



# A seismic survey in the Proctors Road area

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## Abstract

A refraction seismic survey in the Proctors Road area has shown that the dolerite is variably weathered and/or strongly jointed to depths of up to 30 metres. There is a strong likelihood that appreciable thicknesses of overburden overlies competent rock in parts of the area.

## INTRODUCTION

A refraction seismic survey in the area south of Badger Hill and to the west of Proctors Road was undertaken at the request of V. M. Threader, Consulting Geologist. The area is being examined to assess whether it is likely to be suitable for the development of a quarry to produce crushed blue metal. The area has been mapped as being underlain by Jurassic dolerite.

The survey consisted of eleven spreads with a geophone spacing of 7.5 metres. The spreads were fired at each end. Ten of the spreads were laid out along a track, making the traverse length almost one kilometre, while the other spread was fired across the traverse line towards the northern end.

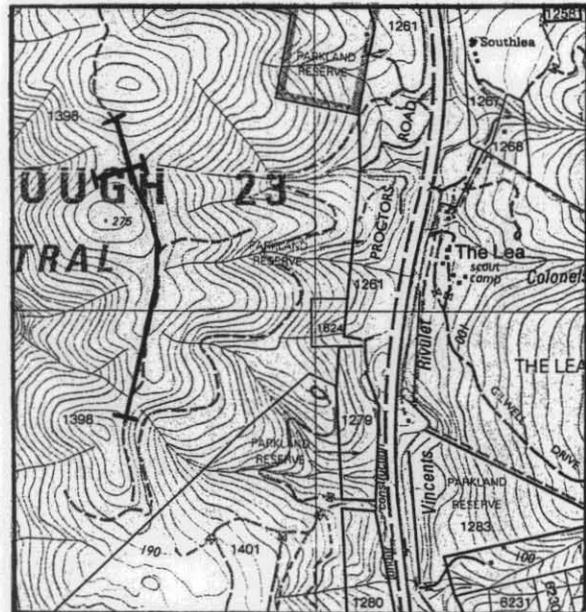
## INTERPRETATION OF SEISMIC RESULTS

Interpretations show that the dolerite is weathered and/or strongly jointed to considerable depths under the whole length of the traverse and under the one cross spread. Dolerite with no weathering and little open jointing is indicated under only three or four spreads, i.e. where indicated velocities were about 4000 m/sec or greater, and in each case at fairly deep levels. One spread (10) has no high velocity material indicated, and it is unlikely that material with a velocity of 3500 m/sec or greater is any closer to the surface than 20 m or more (on the ends of the spread).

The results are presented in Table 1.

Table 1. Results of seismic refraction survey

Spread No.	V <sub>0</sub> (m/sec)	Thickness (m)	V <sub>1</sub> (m/sec)	Thickness (m)	V <sub>2</sub> (m/sec)
1	500	0.5–3 m	1600	5–17 m	4200
2	750	2–3 m	1350	3–55 m	2475
3	450	2–3 m	1250	8–15 m	3040
4	400	5–8 m	1610	2–23 m	2380
5	450	2–3 m	1500	2–8 m	2300
6	650	2–6 m	2260	10–30 m	4800
7	850	0.8–4 m	1950	13–19 m	3000
8	950	0.5–6 m	1650	11–26 m	3900
9	1000	1–3.5 m	1700	19–29 m	6000
10	750	1–3 m	2000	20+?	—
11	500	2–3 m	1900	19–29 m	3775



Material with velocities of 400 to 1000 m/sec is likely to represent mainly soil, loose rock and talus, with perhaps some very weathered rock. The second layer material has velocities ranging from 1250–2260 m/sec. The lower part of this velocity range is possibly also due to compacted clay and talus on deeply weathered dolerite. Where the velocity is greater than 1600 m/sec, it probably represents *in situ* weathered dolerite. Material with seismic velocities in the range of 2000–3000 m/sec is probably less weathered dolerite or very jointed dolerite.

The lower refractor has a variable velocity, and any velocity up to 3000 m/sec is probably indicative of some weathering, although strong open jointing could produce the same result. Velocities of about 4000 m/sec and above are expected to represent relatively fresh rock.

