WATER RESOURCES DIVISION
ASSESSMENT BRANCH

REPORT NO 73/86

BORE COMPLETION REPORT
FOR
GARAWA WATER SUPPLY

N. POWER
GROUNDWATER ENGINEER
AUGUST 1986

39/GDWT
SYNOPSIS

A test production bore has been drilled at Garawa to determine the viability of increased groundwater supplies for Garawa's water supply. It is recommended that the water supplies for Police Lagoon outstation near Garawa and Garawa be integrated into one supply for both communities. It is estimated the combined community of approximately 150 people would require up to 2.3 L/s.

Recommendations are made regarding pumping from the existing four bores at Garawa and Police Lagoon. These can provide up to 5.0 L/s. Recommendations are made regarding further bore drilling which could provide up to 7.7 L/s.
NOTATION

mm  millimetres
m   metre
m²  square metres
d   day
L/s litres per second
RN  Registered Number
INTRODUCTION

The Department of Transport and Works on behalf of the Department of Community Development requested the drilling and construction of a test production bore at Garawa to determine the viability of increased groundwater supplies for Garawa water supply.

Garawa is located on the eastern side of the McArthur River adjacent to Borroloola.

The water supply is currently drawn from Bore RN 9076. The maximum continuous pumping rate for this bore issued in 1977 was 1.5 L/s. A standby production bore RN 9075 was drilled 38m from RN 9075 but has not been equipped. (see attached Figure).

GEOLOGY

The groundwater source for Borroloola is drawn from the Proterozoic Aged Abner Sandstone Formation of the Roper Group. The formation is predominately a white, medium-gained quartz sandstone. In the Borroloola-Garawa area the formation outcrops just north of the settlements and strikes at approximately 320°, dipping south-south westerly at one to two degrees.

Bores RN 9075 and RN 9076 intersected the Abner Sandstone between 15-45m (3.7 - 26.3m AHD). They reportedly struck only seepage in the Abner Sandstone and airlifted yields of 4.0 L/s and 2.8 L/s respectively from the underlying Crawford Formation.

Bore RN 22801 which was drilled for an outstation at Police Lagoon intersected the Abner Sandstone between 21-54m and airlifted 2.5 L/s. This bore is along strike of the Abner Sandstone from RN 9076.
All distances are in metres

- Formed dirt road

GARAWA BORE LOCATIONS
Bore RN 24554 was drilled down dip of RN 9076 to strike water in the Abner Sandstone at greater depth and further away from the outcropping recharge zone. Drilling at Borroloola had shown that airlifted water yields were maintained down dip (increasing depth) of the formation. It was anticipated that the greater depth would give greater available water level drawdown and thus potentially a higher individual bore yield. The bore intersected the Abner Sandstone between 32-73m and airlifted 3.4 L/s. The bulk of the yield was struck at 33m.

**AQUIFER PARAMETERS**

The Borroloola groundwater investigation conducted in 1982 derived estimates of Transmissivity towards the outcrop of the aquifer which ranged from 140-230m²/d. Further down dip the Transmissivity decreased to approximately 58m²/d indicating a decrease in the permeability down dip, though airlifted yields of 10 L/s were maintained.

An estimate for Transmissivity of 9m²/d and storage coefficient of 3.6 x 10⁻⁵ were derived from bores RN 9075 and RN 9076. Analysis of pumping bore drawdowns from Bore RN 22801 derived an estimate of Transmissivity of 16m²/d. Similar analysis from Bore RN 24554 gave an estimate for Transmissivity of 5m²/d. The estimate of Storage Coefficient from bores RN 9075/9076 is similar to estimates derived for the Abner Sandstone at Borroloola.

The lower estimates for Transmissivity derived for the Abner Sandstone on the Garawa side of the McArthur River, indicates decreased permeability of the formation and correlates with the lower bore yields. Water level drawdowns associated with bore construction (well loss) are similar for Bores RN 9075/76, 22801 and 24554 but the drawdowns due to extraction from the
aquifer (aquifer loss) are significantly higher in Bore RN 24554. These gave a lower estimate for transmissivity from Bore RN 24554 and suggests a decrease in permeability down dip as postulated at Borroloola.

