PROPOSAL TO UTILISE TOWN BASIN

WATER TO IRRIGATE ALICE SPRINGS

GOLF COURSE – MACQUEEN 1976
Proposal to Irrigate Alice Springs from Basin Water

Golf Course with Town-Basin Water

Possible Source Areas
1. Introduction

The Alice Springs Golf Course has made application to employ Town Basin water in a proposal to grass the course.

The proposal involves the irrigation of 23 hectares, requiring an annual 240,000 kilolitres of water (7.5 litres per second average) with a peak demand of about 12 litres per second.

Although the Basin is capable of providing the required yield and this Branch would be pleased to see such a scheme proceed, the necessary capital works are somewhat extensive and the costs will be considerable.

This report describes the various alternatives open to the Club. Upon choice of a suitable scheme, this Branch would be able to provide more comprehensive advice in relation to the construction and use of bores.

2. General

Before considering the source of water, it is necessary to clarify some aspects of the irrigation proposal itself.

The preliminary suggestion involved a sprinkling system driven directly by the bore pumps, which would operate on a continuous basis in summer months.

The principle of continuous watering should be opposed on the grounds of (a) water conservation objectives (b) public education relating to water conservation objectives and (c) inconvenience to players.

Nevertheless, optimisation of the supply system will require 24-hour running of bore pumps and thus a storage tank of about 600 kilolitres will be required if the system is developed to the stage envisaged by the club, and watering is carried out only at night. This storage tank may be of lined earth or steel construction.

Under these circumstances, a complex system will be required if the sprinklers are to be driven by the hydraulic head provided by the bore pumps. Instead, it is recommended that the bore pumps be selected only to feed the storage tanks, while a booster pump is utilised to drive the sprinklers. This should allow the use of submersible pumps in the bores instead of shaft-driven pumps, at a saving of the order of $2 000 per bore, compared with a cost of some $1 000 for a booster-pump installation. The storage tank and booster pump would be located near the western boundary of the course or more centrally if this produced a more efficient system.

3. Groundwater Constraints

The information below is based on current knowledge of the Alice Springs Town Basin, which is described at greater length in a report currently in preparation by this office.

The following constraints are relevant to the application. It is important to stress that while the basin is currently full and could withstand high extraction rates, management must be on a long-term basis of all consumers are to be satisfied during dry periods.

(a) The 'safe yield' of the Town Basin is 600,000 kilolitres per year. This allows for the maintenance of groundwater flow through Heavitree Gap into the Farm Area Basin.

(b) Pumping from near Heavitree Gap should be minimal.

(c) A 'seepage' of the basin occurs in the area of Alice Springs Hospital. Annual extractions from either the north or south of this point should not exceed 300,000 and 360,000 kilolitres respectively.
(d) After deducting the current annual extraction rates, plus a proposed annual withdrawal of 390,000 kilolitres by the Council for the swimming pool complex and Larapinta Park, the maximum supply available to the Golf Club is 306,000 kilolitres per year, which may comprise of no more than 212,000 and 194,000 kilolitres from the northern and southern portions of the basin respectively. It is therefore apparent that the requirement of 240,000 kilolitres cannot be drawn from any one locality.

4. Groundwater Availability

Four areas have been examined for use by the Golf Club and these are discussed below. The areas are shown on the attached sketch map.

Area 1 (Bore 110 area)

Bore 110 (R.N. 3096) has always been the most efficient bore in the Town Basin, and is capable of some 10 litres per second.

Unfortunately its use by the Golf Club cannot be allowed because (a) its proximity to Heavitree Gap means that it should be pumped only with discretion and (b) the Department of Construction maintains the bore as an emergency town water supply and is opposed to its use for other purposes.

Area 2 (On the banks of the Todd River, between Benstead and Bagot Street, preferably on the western bank).

This area is attractive due to its proximity to the course, but the basin is not deep in the area and the bottom one or two aquifers are not present. Furthermore, information from investigation bores is scanty and the area is not proven.

It is expected that a bore drilled here should yield two litres per second in favourable times, but less than one litre per second in times of drought. Interference effects would prevent the use of more than three, or possibly two bores. For planning purposes, it should only be expected that three bores are possible, producing a maximum total discharge of three litres per second.

