



# Water Sensitive Cities Benchmarking and Assessment

Mildura Rural City Council Area



E2DESIGNLAB



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FORGE AHEAD



CRC for  
Water Sensitive Cities



**Document Title**

Water Sensitive Cities Benchmarking and Assessment: Mildura Rural City Council Area

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**Workshop facilitation**

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# 1. Introduction

*Water sensitive cities are resilient, liveable, productive and sustainable. They interact with the urban hydrological cycle in ways that: provide water security for economic prosperity through efficient use of diverse water resources; enhance and protect the health of watercourses and wetlands; mitigate flood risk and damage; and create public spaces that harvest, clean and recycle water. Its strategies and systems for water management contribute to biodiversity, community health and wellbeing, carbon sequestration and reduction of urban heat island effects.<sup>1</sup>*

Through the planning and delivery of a Water Sensitive Cities (WSC) conceptual framework, urban areas can exploit the synergies between local water management and urban greening while creating resilient and liveable neighbourhoods. This is achieved by strengthening governance arrangements, building community capital, and investing in multifunctional adaptive infrastructure. This is complimented by the provision of high quality and connected open spaces, protecting and enhancing the ecological values of the urban landscape, providing a diversity of water supply options and recreating a more natural water cycle that restores soil moisture while reducing stormwater runoff.

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) is an Australian research centre that brings together many disciplines, world-renowned subject matter experts, and industry thought leaders to revolutionise urban water management in Australia and overseas.

The CRCWSC has developed a tool driven by the best research to understand how far towards a water sensitive city places are so they can take steps and track progress toward that goal. Communities expect efficient, water-supported, vibrant cities and this is a great way to see how we are doing in delivering those outcomes. The purpose of the WSC Index Tool is to guide governments and organisations to transition cities into liveable, resilient, sustainable and productive places through water related actions.

Mildura was benchmarked using the WSC index in October, 2017 with the participation of staff from Mildura Rural City Council, Lower Murray Water, the Mallee Catchment Management Authority and the Department of Environment, Land, Water and Planning. The goal was to share knowledge across organisations and come to an understanding of how far towards a water sensitive city the Mildura urban area is now.

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<sup>1</sup> <http://watersensitivecities.org.au/>

## 2. WSC Index Tool

*Water Sensitive Cities are a way of understanding water's role in place-making through a broad understanding of the way it contributes to the identity and liveability of a city. People need water for drinking and washing, but also for cool, healthy, green places to live, work and play.*

The WSC Index Tool has undergone multiple development phases including a co-design process with industry partners. Its application relies on cross-organisational knowledge sharing and collaboration that strengthens broader industry relationships to deliver commitment to action.

The WSC Index aims to:

- Provide a communication tool for describing key attributes of a Water Sensitive City;
- Articulate a shared set of goals of a Water Sensitive City;
- Provide benchmarking for a city's water-sensitive performance;
- Measure the progress and direction towards achieving Water Sensitive City goals; and
- Assist decision-makers prioritise actions, define responsibility and foster accountability for water-related practices.

The WSC Index Tool identifies all the key components (indicators) of a Water Sensitive City. The Tool covers 7 goals and assesses 34 indicators that represent important attributes of a Water Sensitive City. It is designed to benchmark cities based on water sensitivity

performance and provides users with the capacity to monitor and evaluate potential management actions against performance to make the most impact with available resources. It enables users to explore measures that deliver improvements in liveability, sustainability, resilience and productivity.

A summary of the goals and indicators of the WSC Index Tool are listed in the following section.

It is anticipated that subsequent benchmarking would be undertaken every two to three years in order to track progress and achievements.

The CRCWSC, E2Designlab and Foundry have partnered to apply the Index across various scales and locations throughout Australia.

The index is designed to benchmark cities and regions based on water sensitivity performance and provides users with the capacity to monitor and evaluate potential management actions against performance to make the most impact with available resources. It enables users to explore measures that deliver improvements in liveability, sustainability, resilience and productivity.

Further reading regarding the design and application of the WSC Index Tool can be found here:

<https://watersensitivecities.org.au/solutions/wsc-index/>

## Summary of Goals and Indicators

Ensure good water sensitive governance	Increase community capital	Achieve equity of essential services	Improve productivity and resource efficiency	Promote adaptive infrastructure	Improve ecological health	Ensure quality urban space
Knowledge, skills and organisational capacity	Water literacy	Equitable access to safe and secure water supply	Maximised resource recovery	Diversify self-sufficient fit-for-purpose water supply	Healthy and biodiverse habitat	Activating connected urban green and blue space
Water is key element in city planning and design	Connection with water	Equitable access to safe and reliable sanitation	Low GHG emission in water sector	Multi-functional water infrastructure	Surface water quality and flows	Urban elements functioning to mitigate heat impacts
Sound institutional arrangements and processes	Shared ownership, management and responsibility of water assets	Equitable access to flood protection	Water-related business opportunities	Integration and intelligent control	Groundwater quality and replenishment	Vegetation coverage
Public engagement, participation and transparency	Community preparedness and response to extreme events	Equitable and affordable access to amenity values of water-related assets	Low end-user potable water demand	Robust infrastructure	Protect existing areas of high ecological value	
Leadership, long-term vision and commitment	Indigenous involvement in water planning		Benefits across other sectors because of water-related services	Infrastructure and ownership at multiple scales		
Water resourcing and funding to deliver broad societal value				Adequate maintenance		
Equitable representation of perspectives						

## 2.1 1 Process for Rating Indicators

A full day workshop was held at Mildura Rural City Council, on the Tuesday of 24<sup>th</sup> Oct, 2017. Participants included internal stakeholders from a range of council departmental units and external stakeholders including Lower Murray Water and the Mallee Catchment Management Authority. A three-step method for scoring each indicator was used:

1. Live polling to gauge individual participants' perspectives on the score for the indicator in question;
2. Interactive discussion to uncover evidence and justification to inform the indicator's score; and
3. Reaching consensus amongst the participants on the score to be assigned.

The live polling used a bespoke web-based tool that participants accessed through their mobile devices to attribute a score of 1-5 to each rating which showed the collective results in real-time. These results were then discussed, with evidence identified (e.g. policy documents, organisational materials, expert views, etc.) to support the various scores attributed to the indicators before reaching consensus on a given rating and level of confidence.



