

Irrigation network renewal

North Victoria, Australia

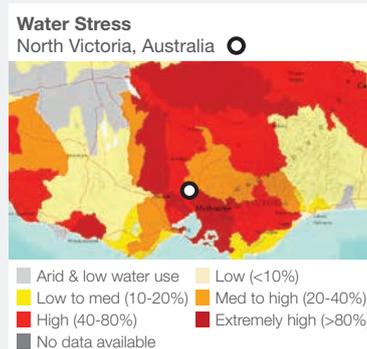
water scarcity impact

Reduced withdrawal	●
Reduced consumption	●
Improved water quality	●
Increased productivity	●
Net basin benefit	●

volumetric impact
204 387 000 m³/yr

capital cost
\$1 229 000 000

estimated unit cost of water
40 ¢/m³



Water Stress Map:
Gassert, F., M. Landis, M. Luck, P. Reig, and T. Shiao. 2013. "Aqueduct Global Maps 2.0."

Confidence level
● Low ● Medium ● High

Water Scarcity Impact Key
● Main ● Minor

Project Overview

The Golburn-Murray Irrigation District (GMID) covers 68 000km² in the upper Murray Catchment and is Australia's most extensive irrigation network with water drawn from the Murray and Goulburn Rivers. Parts of the irrigation system were antiquated with inefficiencies in the water supply system due to leakage, and inefficient farming practices, resulting in high water use. The North Victoria Irrigation Renewal Project (NVIRP) covers 85% of GMID area, and was established to reduce leakage in the irrigation water supply system and improve the efficiency of on-farm irrigation systems. The \$1 229m project was funded by Government of Victoria (\$737 000 000), Melbourne Water (\$369 000 000), and Golburn-Murray Water (\$123 000 000).

The project involved lining of channels, automation of flow control structures, metering of supply points and installation of remote sensing and control systems on the flow control structures and farm supply points. The water entitlement trading helped transition from inefficient practices and low value crops to efficient practices and higher value crops, improving the economic productivity of the district.

These improvements reduced the agricultural water withdrawal within the GMID without affecting crop production, reduced evaporative loss by 1 690 000m³/year and made available 204 387 000m³ of water for environmental flows, municipal water use and additional agricultural use.

Key Elements

- Improvements to water supply system with real-time monitoring and control of flows.
- Lining of main channel, improvement of on-farm channels or replacement with piped systems.
- Installation of sprinkler and drip irrigation system to improve application of water to crops.
- Central data repository of irrigation system flows and abstractions.
- Real-time trading of water entitlements by farmers.

Key Outcomes

- Improved channel water supply efficiency from 79% to 92%, based on volumes of water delivered.
- Enabled real-time monitoring of water supplies in the system and abstraction by users.
- Decoupled water allocation from land and creation of Water Entitlement Entities (WEE).
- Enabled real-time trading of the water entitlements by the WEEs.
- 204 387 000 m³ reduction in agricultural water withdrawal due to reduced evaporative losses and reduced return flow.
- Small reduction in consumptive use through reduced evaporative losses (1 690 000m³/year)



Victoria, Australia

Intervention Features

- Irrigation metering
- Remote monitoring and sensing
- Sprinkler irrigation systems
- Drip irrigation systems
- Replacement of channels with pipes
- Lining of irrigation channels
- Water entitlement trading

Project Levers

(1) Irrigation control systems:

Open channel irrigation control systems with automated control gates with real-time monitoring were installed. These upgrades enable remote operation of control structures to divert flows. The remote sensing equipment enables accurate measurements of flows and demand in real-time.

(2) Channel remediation and bed lining:

Almost 130km of earth bed channels were lined with High Density Polyethylene (HDPE) liners to reduce the amount of water leaking out of the irrigation water supply.

(3) On-farm distribution system improvement:

On-farm channels were improved or replaced with piped systems to reduce the leakage. The piped system also enables installation of meters and improvement to the on-farm irrigation systems with sprinklers and drip irrigation.

(4) Irrigator supply point improvement and metering:

Improvements were made to flume gates and automated controls were installed. Outfalls were refurbished or replaced and new meters incorporating automatic controls were installed. Both these measures enable real-time monitoring and control of water supply into the farms. Central monitoring of flows also provides the ability to validate the abstracted volumes.

(5) Sprinkler and drip irrigation systems:

Sprinkler and drip irrigation systems were installed to reduce on-farm water use. Altering the flow rates of sprinkler and drip irrigation system allows the farmer to ensure that water application does not exceed the soil infiltration rate and is sufficient to meet peak water requirements of the target crops.

(6) Water entitlements trading:

The water trading market has been in operation for 50 years, but the upgrades to the irrigation system enabled real-time trading of water entitlements. Farmers can transfer their entitlement permanently or trade a portion of the entitlement as a timed allocation. The timed allocation frees up the resources, helps set the price for water and enables farmers to purchase additional entitlements when necessary.

Outcomes and Challenges

The improvements to the irrigation system have increased distribution efficiency by reducing leakages, better monitoring and control of abstractions, more accurate metering of consumption by the users and enabling real-time trading of water entitlements. The monitoring of flows and abstraction data is stored on a central server, which allows monitoring of the farm abstraction volumes and the performance of the irrigation system. It also allows the audit of reductions in withdrawals achieved as a result of the project.

The installation of automated gates and new meters enable monitoring and control of water supply from the system to the farmers. The reduced withdrawals achieved by each measure are presented in the table below.

Measure	Reduced withdrawal (in m ³ /year)
Irrigation control systems	83 748 000
Meter replacement and rationalisation	85 224 000
Channel remediation and bed lining	22 854 000
On-farm channel improvements	12 561 000
Total savings	204 387 000

The improved monitoring of flows and the water trading system has enabled the transfer of entitlements from inefficient farming practices and low value crops to more efficient farming practices and higher value crops. It has enabled individual farmers to consider their own circumstances and water needs and adjust their allocations via real-time trading. In 2010-11, the Water Entitlement Entities in the GMID traded a total 24 610 000m³ of entitlements. It has also encouraged inefficient farmers to improve efficiency or leave the industry.

The improvements to the irrigation system have reduced evaporative losses by 1 690 000m³/yr and increased channel water supply efficiency from 79 to 92%. The improvements in channel and water trading has made available 204 387 000m³ of water for other uses, primarily from reduced infiltration and return flow.

Most of the savings have been allocated for the environmental flows within rivers, with some of the savings allocated to meet water demand from Melbourne and for additional agricultural use.