

## 4. Evaluation of dolerite quarry sites, Hobart area.

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This report has been prepared for a working party considering the environmental impact of the Giblin Street quarry operated by Hobart Quarries Pty Ltd.

Whilst the following information can be used for the assessment of many potential quarry sites the scheme of evaluation has been specifically designed so that the best possible replacement for the Giblin Street operation could be found should that become necessary as a result of the deliberations of the impact study. The scheme of evaluation is detailed below.

Several of the 'sites' listed were inserted for comparative purposes and could not be seriously considered as real possibilities. Examples include the Organ Pipes and Mt Arthur. All major operating quarries are also rated and several sites are included to evaluate sensitivity of the assessment to distance, quality of material and environmental parameters. Hence, although the listing of sites is not exhaustive, each location may be considered representative of any local cluster of sites. Not every dolerite area is included as many are built over, inaccessible or too small to support a long-lived quarry. Site locations are shown in Figure 6.

For the purposes of this assessment, undertaken in relation to Hobart Quarries Giblin Street operation, an equivalent or good, perhaps better, site is one with very large reserves of good rock with significant reserves of poorer material. This is necessary to allow a complete, balanced commercial operation which could supply material for fill, aggregate and road surfacing.

## ASSESSMENT FACTORS

The weighting of the various factors, whilst arguable and often subjective, has been consistently applied to all sites. The factors have been grouped into site, material and environmental aspects so that sub-totals can be inspected. Each sub-total may indicate site problems not apparent in summary totalling. The land form at each of the proposed sites is such that a quarry could be initiated.

*SITE EVALUATION (A nil score implies an on-the-spot serviced site)*

**Factor 1.** Distance to good main road for dispersion. This is designed to consider supply and construction needs. (Good road = two lane seal).  
Scoring: 0-5 km = 0; 5-10 km = 1; 10-15 km = 2; 15-20 km = 3; 20-25 km = 4; >25 km = 5.

**Factor 2.** Distance from Hobart G.P.O. A measure of isolation from, or centrality to, consumers. This factor will of course change with northern and eastern expansion, as at present contemplated. Distance calculated on shortest main routes. Kilometre scoring as for Factor 1.

**Factor 3.** Rating of traffic and route problems. Scale 0 to 6. Tasman Bridge = 2; long steep hills = 3. Route problems include road surface, hills and bends.

**Factor 4.** Availability of services. Power 0 to 2; water 0 to 3 (as water supplies may be more difficult to install).

Developed quarries in the metropolitan area generally rate 4 or less; undeveloped sites should not rate more than 8 or 9 unless distances are

'excessive' and supply of services is likely to be difficult. Excessive distance may have to be defined more closely than here, on economic grounds.

*MATERIAL EVALUATION (A low score implies good, workable reserves of all rock types)*

**Factor 5.** Nature of material. Two scales 0 to 3; scores additive.  
Scale 1: Rare joints = 0; joints 2-4/m = 1; joints 4-7/m = 2; >7/m = 3.  
Scale 2: Fresh = 0; slight weathering = 1; moderate decomposition = 2; extreme decomposition = 3.

**Factor 6.** Estimate of reserves of good stone. Scale 0 to 9. Score 0 = >25 million tonnes; 9 = nil. (25 million tonnes = a 200 metre cube of dolerite).

**Factor 7.** Estimate of reserves of poor/variable stone. Scale 0 to 4 as it is not as quantitatively or economically important. 0 = one million tonnes; 4 = nil.

**Factor 8.** Workability. Very massive rock requiring intensive blasting, 1; fairly massive, moderate blasting = 0; partly rippable = 1; rippable = 3.

Quarry sites with good material mixes and reserves rate 4 or less.

