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Record 1973/88



INVESTIGATION FOR GRAVEL

MONARO HIGHWAY, WILLIAMSDALE, ACT.

by

R.J. HANSEN & E.G. WILSON

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1. Location map
2. Location of hand-auger holes and proposed gravel pit
3. Location of test pit, auger holes, and seismic traverses

SUMMARY

Supplies of gravel that roughly conform to the specifications for plastic gravel laid down by the Department of Works are available near Williamsdale, ACT. The gravel is a slope-wash deposit derived from and overlying acid volcanic rock. It contains boulders and appears to be a shallow deposit. Laboratory tests on samples taken from a test pit indicate that the material to a depth of at least 2 m is marginally suitable for road construction. Provisional estimates place indicated reserves at 2 000 m³, inferred reserves at 6 000 m³, and possible additional reserves of another 2 000 m³.

Additional testing of this deposit is not warranted as the reserves are not adequate for development.

INTRODUCTION

In June 1970 the former Department of the Interior (now the Department of the Capital Territory) requested the Bureau of Mineral Resources (BMR) to locate a deposit of plastic gravel in the Williamsdale area, ACT. Plastic gravel is used extensively for forming the shoulders of sealed roads and for surfacing unsealed roads. As specified by the Commonwealth Department of Works, such gravel must have a plasticity index (PI) of between 2 and 9, depending on its grade, and its grade must also lie within specified limits (Appendix 1).

Plastic gravel, consisting of crushed weathered rock, has been extracted from several privately owned pits, but an alternative source of supply is now required. The Department of the Capital Territory has specified that such gravel deposits should comply with the following conditions; they should be

- 1) close to existing roads;
- 2) out of view from a major road;
- 3) on Commonwealth land;
- 4) the material must be easily quarried; and
- 5) the site must be free of water problems.

The restrictions limited investigations to Block 17, Lanyon District (Fig. 1) and excluded other Commonwealth-owned blocks from the search.

GEOLOGY, WEATHERING, AND SOILS

The rocks of the Williamsdale area form part of the Middle Silurian Colinton Volcanics (Strusz, 1971). They include welded tuffs and acid volcanics with lenses of sedimentary rock.

