DEEP WELL GROUNDWATER INVESTIGATION: DATE FARM HORTICULTURAL PROJECT

INTERIM REPORT
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WATER RESOURCES BRANCH, ALICE SPRINGS
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FIGURE 1 LOCATION MAP
1 INTRODUCTION

This project has arisen from a need to prove up water supplies for the establishment of a date industry in the Deep Well area south of Alice Springs. The project brief documentation proposed the production of this interim report for the client - D.I.D. by 18 September 1987. Refer Section 6 (c) - Analysis of all data and reporting (Job Brief P Jolly). The target completion date for the final report is 18 December 1987.

This interim report presents a summary of results of drilling and test pumping following from the completion of these field activities. It addresses the issue of obtaining an annual irrigation requirement of 1250 ML/a (Mega litres per annum) for area 1. See Figure 1. This equates to a constant annual supply of 39.6 L/s (Litres per second). This target requirement has been achieved.

Two test production bores have been drilled at the designated locations and test pumping is complete. The aquifer is potable.

The project area had been amended from the original to include the new drilling site locations. This change is documented in the note Amendment to Job Brief - G Prowse.

This report also presents a financial statement of both establishment and running costs associated with the provision of the water requirement for an agricultural project.
2 RESULTS

TEST PRODUCTION BORE RESULTS

SUMMARY TABLE

<table>
<thead>
<tr>
<th>SITE</th>
<th>BORE RN</th>
<th>SWL</th>
<th>MAXIMUM YIELD</th>
<th>PUMPING TYPE &amp; DISCHARGE RATES</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>14868</td>
<td>96 m</td>
<td>40 L/s</td>
<td>Step @ 25.3, 30, 35.4, 40.0 L/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Constant @ 40.0 L/s</td>
</tr>
<tr>
<td>B</td>
<td>14869</td>
<td>90 m</td>
<td>40 L/s</td>
<td>Step @ 20.1, 25.0, 33.0 39.5 L/s</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Constant @ 38.0 L/s</td>
</tr>
</tbody>
</table>

Testing of bore RN 14868 resulted in a water level drawdown of approximately half that obtained in bore RN 14869. The northern bore is the more efficient of the two. Drawdown differences reflect a variation in individual bore hydraulic efficiencies from this aquifer, in this area. The better performing bore is located away from the hill, adjacent to the drainage stream.

It should be noted that the two bores tested are constructed to test production standards only. Each is cased with 203 mm ID steel blank casing to approximately 160 metres depth, without a cement base. Open hole conditions ie without a screen string, persist to the total depth.

Both bores were drilled to a depth of 350 m and the Mereenie sandstone strata intersected was competent and thus non sanding.

WATER QUALITY

Field conductivity measurements were taken during drilling and testing and were found to be consistent and averaged 1300 µS/cm. (Microsiemens per centimetre). Water analysis results indicate that supplies with a total dissolved solids of 730 mg/L (milligrams/Litre) can be expected. Examples of typical analysis results from each bore are attached.
3 PRELIMINARY ASSESSMENT

(a) Estimates of Pumping Rates and Bore Construction

From an assessment of the field results, it can be expected (in this area) to drill and construct bores each to supply a yield 40 to 50 L/s.

These supplies are possible due to the characteristics of the Mereenie Sandstone of this area. The expected yields are based on the construction of bores to a depth of 300 metres, and on a pump setting of between 160 metres and 200 metres. A standing water level of 90 to 100 metres is assumed, dependant upon the exact location of bore sites and the overall drawdowns in response to long term pumping.

The construction of bores to production standards would be expected in order to produce hydraulically efficient bores. This is a pre-requisite for the maintenance of minimum operating costs. The long term economics of this strategy are obvious.

(b) Number of Bores Required

For the initial stage of a 50 hectare plot sufficient water to irrigate date trees has been given as 1,250 ML/a (Mega litres per annum). This equates to a constant supply of 39.6 L/s 24 hours per day, 365 days of the year. Thus one production bore would be sufficient for this requirement. However it is considered essential to provide for a standby capacity of at least one bore. Therefore two bores would be required for a balanced irrigation project.

The aspect of seasonal peak demand must also be addressed. Although the annual requirement of 1,250 ML/a equates to a 39.6 L/s constant supply, obviously seasonal variations will alter the actual daily need of the Alice Springs town supply demand is four times greater in summer then in the winter season. Therefore the daily average requirement for the peak month will have be to calculated. If the summer season demand requirement exceeds 40 to 50 L/s then the minimum number of bores required will be greater than one production with one standby.

The expansion to 200 hectares as eventually planned for will require 5,000 ML/a as estimated by the client. This equates to a constant supply of 159 L/s. Thus four production bores plus one standby capacity bore would be needed. The total is again conditional upon a peak demand not exceeding 40 to 50 L/s during the summer season.
4 FINANCIAL COSTS

(a) **Establishment of Production Bore**

It is believed that production bore standards for an irrigation project is essential. If minimum operating costs are to be maintained the bores must be hydraulically efficient. This translates to minimal drawdown effects from pumping, thus minimising the costs incurred during pumpage to the ground surface.

Efficiency is a consequence of the construction standards employed.

A summary of indicative costs for the drilling, construction and the equipping of such production bores follows. The costing is based on commercial rates prevailing at this time.

**Irrigating 50 Hectares**

<table>
<thead>
<tr>
<th></th>
<th>Casing &amp; Screens</th>
<th>$20 600</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Drilling</td>
<td>84 200</td>
</tr>
<tr>
<td></td>
<td>Equipping</td>
<td>60 000</td>
</tr>
<tr>
<td></td>
<td>Test Pumping</td>
<td>13 200</td>
</tr>
<tr>
<td><strong>TOTAL</strong></td>
<td></td>
<td><strong>$178 000</strong></td>
</tr>
</tbody>
</table>

Cost of 2 bores $356 000
Cost of 3 bores $534 000

**Note 1:** The equipping component includes a suitable pump, column and a generator source. It does not include the reticulation and storage tank components.

**Note 2:** The bore casing diameter size is designed to optimize hydraulic and costing conditions. Selection of 305 mm casing is suitable for this purpose.

**Note 3:** Standby bores are usually also fully equipped.

(b) **Operation Running Costs**

It has been estimated, based on industry figures that operating costs per bore would be $50 per hour. This equates to energy costs of approximately 35 cents per kilolitre.
One bore only cost per hour $50
   cost per year $438 000

Cost until trees are productive (assuming 15 years) - $6.6 M.