



6

This chapter outlines actions that support a profitable and resilient irrigation sector by aligning system modernisation with on-farm, natural resource management and environmental programs.

Modern, efficient and sustainable irrigation

Guide to the chapter

Section 6.1 Modernising the water distribution system

- Current modernisation projects
- Maximising the benefits of modernisation
- Increasing confidence in water savings

Section 6.2 On-farm water use efficiency

- Current practices and initiatives




Section 6.3 Managing the impacts of irrigation

- Accounting and reporting of salinity impacts
- Capping salinity impacts
- Drainage programs

What is the issue with the existing arrangements?

Irrigation is a key factor in the region's ongoing prosperity. Climate change is likely to reduce the amount of water allocated to irrigators' water shares, resulting in a significant reduction in the area of land irrigated. In addition, the available water is currently being inefficiently delivered via an old and leaky distribution system, providing lower service levels than required by modern enterprises. With \$2.1 billion committed to renewing this infrastructure, the very nature of the distribution system is set to change. To maximise the benefits, it must be aligned with the other water programs currently being rolled out in this region. In this way, regional communities can be protected and grow prosperous, while maintaining river and wetland health in the face of reduced water availability.

What improvements does the Strategy make?

-  Distribution system modernisation will be integrated with on-farm modernisation, water purchase and works programs – to support smart, efficient irrigation enterprises and maximise the community benefits of modernisation.
-  Clear principles have been developed to guide the conversion of modernisation water savings to usable entitlements. These are critical to protect the reliability of existing entitlements and increase community confidence.
-  Improvements are made to salinity management to ensure the region's irrigation continues to be as environmentally sustainable as possible.

6.1 Modernising the water distribution system

Modernisation reduces the amount of water required to operate the distribution system (that is, distribution system operating water). There are two aspects to modernisation: renewal and rationalisation (see Figure 6.1).

Renewal replaces old distribution infrastructure with modern equipment and technology that improves water efficiency. It can include activities such as channel automation, lining or piping of channels and metering upgrades. Modern meters and control systems provide improved service levels to the farm including uniform flow rates, a wide range of flow rates and short ordering times.

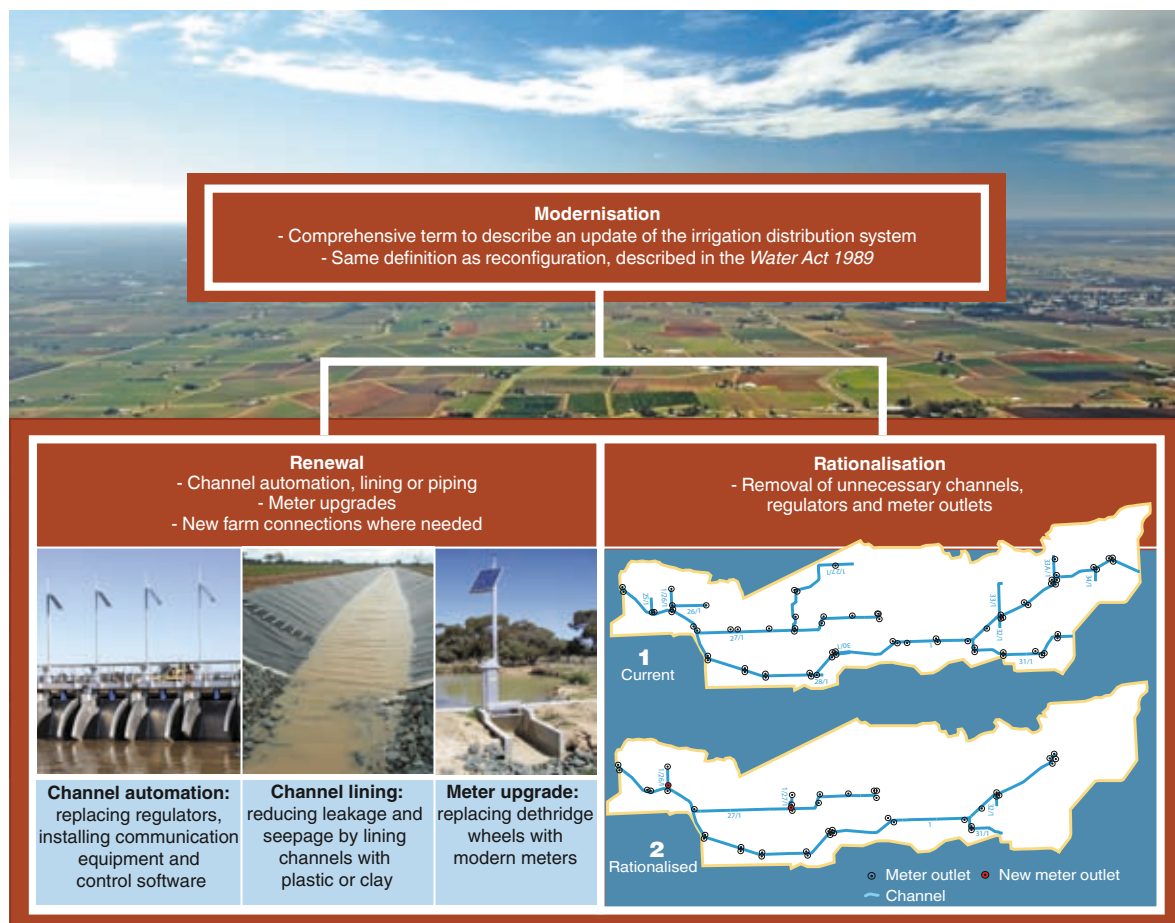
Rationalisation removes some infrastructure or channels or modifies them to provide a different level of service.

