Shepparton Irrigation Region Land and Water Management Plan 2050

Australia's Leading Irrigation Region: **Planet, People, Production**

GOULBURN BROKEN CATCHMENT MANAGEMENT AUTHORITY

VICTORIA State Government

Shepparton Irrigation Region

Acknowledgments

The SIRLWMP 2050 was guided by the Shepparton Irrigation Region People and Planning Integration Committee (SIRPPIC) and overseen by a steering committee. SIRPPIC members are Kelvin Bruce (chair), Alfred Heuperman, Barry Croke, Heather du Vallon, John Laing, Kevin L'Huillier, Peter Hacon, Stuart Young, Lachlan Barnes and Dan Walker.

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The Goulburn Broken CMA acknowledges the First Nations people of the land in the Goulburn Broken Catchment and strongly respects the rich culture and intrinsic connection First Nations people have to the land.

Contents

Foreword

The Shepparton Irrigation Region (SIR) is a unique area of northern Victoria that has a long and celebrated history of sustainable irrigated agriculture.

For more than 30 years, the Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) has guided the efforts of landholders, regional organisations and governments to protect and enhance the land and water resources of the region.

Told through the voices and actions of its stakeholders, the Plan is an account of the region's history, identity and potential. It is a vision for a sustainable and prosperous region that balances the needs and aspirations of its people and environment. By any measure, the SIRLWMP has been a remarkable success story.

The Plan has been central to the reduction of salinity, improved water quality, the restoration of native vegetation and improved farm and regional viability. But despite all that had been achieved there is still plenty to do.

The SIR continues to embrace the opportunities that come from challenges such as climate change, water scarcity, market volatility, social change and environmental degradation. For example the new drainage approach is about restoring natural flow paths back into the landscape. These adaptive and innovative responses that build on the achievements and lessons from the past help the region transition to a better future.

The SIRLWMP 2050 is the result of extensive consultation with stakeholders from across the region. We have listened carefully to the concerns and ideas from farmers, environmentalists and community members and we have incorporated their feedback into the Plan. There are some new directions in this plan as well as improving and adapting what we have been doing.

Aligned with the United Nation's Sustainable Development Goals and using a resilience approach the SIRLWMP 2050 aims to capture and communicate the region's uniqueness and complexity. Both bold and cautious, the Plan is a tribute to the wisdom of those committed to preserving and improving the region's land and water.

The SIRLWMP 2050 remains an open invitation to jump on board the journey of the SIR, to celebrate its achievements, to embrace its challenges and contribute to its future.

Kelvin Bruce
Chair SIRPPIC

Carl Walters
Sustainable Landscapes Manager GBCMA

First Nations

Acknowledgement of Country

Goulburn Broken Catchment Management Authority (GBCMA) and its partners acknowledge and respect Aboriginal peoples and culture. We pay our respects to Elders past and present and extend that respect to other Aboriginal and Torres Strait Islanders people who live and work in the Shepparton Irrigation Region. We particularly acknowledge the Yorta Yorta, Taungurung and Dja Dja Wurrung as the First Nations people of the land and waters that encompass the Shepparton Irrigation Region. We recognise and respect each Nation's deep connection with Country and value their ongoing care and protection for Country across thousands of generations.

We recognise the primacy of First Nations' obligations, rights and responsibilities to use and care for Country. We value our journey with Yorta Yorta Nation Aboriginal Corporation, Taungurung Land and Waters Council and Dja Dja Wurrung Aboriginal Clans Corporation as we walk and work together to support communities and heal Country.

We support the Yorta Yorta Whole-of-Country Plan (2021-2030), the Taungurung Country Plan (2016) and the Dhelkunya Dja – Dja Dja Wurrung Country Plan (2014-2034) and recognise that upholding these Plans and associated plans will support self-determination, as well as healing and management of Country.

Statement by

Yorta Yorta Nation Aboriginal Corporation

Yorta Yorta Country radiates out from the Murray River on both sides in all compass directions, roughly from Cohuna in the west to just outside Albury/Wodonga in the east to a northerly point in NSW approximately 20-30 km past Finley and extends south into Victoria just short of Nagambie. Yorta Yorta region includes the lower Goulburn River and towns such as Echuca, Cohuna, Shepparton, Benalla, Corowa, Wangaratta, Glenrowan, Rutherglen, Chiltern, Wahgunyah, Thoona and Violet Town.

The people of the Yorta Yorta Nation are comprised of eight different clan groups, where the Yorta Yorta language is spoken by all the Yorta Yorta clans, including the Kailtheban, Wollithiga, Moira, Ulupna, Bangerang, Kwat Kwat, Yalaba Yalaba and Ngurai-illiam-wurrung clans.

The Yorta Yorta Nation is comprised of peoples with undeniable bloodlines to the Original Ancestors of the Land of the Yorta Yorta Nation. These bloodlines link our past, present and future to one another, with traditional laws, customs, beliefs and sovereignty intact.

We have continued to exercise our natural rights as the indigenous occupants and owners of Country. Our social, spiritual, economic and cultural links with the area have never been broken. In other words, our relationship with our Country has continued since time immemorial.

The survival of the ancestral lands, waters and all its children are equally important for the continuity of the Yorta Yorta timeless connection with our inherent right. For us – the land has a spiritual connection; it's our mother. The human spirit is born from our land and creator and returns to it upon death. The land supplies us with everything that we need for living. We must look after it, so that it looks after us in return.

Statement by

Taungurung Land and Waters Council

The Taungurung are the first peoples of the rivers and mountains. Our Country is bounded by the Great Dividing Range to the east and south, the Campaspe River to the west and by the Ovens River and a series of flats and wetlands in the North. Our People have never ceded our intrinsic rights and obligations to care for Country, Culture and People.

Waring – the mid-Goulburn River – is the lifeblood of Taungurung Country. It heals and nurtures us and has sustained our people for thousands of years. Waring flows through Country, watering our places of ceremony and bringing life to all. It is our living connection with our ancestors and Country, and the spirit of the Taungurung people. When our Country is sick, we are sick. When our Country is healthy, we become healthy.

Waring also brings the water that flows down into the channels of Shepparton Irrigation Region and allows present day communities to thrive. But how this water is used – how much, and when - affects the health of Waring and of Taungurung Country and people. While Waring still flows upside down – high in summer, low in winter – through the careless reduction of it to just a channel to supply irrigation - Taungurung Country and people will continue to suffer.

Taungurung have a deeply held cultural obligation to care for Waring to return the care with which she has nourished us for thousands of generations. Our clans had responsibilities for the care and protection of each other, their culture and Country, including food and water sources. Our Ancestors had an intimate knowledge of their environment and were able to sustain the ecology of each region.

They used food and other resources to lead healthy and productive lives, without over-exploiting any resource.

We ask all those who walk on Country with us to recognise that they also share in this obligation. Economic activity on Taungurung Country or that affects it, should do no harm to Country and should enhance the abundance it provides so that all beings on Country may flourish and thrive. It should be restorative or regenerative in nature and focus on economic progress as a parallel process to responsibility for Country, resource management, active management, and the long-term health of Country.

We have a long way to go to restore Country to health. We can only do so one step at a time, and by recognising the interconnectedness between Country and all who inhabit and depend on it. This plan includes some important early steps forward that recognise this interdependence. But more importantly, it points towards the transformations in agricultural practice and the way land and waters are managed needed to ensure an abundant future for all, and for those that come after.

It is the deeply held hope, and heartfelt request, of the Taungurung Land and Waters Council that all those who draw sustenance from Waring and live along her banks, walk alongside us in working to heal the river, and Country. Country is our mother, our flesh and blood. In return for this care, she will care and provide for us as she always has.

1. Summary

The Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) has been an adaptive 30-year journey so far. The implementation of the Plan has been led by community, partners and government. As a result of continued collaboration and implementation of the Plan, the region has healthy landscapes, dynamic and diverse communities and profitable and sustainable agriculture. However, while this Plan has supported our region's successes, the SIR is facing a changing and uncertain future. These changes will present the region with challenges and opportunities that will need to be managed to ensure the future prosperity of the region and ecological resilience.

The SIRLWMP 2050 aims to continue building on the previous Plan and work of communities, partners and governments to ensure the region remains resilient, healthy and productive into the future.

1.1 Vision

The Plan's 2050 vision is:

Australia's Leading Irrigation Region: **Planet, People, Production**

VISION STATEMENT

What do we want the SIR to look like in 2050?

The SIR is Australia's leading irrigation region. It has the best land and water in Australia, looked after by resilient and capable communities.

The region is strong and secure due to enthusiastic and capable leaders, rich First Nations' culture and enduring community and government partnerships. This strength enables effective responses to extreme challenges such as climate change, water policy change and global upheavals.

The collective knowledge of Taungurung, Yorta Yorta, Djaara and western cultures has elevated management of the landscape's iconic ecosystems.

The SIR is recognised internationally for environmental improvement. Native flora and fauna are now thriving with many threatened species returned to healthy numbers in restored habitat on land and in the waterways.

The region continues to benefit from its natural agricultural advantages of fertile soils, secure water for irrigation, abundant sunshine for plant growth and electricity and proximity to markets. The SIR is the most efficient irrigated agriculture in terms of value of produce per megalitre of water and is helping to feed the rest of the world.

The region shares water for its significant wetlands, river and stream ecosystems, irrigated agriculture and other needs. Integrated management of surface and groundwater keeps water tables and water quality at healthy levels for multiple uses.

The SIR and its community are in a strong position to tackle the challenges to 2080.

1.2

Critical Attributes

This Plan focuses on five critical attributes to guide community and agency actions in overcoming environmental, economic and social challenges.

The critical attributes are:

- **Resilient Community**
- **Farm and Regional Prosperity**
- **Water Availability**
- **Biodiversity**
- **Drainage**

1.3

Land and Water Management 101

The Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) is Australia's longest-running natural resource management plan.

It was developed more than 30 years ago to protect and improve the natural environment of the region, including water quality, biodiversity and land health.

The Plan also supports the sustainable development of the irrigation industry, which is vital for the local economy and Australia's food security.

Over the 30-year journey of the SIRLWMP, the Plan has been developed and refined with wide community input and involvement.

This collaborative approach ensures the needs and interests of different stakeholders are considered and respected.

The Plan has been recognised nationally and internationally for its successful implementation of best practices in catchment management.

SIRLWMP 2050 aims to continue implementing a successful plan into the future.

1.4

Plan on a Page

2050 Vision

Australia's Leading Irrigation Region:
Planet, People, Production

2050 Outcomes

Resilient community

A resilient and capable SIR community is forging its own future in a changing landscape.

Farm and regional prosperity

Farms and other enterprises are adaptive, growing and contributing to the environment and the community.

2030 Outcomes

Increased community capacity, stewardship and leadership

- Partners are empowered and resources are attained
- People are engaged in Plan development and delivery
- First Nations' communities and culture are healing
- Communities are socially engaged and connected to nature
- The Plan's integrity remains respected

Increased environmental, social and economic adaptability of farms and other enterprises

- Land and water use is optimised
- Carbon and energy are optimised
- Technology efficiencies are made
- The cyclical economy is advanced with waste being used and reduced
- Farms, regional enterprises and the environment are connected
- Local produce is value-added

Water availability

Water is shared collaboratively between the environment, agriculture and other community needs.

Water in a changing climate is used efficiently and appropriately

- Optimal use of water for agriculture with adverse impacts minimised
- Cultural flow water is managed by First Nations
- Water for the environment is managed for maximum ecological benefits
- On-farm and regional water delivery systems are modern and environmentally appropriate
- Regional water policy is locally decided and influenced (at relevant scale)
- Regional community is informed about water issues and climate impacts and is adaptive

Biodiversity

Biodiversity is thriving and resilient in the face of a changing climate and other impacts.

Increased quality and extent of native vegetation

- 'Net gain' within each local government area is implemented
- Environmental water is appropriately managed for ecosystem health
- Environmental works on private and public land are implemented and valued
- Biodiversity and Country are healing with First Nations
- People are connected with nature
- Bold ideas to achieve change are adopted

Drainage

Water is managed and drained adaptively in all SIR catchments while protecting natural and built assets.

Improved drainage and management of drainage water

- Surface and ground water disposal is coordinated
- Surface and groundwater drainage infrastructure is networked and managed
- The area appropriately surface drained is increased and ground water drainage is adaptive
- Partnerships are formed and maintained with relevant stakeholders
- Community expectations, regulatory standards and MDB salinity requirements are met
- The GMID Drainage Management Strategy is being implemented

2. About SIRLWMP 2050

2.1
Purpose and Scope of this Land and Water Management Plan

The purpose of the Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) 2050 is to continue community, stakeholder and government collaboration to promote integrated management in the region. The Plan aims to help the region become 'Australia's Leading Irrigation Region: Planet, People, Production'. To achieve long-term success, SIRLWMP 2050 outlines how the region will build on past achievements to continue increasing regional capacity and resilience as well as balancing environmental, social and productive needs.

The SIRLWMP 2050 covers all irrigation areas in the Shepparton Irrigation Region (Figure 2.1). It is important to note that while the SIRLWMP 2050 strives to influence the management of water resources, it does not include the operational delivery of water resources. The role of the SIRLWMP is to provide a focus for a range of activities to improve the health of waterways, biodiversity, communities and agriculture.

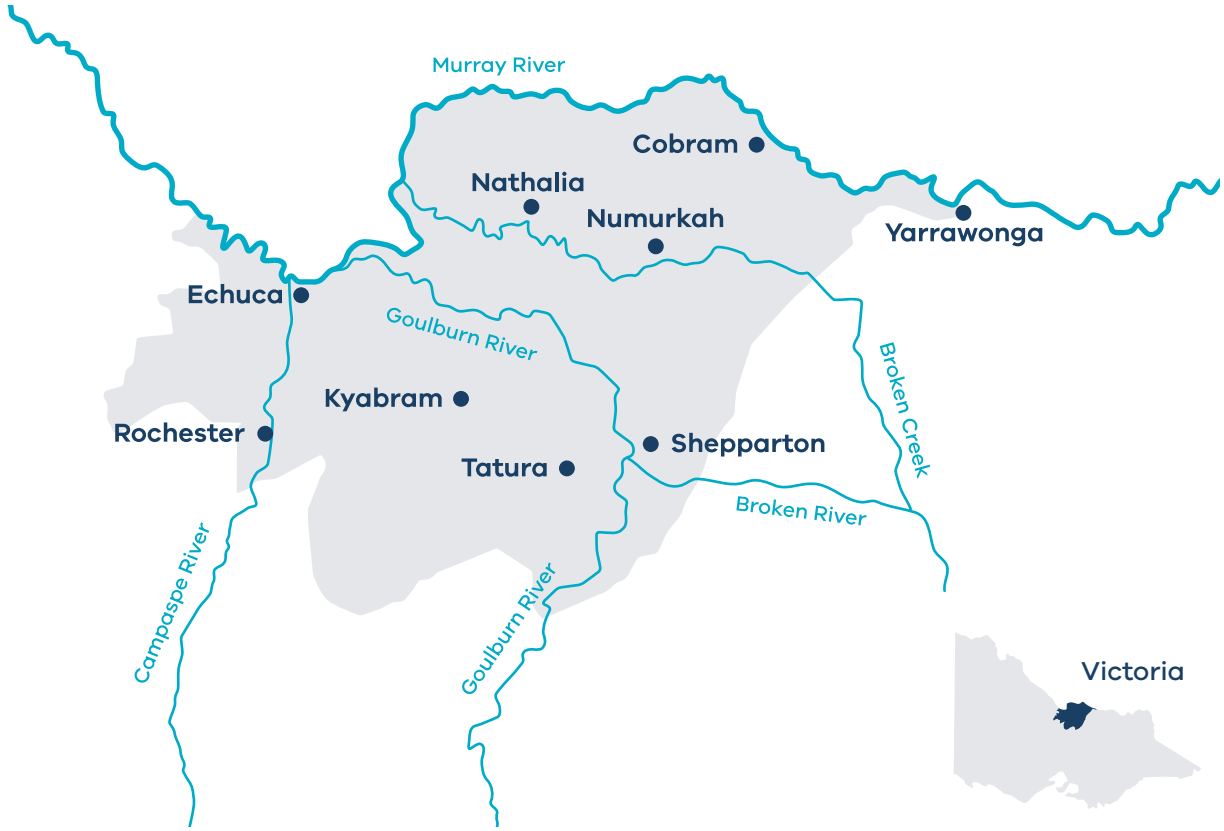
2.2
The Shepparton Irrigation Region

The SIR is located in northern Victoria (Figure 2.1), and makes up the majority of the broader Goulburn Murray Irrigation District (GMID). Known as Australia's 'food bowl', the GMID is the nation's largest irrigation district and produces more fruit and dairy produce than any other region (RMCG [commissioned by Greater Shepparton City Council] 2020).

The SIR covers approximately 500,000 hectares of the GMID, equating to 4.5% of the Murray-Darling Basin (MDB). Victoria's largest river, the Goulburn, meanders through the SIR and Australia's largest river, the Murray, runs about 300 km along its northern border. Other significant rivers in the SIR are the Campaspe and Broken rivers. The SIR is predominantly in the Goulburn Broken CMA boundary, but also includes the Rochester-Campaspe Irrigation Area which is within the North Central CMA boundary.

The SIR is internationally renowned for its high-quality produce and innovative approaches to natural resource management (NRM), making it an environmentally and economically significant area. The region is an inland jewel that continues to attract long-term investment in agriculture, agricultural-related industries, manufacturing, renewable energies, as well as environmental and cultural-based tourism.

