Department of Employment, Economic Development and Innovation

MORE PROFIT PER DROP
Irrigated Farming Systems

Supporting the Healthy Head Waters Water Use Efficiency project

Increasing Storage Wall Heights

Overview

Increasing the wall height of an on farm storage while maintaining the stored volume is an effective strategy to reduce evaporation losses. Decreasing the surface area of the storage reduces the potential evaporation losses proportional to the reduced surface area.

Applicability

Typical Applications

Storages are commonly raised to cater for the need of increased storage volume while maintaining the original footprint. This improves the water performance of the storage by reducing the potential evaporation losses per megalitre of stored water. Modifying an existing storage to reduce evaporation losses may have a number of constraints particularly where the storage volume needs to remain constant therefore the storage footprint needs to be reduced by building a new section of wall.

Applications within Healthy HeadWaters

Within the HH the main application for increasing wall height as an evaporation mitigation strategy is to increase the wall heights to 8m where storages were built to previous regulations which limited storage height to 5m. A major impediment for adoption within the HH will be compliance with regulatory requirements. To ensure there is no increase in take of water a reconfiguration of the storage geometry may be required.

Applicability: Increasing storage wall heights

Capital Cost: large range

Annual Costs: nil

Strengths:

- Easy to determine likely water savings – robust calculations
- No additional ongoing maintenance

Weaknesses:

- Easier to build a new storage with smaller surface area and same volume
- Cost of construction increases rapidly with increasing embankment height
- May increase seepage rate

Water Savings

Documented Range of Water Savings

Although there are numerous examples reported in the literature of storages that have had an increased wall height there is limited published data documenting the savings. Water savings are relatively simple to determine and are robust given the reduction in evaporation losses is proportional to the reduced surface area of the water in storage. Eg increasing the height of a

1000ML storage from 5m to 8m would result in a reduction of the surface area by approximately 43% which would equate to the same reduction in evaporation losses providing water is in storage for a 12 month period.

Factors affecting water savings

The main factor affecting the range of water savings is the time the water is in storage. Storages which cycle relatively quickly reduce the opportunity for losses. Other factors which may affect water savings is potentially higher seepage losses as a result of increased hydraulic head.

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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 dependant on an accurate assessment for the time the water is in storage. One are of uncertainty is the potential for increases seepage losses driven by a relatively greater depth of water in storage (i.e. hydraulic head).

Costs

Capital costs

An example illustrating the costs and water savings of rasing the wall height for a 1000ML reservoir is reported by Barret (2007). Here the additional cost of building a storage from 5m to 8m is based on a construction cost of $2.80 per cubic metre. Notably the cost of construction per cubic metre of soil increases with embankment height.

Operational costs

There are no ongoing operational costs.

Based on the work of DNR&M (2002), costs range from $1400 up to $7500/ML which are largely a function of the storage shape and size.

Skill and Management Requirements

Installation considerations:

Design considerations for raising storage height are outlined by Barret (2007). 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 Resource Operations Plan (ROP) requirements. This will require the construction of a new wall or moving of an existing wall.

Operational considerations

There are virtually no additional operational considerations by the irrigator. Raising the storage wall height will require technical expertise to design the new embankments. The use of appropriately skilled earthmoving contractors is advised.

Impediments to Adoption

The main impediment to adoption is the potentially significant modifications to existing storages that will be required to maintain the current storage volume (i.e. reduce storage footprint). 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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http://www.derm.qld.gov.au/water/health/healthy-headwaters/healthy-headwaters-water-use-efficiency-project.html

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