DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

REPT. BK. NO. 81/63
THE MOUNT SCHANK VOLCANIC ASH DEPOSIT AUGER DRILLING 1981
Sections 346, 347, 429, 62
Hd. MacDonnell (District Council of Port MacDonnell)

GEOLOGICAL SURVEY

By

A.M. PAIN

DME. 189/78

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DEPARTMENT OF MINES AND ENERGY
SOUTH AUSTRALIA

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(District Council of Port MacDonnell)

ABSTRACT

The District Council of Port MacDonnell uses volcanic ash from the eastern flank of the Mount Schank volcanic cone to increase the durability of unsealed limestone rubble roads.

The quarry has been closed by the Chief Inspector of Mines because of instability of the quarry faces.

14 auger holes totalling 67.8 m were drilled in February 1981, and proved that the only sources of ash available to the Council lie beneath the road adjacent to the quarry, and beneath a pine plantation which occupies the site of a former council ash quarry.

This Department will provide assistance in the preparation of working plans for the ash deposit beneath the road reserve.

INTRODUCTION

Limestone rubble won from borrow pits in Gambier Limestone, Bridgewater Formation, or calcrete is used extensively for roadmaking throughout the Southeast of South Australia. Open surface roads constructed of these materials are often susceptible to erosion and pot-holing. The District Council of Port MacDonnell has minimized this problem for many years by working volcanic ash into the road surface, to increase its wearing properties.

Prior to opening a quarry in volcanic ash on section 347, in about 1948 (Fig. 2), Council obtained similar material from a pit on section 62 which is currently the site of a small pine plantation (Fig. 3).

The present quarry was investigated by Waterhouse (1972) who warned of the long term instability of the quarry faces.

Operations at the quarry were stopped on 25 February 1977 by an order placed under Section 10(1) of the Mines and Works Inspection Act because of danger to men working below a slip which had occurred above the working area.

Permission to recommence operations was granted, and between September 1979 and February 1980 approximately 3 900 m^3 of material are reported to have been removed. Bulldozing operations at the working face were prohibited by an order of the Chief Inspector of Mines on 13 February 1980.

At the request of this Department, officers of the Soils and Foundations Section of the E. & W.S. Department undertook an investigation into the stability of the quarry using in situ direct shear testing equipment, between 6 and 8 May 1980 (Collingham, 1980). The factor of safety in the existing faces was found to be low, and 'the present face has been extended as far into the cone as it is reasonable to go before the increasing dip of the ash layers makes the likelihood of large uncontrolled block slides a certainty'.

In August 1980, Council reached agreement with the adjoining landowner to remove sufficient ash to satisfy immediate requirements from a ridge adjacent to the northern boundary of the Council quarry.

Mount Schank has been classified as a geological monument by the Geological Society of Australia (Mooney, 1977).

LOCATION, ACCESS AND TOPOGRAPHY

The Mount Schank volcanic cone is a prominent landmark which rises to about 100 m above the surrounding plain, 13 km south of Mount Gambier within the District Council of Port MacDonnell in the South East Planning Area.

Access is from the sealed Port MacDonell-Mount Gambier road turning eastwards onto an unsealed road 750 m south of the Bellum Hotel. The unsealed road is followed eastwards for 1 000 m and northwards for 500 m to the Council pit which is located on the eastern flank of the Mount Schank cone.

MINERAL TENURE AND PRODUCTION

Most of the basalt deposit on the western side of the cone is within Private Mine 213 and is worked by Mount Schank Quarries Pty. Ltd. under agreement with W.J.T. Clarke, the P.M. holder (Barnes and McCallum, 1975). Most of the remainder of the basalt deposit is held under Extractive Mineral Leases 4581 and 4582 by L.A. C.A. D.R. and G.R. Edwards (Fig. 2).

No mining tenement is current over the ash deposit, but the Council has access to construction materials under the Local Government Act.

Production from individual Council borrow pits is not differentiated in figures supplied to the Department of Mines and Energy. However, the District Clerk, Mr. Deane Tregoweth reports that annual consumption of ash approximates 1 000 m^3.

GEOLOGICAL SETTING

Mount Gambier and Mount Schank are the youngest volcanoes in South Australia, and represent the final phase of volcanic activity in the South East of the State (Fig. 1). The Mount Schank eruption has not been accurately dated but is believed to have occurred at about the same time as the eruption at Mount Gambier, from which a carbon-14 date of 4830 ± 70 years has been obtained (Ferguson and Rafter, 1957).

Volcanic lava and ash at Mount Schank overlies the Gambier Limestone of Tertiary age, and a series of fossil sand dunes of Pleistocene age (Fig. 3).

