ALICE SPRINGS
TOWN BASIN

CONSTRUCTION OF
IRRIGATION BORES

Report # 55/1990

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ABBREVIATIONS

AHD           AUSTRALIAN HEIGHT DATUM
EC            SPECIFIC CONDUCTANCE (µS/cm @ 25°C)
i             FLOW GRADIENT
ID            INTERNAL DIAMETER
K             HYDRAULIC CONDUCTIVITY
KL            KILOLITRE
km            KILOMETRE
l             LITRE
L/s           LITRES PER SECOND
m             METRE
m/d           METRES PER DAY
m²/d          METRES SQUARED PER DAY
m²/m          METRES SQUARED PER METRE
m/s           METRES PER SECOND
meq/L         MILLIEQUIVALENTS PER LITRE
mg/L          MILLIGRAMS PER LITRE
mS/m          MILLISIEMENS PER METRE
OD            OUTSIDE DIAMETER
q             DISCHARGE RATE
r             DISTANCE BETWEEN BORES
RN            REGISTERED NUMBER (OF BORE)
RSC           RESIDUAL SODIUM CARBONATE
s             DRAWDOWN (m)
S             STORAGE CO-EFFICIENT
SAR           SODIUM ABSORPTION RATIO
SWL           STANDING WATER LEVEL
T             TRANSMISSIVITY (in m²/d)
TDS           TOTAL DISSOLVED SOLIDS (in mg/L)
µS/cm         MICROSIEMENS PER CENTIMETRE
W(u)          THEISS WELL FUNCTIONS
%             PERCENTAGE
Engineering Branch, PAWA, Alice Springs
Water Resources Library Alice Springs
Water Library Darwin
Principal Engineer Groundwater
Author
1.0 INTRODUCTION

1.1 PROJECT BRIEF

Use of water from the Alice Springs Town Basin for irrigation of public recreation areas is encouraged by PAWA. This forms part of a strategy to decrease consumption from, and thereby reduce stress on, the Roe Creek Borefield. It should also contribute to a deepening of the shallow water table within the town area.

A consultancy to examine effective utilization of Town Basin water was commissioned by PAWA in 1990. The ensuing report (Acer Vaughan, 1990) included a recommendation that three irrigation bores be constructed as follows;

1. Downstream of Stott Terrace Bridge, in the bed of the Todd River to irrigate Ross Park School and Anzac Oval.

2. In the grounds of Traeger Park School or Alice Springs Hospital to irrigate both the playing fields and lawns of these institutions.

3. At the Alice Springs Town Swimming Pool, to water the pool's surrounds and Larapinta and Newlands Parks.

In order to meet this recommendation a total of eight investigations and four production bores were drilled. This report presents the outcome of this work. A previous stage of investigation which formed part of this project was reported by Baker (1990).

1.2 CLIENT REQUIREMENTS

The Engineering Branch of PAWA in Alice Springs commissioned the Acer Vaughan Report, and subsequent work
detailed herein was carried out by Water Resources Branch within the 1990/91 Capital Works (continuous items) Programme.

Water requirements for the different sites was based on the volume needed to irrigate to a depth of 3m per annum over the nominated area. It is expected that the area will be irrigated for 8 hours per day, 3 days per week, depending on weather conditions. For further details see Section 8.

Water quality requirements were stipulated as water being suitable for irrigation. Water quality details are contained in Section 7.
2.0 GEOLOGY AND GROUNDWATER HYDROLOGY

The Town Basin is a small Quaternary alluvial basin overlying Precambrian gneiss of the Arunta Complex (Figure 1).

An extensive study of the Town Basin's hydrogeology was completed in 1969 by Quinlan and Woolley and remains the most comprehensive source of information on its aquifers.

The Town Basin was divided into four main lithological groups. These were:-

Brown Sand  
Brown and grey clayey sand  
Brown and grey silt and clay  
Regolith and Colluvium

Regolith and colluvium make up a small percentage of the basin and are confined to the area near Heavitree Gap. The brown and grey silt and clay were estimated to make up 80 percent of the basin and represent remnant meander belts and overbank areas. The brown sand aquifer was considered to be abandoned channels of the Todd River, and are up to 5m thick. They are generally long, narrow, lenticular bodies.

MacQueen (1979) determined a safe yield of 600 ML/yr, allowing for 100 ML/yr of throughflow to the Farm Area. This figure neither included leakage from the town's reticulation system nor irrigation of areas in the Town Basin. Both these recharge sources are considered significant by Acer Vaughan (1990).

Peak water abstraction from the Town Basin occurred in 1962 and 1963 with 1140 ML and 1260 ML respectively (Quinlan and Woolley, 1969). Abstraction has been estimated at 800 ML/yr over the last three years and this has had little effect on the water table. As such a somewhat arbitrary figure of 2000 ML/yr has been selected as
available for abstraction (Acer Vaughan, 1990). This may over-tax the basin, but is necessary to lower the water table.
Substantial drilling has been undertaken in the Town Basin. A summary of selected bores in the vicinity of the present study areas, shown in Figure 2, are described below:

1. Stott Terrace/Todd River: Near the proposed site, three bores were drilled using similar techniques to those employed as part of this investigation (refer Section 5.1). RN15096 and RN15211 were pump tested and had recommended yields of 3.5 L/s and 4.0 L/s respectively. RN15095 had a small yield and was completed as a 50mm observation bore.

During a groundwater investigation carried out in 1985 two traverses of small diameter investigation holes were jetted into the bed of the Todd River downstream of the Stott Terrace Bridge. Recommendations were made that the most prospective site for a production bore would be between Holes No. 5 and No. 6 (see Figure 3).

2. Traeger Park School/Alice Springs Hospital: RN12733 in the south-west corner of the Alice Springs Gaol had a total depth of 9.5m and was pump tested to a maximum 10.4 L/s with a recommended rate not exceeding 6.0 L/s. It is currently not utilised. One hundred metres to the north, RN2799 was drilled to a depth of 18m, cased with 150mm NB perforated casing and yielded 3.0 L/s.

Within the school grounds RN3041 and RN11088 were pump tested and recommended at 5.0 L/s and 3.0 L/s respectively.

