Sunraysia Modernisation Project

FINAL REPORT

Australian Government

VICTORIA State Government

LOWER MURRAY WATER

SMP Sunraysia Modernisation Project

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Acronyms

DELWP	Victorian Dept of Environment, Land, Water and Planning
GL	Gigalitres
Ha	Hectares
LMW	Lower Murray Water
ML	Megalitres
SMP	Sunraysia Modernisation Project

Main Cover: Red Cliffs Pipeline - 2m diameter pipe placed alongside alignment prior to installation.

Below: Mildura District's upgraded Central Pump Station.

EXECUTIVE SUMMARY

The $120 million Sunraysia Modernisation Project (SMP) was successfully completed in August 2016, delivering 50 per cent more benefits than originally expected. Today more than 1,300 customers across 8,600 hectares have access to a 365-day water supply within the Merbein, Red Cliffs and Mildura irrigation districts.

The Sunraysia region is already seeing the benefits created by the project; with renewed growth in irrigation development, greater water pumping efficiencies, improved water quality on-farm and modern infrastructure that supports crop diversity. By replacing open channels with pipeline, installing modern metering systems and automating remaining channels, the project has achieved 7.794 gigalitres (GL) of long term average annual water savings, exceeding the 7.0GL initially estimated in the business case.

SMP's effective project delivery methods won the Victorian Project Innovation Award in 2015, with the overall project completed on time and within budget.

PROJECT BACKGROUND

On 3 July 2008, the Commonwealth and the Basin States signed an Intergovernmental Agreement on Murray- Darling Basin Reform. The reform assisted Basin States to undertake projects that would improve water use efficiency and sustainable rural water use in the Murray-Darling Basin.

A final business case was submitted to the Commonwealth in June 2013 that aimed to deliver significant changes in the way that irrigation water was delivered within the three pumped irrigation districts, Merbein, Red Cliffs and Mildura. These changes would generate water savings for the environment, while supporting more diverse and profitable farming practices and businesses.

On 19 December 2013, the Project Schedule was signed between the Commonwealth and Victorian Government that provided approximately $120 million of funding and a delivery timetable to achieve benefits to the environment, irrigators and broader community.

Commonwealth funding of $103 million was provided from the Sustainable Rural Water Use and Infrastructure Program, with Victoria funding the remaining $17 million from the Capital Works budget at Lower Murray Water (LMW).

The geographical scope of the Sunraysia Modernisation Project encompasses the Mildura, Red Cliffs and Merbein irrigation districts. Over 120 years of irrigation has transformed the landscape, with water supplied to nearly 2,000 customers across 25,000 hectares of agricultural land. Today the region contributes significantly to Australia's dried fruit, wine grape, citrus and table grape production.

The Millennium drought resulted in widespread 'drying off' of land across the irrigation districts, having negative flow on impact to the regional economy. Despite some signs of recovery in the region, modernisation of the irrigation delivery system was required to enable the region to remain competitive and embrace emerging agricultural opportunities.

In response, the SMP business case outlined:

- construction of underground pipes to replace open water channels;
- upgrade of pump stations to provide a range of flows with more efficient energy use;
- removal of infrastructure no longer in use;
- automation of the remaining channels; and
- installation of modern irrigation and domestic and stock metering.

