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Estimate of dolerite reserves, Giblin Street property of Hobart Quarries Pty Ltd.

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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.

Estimation of available reserves, and their distribution, is necessary to evaluate any present or future claims by the operators in respect of:

(1) quarry life,
(2) quarry management necessities,
(3) quarry economy, proportion of overburden; poor quality versus high quality material; and
(4) compensation, should that be necessary.

ASSUMPTIONS

The following assumptions have been made in calculating material estimates for an orderly operation.

(1) That the quarry is operated to a coherent plan and excavated to a base level of 195 m (640 ft) which is the floor level of the original quarry.
(2) That the operation, when complete, leave benches with a face slope of 75-80°, a height of 9 m and width of 6 m.
(3) That the Hydro-electric Commission transmission lines are moved enabling full and orderly working of the lease.
(4) That the seismic estimates of what constitutes overburden, fair rock or good rock are valid. Seismic velocities of 1000 m/s or less are related to soil and highly decomposed rock and velocities in excess of 4500 m/s to good rock. First grade, fresh, massive rock normally has a velocity in excess of 5200-5500 m/s.
(5) That the material classed as 'good' rock is wholly usable and that there will be no significant losses due to zones of weathering.

MEANS OF ASSESSMENT

Two types of assessment have been used. The first, or geological, considers the nature of surface exposures and landforms as well as the rock characters displayed in the many cuts, excavations and quarry faces displayed on the site. The second, or geophysical, considers the seismic character of the rock with depth. The seismic character can be related to rock quality as indicated by assumption 4 above. Several seismic tests were made at random locations on lease 615P/M.

MATERIAL ESTIMATES

For the purposes of this assessment the property has been divided into four parts (fig. 1).

(1) The region of the present main quarry (Area A).
(2) The area covered by lease application 875P/M (Area B). Part of this area has already been quarried.
(3) Area C is defined as that portion of lease 615P/M south of the spoils dump and with its south-east corner on the line of

the H.E.C. easement.
(4)   Area D is defined as that area south of Area C.

Area A, the main quarry, displays a considerable weathering profile. There is a zone of slightly weathered dolerite ranging from 5 to 9 m thick overlain by a thin veneer of soil. The dolerite exposed is medium-grained and the basic joint network is wide and columnar.

Area B is very similar to Area A but, as the face is cut down the hillside in the present excavation, more weathering problems are apparent. Seismic results south of Area B confirm a thickening wedge of weathered rock downslope.

Area C generally contains less than 1-2 m of soil and very decomposed rock but up to 15 m of partially weathered rock (maximum seismic velocity 3500-4000 m/s). Weathering is less extreme in the eastern portion of the area and the thickness of weathered rock is as little as 6 m in places. Sandstone and mudstone are exposed in the south-west portion of the area and the dolerite is fine-grained and weathered as a consequence of being near a contact. Up to 15 m of sandstone occurs in the south-west corner of Area C.

Area D is also not wholly dolerite; the western third and part of the southern side of the area is of sandstone or siltstone. The southern boundary of the dolerite is a fault and there is a broad zone of shattered, decomposed rock. There is a small quarry in this zone and only toward the eastern boundary of the lease does the quality of the rock improve. More than 20 m of poor quality rock is common across the whole area.

The estimates for recoverable reserves in each area are summarised below. The figures are regarded as absolute maxima.

Area	Fair/poor rock (m^3)	Good rock (m^3)
A	not calculated (nil?)	160 000
B	230 000 (110 000)*	250 000 (120 000)*
C	130 000	310 000
D	900 000	700 000
	1 260 000 (1 140 000)*	1 420 000 (1 290 000)*

*The estimate for Area B presumed that it has not been worked. However due to oversight it has been partially quarried and although it is not possible to accurately determine what proportion has been removed it is thought that 50% is a conservative figure. Thus the remaining recoverable reserve will be about 120 000 m^3 and the adjusted total 1 290 000 m^3.

Extraction from zones C and D is conditional on removal of the H.E.C. lines since only part of C could be worked directly.

In addition complete extraction of the above rock reserves would require removal of 330 000 m^3 of soil and weathered sandstone. As it is unlikely that the large volume of overburden and poor rock could be sold some special arrangements would be necessary so as to place a possible 800 000-1 000 000 m^3 of this material on the site.

If the average density of good rock is taken as 2850 kg/m^3, based on texture and mineralogy, and assuming no losses due to weathering or treatment then the available tonnage of acceptable rock is 3 700 000 t (including 460 000 t from Area A and 347 000 t from Area B). At the present rate of extraction (200 000 t/yr) the maximum life of the quarry is about 18 years

(but only about 4 years if only Areas A and B are worked).

It is possible that massive kernels of dolerite will be recovered from the fair/poor zone but these may require a larger crusher or secondary blasting. It is unlikely that the overall quality or quantity of such kernels will make them attractive economically.