Two phases of volcanic activity occurred at Mount Schank. The first phase produced a small cone on the southern side of the mount together with a basaltic lava flow to the west. This lava flow is currently quarried and crushed for aggregate by Mt. Schank Quarries Ltd. The second phase created the main cone which now slightly overlaps the original smaller one (Fig. 3). Both cones consist of bedded ash consolidated to form tuffaceous layers (Sheard, 1980).

The volcanic cones comprise fine ash with abundant gravel-sized lapilli. This is easily and cheaply won by bulldozer and provides a soft but well graded aggregate for road construction. Unfortunately, the proportion of gravel-sized fragments in the volcanic ash declines rapidly away from the cone. The outer limit of volcanic ash depicted on Figure 3 represents the limit of fine silt-sized material blown away from the cone by predominantly northeasterly winds during eruption.

DRILLING

Fourteen holes totalling 67.8 m were drilled on 4 and 5 February 1981 using a Departmental power auger mounted on the back of a Daihatsu light truck. All drillholes were logged on site and a summary of drilling data is presented in Table 1. Funding for the project was provided by the Department of Mines and Energy. Drillhole locations are shown in Figure 3.

Only two of the fourteen holes drilled in this programme, MSA1 and MSA3, intersected a workable thickness of ash with an acceptable overburden ratio. Both holes were drilled on the side of the road adjacent to the Council ash quarry (Fig. 3).

TABLE 1

Summary of Drilling Data

Hole No.	Overburden Intersection(m)	Useable Ash Intersection(m)	Depth of Hole(m)	Overburden/Ash Ratio
MSA1	0-1.5	1.5-9.0+	9.0	<0.2
MSA2	0-1.8	1.8-3.0	5.0	1.5
MSA3	- 0-9.0+	9.0	0.0	
MSA4	0-2.4	2.4-4.9	4.9	1.0
MSA5	0-2.0	2.0-5.6	5.6	0.6
MSA6	0-1.8	1.8-2.9	3.0	1.6
MSA7	0-2.5	-	2.5	-
MSA8	0-2.0	2.0-3.0	4.0	2
MSA9	0-1.8	1.8-2.9	4.0	1.5
MSA10	0-2.0	2.0-2.8	3.0	2.5
MSA11	0-3.0	3.0-5.4	5.5	1.3
MSA12	0-2.0	2.0-5.3	5.8	0.6
MSA13	0-4.0	-	4.0	-
MSA14	0-2.5	-	2.5	-

The eastern limit of ash suitable for roadmaking purposes is shown on Figure 3, and coincides approximately with the break in slope at the base of the volcanic cone.

CONCLUSIONS

The Mount Schank volcanic cone is the only source of volcanic ash within the District Council of Port MacDonnell.

An investigation into the stability of the faces of the Council's quarry revealed a low factor of safety which will decrease even further if operations are permitted to continue.

Quarrying has been prohibited by an order placed under Section 10(1)V of the Mines and Works Inspection Act. This order will not be rescinded.

Auger drilling has shown that coarse ash suitable for road construction has a limited extent. Only two areas remain from which Council could win material.

(a) The road adjacent to the council pit is underlain by a thickness of at least 9 m of ash. The deposit thins to north and south along the road.

(b) The pine plantation which is the site of the Council's former ash quarry probably contains material which could be worked by modern equipment. Drilling within the pine plantation was not possible because there was no access for the auger.

RECOMMENDATIONS

It is recommended that this Department undertake a topographic survey to enable calculation of reserves of ash in the road reserve. Assistance in the preparation of a working plan should be provided by this Department.

AMP:ZV

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REFERENCES

Barnes, C.P. and McCallum, W.S., 1975. Mount Schank Quarry, Sec. 32. Hd. MacDonnell Co. Grey. S. Aust. Dept. Mines report 75/40 (unpublished).

