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THE DRAINAGE PROBLEM AT No.16 MUGGA WAY, RED HILL

by

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                 stormwater drain.

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# THE DRAINAGE PROBLEM AT No.16 MUGGA WAY, RED HILL.

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## SUMMARY

At the request of the Department of Works, a drainage problem at the residence of the Dutch Ambassador at Mugga Way was investigated. During rainy periods water flowed on to the tennis court at the rear of the property; by using fluorescent dyes, it was proved that this water was leaking from the Red Hill stormwater drain which passes to the rear of the property. Reports of wet spots appearing on the court could not be assessed since no damage of this nature was found during the period of investigation. Five auger-holes have been put down elsewhere in the area to detect leakage during the next wet period. The leakage continued for as long as the stormwater drain flowed, in this case for two days after rain ceased, and carried run-off from large catchments to the south.

Excessive leakage may be prevented by lining the drain, or by draining the channel at a number of points along its course. If leakage is prevented by lining the drain, an increased volume of water will have to be handled and allowance made for the collection of hill side seepage. The immediate local problem at No.16 Mugga Way can be controlled by using a cut-off drain along the rear of the property to divert water from the tennis court.

In addition to the underground problem, surface water does not clear the rear of the residence quickly during heavy rain. Overloading of the drainage system during downpours or a blockage in the drains may be the cause; further investigation is in the hands of the Department of Works.

## INTRODUCTION

Early in March the Department of Works asked for a report on the drainage of the tennis court behind the residence of the Dutch Ambassador, No.16 Mugga Way, Red Hill. Reports indicated that a large amount of water was flowing from the base of a cutting at the rear of the tennis court during wet periods; in addition soft spots had formed in the court. It was also necessary to determine whether the accumulation of water at the rear of the residence during heavy rain was aggravated by sub-surface water.

The Red Hill stormwater drain runs at the rear of this property and it was decided to test this drain for leakage by using fluorescent dyes. Observations were made over the rainy period, 28/3/59 to 4/4/59; rainfall figures were obtained from three recording stations, the Canberra Climatological Station at Yarralumla, Fairbairn Airport, and Mr.J.C. Garrahan, No.22 Mugga Way, who keeps a private record.

Recorded daily rainfall for the 24 hours ending 9 a.m.

<u>Climatological Station</u>	<u>Fairbairn Airport</u>	<u>Mr.J.C. Garran, 22 Mugga Way</u>
28.3.59	-	-
29.3.59	20	26
30.3.59	2	4
31.3.59	1	-
1.4.59	76	62
2.4.59	178	195
3.4.59	30	4
4.4.59	5	-
<u>TOTALS</u>	<u>312</u>	<u>291</u>

Specific figures quoted in the text are taken from Mr.J.C. Garran's record because of proximity to the area.

### INVESTIGATION

At midday on Wednesday 1st April, after approximately 170 points of rain had fallen over the last three days, an inspection showed that the Red Hill stormwater drain was not yet flowing and there was no sign of water running on to the tennis court. The following morning, Thursday, 2nd April, the stormwater drain was flowing strongly at 8.30 a.m.; water was also flowing at approximately 1,000 - 1,500 g.p.h. from the cutting at the rear of the tennis court.

Fluorescent dye was placed in the storm water drain; the first dye emerged on the tennis court within seven minutes after travelling a distance of about 85 feet.

Rain ceased on the morning of Friday, 3rd April, but the stormwater drain flowed until Sunday morning, 5th April. The flow of water on to the court had decreased to about 300 gallons per hour by Saturday morning, 4th April, and by the following morning, Sunday 5th April, the flow of water had ceased.

There is no doubt that leakage from the drain takes place at this point. Investigation to detect leakage from other points of the drain in the same area is proposed. Five hand auger-holes have been put down preparatory to tracing the movement of dyes from the stormwater drain to these points during the next wet period. Details of the holes are given in the Appendix and their positions are shown on Plate I.

Leakage from the drain may be facilitated by weathered and fractured rocks of the Red Hill Group which are exposed in the drain at the rear of No.16. Red clayey soil which is present along much of the drain may stop excessive leakage; the absence of red soil near No.16, therefore, seems significant.

No soft patches appeared on the surface of the tennis court during the rain or afterwards, and for this reason it was impossible to assess the problem; further investigation can be made if the trouble recurs.

Accumulation of water takes place on the sealed area at the rear of the residence during very heavy rain; the surrounding slopes concentrate water at this point where a single gully trap is ineffective due to overloading of the drainage system, or to a partial blockage of the pipes. The problem is not aggravated by underground water, except in so far as draining the tennis court imposes an additional load on the system. Further investigation is being undertaken by the Department of Works.

