REPT.BK.NO. 73/27



Depot.

# GROUNDWATER SURVEY
# HD. WILLUNGA, SEC. 772

A. F. WILLIAMS

Department of Mines
South Australia —

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DEPARTMENT OF MINES
SOUTH AUSTRALIA

# GROUNDWATER SURVEY

## Hundred Willunga, Section 772

by

A.F. WILLIAMS
GEOLOGIST
HYDROGEOLOGY SECTION

Rept.Bk.No. 73/27
G.S. No. 5033
Hyd. No. 2478
D.M. No. 107/73

5th February, 1973.

## METRIC CONVERSION DATA

### METRIC TO IMPERIAL

| | | |
|---|---|---|
| **Distance** | centimetres (cm) x 0.39 | = inches |
| | metres (m) x 3.28 | = feet |
| | metres (m) x 1.09 | = yards |
| | kilometres (km) x 0.62 | = miles |
| **Area** | hectares (ha) x 2.47 | = acres |
| | square kilometres ($km^2$) x 0.39 | = square miles |
| **Rainfall** | millimetres (mm) x 3.94 | = points |
| **Capacity** | litres (l) x 0.22 | = gallons |
| **Rate of Flow** | litres per sec (l/sec) x 791.9 | = gallons per hour |
| | cubic metres per hour ($m^3/hr$) x 220.0 | = gallons per hour |
| **Salinity** | milligrams per litre (mg/l) x 1 | = parts per million |
| | milligrams per litre (mg/l) x 0.07 | = grains per gallon |

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# GROUNDWATER SURVEY

## Location

General: On Range Road, approx. 2.4 km from top of Willunga Hill.

Region: 4

County: Adelaide

Hundred: Willunga

Section: 772

Name of Property: -

Owner: J.J. O'Shea

Postal Address: Unit 1,
12 Fernleigh Street,
UNDERDALE. 5032.

Telephone: 47-5355 (Business)

## Requirements

Water required for: Irrigation of garden plants and hay production.

Quantity: 6.25 l/sec. (500 g.p.h.)

Quality: Less than 1500 milligrams per litre ( 1 milligram per litre is numerically equivalent to 1 part per million.

Other factors: Salinity for the above uses varies. Some garden plants need water of better quality (1000 mg/l) whereas lucerne can withstand water of a salinity of up to 2300 mg/l of dissolved salt.

HYDROGEOLOGICAL REPORT

Physiography and Land Use:

The applicant's property lies at the edge of a major fault scarp (the Willunga fault) and has been moderately dissected by erosion subsequent to the faulting. Relief may vary by 100 metres or more from the top of the ridge near the owner's house to the lower part of the property to the west. About 30-40% of the land is uncleared, the rest being used for stock grazing. The owner intends irrigating lucerne and other pastures if sufficient water supplies are established.

Climate:

Nearest rainfall station: Willunga

Mean annual rainfall: 658 mm (25.91 ins.)

Remarks on rainfall pattern: The owner reports a rainfall in excess of 890 mm (35 ins.) - considerably more than that recorded at Willunga. This is probably due to the increased elevation of the owner's land compared to the township. The rainfall pattern is expected to be similar, with most rain falling during winter. Extra water for irrigation is required during the drier summer months.

Surface Hydrology:

Creek Name: Unnamed

Characteristics: Emphemeral, although running for long periods during winter and spring if rainfall is sufficient (i.e. near or above average).

Springs: Springs are recorded by the owner in creeks below the house, however these dry up in times of very low rainfall.

Surface storage: At least four dams have been constructed on various creeks on the property. These appear to hold water during most of the summer, including very dry years.

Geology

Soil Cover: This is composed of sandy grey to off-white soil, slightly clayey and containing various breakdown products derived from underlying rocks. Laterite pebbles and fragments are common within the soil profile.

Rock Units: (1) Tertiary Laterite

(2) Sturt tillite (bedrock)

Lithology: (1) The laterite is composed of a sandstone, ferruginized to varying degrees and a ferruginous rock with occasional quartz fragments. This is a remnant of a Mid Tertiary weathering profile and caps older rocks throughout this portion of the Mount Lofty Ranges.