Figure 2.1: Shepparton Irrigation Region



The SIR has achieved its outstanding international reputation for NRM due to the diligent work of communities in the region and support from successive governments. For the last 30 years, communities have worked in partnership with government, landholders and stakeholders to address some of the region's most significant environmental concerns. Our communities have overcome challenges such as salinity, water quality, drainage and climatic extremes. Our region's community collaboration with government has seen the region recognised for its profitable and sustainable agriculture, dynamic communities and environmental stewardship. The SIR has the capability for concurrent integration of essential parts of productive systems.

2.2.1

Profitable And Sustainable Agriculture

The SIR is a critically important region for food production in Australia. The region arguably has the 'best land and water resources in Australia' and is defined by its robust irrigated agricultural production which is derived from its highly reliable sources of water for irrigation.

Land used for dairy (including associated land without milking sheds and dairy agistment and fodder) accounted for 52% of the total irrigation water use in the SIR in the 2021-22 irrigation season (GBCMA 2023). Crop (grains, cereals, rice and fodder) production accounted for 24%, while horticulture (including viticulture) made up 10% of water use in 2021-22 (GBCMA 2023). The SIR also contains large areas of dryland cropping and livestock production.

The SIR was founded on a wealth of natural advantages that have supported the increasing irrigated agricultural production. The following regional aspects ensure our irrigated agriculture to be efficient and productive:

- abundant sunshine
- high solar energy availability (for plant growth and electricity generation)
- productive soils and a landscape suited to irrigation
- high proportion of the region is serviced by surface and sub-surface drainage systems, increasing its ability to manage water logging and salinity risks
- a reliable annual supply of clean water to supplement rainfall
- close to water storages
- state-of-the-art gravity-fed (low energy) irrigation-delivery system
- world-class farm infrastructure and management
- a community that is resilient and strives to be the best in land and water management
- close to labour sources.

The SIR is also ideally situated for distribution of agricultural products to south-eastern Australia (RMCG [commissioned by GSCC] 2020). Getting produce to domestic and international markets is relatively easy because the region is:

- a major node of Australia's highway network
- within two hours of seaports and an international airport
- within two hours of Melbourne.

Food production and processing are large contributors to the region's economy (Figure 2.2). The SIR has a strong reputation for quality produce, integrated governance and cutting-edge irrigated food production and food-processing technologies.

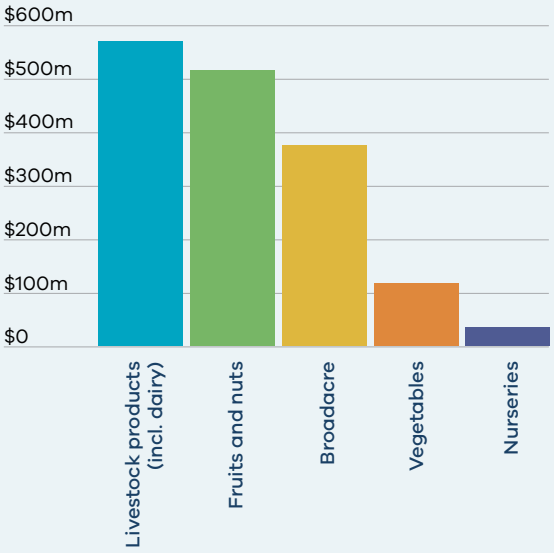
While the region's agricultural industries face many challenges, including domestic and global pressures 'to produce more with less', industry diversity has helped develop the region's resilience to variable domestic and world markets. The SIR must continue to compete to retain its competitive advantage and future prosperity.

Figure 2.2: 2020-21 Shepparton Irrigation Region Agricultural Economy

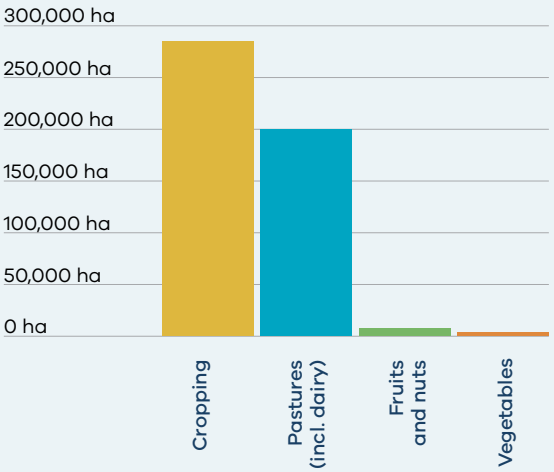
The total area for agricultural production was **500,000 ha**

The total gross value of agriculture was **$2 billion**

The gross value of agricultural commodities in the region were:



Agricultural land use included:



Farmers in the region produced:

$539 million milk and meat

$443 million fruits

$245 million cereals

$129 million non-cereals

$24 million wool

191,000 ha of agricultural land was irrigated

565 GL of water was applied to agricultural land

60,000 people over 15 were employed in the region's agricultural sector.

Data sourced from ABS 2022

2.2.2

Dynamic and Diverse Communities

The population in the SIR is diverse and multicultural (Figure 2.3). First Nations people make up 5.5% of the population and 13% of the population were born overseas (GBCMA 2021a). The region consists of major centres such as Cobram, Shepparton, Echuca and Yarrawonga and smaller regional towns such as Nathalia, Tatura, Kyabram, Tongala, Rochester and Numurkah. Agriculture continues to be a strong, resilient and innovative industry in the area (Figure 2.4).

The region includes three Registered Aboriginal Parties (RAP) (Figure 2.3), Yorta Yorta Nation Aboriginal Corporation (YYNAC), Taungurung Land and Waters Council (TLaWC) and Dja Dja Wurrung Clans Aboriginal Corporation (DDWCAC). YYNAC, TLaWC and DDWCAC have statutory responsibilities for managing traditional cultural heritage and Crown land within their respective regions, which covers most of the SIR.

The groups are actively managing large areas of their Country in partnership with government and communities. The Yorta Yorta, Taungurung and Dja Dja Wurrung people's ecological and cultural knowledge of their Country is widely appreciated and incorporated into management of our environment.

We will continue to develop collaborative partnerships with YYNAC, TLaWC and DDWCAC to ensure we work together and walk together with respect.

Yorta Yorta people have been conserving the region's waterways and landscape for thousands of generations. They maintained and occupied a landscape that contained a wealth of natural resources that have since degraded upon European arrival. Yorta Yorta people maintain social, spiritual, economic and cultural links to their Country, that has continued since time immemorial (GBCMA 2021a).

Access and management for Yorta Yorta people over their ancestral land is essential for continuing connection to Country. Access to Yorta Yorta Country for Yorta Yorta people is an inherent right. Yorta Yorta people hold a spiritual connection to the land and they must look after it, so that it will look after them in return. Maintaining a spiritual connection with the environment and water is central to Yorta Yorta culture and identity (GBCMA 2021a).

Taungurung people have managed our lands, forests, rivers, wetlands and floodplains for thousands of years. Taungurung people relied on a healthy Country, which was shaped by their traditional knowledge of cultural landscapes. Taungurung ancestral connection to Country is a relationship that has endured to the present day. Taungurung people are an intrinsic part of Country (GBCMA 2021a).

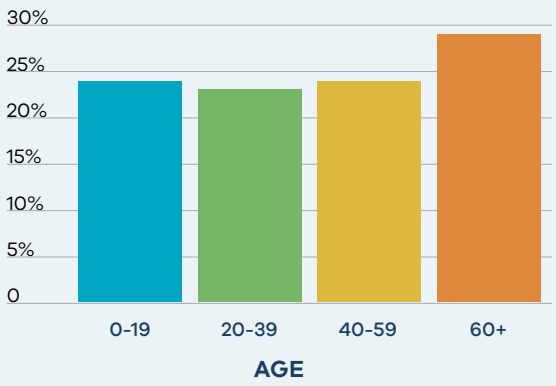
Figure 2.3: Registered Aboriginal Parties within the Shepparton Irrigation Region

Figure 2.4: 2021 Shepparton Irrigation Region Community Profile

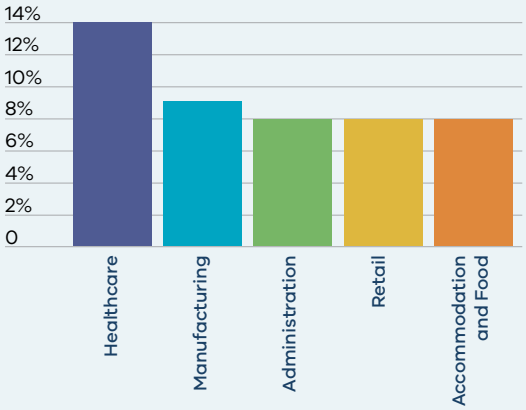
The total residential population of the region was **138,000**

13% of the population were born overseas, mostly from Asia and Europe.

The population consisted of:



Dominant workforce sectors were:



The average age of the region's population was **45**

75% of the population were located in towns

5.5% of the region's population were Aboriginal or Torres Strait Islander

8.7% of the population were farming full or part-time

Data sourced from ABS 2022

2.2.3

Leaders in Environmental Stewardship

The SIRLWMP has been a leading plan in NRM in Australia for the last 30 years. It has also been the longest running and supported integrated community plan. As a result of quality management and leadership, visitors from all over the globe visit the region to better understand how the state-of-the-art irrigation delivery system and farm technologies are integrated with management of natural resources and how genuine partnerships are fostered between government, industry and the community.

Communities and visitors to the region enjoy a great climate in an iconic Australian setting: agricultural pasture and woodland landscapes between significant areas of grasslands, riverine forests and wetlands. These include the world's largest river red gum forest, the Ramsar-listed Barmah wetlands and the Lower Goulburn National Park.

The regional landscape has been transformed since the 1880s, with more than 97% of native vegetation on private land cleared for settlement, agriculture and riverboat trade. Many species of plants and animals have become extinct or are 'just hanging on' in ecosystems that are below threshold requirements for survival in the long-term. However, many local landscapes have significant riparian and roadside corridors and patches of habitat that are acting as biodiversity reservoirs. Agricultural enterprises have also worked to protect and enhance remnant vegetation across their properties.

Reserves and pathways that connect them are targeted to ensure that plants, animals and their genes can migrate, so that species can adapt to different conditions as the climate changes. In addition, as the likelihood and impact of fires is increased during extended dry periods, natural and other assets are placed at further risk.

Currently, 6% of land in the region is protected under public land reserves, such as the red gum-dominated 28,500-hectare Barmah National Park and corridors alongside waterways and roads. Areas of native vegetation away from these reserves and corridors are mainly isolated fragments and generally lack the shrubs, ground layers, fallen logs and other habitat elements needed to host a diversity of flora and fauna. Many local species have become extinct, and others are under threat.

Our communities have been working to improve landscape and waterway health. Efforts since the 1990s have included connecting remnant vegetation, increasing environmental watering to support regeneration of wetlands and forests and building large-scale water infrastructure to enhance water quality and drainage. Our communities are ensuring that our region's remnant vegetation is valued by working to ensure natural features across our agricultural landscapes are healthy and protected. Continued community support will ensure that our region can tackle management challenges to remain leaders in environmental stewardship.

2.3

Future Changes, Challenges and Opportunities

Healthy land, water and biodiversity are essential for a functioning ecosystem and are integral to our lives. The Shepparton Irrigation Region (SIR) operates in a landscape that has been changed greatly from its pre-European state and will continue to change to the current day. Our region is a 'working landscape', with complex relationships between people and nature.

The future of SIR communities is dependent on a strong economy, but a strong economy cannot be maintained without healthy waterways, landscapes and people. Our region needs reliable water, flourishing biodiversity and productive soils so that our communities can thrive. We not only need to work on our landscape but actively work with and for it, to ensure it is resilient and healthy for future generations.

This Plan identifies five critical attributes that need to be achieved to ensure the region capitalises on future opportunities and remains resilient through upcoming challenges. The critical attributes are discussed further in Sections 4 and 5.

The work of our local communities and governments has already supported the SIR to have successful and profitable agricultural production. Without this support, our region would not have been able to overcome salinity, which was one of the most serious and challenging threats to agriculture in the 1980s. However, the community's and economy's reliance on natural resources is placing a heavy demand on soils, water and biodiversity. These demands will only be increased under a changing and uncertain climate. While natural resource demand and climate change threatens to reduce agricultural production and environmental protection, it is possible and essential for communities in the SIR to be innovative and increase their resilience to change.

While the future is uncertain, the SIR has strong regional foundations to overcome challenges. The SIR has many skilled people and stakeholder partnerships committed to developing the region (GBCMA 2016). SIR industries and communities are committed to working collaboratively to see the region thrive (see GMID Resilience Strategy RDV 2020).

The region fosters strong social relationships that enable vibrant communities to adapt to change. This Plan aims to provide further support to SIR communities, to ensure that the region remains resilient, healthy and productive into the future.

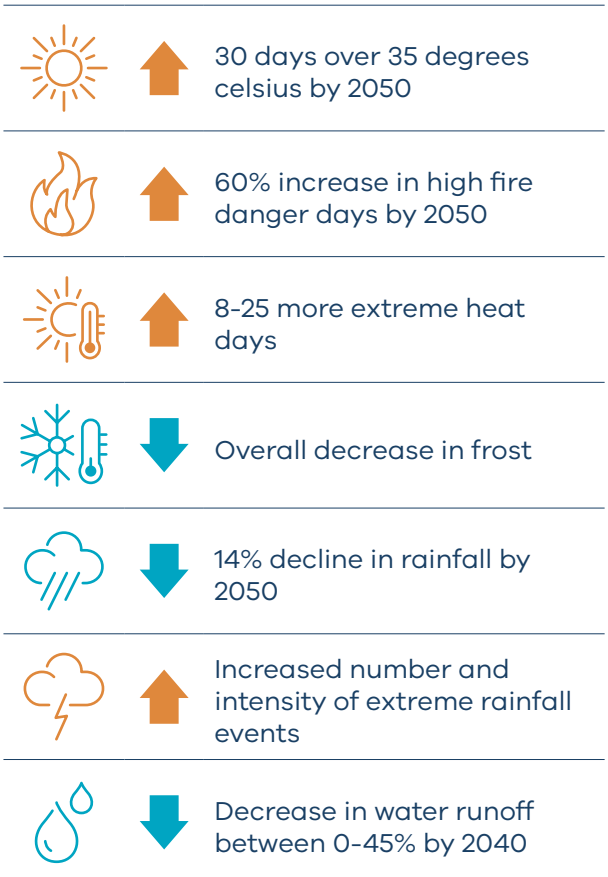
2.3.1

Climate Change and Variability

Climate change in Australia poses a significant risk to agricultural production, community wellbeing and environmental health. While farmers in the SIR have historically proven they are adaptable to climatic change and variability, under current climate projections (BoM 2022) adapting to extreme weather will become more difficult. Over the last decade floods have impacted our region's people and biodiversity long after the natural disasters have ended.

In the future, the SIR is projected to experience a vastly different climate (Figure 2.5) (Clarke et al. 2019; RDV 2020).

Figure 2.5: Climate change infographic



Data sourced from Department of Environment, Land, Water and Planning 2019

Current projections predict that the SIR's climate will become more like Griffith in New South Wales, by 2050. To deal with this, the region needs to continue to build preparedness to address climate extremes.

Climate change will continue to have a profound impact on the profitability of agriculture and success of the community and environment in the region. While building climate resilience will be difficult, it also presents opportunities for landowners to diversify their income and management techniques (NFF 2019). This will mean that there is potential for farmers to reduce their carbon emissions impacts, as well as increase their farming enterprises carbon adaptation and storage response.

2.3.2
Water Availability and Water Security

Prosperity of the SIR is dependent on water availability for irrigated agriculture. The health of the regional community and environment is also reliant on environmental water deliveries. However, under a changing climate and increasing competition around water sharing, water availability in the region will become more challenging (GBCMA 2016; RDV 2020). Increasing demands from environmental, cultural, residential and urban uses, as well as agricultural water allocation, will continue to increase into the future (RMCG [commissioned by GBCMA] 2023).

While water availability will be a challenge into the future, living with variable water supply is already a feature of agriculture in the SIR (RDV 2020). Farmers in the region have been adapting and are already well prepared for reduced water access by having flexible farm water management and using water more efficiently.

Limited water availability and the value of water have created more efficient irrigation and increased farm productivity (RMCG [commissioned by GBCMA] 2023). However, there are opportunities for adaptable irrigation for annual cropping and mixed farms when it is affordable. Adoption of dryland practices can also support resilience and competitive advantage in drier years.

2.3.3
Land Use Change

Land use patterns in the SIR are continuing to change. Expanding urbanisation and changes to agricultural practices are placing pressure on available land for production.

Between 2015 and 2022, land use change seen in the Shepparton Irrigation Region included (GBCMA 2020; GBCMA 2023):

- changes to configuration of dairy land use
- expansion of rural lifestyle properties
- expansion of cropping as a primary land use.

The SIR is made up of four irrigation areas within the Goulburn Broken and part of the North Central CMA areas including (see Figure 2.7 and 2.8):

- Central Goulburn
- Murray Valley
- Rochester
- Shepparton.