*ENVIRONMENT EVALUATION (A low score implies an unobjectionable site)*

**Factor 9.** Buffer zone. Wider than one kilometre = 0; 200 m or less = 5. Linear scale.

**Factor 10.** Area zoning. Unzoned = 0; industrial to light industrial = 1-3; residential or reserve 5.

**Factor 11.** Access. Via open country = 0; village, small town = 2; city = 4. A measure of local nuisance by number of persons affected and road loadings of quarry traffic before reaching consumer or suitable main roads.

**Factor 12.** Site visibility from built up areas, main roads. Not visible = 0; partly visible = 1; wholly visible = 2.

**Factor 13.** Relative increase in dust nuisance. Industrial region = 0; virgin land = 2; city (including worked farmland) = 1.

**Factor 14.** Noise with respect to background. Each 10 dBA increase = 1 point. Maximum score 3.

**Factor 15.** Nature of land use, type of working required. Regular/compact/amphitheatric = 1; extended = 2; irregular = 4. Add 1 for sites where effluent problems may exist.

**Factor 16.** Cultural value impact assessment. Popular rating of the area, or feature. Range 0-5. Unknown, undesired = 0; to much regarded = 5.

**Factor 17.** Employment pattern. Toward decentralisation with local labour -2; local labour -1; city 0; no labour near 2.

Material rating factors for potential sites have been derived from surface considerations based on experience of exposures, land forms and other purely geological factors. As such, the values are assumptions and may be modified by investigation or development. In the case of low rating sites changes will not exceed 1 or 2 points. Thus the rating order of key sites will remain basically unaffected.

