POWER AND WATER AUTHORITY
REPORT NO 92/90D

Bore Completion Report
BORES 26836 AND 26838
SOUTH WEST
OUTSTATION

R SANDERS
Hydrogeologist
Water Resources Division
Darwin
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<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>AMG</td>
<td>Australian Map Grid</td>
</tr>
<tr>
<td>°C</td>
<td>degree Celsius</td>
</tr>
<tr>
<td>ID</td>
<td>internal diameter</td>
</tr>
<tr>
<td>km</td>
<td>litre per second</td>
</tr>
<tr>
<td>L/c/d</td>
<td>litre per capita per day</td>
</tr>
<tr>
<td>m</td>
<td>metre</td>
</tr>
<tr>
<td>mm</td>
<td>millimetre</td>
</tr>
<tr>
<td>m³/d</td>
<td>cubic metres per day</td>
</tr>
<tr>
<td>mg/L</td>
<td>milligram per litre</td>
</tr>
<tr>
<td>pH</td>
<td>acidity and alkalinity index</td>
</tr>
<tr>
<td>SWL</td>
<td>standing water level</td>
</tr>
</tbody>
</table>
1. INTRODUCTION

This report details groundwater investigations and drilling for the Aboriginal outstation on South West Island. This project was undertaken by the Water Resources Division of the Power and Water Authority with the aim of constructing a water supply bore (and a standby bore if possible).

The outstation is situated at the northern end of South West Island, and is approximately 1.3 km inland along a tidal creek with adjacent salt flats (AMG Grid Reference 677630 - 8264700). The island is part of the Sir Edward Pellew Group in the Gulf of Carpentaria. The area is covered by Topographic Map Pellew, 1:100 000 Sheet 6266.

The outstation population ranges between 20 and 50 people. The present water supply is from a spring-fed creek where this is dammed (to stop saltwater contamination during King Tides) approximately 400 m from the outstation. This supply diminishes and turns brackish as the dry season progresses.

The climate is monsoonal with a hot rainy summer and a long dry season. The mean annual rainfall is about 800 mm, most of which falls between December and March. Annual pan evaporation is about 3000 mm.

Following a preliminary desktop study a field reconnaissance was undertaken in October 1989. Barge landings (for drill rig access) were marked and a geophysical survey to aid in later site selection was undertaken. A cable tool drilling rig was mobilised to the island in mid-December. Investigation drilling and the construction of two water supply bores (RN 26836 and RN 26838) were followed by pump testing in early January 1990.

2. HYDROGEOLOGY

Regional geology is covered by the 1:250 000 Geological Series Map Pellew (Roberts, 1962). South West Island is underlain by quartz sandstone of the Masterton Formation and is exposed as upstanding hills and ridges. At low levels the sandstone is mantled by secondary deposits including coastal dunes, alluvium, and laterite.

The Lower Proterozoic Masterton Formation sandstone in its fresh state is of very low porosity and its aquifer potential is dependent on the presence of fracturing. No structural features indicating fracturing are apparent in the region of the outstation. However, where weathering of this sandstone has begun (probably the early phases of lateritisation) water supplies have been located. Bores 26836 and 26838 have intercepted potable supplies of 1.6 L/s and 0.5 L/s respectively in weathered sandstone. These bores have been constructed with screens and formation stabilising gravel pack adjacent to the aquifer zones. Bore 26837 intercepted unweathered sandstone at 6.8 m before an adequate water supply was encountered.
Alluvial sediments exist adjacent to the dammed stream. The sediments consisting of sands and clayey sands, though saturated, have a high fines content which reduces aquifer potential. Bore 26835, close to the dam, has yielded 0.2 L/s of brackish water (TDS = 2780 mg/L) from the alluvium.

Coastal dunes, consisting of shellgrit or unconsolidated sand have exhibited maximum yields of 0.2 L/s on Centre Island (Power, 1982). Similar dunes exist on South West Island, but have not been drilled during this programme.

The brackish water at RN 26835 highlights the limited freshwater resource and the possibility of overpumping of bores 26836 and 26838 causing saline intrusion. Care will need to be exercised to avoid movement of the saline water interface towards these bores.

3. WATER QUALITY

Water samples were collected during bailing of RN 26835 and pump testing of bores 26836 and 26838. Chemical analysis results for the two latter bores are within the recommended limits for drinking water (AWRC and NHMRC, 1987) and are summarised in Table 1.