Figure 2.7: Irrigated Areas of the Shepparton Irrigation Region (GBCMA 2020)

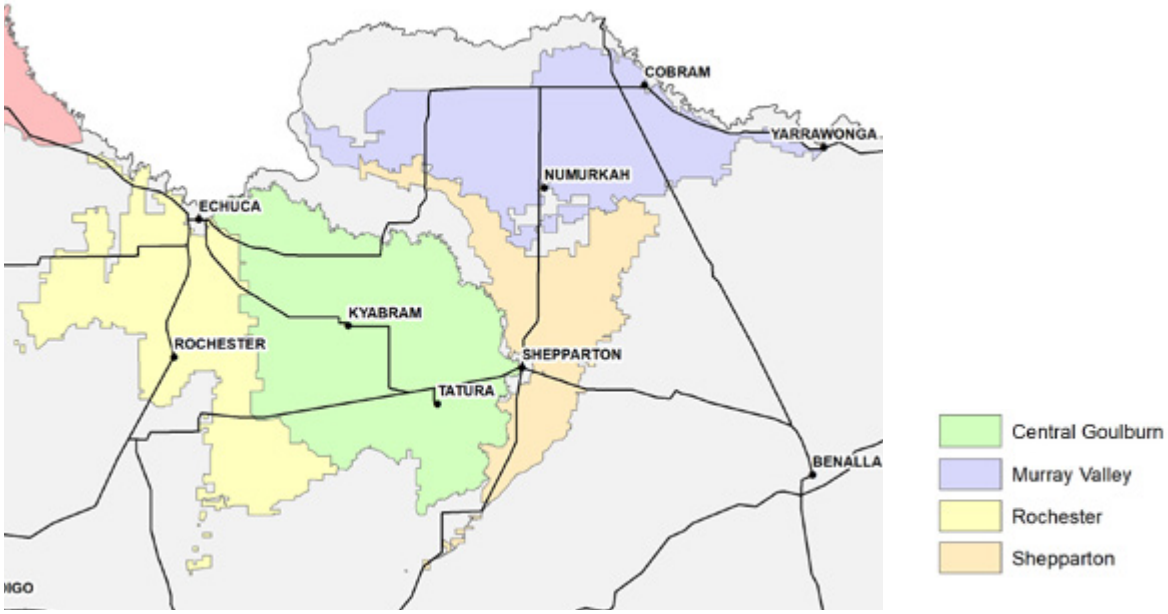
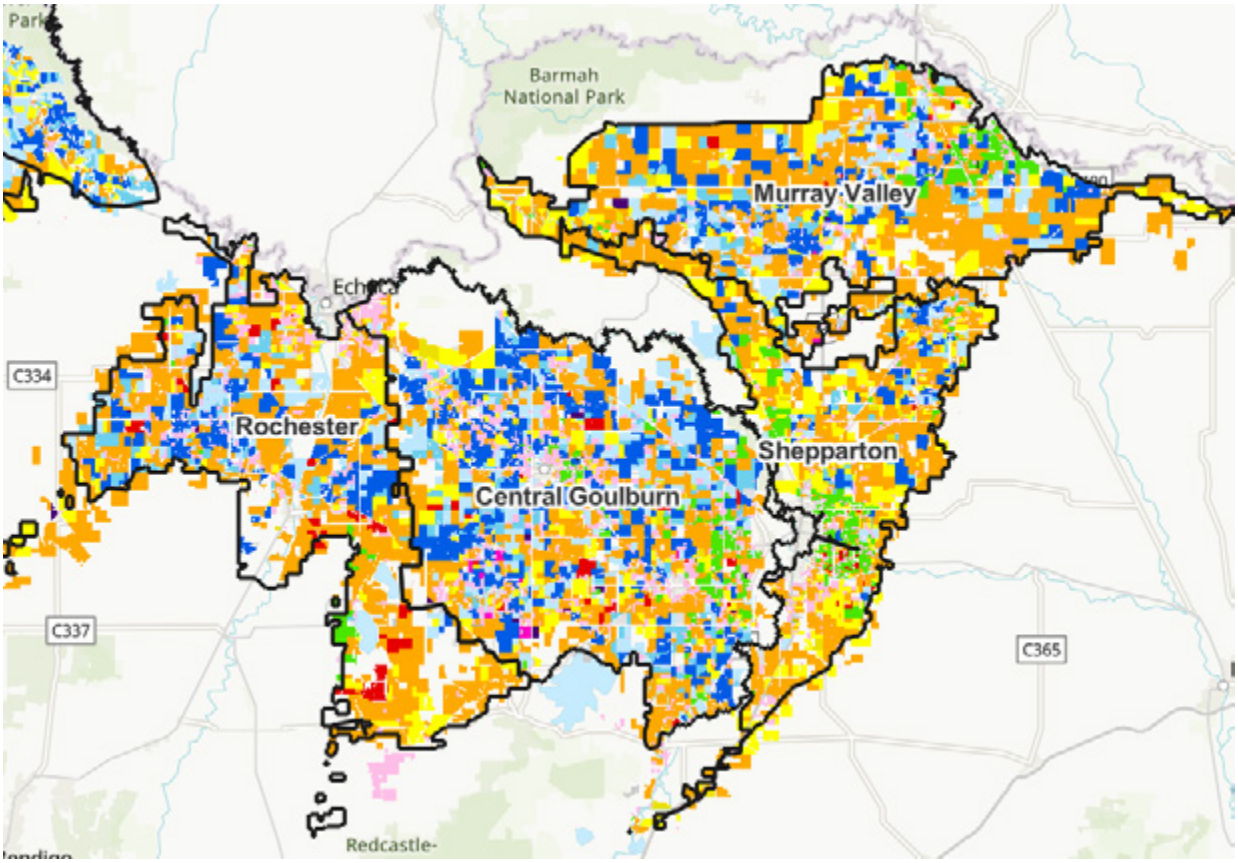
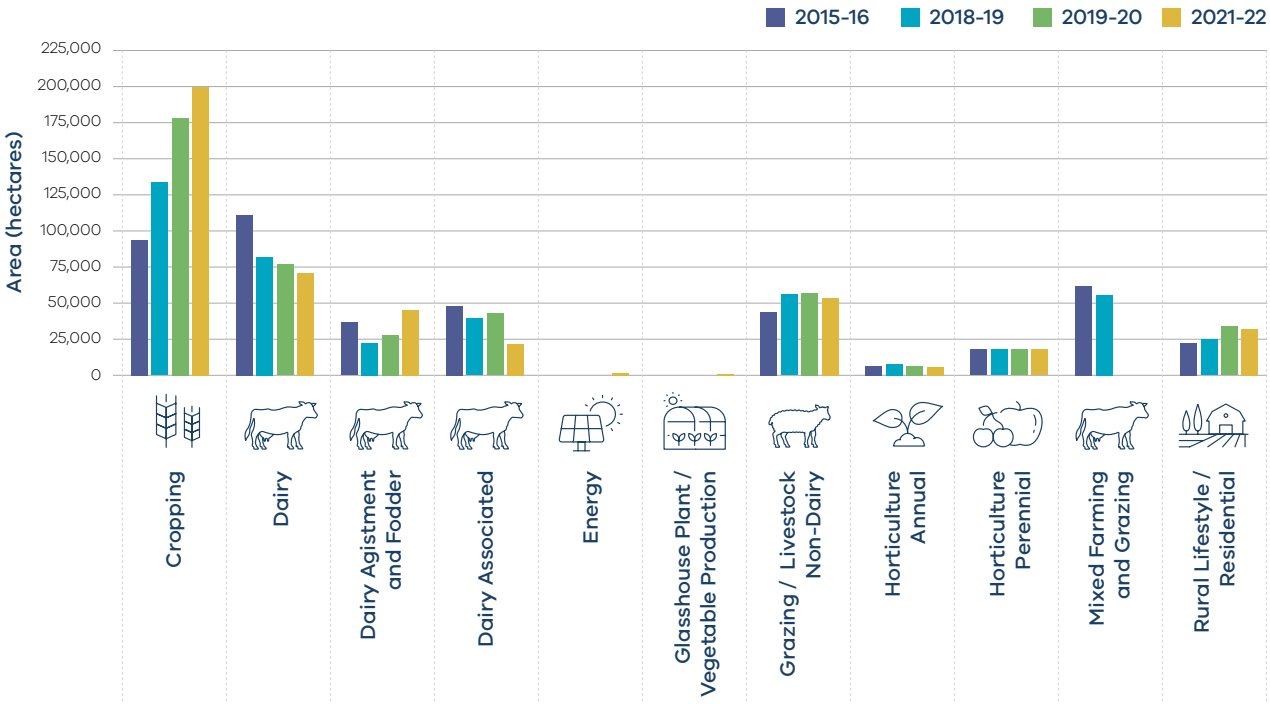


Figure 2.8: Land use in 2021-22 of the Shepparton Irrigation Region (DEECA, Land Use Mapping Data Dashboard internal version 2023)



Dairy | Dairy Associated | Dairy Agistment and Fodder | Horticulture - Perennial | Glasshouse Plant / Vegetable Production | Horticulture - Annual | Cropping | Grazing - Non Dairy | Intensive - Animals | Horses | Rural Lifestyle / Residential | Energy | Other Landuse | Not Irrigated

Figure 2.9: Shepparton Irrigation Region — Change of Primary Land Use 2015-16, 2018-19, 2019-20 and 2021-22 (DEECA, Land Use Mapping Data Dashboard internal version 2023)



The land use trends seen in the SIR are demonstrated in Figure 2.9 with the decrease in Dairy and Dairy Associated and noticeable increases in Cropping and Dairy Agistment and Fodder. Overall, there has been an increase in Rural Lifestyle/ Residential however a minor decrease was observed from 2019-20 to 2021-22. It is noted that Mixed Farming and Grazing was re-categorised from 2019-20, and in 2021-22 there were two new categories added, Energy and Glasshouse Plant/Vegetable Production, to monitor these emerging industries.

Changes in land use and contraction of agricultural land in the SIR have presented opportunities for landholders to diversify their production and increase farm sizes (RDV 2020). Under an uncertain and changing future climate, increasing the diversity of industries and ensuring farms are adaptive enough to absorb shocks will increase the region's resilience (RMCG [commissioned by GBCMA] 2023).

Future opportunities to diversify production in the SIR include:

- Intensive agriculture such as glasshouses, piggeries and poultry
- Alternative agriculture such as First Nations' food and fibres, solar farms, cultural and agri-tourism.

While diversifying landholder income provides an opportunity to build resilience in the region, landholders will need support to make this transition (RMCG [commissioned by GBCMA] 2023). The Agricultural Redevelopment Coordinator (ARC) Project is one such example of supporting regional transition. The program aims to integrate potential agri-business redevelopments by reducing barriers to change and informing appropriate land use in the region. Programs such as these are vital to ensure that the region's landholders remain profitable into the future.

Smaller agricultural enterprises, including family farms, will be at more risk in the coming years from shock events, such as extreme weather or volatile markets (RMCG [commissioned by GSCC] 2020). Across the region, some agriculturalists are trying to increase their size to remain viable. Long-term trends suggest that the industry will consist of a small number of large producers (RMCG [commissioned by GBCMA] 2023). In the long-term supporting agriculturalists to transition to a more viable farm scale will support economic resilience in the region.

2.3.4

Biosecurity Risks

In recent decades, biosecurity risk to Australian agriculture has increased. Globalisation has increased trade volumes, travel opportunities and stakeholders involved in supply chains (DAWE 2023). This means that biosecurity threats entering Australia will become more difficult to trace. These challenges will only become more complex as the climate changes, increasing impacts and potentially the spread of diseases and pests.

The SIR maintains strong supply chain connections to Melbourne international ports. Exporting products from the region is becoming more complicated due to increased biosecurity concerns in target markets. This means that Australia and the SIR will need to increase biosecurity measures to ensure that farmers have competitive access to overseas markets.

2.3.5

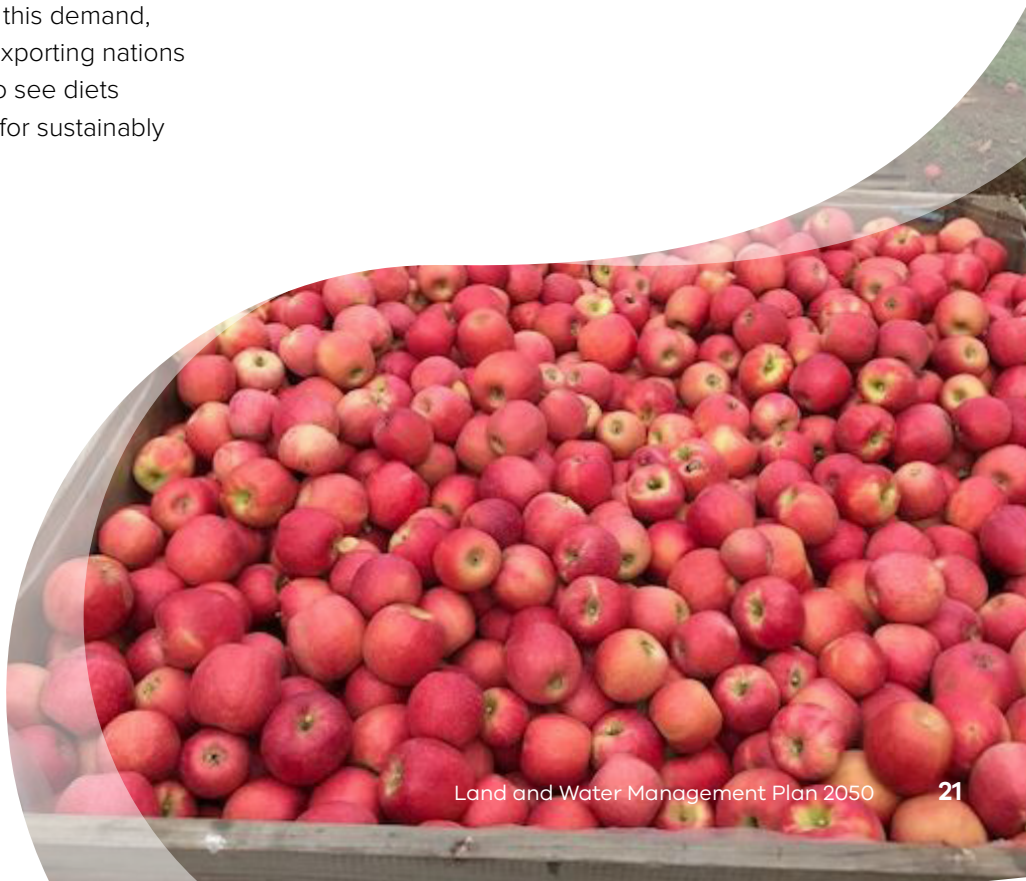
Market Volatility

Industry dynamics are continuously changing, because global and domestic markets are strong drivers of agricultural production in the SIR.

The global population is increasing, which will in turn increase the demand for food production (NFF 2019). The growth of middle-income earners across the globe will change the type and quality of agriculture produced in Australia. As a result of this demand, competition with other agricultural exporting nations will intensify. Income growth will also see diets diversify and an increased demand for sustainably produced food (GBCMA 2016).

To remain competitive in a global market and meet consumer expectations (NFF 2019), farmers in the SIR will need to continue to innovate and produce high quality products. Globally, customers are becoming more selective about sustainability, provenance and ethics (RDV 2020). This means that farmers and food-processors in the SIR already have a long-term interest in food production that is sustainable. Farmers in the region have adjusted their land management practices to reduce their impact on natural resources. For example, producers have increased water-use efficiency, secured available water, reduced stocking rates and altered irrigation drainage to ensure production is sustainable and profitable. Food-processors will continue to capitalise on the region's natural advantage by adopting sustainable food production and maintaining their status as accredited suppliers.

Market volatility will continue to be a challenge into the future for the region. Recently, the cost of living has changed consumer expectations of production. There will be an increasing need for agriculturalists in the region to produce sustainable, ethical, low emissions produce at an affordable price. This will place pressure on our farmers to ensure they are able to supply the nation with high quality food for a low price and remain profitable.



2.3.6

Technology

The emergence of technology in the agriculture sector has seen productivity gains in the sector (RDV 2020; NFF 2019; VSA 2022). New technologies combined with best practice land management have led to reductions in costs and risks, as well as improved product quality and supply chain efficiencies (GBCMA 2016). Continuing improvements in technology have the potential for reducing farming workloads and labour requirements (RDV 2020; RMCG [commissioned by GBCMA] 2023). Technological advancements will also provide opportunities for accelerating the adoption of a circular economy and reduce waste in the region. Examples include the adoption of robotics, circular economy apps, machine learning and AI research. There are further opportunities to adopt cost effective renewable infrastructure to capture and retain the abundant energy available in the region.

2.3.7

Native Vegetation

Current threats, such as clearing of native vegetation (including illegal firewood collection), invasive pest plants and animals and fire management, are exacerbated by climate change and have had a compounding effect on past large-scale habitat loss and degradation.

Paddock trees remain vulnerable, highlighting an increased need for advocacy and support to decision and policy-makers regarding native vegetation controls. The retention of vegetation (both quality and quantity) must be a priority in planning and farm planning applications across the SIR.

Despite ongoing efforts by our stakeholders and landholders to improve native vegetation extent, the scale of change is still not enough to influence 'net gain' and ensure long-term survival of all native species. Thresholds have been breached and many flora and fauna ecosystems are in decline. Urbanisation across the Catchment is a continued risk to biodiversity. The amount of revegetation possible to increase extent on private land is currently restricted by funding and not by the desire of communities, organisations or individual landholders to revegetate.

