m of infill over 740m.

The channel continues northward between lines 11N and 14N over which distance it both narrows and shallows. While the channel may end in this area, "spilling" into the broad shallow depression below 34m depth to bedrock, it appears more likely that it continues northward with increasing downcutting (to 7-8m) to connect with the channel evident between position fixes 234.5 and 235.6, and 227.1 and 227.9 on lines 16N and 18N respectively in the north central portion of the EL (see Encls. 3 and 4). Tracing the channel to the north of line 14N is somewhat tenuous because no seismic was carried out perpendicular to the direction of the channelling between lines 14N and 16N, a distance of 1300m. The usual spacing between east-west lines is no more than about 500m. North-south line 16E is difficult to interpret because of the low quality of the seismic, but it appears to indicate that from position fix 360.5 northly to the intersection with line 16N and beyond, the line is orientated directly along the axis of a channel, as the sediments thicken and there is an erosional base.

Minor channels also enter the main channel from the east along line 11N, and from the southeast near TOEC drillhole 109 (see Encls. 3 and 4). The seismic between position fixes 106 and 109 on line 11N (see Encl. 6) gives a view along the axis of the former channel and shows the average sediment thickness to be about 3.5m.

The main north-south trending channel is infilled (within the licence area only) with an estimated 27 million m^3 of unconsolidated sediments and is thought to be the continuation (at least in part) of the onshore mineralisation being investigated in the Ringarooma River catchment area (e.g. Hellyer/SANTOS/MHA reserves on Great Northern Plain, EL 19/77, 3km to the south of EL 42/80).

Due to the wide spacing of TOEC drillholes over Ringarooma Bay, only three, possibly four (21, 42, 104 and 45) of the 127 holes drilled are located within the defined area. They grade 153, 129, 110 and 65g/m^3 tin over 2.55, 2.12, 3.32 and 2.70m respectively.

However, it is important not to place too much emphasis on the data concerning an overall grade that might be expected within any channel. The number of drillholes is extremely limited over a large area, the drillholes are not reliably located and therefore have not necessarily intersected channel infill material, and in particular, the figures above probably underestimate the true grades. Both 42 and 104 terminated in mineralisation; 42 appears to be located very close to the channel boundary and may in fact be in blanket cover adjacent to the channel (and as such would be more akin to Area 2 below); 45 is located in the "braided" zone noted above, the seismic suggesting that the drillhole was sited on an interchannel high; and the presence of small, barren sand waves near 21 and 42 may contribute overburden non-existent over most of the remainder of the area.

Clearly, the channel infill material is possibly an extension of onshore mineralisation and represents a highly prospective target, in particular the thicker accummulations beneath the nearshore sediment buildups, and at slope changes along the main channel between lines 5N and 7N, and 11N and 16N.

Area 2 - bedrock high or "plateau" in the north-central portion of the EL.

The depth to bedrock contours (see Encl. 4) clearly outline a 13-14 km^2 area in the north-central portion of the EL between the 33 and 36m where the bedrock gradient is very much less than the average 3m/km slope to the northwest.

The gradient falls away relatively steeply to the south, northwest and north giving the area the appearance of a "plateau". The "plateau" is slightly elevated in the west (defined by the 34m depth to bedrock contour centred on 570000E, 5485000N) and slightly depressed in the east (adjacent to the channelling of Area 1), and is covered only by a blanket of moderately thin unconsolidated sediments. (For convenience, the small north-south trending elongate zone between lines 11N and 16N on the eastern side of the channelling of Area 1, akin to Area 2 in many ways, has been included as part of Area 2).

The blanket cover consists of tin-bearing, coarse-grained, often pebbly sand with little or no overbudren, and is in water depths of between 30 and 33m. The sediment thickness over the area (determined more accurately from the seismic records than the 0-4m designated over the area by HydroSets in 1981) averages 2.6m. This means that the total volume of unconsolidated sediments on the "plateau" is estimated to be of the order of $33Mm^3$. 21 TOEC drillholes are reliably located on the "plateau" with a further 6 (109, 107, 79, 108, 106 and 28?) located near the channel margins on the eastern side of Area 1. Twelve of the 27 drillholes intersected wash containing between 100 and $449g/m^3$ tin ($100-321g/m^3$ tin with overburden included - see Table 2). As a first order estimate, an average grade over the entire area (ignoring the areal distribution of the drillholes for the moment) is about $120g/m^3$ tin for the payzone, and $95g/m^3$ if overburden is included.

Again, it is important not to place too much emphasis on this data. The drillhole spacing is extremely wide (often up to 1km) and the average grade noted above includes drillholes in apparent barren or very low grade areas. Furthermore, some drillholes, e.g. 92, terminated in mineralisation and 59, 89 and 110 are all located beneath small barren sand waves, and as such probably underestimate their true grades.

Clearly, the concentration of tin at or near the surface in the moderately thin blanket deposits of the "plateau" represents a highly prospective target.

Area 3 - nearshore sediment buildup in the southeast of the EL and sediment buildups on the northern boundary of the EL.

Large volumes of untested sediments exist in the nearshore sediment wedge adjacent to Boobyalla Beach in the southeast of the EL. An estimated 14.5 million m^3 of unconsolidated sediments occurs within the licence boundaries alone and this feature no doubt, continues along more of the shoreline of Ringarooma Bay. The configuration of the slope is a convex-up surface to a water depth of about 15m below datum, a slope of approximately 10m/km (0.5^o) away from the shoreline. Further seaward, the slope flattens out.

The sediments reach a maximum thickness (within the survey area) of 12m, 400m off Boobyalla Beach (see Encl. 1). The possibility of economic tin values within the "beach" buildup, and concentrated at the foot of the slope in particular, by present day longshore current activity (cf offshore Cornwall) must be considered. At this stage, little is known about possible tin grades that might occur in this area as no TOEC drillholes (except perhaps 62) appear to be located within the nearshore sediment buildup, and indeed no TOEC hole was drilled within 1.6km (1 mile) of the coast.

TOEC drillhole 62 is located near the northeast corner of the EL and appears to be just to the east of the probable extension along the coast of the nearshore sediment buildup. The topmost 2.11m of sediments intersected in 62 assayed 87g/m^3 tin, and while this is not of economic proportions, it does lend support to the proposition of present day "longshore tin" on the surface at the foot of the nearshore sediment buildup.