Figure 1. Langtree Avenue, Mildura

## 2.1 Interpreting WSC Index Scores

Three analytical frameworks support interpretation of the index scores and provide insight into the management responses that should be prioritised to advance water sensitive practice: (1) city state benchmarking (2) water sensitive goals (3) principles of water sensitive practice, and (4) water sensitive outcomes. For the purpose of reporting in this document the city state benchmarking and water sensitive city goals are used.

### City State Benchmarking

The Urban Water Transitions Framework identifies evolving socio-political drivers and service delivery functions as six distinct developmental states that cities may fulfill in response to society's expanding objectives for urban water management. The city state benchmarking provides the first analytical lens, based on a subset of all indicators that are rated above or equal to the threshold values associated with each idealised city-state.

### Water Sensitive Goals

The benchmarking for indicators is analysed against the 7 goals of a Water Sensitive City and include:

- Ensure good water sensitive governance
- Increase community capital
- Achieve equity of essential services
- Improve productivity and resource efficiency
- Improve ecological health
- Ensure quality urban space, and

- Promote adaptive infrastructure.

### Principles of Water Sensitive Practice

The three pillars of practice that are essential to deliver water sensitive services are:

- Water-Sensitive Communities where people engage in water-conscious behaviours, feel connected to their water environments and appreciate the many values of water;
- Cities as Catchments to provide resources at different scales in fit-for-purpose applications; and
- Cities providing Ecosystem Services to integrate water sensitive practices into the urban landscape, providing multiple benefits such as heat mitigation, ecological health and landscape amenity.

### Water Sensitive Outcomes

Water sensitive outcomes assesses the performance of the urban water system against the delivery of resilience, liveability, sustainability and productivity. Resilience in this context is defined as the capacity to maintain water system services under acute or chronic disturbances, through adaptation or recovery. Sustainability is the capacity of water system services to deliver benefits for current and future generations. Liveability is the capacity of the water system to deliver a high quality of life for communities (such as thermal comfort, aesthetics, amenity, connection to place, etc.). Productivity is the capacity of the water system services to generate economic value.

### 3. Evaluation of Performance

#### 3.1 City State Benchmarking

Figure 2 summarises the city state benchmarking results for the Mildura Rural City Council. Percentage attainment for each city state ranged from 100% as a supply city and sewer city down to 14% as a Water Sensitive City. This section summarises the key elements that contribute to the overall percentage attainment of each city state.

#### 100% attainment of water supply city and sewer city

Mildura rated 100 % as a water supply city. The entire community has equitable access to safe and secure drinking water. Water is affordable and Lower Murray Water, through the assistance of state government, offers hardship programs offering some assistance with concessions and stepped tariffs.

Similarly, Mildura rated 100 % as a sewer city because everyone has access to safe and reliable sanitation. All buildings are connected to the sewer system across the urban area and all discharge is managed through transfer to a wastewater treatment plant where the water is treated to 'developed world standards' prior to release or reuse.

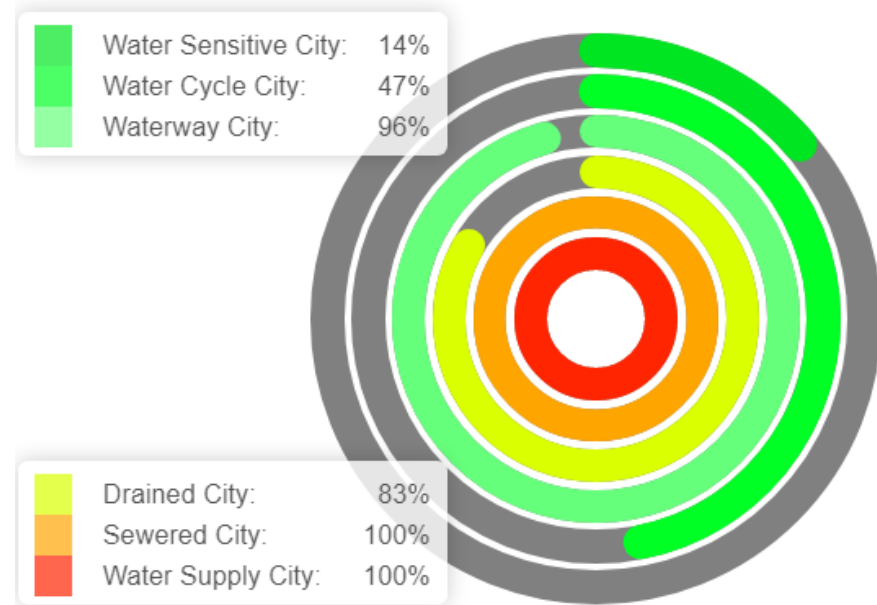


Figure 2. Benchmarking results for Mildura Rural City Council

#### 83% attainment of drained city

Mildura rated 83% as a drained city. Rainfall events generally do not disrupt everyday activities. Extreme events can overwhelm the local drainage system and may affect some property in some areas. The 2011 floods delivered unprecedented flood levels with properties experiencing flooding for the first time (typically Mildura does not get impacted by riverine flooding). Detention measures throughout catchments help reduce flooding impacts associated with peak flood events.



## **96% attainment of waterway city**

Mildura rated 96% as a waterway city. The Murray River, its floodplains and wetlands are multi-functional, accessible to the community and deliver multiple beneficial outcomes. Kings Billabong and Deakin Avenue's green corridor are valued highly by the community and regularly used. In general, the urban landscape is considered pleasant to work and live in. New urban areas are well designed with drainage networks connecting to wetlands and complementing pathways. Older areas are not as well connected and usually a drive is required to reach walking trails.

Leadership and collaboration around integrated water management is showing promising signs for improving practice. The Council, Lower Murray Water and Mallee Catchment Management Authority have done some work in this space, but efforts remain ad hoc with funding perceived as being a constraint.

Integrated water related skills and knowledge are improving across stakeholder organisations. Council is starting to move towards more a multidisciplinary organisation profile. Lower Murray Water remains dominated by engineering skills but a shift is evident as greater importance is placed on collaborative planning. The Mallee Catchment Management Authority has a strong research capabilities and carries a diverse set of skills.