2.3.8

Changing Demographics

As the demographics of the SIR community continues to change to an older profile (Barr 2018), potential challenges emerge, particularly as the agricultural sector transitions to the next generation of farmers. The way regional communities operate is also changing with people working and socialising differently. It will be crucial to adapt our Plan's engagement approach to remain relevant to the SIR community.

There are opportunities to tap into all levels of education (primary, secondary and tertiary) to promote natural resource management practices to a younger demographic. There are also opportunities to strengthen connections with multicultural communities in the region.

Agriculture (dairy in particular) is still a major industry and employer in the region but has been impacted greatly by market forces such as low dairy prices, high water prices and periodic low allocation seasons (Barr 2018). Analysis of the Victorian Skills Authority's Employment Forecast Dashboard of the Goulburn Region (which covers most of the SIR) forecasts a need for 370 new workers by 2026 within the Agriculture, Forestry and Fishing industries (VSA 2023).

3. Development of SIRLWMP 2050

3.1 Regional Collaboration

The development of the Shepparton Irrigation Region Land and Water Management Plan (SIRLWMP) 2050 has been the result of continuing collaboration and partnerships between the SIR community and government departments for more than 30 years. Enduring partnerships and trust have been the cornerstone of the development of the SIRLWMP and have resulted in holistic and meaningful landscape management. The history of community involvement in the development of the SIRLWMP is detailed below (Figure 3.1).

3.2 Community and Stakeholder Engagement

Communities and stakeholders continue to be involved in the SIRLWMP 2050. The community-based committee overseeing the Plan development and implementation has been through the Shepparton Irrigation Region People and Planning Integration Committee (SIRPPIC). SIRPPIC ensures that the implementation of the SIRLWMP remains accountable to local communities, while addressing the broader needs of the region. SIRPPIC has helped facilitate trust in the community and has also given governments confidence in the implementation of the SIRLWMP.

SIRPPIC helps community and agency partners link local action with broader needs and integrate solutions to multiple problems (GBCMA 2021b). The Committee plays a key role in streamlining the complexity of connections between whole farm plans, sub-catchment plans, the SIRLWMP, the Goulburn Broken and North Central Regional Catchment Strategies (RCS) and sub-strategies, MDB plan and various state and national frameworks.

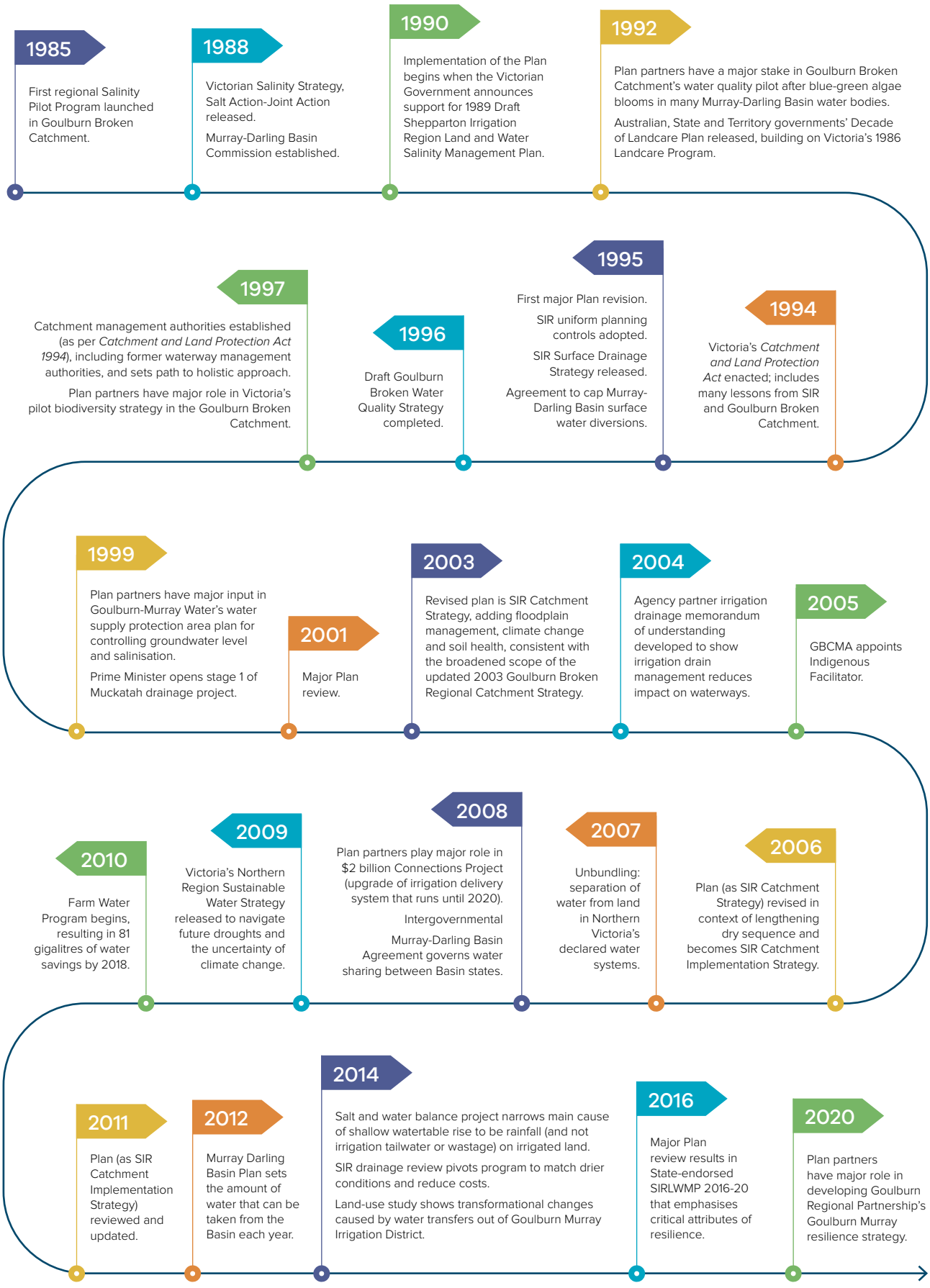
SIRPPIC connects with a diverse range of groups to allow for two-way engagement as the Plan evolves. Through SIRPPIC, the SIRLWMP has helped spawn and connect many similar partner networks such as (GBCMA 2021b):

- GMID Resilience Strategy Taskforce
- Goulburn Broken CMA-led Municipal Catchment Coordinator Reference Group, which is in its 27th year and has representatives from Moira Shire Council, Campaspe Shire Council, Greater Shepparton City Council and other stakeholders
- Goulburn-Murray Water (GMW) (including water service committees) drainage system partnerships with the Goulburn Broken CMA and other stakeholders
- Greater Shepparton City Council-led RiverConnect
- SIR Combined Partner Network of senior agency representatives that has met quarterly since 1992
- Industry groups such as Murray Dairy, Irrigated Farming Network, etc.
- Goulburn Murray Landcare Network (GMLN).

SIRPPIC includes representatives from several government agencies, community and industry organisations, including GBCMA, GMLN, GMW, NCCMA, Murray Dairy, Agriculture Victoria and Department of Energy, Environment and Climate Action. SIRPPIC is also supported by the Farm and Environment Working Group and the SIR Drainage Working Group.

For an overview of SIRPPIC's organisational structure, see the GBCMA webpage (www.gbcma.vic.gov.au/our-region/sustainable_irrigation/sustainable-irrigation-publications)

Figure 3.1: Timeline of the SIRLWMP (GBCMA 2021b)



3.3

History and Achievements of the SIRLWMP 1990-2020

3.3.1

30 Year SIRLWMP

The SIRLWMP has been an adaptive 30-year Plan, which began development in 1985 (GBSPPAC 1989). The success of the Plan over the last 30 years has resulted in the SIR receiving national and international recognition for best practice in catchment management (Norman, Sampson and Canobie 2000). The purpose of the original Plan was to protect and enhance the soil and water of the region to promote agricultural productivity. However, the Plan has evolved over time from origins in salinity management to include biodiversity, water for the environment, climate change for a more holistic approach to land and water management.

This SIRLWMP 2050 is the first complete renewal of the SIRLWMP in 30 years. Due to the success of the SIRLWMP 1990-2020, the GBCMA and SIRPPIC have determined that the Plan should be renewed with a focus on the next 30 years. Over the last 30 years, the SIR has seen new stakeholders, partners and changes in regional drivers. It is now time to renew the SIRLWMP so that communities can continue to have a healthy and resilient environment into the future.

3.3.2

Origins of the SIRLWMP to Current Day

The SIRLWMP began in the 1980s, when the region was facing major environmental challenges. Salinisation was causing enormous damage to our agricultural sector (Norman, Sampson and Canobie 2000). Farmers were increasingly dealing with the impacts of salinity, particularly declining carrying capacity and crop germination (Northage 2014). Lack of cohesive action spurred the community to come together and tackle NRM challenges in the region.

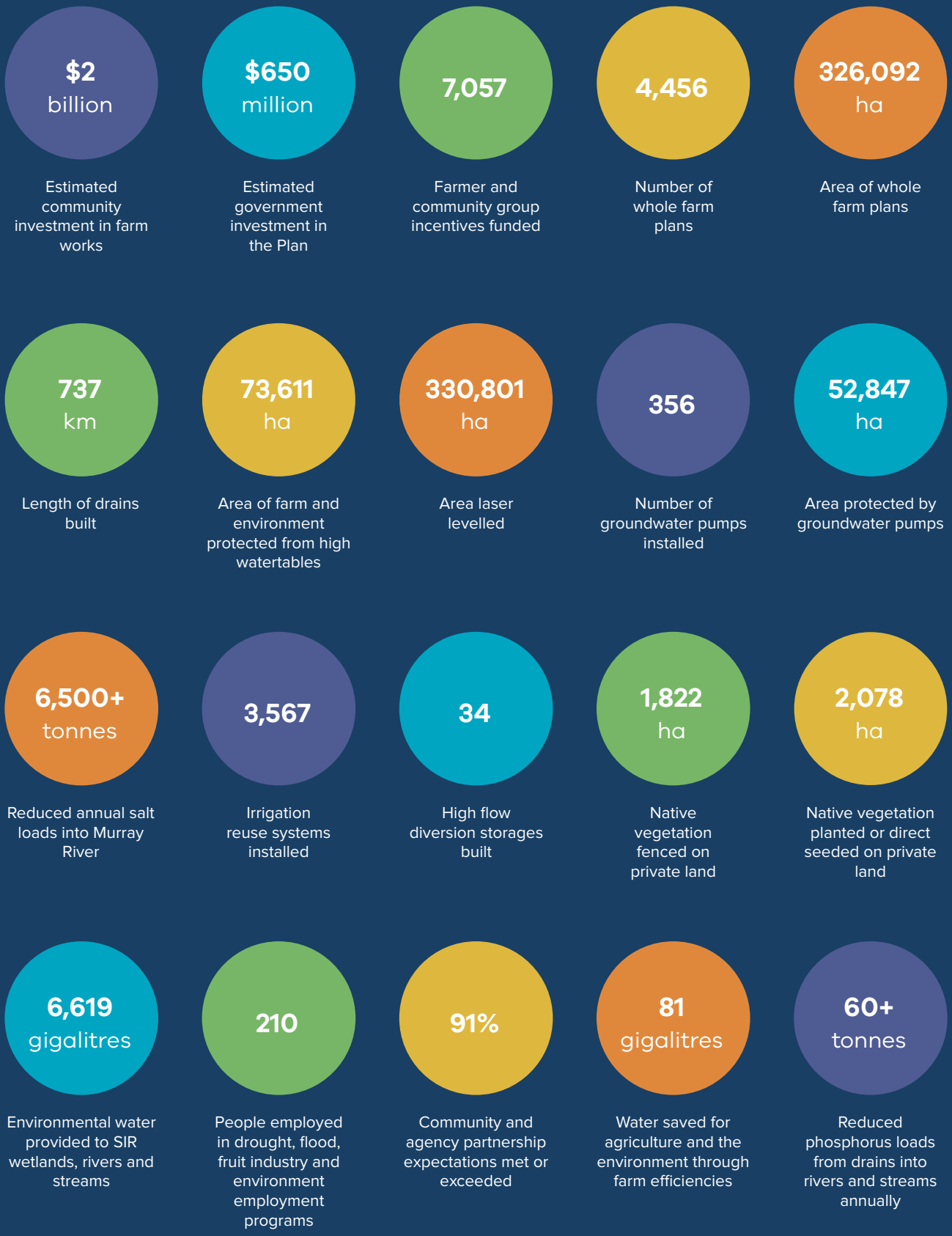
This coming together of the SIR communities and leaders led to research into NRM and the success of the first SIRLWMP.

The SIR was established prior to the CMAs being created in 1997. To avoid confusion for the community the Rochester Irrigation Area is still included the SIRLWMP.

The first SIRLWMP was put into action in 1990. It was the first of its kind in Australia, a new and integrated approach to managing environmental problems with collaboration between local communities and governments from the beginning. The SIRLWMP showed the country that protecting and managing natural assets were important and that local communities were best placed to lead that.

Because the SIRLWMP has been community driven, it has adapted over time as regional issues have changed. During the 1990s, our region wasn't just facing salinity challenges. Emerging environmental issues, such as blue-green algal blooms and the millennium drought were front-of-mind for our communities. These issues needed integrated catchment management to support both agricultural yields and environmental conservation. At this point the focus of the SIRLWMP widened from salinity management to catchment protection.

Figure 3.2: Achievements of the SIRLWMP from 1990 to 2020 (GBCMA 2021b)



More recently, the SIRLWMP has focused on building the resilience of the SIR to adapt, transform and thrive in the face of change and uncertainty. This began in 2005, when communities and partners identified a need to make sure that the region's agricultural sector and environmental assets could survive unprecedented events. This focus on resilience continued and has supported our communities and farmers through extreme weather, natural disasters and the COVID-19 pandemic.

The SIRLWMP has supported meaningful change in our region over the past 30 years, thanks to the commitment of communities and lasting partnerships with governments and partners. SIRLWMPs have reminded us of that our landscapes and waterways are "the primary source of value and the provider of life support" (Northage 2014). This Plan has resulted in protection of the region's environmental and agricultural assets, supporting the regional profitability and health into the future.

> "I always tend to look at issues from the farmer's point of view, but now I understand the importance of looking from a conservation perspective."

Heather du Vallon, farmer, Murray Valley Water Services Committee Chair and SIRPPIC member

Not only has community support increased resilience, but it has also resulted in long-term environmental action. Partnerships across regional and national levels have enabled communities, stakeholders and governments to collaborate to anticipate and adapt to challenges in the long term. To ensure that agricultural practices continue to prioritise natural resource management, government has invested $650 million, and our farmers and communities have contributed $2 billion. As a result of enduring and extensive partnerships, more than 330,000 hectares of on-ground actions have been implemented through 7,057 incentives (GBCMA 2021b) over the 30 years (Figure 3.2).

> "The community supported it and the departments worked together successfully. I had never seen that happen before. There were bitter feuds between agencies when we started but the Premier Joan Kirner at the time put a stop to all that nonsense by empowering the community."

Bill O'Kane, farmer and former Executive Officer of SPPAC, SPAC and Goulburn Broken Catchment and Land Protection Board and inaugural Chief Executive Officer of GBCMA.

Examples of how successful partnerships have led to collaborative action include:

- whole farm plans supporting 4,456 farms to increase water efficiencies across 326,092 hectares of the region and include cultural heritage features
- an increase in native vegetation with support from incentives
- GBCMA and GMW jointly managing drainage to reduce environmental and agricultural risks
- the Goulburn Broken Water Quality Strategy reduced nutrient loads and blue green algal blooms
- environmental water deliveries have increased biodiversity on public lands, such as the Barmah Millewa Forest floodplain, Campaspe River, Reedy Swamp and Kinnairds Wetland
- $2 billion for 429 GL water savings project via regional irrigation delivery upgrade (Connections Project)
- $228 million for 81 GL water savings project on farms (Farm Water Program)
- many regional employment programs following several natural disasters, industry crises and COVID-19.

For more information on the achievements as well as awards and recognition see the GBCMA website, Sustainable Irrigation publications.

LONG-TERM BENEFITS

The long-term benefits of the SIRLWMP have been wide-reaching and diverse. One of the greatest achievements of the Plan was its ability to work with a wide range of partners and adapt to challenges in the SIR (GBCMA 2021b). Over the years, the focus of the Plan has grown from salinity, to include water quality, biodiversity, waterway management, environmental water, water availability, climate change and community resilience. The ability of the Plan to remain relevant over time demonstrates the adaptive nature of not only the SIRLWMP but our communities.

The SIR is a complex system with interconnections between people, places and economies that influence each other in often unpredictable ways. As a result, the impact of the action taken through SIRLWMP can be hard to determine. Analysis of the long-term impacts of the Plan show variable results (Figure 3.3). Water quality, water tables and water availability for the environment have improved. But maintaining water availability for agriculture and increasing native vegetation extent has not been enough.

> "The Plan has led to improved farming practices that we take for granted these days but weren't even considered back in the 90s. Things like whole farm plans, surface drainage, sub-surface drainage and recycle dams – the list goes on."