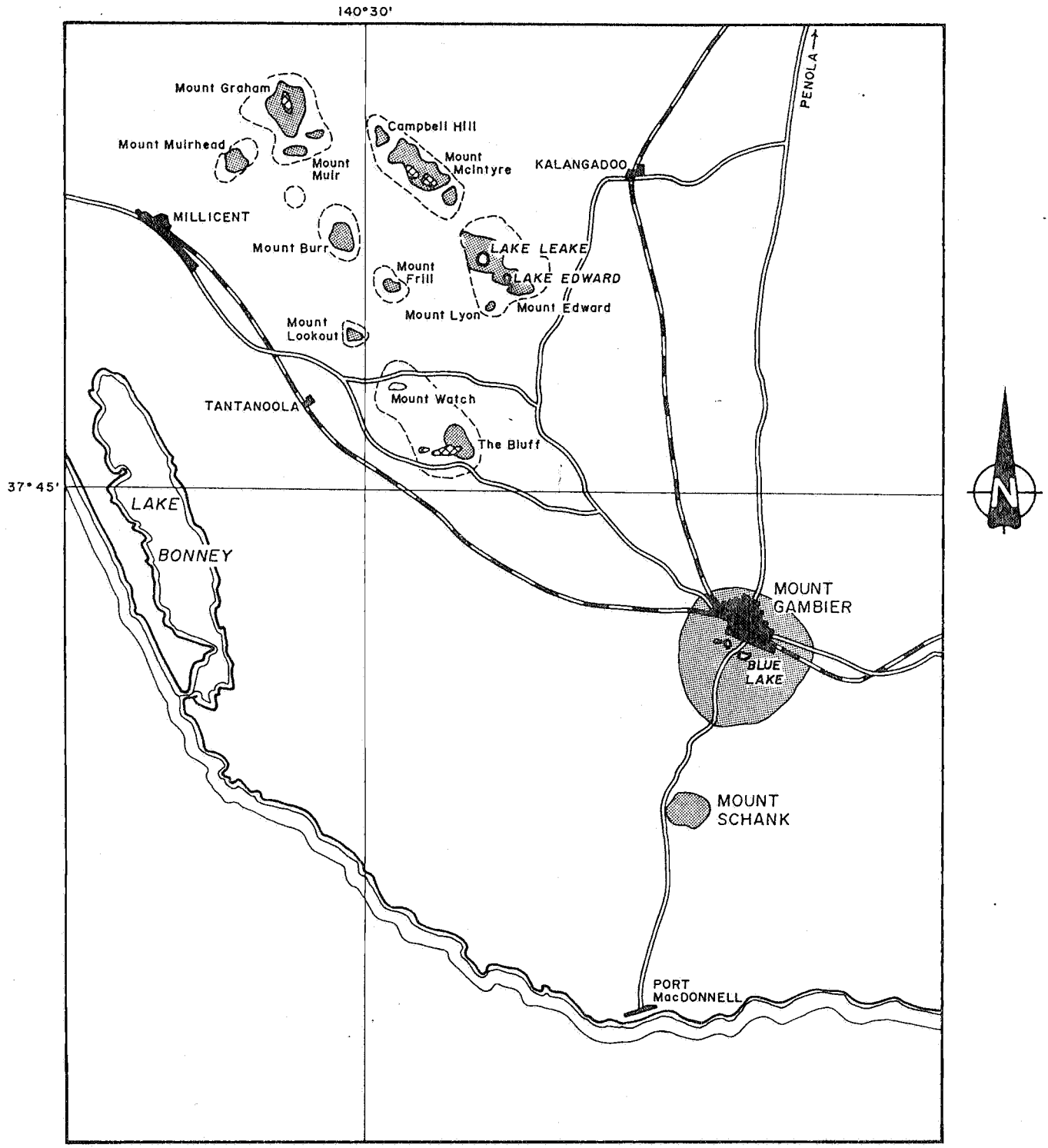
Collingham, E.B., 1980. A report on the stability of Mount Schank Quarry. Engineering and Water Supply Dept. S. Aust. report, Docket 2272/75 (unpublished).

Ferguson, G.J. and Rafter, T.A., (1957). New Zealand C^{14} age measurements. N.Z. J. Sci. Technol. 38(b), 732-733.

Mooney, P.A., 1977. Mount Schank. In: McBriar, E.M. and Mooney, P.A., Geological Monuments in South Australia, Part I. S.A. Division of Geol. Soc. Aust. Incorporated (unpublished).

Sheard, M.J., 1980. Quaternary volcanism in South-Eastern South Australia. S. Aust. Dept. Mines and Energy report 80/20 (unpublished).

Waterhouse, J.D., 1972. Mount Schank volcanic cone, report on effect of existing and proposed quarries. Sections 347, 425 Hundred of MacDonnell. S. Aust. Dept. Mines report 72/178 (unpublished).