90% of Mildura's drainage basins are publicly accessible. Assets owned and operated by Lower Murray Water are not accessible but provide some land to some third parties for irrigation. New strategies will make improvements to current infrastructure to

make assets more useable for the public across older areas where a few retarding basins remain fenced due to steep embankments.

## **47% attainment of water cycle city**

Mildura rated 47% as a water cycle city. The Murray River and surrounding wetlands are recognised as part of what provides amenity value and contributes to the feel of Mildura.

Water supply predominately comes from a single source but is delivered as either high quality potable water or raw water (supplied to most large reserves for use as an irrigation supply).

Cross institutional processes and arrangements are promoted with monthly CEO meetings being held. The Mallee Catchment Management Authority has partnership agreements with all organisations associated with natural resource management. Council has a close relationship with Lower Murray Water and works collaboratively at all levels across many areas.

Urban water policy acknowledges the role of integrated water management planning and the planning scheme is comprehensive on meeting green space outcomes, albeit in some instances poorly implemented. There is a mandate for drainage in new areas to be treated and discharged to waterways via wetlands integrated in public open space.

### **14% attainment of water sensitive city**

Mildura rated 14% as a water sensitive city. This is largely attributed to equity of essential services of water supply and sanitation. Both supply and sanitation services are accessible to everyone, they are safe, secure and affordable. The cost of supply and sanitation is less for low income earners than high incomes through hardship programs offered by Lower Murray Water and the some assistance with concessions and stepped tariffs provided by State Government. Treated wastewater discharged to the environment is well managed.

The river is the community's main, publicly accessible water related asset. Irrigated parks sourced from raw water also offer enhanced amenity values. There is good access to almost all water related assets with the exception of East Mildura which is considered less accessible to water related assets. Council has an open space strategy for bikes and trails improving the connection between assets. Saline drainage basins like Lake Hawthorne are now offering more amenity values than previously occurred and bird numbers are significant.

80% of Mildura's stormwater drains to Lake Hawthorn via Mildura South Wetlands Drainage Scheme thereby protecting the Murray River from many of the impacts associated with urban runoff.

### 3.2 Water Sensitive Goals

Figure 3 summarises the performance of the Mildura Rural City Council against the 7 goals of a Water Sensitive City. The overarching goals include:

- Ensure good water sensitive governance;
- Increase community capital;
- Achieve equity of essential services;
- Improve productivity and resource efficiency;
- Improve ecological health;
- Ensure quality urban space; and
- Promote adaptive infrastructure.

The results for Mildura Rural City Council (shown by the dashed green line) are compared to an idealised Water Cycle City (shaded light blue area). For the goals of water sensitive governance, ensure quality urban space and promote adaptive infrastructure the results are well aligned to the Water Cycle City benchmark. Equity of essential services exceed the Water Cycle City benchmark. Equity of essential services exceed the Water Cycle City benchmark.

A deficit in attaining key attributes of a Water Cycle City is most evident across the goals of improve productivity and resource efficiency, improve ecological health and increase community capital. An overview of the indicators that fall short of attributes for a Water Cycle City are listed below.

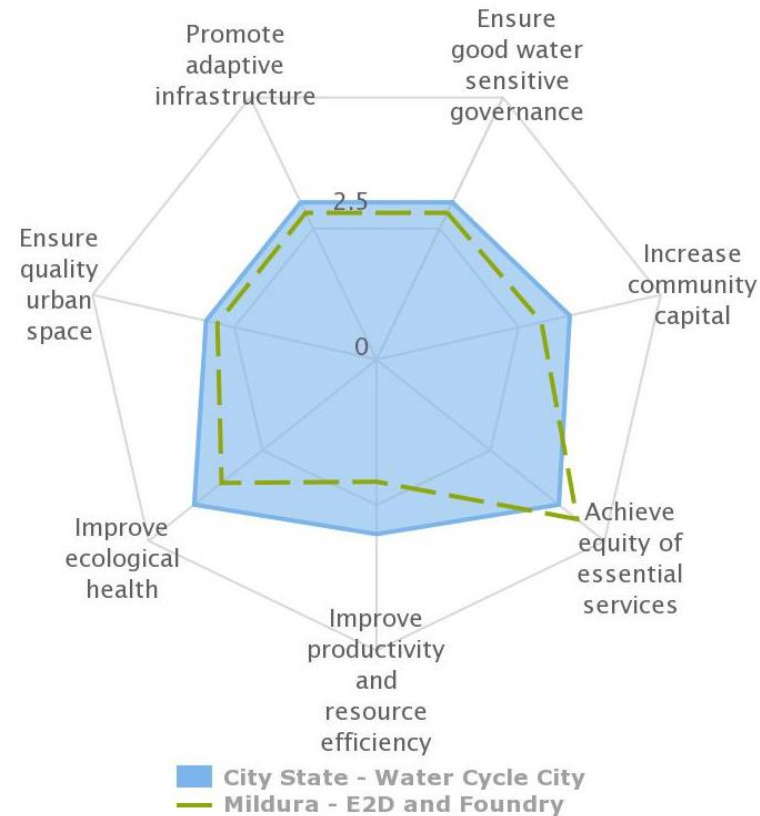


Figure 3. Performance against water sensitive goals

### 3.2.1 Improve productivity and resource efficiency

#### **Indicator: Low end-use potable water demand**

Mildura rates high on end-user potable water demand (total residential, commercial and industrial water use) at more than 400 litres/person/day. The millennium drought resulted in a reduction of indoor demands with the installation of permanent indoor water efficient fittings and fixtures. However, there is a significant amount of high quality drinking water used for garden irrigation across the private domain. A concerted effort to reduce residential outdoor water use is crucial to making Mildura resilient to climate change.

#### **Indicator: Water related commercial opportunities**

Some new business opportunities from resource recovery have been stimulated with use of recycled water from one treatment plant and biosolids generated at a treatment plant. In the surrounding agricultural region of Mildura recent access to the raw water supply by 2 major wineries for processing purposes contributes to major economic development in the area. Thousands of dollars has been invested on block irrigation to improve productivity and overhead sprays upgraded to drippers to improve water efficiency.