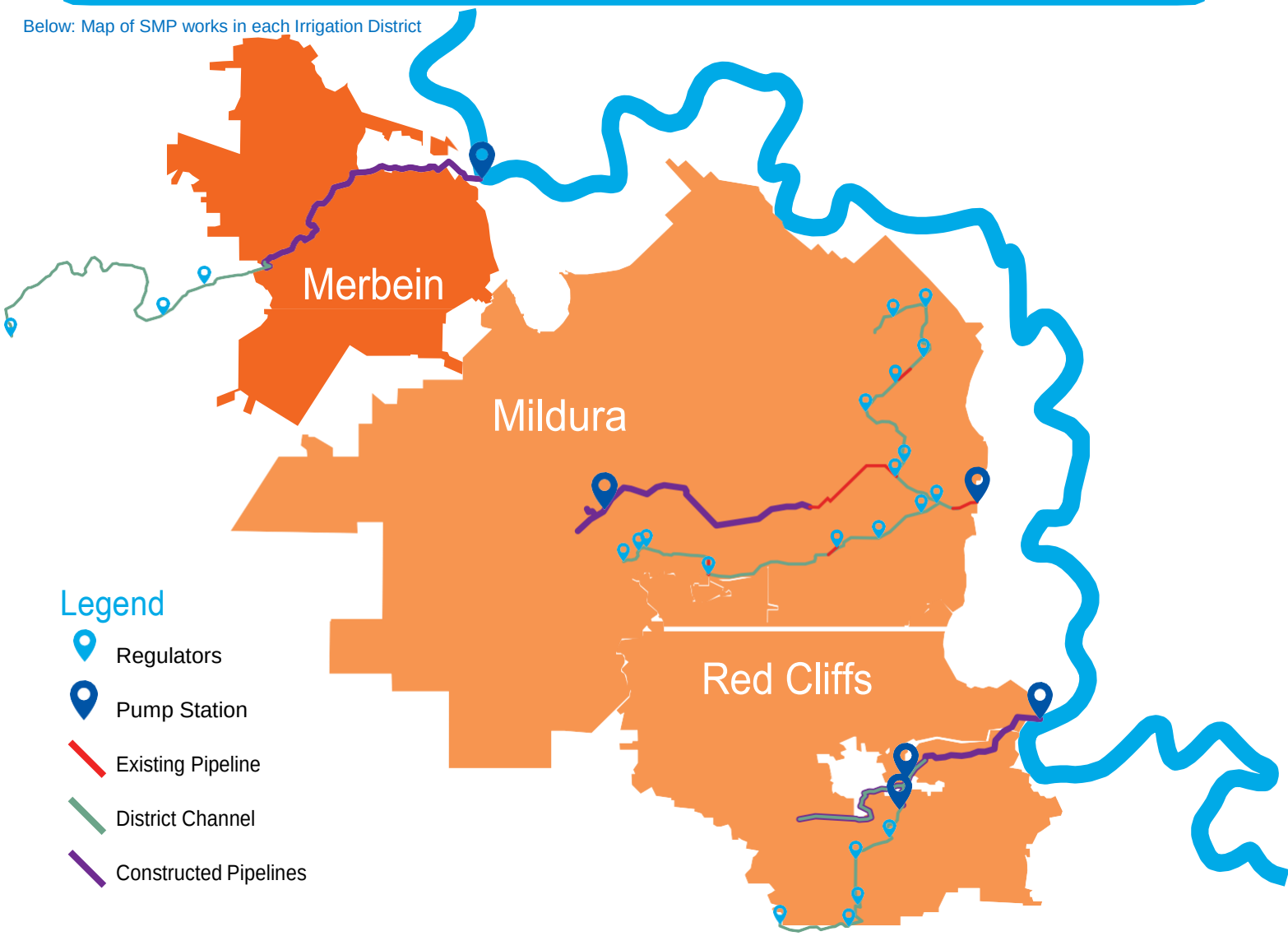
Below: Pipe bend installation on the Merbein Pipeline

OBJECTIVES

The SMP objectives were developed to ensure that the project delivered outcomes consistent with the National Water Partnership Agreement and Commonwealth criteria for investment.

Objective	Mechanism	Outcome
To provide 365 day access to irrigation water via the water ordering system for as many customers as possible.	Replace key sections of channels with pipelines; modernise key pump stations and automation of channels.	Potential to diversify land use and crop types by extending watering of late summer crops, continuous irrigation of crops and winter specific cropping.
Improve water quality and irrigation application rates for as many customers as possible.	Replace key sections of channels with pipelines.	Improve on-farm water efficiency and production rates; improve irrigation supply rates over some areas and remove existing supply constraints; improve public safety and community amenity.
Generate 7.0GL of water savings.	Replace key sections of channel with pipelines and install modern, accurate metering systems to all irrigation and domestic and stock customers.	Realise savings from water that was either lost or unaccounted for through the delivery system.

Below: Map of SMP works in each Irrigation District



DELIVERY

Above: Members of the Project Control Group during Project Director handover. From Left to Right: Member Philip Endley, Independent Chair Dane Huxley, Project Director Mike Walsh handing over the Project Directorship to Frank Fisseler.

Governance

Multiple parties were involved in the delivery of SMP, requiring clear roles and accountabilities to ensure the project was successfully implemented.

The Commonwealth was a key investor in SMP and set out clear project delivery milestones and reporting requirements in the SMP agreements between the Commonwealth and the Victorian Department of Environment, Land, Water and Planning (DELWP) as the State Government's representative. Victoria established a back to back funding agreement with LMW, the owner and operator of the existing rural water infrastructure in the region, to deliver the project.