Subsurface highs to the northwest of Cape Portland are most likely extensions of the dolerite which comprises Ringarooma Tier on the coast to the east of the EL and is suspected of comprising bedrock in the eastern margins of the EL. However, large shoals 4km west-northwest of the tip of Cape Portland and just to the north of the northern boundary of the EL (see Encl. 3) have been interpreted as "banks" of unconsolidated sediments (on or adjacent to the highs) built up by tidal actions and scoured out of Ringarooma Bay. If so, this area would represent good target for heavy mineral concentrations.

Area 4 - old? sediment wedge in the southeast of the EL.

From the base of the slope of the nearshore sediment buildup seawards, the seafloor flattens out for 600-700m before resuming a convex-up surface (less pronounced than that in Area 3 above) to a water depth of 25m. This outer slope, a buildup of unconsolidated sediments wedge-shaped in cross-section, was interpreted by HydroSets as possibly representing an older deeper version of the present nearshore slope. However, as can be seen from the approximate boundaries of this feature (as depicted on Encls. 1 and 3), the buildup (estimated to contain 5.8Mm^3 of sediments within the licence boundaries) is only apparent immediately overlying, and to the northeastern side of the main nearshore channel, narrowing and thinning in the vicinity of 5481000N 576000E before slightly thickening and widening again in the northeast corner of the survey area. The 8-9m of unconsolidated sediments intersected in TOEC drillholes 9, 39 and 11 (49 apparently did not reach bedrock) to the northeast of the survey area suggests that the old? sediment wedge continues in this direction approximately parallel to the nearshore sediment buildup and as such, to the coast. Whether this feature represents a previous beachfront or not, heavy mineral concentration by longshore current activity at the foot of the slope in particular, again represents a prospective target.

Area 5 - deep infilled channelling in the northwest of the EL.

Large volumes of unconsolidated sediments have accumulated as fill in deep, broad channelling in the northwest corner of the EL (estimated at 51Mm^3 within the survey area). This dentritic system, which reaches depths of more than 52m (below datum) is separated from the main channelling in Area 1 by the broad "plateau" of Area 2.

The channelling extends and deepens to the north or northwest with the maximum interpreted sediment thickness being 18-20m - the greatest within the survey area. (The interpreted depths to bedrock on the southern margins of this area were hampered by the absence of the strong, steeply dipping sub-bedrock reflectors which had guided interpretation elsewhere).

The water depths throughout the area are between 33 and 35m (deepening to the west-northwest) and are not seen as restrictive to any potential dredging operation in the area.

No TOEC drillholes were sited within defined area and although blanket deposits containing significant tin values in the vicinity of 92 and 89 in Area 2 probably extend northwestward into this area, the prime target is clearly the great accumulation of channel infill sediments, and their extension(s) to the north or northwest.

In Pleistocene times, the level of the sea was about 90m above present day sea level. Pleistocene aeolian sands, etc. overlie

Devonian granites, etc. near Gladstone 10km inland. With the onset of the last ice age, evidence suggests that the sea firstly receded to about 35m below its present day level over a period of about 1,000 years, prior to transgressing to the present day shoreline as the ice melted fairly continuously over the last 10,000 years. This means that the oldest Pliestocene shoreline may be located a few kilometres to the north or northwest of the northwestern corner of the EL, (i.e., Area 5) and as such, also may represent a prospective target.

Area 6 - moderately deep infilled channelling in the north-central portion of the EL.

Northward-trending downcutting in the form of two broad channels and a shallow, broad depression is evident along the northern margin of the "plateau" of Area 2 in the north-central portion of the EL. The downcutting occupies an area of only about 5.5km^2 within the survey area, but it is clear that the channelling continues northward and occupies at least a further 10km^2 between the survey area and the EL boundary 1.5km to the north. The subsurface highs extending northwest from the tip of Cape Portland noted earlier (extensions of the dolerite comprising Ringarooma Tier) to the north of the EL boundary means that the trend of the channelling must swing to the northwest or west-northwest, and that it probably continues in this direction towards the suspected location of the oldest Pleistocene shoreline noted above.

The main channelling comprising Area 1 probably continues through this area, via the easternmost channel (as shown on Encl. 3) where the maximum unconsolidated sediment thickness is about 10m. This would appear to represent a situation similar to that onshore at Great Northern Plain where the easternmost of two parallel tin bearing channels abuts against a dolerite high (Ringarooma Tier) immediately to the west.

Although 12 TOEC holes were drilled in this area, it is very difficult to accurately place their locations either because of changes in bedrock topography over short distances, the presence of large sand waves, or the fact that some of the drillholes occur to the north of the survey area. Only the northernmost of the TOEC drillholes (85) intersected significant tin values with two separate narrow intervals each grading about 105 g/m^3 tin. This is encouraging as the main channel (if its exists) should be further to the north of this point.

The continuation of the main channelling through this area represents a prime target. The total volume of unconsolidated sediments available (within the EL boundaries only) in this area is estimated to be of the order of 100Mm^{3+}.

Area 7 - deep infilled bedrock depression in the west-central and southwest portions of the EL.

A large basin-like bedrock depression infilled with up to 13m of unconsolidated sediments and outlined primarily on the basis of the relatively large number of TOEC drillholes in the region, covers an area of 11-12km^2 in the west-central and southwest portions of the EL. The area is bounded to the east, southwest and north by bedrock highs covered with relatively thin blanket cover and to the south by the coast, but appears to be open to the west. Although not in the survey area, the seismic does indicate southward deepening offthe southern margin of the plateau of Area 2, and southward and westward deepening from the narrow ridge that extends west, then northwest from the western end of Area 2 (see Encl. 3).

Approximately 32 TOEC drillholes are located in this area (see Encl. 2). A fairly uniform thin, often high grade tin-bearing layer (max. 403g/m^3 over 0.6m) is traceable between many of these drillholes in the northern half of the area in particular. However, due to the large overburden thicknesses involved here (generally 5-8m), any tin dredging operation would be out of the question in this area.

As the tin occurs at uneconomic depths and the area appears to be (one of the few) adequately tested by TOEC drillholes, it is considered unprospective.

Area 8 - very thin blanket cover overlying shallowly sloping bedrock in the northeast, east-central and south-central portions of the EL.

Large portions in the northeast (est. 10km^2), and in the east- and south-central portions (est. 7.5km^2) of the EL have only a very thin cover of unconsolidated sediment covering bedrock. The cover is almost always less than 2m thick and often less than 1m thick with occasional small scattered dolerite? outcrops occuring along the eastern margins of each part of the area (see Encl. 4). Numerous small sand waves occur in the northeast however, but all are less than 3m in height. The bedrock slopes shallowly to the northwest over the area between depths of 15 and 25m below datum. The boundaries between this area and the continuation of Areas 3 and 4 in the northeast, outside the survey area are not accurately known.