4. Alice Springs Swimming Pool/Traeger Park Oval: In the grounds of the pool RN11820 was drilled and cased to 15.5m in 1978. The maximum recommended pumping rate was 8.0 L/s. By early 1981 the yield had decreased substantially and the Alice Springs
Town Council requested further action. The bore was jetted with 4.5kL of water and then pumped again. The yield decreased further and rehabilitation work on the bore was discontinued.

RN11382 is located near the southern boundary of Traeger Park. It was pump tested to 10 L/s, recommended at 4.0 L/s, but currently produces only 2.5 L/s. It is unclear whether this is due to bore failure or pump/column problems.
4.1 INVESTIGATION DRILLING

Where exploratory drilling was required, a cable tool rig was used. This enabled thin wall tube samples to be recovered for good lithological sample description, and precise identification of all water strikes and quality.

Dry sieve analyses (see Appendix 2) were carried out upon sample intervals identified as being potential aquifers. The results:

1) gave an empirical estimate of soil hydraulic conductivity, and;
2) determined screen aperture sizes for installation of stainless steel screens to optimise well performance and prevent sand pumping.

Sample cores recovered from the cable tool drilling were photographed for archive purposes (Plates 1 to 3).

4.2 STOTT TERRACE/TODD RIVER

A total of eight electromagnetic traverses were carried out across the Todd River (see Figure 4). An EM 34 (electromagnetic induction) instrument was used. The data was reduced by Water Resources Division's (Darwin) Senior Geophysicist. Apparent conductivity contour maps were produced from the data (see Appendix 1). The 10m and 20m horizontal (vertical dipole) coils had the deepest penetration and hence provided the most relevant information below the water table down to surficial/bedrock contact.
The interpretation of the apparent conductivities modelled, follows:

<table>
<thead>
<tr>
<th>Apparent Conductivity</th>
<th>Lithological Interpretation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. &lt;20 mS/m</td>
<td>Dry sands/silts, small clay content</td>
</tr>
<tr>
<td>2. 20-30 mS/m</td>
<td>Wet sands/silts, small clay content</td>
</tr>
<tr>
<td>3. &gt;35 mS/m</td>
<td>Low permeability sands/silts possibly with a large clay component</td>
</tr>
<tr>
<td>4. &gt;45 mS/m</td>
<td>Alluvial clays or weathering products of the schist bedrock</td>
</tr>
</tbody>
</table>

This interpretation used the 1985 air-jetting traverse lithologies for control purposes to model the apparent conductivity values and thicknesses.

The main features of the contouring derived from this interpretation is a south-west trending conductivity anomaly of approximately 20-30 mS/m. This is interpreted as the centre of a paleo-drainage channel. Its location is shown in Appendix 1B.

4.3 ALICE SPRINGS SWIMMING POOL/TRAEGAR PARK OVAL

RN15752 was sited 6m east of RN11280 and intersected mainly sandy silt and clay. This was considered an aquiclude and the hole was backfilled. The investigation then concentrated upon Traeger Park Sports Oval.

RN15754 was sunk within Traeger Park, penetrated clays and was subsequently backfilled. It was decided to branch out both eastwards and westwards to try to locate the predominantly north-south oriented paleochannels.
RN15759 and RN15760 encountered good aquifers. Both bores intersected medium grained brown sand; RN15760 from 10 to 15m and RN15759 from 9.5 to 11.0m and 17.2 to 18.4m.

Results of sieve analyses (Table 1 and Appendix 2A and 2B) favoured RN15760 for development, because it yielded a larger median grain size than RN15759. RN15760 was completed as a production bore. Six metres of 219mm surface collar was left in RN15759; to bring on line as another production bore if required. This could be accomplished by reaming it.

**TABLE 1 - CALCULATION FOR K, T & Q FOR RN15760**

Completed using the Hazen method (Hazen, 1975, pp41)

and also with the Driscoll method (Groundwater and Wells, pp738)

<table>
<thead>
<tr>
<th>METHOD</th>
<th>SIEVE ANALYSIS APPENDIX NO.</th>
<th>INTERVAL (m)</th>
<th>K(m/d)</th>
<th>T(m²/d)</th>
<th>Q (L/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>HAZEN</td>
<td>2A</td>
<td>10 - 13</td>
<td>46</td>
<td>138</td>
<td>9.8</td>
</tr>
<tr>
<td>HAZEN</td>
<td>2B</td>
<td>13 - 15</td>
<td>46</td>
<td>92</td>
<td>8.4</td>
</tr>
<tr>
<td>DRISCOLL</td>
<td>2A</td>
<td>10 - 13</td>
<td>32</td>
<td>96</td>
<td>6.6</td>
</tr>
<tr>
<td>DRISCOLL</td>
<td>2B</td>
<td>13 - 15</td>
<td>9</td>
<td>18</td>
<td>1.8</td>
</tr>
</tbody>
</table>

**4.4 TRAEGAR PARK SCHOOL/ALICE SPRINGS HOSPITAL**

RN15761 was drilled in Traeger Park School. It penetrated two sand aquifers of marginal quality. Another bore, RN15763 sunk 40m north-east of RN15761, in an attempt to locate better quality aquifers, intersected clay and silty sand and was backfilled. This left RN15761 to be developed as a production bore.
RN15762 was sunk to a depth of 22.8m in the north west corner of the hospital grounds. A medium grained sand aquifer was intersected between 7.9 and 16.4m.
Bore locations are shown at Figure 2 and their composite logs appear in Appendix 3.

Table 2 summarises total depths and screen intervals of those bores completed to production standards.

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>RN</th>
<th>TOTAL DEPTH (m BGL)</th>
<th>SCREEN INTERVAL (m)</th>
<th>S.W.L.</th>
<th>TEST YIELD L/s</th>
<th>PUMP SETTING (m)</th>
</tr>
</thead>
<tbody>
<tr>
<td>TODD RIVER</td>
<td>15751</td>
<td>11.0</td>
<td>5.1-8.3</td>
<td>1.2</td>
<td>6.0</td>
<td>-</td>
</tr>
<tr>
<td>TODD RIVER</td>
<td>15753</td>
<td>6.1</td>
<td>3.9-6.1</td>
<td>0.8</td>
<td>13.0</td>
<td>-</td>
</tr>
<tr>
<td>TRAEGER PARK OVAL</td>
<td>15760</td>
<td>13.6</td>
<td>11.0-13.0</td>
<td>3.95</td>
<td>30.0</td>
<td>10.2</td>
</tr>
<tr>
<td>TRAEGER PARK SCHOOL</td>
<td>15761</td>
<td>19.3</td>
<td>9.1-11.1</td>
<td>4.69</td>
<td>20.0</td>
<td>8.5</td>
</tr>
<tr>
<td>ALICE SPRINGS HOSPITAL</td>
<td>15762</td>
<td>14.2</td>
<td>11.2-13.2</td>
<td>4.39</td>
<td>5.0</td>
<td>10.8</td>
</tr>
</tbody>
</table>

5.1 DRILLING METHOD

Polymer mud rotary drilling was used for the production bores. A 393mm tricone roller bit was used in all holes. Once drilling and construction was completed, the in-line stainless steel screens were jetted with a compound to accelerate the dispersion and decomposition of the drilling mud. The following day the screens were jetted again using clean water with the bore being pumped simultaneously.