Through modernisation, system operating water can be transferred to more productive use, either for water users or the environment. Improved service levels create flexibility for farm businesses, giving more choice for irrigators about what to grow, when to grow it and how to apply water to crops. Ultimately, more resilient farm businesses generate wealth for regional communities.

Modernisation is now the generally accepted term for what used to be known as, and is described in the *Water Act 1989* as, reconfiguration. Community consultation is a legislative requirement of reconfiguration planning to ensure that community views are taken into account, providing greater certainty and options for customers. Where a channel or service will be closed, the preferred option is to negotiate this decision with customers.

NVIRP now has the powers and obligations conferred for reconfiguration planning under the *Water Act 1989*.

Figure 6.1 Defining distribution system modernisation terms



6.1.1 Current modernisation projects

Since 2000, the Victorian Government has been increasing investment in modernising the irrigation distribution system. Completed or partially completed irrigation modernisation projects demonstrate Victoria's ability to successfully deliver water savings and service improvements. The water savings from earlier projects have been used to meet the government's commitments to increase environmental flows through the Living Murray Initiative and the Snowy River Water Recovery Project (see page 130).

Northern Victoria Irrigation Renewal Project (NVIRP)

On average, about 30 per cent of water or 800-900 GL a year is required to operate the distribution systems in the Goulburn Murray Irrigation District. Even with the reduced inflows occurring since 1997, system operating water requirements are still recorded at about 30 per cent or 700 GL on average each year.

Through *Our Water Our Future – the Next Stage of the Government's Plan*, the Victorian Government recognised that future reductions in water availability will have a major impact on the state's food production region in northern Victoria. It therefore included a \$1 billion investment in Stage 1 of the Food Bowl Modernisation Project to secure the future of this area and improve the efficiency of the distribution system. A state-owned entity, NVIRP, has now been established to implement the Food Bowl Modernisation Project.

Funding for Stage 1 of NVIRP is shared by the Victorian Government (\$600 million), Melbourne Water (\$300 million) and Goulburn-Murray Water (\$100 million). The \$1 billion investment will deliver average annual water savings of up to 225 GL. These savings will be shared equally between irrigators in the Goulburn Murray Irrigation District, the environment and Melbourne water users. While some community members have expressed concern about some of the savings being transferred to Melbourne, Melbourne Water's investment was an important component of the project scope. The Victorian Government's investment recognises the benefits provided to communities in both the north and the south of the state.

The Commonwealth Government has agreed to fund up to \$1 billion for Stage 2 of the NVIRP, subject to due diligence. Stage 2 could secure up to 200 GL of additional annual water savings to be shared equally between irrigators and the environment. When both stages of the NVIRP are complete, the Goulburn Murray Irrigation District will become one of the largest automated and modernised irrigation distribution systems in the world and an international benchmark for irrigation delivery excellence.

In 2004, *Our Water Our Future* committed \$50 million to modernisation in the Northern Region and this program, which was managed by Goulburn-Murray Water, will be aligned with NVIRP.

In April 2009, it was announced that the future of the Campaspe Irrigation District will be reviewed as part of NVIRP. This will help entitlement-holders whose planning has been impaired by uncertainty following a number of zero allocation years. A reference group has been established including various Campaspe land-holders and representatives from the Campaspe Shire, Goulburn-Murray Water, NVIRP and the Modernisation Consultation Committee. The first stage is currently underway with the draft report on an irrigator survey being discussed with NVIRP, the reference group and the broader Campaspe community. The second phase will assess the most cost-effective and beneficial mix of options, including a Waranga-Campaspe pipeline and reticulated domestic and stock supplies.

Sunraysia Modernisation Project

At the 3 July 2008 meeting of COAG, the Commonwealth Government agreed in principle to provide \$103 million for the Sunraysia Modernisation Project, subject to due diligence. This project will modernise the irrigation supply infrastructure in the Merbein, Mildura and Red Cliffs Irrigation Districts to provide a year-round supply to irrigators. It will involve the comprehensive upgrading or replacement of the major components of the pumping and delivery systems. The quality of water and reliability of supply will be substantially enhanced.