(2) Bedrock consists of interbedded shales, siltstones and quartzites. The quartzites are white to greyish, slightly feldspathic, well jointed and cleaved. The shales and siltstones are well weathered - being affected by the Tertiary laterization and subsequent weathering.

Direction and Amount of dip: The bedrock is dipping about 60 to 70° to the south east. According to the geological map, this sequence is overturned but no evidence was seen due to lack of bedding or possible masking of bedding by cleavage.

Structural features: The bedrock is well cleaved with one or more joint sets. The quartzites are far more fractured than the shales or siltstones.

Aquifer Assessment:

Type: Free water table - water is expected to be present in the joints, fractures and pore spaces in the quartzite. Much smaller amounts are expected in the shales and siltstones which are impervious and also more weathered.

Extent: The aquifer (the quartzite bed) underlies the property in several areas. Two prominent quartzites strike across the property (running northeast-southwest) and it is considered that irrigation supplies should be found in these beds.

Potential Recharge: With a fairly high annual rainfall, recharge is expected to be moderate to good although the catchment area is not very large. The topographically lower quartzite aquifer (site 1) is expected to have better recharge potential than that aquifer nearer the house (site 2).

Borehole Site Location:

General: Two sites were chosen - one about 30 m topographically below the other and above a second quartzite bed.

Reason for location: High rainfall (and thence good potential recharge) and the fractured and porous nature of the aquifer imply good chances of obtaining reasonable supplies of irrigation water. Site 1 should obtain larger supplies than site 2 but would require extra pumping as the difference in head could be as much as 30 m.

| | Site 1 | Site 2 |
|---|---|---|
| Proposed Depth: | 60-75 m (200-250 ft.) | 75-90 m (250-300 ft.) |
| Expected Yield: | 13.9-20.8 l.p.sec. (1000-1500 g.p.h.) | 6.9-13.9 l.p.sec. (500-1000 g.p.h.) |
| Expected Quality: | 1-2000 mg/l | 1-2000 mg/l |

Probable Log: 0-1 m Soil, alluvium etc.

1 m-60m+ Shales and siltstone - intersecting sandstone and quartzite near the water table.

Drilling and Testing Recommendations:

Drilling Hazards: No real hazards expected.

Sampling: All waters cut should be sampled and brought to the Department for testing (free of charge). A geological log would be appreciated.

Pump Test: The bore should be pump tested to obtain a reliable estimate of supply. This can usually be arranged with a pump distributor.

Summary:

Two sites were chosen on the applicant's property. Both have prospects of obtaining irrigation quality water although site 1 would be expected to produce a greater supply than site 2. In choosing between these two sites; it would be advisable to investigate possibilities of deepening existing dams and constructing additional dams as an alternate for an extra source of water especially in lieu of the relatively high rainfall (900 mm). Pumping costs would be greater at site 1 than site 2 and for this reason it may be cheaper in the long term to increase dam capacity and use site 2 for a borehole.

A.F. Williams

AFW:JS
5th February, 1973.

Geologist: A.F. Williams
Survey Date: 26.1.73.


## LEGEND

- Slope alluvium and soil deposits.
- Ironstone and ferruginised sandstone – Tertiary.
- Tapley Hill Slates – blue calcareous siltstones.
- Sturt Tillite – tillite, interbedded quartzite and phyllitic shale.
- Phyllitic siltstone and greywacke.

Strike and dip of bedding ..... 60
Strike and dip of jointing ..... 50
Strike and dip of foliation ..... 35
Strike and dip of cleavage ..... 45

Geological boundary .....
Fault line .....
Drainage lines .....
Surface storage .....

Existing borehole
160 – Depth in metres
2015 – Salinity in milligrams per litre
5000 – Supply in litres per hour
2-72 – Month, year

Well .....
Spring .....
Abandoned borehole .....
Proposed boresite .....

**DEPARTMENT OF MINES - SOUTH AUSTRALIA**

| | | |
|---|---|---|
| HYDROGEOLOGY SECTION | GROUNDWATER SURVEY<br>SEC 772 HD WILLUNGA<br>J. O'SHEA | Date. 30 Jan 1973 |
| Compiled. A.F. Williams | | Drg.No. S 10129 |
| Drn. A.F. Ckd. | | Hall |

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