5.2 STOTT TERRACE/TODD RIVER

RN15751 was located 100m south of the Stott Terrace Bridge on the western bank of the Todd River. This site was in
accordance with the target area suggested by the geophysical survey. The hole was drilled to 11.0m with a diameter of 393mm. 356mm OD blank steel casing was run down the hole with 3m of 322mm ID x 4mm aperture screen, set between 7.2 and 10.2m.

A 'Mono' pump was used in the bore. At 3.3 L/s the bore forked after 3 minutes and at 1.5 L/s it forked after 7 minutes. The screens were jetted with 30,000 litres of water, but the yield failed to increase.

The casing was pulled back 2m, and the 'Mono' pump used at a rate of 6.0 L/s. This produced 5.2m drawdown after 30 minutes. This was considered an insufficient yield. The bore was sealed, and casing subsequently withdrawn.

5.3 ALICE SPRINGS SWIMMING POOL/ TRAEGER PARK OVAL

RN15760 was reamed to accept 356mm OD blank steel casing to 13.6m with 2m of 335mm ID x 2mm aperture screen, between 11.0 and 13.0m. (Calculations to ensure non-turbulent flow velocity through the screens is given as Appendix 4)

5.4 TRAEGER PARK SCHOOL/ALICE SPRINGS HOSPITAL

RN15761 was also reamed. Two separate aquifers were screened; one from 9.1 to 11.1m with a 1.75mm aperture and the lower aquifer from 16.3 to 18.3m with a 2.0mm aperture.

RN15762 was originally constructed with 2.0mm aperture screen set between 14.4 and 16.4m. Modifications were made to the bore after initial test pumping and the screen was reset between 11.5 and 13.5m.
6.0 BORE TESTING

Test reports and analyses of drawdown for RN 15760, 11814, 6518, 15761 and 15762 are shown in Appendices 5 and 6. Table 2 contains a summary of the test pumping data. Table 3 presents final pumping drawdown data, and transmissivities derived from Jacob time - drawdown analysis (including observation bore analyses).

<table>
<thead>
<tr>
<th>OBSERVATION POINT</th>
<th>DISTANCE FROM PUMPED FROM (m)</th>
<th>FINAL DRAWDOWN (m)</th>
<th>TRANSMISSIVITY (m³/d) RECOVERY</th>
</tr>
</thead>
<tbody>
<tr>
<td>RN 6518</td>
<td>33</td>
<td>0.35</td>
<td>1000</td>
</tr>
<tr>
<td>RN 11382</td>
<td>36</td>
<td>0.88</td>
<td>2800</td>
</tr>
<tr>
<td>RN 11814</td>
<td>108</td>
<td>0.55</td>
<td>1400</td>
</tr>
<tr>
<td>RN 15760</td>
<td>-</td>
<td>4.43</td>
<td>1900</td>
</tr>
<tr>
<td>RN 15761</td>
<td>-</td>
<td>2.96</td>
<td>745</td>
</tr>
<tr>
<td>RN 15762</td>
<td>-</td>
<td>6.41</td>
<td>320</td>
</tr>
</tbody>
</table>

6.1 STOTT TERRACE/TODD RIVER

A constant rate test was conducted on RN15753. No observation bores were utilised and aquifer parameters were not calculated. The TDS levels were excessive (3600 mg/L) for irrigation water and the test was conducted only to observe any changes in water quality after extended pumping. Section 7.2 provides details.
6.2 ALICE SPRINGS SWIMMING POOL/TRAEGAR PARK OVAL

A five stage step test was conducted on RN15760. It consisted of pumping 10, 15, 20 and 25 L/s each for 30 minutes with an extended step of 30 L/s for 200 minutes. At the end of pumping the drawdown was 3.94m. Available drawdown was 6.05m.

Subsequently a constant rate test of 30 L/s for 25 hours was undertaken. Water levels in three observation bores were recorded during the test (RN6518, 11814 and 11382). After 1500 minutes the final drawdowns were recorded and analyses of the test data carried out to determine transmissivities and storage coefficients.

From commencement of pumping, RN11814, 108m south of the pumped bore, reacted within two minutes. RN6518, 33m west of the pumped bore did not show a drawdown until the 160 minute reading. RN11382 (a current production bore at Traegar Park) 38m from RN15760 recorded a 0.18m drawdown after only one minute. This supports the idea of isolated paleochannels of high permeability parallel to the present course of the Todd River.

6.3 TRAEGAR PARK SCHOOL/ALICE SPRINGS HOSPITAL

A short step test was conducted on RN15761 which included steps of 2, 5, 10, 15 and 20 L/s each for 30 minutes. A 6 hour 20 L/s constant rate test was then carried out with a final drawdown of 2.96m. Available drawdown was 4.11m. The maximum rate recommended is 20L/s. Two observation bores, RN14433 and RN15762, recorded drawdowns of only 0.04m and 0.03m respectively.