Table 1. EVALUATION OF SITE, MATERIAL AND ENVIRONMENTAL IMPACT FACTORS

Location	AMG Reference	SITE					MATERIAL					ENVIRONMENTAL IMPACT					1 SUM	2 SUM	3 SUM						
		1	2	3	4	Total	5	6	7	8	Total	9	10	11	12	13				14	15	16	17	Total	
1. North West Bay R.	EN14254150	0	3	3	3	9	1	2	1	0	4	0	0	0	2+	1	1	1	1	-1	5	18	16	13	
2. Neika	EN20104450	0	3	3	3	9	1	1	3	0	5	1	0	1	1	1	2	1	2	-1	8	22	20	17	
3. Mafeking Ck	EN20004030	0	3	3	4	10	2	4	1	0	7	0	0	0	0	1	2	1	0	-1	3	20	17	14	
4. Whitewater Ck	EN21104020	0	2	3	3	8	2	4	2	0	8	1	0	1	0	1	2	2	1	-1	7	23	21	19	
5. Browns R.	EN21754370	0	2	3	4	9	3	5	2	1	11	0	0	1	0	1	2	1	0	-1	4	24	21	19	
6. Organ Pipes	EN19505050	2	3	6	5	16	0	0	4	0	4	0	5	0	2	2	3	1	5	2	20	40	33	30	
7. Mt Arthur	EN18105150	3	4	6	5	18	0	1	3	0	4	0	5	0	2	2	3	1	5	2	20	42	35	31	
8. Bonnet Hill	EN26004375	0	1	3	4	8	3	6	1	1	11	0	0	0	0	1	2	1	0	0	4	23	19	18	
9. Fern Tree+	EN22004800	0	1	4	1	6	5	7	1	2	15	1	4	0	2	1	2	1	4	0	15	36	35	34	
10. Mt Nelson	EN28004675	0	1	3	2	6	3	4	2	1	10	1	4	1	0	1	2	1	2	-1	11	27	26	25	
11. Nelson Saddle+	EN28404850	0	0	3	2	5	3	3	1	1	8	0	0	0	0	1	1	2	1	0	5	18	16	16	
12. Proctors Rd+	EN25304925	0	0	1	0	1	1	2	3	0	6	3	4	4	1	2	1	2	3	0	20	27	27	27	
13. Clearys Gates†	EN25705400	0	0	3	0	3	2	4	1	0	7	5	5	4	2	1	1	2	3	0	23	33	33	33	
14. Jackson St	EN20505660	0	1	1	0	2	5	9	0	3	17	3	3	4	2	1	1	2	3	0	19	38	38	37	
15. Knights Ck Res.	EN19005460	0	1	1	1	3	2	2	1	0	5	0	5	4	1	2	2	1	1	0	16	24	23	22	
16. Goat Hills	EN19005690	0	1	1	2	4	2	3	1	1	7	0	0	4	0	1	1	1	0	0	7	18	16	15	
17. Molesworth	EN14505850	1	5	1	4	11	2	4	2	1	9	0	0	0	0	1	2	1	1	-2	3	23	21	16	
18. Attamont Ck	EN11506410	0	5	1	4	10	1	2	1	0	4	0	0	0	2	1	2	1	1	-2	5	19	17	12	
19. The Backbone	EN08505900	1	5	2	5	13	1	2	2	1	6	0	0	0	0	1	2	1	0	-1	3	22	18	13	
20. Collinsvale	EN15255750	1	3	2	3	9	0	1	3	0	4	2	0	2	1	1	1	1	0	-2	6	19	18	15	
21. Dromedary	EN11506725	0	5	0	4	9	1	2	2	0	5	0	0	0	0	1	2	1	0	-1	3	17	14	9	
22. Risdon Brook†	EN26606220	0	1	2	1	4	1	1	1	0	3	0	0	0	0	2	2	1	3	-1	7	14	14	13	
23. Bourbon Ck	EN28506670	1	5	0	5	11	1	0	1	1	3	0	0	0	0	1	2	1	0	-2	2	16	13	8	
24. Butchers Hills	EN35006765	0	4	2	3	9	2	3	1	0	6	0	0	0	2	1	2	2	3	-2	8	23	22	18	
25. Brains Hill	EN31157320	1	5	2	5	13	2	3	1	1	7	0	0	0	1	1	2	1	2	-2	5	25	22	17	
26. Bridgewater§	EN20206945	0	3	1	0	4	1	2	2	1	6	1	1	1	0	1	1	1	0	-1	5	15	16	13	
27. Merriworth	EN26757470	0	5	1	3	9	4	6	1	2	13	0	0	0	0	1	2	1	0	-1	3	25	23	18	
28. Brighton	EN17157205	0	4	1	3	8	4	6	0	2	12	0	0	0	2	1	2	2	1	-1	7	27	25	21	
29. Flagstaff Gully§	EN30755750	0	1	2	0	3	0	1	2	0	3	1	1	3	0	1	1	1	1	0	9	15	15	14	
30. Craigow Hill	EN32405950	0	2	2	5	9	0	1	1	0	2	0	0	0	0	1	2	1	0	-1	3	14	10	8	
31. Belbin Rivulet	EN33006200	0	4	2	4	10	1	1	2	0	4	0	0	0	0	1	2	1	0	-1	3	17	14	10	
32. Mt Rumney	EN36505400	0	1	1	3	5	2	2	2	0	6	1	1	0	2	1	1	1	4	0	11	22	19	18	
33. Mt Mather	EN39004700	0	2	2	3	7	1	3	2	0	6	1	0	0	2	1	1	2	2	0	9	22	19	17	
34. Rosny Hill	EN29502535	0	0	2	0	2	1	5	3	0	9	5	5	2	2	2	2	2	4	0	24	35	35	35	
Giblin St	1946	EN23805270	0	0	1	2	3	1	1	2	0	4	2	1	4	2	1	1	1	1	0	13	20	18	18
	1974		0	0	2	0	2	2	3	1	0	6	5	5	4	2	1	1	1	2	0	21	29	29	29

+ Future value, † Abandoned quarry, § Operating quarry.

Totals in excess of 20 are indicative of poor sites on all grounds. An excellent site would score five or less for site and material evaluations (the provision of services is ignored) and nil for environmental factors. In practice the best environmental factor is also five or less and thus good sites will have services corrected totals of better than 16.