#### **Indicators: Low GHG emissions and maximise resource recovery**

Fairly high levels of GHG emissions are associated with water related services and infrastructure with the majority of power supplied to Mildura sourced from coal. Lower Murray Water has a GHG reduction pledge in place and are trialling the potential for

solar systems to supply energy to their infrastructure. Due to the flat terrain drainage systems are generally pumped and Council has a 25% energy reduction target by 2021 (using 2015 baseline levels) identified in their energy management plan.

Approximately 50% of biosolids, which are a product of treated sludge from a wastewater treatment plant, generated at wastewater treatment plants owned and operated by Lower Murray Water are held onsite then sold for use as soil conditioner or fertilisers for agricultural or horticultural purposes.

There is also use the bi-product from the Mildura water supply treatment system for irrigation of ovals and reserves.

#### **Indicator: Benefits across other sectors because of water-related services**

Data on the impact and monetary value associated with water sensitive practices is limited and values remain difficult to quantify. Some benefits are identified and described such as increased property value along the riverfront post revitalisation and improved connection to Mildura's CBD. The broader economic benefits associated with the Salt Interception Scheme have also been described but not quantified. Ultimately evaluation frameworks need to identify and quantify economic, environmental and community values across the water sector as well as other sectors such as health, energy, transport, etc.



### 3.2.2 Improve ecological health

#### **Indicator: Healthy and biodiverse habitat**

Bird, fish, mammal and reptile surveys are undertaken by the Mallee catchment Management Authority and indicate healthy habitats are supported in some the lake and wetland systems. Streamside habitats are reasonably well connected along the Murray River. The biodiversity and quality of the vegetation provides fair functioning ecological systems. There are examples of good initiatives that have vegetation and species connectivity including replanting with understory and trees particularly along the River and around wetlands. Reducing the extent of land clearing undertaken by developers in the growth areas of Mildura is important to address reducing tree canopy coverage (workshop participants felt trees were getting pushed out of the urban environment) to ensure the amenity, biodiversity and thermal comfort benefits are improved into the future.

#### **Indicators: Protecting areas of high ecological value**

Policy is in place to protect and conserve existing or remnant areas with significant ecological value. Kings Billabong is a large floodplain wetland adjacent to the Murray River and recognised as a 'high value wetland' with rare and threatened species. Mapping of areas of significance have been undertaken and management plans are in place. There is legislation supporting vegetation offsets which is typically followed on public land. However, this is not always the case on private land. The community recognise the importance of protecting ecological values and this become evident during the drought.

### 3.2.3 Increase community capital

#### **Indicator: Water literacy**

Lower Murray Water conducts research on the community's understanding of water bills and the water cycle in general. On average there is little interest and low literacy in regards to water. The workshop participants identified there is a lack of understanding around the role of water and vegetation in delivering broader amenity and liveability outcomes for the region. Improved literacy is the precursor to greater understanding and involvement in the planning, ownership and management of water related assets, as well as retaining and increasing canopy cover across the private and public domain.

#### **Indicator: Shared ownership and management**

Management and responsibility of water assets is largely vested in formal water governance organisations (e.g. utilities, councils). Communities play a minor role in the ownership, operation and maintenance of rainwater tanks, septic tanks and recreational lakes (such as, Ouyen Lake) that are privately owned or shared with the community. Rainfall dependent, decentralised systems are considered unreliable in Mildura's climate.

#### **Indicator: indigenous involvement in water planning**

Water for Victoria, sets out the strategic direction by the Victorian Government and acknowledges the importance of aboriginal community involvement in water related decision making. This is a promising step forward with indigenous representatives being provided a platform to voice their interests and become involved in

water planning and economic development. The Mallee Catchment Management Authority has a formal policy in their reconciliation action plan and indigenous participation plans. They have commenced a process of engagement and consultation with Indigenous communities. However, Council has not engaged Indigenous land owners in water planning up to this date. Lower Murray Water has just started on this journey. Formal policy is required across all stakeholder organisations to broaden indigenous involvement in water planning.

**Indicator: Community preparedness and response to extreme events**

Management and responsibility for water related extreme events (for example, flood, drought, and heatwave) rely mostly on formal emergency services. Council, in partnership with the EPA and State Emergency Services have an Emergency Response Plan. A Municipal Emergency Management Plan Committee (MEMPC) oversees the plan. The plan identifies measures to prevent or reduce the causes or effects of emergencies and outlines procedures to be adopted in the event of an emergency. The water related emergencies identified include flooding, drought, heatwaves, hailstorms and water pollution resulting from accidental spills. Regular community engagement to facilitate preparedness to cope with impacts associated with an extreme event at the household scale would complement the regional response plan.

## Appendix 1 List of Workshop Participants


**Workshop Facilitators:** Lindsey Brown and Sara Lloyd

Name	Unit within Council	Title
Andrea Collins	Statuary Planning	Town Planner
Andrew Lucchesi	Recreational Development	Recreation Officer
Andrew Millen	Development Services	Manager Development Services
Bonnie Pettett	Environmental Sustainability	Environmental Sustainability Coordinator
Chris Lee	Parks Services	Parks Services Team Leader
David Arnold	Engineering Services	Development Project Officer
Dean Umback	Parks Services	Parks Services Coordinator
Grant Follett	Parks Services	Parks Services Team Leader
Kylie Sergi	Asset Services	Assets Coordinator
Lindy Pain	Parks Services	Parks Services Team Leader
Mark Jenkins	Community Futures	Manager Community Futures
Matt George	Parks and Waste Services	Manager Parks and Waste Services
Michael Vaughan	Works and Infrastructure Services	Works and Infrastructure Services Coordinator
Nardia Barker	Environmental Sustainability	Environmental Sustainability Education Officer
Peter Douglas	Strategic Planning	Coordinator Strategic Planning
Jamey Mullen	Works and Infrastructure Services	Manager Works and Infrastructure Services
Thomas Stevenson	Environmental Sustainability	Environmental Sustainability Project Officer
Wade Vincent	Parks Services	Parks Services Team Leader
Joanne Robinson	Environmental Sustainability	Environmental Sustainability Biodiversity Officer
Amir Eskandari	Works and Infrastructure Services	Works Coordinator