Key SMP governance groups included:

An established **Agency Liaison Group** to ensure key stakeholders were kept informed of project developments and progress, and to resolve any high-level matters.

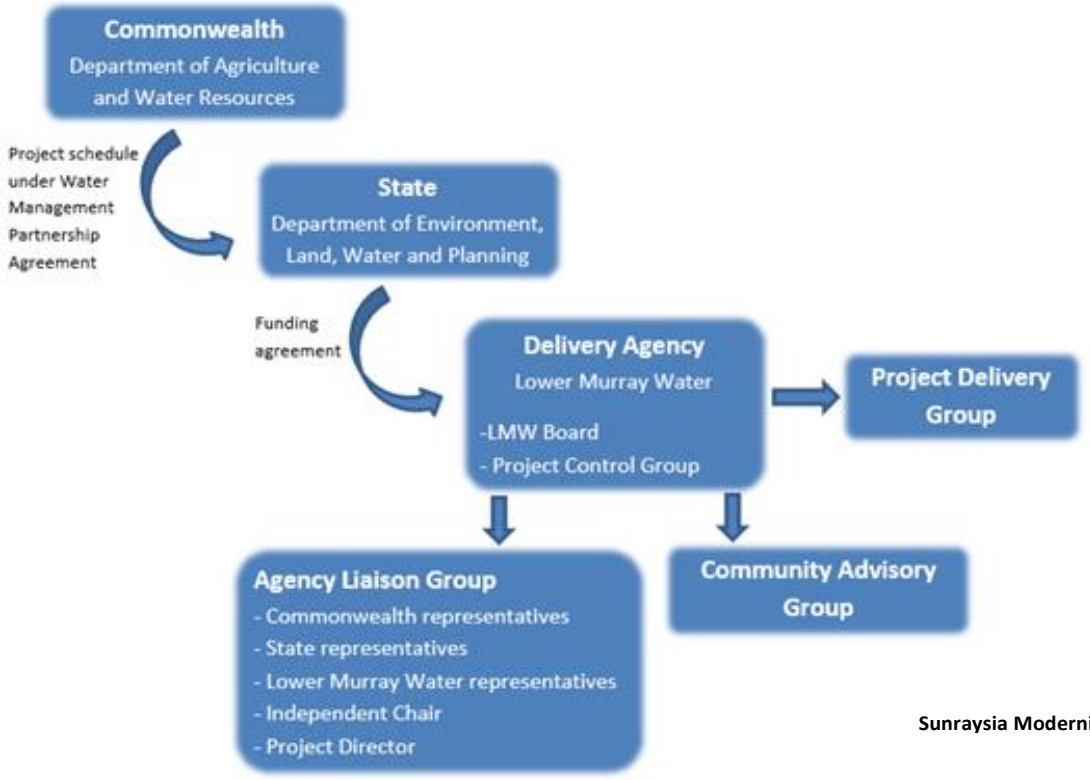
A **Community Advisory Group** to coordinate community involvement in the project consultation process, representing community views and monitoring to ensure the project met community needs.

A **Project Control Group**, headed up by an Independent Chair, with the overall responsibility for the project and primary responsibility to the LMW Board.

A dedicated **Project Delivery Group**, led by the Project Director delivered the project. The team consisted of a mixture of LMW employees, experienced contractors and specialised consultants.

This unique governance structure provided an effective mechanism to build stakeholder understanding and support for the project during periods of rapid progress.

Below: SMP Governance structure



Project Achievements

An innovative delivery model allowed the SMP benefits to be increased by 50 percent more than originally proposed, maintaining the target delivery date and staying within the original project budget. In 2015, SMP won the Australian Water Association Project Innovation Award.

Summary of works completed:

Length of pipeline constructed:	20 km
Length of open channel removed:	23 km
Number of pump stations constructed or upgraded	9 pump stations
Number of meters installed	4,568 meters
Number of channel regulators installed	19 regulators
Number of outlets connected to 365-day water supply	1,334 outlets
Volume of water saved:	7.794 GL

Above: Decommissioned section of channel has now become a community walking track.