Coverage by TOEC drillholes in this area (as in Area 7 and parts of Area 2) is reasonably good, as 29 of the 30 drillholes definitely located within the area show either trace tin (max. 80g/m^3 over 0.45m in 47) at the top of the thin unconsolidated sediment column, or are barren. TOEC drillhole 20 however, bottomed in 0.60m of 92g/m^3 tin and probably reflects the minor channelling interpreted as entering the main channel from the southeast in the vicinity of 109, while an unusually thick barren intersection in 41 probably reflects the minor westerly-trending infilled channelling through the east-central portion of the EL (see Encls. 3 and 4).

Clearly, this area shows little or no potential for economic concentrations of tin and as such, is unprospective.

3.3 RE-ASSESSMENT OF TOEC (1966-67) DRILLING

From an examination of the areal distribution of tin in drillholes in the main area of mineralisation defined by the TOEC's (1966-67) work, that is; all TOEC drillholes in Area 2 (27 holes) and in the northern third of Area 1 (only drillhole 21) it would appear on a large-scale at least that, as with many alluvial tin deposits, the mineralisation is patchy. Clearly, averaging the data over the entire area results in a false (much lower) impression of the grades likely. The spheres of influence of the "higher grade" drillholes define an irregularly shaped, but nevertheless continuous zone of mineralisation totalling in excess of 20Mm^3 grading 208g/m^3. It must be borne in mind that there are only 28 TOEC drillholes located here in an area of over 20km^2, compared with 155 holes drilled by Hellyer/SANTOS/MHA onshore in EL 19/77 where for example, a random selection of 20 or so drillholes would also result in a much lower average grade.

Because of the apparent patchy nature of the mineralisation and the wide spacing of TOEC drillholes (often up to 1km) it is possible that further closer-spaced drilling in this area could intersect more of the higher grade sectors. The effect of this would be to reduce the volumes of influence of the existing "lower grade" drillholes and generally upgrade the deposit. Furthermore, drilling around the edge of the area, particularly in the east near holes 21, 110, 109 and 79, and in the northwest in the vicinity of holes 89 and 92 and further offshore would likely increase mineable reserves. TOEC (1966-67) concluded along these lines in stating "it is difficult to estimate by how much the grade and volume of the deposit might be increased by these means but there is room for about a doubling of the volume (of their initial rough estimate) to say, 38 to 46 million m^3. Then, if only four or five rich patches of mineralisation about equal in grade to the top few so far discovered were intersected in drilling, the overall grade would also be about doubled (to 300g/m^3)".

The TOEC (1966-67) drilling results contain many discrepancies between recorded depth penetration and total length of sample recovered and indeed, often between the total length of samples recovered and the total of the intervals assayed. Also, footages are often not available for particular assays.

The assay results are recoverable tin figures and do not include fine tin losses inherent in the original assaying method. Head grades of a second sample split obtained from four of the better original samples, this time determined as a result of a sizing analysis and a spearte assay of a number of the size fractions, gave much higher results in 3 of the 4 cases. Furthermore, assays were repeated on 42 samples after grinding the non-magnetic material from each sample, and while twenty-five of the duplicate assays gave similar results and ten gave slightly lower results, the remaining 6 (5 of which contained significant tin values) gave drastically increased tin grades (103 189-384g/m^3, 109 150 - 330g/m^3, 107 128 - 204g/m^3, 104 111 - 187g/m^3, and 125 133 - 333g/m^3). Tin losses due to the type of drilling equipment used are also unknown.

There also remains a discrepancy between bedrock levels as defined by the 1981 seismic and those determined during TOEC drilling, particularly in Area 2 where the average thickness interpreted from seismic records is 2.5m as against an average of 9m by TOEC drillhole data. TOEC samples were obtained "between the seafloor and drilling refusal level" and this was often identified as the "bedrock surface". It would seem likely that TOEC drilling simply penetrated on most occasions, well into weathered bedrock before refusal. However, there are odd instances of trace tin at depth (e.g. TOEC drillholes 98 and 88 which contained 0.60m at 48g/m^3 tin and 0.90m at 88g/m^3 tin under 7.32 and 7.62m of overburden respectively) when the seismic records suggest that the depth to bedrock at that location should be no more than 2 to 3m. These problems are as yet unsolved.

3.4 ANALYSIS OF METEOROLOGICAL DATA

Sea State Analysis and State of Swell and Wind records were obtained from the Melbourne Meteorological Bureau for Low Head Lighthouse over the period 1960-73 and a preliminary estimate made of the running time for an offshore dredge operating in Ringarooma Bay.

For wind conditions, it was assumed that a well designed dredge can work in winds up to 35km/hr. Using the Percent Wind Frequency Analysis for each month (all hours), winds in excess of 35km/hr are shown to be on an average of 13.2% of the time.

Turning to Swell Analysis, it was assumed that the dredge can work in a swell of up to two metres in height. This corresponds to a wind velocity of 36km/hr (i.e., a wind of 36km/hr will create a two metre swell if it blows long enough and is 100% efficient). It should be noted that the length of the swell (crest to crest) is probably more important than the swell height because as the length becomes greater than one half of the hull length, the motion accelerates rapidly.

From the Swell Analysis, it can be seen that the State of Sea was greater than 3 (or 1.5m which is a little low, but State of Sea of 4 of 3m is too high) 17.2% of the time. The computer data supplied seems a little contradictory with great gaps of no readings for months, but using the two complete data sheets for 0900 and 1500 hours only, it gives an average State of Sea in excess of 3 of 21%.

Combining these two sources of sea state gives an average of 19.1% of the time with the State of Sea above 3. Combining this with the wind velocity in excess of 36km/hr gives a total combined figure of

32.3%. However, there will be periods when the wind and the sea will both be excessive at the same time, so the combined figure will have to be cut back to say 20%. The normal running time of a dredge can be taken at 80% and subtracting the above 20% leaves a running time of 60%. Another 5% should be taken off for the periods when the dredge has to be moved to shelter for exceptionally bad conditions, leaving a final estimated running time of 55%.

This is a rough estimate only and information on swell length, should be obtained, if possible, and a correlation made of overlap between wind, swell height and swell length to provide a better estimate.

The data shows that the best State of Sea and State of Swell conditions generally exist for greater than 90% of the time between November and March.

4. CONCLUSIONS

1. The principal targets are the infilled channel material of Area 1 and the blanket cover on the "plateau" of Area 2. As a first order estimate, the total volume of potentially tin-bearing sediments occurring in these two areas has been calculated from seismic records at about $60Mm^3$. Both areas are regarded as highly prospective. The sediments are also expected to contain minor gold credits, perhaps of the order of a few mg per cu. metre.