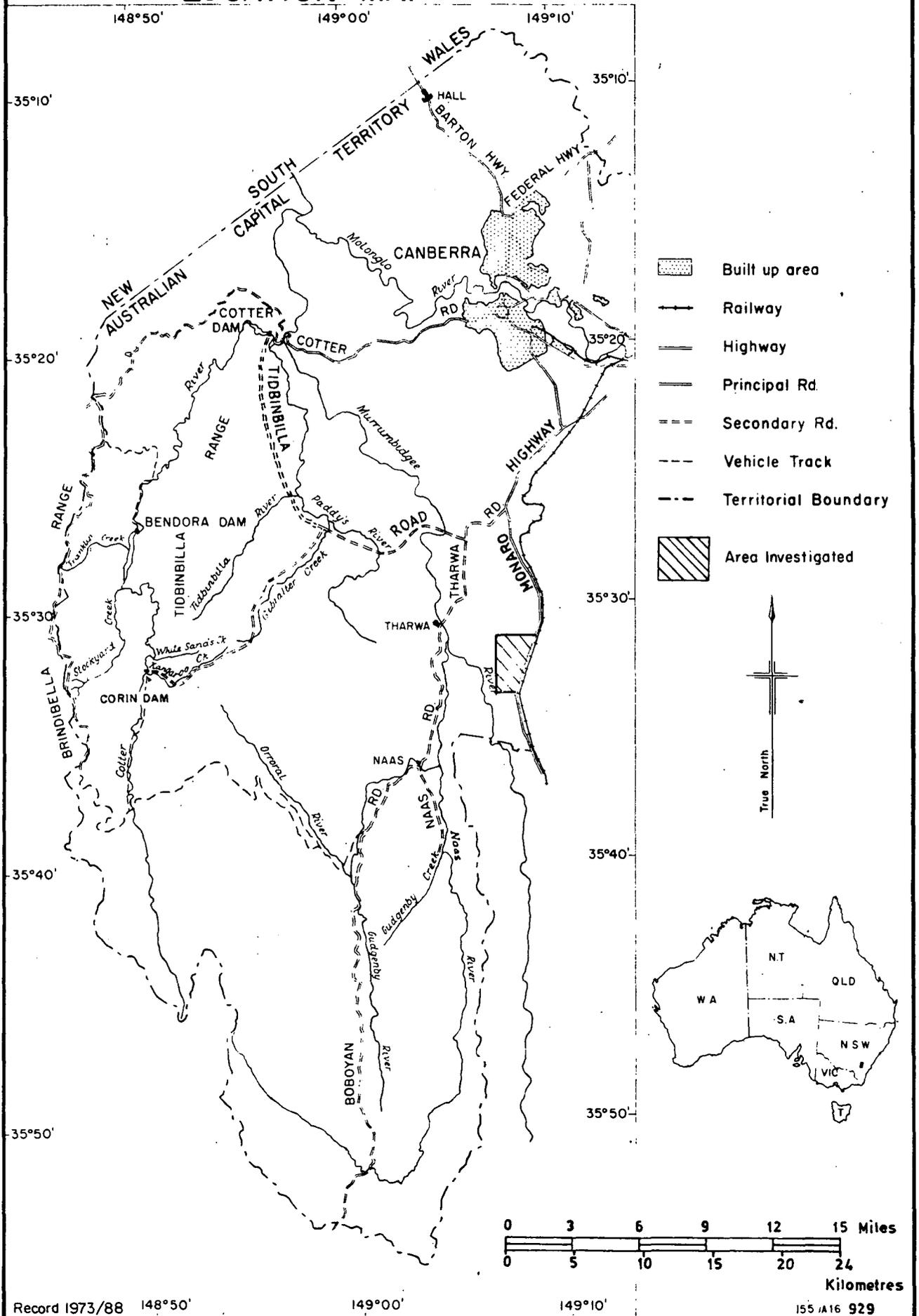
Volcanic rock normally weathers to plastic or semi-plastic gravel; however the thickness of completely weathered rock in the Williamsdale area is generally not more than one metre. Shallow soil* overlies the rock on the higher ground, and slope-wash and scree deposits have accumulated in the valleys

* The terms 'soil' and 'rock' are used in the engineering sense in this report. 'Soil is a natural aggregate of mineral grains that can be separated by such gentle mechanical means as agitation in water. Rock on the other hand is a natural aggregate of minerals connected by strong and permanent forces' (Terzaghi & Peck, 1969).

FIGURE 1

PROPOSED GRAVEL PIT, MONARO HIGHWAY, WILLIAMSDALE, A.C.T.

LOCATION MAP



and on the lower slopes of the ridges. It was decided to test the suitability of the valley deposits for use as plastic gravel.

METHODS AND RESULTS

Augering

Hand-auger holes were drilled along and across the four most accessible valleys in Block 17 (Fig. 2). The suitability of the material for use as plastic gravel was estimated by kneading the moistened material. Of the valleys tested, one (Fig. 3) contains material that may be suitable for use as plastic gravel. To establish the depth of this material, three auger holes (Fig. 3) were drilled with a mechanical Proline auger to auger refusal, which was 2m in all holes. The refusal was attributed to the auger's inability to penetrate indurated slope-wash rather than rock at that depth.