In the table the sites are grouped by areas.

(a)	south and west of Hobart	1-11
(b)	north-west	12-21
(c)	north-east	22-28
(d)	south and east	29-34

Table 1 presents all evaluations and the first summation is derived without reducing operating or proposed sites to any common basis. Since the first summation does not differentiate between operating or proposed sites and thus ignores the distorting effect of provided services or labour a second summation is given so that a more realistic comparison is possible. The second summation excludes the effect of Factors 4 and 17. The third summation excludes the effect of distance (factor 2) but is not claimed as a necessarily valid reduction economically. Factor 2 is a permanent economic factor whereas Factor 1 is a capital item and thus part of any establishment costs.

## DISCUSSION

### *Exclusions*

A number of sites may be excluded from further discussion due to particular location or poor reserve or poor quality of rock.

The material evaluation factor is a key consideration and general considerations suggest that a cut-off value of 6 is reasonable and 7 is marginal (compare original and present rating of Giblin Street). On this basis Sites 4, 5, 8, 9, 10, 11, 14, 17, 27, 28 and 34 may be excluded and Sites 3, 13, 16 and 25 regarded as marginal.

Several sites are absolutely untenable on environmental grounds and include 6, 7, 9, 12, 13, 14, 15, 32 and 34 as a result of position, total valuation or land use status (note present rating of Giblin Street).

Considering that any replacement quarry should have a long life (50-100 years) its concealment must also be a major factor. On this basis 1, 18, 24 and 33 must also be excluded.

Of the remainder, Sites 2 and 3 are distant from future demand and development which is expected to be east of the Derwent. Site 16 could be expected to develop in the same way as Giblin Street and would probably become unacceptable in a decade. Site 19 is very inaccessible and very distant and Site 20 has a less than optimum buffer zone although land purchases could alter this. Site 25 would probably become a significant eyesore in time even though not directly visible from present major roads. Due to its marginal status on other grounds it may thus be excluded.

Only Sites 21, 22, 23, 26, 29, 30 and 31 warrant serious consideration and significantly all except Site 21 lie east of the Derwent and include a bridge factor. Of these, two are operating quarries (Sites 26, 29) and on basis of the present evaluation the remainder may be rated in the following order: 30, 23, (21-22-31). Were a second bridge to be built in the vicinity of Risdon this rating would be (30-23), (21-22-31).

### Recommendation

Taking a very long term view Site 23 is probably the best for the following reasons:

- (a) Anticipated improvement of the road network east of Risdon and an additional bridge will resolve transport problems.
- (b) The growth of the city will be north and south of the site.
- (c) The site is in otherwise unusable land, is well shielded and will remain detached and out of sight.
- (d) Reserves of high grade rock are enormous and the area has capacity to yield large amounts of all grades and qualities.

In any event Sites 23 and 30 should be given close examination and fully tested. Site 22 may need to be overlooked as a result of possible public pressure, due to the nearness of the site to the Risdon Brook water storage although the only viable complaint might be dust fall into the storage.

Detailed site examination would require:

- (a) Outcrop, rock type evaluation.
- (b) Seismic surveys for overall estimation of overburden and poorer grades of rock. Minimum 50 x 150 m spreads, 10 x 50 m spreads.
- (c) Drilling to depths up to 50 m on a grid of 40-50 m or as a control to geophysical work. Minimum 10-12 holes.
- (d) An area of not less than 400 m x 400 m to be examined.
- (e) That the excavation be begun as a sampling of operation.

The reserve to be proved should be up to the limits provided in Factors 6 and 7 and the life of the quarry should be at least a century. Special preservation orders and mining regulations would be necessary to ensure adequate protection and development of any chosen site.