Channel modernisation, Pyramid-Boort

Photographer: Ralph Ewart

6.1.2 Maximising the benefits of modernisation

Chapter 2 explores the risk of zero allocation years when there is insufficient water to operate the distribution system and Chapter 5 outlines actions to address this risk by increasing system reserves. System reserves and modernisation are linked because the latter reduces the amount of water required to operate the distribution system and improves the effectiveness of the reserve policy in securing system operation. The reserve policy in turn maximises the benefits of modernisation by ensuring that the upgraded distribution system will be fully utilised, even in severe drought years. This is particularly important to ensure the delivery of supplies for domestic and stock needs.

Under the most severe climate change scenario (Scenario D), the amount of water available for consumptive use could be reduced by 15 per cent in the Murray system and 30 per cent in the Goulburn system (see page 24). This will reduce the amount of water allocated to irrigators' water shares and could result in a significant reduction in the area of land irrigated. The resulting impact on irrigators, and the communities that depend on them, could be exacerbated by the movement of water from productive use to the environment, such as through the Commonwealth Government's \$3.1 billion program to purchase water entitlements for the environment (see page 45).

So how does modernisation help to address this challenge? Figure 6.1 defines modernisation as the upgrade and rationalisation of the distribution system. This infrastructure focus is a key element in supporting irrigation in the Northern Region. However, more is needed to modernise the entire irrigation sector. Appropriately integrating system modernisation with other water resource programs can significantly improve the productivity, environmental and community outcomes of irrigation. This will be critical if high-value and world-class irrigation is to continue in northern Victoria in the face of water scarcity.

In June 2009, a landmark agreement was reached to integrate Commonwealth water policy with Victorian water policy. Under this agreement, the Victorian Government has agreed to exempt some farmers from the four per cent trading limit (see page 108) where the sale is linked to a modernisation plan and will result

in a clear community benefit. This common-sense agreement targets purchases in less productive areas and protects the significant investment in modernising the distribution system. As part of the agreement, the Commonwealth confirmed a further \$300 million for on-farm works in the southern Murray-Darling Basin. The funds, which complement investment in distribution system modernisation, will improve on-farm efficiency and return a proportion of water savings to the environment. The agreement meets the joint aims of supporting a modern, vibrant and value-adding irrigation sector, while delivering more water for the environment. The joint approach enjoys broad community support; it is based on submissions from community modernisation committees, irrigation and environment peak industry groups, local councils and catchment management authorities.

"...Governments should be encouraged to pursue irrigation reconfiguration as a method of securing water outside the traditional water market to allow for the multiple benefits possible..."

– Draft Strategy submission DS068

This section outlines further opportunities to align such programs to protect and grow prosperous regional communities, while maintaining river and wetland health in the face of reduced water availability. This includes appropriate links with environmental and natural resource management programs. Integrating the programs as shown in Figure 6.2 will improve the flexibility and adaptability of the northern Victorian irrigation sector.



New channel lining, Central Goulburn

Photographer: Ralph Ewart

Figure 6.2 Modernising northern Victoria's irrigation sector

Infrastructure and planning investment

Infrastructure projects	On-farm improvements
<ul style="list-style-type: none"> - System renewal, including channel upgrades and automation, pipeline construction and metering upgrades - System rationalisation, including the closure of some channels - \$2b Northern Victoria Irrigation Renewal Project (Vic/C'wealth) - \$103m Sunraysia Modernisation Project (C'wealth) - \$425m Snowy Water Recovery Project (Vic/NSW/C'wealth) - \$1b Living Murray Initiative First Step (Basin governments) 	<ul style="list-style-type: none"> - Farm engagement and extension - Business planning and risk management through whole farm planning - On-farm efficiencies (including works and management practices) - \$26m over the next 3 years for Sustainable Irrigation Program (Vic) - \$300m On-farm Irrigation Efficiency Program (C'wealth)

Aligned with existing programs

Environmental water delivery	Natural resource management	Better regional planning	Commonwealth water purchases
<ul style="list-style-type: none"> - Use of structural works to deliver environmental water and reduce the need for water recovery (eg. purchase) - Design of delivery infrastructure to deliver environmental water (and consumptive water en route for environmental benefit) 	<ul style="list-style-type: none"> - Managing salinity and nutrient impacts through drainage network - \$12m over the next 3 years for salinity and drainage program (Vic) 	<ul style="list-style-type: none"> - For future management and zoning of rural land - Assist land amalgamation/ repackaging (eg. into viable irrigation enterprises, dryland purposes or ecosystem services) 	<ul style="list-style-type: none"> - Water entitlements purchased from willing sellers to address declining river health - \$3.1b Restoring the Balance in the Murray Darling Basin program (C'wealth)

Delivers multiple outcomes

Increased farm productivity, water savings for business and the environment, resilient communities, healthy rivers and wetlands.

There are many potential benefits of an integrated modernisation program.

Productivity will increase through:

- a modernised irrigation distribution system with reduced losses and better service levels
- the removal of costly stranded irrigation assets
- targeted water purchases to areas that are closing down to facilitate and protect investment in modern infrastructure
- investment in on-farm planning to increase production with less water and support/facilitate decisions to connect or reconfigure
- renewal of on-farm irrigation infrastructure reducing water losses and labour requirements
- improved water management options for farmers through carryover and trade which require changes to the system reserve policy (see Chapter 5).