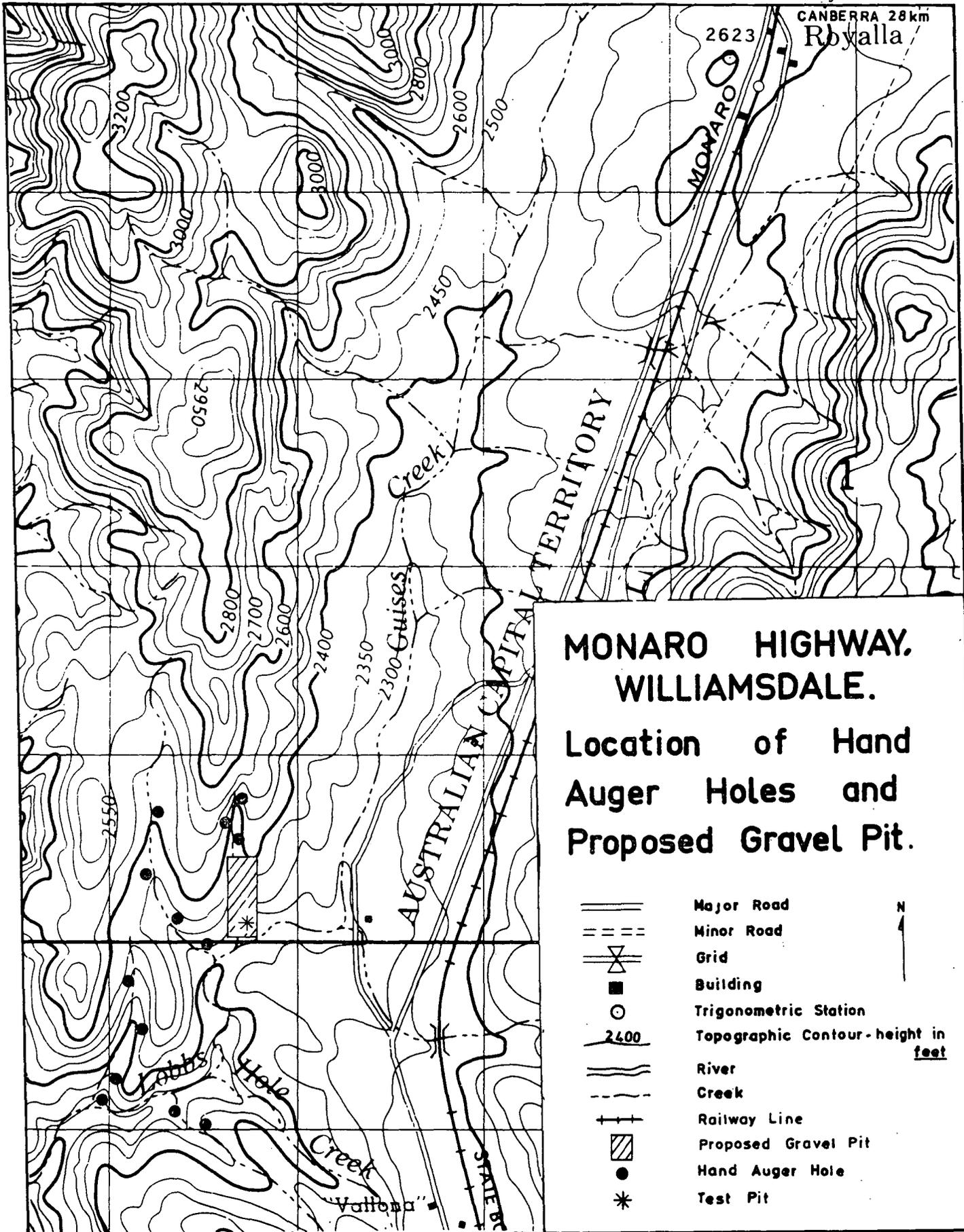
Test pit

A test pit was dug (Fig. 3) to a depth of 2.5 m, below which the material was too indurated to excavate by hand.

The profile encountered in the pit was:

- | | |
|-----------|--|
| 0-0.5 m | Yellow clayey slopewash, well graded but porous; partly cemented, with honeycomb structure |
| 0.5-1 m | Grey porous well-graded, weakly-cemented slopewash; small but variable clay content |
| 1-1.5 m | Orange ironstained gravel with high clay content; partly cemented |
| 1.5-2.5 m | Light grey fine-grained indurated slopewash; the cement content increases with depth to form a well-indurated material at 2.5 m. |

Figure 2
 CANBERRA 28 km
 Rbyalla



MONARO HIGHWAY, WILLIAMSDALE.