Area 3 (Traeger Park Area)

This area is located more favourably in the basin and its potential is better known. Bores may be sited both in Traeger Park and in the Traeger Park Primary School grounds.

Careful consideration has to be given to bore locations in view of pumping by the Council in the same area, and access to land would have to be obtained to install bores and pipelines.

Bores in this area are expected to provide at least four litres per second in times of favour and at least two litres per second in times of drought. For planning purposes, it should be assumed that each bore can produce at a maximum rate of three litres per second.

Area 4 (Town Area)

Up to three bores could be used near the Todd, adjacent to the main town area. Bore 62/9 (R.N. 6547) still exists and may be available for use. Additional sites could be drilled at bore 28 (R.N. 6786), which is no longer serviceable, and near Colocog Park.

Reticulation from these sites would involve no bitumen roads but a considerable length of river bed.

Pumping rates can be expected to be similar to those in Area 3 and a three litres per second per bore maximum should be adopted for planning purposes.

The use by the Club of more than three bores in this area would be inadvisable, as the Council pumps one bore nearby (at Milla Terrace...
causeway) and experience twenty years ago showed that interference effects could be a problem.

5. Possible Schemes

Several possible schemes are listed here and their costs compared. No allowance has been made for standby capacity; in the event of a pump or bore failure in summer, the amount of irrigation would be reduced accordingly. On the other hand, each of the systems should be capable of supplying the stated amounts of water except during rare dry periods.

In reality it is possible that bores, when drilled, will perform better than allowed for in this study, at least in the short term while the water-table is high. Hence, there is a chance that some capital expenditure could be deferred until additional bores are actually required.

The costs given in the schemes are based on the rates listed below, and are only the capital costs involved in reticulating the water to the course boundary. The additional cost of a storage tank and booster pump should be between $5 000 and $10 000 but would depend on the scale of the system chosen and the type of tank.

Rates

<table>
<thead>
<tr>
<th>Bore</th>
<th>20 metre 10&quot; hole gravel packed with 15 metres of 6&quot; casing and 6 metres of telescope size screens</th>
<th>$4 000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pump</td>
<td>submersible, with fittings, water meter and electrical reticulation</td>
<td>$2 000</td>
</tr>
<tr>
<td>Pipe</td>
<td>4&quot; Asbestos Cement, buried</td>
<td>$5/ - metre</td>
</tr>
<tr>
<td>Pipe</td>
<td>3&quot; Asbestos Cement, buried</td>
<td>$4/ - metre</td>
</tr>
<tr>
<td>Pipe</td>
<td>4&quot; Galvanized Iron, buried under Todd River</td>
<td>$12/ - metre</td>
</tr>
<tr>
<td>Pipe</td>
<td>3&quot; Galvanized Iron, buried under Todd River</td>
<td>$9/ - metre</td>
</tr>
<tr>
<td>Additional cost of laying Asbestos Cement pipe under a bitumen road</td>
<td>$500</td>
<td></td>
</tr>
</tbody>
</table>

For each scheme a "capital cost rate", defined as the capital cost per kilolitre of annual consumption, is computed. This is a simple attempt to compare the alternatives.

Scheme A: Drill and equip three bores in Area 2, to pump at an average total rate of two litre per second (63,000 kilolitres per year) peaking at 3 litres per second in summer months.

This scheme would supply only 26% of the stated requirement and capital costs would be as follows:

3" Pipeline (300 metres including 100 metres under river) | $1,700
3 equipped bores | $18,000

Capital cost rate = 19 700/63 000 = 0.31

Scheme B: Drill and equip three bores in Area 3, to pump at an average rate of five litres per second (154 000 kilolitres per year – the maximum allowable from this area) peaking at about eight litres per second in summer months.

This scheme would provide about 65% of the requirement, with estimated capital costs as follows:
4" Pipeline (700 metres, including 100 metres under river and 3 road crossings)  
3 equipped bores

$6,700  
18,000

Capital Cost rate = 24,700/154,000 = 0.16

**Scheme C:** Drill and equip three bores in Area 4, to pump at an average rate of six litres per second (190,000 kilolitres per year), peaking at about nine litres per second.

This scheme would supply 80% of the requirement. Although the upper half of the basin could stand slightly more development than this, a reliable increase on the peak of nine litres per second would require an additional bore, which would have to be located much further upstream or in the town area itself.