2. Clearly, large volumes of untested, prospective sediments also occur in the nearshore sediment buildup (Area 3 - est. $14.5Mm^3$), in the old? sediment wedge (Area 4 - est. $5.8Mm^3$) and in the areas of deep infilled channelling in the north-central (Area 6 - est. $100mm^3$) and northwest (Area 5 - est. $51mm^3$) portions of the EL, as well as in extensions of all features outside the boundaries of the EL, including the possible large sediment buildup 4km west-northwest of Cape Portland (Area 3)..

3. Recent drilling to bedrock between Boobyalla Inlet and Bowlers Lagoon in the northern portion of EL 19/77 three kilometres to the south of the southeastern corner of EL 42/80 clearly shows two north-northwesterly trending channels incised into the bedrock (see Encl. 4). Both of these channels are tin-bearing, particularly the easternmost, and align very well with the two main infilled channels outlined by seismic cutting through the sediment buildups in the southeast corner of EL 42/80. It is recommended that an application to take up an Exploration Licence covering the intervening area between EL's 42/80 and 19/77 (containing the channel continuations), and the extensions outside the boundaries of EL 42/80 of the features outlined in (1) and (2) above be made to the Tasmanian Department of Mines should these areas, a large percentage of which title is due for renewal (EL 48/80) on 17 January, 1983, become vacant.

017

602018

4. The northward continuation of the nearshore channelling has been more accurately determined from the seismic records than had been outlined in the Annual Report for 1981. The nearshore channelling converges, emerging from the base of the sediment buildups as a broad, very shallow, often "braided", northward-trending channel between lines 5 and 7N. The channel narrows slightly and incises deeper into bedrock northward to line 11N before narrowing and shallowing again between lines 11 and 14N. North of line 14N, the channel either "flows" into the broad shallow depression on the eastern side of the "plateau" of Area 2, or as is more likely, continues northward with increased downcutting through the easternmost channel in Area 6, before being directed northwest or west-northwestwards by seaward extensions to the northwest of the tip of Cape Portland of the dolerites forming Ringarooma Tier. No "ancient" channel cuts northwesterly through Area 2 nor is there any evidence of another such channel arising in the northeast of the EL near Cape Portland and trending west-southwesterly as had been proposed prior to the seismic surveying.

5. Results to date tend to suggest that a combination of processes have been, or are currently at work concentrating tin in Ringarooma Bay:

(a) deposition within the various older channel systems, or "remnants" of channel systems, in particular the most likely course of any "ancient" Ringarooma River through Areas 1 and 6 to north of the northwestern corner of the EL;

(b) reworking by ocean currents, etc. of the alluvials of the "ancient" Ringarooma River valley as the shoreline has transgressed from a point near the northwestern corner of the EL to its present location over the last 10,000 years or so; and

(c) by more recent tidal and current activity, with discharge from the mouth of the Ringarooma River possibly depositing tin in the very broad arcuate depression forming the present sea floor, particularly below 30m water depth where the slope of the sea floor flattens out (in fact coincident with Area 2) which may be subject to subsequent minor reworking, e.g., sand waves. Tin may also be subject to transport by longshore current activity.

6. Preliminary economic evaluation to date has provided an order of magnitude estimate of 300g/m^3 as the minimum overall target grade required for an economically viable tin dredging operation in EL 42/80 (based on several project cases, and using a base reserve figure of 63Mm^3). Tin grade is very much the critical factor involved as there appears sufficient available volume of potentially tin-bearing sediments (assuming the correct interpretation of the 1981 seismic records) to support an even large-scale dredging operation.

018

602019

Reassessment of TOEC (1966-67) drilling results outlined an irregularly shaped, but nevertheless continuous zone of mineralisation in excess of 20Mm^3 grading 208g/m^3, Area 2 and the northern third of Area 1. There is scope for increasing (to perhaps double) the grade and volume of the deposit by infill drilling, and by drilling around the edge of the area.

7. Apart from the uncertainty regarding TOEC drillhole locations (accuracy probably +400m from the positions shown on Encl. 2), the reliability of the drilling data is clearly questionable.

8. Present thinking on any mining operation in northeastern Tasmania will also be influenced by the possibility of an adjacent onshore dredging operation on Great Northern Plain, EL 19/77. The viability of a combined onshore-offshore operation will be considered and assessed in terms of grades, volumes and in particular, of dredging requirements.

9. Any future offshore (or part-offshore) development will also be heavily influenced by weather conditions in Ringarooma Bay, and resultant time losses, etc. as a result of bad weather. Preliminary examination of Sea State Analysis and State of Swell and Wind records from the Melbourne Meteorological Bureau for the period 1960-1973 indicate a downtime of approximately 45% and that the most suitable period during which to carry out any drilling is between November and March.

10. Although geological (and economic) evaluation of the prospect is at an early stage, it is considered that an overall grade of 200-250g/m^3 tin is a geologically realistic expectation. Despite (fairly pessimistic) cash flows requiring a minimum of 300g/m^3 tin and internal (Group Development section's) economic recommendations on the project, it is hoped to continue exploration in Ringarooma Bay in order to gain a more accurate indication of the grade potential of the principal zones of interest.

    However, if a target grade of much greater than 300g/m^3 tin is required, the project assumes a high risk on geological grounds.

5. PROPOSED PROGRAMME

At this stage, an explanatory drilling programme of the order of 80 holes to define the alluvial tin (and gold, rutile and zircon) potential of Ringarooma Bay appears warranted. Any drilling will be concentrated primarily in the areas of main channelling (Area 1 - 29 holes,) and moderately thin, tin-bearing blanket deposits (Area 2-23 holes). In addition, 4 drillholes will investigate the area of thickest unconsolidated sediments (Area 5) and its extensions to the north or northwest; with 8 testing the proposed continuation of channelling in Area 1 through Area 6 and its possible extension to the west-northwest along or just to the north of the northern boundary of the EL; 9 testing the nearshore (beach) buildup (Area 3) and adjacent old? sediment wedge (Area 4) and their probable extensions along the coast of Ringarooma Bay; 5 testing possible sediment "banks" west-northwest of Cape Portland; and 2 checking "stratigraphy" in the west-central portion of the EL.