<b>Industry Stakeholder Participants</b>	
<b>Name</b>	<b>Organisation</b>
Brian Smith	Lower Murray Water
Owen Russell	Lower Murray Water
Philip Endley	Lower Murray Water
James Kellerman	Mallee Catchment Management Authority
Emma Healy	Mallee Catchment Management Authority
Louise Chapman	Mallee Catchment Management Authority
Anna May	Department of Environment, Land, Water and Planning
Elliot Stuart	Department of Environment, Land, Water and Planning



# Appendix 2 Summary of Ratings for Each Indicator

 <span style="float: right;"> <a href="#">Edit</a> <a href="#">Settings</a> <a href="#">Projects</a> <a href="#">Cities</a> <a href="#">Report a Bug</a> <a href="#">Logout</a> </span>	
<b>City Index</b>	
<b>1. Ensure good water sensitive governance</b> <span style="float: right;">2.8 ^</span>	
1.1. Knowledge, skills and organisational capacity	2.5
1.2. Water is key element in city planning and design	3.0
1.3. Cross-sector institutional arrangements and processes	3.0
1.4. Public engagement, participation and transparency	3.0
1.5. Leadership, long-term vision and commitment	2.5
1.6. Water resourcing and funding to deliver broad societal value	2.5
1.7. Equitable representation of perspectives	3.0
<b>2. Increase community capital</b> <span style="float: right;">2.9 ^</span>	
2.1. Water literacy	2.5
2.2. Connection with water	4.0
2.3. Shared ownership, management and responsibility of water assets	2.0
2.4. Community preparedness and response to extreme events	2.5
2.5. Indigenous involvement in water planning	3.5
<b>3. Achieve equity of essential services</b> <span style="float: right;">4.4 ^</span>	
3.1. Equitable access to safe and secure potable water supply	5.0
3.2. Equitable access to safe and reliable sanitation	5.0
3.3. Equitable access to flood protection	3.5
3.4. Equitable and affordable access to amenity values of water-related assets	4.0
<b>4. Improve productivity and resource efficiency</b> <span style="float: right;">2.1 ^</span>	
4.1. Benefits across other sectors because of water-related services	3.0
4.2. Low GHG emission in water sector	2.0
4.3. Low end-user potable water demand	1.0
4.4. Water-related economic and commercial opportunities	2.0
4.5. Maximised resource recovery	2.5
<b>5. Improve ecological health</b> <span style="float: right;">3.4 ^</span>	
5.1. Healthy and biodiverse habitat	3.0
5.2. Surface water quality and flows	4.0
5.3. Groundwater quality and replenishment	3.0
5.4. Protect existing areas of high ecological value	3.5
<b>6. Ensure quality urban space</b> <span style="float: right;">2.8 ^</span>	
6.1. Activating connected pleasant urban green and blue space	3.5
6.2. Urban elements functioning as part of the urban water system	2.0
6.3. Vegetation coverage	2.0
<b>7. Promote adaptive infrastructure</b> <span style="float: right;">2.8 ^</span>	
7.1. Diverse fit-for-purpose water supply system	2.0
7.2. Multi-functional water system infrastructure	2.5
7.3. Integration and intelligent control	2.5
7.4. Robust infrastructures	4.0
7.5. Infrastructure and ownership at multiple scales	2.5
7.6. Adequate maintenance	3.0

### Appendix 3 Workshop Notes for Each Indicator

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>1. Ensure good water sensitive governance</b>			
1.1. Knowledge, skills and organisational capacity	2.5	High	<ul style="list-style-type: none"> <li>- Council is starting to move towards more a multidisciplinary organisation profile. Currently Lower Murray Water is dominated by engineering but is changing due to important state driven objectives such as collaborative planning.</li> <li>- Catchment management authority has a strong research ability and carries a diverse set of skills.</li> <li>- The Infrastructure Design Manual is used but not wholly adopted yet.</li> <li>- Knowledge gaps may develop from individual champions moving on. This could be addressed with further training.</li> </ul>
1.2. Water is key element in city planning and design	3	High	<ul style="list-style-type: none"> <li>- Council has its own wetland management plans and design guidelines.</li> <li>- Mandate for drainage in new areas to be treated and discharged to waterways via wetlands integrated in public open space.</li> <li>- Council has an overarching environmental management strategy for stormwater but it is not being met due to dominance of engineering skills.</li> <li>- Council is not looking at alternative sources of water because there are none.</li> <li>- Retarding basins are not integrated as multi-functional assets. Also known to be suffering from erosion.</li> <li>- Council planning is not integrated but looked at compartmentally. This is resulting in perverse outcomes compared to 10 years ago.</li> <li>- Trees are getting pushed out of the urban environment from a range of factors including:               <ul style="list-style-type: none"> <li>o Planning scheme is comprehensive on meeting green space outcomes but has been poorly implemented. This has allowed developments (e.g. smaller lots and narrower roads etc) that have impacted green space outcomes.</li> <li>o Developer lobbying makes it hard to integrate water further into city planning and design.</li> <li>o Underground service conflicts (e.g. Lower Murray Water pipes)</li> </ul> </li> <li>- Some difficulty was encountered in differentiating the urban water system from the wider regulated water cycle system (e.g. irrigation and managed diversions/pumping for wetlands under MDBP etc.)</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>1. Ensure good water sensitive governance</b>			
1.3. Cross-sector institutional arrangements and processes	3	High	<ul style="list-style-type: none"> <li>- Catchment management authority has partnership agreements with all organisations on the water cycle including natural resource management works in urban landscapes.</li> <li>- Council has a close relationship with Lower Murray Water and works collaboratively at all levels in many areas.</li> <li>- CEO forums occur monthly.</li> </ul>
1.4. Public engagement, participation and transparency	3	High	<ul style="list-style-type: none"> <li>- Lower Murray Water (LMW) regularly exercises community engagement. 2017 involved a greater level of communication due to the pricing submission but other years have been lighter. The pricing submission process revealed both apathy and strong community preferences.</li> <li>- Many Catchment Management Authority (CMA) programs and investments are community driven and often delivered by volunteers with strong input from Traditional Owners and citizen scientists. CMA members work closely with the Murray Darling Basin Authority and Federal Government.</li> <li>- Council regularly engages with the community but not much on water or stormwater. Public interest in urban water appears to be quite low but perhaps they are well informed overall about Mildura's water position. Meetings instead tend to be focused on general works and community risks (e.g. flooding). A lot of feedback (mostly positive) has been received around public open space and greenery but tensions exist between "making things green" to fit with the Mildura oasis perspective and a focus on water efficiency. Public engagement on other community issues could be improved.</li> </ul>
1.5. Leadership, long-term vision and commitment	2.5	Medium	<ul style="list-style-type: none"> <li>- Leadership in Integrated Water Management (IWM) is limited but improving across Council, the CMA and the LMW and discussions are in their early stages. Leaders and industry champions are interested but there is little known on the concept and its future application. The 'Water for Victoria' framework is the first many have heard of it.</li> <li>- The CMA, the LMW and Council have done some work in this area, but efforts seem to be limited and ad hoc to particular problems or discrete projects with funding being a constraint.</li> </ul>
1.6. Water resourcing and funding to deliver broad societal value	2.5	High	<ul style="list-style-type: none"> <li>- The CMA and the LMW commonly seek and assess value-for-money projects that offer broader environmental and social outcomes. Politics is particularly influential at the LMW.</li> <li>- Council decisions and projects tend to be cost driven. Strong evidence or a policy case is typically required to resist least cost outcomes. Council is keen to become more value-orientated in its decision making.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>1. Ensure good water sensitive governance</b>			
1.7. Equitable representation of perspectives	3	High	<ul style="list-style-type: none"> <li>- The Lower Murray Water has a mandatory 50:50 gender balance on its board, 2/5 executives are female, management team is 40:60 gender balance and a male managing director.</li> <li>- The CMA has various policies to support a balanced representation of views: gender balance on its board of 50:50, staff are 70% female and 9% indigenous, leadership team is predominately female.</li> <li>- Council has various policies (diversity, non-discrimination and social inclusion) to support a balanced representation of views, however they are not sure to what extent this plays out in water management. 25% of executives are female, decision making on water is higher for female workers. Strong emphasis on gender balance is given with Councillor elections and to achieving diversity within the community, not simply within the organization. Further efforts can be made to promote current and future diversity efforts.</li> </ul>



Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>2. Increase community capital</b>			
2.1. Water literacy	2.5	High	<ul style="list-style-type: none"> <li>- Lower Murray Water (LMW) conducts a lot of research on the community’s understanding of water bills and the water cycle in general. On average there is little interest and low literacy in water.</li> <li>- Water literacy is part of the school curriculum and there are new plans in development.</li> </ul>
2.2. Connection with water	4	Medium	<ul style="list-style-type: none"> <li>- Overall the community’s connection to water is at the lower end. The link seems to be related to a property’s socio-economic status. High wealth areas value water more for their green spaces. But the majority, lower socio-economic demographic is likely to value it less from having less green space and/or a desire to keep it maintained. But a dry garden does not necessarily mean a low connection to water. It might in fact mean a high connection due to water conservation efforts.</li> <li>- Some people gave their water entitlements to the Council to water Deakin Avenue.</li> <li>- Some festivals have a connection to water (Lunar Festival, Mildura Day).</li> </ul>
2.3. Shared ownership, management and responsibility of water assets	2	High	<ul style="list-style-type: none"> <li>- Properties that face waterways share waterway management issues with the Catchment Management Authority.</li> <li>- Some rainwater tanks, septic tanks and recreational lakes (e.g. Ouyen lake) are privately owned or shared with the community.</li> <li>- All LMW assets are owned and managed by the corporation.</li> <li>- Rainfall dependent, decentralised systems are unreliable in Mildura’s climate.</li> </ul>
2.4. Community preparedness and response to extreme events	2.5	High	<ul style="list-style-type: none"> <li>- Community has experienced floods and droughts, but the level of preparedness varies across the city. Community members who have not been directly affected with an extreme event are the most unprepared. It is assumed that the community is not aware of the Council’s regional emergency response plan (Mildura Municipal Emergency Management Plan).</li> <li>- Response plans are often driven by authorities. A new drought response is already being planned. Council has vegetation management plans to deal with this.</li> <li>- Specific flood response plans and a Regional Floodplain Management Strategy (joint agency collaboration) do exist.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>2. Increase community capital</b>			
2.5. Indigenous involvement in water planning	3.5	High	<ul style="list-style-type: none"> <li>- Council has not engaged Indigenous land owners in water planning up to this date.</li> <li>- LMW has just started on this journey. On service provision they get engaged like any other community member. Strategic engagements do occur with them.</li> <li>- The CMA has a formal policy in reconciliation action plan and indigenous participation plans. The State Government is currently running Murray region water resource plans that will engage and employ indigenous people.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>3. Achieve equity of essential services</b>			
3.1. Equitable access to safe and secure water supply	5	High	<ul style="list-style-type: none"> <li>- Lower Murray Water (LMW) offers hardship programs and the State Government provides some assistance with concessions and stepped tariffs etc.</li> </ul>
3.2. Equitable access to safe and reliable sanitation	5	High	<ul style="list-style-type: none"> <li>- Less than 1% have septic tanks.</li> <li>- All urban areas are connected to sewer and treated at local treatment plants.</li> </ul>
3.3. Equitable access to flood protection	3.5	Medium	<ul style="list-style-type: none"> <li>- Extreme events can overwhelm the local drainage system.</li> <li>- The 2011 floods delivered unprecedented flood levels with many properties experiencing flooding for the first time. Flood modelling has not been re-done since then and agencies seem to be unclear on the impact of climate change on flooding.</li> <li>- The city does not get regular riverine flooding anymore.</li> </ul>
3.4. Equitable and affordable access to amenity values of water-related assets	4	High	<ul style="list-style-type: none"> <li>- The river is the community’s main, publicly accessible water related asset. Irrigated parks are also part of the system and do offer amenity.</li> <li>- Council has an open space strategy for bikes and trails etc.</li> <li>- Saline drainage basins like Lake Hawthorne are now offering more amenity than previously and are birding hot spots etc. East Mildura not as well serviced.</li> <li>- LMW mostly try to discourage people from accessing their assets.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>4. Promote adaptive infrastructure</b>			
4.1. Diversify self sufficient fit-for-purpose water supply	2	High	<ul style="list-style-type: none"> <li>- Water supply predominately comes from a single source but can be delivered as potable water or raw water (supplied to most large reserves).</li> <li>- Rainwater tanks are not the preferred option with newer developments. Some do exist on public lots.</li> <li>- The Mildura wastewater treatment plant (WWTP) does not currently offer recycled water. During peak flow times water is discharged to the river and to a woodlot.</li> <li>- The Koolong WWTP is too far out of town to offer the city recycled water. Potential to sell to a third party farmer.</li> <li>- Stormwater from the wetlands is returned to the river and reused in this aspect. This practice is not taken into account as an offset.</li> <li>- The potable water treatment plant (WTP) has a bi-product (non-potable supply) which is supplied to a golf club and used as a recreational resource.</li> <li>- Shallow groundwater aquifers are salty, and no other aquifers are used for supply. Groundwater is used in another nearby town.</li> <li>- Urban encroachment of irrigation districts poses a future opportunity to supply raw water to public open spaces in these areas. There is an issue with aging raw water infrastructure which need to be maintained to keep them open.</li> </ul>
4.2. Multi-functional water infrastructure system	2.5	High	<ul style="list-style-type: none"> <li>- 80 out of a total of 90 city drainage basins are publicly accessible. Deep basins with steep slopes are restricted with pool type fencing barriers. This is reflected in policy.</li> <li>- Developer Control Plans (DCPs) always align drainage basins with public open spaces.</li> <li>- Floodplains are accessible to the public.</li> <li>- Treatment Plants are not accessible but provide some land to some third parties for irrigation. No educational facilities are currently in place.</li> <li>- New strategies will make improvements to current infrastructure to make it more useable for the public (e.g. older areas have fenced off retarding basins).</li> <li>- Need to use developer contributions to create landscapes - financial implications to achieving this target.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
4.3. Integration and intelligent control	2.5	High	<ul style="list-style-type: none"> <li>- WWTPs, WTPs, and drainage basin pumps are automated.</li> <li>- The Hunter irrigation system (which monitors soil moisture and rainfall) has an alert for manual shut-off.</li> <li>- Opportunities to ensure power supplied to public open space for monitoring.</li> </ul>
4.4. Robust infrastructures	4	Medium	<ul style="list-style-type: none"> <li>- Lower Murray Water has asset management and renewal procedures and reports on the number of failures.</li> <li>- Council has aging infrastructure that is under capacity.</li> <li>- Large rainfalls typically produce overland flows (excluding big rainfall events). Buildings do not often suffer from these as flood waters are stored in the roads.</li> <li>- Council has flood maps, asset management plans, customer requests for maintenance forms, and an asset management system for failures. Council also conducts annual reporting</li> </ul>
4.5. Infrastructure and ownership at multiple scales	2.5	High	<ul style="list-style-type: none"> <li>- New developments are required to retain rainwater on-site for temporary storage (e.g. Bunnings, McDonalds, schools).</li> <li>- Policy exists for Council infrastructure to have stormwater capture and reuse.</li> </ul>
4.6. Adequate maintenance	3	High	<ul style="list-style-type: none"> <li>- Green infrastructure maintenance is not financially viable for Council.</li> <li>- Renewal gap of conventional drainage assets is getting bigger- replacement and upgrade of existing infrastructure. Potential future risk for garden maintenance and pipes.</li> <li>- Lower Murray Water undertakes regular maintenance across their assets.</li> <li>- There is good co-ordination between LMW and Council for upgrades. Currently a monthly meeting is held with different stakeholders.</li> <li>- A CCTV inspection program is used and is currently being optimised. Mapping of current infrastructure is underway.</li> <li>- In the next 2 years another 15 acres of public open space (POS) will need to be maintained but no extra funding has been planned.</li> <li>- Council uses the following to ensure adequate maintenance is undertaken:               <ul style="list-style-type: none"> <li>o Constructed wetland management guidelines</li> <li>o Asset management system</li> <li>o GIS</li> <li>o Maintenance guidelines for POS management</li> <li>o Developer Contribution Plans include appropriate standards for stormwater assets.</li> </ul> </li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>5. Improve productivity and resource efficiency</b>			
5.1. Maximised resource recovery	2.5	High	<ul style="list-style-type: none"> <li>- 50% of biosolids generated at the Mildura wastewater treatment plant are used on farms (3 years holding onsite prior to reuse).</li> <li>- A bi-product from the city's water treatment system is used for irrigation of recreational spaces.</li> <li>- ~ 70% use of recycled water at one treatment plant.</li> <li>- A local winery has anaerobic and aerobic lagoons to recover methane and heat.</li> <li>- Local swimming pools treat and use all backwash water for irrigation.</li> </ul>
5.2. Low GHG emission in water sector	2	High	<ul style="list-style-type: none"> <li>- Lower Murray Water (LMW) has a GHG reduction pledge. Currently a dozen solar systems are going in across the Board as a trial.</li> <li>- LMW emits 42,254 tCO<sub>2</sub>e annually, 19,965 tCO<sub>2</sub>e urban across LMW region, 74,000 customers = 270 tCO<sub>2</sub>e/1000 properties. Average for LMW region not just Mildura.</li> <li>- Drainage systems are pumped.</li> <li>- Current Council energy management plan: 25% reduction by 2021 by 2015 levels.</li> </ul>
5.3. Water-related business opportunities	2	High	<ul style="list-style-type: none"> <li>- Potable urban water is being taken up by 2 major winery and another winery for winery processes which will contribute to major economic development in the area.</li> <li>- Third party supply of recycled water and biosolids to create value and economic productivity.</li> <li>- Bird watching at the wetlands.</li> <li>- Management of water services creating business.</li> <li>- Millions of dollars spent on LMW / Sunraysia Modernisation Project to improve open channels to piped irrigation.</li> <li>- Thousands of dollars spent on block irrigation to improve productivity and water efficiency. Eg: overhead sprays upgraded to drippers.</li> </ul>
5.4. Low end-user potable water demand	1	High	<ul style="list-style-type: none"> <li>- Currently 420 Litres/person/day (including losses and irrigated open space). Significant amounts of water used for garden irrigation across the private domain.</li> <li>- Water efficient fittings, fixtures and appliances</li> <li>- Permanent water savings measures</li> </ul>