Allen Canobie, farmer and former SIR Implementation Committee chair

Figure 3.3: Long term impacts of the SIRLWMP from 1990 to 2020 (GBCMA 2021b)

Critical attribute	Contribution to SIR system		Long-term risk of tipping	
	1990	2020	With current support	With no support
Water availability for the environment	POOR	OK	MEDIUM	HIGH
Water availability for agriculture	EXCELLENT	POOR	VERY HIGH	VERY HIGH
Water quality	VERY POOR	OK	MEDIUM	HIGH
Watertables	POOR	OK	MEDIUM	HIGH
Native vegetation extent	VERY POOR	VERY POOR	VERY HIGH	VERY HIGH
Farm and regional viability	GOOD	POOR	HIGH	VERY HIGH

3.4

Integration with Other Strategies and Legislation

The SIRLWMP 2050 is a management plan that outlines how the irrigation region:

- identifies community needs in the region
- identifies priority actions to meet government objectives, regulations and policies.

This section outlines how the SIRLWMP 2050 aligns with relevant government and community strategies, as well as policies and legislation (Figure 3.4).

Table 3.1 outlines key relevant community, regional and state strategies and policies that the SIRLWMP 2050 aligns with. Table 3.2 outlines the relevant state and federal legislation the SIRLWMP 2050 must comply with.

Figure 3.4: SIRLWMP policy context

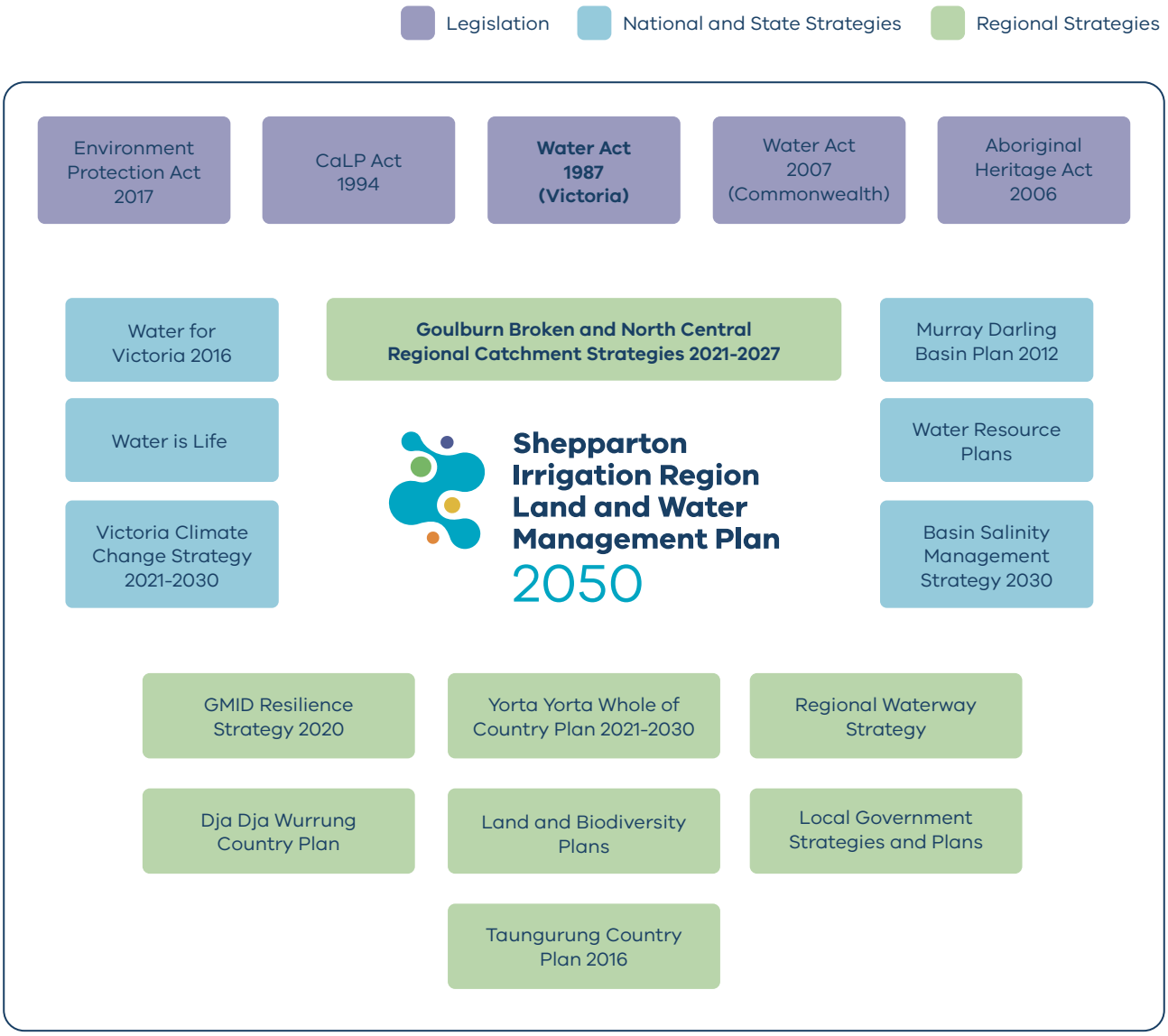


Table 3.1: Key relevant strategies and policies

Strategy/Policy	Description
Goulburn Broken Regional Catchment Strategy 2021-2027	The Goulburn Broken Regional Catchment Strategy (RCS) is a vision for integrated management of natural resources in the catchment. The purpose of the RCS is to guide actions to improve and protect land, water, biodiversity and community.
North Central Regional Catchment Strategy 2021-2027	The North Central RCS sets a vision for integrated management across the region, identifies priorities and targets, providing a framework to coordinate effort.
Water for Victoria Plan 2016	Water for Victoria is a plan for a future with less water as Victoria faces impacts from climate change and a growing population. The plan aims for farmers to maximise agricultural production in a warmer and drier future.
The Murray-Darling Basin Plan 2012	The aim of the Murray–Darling Basin plan is to bring the Basin back to a healthier and sustainable level, while continuing to support farming and other industries for the benefit of the Australian community.
Yorta Yorta Whole of Country Plan 2021-2030	The Whole-of-Country plan describes priorities and solutions for caring for Yenbena, Woka and Walla.
Taungurung Country Plan 2016	The plan will guide TLaWC, partners and stakeholders to implement action on Taungurung's behalf. Taungurung hopes the Country Plan will be used as a 'living breathing tool for action and reflection' that can be refined as they grow as a community and organisation.
Dhelkunya Dja – Dja Dja Wurrung Country Plan 2014-2034	This Country Plan (the Plan) is about re-affirming our aspirations and describing the future of our people, the Traditional Owners of Dja Dja Wurrung Country. It recognises the importance of our cultural heritage - our significant places and landscapes, our stories and language, our customs and practices and our responsibilities for looking after Country. It describes the pathway our community has determined it needs to take to rebuild and prosper.
Agriculture Strategy 2020-2030	The strategy envisions an agricultural sector that is strong, innovative and sustainable. The strategy identifies areas for focus and investment for the Victorian Government.
Basin Salinity Management (2030)	The BSM plan focuses on continuing to ensure salinity within the Murray–Darling Basin is maintained at appropriate levels to protect economic, environmental, cultural and social values.
The Goulburn Murray (Irrigation District) Resilience Strategy 2020	The strategy envisions a region that is thriving in the face of change. It identified resilience principles and five key intervention streams.
Our Catchments, Our Communities Strategy 2016	The strategy confirms the Victorian Government's commitment to managing catchments to benefit environment, community and economy. It focuses on how to manage natural resources, by ensuring catchment management partners work effectively together.
Water is Life (2020)	Water is Life, released in 2022, provides a framework to balance First Nations' self-determination in water access and management and the rights and entitlements of a range of stakeholders.
Victorian Self-Determination Reform Strategy 2020-2025	The strategy outlines how government will work in partnership with Traditional Owners and Aboriginal Victorians to support their right to self-determination.
Victorian Climate Change Strategy 2021-2050	The strategy outlines a roadmap to net-zero emissions and a climate resilient Victoria.

Table 3.2: Relevant legislation

Legislation	Description
Water Act (1989) (Victoria)	The *Water Act (1989)* provides regulations around entitlements to water, as issued by the Minister for Water.
Catchment and Land Protection Act (1994)	This Act sets up the framework for the integrated management and protection of catchments in Victoria, by supporting community integrated management.
Water Act (2007) (Commonwealth)	The purpose of the Act is to manage Murray Darling Basin water for social, economic and environmental outcomes.
Environment Protection Act (2017)	The *Environment Protection Act* includes a general environmental duty for businesses to ensure they are held accountable for protecting both the environment and human health.
Aboriginal Heritage Act (2006)	The purpose of the Act is to provide protection for Aboriginal cultural heritage and Aboriginal intangible heritage in Victoria and recognises Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.
Traditional Owner Settlement Act (2010)	The Act provides for an out-of-court settlement of native title, in which the Victorian Government recognises certain Traditional Owner rights to Crown land.

3.5

SIRLWMP 2050 Principles and Plan Renewal Process

The renewal process of the SIRLWMP 2050 began in late 2021. The process involved SIRPPIC considering the final words in the 30 Years Done document in relation to the challenges ahead for the SIR. SIRPPIC resolved to commence a renewal process at their meeting in December 2021.

3.5.1

Guiding Principles

A key consideration of the SIRLWMP 2050 renewal process was to agree on some guiding principles and document assumptions. The guiding principles were:

1. respect, trust and working together would be at the heart of the update journey
2. the review and update would include continuous and reflective practices to challenge our own assumptions and biases, as well as continuously adapt the project to changing circumstances including climate change
3. a resilience and systems approach would be employed to direct and prioritise decision-making
4. commitment to open, transparent and inclusive engagement with our communities and stakeholders to strengthen regional partnerships and ownership in NRM. This would be done in a safe, inclusive and transparent way to encourage frank and respectful conversations
5. commitment to using the best available science to support decision-making, while acknowledging and respecting that there are multiple legitimate viewpoints and sources of knowledge
6. engaging and working with First Nations' groups, taking into account their aspirations and availability.

3.5.2

Resilience Approach

Resilience and systems thinking was introduced into the last SIRLWMP update in 2016 and has been built upon in this Plan. A good overview of the resilience approach is in the GBCMA Regional Catchment Strategy (GBCMA 2021a).

Resilience is the capacity of people and the environment to absorb a shock or setback and to flourish... It is the capacity to cope with change and continue to evolve positively.

A resilience approach is useful in NRM applications and strategies because it considers:

- complex systems operating at different scales and time
- the multiple future pathways that are possible
- a framework for change that includes transformation, adaptation and persistence.

Seven resilience principles have guided this renewal of the SIRLWMP and they include: diversity/redundancy, connectivity, slow variables/feedback, complex adaptive systems thinking, learning, participation and polycentric governance.

For more information see Stokholm Resilience Centre, www.stockholmresilience.org

3.5.3

Process to Renew the SIRLWMP

In 2022, the GBCMA and partners commenced project planning for the renewal of the SIRLWMP. The SIRLWMP 2050 has been developed in alignment with the 2017 DELWP LWMP Guidelines. The project was delayed by several months in late 2022 as floods swept through the region, causing communities to focus on flood response and recovery. Figure 3.5 shows the timeline and main steps for the SIRLWMP renewal.

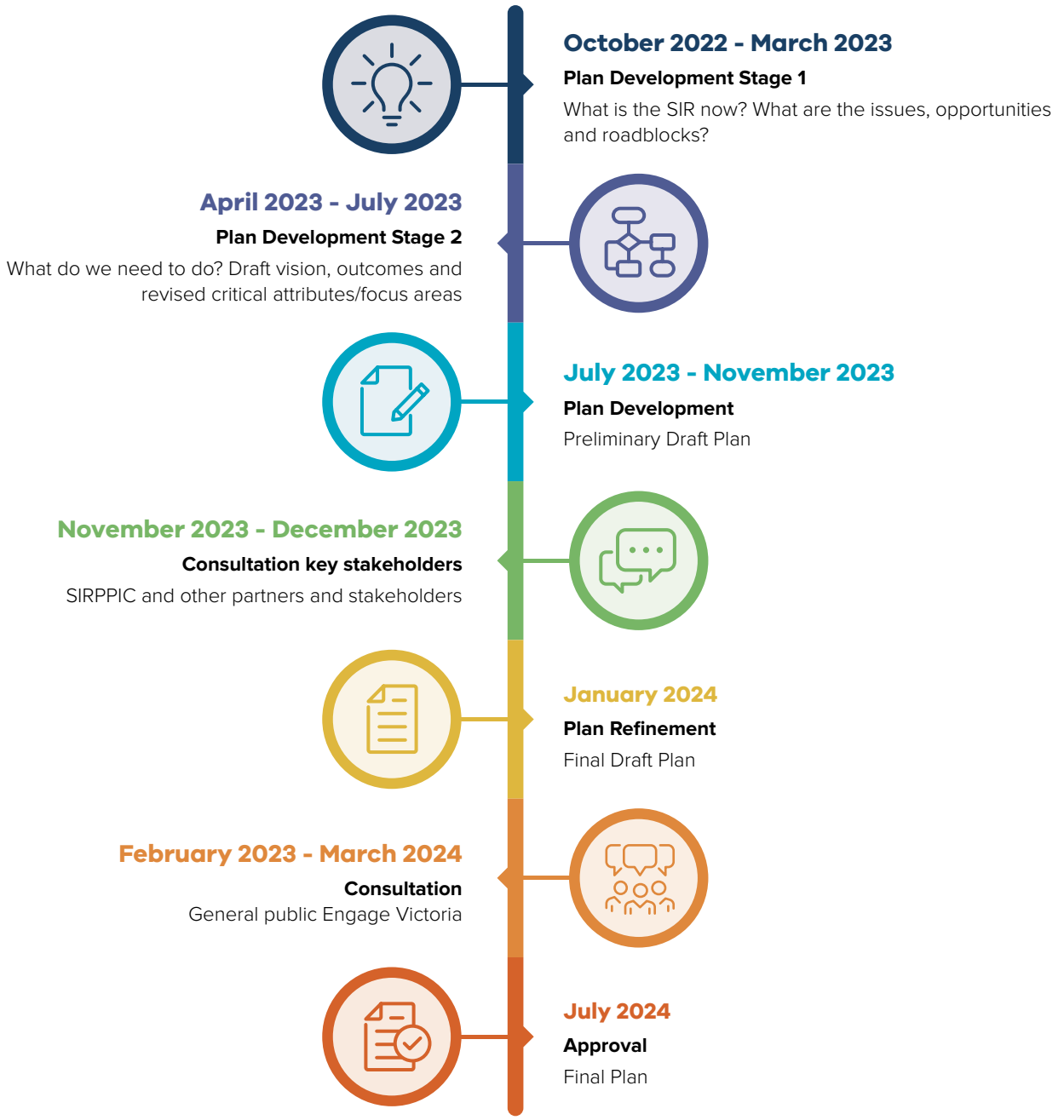
Over the course of the renewal, there have been many challenging conversations and discussions with the community, partners and stakeholders. These discussions have been around the future direction of the Plan and what to do next.

There were three key workshops to discuss significant elements and pivotal points for the Plan. They were:

Date	Purpose of workshop	Number attending
February 2023	Workshop at Kyabram to talk about the values of the SIR and the future directions.	50
May 2023	Workshop at Tatura to consider the SIRLWMP 2050 vision and critical attributes.	30
October 2023	Workshop at Numurkah to discuss the draft critical attributes logic (ie what outcomes and actions do we want)?	50

Public consultation of the draft SIRLWMP 2050 was held in February – March 2024.

Figure 3.5: SIRLWMP renewal timeline



4. A Vision for Irrigation Land and Water Management in the SIR 2050

This section identifies the Plan's SIR 2050 vision, the outcomes expected by 2030 and 2050 and the framework for planning, implementing and monitoring. High-level actions for each critical attribute are listed in Section 5.

4.1 Context

The SIR's social-ecological systems are transforming. Communities and the environment are facing significant challenges, which will continue to create uncertainty and place stress on our region. Already over the past three decades, the SIR has faced a pandemic (COVID-19), the Millennium Drought (2000-2009) extreme fire seasons and the widespread 1993 and 2022 floods. These recent events compromised our ability to capitalise on our natural assets, strong regional networks, existing regional and farm infrastructure, as well as our proximity to markets.

While recent challenges and maintaining government support has been difficult, our region has still created opportunities and contributed more than our share to the MDB plan objectives. Our communities have broken ground on new approaches to salinity management, water quality improvement, water sharing for all uses, biodiversity protection and building strong stakeholder partnerships.

The SIR consists of a diverse and productive agricultural system in a landscape where amenity usage is increasing. This makes the SIR an attractive place to work and live.

The actions for this Plan have been created based on the challenges our region is facing. By recognising our most difficult challenges, this Plan identifies how our communities, environment and economy can remain resilient into the future. Further details of our region's challenges are outlined in Section 2.3.

4.2 Vision

The Plan's 2050 vision is:

VISION STATEMENT

What do we want the SIR to look like in 2050?

The SIR is Australia's leading irrigation region. It has the best land and water in Australia, looked after by resilient and capable communities.

The region is strong and secure due to enthusiastic and capable leaders, rich First Nations' culture and enduring community and government partnerships. This strength enables effective responses to extreme challenges such as climate change, water policy change and global upheavals.

The collective knowledge of Taungurung, Yorta Yorta, Djaara and western cultures has elevated management of the landscape's iconic ecosystems.