The proposed drillhole locations are shown on Encl. 3, located (where possible) in terms of position fixes along completed seismic lines and spaced generally at 400m intervals along east-west lines in Area 1, and at 1km or so intervals along north-south lines in Area 2. Potentially, a large number of sites can be recommended for drilling, but a total of about 80 is seen as the minimum required to realistically assess the potential of the EL. At this stage, the programme is planned to be undertaken during the 1982/83 summer season at an anticipated cost of $180-200,000. Detailed costing is underway but as yet, no offshore drilling contractors with equipment which appears to have a good likelihood of providing an adequate performance have been located and no drilling crews, or positioning equipment contractors, have been engaged.

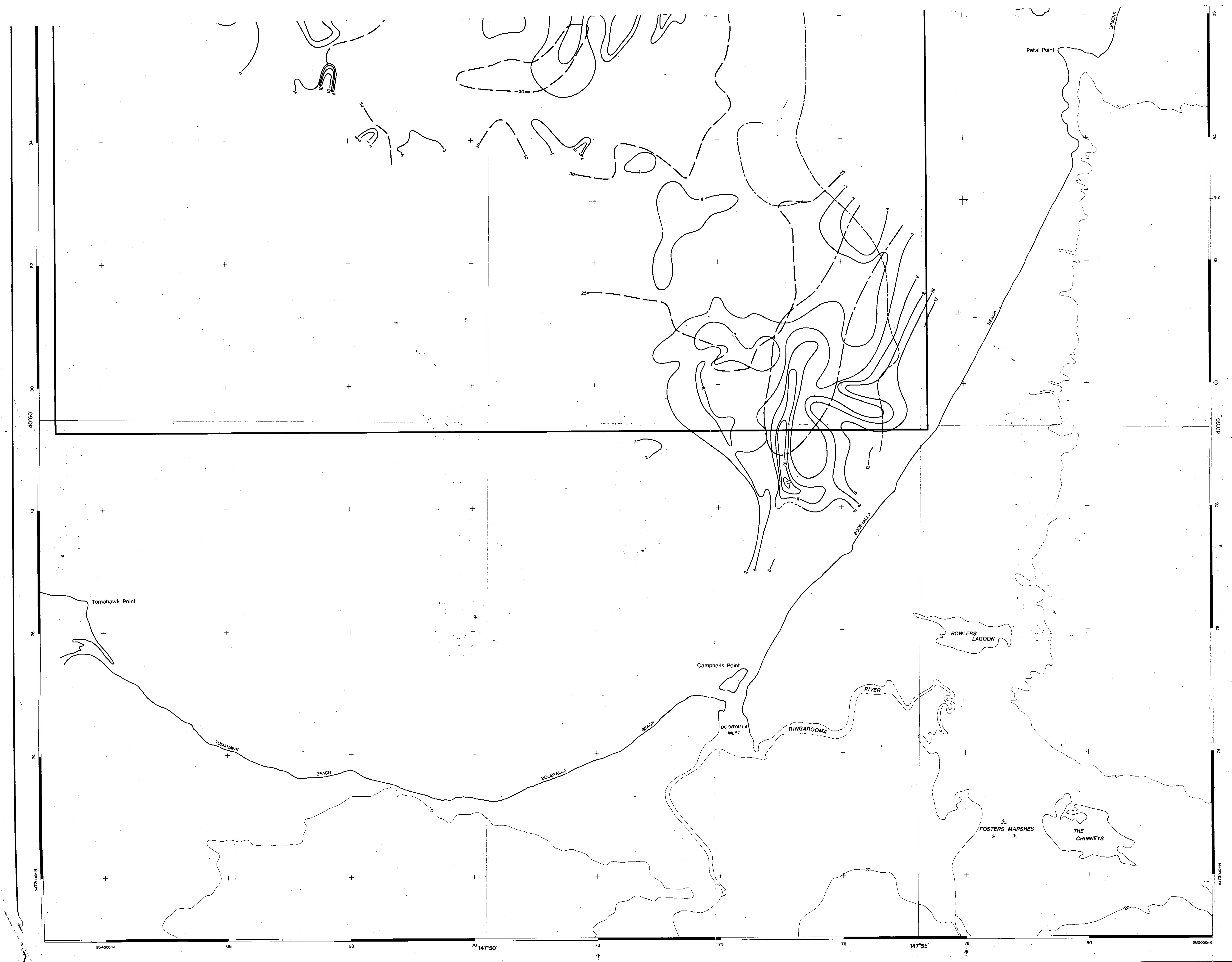
Economic and technical evaluation of the prospect, assessment of the influence of adjacent onshore reserves on the profitability of any offshore operation, and assessment of sea state/weather conditions, etc. in Ringarooma Bay will be ongoing during 1983.

6. EXPENDITURE

The total expenditure incurred in assessing EL 42/80 for the year ending December 31, 1982 was $69,906.16. An itemisation of costs is listed below:

	$
Salaries - Adelaide	5,612.21
On Costs	1,683.96
Australian Travel & Accommodation	3,358.20
Professional Services	6,450.68
Labour & Materials Within	
Licence Areas	198.00
Insurance	477.00
Drilling	232.00
Data Purchase	144.00
Geophysical	40,512.11
Geological/Geochemical	3,438.00
Contract Services - Other	7,800.00
	$ 69,906.16

HM 5.10
GNP:ac
0557X



LEGEND

—12—	Sediment Thickness (Metres)
— —25— —	Water Depth (Metres)
—·—·—	Westernmost Limit of Dolerite
	Possible Previous Nearshore Sediment Wedge

602022

HELLYER MINING & EXPLORATION PTY. LTD.