Project Budget

Actual project expenditure totaled $117,016,669, which is approximately 2 percent below budget. SMP has exceeded the project targets and delivered value for money. The following table details the breakdown of the various works:

SCOPE	ACTUALS (GST EXC)
MILDURA	**$35,392,491**
PUMP STATION UPGRADES AND CHANNEL AUTOMATION	$9,776,003
PIPELINING	$16,760,161
METERING	$8,856,327
RED CLIFFS	**$39,553,951**
PUMP STATION UPGRADES AND CHANNEL AUTOMATION	$8,864,891
PIPELINING	$25,467,022
METERING	$5,222,038
MERBEIN	**$34,790,046**
PUMP STATION UPGRADES AND CHANNEL AUTOMATION	$10,965,812
PIPELINING	$18,705,509
METERING	$5,118,725
OTHER COSTS	$7,280,181
TOTAL	**$117,016,669**
BUDGET	$119,825,030

SMP INVESTOR	FUNDING (GST EXC)
AUSTRALIAN GOVERNMENT	$100,147,212
LOWER MURRAY WATER	$16,869,457

BENEFITS

SMP was designed to enhance productivity in the region and to provide a modernised system capable of meeting the needs of current and future irrigation businesses.

The project delivered a range of quantifiable benefits to local farming businesses and the local community, to LMW in the operation and maintenance of the system as well as to the environment of the Murray-Darling Basin.

The original business case for SMP targeted delivering 365-day irrigation access in Sunraysia to 885 irrigation outlets, which equated to 5,801 ha or 49 per cent of irrigation outlets in Sunraysia. The project delivery model allowed significant enhancements to Red Cliffs and Mildura areas that increased this outcome significantly.

> ***The final SMP scope delivered 365-day improved irrigation and access to 1,334 irrigation outlets, 8,652 hectares or 66.3% of irrigation outlets in Sunraysia***

Local employment

As part of their appointment, contractors undertaking SMP committed to engaging local sub-contractors where possible. In the construction phase, more than 50 Mildura district sub-contractors and firms were engaged in all aspects of service provision for the project such as environmental, planning and community consultancy, traffic management, site cleanup, waste management, excavation, plumbing, welding, engineering, concreting, electrical and cabling work.

Other Sunraysia organisations and individuals also benefitted by providing services like site storage, accommodation, meals and transport.

Investment in the future

SMP is providing opportunities for growers to become more water efficient and diversify their farm businesses. There are also opportunities for new investment in horticulture across the Sunraysia region, including the recently announced investment in the Sunraysia Modernisation Project 2.

To maximise the benefits flowing from SMP, the Sunraysia Rejuvenation Project was established in a partnership between LMW, DELWP, Regional Development Victoria, Mallee Catchment Management Authority, Mildura Development Corporation and Mildura Rural City Council. The Sunraysia Rejuvenation Project supports the redevelopment of currently dried off properties within the irrigation districts.

> ***SMP created an estimated 180 jobs during the life of the project, and in the longer term, many more through improved productivity, diversity and innovation in the horticultural industry.***