The SIR is recognised internationally for environmental improvement. Native flora and fauna are now thriving with many threatened species returned to healthy numbers in restored habitat on land and in the waterways.

The region continues to benefit from its natural agricultural advantages of fertile soils, secure water for irrigation, abundant sunshine for plant growth and electricity and proximity to markets. The SIR is the most efficient irrigated agriculture in terms of value of produce per megalitre of water and is helping to feed the rest of the world.

The region shares water for its significant wetlands, river and stream ecosystems, irrigated agriculture and other needs. Integrated management of surface and groundwater keeps water tables and water quality at healthy levels for multiple uses.

The SIR and its community are in a strong position to tackle the challenges to 2080.

4.3

Overall Framework for the SIRLWMP 2050

This Plan builds on past achievements, stakeholder partnerships and resilience thinking (Section 3), while aligning with key community and government expectations (Table 3.1) to achieve the 2050 vision for the region.

The Plan focuses on five critical attributes to guide community and agency actions in overcoming environmental, economic and social challenges related to these critical attributes: the status of each attribute is critical to the resilience of the region. The Plan is implemented by sharing decisions around socio-ecological system risks and opportunities. The critical attributes of equal priority are:

1. **Resilient community**
2. **Farm and regional prosperity**
3. **Water availability**
4. **Biodiversity**
5. **Drainage**

These critical attributes are not isolated. There are many connections and overlaps between them that need careful and shared attention when framing and implementing the Plan (Figure 4.1: 2030 and 2050 outcomes).

All critical attributes identified in the 2016 update of the Plan were biophysical. This version identifies the resilience of communities as being critical to all biophysical outcomes, as well being a goal itself. First Nations and climate change are prominent across all critical attributes and require collective effort.

Further details about evaluating the Plan's success and outcome quantities are included elsewhere (see Section 4.4 and Part B background document – in development).

It should be noted that there are on-ground works outputs included in the plan implementation for the four biophysical critical outputs and these are fundamental to the achievement of outcomes. These on-ground works outputs are being identified (with targets set as appropriate) in the Part B background document.

Figure 4.1: 2030 and 2050 outcomes

Water availability

Water is shared collaboratively between the environment, agriculture and other community needs.

Water in a changing climate is used efficiently and appropriately

- Optimal use of water for agriculture with adverse impacts minimised
- Cultural flow water is managed by First Nations
- Water for the environment is managed for maximum ecological benefits
- On-farm and regional water delivery systems are modern and environmentally appropriate
- Regional water policy is locally decided and influenced (at relevant scale)
- Regional community is informed about water issues and climate impacts and is adaptive

Biodiversity

Biodiversity is thriving and resilient in the face of a changing climate and other impacts.

Increased quality and extent of native vegetation

- 'Net gain' within each local government area is implemented
- Environmental water is appropriately managed for ecosystem health
- Environmental works on private and public land are implemented and valued
- Biodiversity and Country are healing with First Nations
- People are connected with nature
- Bold ideas to achieve change are adopted

Drainage

Water is managed and drained adaptively in all SIR catchments while protecting natural and built assets.

Improved drainage and management of drainage water

- Surface and ground water disposal is coordinated
- Surface and groundwater drainage infrastructure is networked and managed
- The area appropriately surface drained is increased and ground water drainage is adaptive
- Partnerships are formed and maintained with relevant stakeholders
- Community expectations, regulatory standards and MDB salinity requirements are met
- The GMID Drainage Management Strategy is being implemented

4.4

Evaluation, Learning and Evolution

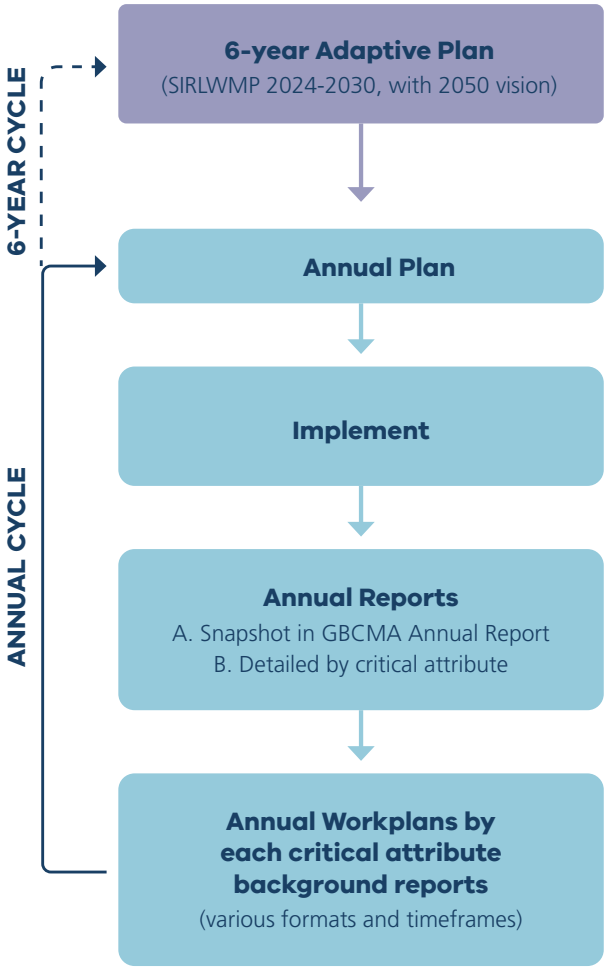
The Plan's socio-ecological context is complex and involves many different people, moving parts and time horizons. Evaluation is therefore challenging but must be done so that the region can adapt appropriately.

The goals (the 2050 vision, 2050 outcomes and 2030 outcomes) define the Plan's intent for success and help frame evaluation of the impacts and progress of actions, as listed for each critical attribute in Section 5.

The evaluation processes developed for the Plan promote ongoing improvement by involving stakeholders in regular shared discussions to question and understand what progress is, how it is measured, and what changes are needed. The framework also helps to assess the effectiveness, efficiency, relevance, impact and sustainability of the Plan's projects and activities, and therefore defines the monitoring needed for improving decisions and accountability.

Regular stages of critical attribute management, such as planning, implementation, monitoring and review, are synchronised to inform the discussions. The two cycles in Figure 4.2 show the expected annual and 6-year cycles. A significant event or change in circumstance, such as a natural disaster or commodity price crash, might cause the cycles to be shortened, but with strong community and agency networks, the resulting shared processes make rapid adjustments possible.

Figure 4.2: SIRLWMP planning cycle



Indicators of the status of the SIR, including critical attributes and management of risks, help frame and inform shared narratives of progress towards the Plan's goals. Table 4.1 includes several indicator targets that help tighten these narratives. Measurement of many other indicators (also listed in Table 4.1) is also useful to inform progress, even when it is not appropriate to have quantitative targets set for them. Qualitative data often complements quantitative data to inform evaluation.

The GBCMA's annual report includes a summary of the Plan's annual and long-term progress.

Table 4.1 is a summary of success indicators: further details are held within partner agencies.

4.5

Success Measures and Targets

Table 4.1: Critical attribute 2050 outcomes and success measures

Critical attribute 2050 outcome	Success measures and other indicators to inform decisions		Target (where appropriate)	
	Parameter	**Indicator summary**	**2030**	**2050**
Resilient community A resilient and capable SIR community is forging its own future in a changing landscape.	**Participation** in NRM	Participant numbers and diversity at various levels Community and government public investment	— $30 million	— —
	Leadership in NRM	Influence of local and regional communities on decisions Involvement by existing and emerging leaders	— —	— —
Farm and regional prosperity Farms and other enterprises are adaptive, growing and contributing to the environment and the community.	**Capacity and motivation** of farmers and others	Wellbeing Financial capacity Community and government (private and public benefit) from Plan investment	— — $60 million	— — —
	Contributors to the environment and community	Various statistics: farmer numbers, area of production, productivity, industry diversity Whole farm plans	— 180 plans	— 780 plans
	Contributions to the environment and community	Farm and other enterprise investments in the environment and the community Various ecosystem services (habitat etc) generated by farms and other enterprises	— to be investigated	— —
	Reduced damage from floods	Floodplain program implementation	81 actions (2018-2028)	—
Water availability Water is shared collaboratively between the environment, agriculture and other community needs.	**Strength** of water market participant collaborations	Regional participant involvement within SIR's processes Regional community influence on state and MDB Volume share of each market participant (from below)	— — —	— — —
	Efficiency of delivery system	Delivery efficiency (%)	85%+	85%+
	Efficiency of farm irrigation systems	Area maintained or improved to 85%+ efficiency	to be determined	to be determined
	Volume of water received by environmental features	Volumes for the environment (high reliability and low reliability)	to be determined	to be determined
	Volume of water for agriculture to achieve delivery-system economic viability	Volume delivered for agricultural use	600GL+	600GL+
	Volume of water delivered to achieve cultural outcomes	Volume delivered as cultural water	to be determined	to be determined
	Volume of water delivered to meet urban needs	Frequency of delivery restrictions	Stage 1 or 2 restrictions: no more frequent than 1 year in 10* Stage 3 or 4 restrictions: no more frequent than 1 year in 20*	
Biodiversity Biodiversity is thriving and resilient in the face of a changing climate and other impacts.	**Reduced risk** to threatened species and ecological communities	Population trajectory and health	—	—
	Extent and quality of habitat for native plants and animals	Extent (area) of native vegetation increased Diversity, quality and connectivity of native vegetation Habitat more permanently protected	1,000 ha — 2,900 ha	4,500 ha — 12,500 ha

Critical attribute 2050 outcome	Success measures and other indicators to inform decisions		Target (where appropriate)	
	Parameter	**Indicator summary**	**2030**	**2050**
Drainage Water is adaptively managed and drained in all SIR catchments while protecting natural and built assets.	**Area** of land with salinity and waterlogging managed	Area of irrigated land drained (high priority)	15,000 ha	66,000 ha
		Area of irrigated land drained (lower priority)	—	52,000 ha
		Area of land at various watertable depths	—	—
		Volumes of groundwater pumped	—	—
		Infrastructure (eg roads, buildings) protected	—	—
	Quality of water	Nutrient levels	Within *Environment Protection Act 2017* tolerance limits	
		SIR Murray River salinity contributions	Comply with MDBA Basin Salinity Management requirements	
		Dissolved oxygen levels	Within prescribed concentrations as included in State or regional waterway management strategy and environmental water management plans	

** Ongoing, as listed in Goulburn Valley Water Urban Water Strategy 2022*

4.6

Economic Analysis of the SIRLWMP 2050

An economic analysis was undertaken by RMCG (2024) which provided an estimate of the economic benefits and costs of the SIRLWMP 2050. The analysis drew heavily on previous work on the assessment of the benefits of irrigation efficiency improvements undertaken as part of the Farm Water Program case studies and also on detailed analysis undertaken on the benefits of surface drainage.

Table 4.2 below summarises the costs and benefits based on the estimates explained in the report. This excludes many of the intangible social benefits associated with the Plan.

The table shows a positive return for total benefits and public benefits. There is a 6% rate of return on public costs with public benefits alone. The following intangible benefits have been unable to be reasonably calculated and have been excluded:

- Additional drought resilience that may arise through the WFP program
- Additional farm and off farm employment that may occur through the program
- Social benefits, for example, reduced neighbour conflict caused by drainage issues.

A sensitivity analysis shows that even if the benefits are 50% of the expected level the plan still has a positive overall net present value and benefit/cost ratio.

Table 4.2: Cost Benefit Analysis Results of Plan (4 year program)

Attribute (rounded totals)	Present Value 4%, 30 years	Public benefits only 4%, 30 years
Present value of costed benefits	$43.3 million (public and private benefits)	$22.8 million (public benefits)
Present value of SIRLWMP program delivery	$19.7 million (public cost) There are no additional private costs relative to the 'without Plan' case	$19.7 million (public cost)
Net present value	$23.6 million	$3.0 million
Benefit/cost ratio	2.2	1.2
Internal rate of return	14%	6%

4.7
Investment Priorities

As outlined in Section 3, the regional community and governments invested significant funds to realise the benefits of the SIRLWMP over the last 30 years. It is expected that this investment approach will continue for the SIRLWMP 2050, and it is crucial that the benefits of implementing the Plan are greater than the costs. The economic analysis for the Plan will be undertaken in early 2024 before the Plan is finalised in mid-2024.

There is always strong competition for resources and funding from both governments and the community, and this is expected to continue throughout the life of the Plan. The economic analysis for the Plan will provide confidence to the community and governments that the proposed actions are a sound investment at the broad plan level. During the life of the Plan, assessment of the best actions and approaches will continue to be investigated as part of ongoing monitoring and evaluation activities embedded in the plan implementation process (see Section 4.4).

Decision makers will use a range of approaches and tools to assess and prioritise works including:

- community and social values
- environmental outcomes
- costs and benefits
- likelihood of success
- risks
- availability of funding.

One of the great strengths of the 1990-2020 SIRLWMP was that it was an adaptable Plan in terms of identifying the risks and opportunities for the SIR which influenced where investment was directed. The Plan set out what was needed to deliver the environmental, economic and social outcomes and then sought funding from a wide range of sources at various times. Some years there may have been interest by irrigators for water efficiency works, other years governments might have a priority for reducing impacts of salinity in the landscape. It is intended that the SIRLWMP 2050 will be an agile and flexible Plan to make the most of all resource opportunities as they become available.

There are three types of actions identified in Section 5 and they are:

- **persisting actions** – those that are not complete or are ongoing and important to the system function
- **adaptive actions** – those that may have been in a different form in the previous Plan, but have needed to be modified or improved
- **transformative actions** – these could be new actions or a completely different direction from previous work.

There were actions identified that were considered to be a priority to implement in the next few years:

- hybrid drainage approaches, including exploring the concept of rewilding
- whole farm planning, including further adaptation to climate change and soil health (this action in particular was seen as a crucial building block for driving change at the farm scale)
- review of community engagement given the changes in how communities are interacting
- working with First Nations' groups and inclusion of their aspirations for the region
- rethinking the opportunities for water systems and water use in drier climate
- reversing the decline of native vegetation habitat.

5. Critical Attributes

5.1
Resilient Community

People and their relationship with the region's land and water is critical to the success of this Plan. The Plan must be relevant and achievable for the region's community. Active involvement of communities, agencies and individuals in the implementation of the Plan is essential. Already, the strength of the SIR's community leadership in environmental protection is widely recognised and will continue to be a defining feature of the Plan (Figure 5.1).

First Nations' rights to self-determination are supported by walking and talking in partnership to provide opportunities to exchange knowledge and connect and care for Country.

The term "community" in this Plan can apply to various scales of place that often relate directly to communities of identity, interest and need, from local rural and urban communities to the SIR community as a whole.

5.1.1
2050 Outcome Sought

A resilient and capable SIR community is forging its own future in a changing landscape.

5.1.2
2030 Outcomes Sought

Increased capacity, stewardship and leadership because:

- Partners are empowered and resources are attained
- People are engaged in Plan development and delivery
- Communities are socially engaged and connected to nature
- First Nations' communities and culture are healing
- The Plan's integrity remains respected.

5.1.3

Current Situation

As mentioned in Section 3, the region's history of environmental management was originally driven by salinisation management in the 1980s. This history created a lasting legacy of strong and resilient partnerships to tackle unforeseen environmental challenges. In the face of social and government changes, our communities and agencies have continued to be good partners and persist in implementing the Plan. These partnerships have endured in the good and bad times by:

- helping each other and not competing
- understanding and respecting each other's role (as a community member or a government funder, regulator, or scientist)
- supporting community leaders to genuinely lead.

Our region has also been supported by the ongoing work of the community-led SIRPPIC. SIRPPIC fosters open communication and builds trust between communities, agencies and partners to ensure the Plan is implemented successfully. As a result, many successful partnerships have been founded to support the Plan (see Section 3.2) which has given governments the confidence to invest in the region.

However, regional communities are always changing, and people are now working and engaging differently both regionally, and at a broader scale. This enables more broad connections across regions, states and nationally. This critical attribute recognises that there is work needed to respond to the changing community and how they interact to ensure the Plan is relevant to communities and partners in the future.

Figure 5.1: 2030 and 2050 outcomes for Resilient Community critical attribute

Resilient Community

2050 Outcome

A resilient and capable SIR community is forging its own future in a changing landscape

2030 Outcomes

Increased community capacity, stewardship and leadership because:

Partners are empowered and resources are attained

People are engaged in Plan development and delivery

Communities are socially engaged and connected to nature

2030 Actions

Set clear boundaries, including roles, responsibilities and expectations.

- Secure funding and other resources for Plan implementation, in line with community expectations.
- Mentor and train potential leaders.
- Support SIRPPIC's networks to build trust and drive community-agency partnerships at all scales: local, regional, State and Commonwealth.
- Target, secure and support community leaders to advocate for the Plan's priorities within the community and beyond.
- Support the community to increase knowledge about climate change and its impacts.
- Share and celebrate successes with the community.
- Connect and support the broader SIR community to the Plan's development and evolution as it responds to change.
- Engage people with diverse backgrounds, ages and skill sets to deliver and implement the Plan.
- Understand and build the capacity of groups and individuals at various levels to:
  - care and be involved
  - provide input
  - make informed decisions
  - direct
  - deliver as part of collective action.
- Evaluate how SIRPPIC and the community are using opportunities such as technology to engage in the Plan and environmental management generally.
- Create community awareness about:
  - environmental values, problems and potential solutions
  - the social-ecological system approach underpinning the Plan
  - the recreational opportunities that nature provides.
- Support environmental education programs and activities being implemented by various bodies, such as Goulburn Murray Landcare Network and RiverConnect.
- Create opportunities to integrate local environmental and agricultural priorities into the curriculum at middle and senior secondary school and tertiary levels, and cross-promote these initiatives.
- Provide opportunities for people to share knowledge, perspectives and opinions.
- Support communities to prepare for and be able to respond to natural disasters.