### *Comments on Giblin Street Quarry*

The rating of the Giblin Street Quarry in 1946 (before commencement of operations) and 1974 is included for comparative purposes. As might be expected in view of zoning changes and city expansion the evaluation verifies the known incompatibility of the site. More important, however, is the original rating of 18 (sum 2) which does not compare favourably with many of the other, and often more distant, proposed sites. It can only be concluded that it was a fair site in 1946. Certainly it was not a good one, as developments have shown and this lends support to the implication that a rating of 14 or better relates to good sites.

### *Other Operating Quarries*

The Bridgewater (basalt) quarry and that in Flagstaff Gully are recognised as above average sites. Great care and planning will be needed to ensure no deterioration in rating in future. Little good can be said about Glenorchy Quarries in Jackson Street and this operation may need close examination; especially if Giblin Street is closed.

### CONCLUSION

The rating method described in this report, although admittedly subjective, permits an evaluation of prospective or existing quarries in respect of rock quality and environmental factors. A small number of potentially very good sites are indicated and should be further assessed. It is also apparent

that integrated planning and development procedures must be used with respect to sites of extractive industries so as to ensure long life and minimum disruption within the community. To enable most efficient working within the quarry region it might also be advisable for governmental or municipal authorities to own the quarry site and buffer zone and lease the site on a long term basis under certain operational restrictions and conditions. Such conditions should only apply to safety, environmental factors and general mining practices.

The evaluation demonstrates that the Giblin Street site of Hobart Quarries was never ideal, or even good, and should be examined critically in relation to other far more acceptable possibilities.

The best sites are in the Craigow-Grass Tree Hill region although this region is indicated on the basis of factors not rigorously related to the economics of operating.

Selection of the actual site would depend on costing of the pertinent economic factors.

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- (a) That the extraction is based on a system of operation.
- (b) No trace of any rock was seen at a depth of 10-15 m.
- (c) Drilling to depths of 10-15 m on a grid of 40-50 m or so as a control to geological work. Minimum 10-15 m.
- (d) Drilling to depths of 10-15 m on a grid of 40-50 m or so as a control to geological work. Minimum 10-15 m.
- (e) Drilling to depths of 10-15 m on a grid of 40-50 m or so as a control to geological work. Minimum 10-15 m.

The results to be proved should be as per the lists provided in factors 6 and 7 and the list of the quarry should be of grade 1. Special investigation should be made regarding the necessity to ensure adequate protection and development of the quarry site.

### Comments on Giblin Street Quarry

The rating of the Giblin Street Quarry in 1968 before commencement of operations and 1974 is included for comparative purposes. As might be expected in view of the changes and city expansion the evaluation reflects the known inoperability of the site. More important, however, is the only last rating of 10 in 1974 which does not compare favourably with many of the other, and other sites. It can only be concluded that it was a fair site in 1968. Certainly it was not a good one, as developments have shown and this leads support to the suggestion that a rating of 10 or better relates to good sites.