#### THE RED HILL STORMWATER DRAIN

The Red Hill stormwater drain commences over one mile south-east of the area being investigated and proceeds north; it curves around the north-east slopes of Red Hill to pass to the south of Deakin. At maximum flow, water nine inches deep, was carried at a rate of 250 feet per hour; the amount of water flowing past the rear of No.16 Mugga Way was calculated at 11,000 g.p.h. After the rain stopped, the stormwater drain continued to flow for another two days; this water came from catchments to the south, some being over a mile away.

Plate II defines the catchments flowing into the Red Hill drain. The gully catchments of Red Hill proper in the north are shown grouped together (No.1). The combined area of the other four catchments, south of the Grammar School, more than doubles the area of No.1. Run-off from No.1 area by means of a number of steep gullies clears the area quickly. Catchments 2, 3, 4 and 5 are spread over large areas with gentle slopes; run-off from them is much slower and keeps the drain flowing after rain has ceased.

#### RECOMMENDATIONS

1. The simplest solution is to take the run-off out as quickly as possible by tapping the stormwater drain at one or more points. This solution is practicable only if it does not overtax the capacity of the drains existing in the area. Future contour stormwater drains might be provided with a number of outlets along their path to ensure quick run-off.
2. Lining with concrete, clay, or bentonite clay is an alternative solution; however, a greater volume of water must be catered for. Extension of built-up areas into any of the catchments will increase run-off into the stormwater drain unless other drainage is provided. Hillside seepage should be allowed to enter the sealed drain at selected points.
3. For the immediate problem, a cut-off drain below the stormwater drain and parallel to it would divert water from the rear of No.16 Mugga Way.

APPENDIX

Plate I marks the positions of a number of auger-holes. These holes are part of a plan to discover leakage from other parts of the stormwater drain in the same catchment.

<u>Auger-hole 1</u>	<u>(rear No.22)</u>
0 - 2'6"	Red-brown soil.
2'6" - 3'0"	Red-brown soil with rock fragments.
<u>Auger-hole 2</u>	<u>(rear No.20)</u>
0 - 3'0"	Red-brown soil.
3'0" - 3'3"	Red-brown soil and rock fragments.
<u>Auger-hole 3</u>	<u>(rear No.18)</u>
0 - 2'9"	Red-brown soil.
2'9" - 3'3"	Red-brown soil and fragments of weathered porphyry.
<u>Auger-hole 4</u>	<u>(rear No.14)</u>
0 - 3'0"	Red-brown soil.
3'0" - 3'10"	Red-brown soil with rock fragments.
<u>Auger-hole 5</u>	<u>(in No.22)</u>
0 - 2'3"	Red-brown soil.
2'3" - 2'6"	Red-brown soil with rock fragments of weathered porphyry.

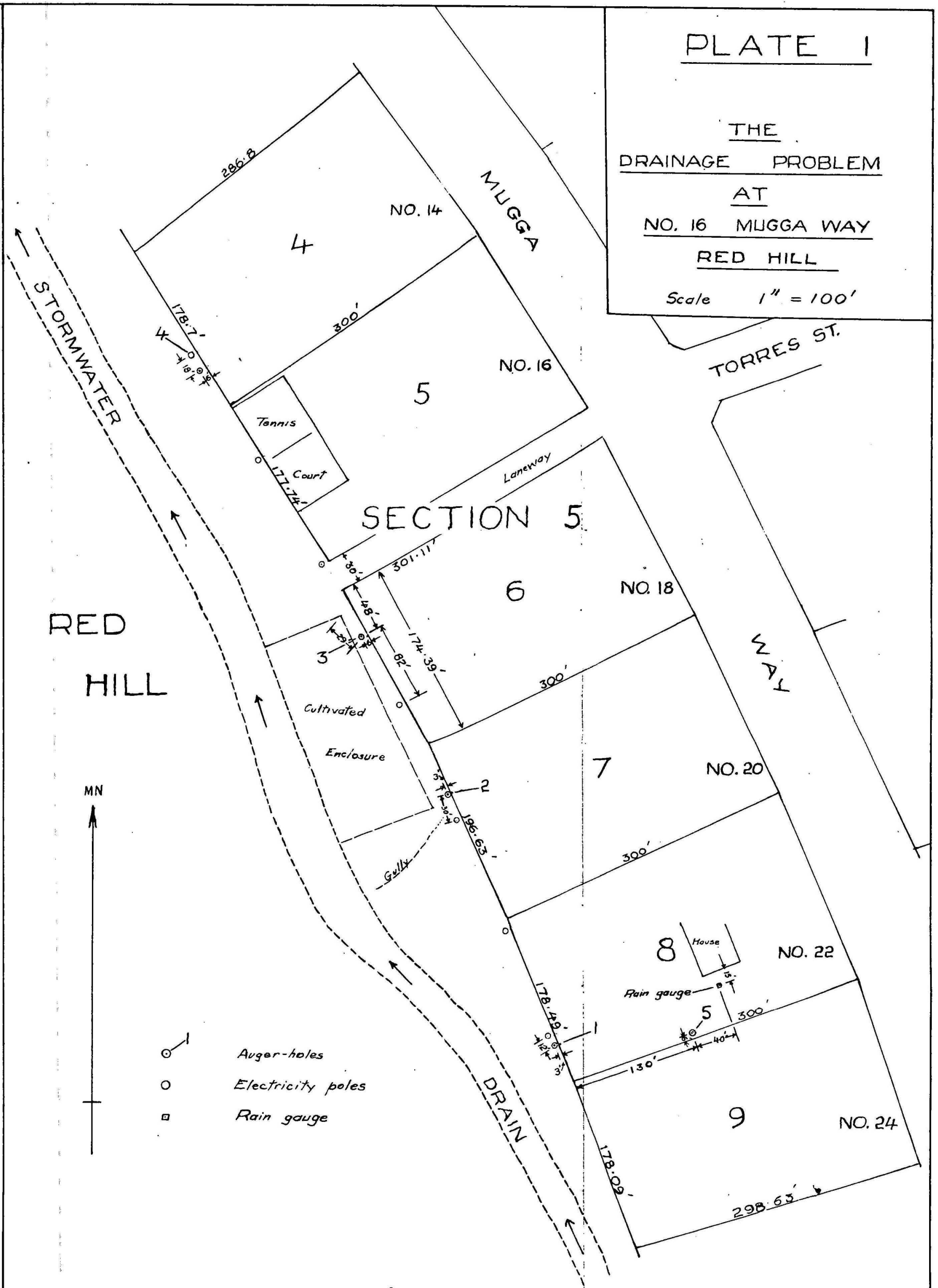
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# PLATE I

