Department of Employment, Economic Development and Innovation

MORE PROFIT PER DROP
Irrigated Farming Systems

Supporting the Healthy Head Waters Water Use Efficiency project

Use of Storage Cells

Applicability: Dividing storage into two cells

Capital Cost: $3.00 /$m^3$- $5.00/$m^3$

Annual Costs: ongoing operational

Cost of Water Saving: $1,800 / ML

Strengths:

- Reduces surface area
- Reduced wind action
- Reduced losses during periods of low water availability.

Weaknesses:

- Lose volume
- Additional operational costs (labour, energy).

Overview

Dividing a dam into cells (by constructing new embankments) to minimise surface area is a strategy that will minimise storage surface area and therefore reduce evaporation and seepage losses. When stored water volume is at maximum, the total storage surface area will be the same. However when the storage volume is lower, either through use, loss or reduced water availability, this water can be concentrated into a smaller area by holding it in a cell, thus reducing the volume of loss that would otherwise occur.

Typical Applicability

A simple and typical example of implementing storage cells is dividing the storage into two equal sized cells by constructing a new internal wall. Variations include dividing the storage into unequal sized cells. Similarly an additional cell might be added by constructing new embankments outside of the existing storage.

Applications within Healthy Headwaters (HH)

The most likely application of storage cells within the HH is dividing an existing storage into two cells. The construction of cells outside of existing storages may be constrained by requirements under Resource Operation Plans (ROP). Where multiple storages occur on farm there is an opportunity to connect these storages via pipe work and strategically manage similarly to the concept of storage cells.

Water Savings

Documented range of water savings

The expected range of water savings from implementing storage cells is 15 – 25%. Despite a significant number of storages already having cells (i.e. 20% recorded from grower / irrigator survey) there is limited published data documenting performance. There is an opportunity to better document the costs and associated benefits from existing infrastructure.

Factors affecting water savings

The main factors affecting the range of water savings are the time water is in storage and the amount of water being stored. Storages which cycle relatively quickly reduce the opportunity for losses. Furthermore, loss prevention will be maximised when smaller volumes of water are being stored such that the area over which this volume is stored can be minimised by using the smallest number of cells. Similarly the other factor which will significantly influence water savings is how tightly the storage is managed to reduce the surface area of water in storage by transferring water into other cells as soon as possible. Savings are also dependant on completely emptying cells which are effectively not in use i.e. water remaining is unused cells will result in same evaporation losses.

Supported by Australian Government Water for the Future

Queensland Government

Ability to measure/quantify water saving

The ability to accurately measure water losses and quantify savings is proportional to the change in surface area. Calculations of water savings are relatively robust however they are dependent on an accurate assessment for the time water is in storage.

Costs

Capital costs

The capital costs include the construction of new embankments which can be budgeted at $3.00 - $5.00 per cubic metre of earthworks. Additional costs include infrastructure such as pumps and pipe work to transfer water into different cells. These costs will be somewhat site specific and dependant on the opportunities presented by the existing site.

Operational costs

Ongoing operational costs include pumping and associated maintenance costs.

Skill and Management Requirements

Installation considerations

Design considerations for raising storage height are outlined by Barret (2007). Within the HHWUE, the main installation requirement will be raising wall height and reducing the current footprint of the storage. In most cases the footprint will need to be reduced to ensure no increase in take of water due to ROP requirements. This will require the construction of a new wall or moving of an existing wall.

Operational considerations – irrigator

The main operational consideration by the irrigator is the transfer of water between cells. How tightly the storage is managed to reduce the surface area of water in storage will influence losses and water savings.

Operational considerations – expert support required

Incorporating cells will require technical expertise to design the new embankments. The use of appropriately skilled earthmoving contractors i.e. those who have previous experience building on farm storages are advised.

A storage cell

Impediments to Adoption

The main impediment to adoption is the potentially significant modifications to existing storages that will be required. The opportunity to implement these changes in most cases will rely on access to a dry storage. Better quantification of costs and benefits are required.

Environmental Impact

Limited environmental impacts (none).

Further Information

For a full copy of *An appraisal to Identify and Detail Technology for Improving Water Use Efficiency in Irrigation in the Queensland Murray Darling Basin* go to:

http://www.derm.qld.gov.au/water/health/healthy-headwaters/bapreport.html

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Photographs used have been accessed from the following sources:

http://www.derm.qld.gov.au/water/health/healthy-headwaters/healthy-headwaters-water-use-efficiency-project.html

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