Initial pumping of RN15762 yielded only 2 L/s. After much development the yield had increased to only 3.5 L/s. The screens were then raised 2m and a step test carried out. This involved pumping at 1, 2, 3, 4 and 5 L/s for 100 minutes and 6 L/s for 200 minutes. The final drawdown was 6.41m with an available drawdown of 6.81m.
Aquifer dewatering was evident during the last step and the maximum rate recommended is 5 L/s.
### WATER QUALITY DATA

**TABLE 4**

<table>
<thead>
<tr>
<th>BORE REGISTERED NUMBER</th>
<th>DATE OF SAMPLING</th>
<th>SPECIFIC CONDUCTANCE µS/cm</th>
<th>TOTAL DISSOLVED SOLIDS TDS</th>
<th>SOXUM</th>
<th>POTASSUM</th>
<th>CALCIUM</th>
<th>MAGNESIUM</th>
<th>TOTAL HARDNESS</th>
<th>TOTAL ALKALINITY</th>
<th>IRON (TOTAL)</th>
<th>SILICA</th>
<th>CHLORIDE</th>
<th>SULPHATE</th>
<th>NITRATE</th>
<th>BICARBONATE</th>
<th>FLUORIDE</th>
<th>(CALC FROM CHLORIDE)</th>
<th>COMMENTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>11382</td>
<td>28/09/90</td>
<td>3310</td>
<td>1960</td>
<td>7.2</td>
<td>590</td>
<td>10</td>
<td>97</td>
<td>48</td>
<td>440</td>
<td>613</td>
<td>0.2</td>
<td>31</td>
<td>535</td>
<td>377</td>
<td>10</td>
<td>747</td>
<td>1.0</td>
<td>882</td>
</tr>
<tr>
<td>15752</td>
<td>02/08/90</td>
<td>448</td>
<td>2830</td>
<td>8.0</td>
<td>970</td>
<td>41</td>
<td>--</td>
<td>4</td>
<td>35</td>
<td>1165</td>
<td>---</td>
<td>55</td>
<td>550</td>
<td>---</td>
<td>---</td>
<td>1421</td>
<td>6.1</td>
<td>906</td>
</tr>
<tr>
<td>15753</td>
<td>08/08/90</td>
<td>5830</td>
<td>3600</td>
<td>7.6</td>
<td>1090</td>
<td>26</td>
<td>110</td>
<td>60</td>
<td>521</td>
<td>922</td>
<td>&lt;0.01</td>
<td>18</td>
<td>1100</td>
<td>568</td>
<td>14</td>
<td>1125</td>
<td>0.4</td>
<td>1813</td>
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<tr>
<td>15760</td>
<td>21/09/90</td>
<td>3710</td>
<td>2210</td>
<td>7.4</td>
<td>680</td>
<td>12</td>
<td>95</td>
<td>53</td>
<td>455</td>
<td>692</td>
<td>22</td>
<td>28</td>
<td>584</td>
<td>445</td>
<td>13</td>
<td>844</td>
<td>0.8</td>
<td>962</td>
</tr>
<tr>
<td>15760</td>
<td>03/10/90</td>
<td>3880</td>
<td>2415</td>
<td>7.4</td>
<td>740</td>
<td>10</td>
<td>95</td>
<td>48</td>
<td>435</td>
<td>741</td>
<td>0.1</td>
<td>28</td>
<td>620</td>
<td>419</td>
<td>11</td>
<td>904</td>
<td>1.1</td>
<td>1022</td>
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<tr>
<td>15761</td>
<td>05/02/91</td>
<td>2070</td>
<td>1210</td>
<td>7.3</td>
<td>364</td>
<td>25</td>
<td>60</td>
<td>32</td>
<td>281</td>
<td>442</td>
<td>0.5</td>
<td>46</td>
<td>280</td>
<td>189</td>
<td>14</td>
<td>539</td>
<td>0.9</td>
<td>461</td>
</tr>
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<td>15762</td>
<td>27/02/91</td>
<td>1690</td>
<td>995</td>
<td>7.3</td>
<td>320</td>
<td>10</td>
<td>38</td>
<td>18</td>
<td>169</td>
<td>400</td>
<td>0.1</td>
<td>24</td>
<td>220</td>
<td>151</td>
<td>5</td>
<td>488</td>
<td>0.6</td>
<td>363</td>
</tr>
</tbody>
</table>

Analysis in milligrams per litre - mg/L (unless otherwise stated)
7.0 WATER QUALITY

7.1 PREVIOUS DATA

A summary of water quality data is presented in Table 4 for selected production bores.

Since cessation of the abstraction of large volumes of groundwater from the Town Basin in the late 1960's, groundwater salinity concentrations have increased markedly (Paige, 1985).

During the decade 1960-1970, TDS concentrations of 500 mg/L to 800 mg/L were the norm with some bores recording less than 300 mg/L. Most of the original bores are now abandoned. Few chemical analyses were undertaken between 1965 and 1980. Hence only incomplete records of salinity changes with time exist. Chemical analyses of RN6518 are quite complete, and contain similar TDS values to other bores in the area. RN6518 was last pumped in 1965 and it was not tested again until 1983. Table 5 presents TDS levels in this bore since its construction.

<table>
<thead>
<tr>
<th>DATE SAMPLED</th>
<th>TDS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 1953</td>
<td>896</td>
</tr>
<tr>
<td>February 1956</td>
<td>682</td>
</tr>
<tr>
<td>October 1960</td>
<td>579</td>
</tr>
<tr>
<td>September 1962</td>
<td>705</td>
</tr>
<tr>
<td>July 1964</td>
<td>700</td>
</tr>
<tr>
<td>November 1983</td>
<td>2790</td>
</tr>
<tr>
<td>July 1988</td>
<td>2380</td>
</tr>
</tbody>
</table>

During some dry years in the latter half of the decade, 1960-1970, when the Town Basin aquifer supplied all of Alice Springs water requirements, the standing water level dropped considerably. RN5818, near the corner of Speed Street and the Stuart Highway was drilled in 1959 and originally had a SWL of 9.37m. By May 1965 this had dropped to 12.43m. Currently its SWL has recovered to
4.53m (see Figure 5). Limited TDS data for RN5818 shows increased TDS levels with shallower SWL (Figure 5).

The large recovery in the water table can be attributed to the cessation of pumping from the Town Basin; a large influx of ground water pumped from Roe Creek Borefield (particularly by irrigation usage and wastewater) and some wet years in the early 1970's.

The effect of high ground water levels has been to mobilise natural soil salts, increase evaporation and decrease recharge into the basin of fresh (200mg/L TDS) Todd River water. Water from the Mereenie Sandstone (500mg/L TDS) may also have had an effect, as at current usage levels, 4500 tonnes of salt are brought into the town area each year. Of this, possibly 1000 tonnes reach the water table (Paige, 1985). Appendix 7 present a classification of irrigation waters. Table 6 summarises the suitability of groundwater sampled whilst pumping the new production bores for irrigation use. According to standard irrigation quality parameters, sodium absorption ratio (SAR), and residual sodium carbonate (RSC), all the waters fail these criteria (refer Section 8 for discussion).