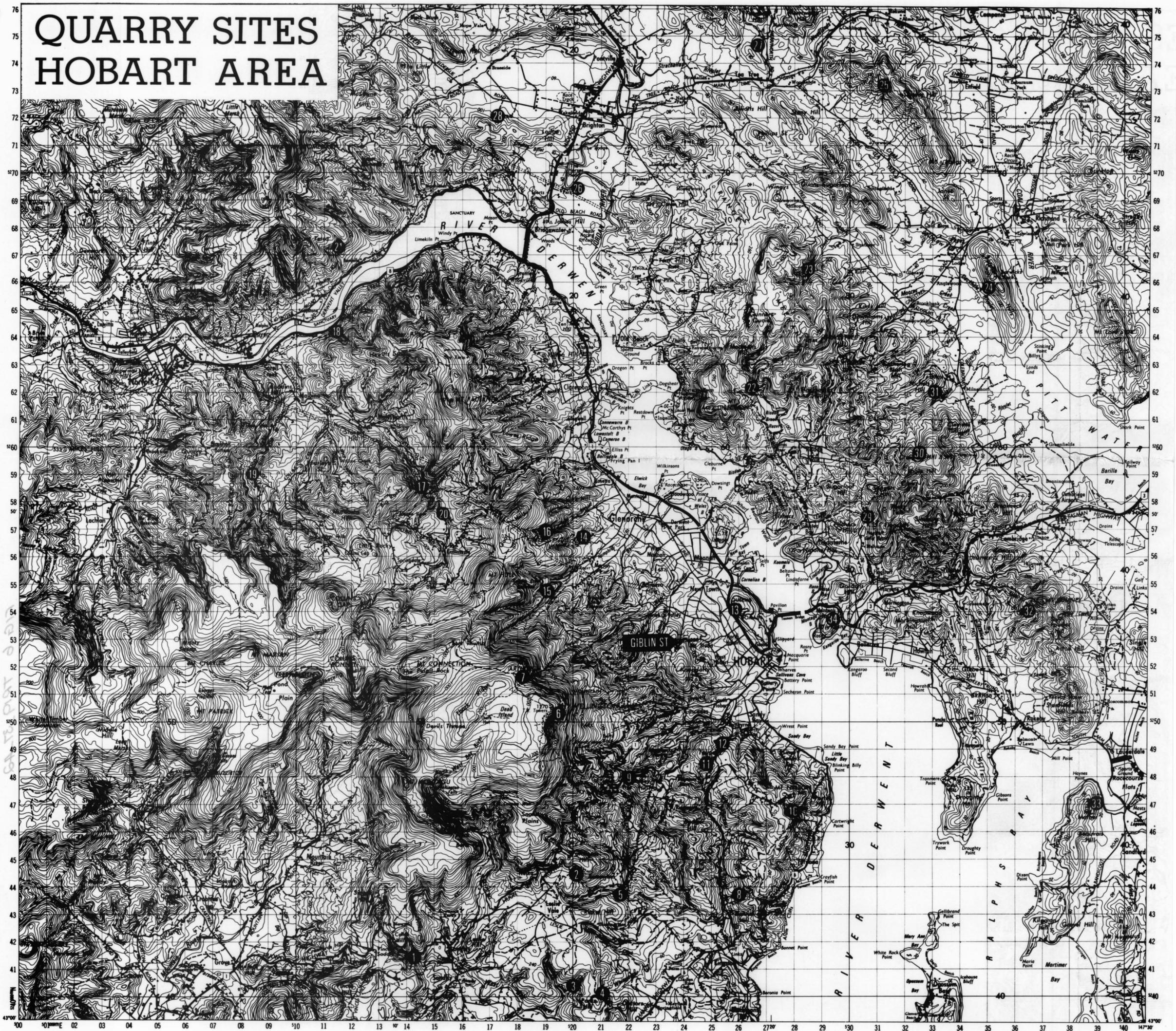
### Other Quarrying Details

The Stridewater (local) quarry and that in Flaxstaff Gully are recorded in above average class. Great care and planning will be needed to ensure no deterioration in rating in future. Little good can be said about quarrying in Hobart Street and this operation may need close examination especially if Giblin Street is closed.

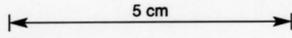
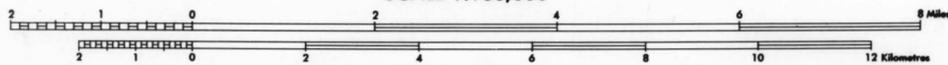
### CONCLUSION

The rating method described in this report, although admittedly subjective, permits an evaluation of prospective or existing quarries in respect of rock quality and environmental factors. A small number of potentially very good sites are tabulated and should be further assessed. It is also apparent

# QUARRY SITES HOBART AREA



SCALE 1:100,000



TR19-37-42

Tech. Rep. Dep. Mines 19

Figure 6