WATER QUALITY

Except for low pH the water quality analysis from the bores in the area listed in the attached table, meets the N.T. Department of Health criteria for drinking water. The water is of comparable quality to the existing supply from RN 9076. The figure for pH in Bore RN 24554 has been raised due to aeration when airlifted.

Due to the low pH and low alkalinity the water is corrosive to metal fittings.

DEMAND

A Department of Community Development list of Aboriginal communities of 19 June 1985 gives the population at Garawa to be 105 and the population of Police Lagoon outstation near Garawa to be 50. This combined population of 155 people would require approximately 1.8 L/s for average day consumption with a peak day consumption of approximately 2.3 L/s.

WATER SUPPLY

The water supply for Garawa is currently drawn from Bore RN 9076. The maximum continuous pumping rate for this bore is 1.5 L/s. A review of the test pump data indicates that RN 9075 can be pumped at 0.8 L/s simultaneously with RN 9076.

Bore RN 22801 was drilled approximately 675m south of the storage tank. This location was dictated by the 39/GDWT
<table>
<thead>
<tr>
<th>BORE NUMBER</th>
<th>SOOTHER</th>
<th>Na</th>
<th>POTASSIUM</th>
<th>K</th>
<th>CALCIUM</th>
<th>Mg</th>
<th>TOTAL HARDNESS AS CaCO₃</th>
<th>TOTAL ALKALINITY AS CaCO₃</th>
<th>ION (TOTAL)</th>
<th>SIO₂</th>
<th>CHLORIDE</th>
<th>CL</th>
<th>SULPHATE</th>
<th>SO₄</th>
<th>NITRATES</th>
<th>NO₃</th>
<th>BICARBONATES</th>
<th>HCO₃</th>
<th>FLUORIDE</th>
<th>F</th>
<th>BICL (CALC FROM CHLORIDE)</th>
<th>PH</th>
<th>SERIES</th>
<th>DATE OF SAMPLING</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>9076</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>7</td>
<td>0.7</td>
<td>15</td>
<td>15</td>
<td>2</td>
<td>1</td>
<td>9</td>
<td>0.3</td>
<td>25</td>
<td>6.1</td>
<td>56</td>
<td>45</td>
<td>25/7/77</td>
<td>PUMPED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>9075</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>1.1</td>
<td>15</td>
<td>12</td>
<td>1</td>
<td>6</td>
<td>0.1</td>
<td>5.2</td>
<td>60</td>
<td>51</td>
<td>9/7/77</td>
<td>PUMPED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>22801</td>
<td>4</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>7</td>
<td>5</td>
<td>0.9</td>
<td>17</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>6</td>
<td>0.1</td>
<td>7</td>
<td>6.5</td>
<td>35</td>
<td>40</td>
<td>17/1/84</td>
<td>PUMPED</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>24554</td>
<td>9</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>21</td>
<td>25</td>
<td>-</td>
<td>14</td>
<td>14</td>
<td>5</td>
<td>1</td>
<td>31</td>
<td>0.1</td>
<td>21</td>
<td>7.6</td>
<td>95</td>
<td>70</td>
<td>19/6/86</td>
<td>AIRLIFT</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<td></td>
</tr>
</tbody>
</table>

Analysis in milligrams per litre - mg/L (unless otherwise stated)
recent housing developments at Garawa and the river. The recommended maximum continuous pumping rate for this bore is 1.2 L/s.

The pumping rates for the above bores have been calculated on a two year continuous pumping period without recharge. Test reports for Bore RN 9075, 9076, 22801 and 24554 showing pump settings and bore construction are attached in Appendix A. A bore completion report for RN 22801 was also prepared previously by Karp (1984). The test report follows the recommendations made by Karp.

Supply Recommendations

(1) Bore RN 9076 be pumped at 1.5 L/s.