83-1947

NORTH EAST TASMANIA

RINGAROOMA BAY

BASE MAP SHOWING UNCONSOLIDATED SEDIMENT THICKNESS

5 cm

Enclosure 1

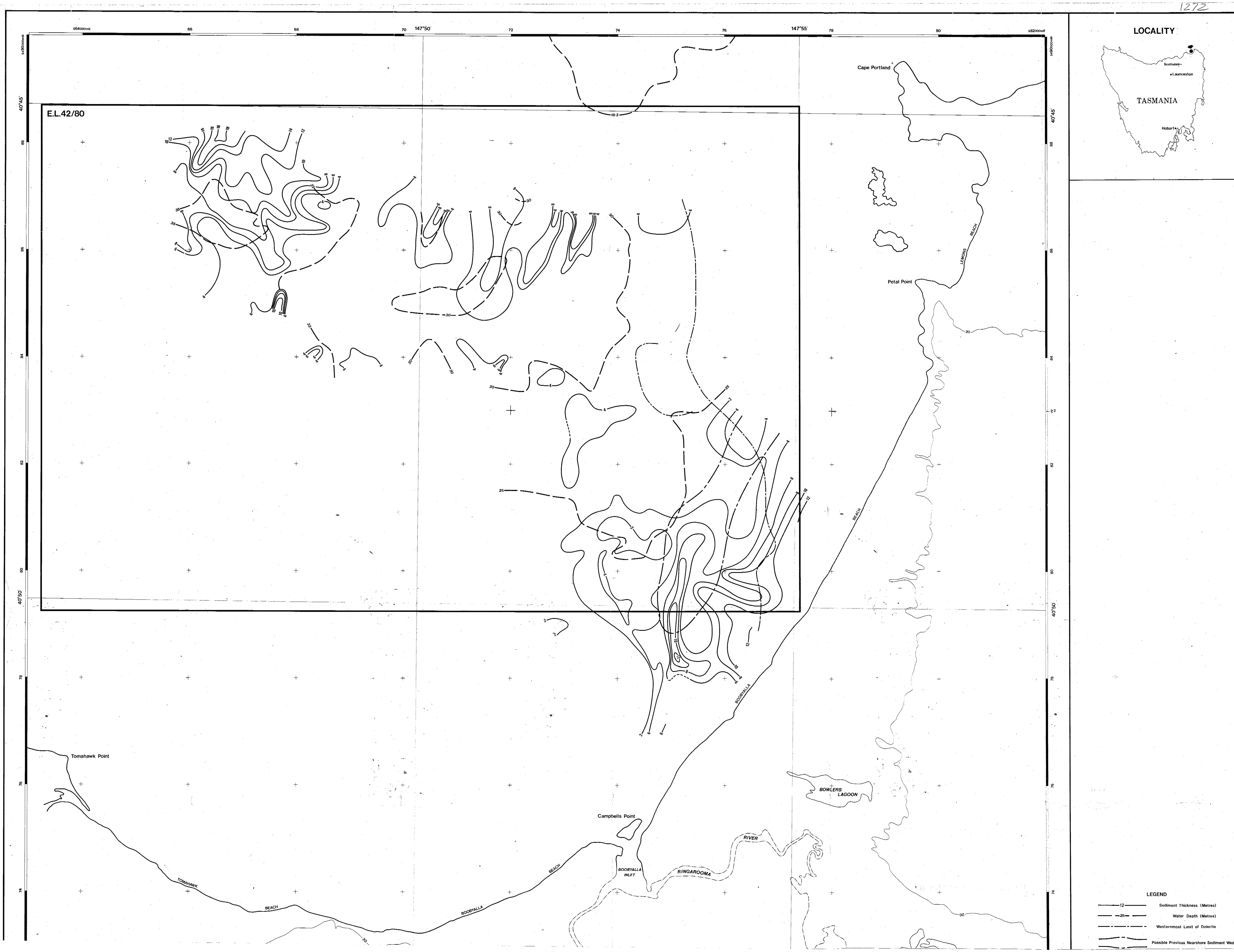
SCALE 1:20000

KILOMETRES

S82-0547 6-P2

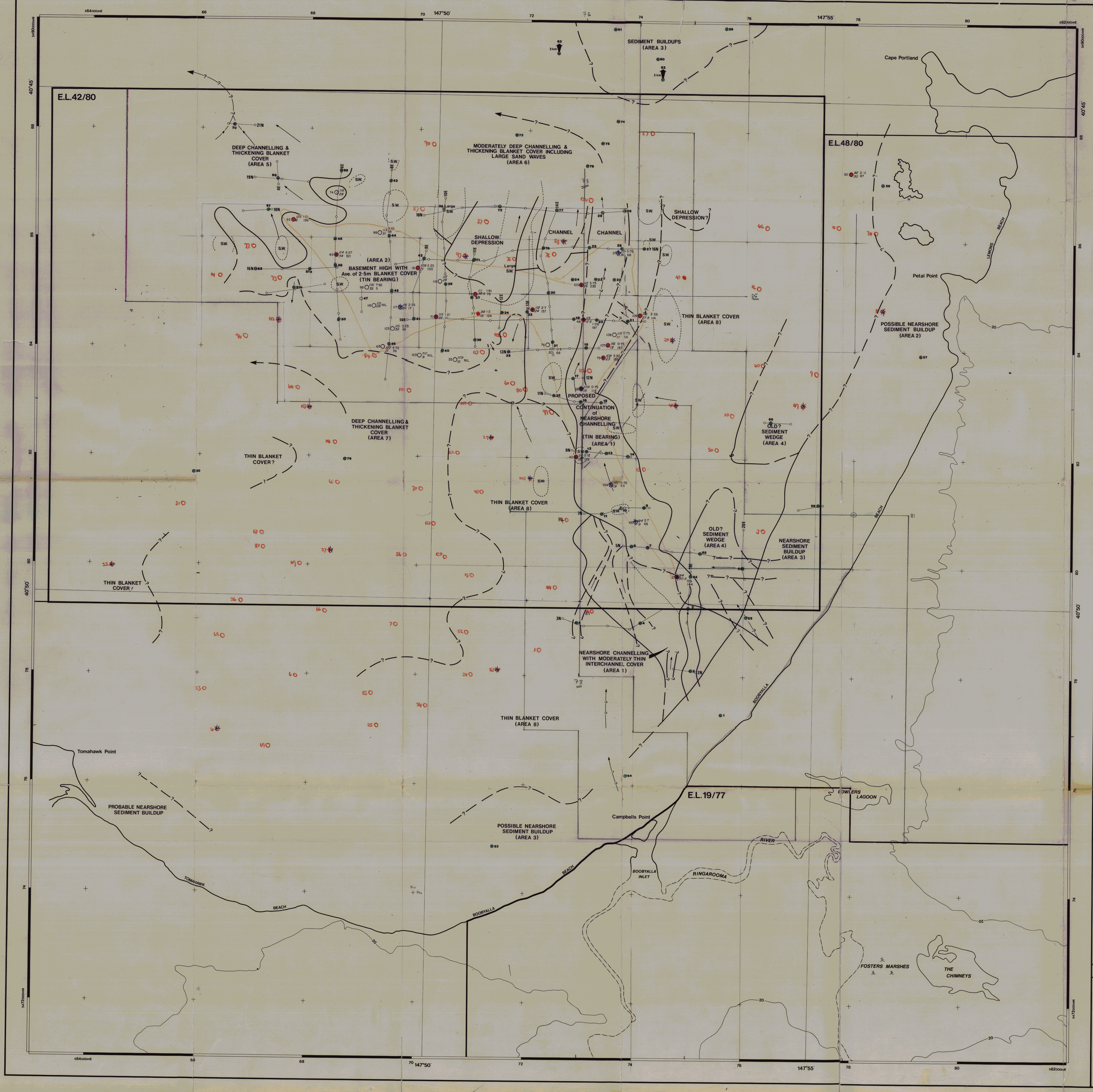
1272

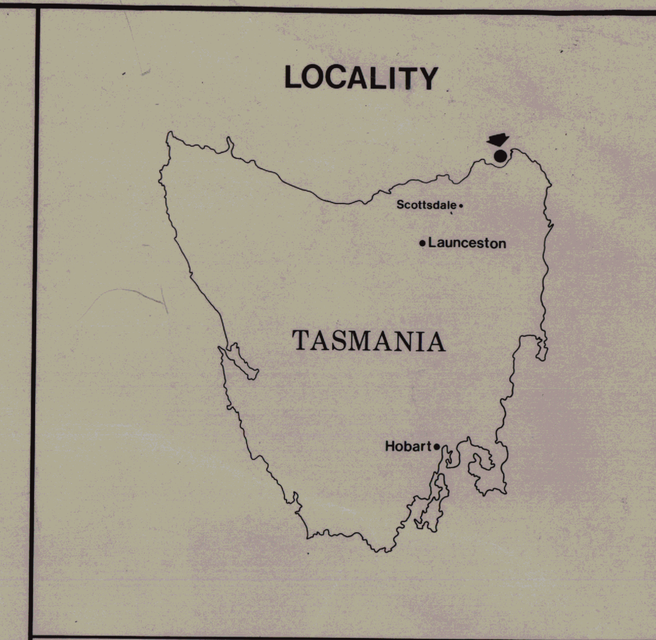
1272



LOCALITY
TASMANIA
Scottsdale
Launceston
Hobart
E.L.42/80
147°50'
147°55'
40°45'
40°50'
Cape Portland
Petal Point
LEMONS BEACH
BEACH
BOOBYALLA
Tomahawk Point
Campbells Point
BOWLERS LAGOON
RIVER
RINGAROOMA
BOOBYALLA INLET
TOMAHAWK
BEACH
BOOBYALLA
BEACH
LEGEND
12 Sediment Thickness (Metres)
25 Water Depth (Metres)
Westernmost Limit of Dolerite
Possible Previous Nearshore Sediment Wedge


83-1947.
1273
602023
TOEC (1966-67)
DRILLHOLE SITES
LEGEND
Drillhole No – 10