**TABLE 6**

**SUITABILITY OF GROUNDWATER FROM PRODUCTION BORES FOR IRRIGATION**

<table>
<thead>
<tr>
<th>RN</th>
<th>SAR (meq/L)</th>
<th>RSC (meq/L)</th>
<th>RECOMMENDED RSC LIMITS (meq/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>15760</td>
<td>3.88</td>
<td>4.74</td>
<td>&lt;1.25 Suitable</td>
</tr>
<tr>
<td>15761</td>
<td>9.44</td>
<td>3.21</td>
<td>1.25-2.5 Marginal</td>
</tr>
<tr>
<td>15762</td>
<td>0.71</td>
<td>4.62</td>
<td>&gt;2.5 unsuitable</td>
</tr>
</tbody>
</table>

Footnote to Table 6:
A TDS concentration of 1000mg/L is generally used as an upper limit for irrigation water. Other indicators of suitability of water for irrigation are SAR (Sodium Absorption Ratio) and RSC (Residual Sodium Carbonate).

\[
\text{SAR} = \frac{\sqrt{\text{Ca} + \text{Mg}}}{2}
\]
\[ RSC = (\text{CO}_3^{2-} + \text{HCO}_3^{-}) - (\text{Ca}^{2+} + \text{Mg}^{2+}) \]

Cations are expressed as milliequivalents per litre (meq/L).

Richards (1954) developed a classification system based on the SAR and conductivity values of water (see Appendix B). Wilcox (1958) developed RSC limits in irrigation water as given below.

7.2 STOTT TERRACE/ TODD RIVER

RN15751 was sunk in the vicinity of air-jet hole No. 7 (Figure 3). Hole No. 7 was drilled in 1985, airlifted 2.5 L/s and had a TDS of 540 mg/L. The results of the geophysical survey, carried out in March 1990, also indicated low conductivity groundwater. However, when RN15751 was drilled in July 1990 the TDS was 1928 mg/L.

RN15753 was sunk into the river bed near air-jet hole No. 5. RN15753 yielded 13 L/s with a TDS of 3371 mg/L. At the start of the pump test the TDS was 4044 mg/l; after 70 hours the TDS had fallen to 2788 mg/L. Five years previously water from No. 5 air-jet hole had a TDS of 450 mg/L.

The area drilled is just down-stream of the Sadadeen Drain (see Figure 2) and the Eastside Trunk Sewer, and it was decided to test whether these water conveyances were having an adverse effect on the ground water quality.

The TDS of surface water ponded at the junction of Sadadeen Drain and the Todd River was tested and found to be over 6000 mg/L. At this time contractors were installing sewer lines at chainage 1.0-1.5km along the Sadadeen Drain from its outfall. Water in both excavation pits had a TDS over 6000 mg/L.

Subsequently four air-jet holes were drilled 100m upstream of the Stott Terrace Bridge. Small supplies were intersected in two of the holes and both had TDS values of around 1200 mg/L. A sample pumped the same day from RN15753 (100m downstream of the Stott Terrace Bridge) had a TDS of 4692 mg/L. This indicates saline inflow from the Sadadeen Drain and/or baseflow of saline water from the
Sadadeen area. This saline influx is hopefully temporary and should abate after cessation of de-watering works. The saline plume in the Todd River should then be progressively diluted and dissipate downstream.

7.3 ALICE SPRINGS SWIMMING POOL/TRAEGER PARK OVAL

During the development and test pumping of RN15760 chemical parameters remained constant. The TDS was originally 2210 mg/L and after a short step test and a 25 hour, 30 L/s constant rate test the TDS was 2415 mg/L.

7.4 TRAEGAR PARK SCHOOL/ALICE SPRINGS HOSPITAL

During development of RN15761 the conductivity varied slightly. A water sample taken at the conclusion of a six hour, 20 L/s constant rate test recorded a TDS of 1210 mg/L.

The water quality of RN15762 also remained constant during pump testing. The TDS of a sample taken at the conclusion of pumping was 995 mg/L.

Salinisation of soils in the Town Basin is a contentious issue, it could be argued that these soils were saline under natural water balance conditions (Wright, 1959).
Based upon Appendix 7, groundwater quality of areas drilled in the Town Basin is Class 3 (RN15761 and RN15762) and Class 4 (RN15760). It is of medium sodium hazard (Appendix 7) and the RSC values are classed as unsuitable.

In Alice Springs water with a TDS up to 1000 mg/L is generally suitable for all irrigation and water with TDS values between 1000 mg/L and 2000 mg/L is satisfactory for selected native plants and most lawn grasses (Acer Vaughan, 1990).

When used in conjunction with good irrigating techniques—irrigating at night and the application of water at a rate sufficient to allow leaching—water from both RN15761 and RN15762 should cause few problems. Areas irrigated with water from RN15760 should be monitored closely.

RN6518 (TDS 2380 mg/L) has water quality similar to RN15760 (TDS 2415 mg/L). This water is currently being used to irrigate Larapinta and Traeger Parks and the grass is presently growing well. Long term effects, however, are unknown and problems with salt tolerance could occur in the future.

Acer Vaughan (1990) stipulated that different yields were required at various locations (Table 7). This was based on an irrigation practice of watering for 8 hours per day, 3 days per week with a total of 3000mm per year being applied:

The yields attained by this latest production bore drilling programme will be more than sufficient for all locations except for the Alice Springs Hospital. At the hospital it may be necessary to stagger the areas being watered so that no more than 5 L/s is required at any one time. This may result in running the pump for a duration of more than 24 hours (3 days x 8 hours) per week. Operationally, this should not cause any undue problems.
**TABLE 7**

**YIELD REQUIREMENTS FOR TOWN AREAS TO BE IRRIGATED***

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>YIELD REQUIRED</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alice Springs Hospital</td>
<td>12</td>
</tr>
<tr>
<td>Traeger Park Primary School</td>
<td>16</td>
</tr>
<tr>
<td>Traeger Park Baseball Oval</td>
<td>10</td>
</tr>
<tr>
<td>Alice Springs Town Swimming Pool</td>
<td>10</td>
</tr>
<tr>
<td>Larapinta Park</td>
<td>12</td>
</tr>
<tr>
<td>Newlands Park</td>
<td>12</td>
</tr>
</tbody>
</table>

*after Acer Vaughan, 1990*
1. A total of nine investigation holes were drilled for this project; RN 15751 and 15753 (100m south of Stott Bridge in Todd River), RN 15752 (Swimming Pool), Rn 15754, 15759 and 15760 (Traeger Park Oval), RN 15761 and 15763 (Traeger Park School) and RN 15762 (Hospital).