Water savings will be generated by:

- increasing system efficiency, through reduced on-farm losses and distribution system operating requirements
- targeted water purchases in areas where land is being retired from irrigation.

Environmental outcomes will improve through:

- the allocation of water savings to environmental flows
- better environmental water management including investment in complementary measures, water recovery and structural works
- improved natural resource management to reduce salinity and nutrient impacts and avoid irrigation on severely affected floodplains.

Community benefits will be enhanced through:

- better water delivery service levels that support high-value, job-generating enterprises
- better quantification of water savings to ensure no impacts on entitlement-holders
- implementing both stages of NVIRP as a single project to ease potential customer confusion and reduce implementation costs
- more farm planning support for farmers who want to continue irrigating and those deciding to retire
- better support for community adjustment by directing Commonwealth purchases to areas that are closing down.



Process to achieve an integrated modernisation program

This section describes several steps to an integrated modernisation program and provides an indication of the benefits each provides. These steps will only be implemented if they do not impact on modernisation project timelines or water savings.

Step 1. Direct some of the Commonwealth's \$3.1 billion water purchase

Water savings		Productivity	✓
Community	✓	Environment	✓

Where water purchases are made as part of a modernisation plan, they will be exempt from the four per cent trading rule (see page 108) and the termination fee may be waived in part or full. Targeting purchases to less productive areas or where infrastructure is being rationalised will avoid the loss of water in modernised areas and improve regional productivity. Retaining the four per cent rule in all other circumstances will allow time for communities to adjust to the impacts of water leaving areas. Criteria to guide ongoing exemptions will be developed around:

- irrigation suitability, including soil type, environmental, floodplain and drainage considerations
- distance from the 'backbone' (major irrigation channels) of the distribution system
- the amount of water entitlement that has been sold out
- whether the exemption would facilitate structural/community adjustment.

Step 2. Implementing NVIRP Stages 1 and 2 as a single project

Water savings		Productivity	
Community	✓	Environment	

While the two stages of this project have different funding sources, the water savings targets, location, beneficiaries, timelines and nature of the works are similar. Integration of the two stages with a single point of contact would increase the efficiency of administrative processes and avoid competition for water savings. Both stages would use the same information, offer similar incentives and involve the same institutions and engagement processes. Responsibilities and reporting accountabilities will need to be negotiated with the Commonwealth Government.

Step 3. Include a more comprehensive on-farm component

Water savings	✓	Productivity	✓
Community	✓	Environment	

Whole farm planning, which guides farm infrastructure and management including how farms connect to the publicly-owned distribution system, will be integrated with NVIRP works. Whole farm plans will help to optimise the benefits of improved service levels offered by modernisation. The Commonwealth has recently committed \$300 million to on-farm works to improve efficiency in the southern Murray-Darling Basin, with a portion of savings to go to the environment. The works program will be aligned with NVIRP and a whole farm plan will be required to qualify for a grant. The scope of whole farm planning also needs to be expanded with a greater focus on business/financial planning and risk management to help those wishing to continue irrigation, retire or otherwise leave the industry. For example, it could facilitate disconnections from the system and subsequent conversion to dryland farming or ecosystem services. Early inclusion of the on-farm component in modernisation projects will improve confidence in rationalisation decisions.

Step 4. Allow for a greater range of options in rationalisation

Water savings	✓	Productivity	✓
Community		Environment	✓

To improve the overall productivity of irrigation in the region and reduce its environmental footprint, land suitability and salinity considerations will be incorporated to rationalisation decisions. Options to prevent future irrigation of this land, including the surrender of associated water-use licences, will be investigated. Where channels are identified for closure and entitlement-holders no longer wish to irrigate, they can choose to sell their water shares or alternatively, can enter a commercial agreement to surrender their water shares, which will be counted towards NVIRP's water savings.

Step 5. Facilitating changed land management practices

Water savings		Productivity	✓
Community		Environment	✓

Land use zoning and planning provisions should be streamlined to facilitate changed land management practices. This will help with the implementation of modernisation programs and provide broader regional benefits. For example, where the Commonwealth Government or other organisations purchase property/ water packages as part of modernisation, they may wish to repackage and resell the properties as larger, more viable, dryland enterprises or for ecosystem services including revegetation for habitat or carbon offset purposes. Alternatively, they could provide Traditional Owners with title to land. Some or all of the water entitlements could go to the environment.

Step 6. Identify opportunities for works to deliver environmental water

Water savings		Productivity	
Community		Environment	✓

NVIRP will consult catchment management authorities on environmental requirements for water delivery when designing upgrades to distribution system infrastructure, although any material cost increases will be funded by the catchment management authority. In addition, Victoria will put forward a prospectus of opportunities for structural works and encourage the Commonwealth to redirect a portion of their Water for the Future funding to the construction of these works to efficiently deliver environmental outcomes (see page 45). This will be just as important as water recovery in the protection of environmental assets in the face of climate change.