This Page: Inside a 2 m diameter pipe during installation

Issue (pre-SMP)	Description of Issue (pre-SMP)	SMP Outcome	Project Benefit (post-SMP)
Restricted access to winter irrigation	The backbone open channel delivery system required winter shut-down between May and August for maintenance. Restricted access to water during winter limited the establishment of crop types such as winter vegetables that require on-demand irrigation over this period and reduced the potential yield of table grapes that required extended irrigation periods into late autumn and eliminated frost control for citrus and avocados.	The Project enabled year-round irrigation access to over 1,300 customers and over 8,600ha across the three districts. It is estimated this will result in an increase in the area irrigated by over 1,500 ha over the next 5 years. Customers downstream of the pipelines receive increased access to winter supply due to a reduction in channel maintenance times and therefore system shutdown.	• Increased number of customers able to irrigate at peak times • Increased number of customers with 365-day access • Change in crop mix i.e. increased crop diversity enabling the region to be more resilient to commodity price fluctuations and water use requirements.
Poor water quality	The open channel system received large amounts of wind-blown debris, blocking on-farm filtration systems and pumps. This required significant attention to clear, resulting in time and cost to irrigation businesses.	The water quality issues relating to sediment, weeds, algae and wind-blown contaminants have been eliminated for customers serviced through the pipelines. This directly benefits over 1,300 customers over an area of 8,600ha. The improved water quality results in less time and money for farmers in cleaning and servicing filters and pumps in their on-farm irrigation systems.	• On-farm cost savings from improved filtration, making irrigators more competitive on the global market
Inefficient and out-dated pumps	The fixed speed pumps could not match the range of flows required in the system, resulting in high energy costs and flow rates that mismatched farm delivery requirements. Some pump stations were at risk of shut down, with the potential for production losses and crop failures to irrigators.	The upgrade of pump stations and replacement channel at the highest risk of failure reduces the incidence of system shut down and potential loss of production and crop failure. It is estimated that this will result in an additional 400 ha of irrigated production over the next 5 years in those areas of the system continued to be supplied through open channels.	• Increased area of land re-entering production / reduction in dried off areas • Increased crop diversity • Reduced frequency of system shutdown • Lower energy consumption and related costs for LMW
Inaccurate measurement, monitoring and information	Many irrigation outlets were not fitted with accurate meters and some Domestic and Stock outlets were not metered at all, resulting in meter errors across the districts. No real-time recording of water use information made it difficult for LMW to monitor and manage water delivery and for landholders to maximise the efficiency of their water use.	Administrative cost savings through billing efficiency and management of water usage data. Reduction in meter read errors and efficiency in water trading transactions has been achieved through the installation and upgrade of modernised meters. Real time and accurate water use data allows LMW to more closely monitor and manage water delivery through the system, identify any unmetered usage or meter errors and provide more efficient billing processes to customers. Accurate measurement and reading of meters is consistent with the National Water Initiative.	• 2,139 irrigation meters installed or upgraded including telemetry • 2,459 domestic and stock meters upgraded • Customers able to monitor and manage water use

Issue (pre-SMP)	Description of Issue (pre-SMP)	SMP Outcome	Project Benefit (post-SMP)
Land remains vacant and unproductive	For farming businesses to remain competitive and viable, it is desirable to expand their irrigated production or establish new farming businesses in the districts, with a level of service comparable to that available to private diversion schemes and adjacent irrigation districts. Access to a year-round irrigation supply and water quality were two important areas of service level improvement that allow farming businesses to establish and grow a more diverse and profitable range of crops and reduce on-farm costs.	Year-round water access for over 8,600ha has enabled some of the unproductive land to be rejuvenated. As such LMW together with the Mildura Development Corporation engaged a Rejuvenation Project Officer to assist customers wishing to bring land back into production. The Sunraysia Rejuvenation Project finished in June 2018.	• Increased area of land re-entering production / reduction in dried off areas • Change in crop mix i.e. increased crop diversity. • Increased number of customers able to irrigate at peak times • Increased number of customers with 365-day access
Public safety and OH&S risk	The open channel system ran through urban areas, presenting a significant public risk of drowning and injury. The previous aging pump station infrastructure and open channel infrastructure presented WH&S risks to LMW operations staff.	The risk of drowning and injury to the community was effectively reduced with the replacement of 5.4km of open channel that ran through residential areas of Merbein and Red Cliffs with pipelines. Appropriate safety measures have been installed in new infrastructure.	• Reduced frequency of system shut down • Reduced risk of drowning or injury to community
Catastrophic failure	Catastrophic failure of the irrigation system could result in reduced crop yields, lost income or in the worst case, crop death and failure. Areas of raised channels in Red Cliffs and smaller areas in Mildura presented a risk of breaching, leading to localised flooding potentially having broader effects on the region through system shut down.	The upgrade of pump stations and replacement of high risk lengths of channel with pipelines reduce the risk of system failure and breakdown.	• Reduced frequency of system shutdown
Important environmental assets stranded	The Cardross Lakes and Woorlong Wetlands adjacent to the irrigation districts were without a year round water supply, reducing their value as habitat and minimising opportunities for optimal timing of environmental watering events.	Creating a delivery outlet has enhanced effective environmental watering opportunities in Cardross Lakes, assists in the management of water quality to protect endangered aquatic species. In the Woorlong Wetlands, the impacts of salinisation are reduced improving the health of wetland communities.	Improved health of wetland communities
Declining health of the Murray-Darling Basin	The Victorian Government has water recovery targets under the Murray-Darling Basin Plan to deliver water for environmental purposes.	The project exceeded its target, generating 7.794GL of water savings. This contributes to Victoria's overall water recovery target under the Murray-Darling Basin Plan.	• Water available for environmental flows