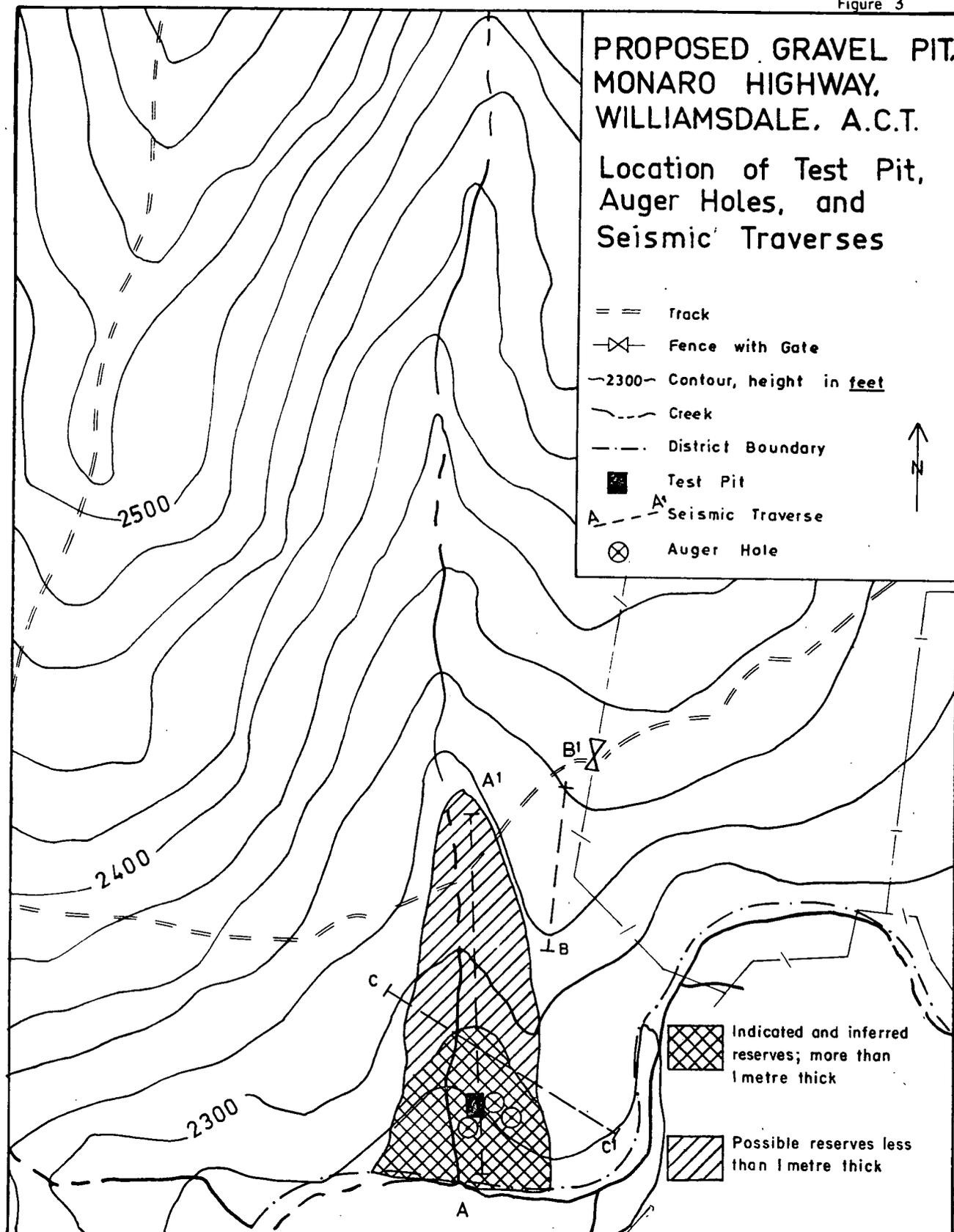
Location of Hand
 Auger Holes and
 Proposed Gravel Pit.