75
15
x
Water Depth (ft)
Did Not Reach Bedrock
Depth Penetration (ft)
① ≥ 100g/m³ Sn over ≥ 2m
② ≥ 100g/m³ Sn over < 2m
③ 34-99g/m³ Sn over ≥ 2m
④ 34-99g/m³ Sn over < 2m
⑤ Essentially Barren
SCALE 1:20 000
5 cm
Encl 2





5 cm

● > 75g/m³

TOEC drill hole

Hole No.—104 ○ 100/19 — Water depth (ft); 5·76 — Tin bearing intersection - incl. overburden (m); 64 — Grade (g/m³); Depth of penetration (ft)

52 ● Proposed drill hole

11N ○———○ Seismic line

602024

HELLYER MINING & EXPLORATION PTY. LTD.

83-1947

NORTH EAST TASMANIA

1274

RINGAROOMA BAY

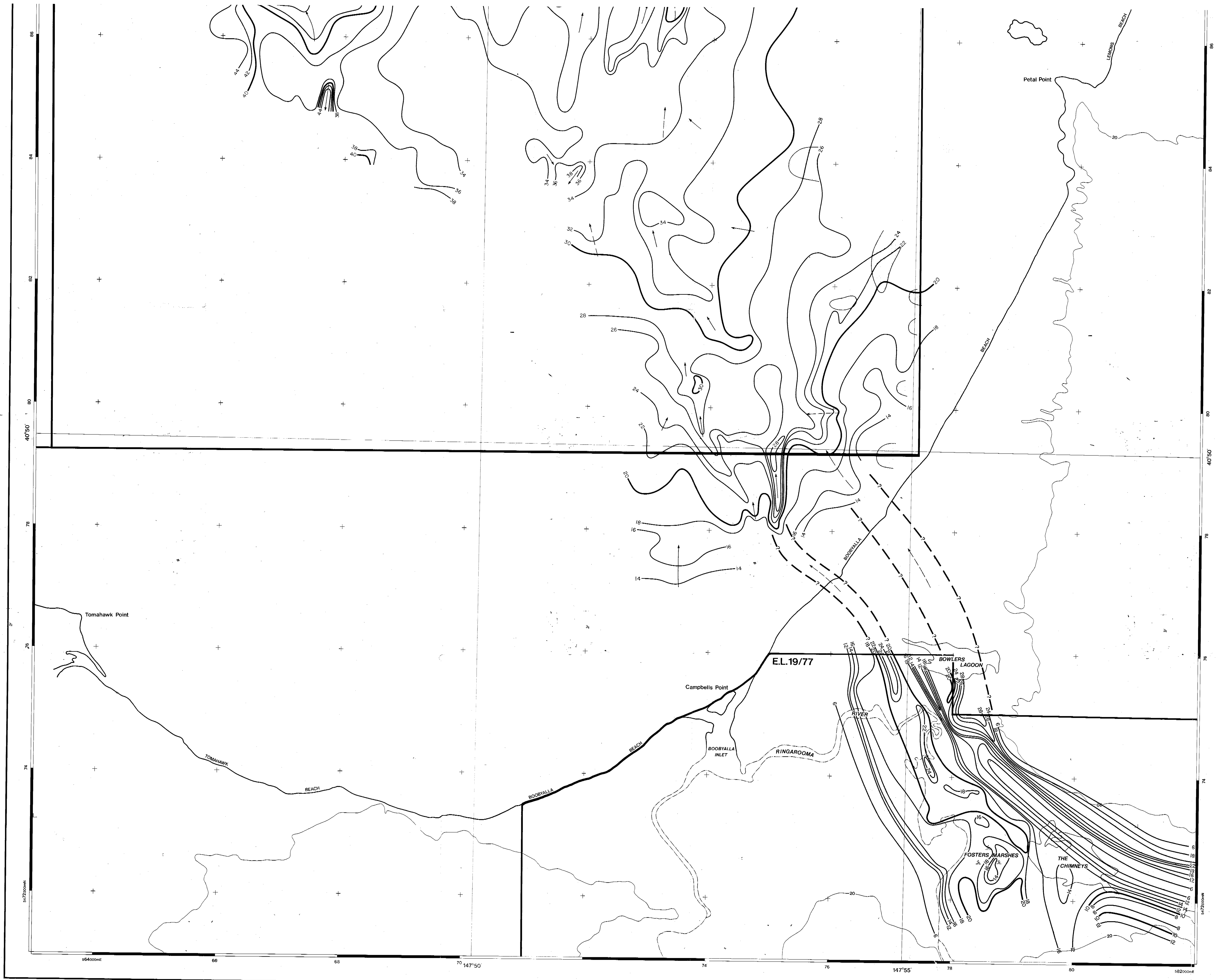
BASE MAP SHOWING INTERPRETATIVE GEOMORPHOLOGY PROPOSED HELLYER DRILLHOLE LOCATION (80 Hole Programme) TOEC (1966-67) DRILLHOLE LOCATION (Approx.) In Areas 1 & 2