5.5. Benefits across other sectors because of water-related services	3	Medium	<ul style="list-style-type: none"><li>- Value of the riverfront post investment (increase in property prices).</li><li>- Creation of two new 2 cafes and a dog park along the waterfront.</li><li>- Value of Salt Interception Scheme.</li><li>- Many benefits identified but not quantified.</li></ul>
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Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>6. Improve ecological health</b>			
6.1. Healthy and biodiverse habitat	3	Medium	<ul style="list-style-type: none"> <li>- Developers are not on board with this. They need to be convinced to support this vision.</li> <li>- Isolated examples of good initiatives that have vegetation and species connectivity. Examples include replanting with understory as well as trees - particularly along the river and around wetlands (\$1M of water plants in Mildura). Also managing water levels to protect specific areas.</li> <li>- Across the region it is not too bad in terms of threatened species. Example - Kangaroos in urban area, bird life, turtles and rare species.</li> <li>- Opportunity: during development top soils should be saved and groundwater should be restricted from entering wetlands.</li> </ul>
6.2. Surface water quality and flows	4	High	<ul style="list-style-type: none"> <li>- 80% of Mildura's stormwater goes through a wetland. Industrial development is included in this.</li> <li>- There are currently 27 gross pollutant traps installed.</li> <li>- Instream surveys and monitoring occurs.</li> <li>- Bird, fish, mammal and reptile surveys of Catchment Management Authority (CMA) wetlands are undertaken and indicate healthy habitats are supported in some the lake systems. This information feeds into the CMA environmental water management plans.</li> </ul>
6.3. Groundwater quality and replenishment	3	High	<ul style="list-style-type: none"> <li>- Groundwater issues associated with agricultural practices – urban impacts minimal in comparison.</li> <li>- The region has a high groundwater level which is highly naturally saline. This is impacting the sewage system and lagoons, and the regions ecological health.</li> <li>- Extensive actions and monitoring are undertaken to reduce the salt impacts from the high groundwater level. Without management it would be a problem.</li> <li>- Groundwater is captured and diverted in road areas.</li> <li>- Salt interception schemes are in place to reduce impacts on the Murray River.</li> <li>- In terms of improving groundwater quality in Mildura, irrigation systems are being modernised to reduce the amount of water used and also treat irrigation runoff.</li> <li>- There is an opportunity to investigate if a deeper aquifer could be used.</li> </ul>
6.4. Protect existing areas of high ecological value	3.5	High	<ul style="list-style-type: none"> <li>- Community values of ecological values were realised during the drought.</li> <li>- Mapping of areas of significance and management plans are now in place.</li> <li>- Council vegetation offsets: legislation and process are in place which is typically followed on public land. This is not always the case on private land.</li> </ul>