Action 6.1: Integrating programs to modernise the irrigation sector

Who: NVIRP; Department of Sustainability and Environment; Goulburn-Murray Water

Timeframe: Various (see dot points below)

To increase productivity and water savings and improve environmental and community outcomes, programs to modernise the irrigation sector in northern Victoria will be integrated by:

- directing the Commonwealth's water purchases to less productive areas by exempting purchases from the four per cent trading limit when they are linked to modernisation plans (2008/09-2012/13)
- co-ordinating the rollout of Stages 1 and 2 of NVIRP (2009-2012)
- linking NVIRP to comprehensive on-farm programs, including integration with whole farm planning and the Commonwealth's \$300 million on-farm program (2009/10-2012/13)
- allowing for a greater range of options in rationalisation (2009-2012)
- working with local government to facilitate changed land management practices (2009-2012)
- identifying opportunities for structural works to enable delivery of environmental water and consumptive water en route for environmental benefit (2010).

Program integration will be built into the design and implementation of NVIRP but will only occur where it does not impact on project timelines or water savings.

Integration opportunities will also be investigated in the implementation of the Sunraysia Modernisation Project.

6.1.3 Increasing confidence in water savings

While not a major focus of the Draft Strategy consultation, some community members raised concerns about how water savings from modernisation projects would be quantified to protect existing entitlements.

The finalisation of the *Water Savings Protocol for the Quantification of Water Savings from Irrigation Modernisation Projects* will increase confidence in water savings projects. The Protocol was developed to provide a consistent and sound technical basis to calculate water savings from modernisation works. It is made up of a series of technical documents that will guide water corporations and project proponents in the estimation, application for, and allocation of water savings from irrigation modernisation projects.

The Protocol not only provides detailed calculations for water savings based on engineering principles, but also describes an independent audit procedure that is to be undertaken for each project. The annual independent audit of the water savings will demonstrate that water savings from the project are real. Making the Protocol and audit results publicly available improves the rigour and transparency of water savings quantification. Ultimately, these procedures will clearly demonstrate that when new entitlements are created from water savings there is no adverse impact on existing entitlement-holders or the environment.

The Protocol is available from www.ourwater.vic.gov.au/programs/irrigation-renewal. The following sections outline the key principles in the Protocol.

Policy 6.1: Principles to guide the conversion of water savings to entitlements

- a) Savings of system operating water in the irrigation distribution system may by agreement be converted to entitlements (in accordance with the *Water Act 1989*) and will go to the investors, or beneficiaries of the investors in the works and measures to achieve the savings.
- b) Water savings are the total (gross) volumes saved less the volume of water required to ensure no net impacts from the project on high environmental values.
- c) Evaporation and seepage losses associated with water storage and operation of river systems are part of storage losses or river operating water. Savings made in storage losses or river operating water will go to the investors, or beneficiaries of the investors in the works and measures to achieve the savings.
- d) Water savings converted to entitlements must be ongoing and quantifiable.
- e) The volume and availability of water savings will reflect the nature of water which was saved.
- f) Water savings must be sustainable over the long term (that is, the improved assets and operating practices on which the savings depend are to be maintained).
- g) The base year against which savings are assessed should be consistent with the basis of establishing the loss allowance in bulk entitlements.



Sheep, Goulburn catchment

Photographer: Alison Pouliot

Policy 6.2: Roles and obligations in water savings projects

The project proponent will:

- identify the water saving opportunities
- devise and develop the scope of projects in conjunction with the system operator
- seek all necessary approvals to works and endorsement of their associated water savings
- identify potential environmental impacts and mitigation measures and consult with the appropriate environmental managers at a State and Commonwealth level
- quantify the volume of water savings to be generated by each intervention in accordance with the methodology outlined in the *Technical Manual for the Quantification of Water Savings*
- prior to implementing the annual works program, and at reasonable intervals throughout the season if requested by the system operator, calculate the estimated interim water savings for the current/future irrigation season for the purpose of setting this water aside for future allocation
- communicate to the system operator the planned annual works program and changes as they occur
- implement works in accordance with the works program
- communicate any significant departures from the planned works program, as it is implemented, to the system operator
- notify the system operator and the Executive Director of Water Entitlements and Strategies, within the Department of Sustainability and Environment ('the Department'), of the volumes of water that are expected to be set aside ('interim savings') and transferred ('long-term savings') as a result of each intervention being implemented
- calculate the actual water savings arising from the works in accordance with the *Technical Manual for the Quantification of Water Savings* to determine both the interim and the long-term water savings
- report, as required, the projected interim and final water savings including any details of changes from the overall targeted volumes of water savings for the project or water savings intervention
- arrange for an independent audit and report of the water savings utilising the independent auditor(s) awarded to the auditing of water savings by the independent panel in accordance with the audit process
- advise the system operator and Executive Director of Water Entitlements and Strategies, within the Department, on the outcomes of the water savings audit.

