Bore Completion Report

BORE 28359
WOOLIANNA

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Water Resources Division
Darwin
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<td>AMG</td>
<td>Australian Map Grid</td>
</tr>
<tr>
<td>ID</td>
<td>internal diameter</td>
</tr>
<tr>
<td>km</td>
<td>kilometre</td>
</tr>
<tr>
<td>L/s</td>
<td>litre per second</td>
</tr>
<tr>
<td>L/c/d</td>
<td>litre per capita per day</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>m³</td>
<td>cubic metre</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic metre per day</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligram per litre</td>
</tr>
<tr>
<td>pH</td>
<td>acidity and alkalinity level</td>
</tr>
<tr>
<td>us/cm</td>
<td>microsiemens per centimetre</td>
</tr>
</tbody>
</table>
This report presents results of the 1991/92 and 1992/93 Production Bore Drilling programme for Woolianna. The project was carried out by Water Resources (PAWA) on behalf of Aboriginal Essential Services (PAWA) during May 1991 and November - December 1992.

Woolianna is located approximately 150km south-west of Darwin and 10km north-west of Daly River Police Station (Figure 1) and is accessible by road throughout the year.

The climate of the area is monsoonal with a dry season lasting from May to September and a wet season from November to March. The mean annual rainfall at Woolianna is 1484mm and most of the rain falls during the wet season. The monthly mean of daily maximum temperatures ranges from 31° to 37° and the monthly mean of daily minimum from 14.5° to 23°.

Woolianna lies within Floodplains geomorphic unit which occupies the areas below the 15m contours extended along the Daly River. The plains are mostly vegetated by various grasses, but in permanently wet areas are covered by Melaleuca paperbarks and freshwater mangroves.

Geologically the area is located on the sedimentary rocks of the Cambro-Ordovician Daly Basin. It is covered by a geological and topographic map of Daly River 1:100 000 sheet 5070 (Reference 2).

The Daly Basin located in the northern part of the Northern Territory is a shallow intracratonic basin consisting of flat-lying sediments of the Daly River Group: the Tindall Limestone, Jinduckin Formation and Ooloo Dolostone.
Woolianna is underlain by Tindall Limestone (Figure 2) covered by Cainozoic alluvium. The Tindall Limestone formed the lowest unit of the Daly River Group. It comprises fine-grained, crystalline limestone, maroon siltstone, maroon-purple arkosic sandstone and conglomerate.

Previous drilling (Figure 3) for groundwater was carried out in June 1991 and two bores were drilled to encounter aquifers in Tindall Limestone. Bore 27590 located at AMG co-ordinates 677600-8487300 was drilled into 47.5m and struck aquifers with supply of 2.5 L/s between 44.5 and 45.0m in fine, white sandstone interbedded with maroon-purple shale. After three hours of airlift the conductivity of water increased from 1056 us/cm to 2260 us/cm. Second bore 27592 located at AMG co-ordinates 677450-8487300 encountered aquifers with a supply of 6.1 L/s between 45.9 and 90.9m in maroon-purple sandstone and purple-brown siltstone. Conductivity of water increased from 1290 us/cm to 11000 us/cm during the drilling.

Further drilling was commenced in November 1992. Bore 28359, located 1.0km north-west of bores 27590 and 27592, struck shallow aquifers of good quality water in Tindall Limestone with a supply of 0.4 L/s in brown weathered sandstone between 15.5m and 18.5m.

4. WATER QUALITY

Water quality analyses results from bore 28359 are summarised in Table 1. The water is within the recommended limit for drinking water as adopted by the Australian Water Resources Council/National Health and Medical Resource council (Reference 1).
<table>
<thead>
<tr>
<th>BORE REGISTERED NUMBER</th>
<th>DATE OF SAMPLING</th>
<th>SPECIFIC CONDUCTANCE (µS/cm)</th>
<th>TOTAL DISSOLVED SOLIDS (mg/l by evap at 189°C)</th>
<th>pH</th>
<th>SODIUM, Na</th>
<th>POTASSIUM, K</th>
<th>CALCIUM, Ca</th>
<th>MAGNESIUM, Mg</th>
<th>TOTAL HARDNESS (as CaCO₃)</th>
<th>TOTAL ALKALINITY (as CaCO₃)</th>
<th>IRON (TOTAL), Fe</th>
<th>SILICA, SiO₂</th>
<th>CHLORIDE, Cl⁻</th>
<th>SULPHATE, SO₄²⁻</th>
<th>NITRATE, NO₃</th>
<th>BICARBONATE, HCO₃⁻</th>
<th>FLUORIDE, F⁻</th>
<th>NCl (CALC FROM CHLORIDE)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>28359</td>
<td>15/12/92</td>
<td>834</td>
<td>485</td>
<td>7.2</td>
<td>94</td>
<td>1</td>
<td>50</td>
<td>35</td>
<td>269</td>
<td>404</td>
<td>0.4</td>
<td>38</td>
<td>20</td>
<td>54</td>
<td>1</td>
<td>492</td>
<td>0.4</td>
<td>33</td>
<td>Production bore</td>
</tr>
</tbody>
</table>

Analysis in milligrams per litre - mg/l (unless otherwise stated)

**WATER QUALITY DATA**
The water demand for the Woolianna should be met from the bore 28359 with pumping recommendation of 34.5 m³/d.

6. RESULTS

During June 1991 two bores, 27590 and 27592 (Figure 3), were drilled and encountered aquifers with water unsuitable for human consumption. Further drilling completed in November 1992 about 1km north-west from the previous attempts established fresh water supply of 0.4 L/s from the shallow aquifers.