First Nations' communities and culture are healing

The Plan's integrity remains respected

- Provide opportunities for First Nations people to:
  - connect with Country
  - connect with partners and build collective capacity, including collaborative knowledge and governance
  - co-design the planning and delivery of projects.
- Support regional prosperity through First Nations' economic inclusion in delivering the Plan.

- Provide rigorous evidence to underpin each Plan project. Types of evidence include scientific, environmental, economic, social and cultural.
- Ensure a continuous learning and adaptation approach continues to build on the achievements to date.
- Support SIRPPIC to drive accountability of all Plan-led projects via the relevant forum.
- Collaboratively determine and respond to implications of partner-led and other projects that impact on the Plan.
- Encourage a decision-making framework that allows regional and local communities to decide their futures.

5.2
Farm and Regional Prosperity

Farms and other enterprises underpin our region's social, economic and environmental health. Supporting and coordinating the region's enterprises to continue integrating long-term sustainability practices will provide environmental, social, cultural and economic benefits for the community (Figure 5.2).

5.2.1
2050 Outcome Sought

Farms and other enterprises are adaptive, growing and contributing to the environment and the community.

5.2.2
2030 Outcomes Sought

Increased environmental, social and economic adaptability of farms and other enterprises because:

- Land and water use is optimised
- Carbon and energy are optimised
- Technology efficiencies are made
- The cyclical economy is advanced with waste being used and reduced
- Farms, regional enterprises and the environment are connected
- Local produce is valued-added.

5.2.3

Current Situation

Since 1990, our farmers have faced many challenges, such as:

- changing and variable climate
- variable domestic and world markets
- increasing costs of land, irrigation water, nutrients, energy and technology
- labour shortages
- fluctuating commodity prices
- transformative changes in agriculture and planning policy.

Many of these challenges persist and are projected to worsen in the future (Section 2.3). Despite these challenges, our region remains productive and profitable. Our irrigation farmers and irrigation-dependent industries are continually innovating and diversifying their practices, the technology they use and the markets they access. As a result, agricultural production in the region has increased significantly while using less water. In 2021, the gross value of agricultural productivity in the SIR was $2 billion (ABS 2022).

SIRLWMP initiatives have also supported the increase in agricultural productivity by helping farmers and enterprises make the most of the SIR's natural advantages without damaging the environment or compromising their profits. This support has included:

- between 2008 and 2020, a $2 billion state-of-the-art irrigation delivery system was installed (the GMW Connections Project). It has been complemented by world-class farm infrastructure and management, partly through the Farm Water Program which saved over 80 GL water on farms from 2010-2018
- through SIRLWMP support, irrigators have implemented changes saving both energy and water after having both the energy needs and the irrigation efficiency of their existing irrigation systems assessed
- First Nations' participation in agriculture and NRM has increased through First Nations' ownership of farmland.

The SIRLWMP has demonstrated to the community that productivity benefits and the protection of the region's land and water work hand in hand. However, as farm systems and irrigation-dependent industries transform, many communities face uncertainty and stress. Farmers and communities continually grapple with questions around how to adapt and thrive in the face of rapid change, including a future with even less water. This threatens communities' and farmers' ability to invest in adapting to changes in the environment. The SIRLWMP continues to build further understanding of how irrigated agriculture is changing across the region.

Farmers and enterprises will need ongoing support and work with partners to face future uncertainty and stress. Changing community and farming demographics will alter the way people are approached and engaged to implement the Plan. Government incentives and extension services will still be vital to help farmers and communities understand when to adapt or transform their practices.

As we have seen with the COVID-19 pandemic, our region's communities will continue to respond and change over time. This will create new opportunities and challenges for our agriculture and environment, and the Plan will help guide communities, farmers and enterprises.

Figure 5.2: 2030 and 2050 outcomes for Farm and Regional Prosperity critical attribute

Farm and Regional Prosperity

2050 Outcome

Farms and other enterprises are adaptive, growing and contributing to the environment and the community

2030 Outcomes

Increased environmental, social and economic adaptability of farms and other enterprises because:

- **Land and water use is optimised**
- **Carbon and energy are optimised**
- **Technology efficiencies are made**

2030 Actions

- Support whole property planning, including enterprise adaptation, through whole farm planning and extension.
- Map and analyse land and water use data.
- Research the impact of climate change on agricultural land and water use.
- Provide a central point of support for developers and landowners to access information on land use change and irrigation development (via ARC).
- Support GMW to modernise the irrigation delivery system and optimise the overall footprint.
- Encourage the redesign of irrigation farms to capitalise on, and align with, modernised irrigation delivery.
- Provide landowners with access to data and information to transform their properties.
- Support local government to include agricultural, floodplain and environmental needs in land use planning.
- Influence state government regulations that constrain local government planning decisions concerning agriculture and the environment.
- Provide balanced information about the carbon market and opportunities to participate.
- Promote conjunctive use of agriculture, renewable energy and enhance connections to the wider grid.
- Influence state government to amend planning schemes to support renewable-energy production on serviced low-value and other appropriate land.
- Assist landowners to improve soil health through carbon capture.
- Assess and provide advice on the performance and energy efficiency of irrigation systems.
- Create opportunities for landowners to become aware of and adopt new technology and information systems to support their decision-making.
- Strengthen linkages with universities and start-up companies who are working in the agricultural technology space.
- Encourage and support the need for local agricultural research capacity.

The cyclical economy is advanced with waste being used and reduced

- Simplify available circular economy information into information packages suitable for landholders, covering topics such as circular economy principles and new technologies such as, changing agricultural waste into energy sources/ fertilisers and minimising material inputs.
- Promote the use of closed-loop optimisation.
- Promote and encourage the use of waste products in energy systems, such as anaerobic digesters, micro grids, community energy, and regionally-based systems.

Farms, regional enterprises and the environment are connected

- Apply the Northern Victoria Irrigation Development Guidelines so that new developments meet high standards.
- Provide farmers and whole farm plan designers with access to information so they can factor environmental sensitivities into planning.
- Provide opportunities for First Nations' involvement in farm and other enterprise plans.
- Incorporate biosecurity into farm planning.
- Promote the use of the Agricultural Redevelopment Coordinator to guide developers.
- Provide landowners with research information on climate-change impacts on agricultural land, water availability, water quality, seasonal changes, and productivity.

Local produce is value-added

- Implement the Goulburn Murray Resilience Strategy to improve the resilience of the area, including the agricultural sector.
- Create opportunities for locals and visitors to experience the connection between local agriculture and their food.
- Support all scales of enterprise to value-add within the region, from small farmers to large manufacturers and food-processing companies.

5.3
Water Availability

The SIR is characterised by a reliable and abundant supply of water including both rain-fed and storages. The Goulburn Broken and Campaspe catchments support internationally and nationally significant wetlands, rivers, streams and their associated ecosystems, irrigated agriculture, the regional economy and areas downstream. To protect our water supply, we need community support to achieve equitable, efficient and appropriate water sharing for environmental, social, cultural and economic needs across the region (Figure 5.4).

5.3.1
2050 Outcome Sought

Water is shared collaboratively between the environment, agriculture and other community needs.

5.3.2
2030 Outcome Sought

Water in a changing climate is used efficiently and appropriately because:

- Optimal use of water for agriculture with adverse impacts minimised
- Water for the environment is managed for maximum ecological benefits
- Cultural flow water is managed by First Nations
- Regional water policy is locally decided or influenced (at relevant scale)
- On-farm and regional water delivery systems are modern and environmentally appropriate
- Regional community is informed about water issues and climate impacts and is adaptive.

5.3.3
Current Situation

The Goulburn Broken and Campaspe catchments are important water sources and most of the Goulburn Broken catchment's water flows through the SIR. The catchment also generates 11% of the Murray-Darling Basin's water. While the region has access to a significant catchment, water security and availability is still a challenge (Section 2.3) in the region due to:

- climate change and variability causing extended dry sequences that have reduced storage inflows
- rising global food demand has seen an increase in competition for water for agriculture, which has resulted in higher water prices
- changing environmental watering requirements
- water is traded out of the SIR to other users in the MDB
- increased downstream demand in Victorian, New South Wales and South Australian Murray systems has caused high unseasonal summer flows that reduced streambank stability along the Murray and Goulburn Rivers.

WATER AVAILABILITY FOR THE ENVIRONMENT

Many of the SIR's rivers, streams and floodplain wetlands are nationally and internationally significant, including the Ramsar-listed Barmah National Park.

Water for the environment began to be set aside and delivered specifically for the SIR's environment in the early 1990s. There was mixed success in those ground-breaking years due to the small volume of environmental water available and the developing scientific knowledge.

The 8,662 GL of water delivered for the environment since the early 1990s has had targeted biodiversity and water quality objectives. Environmental water has been delivered to the Goulburn River, Broken River, Campaspe River, Barmah-Millewa Forest floodplain, Kinnairds Wetland, Reedy Swamp and private land.

More water has been made available for the environment by purchase of water from irrigators (both through buybacks and improving farm water efficiency) as well as reducing losses in the public supply system. In recent years, an increase in water delivered for the environment has significantly reduced environmental risks in our region.

WATER AVAILABILITY FOR AGRICULTURE

The SIR's prosperity depends on enough water being available at the right time and at the right price for irrigated agricultural enterprises. To prepare for reduced long-term water availability and reduce costs, our irrigators are continuing to innovate and invest in modernised systems. Since 1990, our irrigators have invested $2 billion on-farm to increase their productivity while using less water (Figure 5.3). The diversity of agricultural industries in the SIR enables the region to remain resilient, responsive and adapt to changes in water availability. The SIR includes irrigators in districts as well as private diverters within the region.

Downstream of the SIR, large horticultural enterprises continue to increase water use for new permanent plantations and maturing trees. In drier years, horticulture usually outbids dairying and others for water, resulting in significant net trade of water downstream. As a result, deliveries of water in the SIR have declined significantly and are at risk of reducing further. However, the SIR remains attractive for investment in water use and irrigation development when low long-term costs are factored in, such as transporting goods to market, natural climate advantages and water delivery losses.

Figure 5.3: Water delivered for the environment and agriculture in the SIR, ML.

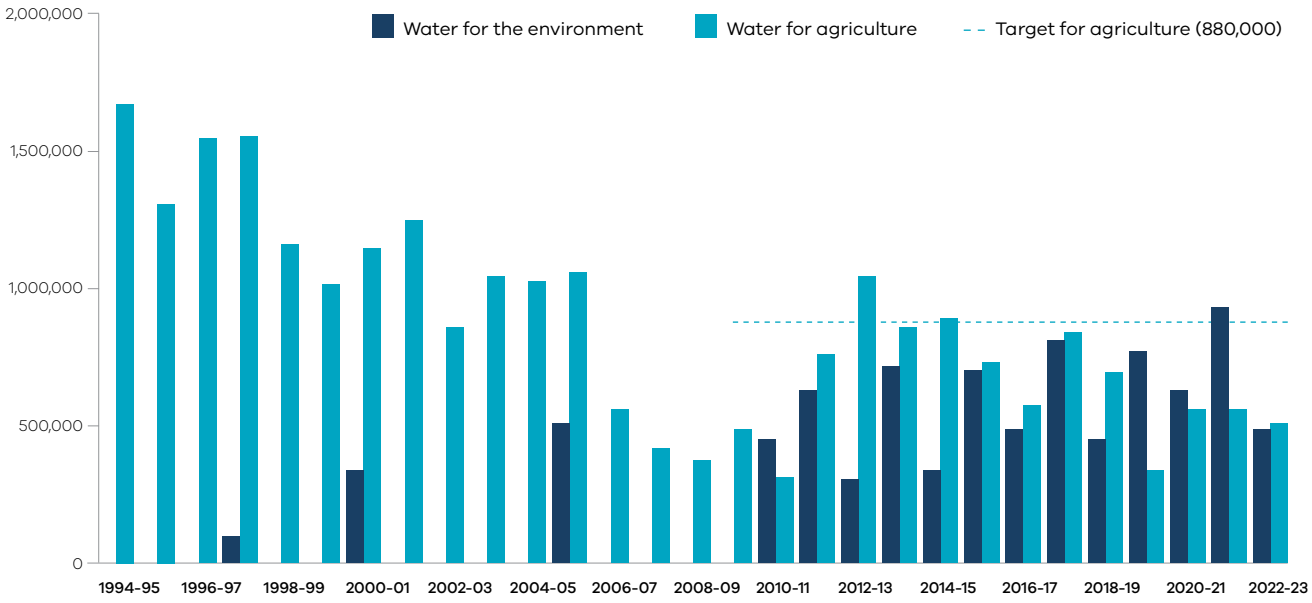


Figure 5.4: 2030 and 2050 outcomes for Water Availability critical attribute

Water Availability

2050 Outcome

Water is shared collaboratively between the environment, agriculture and other community needs

2030 Outcomes

Water in a changing climate is used efficiently and appropriately because:

- **Optimal use of water for agriculture with adverse impacts minimised**
- **Water for the environment is managed for maximum ecological benefits**
- **Cultural flow water is managed by First Nations**

2030 Actions

- Deliver programs which support a minimum of 600,000 ML for agriculture within the SIR (in an average season with 100% allocation).
- Keep water delivery efficiency in the district systems greater than 85%.
- Support the broader community to advocate for water security through advocacy bodies ie the Goulburn Murray Water Leadership Group.
- Support irrigation farmers and agencies in preparing for climate extremes ie drought and flood.
- Support water users to be more flexible and responsive to match water availability in a dynamic landscape.
- Develop annual seasonal watering proposals for priority waterways and wetlands so they meet the needs of the environment while considering those of agriculture and the community.
- Monitor and evaluate implementation of seasonal watering plans.
- Work with First Nations to include cultural flow values when water for the environment is planned and delivered.
- Support First Nations to manage cultural flow water.
- Provide opportunities for the broader community to collectively understand cultural flow water and build relationships with First Nations people.

Regional water policy is locally decided or influenced (at relevant scale)

- Support SIR communities and individuals to regularly contribute to water-sharing policies and rules that affect SIR water use.
- Develop a regional prospectus to showcase SIR's water availability advantages and opportunities.
- Provide avenues for water policy agencies to inform and coordinate support for communities (including Agricultural Redevelopment Coordinator).
- Communicate the environmental, social and cultural benefits as well as immediate economic benefits from irrigation water.
- Strengthen diverse community leadership, relationships and influence in water decisions.

On-farm and regional water delivery systems are modern and environmentally appropriate

- Investigate the impact of changing water, land use and climate on the SIR.
- Develop mechanisms to adjust water delivery infrastructure efficiently to maximise benefits and reduce costs.
- Support irrigators to improve water efficiency on farms in an environmentally sustainable way.

Regional community is informed about water issues and climate impacts and is adaptive

- Create opportunities for water users to learn and respond to all water availability issues, water quality, drought and alternative water sources (ie groundwater).
- Collaborate researchers to ensure regional water questions (including climate impacts) are investigated eg One Basin CRC.
- Build awareness and skills of community to enable transition to a future with less water and changing climate patterns.
- Continue to provide irrigators with easy access to water information, including:
  - summarising the scattered and increasing information available
  - conducting a gap analysis.

5.4
Biodiversity

In our region, many species of flora and fauna and other organisms are at very high risk due to threats such as clearing of native vegetation on private land. Native vegetation extent and quality in the SIR need to be significantly improved to provide more habitat to ensure species adapt to the changing climate (Figure 5.5).

5.4.1
2050 Outcome Sought

Biodiversity is thriving and resilient in the face of a changing climate and other impacts.

5.4.2
2030 Outcome Sought

Increased quality and extent of native vegetation because:

- 'Net gain' within each local government area is implemented
- Environmental water is appropriately managed for ecosystem health
- Environmental works on private and public land are implemented and valued
- People are connected with nature
- Biodiversity and Country are healing with First Nations
- Bold ideas to achieve change are adopted.

5.4.3

Current Situation

Biodiversity is a critical attribute for this Plan and the region. Native vegetation is a key component of biodiversity and is crucial for the health of our environment and ecosystem services. During the 20th century, agricultural development in the SIR saw rapid removal of native vegetation that resulted in a decline and loss of flora and fauna species. More than 97% of plains grassy woodland on private land was cleared.

The SIR community has been working together to improve the amount, quality and connectivity of native vegetation. SIRLWMP activities have protected and enhanced native vegetation, including connection of remnants on private and public land, such as land reserves and roadsides. Through extensive stakeholder partnerships under the Plan, there has also been environmental water delivery and monitoring for significant wetlands, such as Reedy, Doctors, Brays, Kinnairds and Black swamps, as well as for smaller reserves with native vegetation.

Despite ongoing efforts by our stakeholders and landholders to improve native vegetation extent, the scale of change is still not enough to ensure long-term survival of all native species. Remaining native vegetation on private land is largely fragmented, with a lack of native grasses, shrubs, ground layer, fallen logs and other habitat elements for hosting diverse flora and fauna. Even though there are significant remnants on public land such as Barmah National Park (28,520 hectares), Lower Goulburn National Park (9,310 hectares), Murray River Reserve and Broken-Boosey State Park, many species are still at very high risk. Continued clearing through permitted and illegal direct removal is putting our environment at risk of further degrading into an unhealthy state.