The water corporation will:

- ensure water delivery services can continue to be provided to water entitlement holders on the system
- on the advice of the proponent, consult with system water users impacted by the agreed project works
- provide water system asset information required to enable the project proponent to complete interim and long-term water savings projections
- apply to the Minister for Water to amend/transfer part of the savings as water entitlement
- operate and maintain the water delivery system in accordance with the agreed project objectives and ensure accountable water savings are sustainable and maintained in the long term.

The system operator will:

- provide to the proponent, projections of annual water deliveries and allocations to enable the progressive calculation of interim water savings as the project is implemented
- manage and collect water delivery system flow (inflow and outflow) measurement data and make that data available to the project proponent
- ensure provision of water related data to the project proponent and the Department is guaranteed through a quality assurance process; where the data has been modified or filtered, provide both the raw and modified data including documentation of reasons for modification
- at the start of each irrigation season, or progressively as agreed, set aside the amounts of water projected to be saved in the year ahead through the modernisation works
- confirm the estimates of actual water savings provided by the project proponent and where necessary recommend an amendment to those savings for consideration by the project proponent.

The Minister for Water and associated departments will:

- with the support of the Department, update the Protocol to ensure continual improvement and the use of the best technical basis available at the time
- with the support of the Department and at the request of the bulk entitlement-holder, amend and transfer bulk entitlements to represent the long-term water savings realised through the modernisation program.

The Department for Sustainability and Environment will:

- support the Minister for Water in administering the *Technical Manual for the Quantification of Water Savings* and the associated audit processes
- support the Minister for Water in amending and transferring bulk entitlements
- recommend to the Minister for Water updates to the Protocols, particularly the *Technical Manual for the Quantification of Water Savings*, to ensure continual improvement and the use of the best technical basis available at the time
- convene a meeting with the system operator, the project proponent and the Department a minimum of every six months to review the application of the *Technical Manual for the Quantification of Water Savings* in northern Victoria
- establish a panel of independent auditors which may be used to audit water savings estimates and related baseline data (both interim savings on annual basis and long-term savings at the end of the water savings project)
- establish an agreed methodology for calculating the annual long-term cap equivalent conversion factor to be used in long-term water savings estimates
- provide the project proponent (and system operator if requested) with the long-term cap equivalent conversion factors for particular years.

The Minister for Planning and associated departments will:

- provide advice on processes to assess environmental impacts of the works and measures proposed by the project proponent
- oversee the planning requirements for the works proposed by the project proponent.

The Minister for Environment and associated departments will:

- work with environmental managers and decision makers to investigate any potential environmental impacts of works and seek multiple benefit outcomes
- provide advise when requested to the Minister for Planning and / or Minister for Water on potential environmental impacts of the project and suitable mitigation measures.

Catchment management authorities (environmental managers) will:

- improve river and wetland health through the use of the EWR and delivery of complementary restoration works
- work with the water savings project proponent to identify potential environmental impacts of the actions and potential mitigation measures proposed by the project proponent
- work with the project proponent and system operator to seek multiple benefit projects and multiple project benefits
- in instances where Parks Victoria is the owner or custodian of the land, the catchment responsibilities for the maintenance of catchment health will be delivered through Parks Victoria.

The Murray-Darling Basin Authority will:

- ensure appropriate water diversion accounting against the Murray-Darling Basin Cap on allowable annual diversions, with details of the future role of the Authority in relation to water savings to be resolved as part of the Basin Plan.

6.2 On-farm water use efficiency

In times of water scarcity, improved on-farm water efficiency is an economically viable alternative to reducing crop or herd size (that is, reducing production). Diversifying into less water-demanding and more profitable crops or improving the efficiency of current crops can allow farmers to increase production and productivity even with reduced allocations.

Farm water efficiency can be improved by applying water at a time and volume that meets the needs of crops. Current farm water efficiency ranges from less than 60 to more than 90 per cent⁵⁰. Higher efficiency means less water is lost to deep drainage, leakage, evaporation or surface runoff, which in turn can reduce salinity, water-logging and nutrient impacts. Factors that influence farm water efficiency include the type of irrigation system, drainage and reuse systems, management practices such as scheduling and management of surface irrigation flows, crop and soil types and the quality of applied water.

6.2.1 Current practices and initiatives

Victoria's Sustainable Irrigation Program has been operating since the late 1980s with annual funding of about \$15 million. In partnership with irrigators, the program has delivered significant improvements in on-farm water efficiency and reduced nutrient and salinity impacts on the environment.

In 2003/04, \$23 million was committed for eight years to encourage whole farm planning, reuse systems, irrigation system upgrades and groundwater pumping. To date this investment has resulted in:

- an additional 38,000 ha of land being surveyed or subject to a whole farm plan, with significant improvements in water efficiency and diversion of salts from the Murray-Darling Basin
- almost 17,000 ha of land being protected by reuse systems and 25,700 kg of phosphorous prevented from entering waterways
- significant volumes of water saved using reuse systems (13.8 GL), groundwater pumps (1.9 GL) and improved irrigation (6.1 GL) – a total of at least 21.8 GL
- increased productivity from the irrigation regions, and improved ability to cope with drought or low water allocations.