2. A cable tool rig was used to gain representative samples of the strata drilled in seven out of the nine holes. Three of these holes were converted to production bores by mud rotary drilling. They are Rn 15760, 15761 and 15762. (A fourth cased bore, RN 15753 has yet to be test pumped).

3. The following yields and water qualities were obtained after pump testing of production bores:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>REGISTERED NUMBER (RN)</th>
<th>TEST DURATION (hrs)</th>
<th>YIELD (L/s)</th>
<th>MAX. DRAWDOWN (m)</th>
<th>AVAILABLE DRAWDOWN (m)</th>
<th>TDS (mg/L)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traeger Pk Oval</td>
<td>15760</td>
<td>24</td>
<td>30</td>
<td>4.40</td>
<td>7.1</td>
<td>2415</td>
</tr>
<tr>
<td>Traeger Pk School</td>
<td>15761</td>
<td>6</td>
<td>20</td>
<td>2.96</td>
<td>4.1</td>
<td>1210</td>
</tr>
<tr>
<td>Alice Springs Hospital</td>
<td>15762</td>
<td>6</td>
<td>5</td>
<td>4.38</td>
<td>6.8</td>
<td>995</td>
</tr>
</tbody>
</table>

4. RN 15760 should be used to supply water for the irrigation of Traeger Park Baseball Oval, Town Swimming Pool, Larapinta and Newland Parks.
Although RN 15760's yield can meet irrigation demand there is a potential problem regarding its salinity which needs to be addressed.

RN 15761 should be used to water the playing fields of Traeger Park School and any excess directed to the grounds of the Hospital, if an agreement can be reached to reticulate beyond the School's property. RN 15762 should be used to water Alice Springs Hospital's grounds.

5. Subject to satisfactory testing (yield and quality) of RN 15753, this bore may be connected to pre-existing reticulation which connects to Ross Park Oval and Ross Park School for their irrigation.
1. Bores should be utilised, as much as possible, to;

a) Decrease demand on Roe Creek.
b) Lower the water table in the Town Basin.

2. Bulk flow meters should be installed on all bores and water quality and the standing water levels measured regularly.

3. Water quality of RN15761 and RN15762 is acceptable while that of RN15760 is marginal and long term effects of using this water should be monitored.

4. Pump settings and yields for the three production bores are:

<table>
<thead>
<tr>
<th>LOCATION</th>
<th>RN</th>
<th>PUMP SETTING (mBGL)</th>
<th>RECOMMENDED MAXIMUM RATE (L/s)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Traeger Park Oval</td>
<td>15760</td>
<td>10.2</td>
<td>30</td>
</tr>
<tr>
<td>Traeger Park School</td>
<td>15761</td>
<td>8.3</td>
<td>20</td>
</tr>
<tr>
<td>Alice Springs Hospital</td>
<td>15762</td>
<td>10.8</td>
<td>5</td>
</tr>
</tbody>
</table>
REFERENCES


Wright M.J., 1959  A Soil survey of the Township Area of Alice Springs, N.T. CSIRO Division of Soils; Report 2/59.
Figures
Limits of Town Basin Aquifer

SCALE 1:100 000

HEIGHTS IN METRES. CONTOUR INTERVAL 20 METRES

LOCATION MAP

FIGURE 1
2861-16-1008
ELECTROMAGNETIC TRAVERSES
TODD RIVER

FIGURE 4
Appendix 1

Electromagnetic Contour Maps
Zone of highest permeability aquifer material.
Appendix 2

Grading Analyses
Appendix 3

Composite Logs of Bores
COMPOSITE LOG OF BORE

DEPTII (m) BORE CONSTRUCTION GRAPHIC LOG STRATA DESCRIPTION AQUIFERS (Water Struck)

0

1 Fine to medium grained river sand. SWL 1.3m

2 Fine grained silty sand. 6.0 L/s

3 Fine grained sand with clay.

4 Medium grained silty sand.

5 Medium grained sand with clay.

6 Weathered schist.

ALICE SPRINGS TOWN BASIN IRRIGATION RN 15751

3007-16-1023
COMPOSITE LOG OF BORE

DEPTH (m)  BORE CONSTRUCTION  GRAPHIC LOG  STRATA DESCRIPTION  AQUIFERS (Water Struck)

<table>
<thead>
<tr>
<th>0</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
<th>11</th>
<th>12</th>
<th>13</th>
<th>14</th>
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</tr>
<tr>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
<td>5</td>
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<td>10</td>
<td>11</td>
<td>12</td>
<td>13</td>
<td>14</td>
<td>15</td>
<td>16</td>
</tr>
</tbody>
</table>

Brown and grey clay

Coarse Brown silty sand with clay layers

Brown and grey clay
Weathered Schist.

SWL 4.1m

ALICE SPRINGS TOWN BASIN IRRIGATION  RN 15752

3008-16-1024
COMPOSITE LOG OF BORE

DEPTH (m) | BORE CONSTRUCTION | GRAPHIC LOG | STRATA DESCRIPTION | AQUIFERS (Water Struck)

0 | 142mm I.D. Blank steel casing | | | SWL 0.8m
1 | 142mm I.D. x 2.1m x 2.5mm screen | | Medium to coarse sand and gravel. | ~ 13 L/s
2 | | | Grey/blue clay. |
3
4
5
6
7

ALICE SPRINGS TOWN BASIN IRRIGATION
RN 15753
3009-16-1025
## Composite Log of Bore