Figure 5.5: 2030 and 2050 outcomes for Biodiversity critical attribute

Biodiversity

2050 Outcome

Biodiversity is thriving and resilient in the face of a changing climate and other impacts

2030 Outcomes

Increased quality and extent of native vegetation because:

- 'Net gain' within each local government area is implemented
- Environmental water is appropriately managed for ecosystem health
- Environmental works on private and public land are implemented and valued

2030 Actions

- Reduce the impact of development on biodiversity by advocating, with partners, for improved legislation, policy and procedures.
- Support the transition from firewood to alternative heating to reduce loss of old growth trees.
- Support compliance activities that reduce illegal firewood collection.
- Deliver environmental water to priority floodplain systems without impacting the values of other environmental systems.
- Restore natural flow paths and provide appropriate drainage.
- Investigate new opportunities for restoring ecosystem health, including protection of threatened species.
- Monitor environmental water delivery sites in accordance with best practice.
- Partner with private wetland partners to deliver environmental water and protect wetlands.
- Support land managers to manage pest plants and animals through resourcing or providing information.
- Increase opportunities to protect habitat permanently on private property.
- Restore and protect native vegetation using the latest scientific tools.
- Implement priority threatened species action statements.
- Establish or enhance corridors to increase landscape connectivity.
- Plan for alternative climate futures, considering implications such as species movement, seed supply, genetics and provenance.

People are connected with nature

- Improve landholder and community awareness of the value of biodiversity.
- Provide natural environment volunteering opportunities.
- Expand biodiversity related citizen-science opportunities.
- Support creation of enhanced nature experiences to improve mental and physical health.
- Grow partnerships such as the Greater Shepparton City Council-led RiverConnect and support other equivalent projects, especially those involving youth and multiple cultures.
- Partner with schools and universities to increase awareness of the value of biodiversity.

Biodiversity and Country are healing with First Nations

- Support implementation of First Nations' Country Plans.
- Support collaborative governance between First Nations and partners.
- Support knowledge-sharing and planning between First Nations and partners.
- Support First Nations' involvement in the delivery of biodiversity initiatives.

Bold ideas to achieve change are adopted

- Support carbon farming and other climate initiatives where they contribute to biodiversity and provide alternative income opportunities for land managers.
- Explore opportunities from emerging government initiatives, such as Nature Positive planning.
- Develop new ways to permanently protect habitat to complement existing mechanisms.
- Develop innovative partnerships and models to increase biodiversity funding.
- Achieve biodiversity outcomes through innovative solutions for solar and other mixed-use developments.

5.5
Drainage

Our region and its landscapes are defined by irrigation for agricultural production. To minimise the impact of irrigation, support is needed to integrate management of surface water and groundwater across the SIR's farms and landscapes. Management and support are particularly required following large amounts of rainfall to keep water table levels and river and stream water quality within acceptable limits.

5.5.1
2050 Outcome Sought

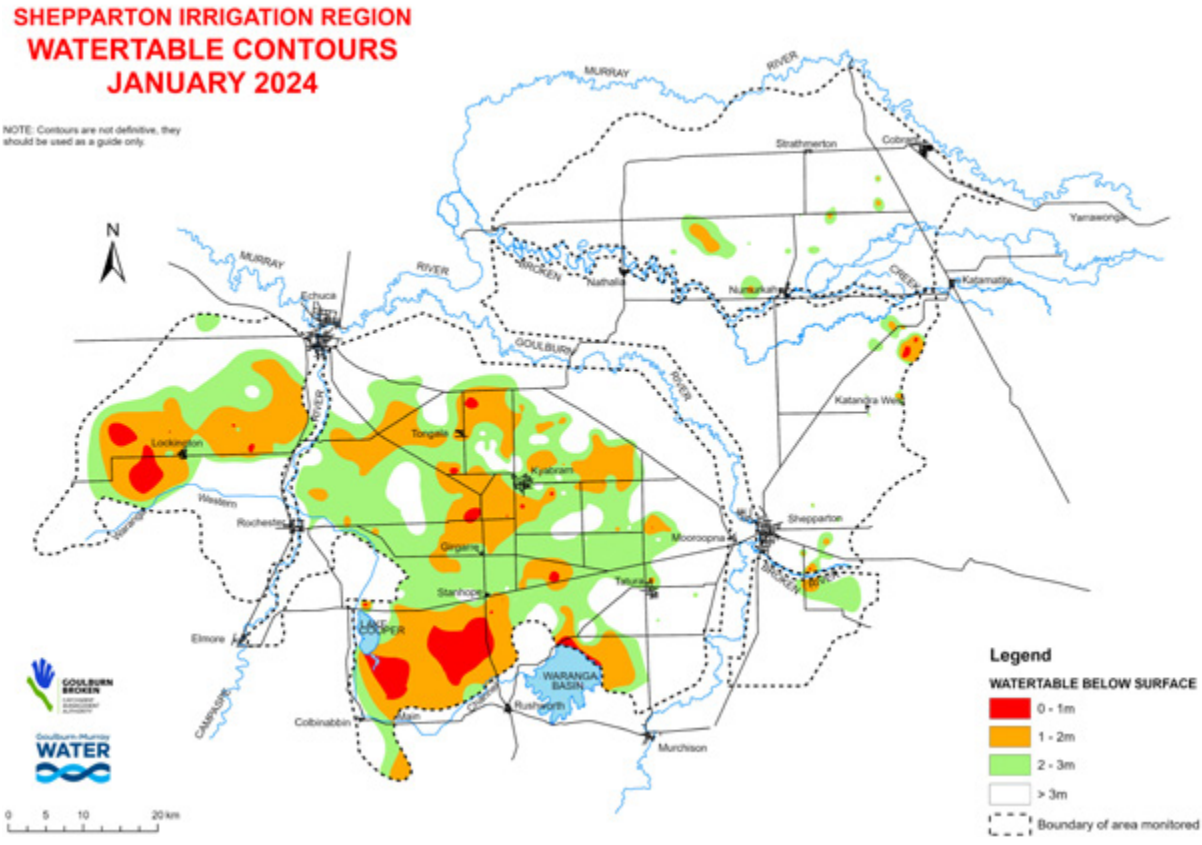
Water is managed and drained adaptively in all SIR catchments while protecting natural and built assets.

5.5.2
2030 Outcome Sought

Improved drainage and management of drainage water because:

- Surface and groundwater disposal is coordinated
- Surface and groundwater drainage infrastructure is networked and managed
- The area appropriately surface drained is increased and groundwater drainage is adaptive
- Partnerships are formed and maintained with relevant stakeholders
- Community expectations, regulatory standards and MDB salinity requirements are met
- The GMID Drainage Management Strategy is being implemented.

Figure 5.6: SIR Watertable Contour Map of January 2024, Response after the October 2022 Floods and high rainfall in 2023



5.5.3

Current Situation

Large drainage improvements since 1990 have supported widespread gains for agriculture, the environment, community and water quality. A lot has been achieved, but there is still more to do.

Drainage needs within the SIR have changed from addressing the high salinity and waterlogging risks of the 80s and 90s to the current risks posed by changes in water and land use and more variable and intense rainfall events.

Most recently, our region has focused on improving our water drainage systems and management approach for both surface water and shallow groundwater. Drainage systems are managed at all levels from government to landholder. This includes:

- GBCMA and GMW jointly managing drainage to support agriculture and the environment. Drainage management is tailored to meet varying risks across the SIR's irrigable land, and it remains a high priority in sub-catchments where drainage improvement is still needed across 103,000 hectares.
- Maintaining a surface drainage and groundwater pumping buffer and managing water table accessions resulting from intense rainfall events. These rainfall events tend to be localised, random and increasingly occur in summer.
- Drainage Course Declarations (DCD) and associated obstruction removal programs have been piloted under the SIRLWMP to remove blockages within declared drainage courses. They have connected fragmented natural drainage lines and restored natural flows within the catchment. This program has reduced water logging and salinity impacts, which has increased agricultural productivity, enhanced environmental values and protected infrastructure.

SIR surface water is naturally of good quality and is generally suitable for various human and environmental uses. However, our region's water quality has improved greatly since 1990. Thanks to a drier climate and our communities adopting large-scale water efficient infrastructure and practises, our region has significantly reduced water flows and associated salt and nutrients in SIR channels and drains that outfall into the Murray River.

The SIRLWMP balances farm salinity and productivity with the removal of salt from the landscape for disposal. Saline groundwater, irrigation channel and drain flows are disposed of through tight operational procedures.

As a result, salt loads from the SIR entering the Murray River are minimal compared to load contributions by downstream irrigation regions. Our region also contributes significantly less salt than legally allowed by the state.

Similarly for salt, nutrient loads have also been reduced by the decline in water volumes out-falling into streams from channels and drains. Actions directly implemented by our communities, partners and landholders under the SIRLWMP have been major contributors of nutrient reduction.

Figure 5.7: Annual phosphorus loads from all irrigation drains in the Goulburn Broken Catchment, tonnes per year

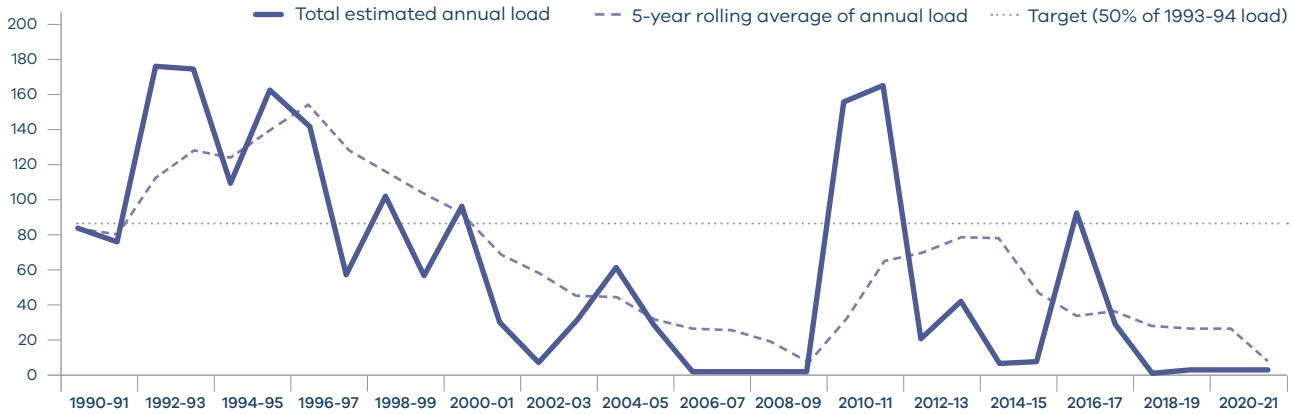


Figure 5.8: 2030 and 2050 outcomes for Drainage critical attribute

Drainage

2050 Outcome

Water is managed and drained adaptively in all SIR catchments while protecting natural and built assets

2030 Outcomes

Improved drainage and management of drainage water because:

- Surface and groundwater disposal is coordinated
- Surface and groundwater drainage infrastructure is networked and managed
- The area appropriately surface drained is increased and groundwater drainage is adaptive

2030 Actions

- Review disposal rules and implement recommendations.
- Explore and invest in modern drainage technologies.
- Formulate long-term drainage plans.
- Continue to adapt monitoring of water quality in rivers, drains, and wetlands.
- Initiate and monitor pilot programs to rewild DCD pathways.
- Develop and implement operations and maintenance plans for surface water and groundwater.
- Develop and implement targeted infrastructure projects.
- Align and consistently manage the drainage and irrigation networks.
- Continue the Drainage Course Declaration (DCD) Program.
- Review the threat status of SIR salinity, including drivers.
- Conduct innovative studies to identify areas requiring drainage system enhancements.

Partnerships are formed and maintained with relevant stakeholders

- Build consensus with local stakeholders and jointly implement drainage effectiveness projects.
- Provide opportunities for First Nations to include cultural values, knowledge and aspirations for water management in drainage decisions.
- Educate the community about the importance of drainage effectiveness and their role in flood mitigation, preserving water resources and ecosystems.

Community expectations, regulatory standards and MDB salinity requirements are met

- Continue surface water and groundwater monitoring.
- Annually review compliance with *Environment Protection Act 2017* Environmental Reference Standards and Basin Salinity Management 2030 strategy (BSM2030) obligations.
- Participate and influence Victorian Salt Disposal Working Group to ensure compliance with BSM2030.
- Coordinate and manage the regional responsibilities for salinity according to BSM2030.
- Conduct surveys to assess the health and diversity of ecosystems and species in the region, guiding conservation efforts and ecological restoration initiatives.

The GMID Drainage Management Strategy is being implemented

- Implement GMID Drainage Management Strategy (DMS) recommendations in the SIR.
- Maintain the GMID DMS Coordinating Committee to oversee and manage implementation.
- Regularly monitor and evaluate the effectiveness of drainage projects and adjust strategies to achieve medium-term outcomes.

6. Glossary of Terms

Biodiversity
The variety of life in the world or in a particular habitat or ecosystem.

Buybacks
Direct purchase of water rights from irrigators by the Commonwealth Government.

Circular economy
A circular economy is an economic system based on reuse and regeneration of materials or products in an environmentally friendly or sustainable way.

Community
Communities are defined as a group of people living in the same place or having a similar characteristic, attitude or interest in common.

Cultural flows
Water entitlements that are legally and beneficially owned by Indigenous Nations of a sufficient and adequate quantity and quality to improve the spiritual, cultural, environmental, social and economic conditions of those Indigenous Nations. This is our inherent right". This definition was developed by representatives from 31 Aboriginal Nations at a joint meeting of the Murray Lower Darling River Indigenous Nations and adopted by the Northern Basin Aboriginal Nations - the Echuca Declaration, September 2010 (MLDRIN 2007).

Critical attribute
Critical attributes are critical to a systems identity and how it functions; has limits, range or distribution that are at or near threshold levels in terms of maintaining the system's identity and function; and can be influenced through intervention and is therefore a focus for shared decisions around socio-ecological system risks and opportunities.

Ecosystem
A diverse and changing set of living organisms within a community, interacting with each other and the physical elements of the environment in which they are found.

Net gain
Where actions to compensate unavoidable losses contribute to longer term gains in quality and quantity.

Ramsar
The Convention on Wetlands is an intergovernmental treaty adopted on 2 February 1971 in the Iranian city of Ramsar, on the southern shore of the Caspian Sea. Though nowadays the name of the Convention is usually written "Convention on Wetlands (Ramsar, Iran, 1971)", it has come to be known popularly as the "Ramsar Convention"; (Source: www.ramsar.org).

Registered Aboriginal Parties
Registered Aboriginal Parties are the voice of Aboriginal people in managing and protecting Aboriginal cultural heritage under the *Victorian Aboriginal Heritage Act 2006*. The Act recognises Aboriginal people as the primary guardians, keepers and knowledge holders of Aboriginal cultural heritage.

Resilience
Resilience is the ability of the Catchment's people and environment 'to absorb a shock or setback and to flourish in spite of it, maybe even because of it'. It does not mean 'ploughing through' and doing what we have always done. It is the capacity to cope with change and continue to evolve positively.

Rewilding
Rewilding is the process of restoring the environment to a more natural state and reducing human influence.

Socio-ecological systems (SES)
Linked and generally similar systems of people and nature, taking into account cultural, political, social, economic, ecological and technological components.

Sustainability
The ability to maintain an ecological balance without depleting natural resources.

Thresholds
A breakpoint between two states of a system that must be exceeded to begin to produce some sort of effect or response.

7. Abbreviations and Acronyms

ABS
Australian Bureau of Statistics

ARC
Agricultural Redevelopment Coordinator

BoM
Bureau of Meteorology

CMA
Catchment Management Authority

COVID-19
Coronavirus 2019

DAWE
Department of Agriculture, Water and Environment

DCD
Drainage Course Declaration

DDWCAC
Dja Dja Wurrung Clans Aboriginal Corporation

DEECA
Department of Environment, Energy and Climate Adaptation

GB
Goulburn Broken

GBCMA
Goulburn Broken Catchment Management Authority

GBRSSPAC
Goulburn Broken Region Salinity Pilot Program Advisory Council

GL
Gigalitres

GMID
Goulburn Murray Irrigation District

GMLN
Goulburn Murray Landcare Network

GMW
Goulburn-Murray Water (Rural Water Authority)

GSCC
Greater Shepparton City Council

ha
Hectares

LWMP
Land and Water Management Plan

MDB
Murray-Darling Basin

ML
Megalitres

MLDRIN
Murray Lower Darling Rivers Indigenous Nations

NCCMA
North Central Catchment Management Authority

NFF
National Farmers Federation

NRM
Natural Resource Management

RAP
Registered Aboriginal Party

RCS
Regional Catchment Strategy

RDV
Regional Development Victoria

RMCG
RM Consulting Group

SES
Socio-economic system

SIR
Shepparton Irrigation Region

SIRLWMP
Shepparton Irrigation Region Land and Water Management Plan (1990 – 2020)

SIRPPIC
Shepparton Irrigation Region People and Planning Integration Committee

SOO
Statement of Obligations

TLaWC
Taungurung Land and Waters Council

VSA
Victorian Skills Authority

YYNAC
Yorta Yorta Nation Aboriginal Corporation

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