All pH values indicate slightly corrosive waters. Consequently corrosion-resistant reticulation materials should be utilised where possible.

4. WATER DEMAND

A population of 20 to 50 people requires a water supply of between 0.25 L/s and 0.6 L/s to provide 1000 L/c/d. Bore 26838 has sustained a discharge of 0.5 L/s for an 8 hour constant rate pump test. However it is recommended that initial pumping should not exceed 0.3 L/s to lessen the probability of saline intrusion at this bore (the brackish bore 26835 is only 150 m from this site). Water quality should be monitored for one dry season at which time further recommendations as to pumping rate could be made.

Bore 26836 has been equipped with a hand pump. It should only be equipped with a mechanical pump if utilised as a standby bore when RN 26838 is shut down. In such an event the discharge at this bore should not exceed 0.3 L/s.
<table>
<thead>
<tr>
<th>Analysis in milligrams per litre (unless otherwise stated)</th>
<th>Stream sampled</th>
<th>Pumped sample</th>
<th>Bore sampled</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>SODIUM, Na</td>
<td>5880</td>
<td>30</td>
<td>655</td>
<td></td>
</tr>
<tr>
<td>POTASSIUM, K</td>
<td>65</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>CALCIUM, Ca</td>
<td>13</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>MAGNESIUM, Mg</td>
<td>12</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>TOTAL HARDNESS (AS CaCO₃)</td>
<td>12</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>TOTAL ALKALINITY (AS CaCO₃)</td>
<td>12</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>IRON (TOTAL), Fe</td>
<td>263</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>SILICA, SiO₂</td>
<td>26</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>CHLORIDE, Cl</td>
<td>26</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>SULPHATE, SO₄</td>
<td>26</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>NITRATE, NO₃</td>
<td>263</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>BICARBONATE, HCO₃</td>
<td>263</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>FLUORIDE, F</td>
<td>263</td>
<td>0.1</td>
<td>0.1</td>
<td></td>
</tr>
<tr>
<td>NaCl (CALC FROM CHLORIDE)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>WATER QUALITY DATA</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Table 2.4</strong></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

**Notes:**
- Data presented in milligrams per litre, unless otherwise stated.
- Analysis conducted per site given.
5. RESULTS

Four holes have been drilled on South West Island. Two of these, bores 26836 and 26838, have been constructed with stainless steel screens and gravel pack adjacent to the aquifer zone. However, some sanding of RN 26836 has been observed. Pump testing has shown that short term yields of 1.6 L/s (RN 26836) and 0.5 L/s (RN 26838) may be sustainable, but to avoid saline intrusion a pumping rate of 0.3 L/s is a more realistic extraction rate. Bore 26836 has been equipped with a hand pump and should only be considered as a standby bore.

6. RECOMMENDATIONS

It is recommended that:

- RN 26836, already equipped with a hand pump, should be utilised as a standby bore only;

- a pump setting of 6.9 m and an extraction rate of not more than 0.3 L/s should be adopted in RN 26838;

- conductivity readings should be undertaken monthly throughout the first dry season following bore commissioning;

- corrosion resistant reticulation materials should be utilised where possible because of low water pH;

- absorption trenches and septic tanks should not be constructed within 100 m radius of the bore.

Further recommendations for bore equipping are included in the Test Report (see Attachments).
REFERENCES


TEST REPORT — BORE RN. 26838

Bore location: SOUTH WEST ISLAND  
Client/owner: ABORIGINAL ESSENTIAL SERVICES

Client's reference:
Purpose of supply: Domestic

Map: PELLEW 1:100 000 Sheet
Grid reference: 677725 - 8264100

RECOMMENDATIONS

Pumping rate: 0.3 L/s, Pump setting: 6.9 m below ground level

General recommendations are given on the reverse side.

The aquifer and bore cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from: PWA, Water Directorate (in all correspondence refer to the bore's RN number).