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Bore Construction</th>
<th>Graphic Log</th>
<th>Strata Description</th>
<th>Aquifers (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>Red and brown clay.</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td>1</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>3</td>
<td></td>
<td></td>
<td></td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>SWL 4.2m</td>
<td>4</td>
</tr>
<tr>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>5</td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td>7</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Medium to coarse silty sand.</td>
<td>8</td>
</tr>
<tr>
<td>9</td>
<td></td>
<td></td>
<td></td>
<td>9</td>
</tr>
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<td>10</td>
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</tr>
<tr>
<td>11</td>
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<td></td>
<td></td>
<td>11</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>Fine to medium silty sand.</td>
<td>12</td>
</tr>
<tr>
<td>13</td>
<td></td>
<td></td>
<td></td>
<td>13</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td></td>
<td>14</td>
</tr>
<tr>
<td>15</td>
<td></td>
<td></td>
<td>Hard brown and grey clay.</td>
<td>15</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>17</td>
<td></td>
<td></td>
<td>Weathered schist.</td>
<td>17</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
</tbody>
</table>

### Alice Springs

Town Basin Irrigation

RN 15754

3010-16-1026
COMPOSITE LOG OF BORE

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>BORE CONSTRUCTION</th>
<th>GRAPHIC LOG</th>
<th>STRATA DESCRIPTION</th>
<th>AQUIFERS (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>Brown and grey clay</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>203mm O.D. Steel casing</td>
<td></td>
<td></td>
<td>2</td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Medium to coarse brown sand.</td>
<td>4 SWL 4.2m</td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Brown and grey sandy clay.</td>
<td>8</td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td>Fine grained brown sand.</td>
<td>12</td>
</tr>
<tr>
<td>14</td>
<td></td>
<td></td>
<td>Grey clay and weathered schist.</td>
<td>14</td>
</tr>
<tr>
<td>16</td>
<td></td>
<td></td>
<td></td>
<td>16</td>
</tr>
<tr>
<td>18</td>
<td></td>
<td></td>
<td></td>
<td>18</td>
</tr>
<tr>
<td>20</td>
<td></td>
<td></td>
<td></td>
<td>20</td>
</tr>
</tbody>
</table>

ALICE SPRINGS
TOWN BASIN IRRIGATION
RN 15759
3011-16-1027
### Composite Log of Bore

**Depth (m)**  
0  
2  
4  
6  
8  
10  
12  
14  
16  
18  
20  
22  

**Bore Construction Graphic Log**  
- 394mm O.D. Steel casing  
- 2m x 2.0mm Screen  

**Strata Description**  
- Brown and grey clay  
- Medium grained brown sand  
- Medium brown sand and silt.  
- Brown and grey sandy clay.  
- Brown clay rich sand.  
- Weathered schist.  

**Aquifers**  
- SWL 4.1m  
- ~30 L/s

---

**Alice Springs**  
**Town Basin Irrigation**  
**RN 15760**
ALICE SPRINGS
TOWN BASIN IRRIGATION

COMPOSITE LOG OF BORE

<table>
<thead>
<tr>
<th>DEPTH (m)</th>
<th>BORE CONSTRUCTION</th>
<th>GRAPHIC LOG</th>
<th>STRATA DESCRIPTION</th>
<th>AQUIFERS (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>394mm O.D. Blank steel casing</td>
<td></td>
<td>Brown and grey clay.</td>
<td>SWL 4.9m</td>
</tr>
<tr>
<td>2</td>
<td>335mm I.D. x 2m x 2.0mm</td>
<td></td>
<td>Medium grained brown sand.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>335mm I.D. x 2m x 1.75mm</td>
<td></td>
<td>Hard brown and grey clay.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Brown and grey silty sand.</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td></td>
<td></td>
<td>Brown and grey sandy clay.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>Weathered schist.</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>14</td>
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<tr>
<td>16</td>
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</tr>
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<td>20</td>
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</tr>
<tr>
<td>22</td>
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<td></td>
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</tr>
</tbody>
</table>

RN 15761

3013-16-1029
COMPOSITE LOG OF BORE

DEPTII (m) BORE CONSTRUCTION GRAPHIC LOG STRATA DESCRIPTION AQUIFERS (Water Struck)

0 394mm O.D. Blank steel casing

2 Silty and sandy clay.

4 Medium grained brown sand.

8 Sandy brown and grey clay.

12 Weathered schist.

16 SWL 4.7m

20

24

ALICE SPRINGS RN 15762 TOWN BASIN IRRIGATION 3014-16-1030
## Composite Log of Bore

<table>
<thead>
<tr>
<th>Depth (m)</th>
<th>Bore Construction</th>
<th>Graphic Log</th>
<th>Strata Description</th>
<th>Aquifers (Water Struck)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td></td>
<td></td>
<td>Red and brown silty clay.</td>
<td>SWL 3.9m</td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td>Medium silty brown sand.</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td></td>
<td></td>
<td>Coarse sand and gravel.</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td></td>
<td></td>
<td>Silty brown sand with grey clay layers.</td>
<td></td>
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<tr>
<td>8</td>
<td></td>
<td></td>
<td>Silty blue and grey clay.</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td></td>
<td></td>
<td>Hard grey clay and weathered schist.</td>
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<td>12</td>
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<td>22</td>
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</tr>
</tbody>
</table>

**Alice Springs**

**Town Basin Irrigation**

**RN 15763**
Appendix 4

Calculation for Screen Entrance Velocity

for RN 15760
APPENDIX 4

CALCULATION OF SCREEN ENTRANCE VELOCITY FOR RN 15760

1. Surface area per 1m length of screen

   \[ \text{Area} = \pi d \quad \text{where} \quad d = 335\text{mm} \]
   \[ = 3.14 \times 0.335 \]
   \[ = 1.05 \text{ m}^2/\text{m} \quad \text{of screen} \]

2. Screen length is 2.0m.

3. From screen manufacture specifications:

   2.0mm aperture, 335mm NB continuous slot screen has an open area of 59.3% of screen bulk.