It is possible that the three bores could provide higher peak rates than allowed for above, in which case a consumption of up to 212,000 kilolitres per year would be permitted.

Bore 62/9 (R.N. 6547) can probably be utilised as one of the three, but it would still be necessary to equip the bore. If rehabilitation of the bore itself is required, it would be preferable to construct a new bore. It is assumed in the costs below that a new bore is required.

4" Pipeline (1,400 metres, including 400 metres under river or on rocky hillside)  
3 equipped bores

$9,800  
18,000

Capital cost rate = 27,800/190,000 = 0.15

**Scheme D:** Drill and equip 3 bores in Area 4, as in Scheme C, but to pump at an average rate of 6.7 litres per second (212,000 kilolitres per year – the maximum allowable), peaking at 9 litres per second. Also drill a bore in Area 2, possibly on the eastern bank of the Todd, to pump at an average rate of 0.3 litres per second and a peak of one litre per second.

This would provide an overall average rate of seven litres per second (220,000 kilolitres per year), peaking at about 10 litres per second. The scheme would satisfy about 90% of the requirement, with capital costs as follows:

As for Scheme C

3" Pipeline, 50 metres  
1 Equipped Bore

$27,800  
200  
6,000

Capital cost rate = 34,000/220,000 = 0.16

**Scheme E:** Drill and equip 3 bores in Area 4, as in Scheme C, but to pump at an average rate of 6.7 litres per second (212,000 kilolitres per year – the maximum allowable), peaking at 9 litres per second. Also drill a bore in Area 3, to pump at an average rate of 0.9 litres per second and a peak of three litres per second.

This scheme should normally satisfy the entire demand of 240,000 kilolitres per year with a peak rate of 12 litres per second. Capital costs would be:
As for Scheme C

<table>
<thead>
<tr>
<th></th>
<th>Cost</th>
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<tbody>
<tr>
<td>3rd Pipeline (700 metres, including 100 metres under river and 2 road crossings)</td>
<td>$327,800</td>
</tr>
<tr>
<td>1 Equipped Bore</td>
<td>$4,300</td>
</tr>
<tr>
<td></td>
<td>$6,000</td>
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<tr>
<td></td>
<td>$38,100</td>
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Capital cost rate = $38,100/240,000 = 0.16

6. Operating Costs

Until bores are actually drilled and their hydraulic characteristics determined it is not possible to accurately determine operating costs. Furthermore, it may be wise to defer the choice of location of the storage reservoir until the bores are drilled, so that the efficiency of the pumping system can be optimised by design of rising-main length.

Although the length of a rising main from the confluence of lines from individual bores would be one or two hundred metres longer from Area 4 compared with Area 3, the additional head loss would be compensated by the higher potentiometric surface at Area 4. Therefore, the operating costs from Areas 3 and 4 should be assumed equal, for comparison purposes.

On the assumptions that the bores will need pumps of about 2 kilowatts capacity while the booster pump at the course may require a capacity of nearly 20 kilowatts, for a yield of 240,000 kilolitres per year the annual power costs should be of the order of $1,500 for the bore pumps (total) and $1,500 for the booster pump.

7. Conclusions and Recommendations

7.1 The irrigation of the course should be planned on the basis of watering only at night.

7.2 The supply system will have to be run on a 24 hour per day basis during peak consumption and therefore a storage of up to 6.0 kilolitres will be required.

7.3 The irrigation should be driven by a booster pump, while the bore pumps need only be designed to feed the storage.

7.4 Although the basin is now full due to abnormal seasons, the supply system must be planned in accordance with long term management of the basin, and, for the Golf Club's own protection, should be designed to perform in dry years when the water table is low.

7.5 Use of Bore 100 cannot be permitted.

7.6 The stated requirement of 240,000 kilolitres per year with a peak rate of 12 litres per second cannot be met from any one area of the Town Basin.

7.7 A system involving three bores in or near the Todd adjacent to the main town area is probably the most attractive solution. At least 80% of the stated requirement should be available in most years, and the estimated capital cost of bores, pumps and reticulation is $28,000.

7.8 The whole requirement should be obtainable by drilling a fourth bore in the Traeger Park area, with additional capital costs of about $10,000. However, this plan should not be seriously considered until the first three bores are constructed and their characteristics accurately determined.

A.D. Macqueen

April 1976