On-farm programs are being adapted to significantly improve the benefits from, and facilitate the delivery of, modernisation.

Linking farm and catchment programs to modernisation

To improve the benefits from system modernisation, and reduce adverse impacts on the environment, modernisation must be aligned with farm and catchment management programs. The Victorian Government has committed to fund the \$12 million Linking Farm and Catchment Programs to Irrigation Modernisation Initiative. The initiative is delivered through the Sustainable Irrigation Program.

This will support the integrated approach to modernisation programs described on page 118 by linking current farm and catchment-focused engagement, extension and works programs with distribution system modernisation programs. This includes the Commonwealth Government's \$300 million program for on-farm works in the southern Murray-Darling Basin, which will be aligned with NVIRP and implemented by catchment management authorities.

The initiative complements the Victorian Government's *Future Farming* strategy that supports farm business decision-making (see page 168 and www.dpi.vic.gov.au).

To assess the magnitude of farm water losses and the potential for improved on-farm water use efficiency the Victorian Government undertook a benchmarking study⁵¹. This establishes data measures to determine the water efficiency of metered irrigated agriculture at industry and regional levels. It also provides the ability to set state-wide targets for farm water efficiency. Together these investment programs will improve on-farm efficiency while improving the robustness of farm businesses in the face of change.

6.3 Managing the impacts of irrigation

Chapter 2 highlighted that salinity continues to be one of the most prevalent water quality problems in the Northern Region. Substantial reserves of salt are stored in the soils of northern Victoria and as groundwater levels rise due to clearing of native vegetation and irrigation, these salts are brought closer to the surface where they affect crop productivity and can be washed into streams. Continuing to improve salinity management is central to ensuring environmentally sustainable irrigation.

The management of dryland and irrigation salinity is governed by the 15-year Basin Salinity Management Strategy (BSMS), an agreement between the Basin states to prevent further degradation from salinity⁶². Under the provisions of the BSMS, if an action results in additional salt entering the River Murray, it incurs a salinity debit. If it results in less salt entering the River Murray, it earns a salinity credit. Total salinity credits must equal or exceed total debits for Victoria to meet its obligations under the BSMS. Salinity is measured by electrical conductivity or EC units. If an action has a net impact greater than 0.1EC it is termed an 'accountable action' and is tracked through the Murray-Darling Basin Authority's salinity registers.

The BSMS was released in 2001 and underwent a mid-term review in 2008. The review proposed a series of recommendations to address future challenges for salinity management arising from severe droughts, changing climate and institutional developments. Victoria's Sustainable Irrigation Program is working with other jurisdictions to implement these recommendations.

By approving the Basin Plan, which will include a water quality and salinity management plan, the Commonwealth Government now has a greater role in salinity management. The plan will include water quality and salinity objectives and targets for Basin water resources. Before the implementation of the Basin Plan, Victoria will continue to maintain compliance with BSMS obligations. Contributing to the Basin Plan's water quality and salinity management plan will be a priority for Victoria's Sustainable Irrigation Program.

The *Victorian Manual of Salt Disposal in the Murray-Darling Basin*⁶³ documents how salinity is managed within Victoria to meet BSMS obligations. The manual will be revised to account for management changes including the unbundling of water entitlements in Victoria, BSMS mid-term review and Basin Plan and changed institutional arrangements.

Action 6.2: Updating Victoria's approach to salinity management

Who: Department of Sustainability and Environment; catchment management authorities; rural water corporations

Timeframe: 2010

The *Victorian Manual of Salt Disposal in the Murray-Darling Basin* will be updated to account for a range of recent changes including the unbundling of water entitlements, recommendations from the Basin Salinity Management Strategy mid-term review and changed institutional arrangements. Further amendments may be required after the release of the Basin Plan.

6.3.1 Accounting and reporting of salinity impacts

The unbundling of water entitlements means permanent water trade into or out of an area is no longer a reasonable measure of water use within an area (and therefore of salinity impact). The impact of irrigation on river salinity is now controlled through the annual use limit (AUL) on the water-use licence. The AUL sets the maximum amount of water that can be used for irrigation on the property, and is a key way of controlling groundwater infiltration and high water tables. This approach is particularly useful in the Sunraysia region where salinity impact zones have been established. The volume of water use in these zones can be capped, which in turn limits the salinity impacts of irrigation within a given area.

The total volume of AULs in a salinity impact zone can be easily measured and reported through the Victorian Water Register. Salinity accountability reporting and the administration of charges and levies by water corporations will be based on the AULs. The change in AULs over each 12-month reporting period will be the method of accounting for salinity impacts in salinity impact zones. Work is underway to prepare salinity accounting procedures using AULs, which will be completed in time for implementation in the 2009/10 irrigation season.