Taken from Sheard, 1980

Fig. 1

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COMPILED A. M. P.
C.D.O. DATE

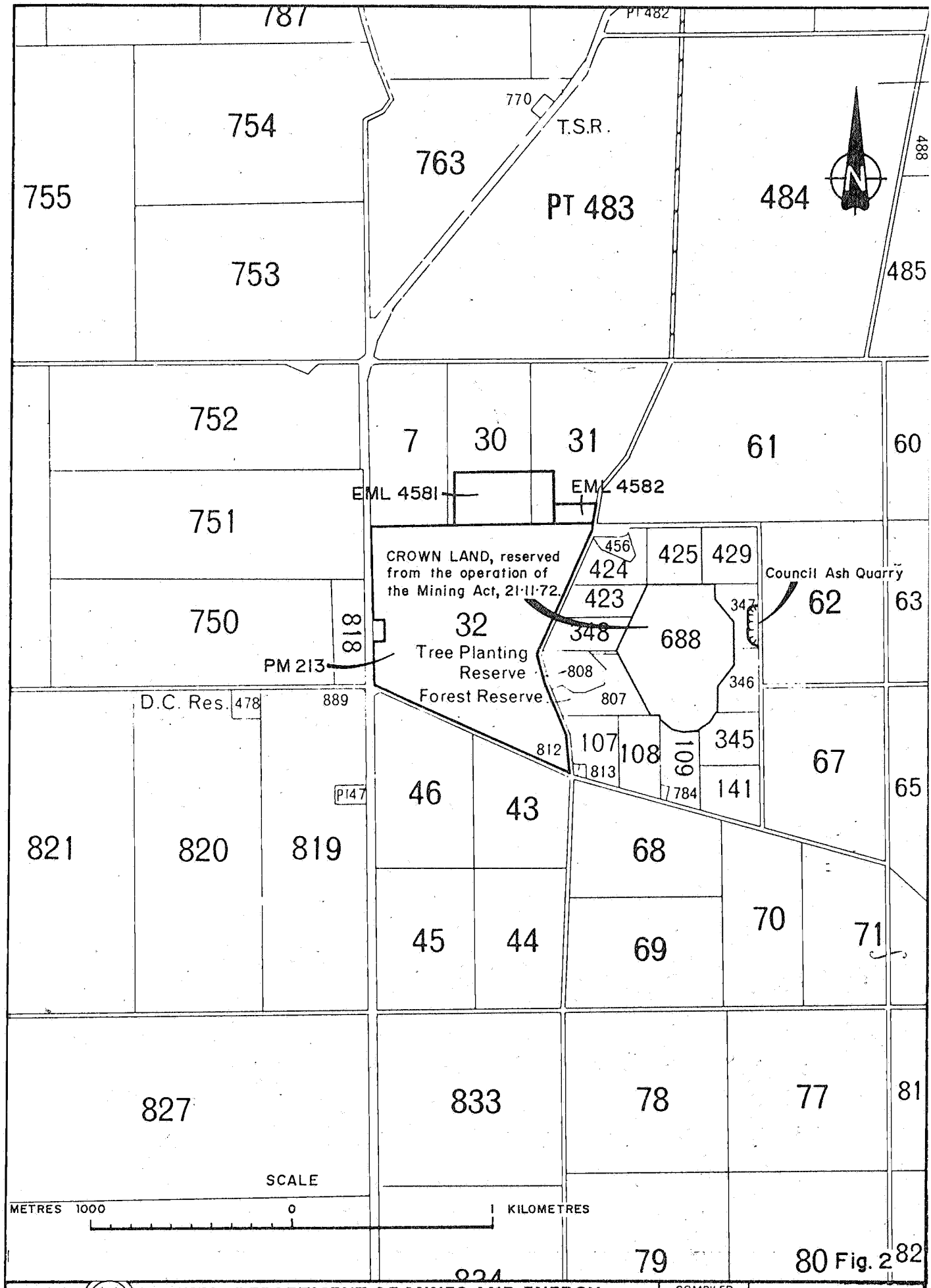
DRAWN M. B.
SCALE As Shown

DATE 19-6-81
PLAN NUMBER S15612

CHECKED

MOUNT SCHANK ASH DEPOSIT
SEC. 347, HD. MacDONNELL
Quaternary Volcanic Centres in the South-East of South Australia

24·80



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MOUNT SCHANK ASH DEPOSIT
LOCALITY PLAN

COMPILED A.M.P.	C.D.O. DATE
DRAWN M.B.	SCALE 1:25000
DATE 25-6-81	PLAN NUMBER S15613
CHECKED	

2480

Drillhole locations..... ⊙ 9

Adapted from Sheard, (1980).

Fig. 3

SCALE

METRES 100 0 100 200 300 400 500 METRES

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MOUNT SCHANK ASH DEPOSIT
GEOLOGY AND DRILLHOLE LOCATIONS

COMPILED A.M.P.	C.D.O. 4.8.81 DATE
DRAWN M.B.	SCALE 1:5000
DATE 29-6-81	PLAN NUMBER 81-460
CHECKED	

2480