Long Term SMP Outcomes

The major economic and environmental outcomes from the project will not be measurable for some time as changes in agricultural practices and ecological health take effect over the long term. What has occurred is that 7.794 GL of water recovered from the project (Long Term Average Annual Yield) has been issued to the environment without impacting the amount of water that is available to irrigators at their farm gate. This is expected to improve river health in the long term without adversely impacting the economic sustainability of the irrigation community. There are several early indicators that these long-term outcomes will be realised. For example:

- irrigation customers can now plan and monitor their water needs using a range of smart irrigation management tools to maximise water efficiency. This is particularly important as irrigators continue to operate in recent extreme dry conditions.
- in Lower Murray Water's 2018 customer survey, 14% of rural customers planned to expand or redevelop their property in the next 1-2 years.
- supporting the long-term watering regime for the Cardross and Koorlong Lakes to maintain and improve Murray hardyhead populations and the Ruppia aquatic habitat that supports them. Environmental water continues to be delivered to Cardross Lake since SMP was completed.

CASE STUDIES

Renewed Confidence

The Lloyd family have been farming in the Mildura Irrigation District since 1890. During the Millennium drought, the Lloyds were forced to dry off around 15 per cent of their farms due to low water availability and unsustainably high temporary trade prices.

SMP has resulting in renewed confidence by providing reliable water at an affordance price.
The Lloyd family are using this renewed confidence and are in the process of bringing the dried off areas of their farms back into production over the next 5 years.

Above: Contrast between areas of productive and dried off land on the Lloyd farms

Improved Water Quality

Merbein irrigators are experiencing measurable benefits from the improved water quality offered by the new pipelines installed under SMP. Irrigator Richard Wells states that water supplied from the open channels was unpredictable in quality and was often influenced by air borne pollutants in addition to algae, yabbies and weeds.

Previously, Mr Wells would back flush his filtration system a total of up to 18 minutes per hour when irrigating. Since SMP's pipeline construction, Mr Wells has reduced back flushing to just 3 minutes per hour while irrigating, leading to overall improvements in water and energy use efficiency.

Above: Blocked filters and damage to on-farm pumps

New Crop Opportunities

SMP is now providing irrigators the opportunity to expand on the traditional summer dominated irrigated crop types, as well as attracting new investment from outside the region. Irrigators have noticed measurable benefits from the improved water quality offered by the new pipelines installed under SMP.

P&T Marciano are a large table grape grower from the Mildura district with business operations now spanning the country. A desire to expand their local operations has previously been constrained by concerns over the reliability of the system, water quality issues and limited access to supply outside the traditional summer irrigation season. With access to 365-day water supply and renewed "faith in the system", P&T Marciano now have the option of using plastic covering and glass housing to diversify in the Mildura district.

Other growers in the irrigation districts have also indicated their intention to consider alternative crop types and varieties. Growers in Merbein have already established new areas of pistachio and almond trees and intend to expand these areas in coming seasons.

Above: Pistachio plantation in the Merbein district

KEY ACTIVITIES

Activity Timeline

The following table details the progression of activities for SMP:

Transfer of 3GL of Water Savings to Commonwealth	March 2014
Upgrading work completed on Red Cliffs and Mildura Pumping Stations	Sept 2014
LMW announces enhancements to Mildura (KT Pipeline)	Sept 2014
Merbein Channel – Yellow Duck Race held	Jan 2015
LMW announces enhancements to Red Cliffs (CD Pipeline)	May 2015
Transfer of 3 GL of Water Savings to Commonwealth	June 2015
Transfer of 1 GL of Water Savings to Commonwealth	Oct 2015
Project Innovation Award (Australian Water Association - Victoria)	Dec 2015
Merbein Pump Station complete Merbein Pipeline complete Red Cliffs Pipeline complete All Metering Works complete All Channel Regulators complete	June 2016
KT Pipeline complete CD Pipeline complete	Aug 2016
Red Cliffs Channel - Red Duck Race held	Aug 2016
Official opening of SMP	Sept 2016

Below: Benetook Pump Station had a significant upgrade including additional low flow capability.

Above: Red Cliffs "Red Duck" Race in action

COMMUNICATION AND STAKEHOLDER ENGAGEMENT

During the development of the business case and construction, extensive consultation was carried out with growers, businesses and the community. Grower forums, information sessions and presentations occurred via YouTube clips, website content, social media campaigns and direct emails and text message services.