(2) Bore RN 9075 be equipped to pump at 0.8 L/s. As this bore has not been used for a number of years it should be pumped initially onto the ground to ensure the water is clear.

(3) Bore RN 22801 be equipped to pump at 1.5 L/s. The bore or tank at Police Lagoon be connected to the storage tank at Garawa.

This would require a pipeline approximately 1200m long and possibly an electric power supply from Garawa.

(4) Bore RN 24554 be equipped to pump at 1.2 L/s. This bore is artesian flowing at approximately 0.3 L/s with a head above ground level of 2.6m.

This would require a pipeline approximately 700m long but it is close to existing power supply.
The above recommendations would give a combined supply of 5.0 L/s for Garawa and Police Lagoon outstation.

The pipeline between Garawa and Police Lagoon outstation should be sized to cater for an additional production bore midway along it. This bore would also be expected to yield 1.5 L/s giving a combined supply of 6.5 L/s.

An additional supply of approximately 1.2 L/s would be obtained by drilling a bore approximately 600m east of RN 24554 in the vicinity of the Borroloola-Burketown Road. This would give a combined supply of 7.7 L/s.

REFERENCE

APPENDIX A

TEST REPORTS
**TEST REPORT — BORE RN. 9075**

**RECOMMENDATIONS**

<table>
<thead>
<tr>
<th>Pumping rate: 0.8 L/s</th>
<th>Pump setting: 43 m below ground level</th>
</tr>
</thead>
</table>

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: WATER RESOURCES DIVISION (In all correspondence refer to the bore's RN number). SASCO HOUSE DARWIN N.T.

**BORE DATA**

<table>
<thead>
<tr>
<th>Finished depth: 63.34 m</th>
<th>Completion date: 2/6/77</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standing water level: 2.92 m</td>
<td>Test date: 7/7/1977</td>
</tr>
</tbody>
</table>

**AQUIFER TEST**

<table>
<thead>
<tr>
<th>Test rates: 1.1, 1.2, 1.5, 1.7 L/s</th>
<th>Test duration 24 hrs</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 43.74</td>
<td>140mm diameter blank steel casing</td>
</tr>
<tr>
<td>43.74 - 57.7</td>
<td>175mm open hole</td>
</tr>
</tbody>
</table>

Notes:
1. Top of casing as constructed was m above ground
2. All depths are measured from natural ground level
3. Test rates are not indicative of safe long term pumping rates.

**WATER QUALITY**

Suitable for Human Consumption.

See water laboratory report (Analysis No. 77/1688)
DEPARTMENT OF MINES AND ENERGY
WATER RESOURCES DIVISION

PUMPING PERFORMANCE CURVE
THIS DIAGRAM SHOWS THE EXPECTED DECLINE OF GROUNDWATER LEVEL AT VARIOUS PUMPING RATES (Q). IT PROVIDES A GUIDE TO SELECTION OF PUMP SETTING.

NOTE: Drawdown in water level with RN9076 pumping simultaneously at 1.5L/s

PUMPING PERFORMANCE - BORE 9075
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 9076

Bore location: GARAWA
Client/owner: DEPT COMMUNITY DEVELOPMENT
Client's reference: DOMESTIC

Purpose of supply: DOMESTIC

Map: SE 53-3 BAUHINIADOWNS 1:250 000
Grid reference: 437 973

RECOMMENDATIONS

Pumping rate: 1.5 L/s. Pump setting: 47.0 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: WATER RESOURCES DIVISION (In all correspondence refer to the bore's RN number). SASCO HOUSE DARWIN N.T.

BORE DATA

Finished depth: 63.3 m Completion date: 3/6/77 Test date: 24/7/77
Standing water level 1.81 m on 24/7/1977 Test rates: 2 L/s
Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 47.0</td>
<td>140mm diameter steel casing.</td>
</tr>
<tr>
<td>47.0 - 63.3</td>
<td>175mm open hole.</td>
</tr>
</tbody>
</table>

Notes: 1. Top of casing as constructed was 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 140 mm

COMMENTS

1. Maximum pump rate pumping simultaneously with RN 9075.
2. Attached water level drawdown curve allows for increased drawdown due to interference from RN 9075.

