Potential of the aquifer at Papunya for horticultural use

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LIST OF CONTENTS
1. INTRODUCTION ........................................................................................................... 1
2. HYDROGEOLOGY ........................................................................................................... 1
3. PREVIOUS WORK ........................................................................................................... 1
4. HISTORY ......................................................................................................................... 1
5. WATER CONSUMPTION ............................................................................................... 1
6. WATER QUALITY .......................................................................................................... 1
7. AVAILABLE WATER ...................................................................................................... 2
8. OTHER AQUIFERS IN THE REGION .............................................................................. 2
9. CONCLUSIONS ............................................................................................................. 2
10. REFERENCES ............................................................................................................... 2

LIST OF TABLES
Table 1 Estimate of available water ................................................................................ 2

LIST OF FIGURES
Figure 1 Papunya and surrounds .................................................................................... 3
Figure 2 Bore location plan ............................................................................................. 4
Figure 3 Hydrographs ....................................................................................................... 5
Figure 4 TDS in production bores .................................................................................. 5
Figure 5 Aerial photo of Papunya .................................................................................. 6
1. INTRODUCTION
Papunya is on Aboriginal land west of Alice Springs and on the north side of a mountain range (Figure 1).
The object of this study is to assess the potential of the aquifer at Papunya for horticultural use in addition to the present community water supply.

2. HYDROGEOLOGY
Papunya draws its water supply from sand aquifers in a palaeo-channel (Figure 2) which is recharged from creeks running off the mountains to the south (Woodgate 1998).

3. PREVIOUS WORK
Woodgate (1988) reviewed the sustainability of the Papunya water supply, and concluded that consumption was around 20% of through-flow.
Read (2007) assessed the potential of Cainozoic aquifers in the region for horticulture, and concluded that there might be 300 ML/year available for horticulture from the Papunya aquifer.

4. HISTORY
Papunya was established in 1959, and the population increased to a peak of around 1500 in the mid 1970’s (Woodgate, 1998). Since then there has been a decline in the population to about 300. The hydrographs (Figure 3) reflect this, with a change from falling to rising water level about 1982.

5. WATER CONSUMPTION
Water consumption at Papunya for the 12 months to September 2007 was 89 ML. Aboriginal policy is in a state of flux at present, and future trends cannot be forecast with any confidence. A possible scenario is that a process of centralisation might lead to an increase in population and water consumption at Papunya.

Water use for landscaping is very limited. The football oval is not irrigated, and recent imagery on NRETA maps shows that there are relatively few trees (Figure 5). There is scope for additional water use for landscaping. A grassed oval could use 20 to 30 ML/year, say an extra 100 ML/year for landscaping.

6. WATER QUALITY
TDS is generally under 1200 mg/L.
Figure 4 shows TDS against time for the production bores. Data is only available up to 2000 because the chemical database has been not been kept up to date since this time.
The older bores on the eastern side had erratic variations in TDS, and were rapidly increasing in the mid 1980’s.
The bores currently in use, which are on the western side of the borefield, seem to show a slight downward trend in TDS. Two factors may have caused this:
The bores are located in a larger zone of better quality water.
The reduction in pumping rates as noted above.
7. AVAILABLE WATER

Woodgate (1998) estimated that Papunya was using 20% of through-flow. Implied throughflow is of the order of 400 to 500 ML/year.

Hydrographs (Figure 3) show continually declining water level until about 1982, that is the aquifer was being over pumped at that time. Assuming extraction was proportional to population pumping would have been about 400 ML/year at that time. A reasonable guess of the available yield is about 300 ML/year.

From Table 1 it can be seen that around 100 ML/year is available for horticulture. This may be enough for a training farm, or a local market garden, but is unlikely to support a commercial horticultural operation.

More water than this may be available, but certainly significantly less than 400 ML/year.

Table 1 Estimate of available water

<table>
<thead>
<tr>
<th>Component</th>
<th>ML/year</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>Current consumption</td>
<td>90</td>
<td>Known</td>
</tr>
<tr>
<td>Possible increase</td>
<td>100</td>
<td>May be an over estimate, but cannot be sure with present uncertainty.</td>
</tr>
<tr>
<td>Estimated safe maximum extraction</td>
<td>300</td>
<td>Uncertain</td>
</tr>
<tr>
<td>Water available for horticultural</td>
<td>110</td>
<td>Very approximate, need better estimates of the two above components</td>
</tr>
</tbody>
</table>

8. OTHER AQUIFERS IN THE REGION

Read (2007) reviewed other Cainozoic aquifers in the region and concluded that outside the Papunya aquifer there were no aquifers of any significance.

9. CONCLUSIONS

About 100 ML/year could be committed for a use such as a training farm, or possibly a local market garden.

More than this may be available, but would need either a clear understanding of the effects of government policies on the future population of Papunya, or modelling to predict the aquifer response, or both.

10. REFERENCES

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Title</th>
</tr>
</thead>
</table>
Figure 1 Papunya and surrounds
Bores
TDS
- no data
- 1 - 1000
- 1001 - 1200
- 1201 - 1500
- 1501 - 58300
- production bores
- Palaeo-channel boundary, after Ride (1967)

Road
built up areas

Figure 2 Bore location plan.
Figure 3 Hydrographs

Figure 4 TDS in production bores

END OF DATA, DATABASE DYSFUNCTIONAL
Figure 5 Aerial photo of Papunya