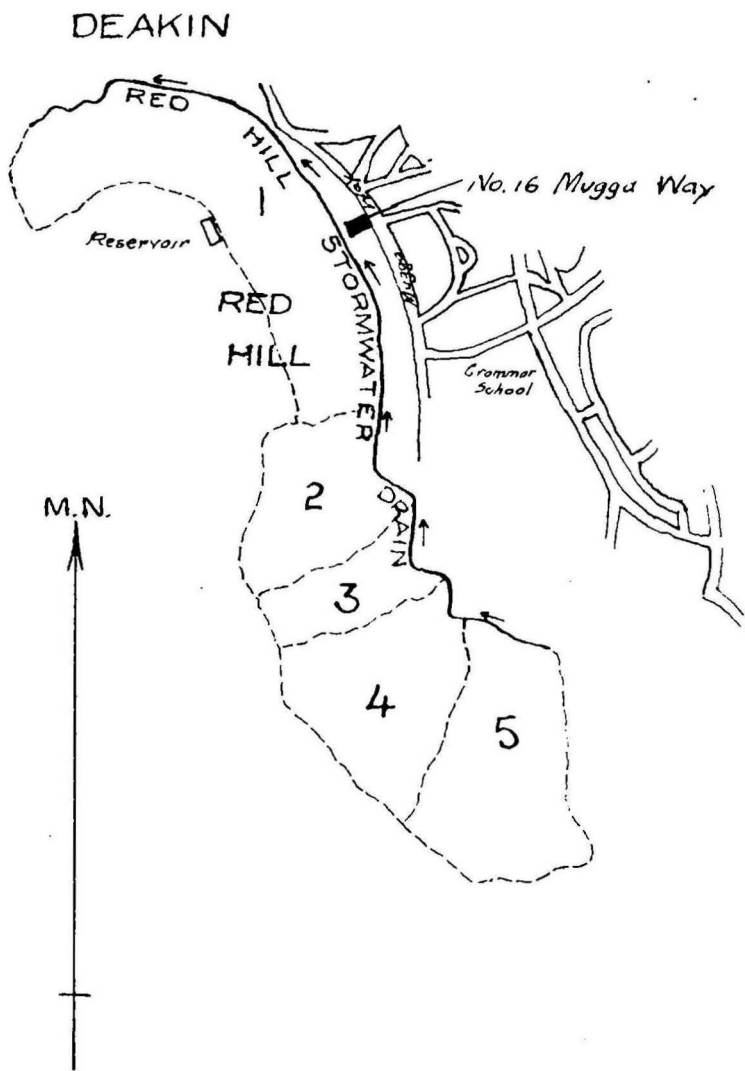
THE  
DRAINAGE PROBLEM

AT  
NO. 16 MUGGA WAY  
RED HILL

Scale 1" = 100'



CATCHMENT AREA  
OF THE  
RED HILL STORMWATER DRAIN



THE  
DRAINAGE PROBLEM  
AT  
NO. 16 MUGGA WAY  
RED HILL

Scale      2" = 1 ml.