- ==== Major Road
- == == Minor Road
- X --- Grid
- Building
- Trigonometric Station
- 2400 Topographic Contour - height in feet
- ~~~~ River
- - - - Creek
- + + + + Railway Line
- ▨ Proposed Gravel Pit
- Hand Auger Hole
- * Test Pit



AMENDMENTS				SCALE		COMMONWEALTH OF AUSTRALIA BUREAU OF MINERAL RESOURCES CANBERRA, A.C.T.		
No.	Description	Author	Checked	0	1/4	1/2	Mile	TITLE LOCATION OF PROPOSED GRAVEL PIT
A1				0	1/2	1	Kilometre	
A2				Base map/survey 1:50,000 Military map, Michelago (enlarged)				
A3				Geology by R. J. Hansen				To accompany Record 1973/88
A4				Compiled and checked		Checked and approved		
A5				Project geologist		Senior geologist		Drawing No. 155/A16/930
				Supervising geologist				

Figure 3



**PROPOSED GRAVEL PIT,
MONARO HIGHWAY,
WILLIAMSDALE, A.C.T.**

**Location of Test Pit,
Auger Holes, and
Seismic Traverses**

- == Track
- ⊗ Fence with Gate
- 2300- Contour, height in feet
- Creek
- - - District Boundary
- Test Pit
- A - - - Seismic Traverse
- ⊗ Auger Hole

-  Indicated and inferred reserves; more than 1 metre thick
-  Possible reserves less than 1 metre thick

AMENDMENTS				SCALE		COMMONWEALTH OF AUSTRALIA BUREAU OF MINERAL RESOURCES CANBERRA, A.C.T.		
No.	Description	Author	Checked	0 200 400 Feet		TITLE		
A1				0 50 100 Metres		LOCATION OF TEST PIT, AUGER HOLES & SEISMIC TRAVERSES		
A2				Base map/survey		PROJECT		
A3				Geology by R. J. Hansen		WILLIAMSDALE GRAVEL INVESTIGATION		
A4				Compiled and checked		To accompany Record 1973/88		Drawn by M.P.E.
A5				Project geologist		Checked and approved		Drawing No. 155/A16/931
				Supervising geologist				

Bulk samples were taken from the pit and tested for plasticity.

Bulk sample PI = 6.5%

Ironstained layer (1-1.5 m) PI = 8%

Bulk sample below 1.5 m PI = 4.5%

The responses of samples re kneading suggested that material to a depth of 1.5 m might be suitable as plastic gravel. A visual inspection of the bulk sample below 1.5 m indicated that it may be too fine-grained as plastic gravel; a particle-size analysis of this sample indicates a predominance of fine-grained material, and the grading curve lies outside the limits imposed by the Department of Works' specifications (see Appendix 1).