CONCLUSIONS

(1) The maximum reserve of good rock is estimated at 1 290 000 m^3.

(2) The maximum reserve of fair/poor rock is estimated at 1 140 000 m^3.

(3) To recover the above reserves up to 330 000 m^3 of overburden must be removed.

(4) The life of the quarry is definitely limited and purely dependent on the evolution of a coherent plan of working. Removal of the H.E.C. transmission line could extend the life of the quarry from little more than four years to 18 years at present rates of extraction.

(5) The reserve could be increased by lowering the base level of the operation but this could produce drainage problems unless the water is carried to McRobies Gully.

(6) There is likely to be a problem with respect to the size of the waste dump. It will be awkward to place and very visible to residents in neighbouring areas. The stability of a large dump on a hilltop would also need careful consideration.
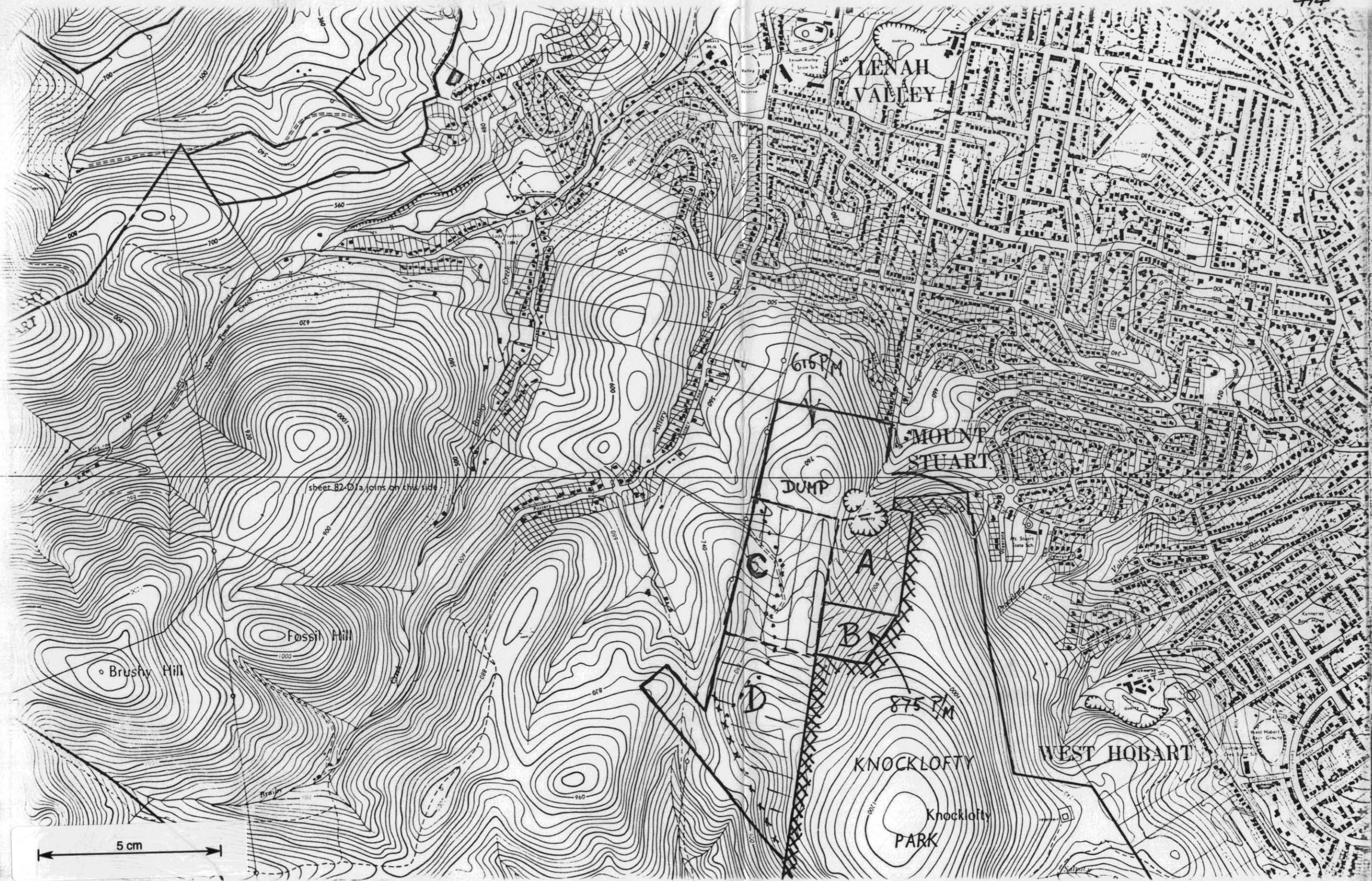
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FIGURE 1

(APPROX) •••• DOLERITE CONTACT ××× TERMINATION OF DOLERITE