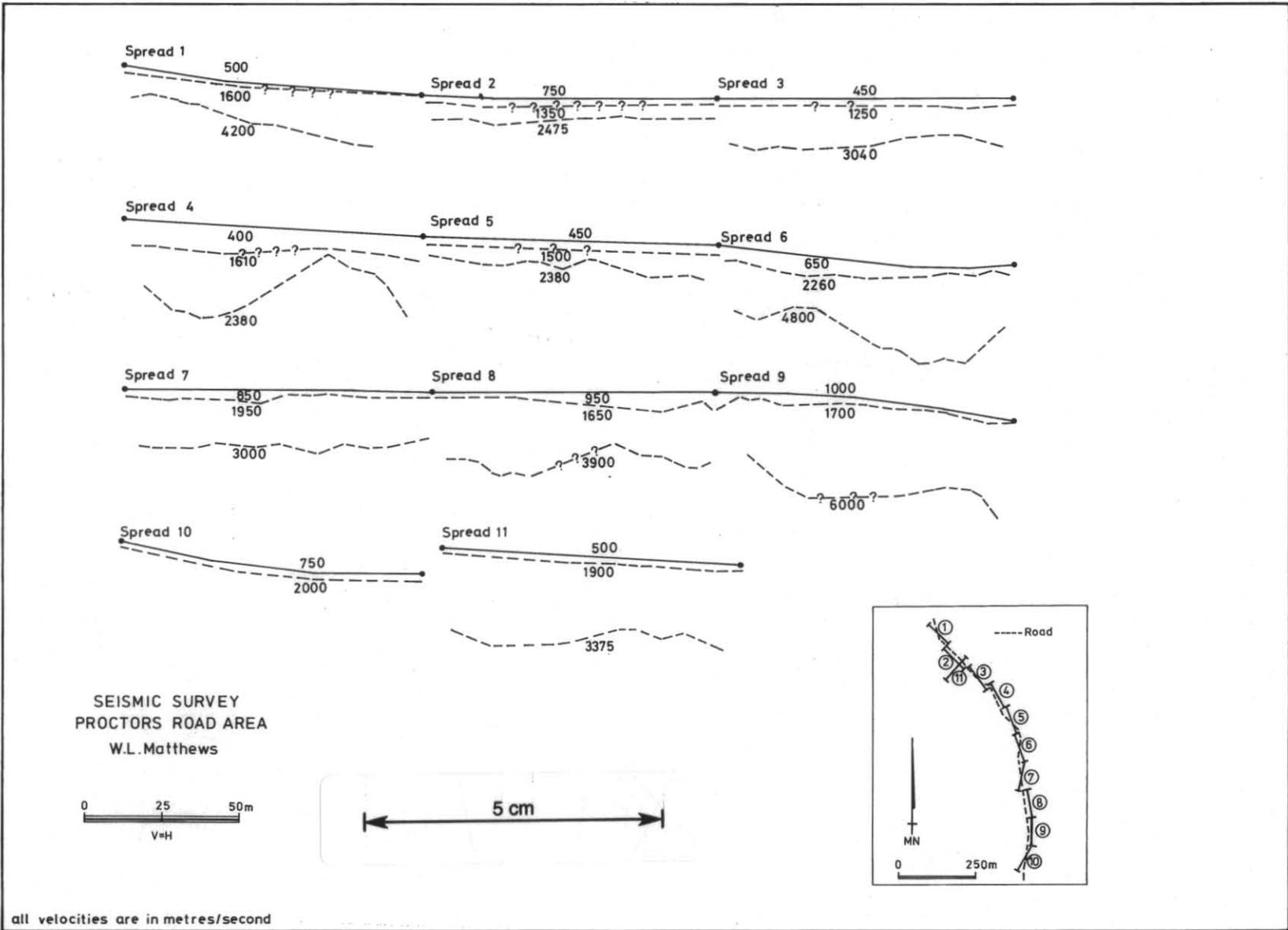


Figure 1.

**CONCLUSIONS**

The seismic survey indicates that the dolerite has low to moderate seismic velocities to relatively deep levels, and this is likely to be due to deep weathering, fracturing, or

both. Material with velocities of less than 4000 m/sec is likely to extend to depths of at least 20-35 m in many locations in the area.

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## APPENDIX 1

## Time/distance data

*Spread 1*

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0	-	0
1	15	7.5
2	20	15
3	24	22.5
4	28	30
5	31	37.5
6	33	45
7	35	52.5
8	40	60
9	41	67.5
10	40	75
11	42	82.5
12	?	90

*East shot*

0	-	0
1	-	7.5
2	9	15
3	13	22.5
4	19.5	30
5	24.5	37.5
6	25	45
7	29.5	52.5
8	33	60
9	34	69.5
10	35	75
11	37	82.5
12	38	90

*Spread 2*

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	10	7.5
2	18	15
3	21.5	22.5
4	24.5	30
5	27	37.5
6	30	45
7	32	52.5
8	35	60
9	37	67.5
10	41	75
11	43	82.5
12	46.5	90

*East shot*

0		0
1	10	7.5
2	15.5	15
3	19	22.5
4	22	30
5	25	37.5
6	28	45
7	32	52.5
8	35	60
9	39	67.5
10	43	75
11	46.5	82.5
12	47	90