4. Amount of open area, \( A = \text{surface area} \times \% \text{ open area} \)

   \[ = 2.1 \times 0.593 \]
   \[ = 1.24 \text{ m}^2 \]

5. At maximum production yield of 30 L/s the entrance velocity, \( V \), will be

   \[ V = \frac{Q}{A} \]
   \[ = \frac{0.030}{1.24} \]
   \[ = 0.024 \text{ m/s} \]
Appendix 5

Jacob's Analysis of Drawdown Graph
JACOB'S METHOD - ANALYSIS OF AQUIFER PUMPING TEST DATA

\[ Q = 30 \text{ L/s} = 2592 \text{ m}^3/\text{day} \]
\[ \Delta s = 0.25 \]
\[ T = \frac{2.3Q}{4T\Delta s} \]
\[ : T = 1903 \text{ m}^2/\text{day} \]

RN 15760
TRAEGGER PARK OVAL
TIME - DRAWDOWN PLOT
Jacob's Method - Analysis of Aquifer Pumping Test Data

**Q** = 30 L/s

\[ \Delta s = 0.46 \text{m} \]

\[ T = \frac{2.3 \times Q}{4 \pi \Delta s} \]

\[ \downarrow \]

\[ T = 1033 \text{m}^2/\text{day} \]

Appendix 5B
JACOB'S METHOD - ANALYSIS OF AQUIFER PUMPING TEST DATA

DRAWDOWN (metres)

TIME (minutes)

Q = 30 L/s

Δs = 0.17m

T = \frac{2.3 \times Q}{4\pi \Delta s}

 Jail

RN 11382
TRAEGERTH PARK OVAL
TIME - DRAWDOWN PLOT

T = 2798.8m^2 /day

Appendix 5C
JACOB'S METHOD - ANALYSIS OF AQUIFER PUMPING TEST DATA

\[ Q = 30 \text{ L/s} \]

\[ \Delta s = 0.33\text{m} \]

\[ T = \frac{2.3 Q}{4\pi \Delta s} \]

\[ \therefore T = 1441\text{m}^2/\text{day} \]
Jacob's Method - Analysis of Aquifer Pumping Test Data

\[ Q = 20 \text{ L/s} \]

\[ \Delta s = 0.43 \text{ m} \]

\[ T = \frac{2.3 \times Q}{4\pi \Delta s} \]

\[ \therefore T = 745 \text{ m}^2/\text{day} \]

RN 15761

Traeger Park Primary School

Time - Drawdown Plot

Appendix 5E
Appendix 6

Test Reports of Bores
TEST REPORT — BORE RN 15760

Bore location: TRAEGER PARK OVAL
Client/owner: ENGINEERING
Client's reference:
Purpose of supply: IRRIGATION

Map: ALICE SPRINGS
Grid reference: 385015 737727

RECOMMENDATIONS
Pumping rate: 30 L/s. Pump setting: 10.2 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can/cannot sustain higher pumping rates with deeper pump settings or for short
periods in favourable seasons. Further advice can be obtained from:
(In all correspondence refer to the bore's RN number).

BORE DATA
Finished depth: 13.65 m Completion date: 20/09/90 Test date: 02/10/90
Standing water level: m on
Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.0 - 11.0</td>
<td>335mm ID BLANK STEEL CASMS</td>
</tr>
<tr>
<td>11.0 - 13.0</td>
<td>335mm ID 2.0MM APERTURE SCREEN</td>
</tr>
<tr>
<td>13.0 - 13.6</td>
<td>335mm ID BLANK STEEL CASING</td>
</tr>
</tbody>
</table>

Test rates: 30 L/s
Test duration: 25 hrs

Notes: 1. Top of casing as constructed was 0.31 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 335 mm

COMMENTS

SET PUMP INTAKE AT 10.2m
SET CUT OFF SWITCH AT 9.5m

WATER QUALITY

SEE TABLE 4

See water laboratory report (Analysis No. )
TEST REPORT — BORE RN 15761

Bore location: TRAEGER PARK SCHOOL
Client/owner: ENGINEERING
Client's reference: 
Purpose of supply: IRRIGATION

Map: ALICE SPRINGS
Grid reference: 38531 7377513

RECOMMENDATIONS
Pumping rate: 20 L/s. Pump setting: 8.3 m below ground level
General recommendations are given on the reverse side.
The aquifer and bore can/cannot sustain higher pumping rates with deeper pump settings or for short periods in favourable seasons. Further advice can be obtained from:
(In all correspondence refer to the bore’s RN number).

BORE DATA
Finished depth: 19.3 m  Completion date: 
Standing water level m on 
Construction details: 
  Interval (m)  Description
    0.0 - 09.1  335mm ID BLANK STEEL CASING
    9.1 - 11.1  335mm ID 1.75mm APERTURE SCREEN
    11.1 - 16.3 335mm ID BLANK STEEL CASING
    16.3 - 18.3 335mm ID 2.0mm APERTURE SCREEN
    18.3 - 19.3 335mm ID BLANK STEEL CASING

AQUIFER TEST
Test date: 05/02/91
Test rates: 20 L/s
Test duration 06 hrs

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 335 mm

COMMENTS

SET PUMP INTAKE AT 8.5m.
SET CUT OFF SWITCH AT 8.0m.

WATER QUALITY

SEE TABLE 4
See water laboratory report (Analysis No.)

WRD4020
TEST REPORT — BORE RN 15762

Bore location: Alice Springs Hospital
Map: Alice Springs
Client/owner: Engineering
Client's reference:
Purpose of supply: Irrigation
Grid reference: 38536 737525

RECOMMENDATIONS
Pumping rate: 5.0 L/s. Pump setting: 10.8 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:
(In all correspondence refer to the bore's RN number).

BORE DATA
Finished depth: 14.2 m Completion date: 26/02/91
Standing water level: 4.39 m on 27/02/91
Construction details:

<table>
<thead>
<tr>
<th>Interval (m)</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 - 11.2</td>
<td>335 mm ID Blank Steel Casing</td>
</tr>
<tr>
<td>11.2 - 13.2</td>
<td>335 mm ID 2.0 mm Aperture Screen</td>
</tr>
<tr>
<td>13.2 - 14.2</td>
<td>335 mm ID Blank Steel Casing</td>
</tr>
</tbody>
</table>

Notes: 1. Top of casing as constructed was 0.30 m above ground
2. All depths are measured from natural ground level
3. Test rates are not indicative of safe long term pumping rates.

AQUIFER TEST
Test date: 27/02/91
Test rates: 1.0 - 6.0 L/s
Test duration: 10 Hrs

WARNING: MINIMUM INTERNAL BORE DIAMETER IS 335 mm

COMMENTS
Set pump intake at 10.8 m.
Set cut off switch at 10.4 m.

WATER QUALITY
SEE TABLE 4
See water laboratory report (Analysis No.)
Appendix 7

Classification of Irrigation Waters
CLASSIFICATION OF IRRIGATION WATERS
(From U.S.D.A. Agriculture Handbook 60)
Plates
PLATE 3  Core of RN 15763

PLATE 4
Pump Test of RN 15760