Changes to land and water use as a consequence of environmental water recovery and modernisation programs will alter salinity impacts. These changes are generally associated with water recovery (for example, decreased outfalls and flows in drains), transfers (for example, savings going to Melbourne) and environmental use (for example, additional environmental flows). The existing accountability framework under the BSMS, including interstate accountability, is adequate to address the implications of these changes, but detailed procedures clarifying how salinity impacts of the projects will be managed need to be developed.

Action 6.3: Salinity accounting and reporting

Who: Department of Sustainability and Environment; catchment management authorities; rural water corporations

Timeframe: 2010

The salinity impacts of water use in irrigation areas will be managed through water-use licences and associated annual use limits. A process will be established to monitor the annual change in annual use limits through the water register. The change in annual use limits will be used to calculate and report on the new irrigation development accountable action within existing salinity impact zones in the Sunraysia region.

The following will guide the development of procedures to manage the salinity impact of modernisation projects:

- a) Establish a systematic process to manage the salinity impacts of environmental water use through use conditions relating to an entitlement (*Water Act 1989*, Section 48J).
- b) Salinity impacts of modernisation projects will be evaluated in terms of total credits and debits (not net impact) and separated into components of recovery, transfer and use.
- c) A 'user pays' principle will be applied to any modernisation project undertaken in Victoria.
- d) The responsibility for offsetting any net costs of projects will be shared according to a process agreed as part of the project investment strategy.
- e) As far as practical, salinity impacts of water infrastructure projects will be evaluated and accounted for at a regional level, and built into existing salinity register entries.

6.3.2 Capping salinity impacts

The use of AULs as the salinity accounting mechanism requires the existing caps on water trade into the highest impact zones in Sunraysia to be converted to an equivalent AUL volume. This change will have no affect on water users in the zones.

Further expansion of irrigated area in the Sunraysia region will increase the amount of salt entering the River Murray. To maintain Victoria’s compliance with the BSMS additional salt credits will be needed to cover the impact. To keep salinity impacts and the need to generate additional credits to a minimum, AULs in Low Impact Zones 3 and 4 will be capped. Future development will subsequently be directed to Low Impact Zones 1 and 2 where the amount of salt mobilised from irrigated land is much less. The AUL cap in Low Impact Zones 3 and 4 will be

a ‘rolling’ cap, which can be adjusted upwards to allow for further irrigation development when Victoria obtains additional salinity credits through its ongoing programs. This ‘rolling’ cap approach is different to the ‘absolute’ cap in the High Impact Zone. Maps of the salinity impact zones are available at www.waterregister.vic.gov.au.

Although salinity impact zoning is only applied in Sunraysia, there are other areas in the Northern Region where irrigation has significant salinity impacts. The Department of Sustainability and Environment, in partnership with catchment management authorities and water corporations, will investigate the possible role of salinity impact zones in these locations. One benefit of extending the zoning approach would be to allow for salinity impacts to be recognised in a systematic manner in areas where water has been traded out or may be traded out in the future.

Action 6.4: Capping salinity impacts

Who: Department of Sustainability and Environment; catchment management authorities; rural water corporations

Timeframe: 2010

To maintain a robust, practical and affordable process to manage salinity on farms across northern Victoria, Victoria will:

- establish a rolling cap on total annual use limit volume in Low Impact Zones 3 and 4 in the Sunraysia region
- investigate the need to expand the salinity impact zones to areas upstream of Nyah
- continue to investigate further refinements in the management of salinity impact zones, such as the ability to trade annual use limits.



Salt tree, Karadoc Swamp

Photographer: Bob Meriin, Mallee Catchment Management Authority

6.3.3 Drainage programs

The Victorian Government has long undertaken irrigation drainage schemes, which involve surface or sub-surface water management to mitigate irrigation-induced salinity and water logging. In the Goulburn Murray Irrigation District, there is a memorandum of understanding between the Department of Sustainability and Environment, Goulburn-Murray Water, the Environmental Protection Authority Victoria and the North Central and Goulburn Broken Catchment Management Authorities to coordinate the management of irrigation drainage water to improve water quality.

Under the BSMS, if drainage works have a significant impact on land and water salinity, they must be accounted for. However several factors are reducing irrigation drainage volumes, including:

- reduced rainfall due to climate change and drought
- improved farm irrigation practices and water use efficiency
- irrigation supply system modernisation
- increased use of shallow groundwater as an alternative water source.

The Victorian Government is currently reviewing Victoria's irrigation drainage program to understand how these changes will alter the requirements for drainage investment.

Policy 6.3: Continuing support for the Sustainable Irrigation Program

The Victorian Government is committed to maintaining its current investment in the Sustainable Irrigation Program in recognition of the role the program will play in:

- linking farm and catchment focused engagement, extension and works programs (including the Commonwealth Government's \$300 million program for on-farm works) to distribution system modernisation (see page 117)
- implementing recommendations from the Basin Salinity Management Strategy mid-term review (see page 123)
- leading Victoria's input to the water quality and salinity elements of the Basin Plan (see page 123)
- implementing recommendations from the review of Victoria's irrigation drainage program.