SCALE 1:20000

0·5 0 0·5 1·0 1·5 2·0
KILOMETRES

ENCL 3

S83-0039 7-A4



602025

Inferred subcrop of igneous material

Probable Channel Axis

Possible Channel Axis

Interpreted depths to bedrock in Ringarooma Bay are in metres below Admiralty chart datum.

Depths to bedrock on Great Northern Plain are in metres below the level of the coastal marshes in the area.

HELLYER MINING & EXPLORATION PTY. LTD.

83-1947.

NORTH EAST TASMANIA

E.L.42/80 RINGAROOMA BAY & PART E.L.19/77 GREAT NORTHERN PLAIN

DEPTH TO BEDROCK

5 cm

Encl 4

1275

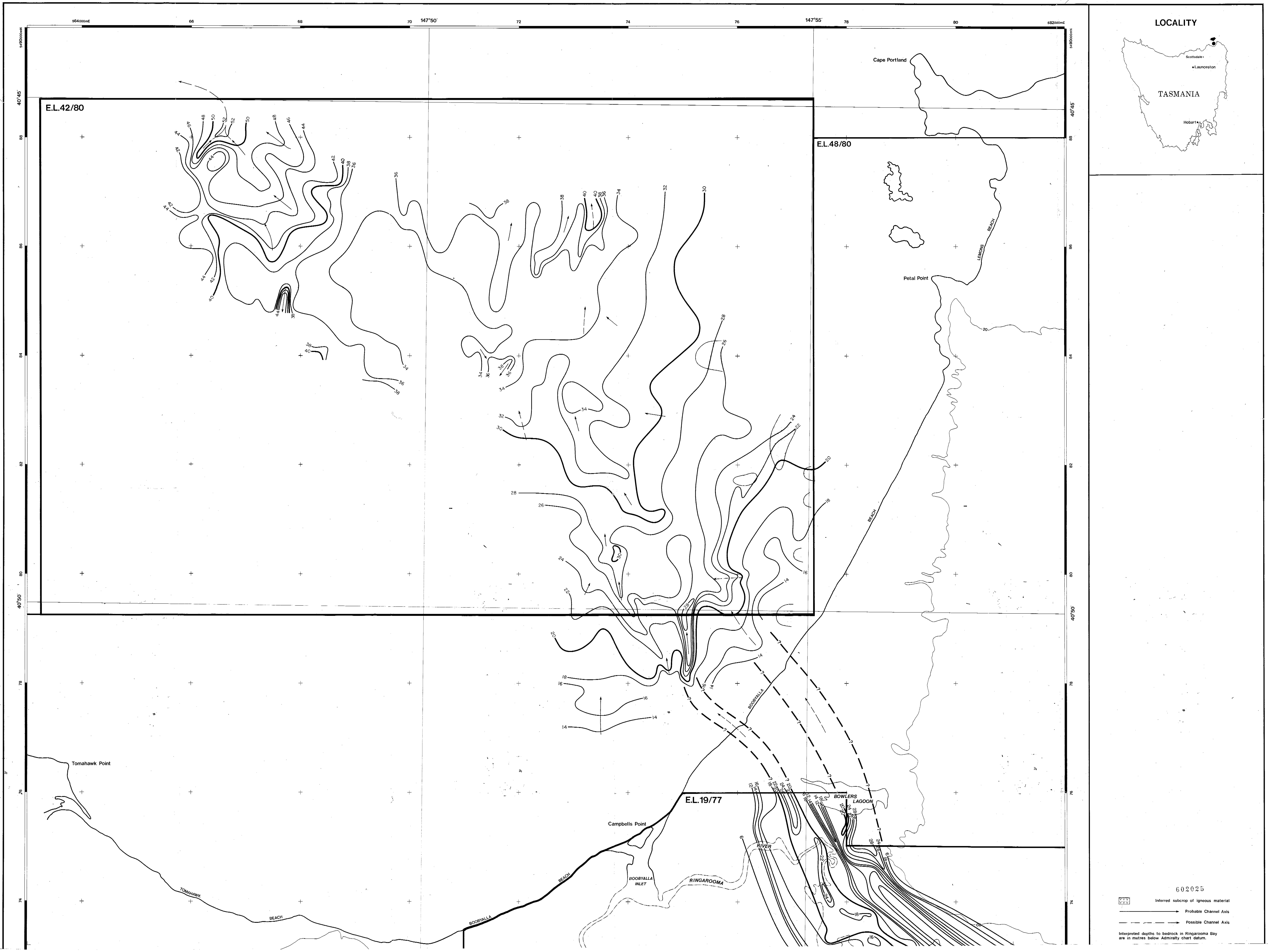
SCALE 1:20000

0·5 0 0·5 1·0 1·5 2·0

KILOMETRES

S83-0038 7-A4

1275


LOCALITY
TASMANIA
Scottsdale
Launceston
Hobart
E.L.42/80
E.L.48/80
E.L.19/77
Cape Portland
Petal Point
LEMONS BEACH
BEACH
BOOBYALLA
Tomahawk Point
Campbells Point
BOWLERS LAGOON
RIVER
RINGAROOMA
BOOBYALLA INLET
TOMAHAWK
BEACH
BOOBYALLA
BEACH
147°50'
147°55'
40°45'
40°50'
564000mE
582000mE
5490000mN
602025
Inferred subcrop of igneous material
Probable Channel Axis
Possible Channel Axis
Interpreted depths to bedrock in Ringarooma Bay are in metres below Admiralty chart datum.

602026


LINE 3N
W → E
19
20
21
22
23
24
25
26
27
28
300 Joules/¼ sec
¼ sec sweep
F500-10000

1277