SAECO House, DARWIN NT

BORE DATA

Finished depth: 11 m  
Completion date: 14/1/90  
Test date: 13/1/90

Standing water level: 0.6 m on 13/1/90

Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6.13</td>
<td>191 mm ID Steel Casing</td>
</tr>
<tr>
<td>0 - 7.4</td>
<td>150 mm Class 9 PVC Casing</td>
</tr>
<tr>
<td>7.4 - 9.4</td>
<td>146 mm ID Stainless steel screens with 1 mm aperture</td>
</tr>
<tr>
<td>9.4 - 10.5</td>
<td>150 mm ID PVC Casing</td>
</tr>
<tr>
<td>10.5 - 11</td>
<td>Backfill</td>
</tr>
</tbody>
</table>

Notes: 1. Top of casing as constructed was 0.5 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

COMMENTS

1. These results are based on a constant rate test at 0.5 L/s for 8 hours and assume hydrological conditions remain constant.

2. Provisions to monitor bore water levels and to obtain water samples at the bore head should be incorporated in any reticulation.

WATER QUALITY

See water laboratory report (Analysis No. 89/90/1192)
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.
### COMPOSITE LOG OF BORE 26838

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Bore Graphic Log</th>
<th>Strata Description</th>
<th>Aquifers (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 0.5 m</td>
<td>Sand and clay</td>
<td>Sand: yellow, grey, white, fine to medium sand</td>
<td>S.W.L. 0.6 m</td>
</tr>
<tr>
<td>1 m</td>
<td>Cement</td>
<td>Clayey Sand/Sandy Clay: white</td>
<td>13/1/90</td>
</tr>
<tr>
<td>2 m</td>
<td>Sand and clay</td>
<td>Clayey Sand/Sandy Clay: white</td>
<td></td>
</tr>
<tr>
<td>3 m</td>
<td>Sand and clay</td>
<td>Sandstone: pink, white, fine to medium quartz sandstone with ferruginous band</td>
<td></td>
</tr>
<tr>
<td>4 m</td>
<td>Sand and clay</td>
<td>Sandstone: white, friable, fine quartz sandstone</td>
<td></td>
</tr>
<tr>
<td>5 m</td>
<td>Sand and clay</td>
<td>Sandstone: white, fine to medium quartz sandstone</td>
<td></td>
</tr>
<tr>
<td>6 m</td>
<td>Gravel pack</td>
<td>0.5 L/s</td>
<td></td>
</tr>
<tr>
<td>7 m</td>
<td>PVC pip</td>
<td></td>
<td></td>
</tr>
<tr>
<td>8 m</td>
<td>Stainless steel screens</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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**Technical Report WRD90092**

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POWER
WATER
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 26836

Bore location: SOUTH WEST ISLAND
Client/owner: ABORIGINAL ESSENTIAL SERVICES
Client's reference:
Purpose of supply: Domestic

Map: PELLEN 1:100 000 Sheet 6266
Grid reference: 677700 - 8264100

RECOMMENDATIONS
Pumping rate: 0.3 L/s. Pump setting: 7 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from: POWER, Water Resources (In all correspondence refer to the bore's RN number).

BORE DATA

AQUIFER TEST

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
<th>Test rates: 1.6 L/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 6.3</td>
<td>191 mm ID Steel casing</td>
<td></td>
</tr>
<tr>
<td>0 - 7.8</td>
<td>150 mm ID Class 9 PVC Casing</td>
<td></td>
</tr>
<tr>
<td>7.8 - 9.8</td>
<td>146 mm ID Stainless steel screens with 1 mm aperture</td>
<td></td>
</tr>
<tr>
<td>9.8 - 10.1</td>
<td>146 mm ID Stainless steel sump</td>
<td></td>
</tr>
<tr>
<td>10.1 - 10.5</td>
<td>Backfill</td>
<td></td>
</tr>
</tbody>
</table>

Test duration: 8 hrs

Notes:
1. Top of casing as constructed was 0.6 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

COMMENTS

1. These results are based on constant rate test at 1.6 L/s for 8 hours and assume hydrological conditions remain constant.

2. Equipped with a Southern Cross KDC Handpump plus 1 length 25 mm GWF and foot valve.

WATER QUALITY

See water laboratory report (Analysis No. 89/90/1191)
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.
TOPSOIL
SAND: white, firm, fine to coarse

CLAYEY SAND/SANDY CLAY: white, fine to medium grained sand. Some shell grit near top

SAND: white, fine to medium grained

SANDSTONE: pink, friable to firm, fine to medium grained quartz sandstone

SANDSTONE: pink, hard quartz sandstone

COMPOSITE LOG OF BORE 26836