WATER QUALITY

SUITABLE FOR HUMAN CONSUMPTION.

See water laboratory report (Analysis No. 77/1715)
DEPARTMENT OF MINES AND ENERGY
WATER RESOURCES DIVISION

PUMPING PERFORMANCE CURVE
This diagram shows the expected decline of groundwater level at various pumping rates (Q). It provides a guide to selection of pump setting.

NOTE: Drawdown in water level with RN9075 pumping simultaneously at 0.8L/s

PUMPING PERFORMANCE - BORE 9076
WATER RESOURCES DIVISION

TEST REPORT — BORE RN. 22801

Bore location: POLICE LAGOON
Client/owner: DEPT. COMMUNITY DEVELOPMENT

Client's reference:
Purpose of supply: DOMESTIC

Map: BORROLOOLA 1:100 000 SHEET 6165
Grid reference: 437 242

RECOMMENDATIONS
Pumping rate: 1.5 L/s. Pump setting: 29 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: WATER RESOURCES DIVISION (In all correspondence refer to the bore's RN number). SASCO HOUSE, DARWIN N.T.

BORE DATA
Finished depth: 54.4 m Completion date: 6/6/84 Test date: 28/6/84
Standing water level 10.39 m on
Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 15.8</td>
<td>219mm diameter steel casing</td>
</tr>
<tr>
<td>0 - 54.4</td>
<td>152mm steel casing</td>
</tr>
<tr>
<td>29.6 - 41.9</td>
<td>152mm perforated steel casing</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 152 mm

COMMENTS

WATER QUALITY
SUITABLE FOR HUMAN CONSUMPTION.

See water laboratory report (Analysis No. 84/85/6080)

WRD4020
DEPARTMENT OF MINES AND ENERGY
WATER RESOURCES DIVISION

PUMPING PERFORMANCE CURVE
This diagram shows the expected decline of groundwater level at various pumping rates (Q). It provides a guide to selection of pump setting.

PUMPING PERFORMANCE - BORE 22801
TEST REPORT — BORE RN. 24554

Bore location: GARAWA
Client/owner: DEPT COMMUNITY DEVELOPMENT
Client's reference:
Purpose of supply: DOMESTIC

Map: BORROLOOLA 1:100 000 SHEET 6165
Grid reference: 409 221

RECOMMENDATIONS
Pumping rate: 1.2 L/s. Pump setting: 26.7 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: WATER RESOURCES DIVISION (In all correspondence refer to the bore's RN number). SASCO HOUSE DARWIN N.T.

BORE DATA
Finished depth: 73 m
Completion date: 19/6/86
Test date: 8/7/86
Standing water level: 2.65 m above ground level
Test rates: 0.8, 1.6, 2.0, 2.3, 2.8 L/s
Test duration: 48 hrs

Construction details:
Interval (m)
0 - 30.55
27.4 - 27.7
27.7 - 70.0
70.0 - 73.0

Description
152mm Steel casing - pressure cemented.
152-101.6mm Stainless steel packer.
101.6mm perforated class 9 PVC with 6 x 1m staggered s/s screens, aperture width 2mm.
open hole.

Notes:
1. Top of casing as constructed was 0.69 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 152 mm

COMMENTS

1. Bore flowing at 0.28 L/s with head of 2.65 m above ground level on 19/6/86.
2. Ball valve mounted on top of casing to control flow.

WATER QUALITY

SUITABLE FOR HUMAN CONSUMPTION.

See water laboratory report (Analysis No. 86/87/0008)

WRD4020
PUMPING PERFORMANCE CURVE
This diagram shows the expected decline of groundwater level at various pumping rates (Q). It provides a guide to selection of pump setting.

PUMPING PERFORMANCE - BORE 24554