*Spread 3*

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	14	7.5
2	21	15
3	26.6	22.5
4	31	30
5	34.5	37.5
6	39	45
7	43	52.5
8	46	60
9	49	67.5
10	50	75
11	53.5	82.5
12	51 or 58	90

*East shot*

0		0
1	17	7.5
2	24	15
3	30	22.5
4	35	30
5	40	37.5
6	45	45
7	48	52.5
8	50	60
9	53	67.5
10	55	75
11	56	82.5
12	59	90

*Spread 4*

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	20	7.5
2	25.5	15
3	30.5	22.5
4	36	30
5	38	37.5
6	42	45
7	47	52.5
8	49	60
9	52	67.5
10	55	75
11	56.5	82.5
12	60	90

*East shot*

0		0
1	18	7.5
2	21	15
3	26	22.5
4	28.5	30
5	34	37.5
6	37	45
7	42	52.5
8	44	60
9	50	67.5
10	51	75
11	54	82.5
12	58	90

**Spread 5**

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	15	7.5
2	20	15
3	25	22.5
4	27	30
5	30	37.5
6	36	45
7	37	52.5
8	41	60
9	48	67.5
10	52	75
11	55	82.5
12	56.5	90

<i>East shot</i>		
0		0
1	16.5	7.5
2	21	15
3	26.5	22.5
4	33	30
5	35	37.5
6	39	45
7	41	52.5
8	43	60
9	46	67.5
10	49	75
11	53	82.5
12	54	90

**Spread 6**

<i>West shot</i>		
0		0
1	16	7.5
2	22	15
3	27	22.5
4	31	30
5	33	37.5
6	37	45
7	38.5	52.5
8	41.5	60
9	43	67.5
10	44.5	75
11	45	82.5
12	45	90

<i>East shot</i>		
0		0
1	7.5	7.5
2	12.5	15
3	15.5	22.5
4	23	30
5	27	37.5
6	30	45
7	34	52.5
8	37	60
9	40	67.5
10	42	75
11	44	82.5
12	46	90

**Spread 7**

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	10	7.5
2	14	15
3	18	22.5
4	23.5	30
5	26	37.5
6	31.5	45
7	32	52.5
8	35	60
9	38	67.5
10	38	75
11	42	82.5
12	44	90

<i>East shot</i>		
0		0
1	7.5	7.5
2	11	15
3	15	22.5
4	17	30
5	22.5	37.5
6	25	45
7	27	52.5
8	33	60
9	37	67.5
10	39	75
11	42.5	82.5
12	45	90

**Spread 8**

<i>West shot</i>		
0		0
1	7	7.5
2	10	15
3	15	22.5
4	20	30
5	24	37.5
6	29	45
7	34	52.5
8	39	60
9	42.5	67.5
10	46	75
11	47.5	82.5
12	50	90

<i>East shot</i>		
0		0
1	9	7.5
2	17.5	15
3	23.5	22.5
4	29	30
5	32	37.5
6	38	45
7	40	52.5
8	44	60
9	47	67.5
10	47.5	75
11	51	82.5
12	50	90

**Spread 9**

Geophone	Time (m/sec)	Distance (m)
<i>West shot</i>		
0		0
1	6	7.5
2	13	15
3	20	22.5
4	23	30
5	24	37.5
6	28	45
7	33.5	52.5
8	38.5	60
9	41.5	67.5
10	42.5	75
11	43	82.5
12	44.5	90

<i>East shot</i>		
0		0
1	12	7.5
2	12	15
3	15	22.5
4	20	30
5	26	37.5
6	32	45
7	36.5	52.5
8	40	60
9	45	67.5
10	48	75
11	51.5	82.5
12	50	90

**Spread 10**

<i>West shot</i>		
0		0
1	10	7.5
2	12	15
3	15	22.5
4	18	30
5	22	37.5
6	27	45
7	29	52.5
8	34	60
9	37.5	67.5
10	42	75
11	45	82.5
12	49	90

<i>East shot</i>		
0		0
1	10	7.5
2	12.5	15
3	17	22.5
4	20	30
5	24	37.5
6	29	45
7	30	52.5
8	38	60
9	40	67.5
10	41	75
11	44	82.5
12	47	90

**Spread 11**

Geophone	Time (m/sec)	Distance (m)
<i>North shot</i>		
0		0
1	11	7.5
2	15	15
3	19.5	22.5
4	23.5	30
5	28	37.5
6	31.5	45
7	35	52.5
8	36	60
9	39	67.5
10	43	75
11	42	82.5
12	46	90

<i>South shot</i>		
0		0
1	13	7.5
2	16.5	15
3	20	22.5
4	24	30
5	28	37.5
6	31	45
7	37.5	52.5
8	44	60
9	45	67.5
10	47	75
11	50.5	82.5
12	52	90