Indicator	Rating 0 to 5	Confidence High/Med/Low	Evidence
<b>7. Ensure quality urban space</b>			
7.1. Activating connected pleasant urban green and blue space	3.5	High	<ul style="list-style-type: none"> <li>- New urban growth has been done well with drains connecting to wetlands and complementing pathways.</li> <li>- Older areas are not as well connected and usually a drive is required to reach walking trails.</li> <li>- Green - Blue Spaces:</li> <li>- The Murray River is a key element of the connection to waterways for Mildura.</li> <li>- Lake Hawthorn offers walkways and carparks.</li> <li>- Kings Billabong is valued highly by the community and is regularly used.</li> <li>- Linking CBD and new developments to the Murray River.</li> <li>- Deakin Avenue is green corridor for the community.</li> <li>- Issue: A lot of people in the older sections of the city do not know where the parks are.</li> <li>- Council has mapped its green-blue infrastructure and tracks and trails and has GIS capabilities</li> <li>- A public open space strategy is in place.</li> <li>- A planning scheme and a development contributions plan is in effect.</li> </ul>
7.2. Urban elements functioning to mitigate heat impacts	2	Low	<ul style="list-style-type: none"> <li>- In Mildura the focus is not around heat mitigation but about delivering amenity.</li> <li>- New growth and developments trend away from eaves on buildings and have less grass and trees on properties. Build design is seen as important.</li> <li>- Central Mall is mainly concrete and brick. Most people prefer to be with air-conditioning on warm days.</li> <li>- There is a lack of green space in the city's main streets but there are lots of green along the river and irrigated sports fields/ovals.</li> <li>- Due to the dry climate, active irrigation is required to deliver more green space.</li> <li>- Some water saving behaviors from the millennium drought still exist.</li> <li>- Stormwater is treated via wetlands and provided back to the Murray River or Lake Hawthorn (urban water balance and volumes delivered back to the Murray River are unknown).</li> <li>- Stormwater harvesting is not something the area has invested in as the reliability is low. Recycle into potable supply could be financially feasible (policy is a current barrier).</li> <li>- The drainage network is based around the drainage basins, therefore there is lots of temporary storage.</li> <li>- Council has WSUD and planning guidelines in place.</li> </ul>
7.3. Vegetation coverage			<ul style="list-style-type: none"> <li>- Study is currently being completed.</li> <li>- The trend is for small lots with plantings of shrubs rather than trees.</li> </ul>

	2	Medium	<ul style="list-style-type: none"><li>- The Council has an urban tree policy.</li><li>- Most properties have outdoor shade, but it is not necessarily provided by a tree.</li><li>- Trees that do well in Mildura are quite slow growing. Thousands of street trees have been planted over the last 5 years as well as along the river front. It is expected it will be another 10 years before the shade benefits are realised.</li><li>- There is a significant difference between the old and new suburbs. Older areas are more pleasant as they have established trees. The trees are still growing in the newer areas and there are problems with them getting pulled out. Community education is important to ensure this does not continue to happen.</li></ul>
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