The modified compaction test of material from the bulk sample gave a maximum dry density of 2.15 g/cm^3 at an optimum moisture content of 6.4%. Materials used as plastic gravel generally have a maximum dry density of between 2.07 and 2.25 g/cm^3 .

Seismic traverses

In order to estimate the probable depth and extent of the gravel deposit, BMR recorded seismic profiles on traverses along and across the valley (Bishop, 1973), as shown in Figure 3. The seismic work failed to locate any layer with a velocity close to that of slope-wash; as seismic records would not readily detect slope-wash less than 3 m thick, the thickness of the deposit is unlikely to be deeper than indicated in the test pit.

CONCLUSIONS

The deposit has a relatively shallow thickness, about 2.5 m. Indicated reserves from test pit, augering, and exposures in erosion gullies are $2\ 000 \text{ m}^3$ of plastic gravel. Less reliable data from the hand-auger holes and the topography of the area place the inferred reserves at about $6\ 000 \text{ m}^3$. The indicated and inferred reserves are best evaluated by systematic drilling and sampling of the deposit, and by testing the samples obtained; additional reserves of $2\ 000 \text{ m}^3$ may be proved from the possible reserves less than 1 m thick to the north of the main deposit.

The deposit is not of sufficient size to warrant additional investigation.

REFERENCES

- BISHOP, I.D., 1973 - Gravel for rural roads seismic refraction surveys near Tharwa and Williamsdale, A.C.T. 1972. Bur. Miner. Resour. Aust. Rec. 1973/40
- BUREAU OF MINERAL RESOURCES, 1977: Internal file 1977/348.
- STRUSZ, D.L., 1971 - Canberra, Australian Capital Territory and New South Wales 1:250 000 geological series. Bur. Miner. Resour. Aust. explan Notes SI/55/16.
- TERZAGHI, K., & PECK, R.B., 1969 - SOIL MECHANICS IN **ENGINEERING PRACTICE** New York, John Wiley.

APPENDIX 1

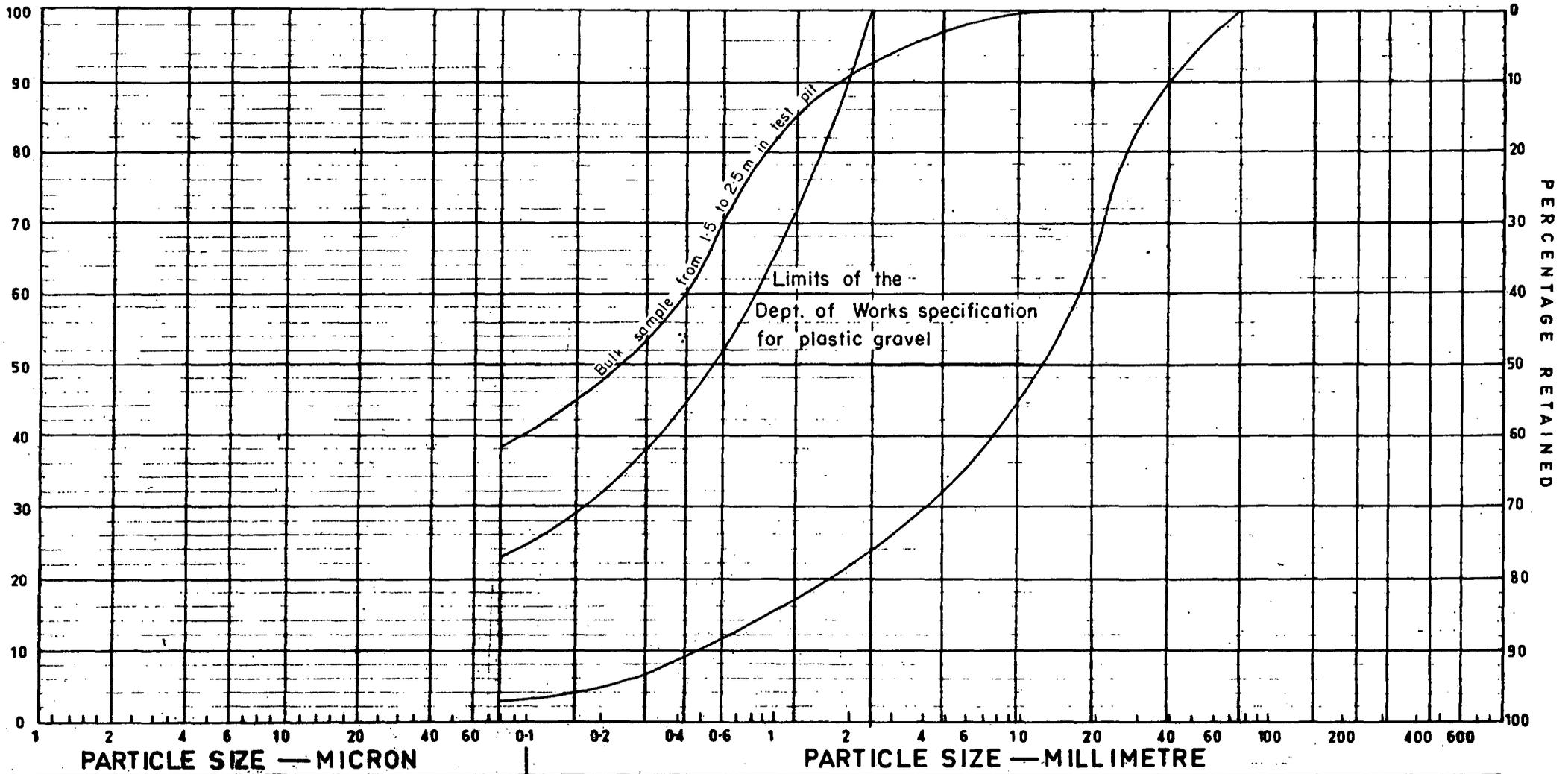
PARTICLE-SIZE DISTRIBUTION CHART

PARTICLE SIZE DISTRIBUTION CHART

APPENDIX I

B. S. STEVE

#200 #100 #52 #36 #25 #14 #7 $\frac{3}{16}$ $\frac{1}{4}$ $\frac{3}{8}$ $\frac{1}{2}$ $\frac{3}{4}$ 1" 1 $\frac{1}{2}$ " 3" 4 $\frac{1}{2}$ " 6" 9" 12" 18" 24" 36"



CLAY	SILT			SAND			GRAVEL			COBBLES	BOULDERS
	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE	FINE	MEDIUM	COARSE		