During the project delivery phase, customers were kept up to date on a regular basis via face-to-face meetings, newsletters, emails and media releases.

Project highlights included Duck Races in channels, the Merbein Irrigation Historic Precinct and SMP information clips.

Merbein and Red Cliffs Little Duck Races

In January 2015 the Merbein Duck Race was held with over 2,000 spectators watching 1,500 ducks race along the soon-to-be decommissioned channel. In August 2016 the Red Cliffs Little Red Duck Race was held which also had a huge response from the community. Proceeds from both races were given to each town for future community projects and events.

Merbein Historic Pump Monument

The historical pump three from the Merbein Pump Station was relocated to the Park Reserve located at the top of pump hill in the entrance to the township of Merbein.

A public space has been established for the community to enjoy and view the 100-year old pump decommissioned as part of SMP. A section of the channel has also been retained to show how water was delivered to growers.

SMP Information clips

Nine SMP information clips were created to capture the works on film and the decommissioning process of the channels to ensure future generations can understand the transformation of the irrigation system to modern requirements. The clips were released via social media on YouTube and Facebook achieving excellent coverage with each clip averaging a reach of over 20,000 people. Many positive comments were received via the social media platforms.

Below: The 100-year-old pump now proudly stands at the entrance to Merbein

Above: Merbein Community have enthusiastically decorated the "Cluster Boxes" with murals

CHALLENGES AND LEARNINGS

SMP experienced several challenges which were overcome and became learnings for this and future projects:

- Contracting a large amount of work in a short space of time required processes and procedures to be standardised, while having the flexibility to adapt to changes as issues evolved.
- The new infrastructure constructed by SMP has changed the operation of existing infrastructure owned by LMW. In particular, automation of the channel's regulators required significant training and refinement between the initial commissioning and its automatic operation during peak irrigation supply.
- Crossover between different components of work required consideration and management. Particularly, the extension works to the Red Cliffs Pipeline required careful planning to allow a seamless transition from one contractor's works to another contractor's works. Clearly defining the responsibilities and scope of each contractor's works was essential.
- Commissioning and handover of infrastructure while still maintaining an irrigation supply required significant planning, resources (both within the SMP team and LMW) and two-way communication with the customer base.

Water availability continues to be a challenge to irrigators facing a drier climate and reduced volumes of water available for consumption across the Murray-Darling Basin. The Victorian Government and LMW play an important part in enabling growers to make informed business decisions, supported by a modernised water delivery system.

Above: On 21 September 2016, SMP was officially opened by the Assistant Minister to the Deputy Prime Minister the Hon Luke Hartsuyker, assisted by the Federal Member for Mallee the Hon Andrew Broad and LMW Chair John Tesoriero.

CONCLUSION

SMP has been unprecedented in its successful delivery. The project was completed within budget and time, while achieving significantly more benefits than originally expected. The amount of open channel replaced with pipeline was more than doubled from the initial scope, resulting in an additional 450 irrigation outlets from the Sunraysia Irrigation District having access to 365-days per year water supply.

Areas of success for SMP includes:

- The project governance structure being used across other regional Victorian projects;
- Procurement methods commended by industry;
- Employment across Sunraysia increased, with many sub-contractors learning valuable knowledge and skills;
- Significant investment occurring in irrigation properties that were not in production prior to the commencement of SMP;
- Crop diversification underway, with many irrigators now having the certainty of water throughout the year to grow new crop types or varieties;
- Community involvement in celebrating their history via Duck Race events, mosaic artwork and monuments, with the backfilled channels creating valuable public spaces for the future;
- Successful environmental outcomes with the project resulting in significant benefits to ecologically important wetlands and water savings contributing to the Murray-Darling Basin Plan;
- Targeted use of digital media such as YouTube clips and drones to provide engaging information to the community; and
- Full completion of the project under budget.

SMP has created an opportunity for the Sunraysia region to renew, grow and diversify. In May 2018, the Commonwealth Government announced its investment in the Sunraysia Modernisation Project 2, through the National Water Infrastructure Development Program which completed capital construction in October 2019. SMP2 has built on the current system's delivery capacity to meet market demand to develop agriculture adjacent to the Red Cliffs and Merbein irrigation districts, utilising capacity in the existing SMP infrastructure.

Below: Commencement of the CD Pipeline Enhancement Works

This Page: Row of mechanical valves part of the Merbein Pipeline

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LOWER MURRAY WATER

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