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**THE UNIVERSITY OF NEW SOUTH WALES
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**Irrigation of the
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by

D.T. Howell.

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MARCH, 1961.



The University of New South Wales

WATER RESEARCH LABORATORY

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by

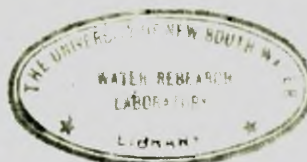
D.T. Howell

Report to The University of New South Wales

March 1961

Report No. 37

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Irrigation of the Daceyville Sports Ground

Introduction

The sports grounds at Daceyville will require irrigation from the time turf grass is first sown. Irrigation water can easily be supplied from a deep well pump practically anywhere on the site. Three alternative methods of applying the irrigation water are considered. The first method is a system using portable spray lines, the second a fixed underground pipe system with portable "quick-coupling" sprinklers, and the third a permanent fully automatic system.

General Considerations

Peak demand for water during the months of January and February is approximately one inch per week. To allow for losses it is advisable to provide for a gross application of 1-1/4 inches per week or more if watering is to be carried out in daylight hours.

The grounds are to be established on sand which has a very low moisture holding capacity. This requires that the water be applied in a great number of small applications rather than in a small number of large applications. Too much water in one application will moisten the sand well below the root zone, where the water is wasted, and will also remove nutrients from the soil away from the roots. It would be advisable in this case to apply not much more than 1/2 inch in one watering, so that two or three waterings will be required per week at peak times.

Alternative Methods

Three alternative systems are described below for which estimates have been obtained from irrigation firms.

1. Portable System

The portable system proposed comprises permanent underground fibre mains leading from the pump to hydrants which are connected portable aluminium submains and spray lines. At the end of each watering the spray lines are moved to new positions.

2. "Quick-coupling" System

The "quick-coupling" system comprises permanent underground mains and laterals with a "quick-coupling" valve at every permanent sprinkler location. Some 15 or so sprinklers would be used and moved to new positions after each watering.

3. Automatic System

The automatic system comprises permanent underground mains and laterals with sprinklers fixed permanently at ground level or slightly below. There is no need for sprinklers to be moved, and the durations and times of all waterings are automatically controlled by a pre-set controller.

Costs

Detailed designs have not been undertaken and the following costs are estimates only:-

(a) Capital Costs

Approximately £2000 will be required for a pump and bore for any of the three systems.

The additional capital cost of supply and installing each system is estimated as:-

(1)	Portable system	£2,600
(2)	Quick-coupling system	7,800
(3)	Automatic system	16,200

(b) Annual Costs

The annual costs may be taken as being made up of depreciation, electricity charges, labour costs for operation and maintenance and repair. These are estimated as follows:-

	(1) <u>Portable</u>	(2) <u>Quick Coupling</u>	(3) <u>Automatic</u>
(i) Depreciation	165	300	810
(ii) Electricity	300	300	200
(iii) Labour for operation	600	300	nil
(iv) Maintenance and repair	<u>120</u>	<u>80</u>	<u>50</u>
Total annual cost	<u>£1,185</u>	<u>£1,070</u>	<u>£1,060</u>

(i) Complete depreciation over 20 years has been allowed for all fixed equipment, including pump and motor, but complete depreciation over 8 years has been allowed for portable equipment.

(ii) The electricity cost for the automatic system is lower because advantage can be taken of the concession rates between 11 p.m. and 7 a.m.

(iii) The labour cost is difficult to evaluate, but it is clear that for the portable system a man will be required for about half an hour three or four times a day with an additional 4 hours each time the ground is used for play so that pipes can be removed and stored. The time required by the quick-coupling system is considerably less, while the labour for the automatic system is nearly nil, only inspection to ensure correct operation is required.

(iv) The sum spent on maintenance and repairs on the automatic system may be expected to be much higher than on the other systems, since damage during use will be greater and the system is more susceptible to vandalism.

As shown above the total annual costs of all three systems are approximately the same. It should be noted that any change in the method of calculating the depreciation will affect these total annual costs considerably.

Relative Merits

1. Portable System

The portable system is by far the cheapest to purchase. It provides some measure of flexibility if watering positions need to be changed. No permanent equipment is left on playing fields during play. However, it is awkward for use on irregular shapes of enclosed areas as there will be, and consumes time in changing positions. Its successful operation depends on the continued diligence of the operator. Watering must be carried out largely during daylight working hours. The portable equipment is susceptible to damage by accident, use and vandalism.

2. Quick-coupling System

The quick-coupling system has less equipment susceptible to damage and involves less onerous work in changing. It is suited to any shapes of enclosed areas but is much more expensive than a portable system. Watering must still be carried out largely during daylight working hours. Rubber covered fittings are left on playing field slightly below ground level during play.

3. Automatic System

An automatic system requires minimum labour. All changing is carried out automatically. All watering may be carried out at night leaving the area free for other work during the day. Rubber covered fittings are left on playing fields slightly below ground level during play as with the quick coupling system. The automatic system is by far the most expensive to purchase.

Conclusion

The automatic system is the most suitable and would be recommended were the high purchase price no object. A decision has to be made whether the additional initial cost justifies its advantage over the quick-coupling system. The portable system is not recommended.