Bore 28359 is located at AMG co-ordinates 676900-8488600. It is constructed with PVC casing and stainless steel screens (Composite Log Bore 28359). A twenty-four hour constant rate test (Figures 4 and 5) and recovery test were conducted on the bore and water samples were collected. The test pump result (Test Report - Bore 28359) indicates that the safe pumping rate of this bore is 0.4 L/s and the pump setting depth is 15m.

The maximum continuous pumping rate and the pump setting depth are based on the available hydraulic data which is considered safe but not conservative.

6. RECOMMENDATIONS

It is recommended that:

- the pump setting for bore 28359 should be 15.0m below ground level for a pumping rate of 0.4 L/s
- provision to monitor water levels and obtain water samples while pumping should be incorporated when equipping the bore
- absorption trenches and septic tanks be located at a minimum of 100 metres from the bore.
REFERENCES


ATTACHMENTS
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 28359

Bore Location: WOOLIANNNA.  
Client : AES.  
Map: DALY RIVER. 1:100,000. Sheet 5020.  
Purpose : DOMESTIC.  

RECOMMENDATION. Pumping Rate: 0.4 L/s. Pump Setting: 15 m.

For alternative pumping rates or settings contact: Water Resources.  
General recommendations are on the reverse side.  
In all correspondence please quote bore RN.28359.

BORE DATA.

Finished depth: 25.7 m. Completion Date: 25/11/92. Test Date: 14/12/92.  
Standing Water Level: 9.94 m. on 14/12/92. Test Rates: 0.6 L/s.  
Construction details: Test Duration: 24 hrs.

Interval. | Description.  
--- | ---  
0 - 2.50 m. | 203 mm. I.D. steel casing.  
0 - 15.50 m. | 146 mm. I.D. Class 9 PVC casing  
15.50 - 19.67 m. | 154 mm. I.D. stainless steel screens, 0.75 mm. aperture.  
19.67 - 25.70 m. | 146 mm. I.D. Class 9 PVC sump.

Notes: 1. Top of casing as constructed was 0.55 m. above ground.  
2. All depths are measured from natural ground level.  
3. Test rates are not indicative of safe long term pumping rates.  
WARNING: MINIMUM INTERNAL BORE DIAMETER IS 146 mm.  
MINIMUM INTERNAL BORE DIAMETER TO RECOMMENDED PUMP SETTING IS 146 mm.

COMMENTS.

1. The above recommendations are based on a constant rate test at 0.6 L/s. for 24 hrs. and assume hydrological conditions remain constant.  
2. Provision to monitor water levels and obtain water samples while pumping, should be incorporated when equipping this bore.  
3. This bore may be pumped on a cyclic basis of 8 hrs. on and 16 hrs. off at 0.5 L/s. Water levels should be monitored on a regular basis as at this rate viable long term pumping is marginal.

WATER ANALYSIS. No. 92/93/0663.

Prepared by: B. Thatcher.  
16/12/92.  
Checked by: D. Karp.  
20/1/93.
RECOMMENDATIONS FOR FINISHING, OPERATING AND PROTECTING GROUNDWATER BORES

Attention to the following points will ensure a long and safe life for the bore supply and help prevent pollution of the groundwater resource.

1. Construct a concrete apron around the bore head to prevent surface flow, seepage and waste from entering the bore.

2. Seal the space between the casing and pump equipment to prevent entry of vermin, dirt and pollutants.

3. Maintain pumping equipment in good order to prevent pollution. Prevent spillage of fuel and oil on the ground around the bore. Store fertilizer and other chemicals at least 50 m away.

4. Keep stock away from the bore head. Discourage domestic activity at the bore. The first tap on the pipeline should not be less than 5 m from the bore head.

5. Pumping the bore at higher than recommended rates may fork the bore leading to instability or pump maintenance problems. Seek the professional advice of an hydrogeologist or groundwater engineer.

6. If the bore is no longer required, the casing is to be removed or securely capped and the bore backfilled with clayey material. A cement plug may be required in some instances.

In addition, please ensure that the BORE IDENTIFICATION TAG is retained securely at all times. The registered bore number is Water Resources Division's only reference to the scientific and engineering data on this bore, and hence important to WRD's further advice to bore owners.
STEP DRAWDOWN TEST

PUMPED BORE 28359
DATE 11-12-92
Fig. 5

PUMPED BORE 28359
DISCHARGE 0.6 L/s
DATE 14-12-92 TO 15-12-92

CONSTANT DISCHARGE TEST
POWER AND WATER AUTHORITY

DEPTH (m) BORE CONSTRUCTION GRAPHIC LOG STRATA DESCRIPTION AQUIFERS (WATER STRUCK)

0.55m

CEMENTED

BACKFILL

CEMENT PLUG

GRAVEL PACK

146mm ID CLASS 9 PVC SUMP

146mm ID PVC CASING CLASS 9

203mm ID STEEL CASING

154mm ID STAINLESS STEEL SCREENS WITH 0.15mm APERTURE

CLAY: brown with LIMESTONE lenses

CLAY: red, white

SANDSTONE: brown and CLAY

SANDSTONE, Siltstone and CLAY

SANDSTONE and Siltstone: grey, brown

SWL = 9.94m 14/12/92

0.8L/s

-1.0L/s

COND.: 2100µs

14/12/92

0.8L/s

-20

-30

-40

-50

-60

-70

COMPOSITE LOG OF BORE 28359

Fig. 6