

BALLARAT CITY INTEGRATED WATER MANAGEMENT PLAN

A PROTOTYPE FOR URBAN AREAS AND REGIONAL CITIES







Project Team





Environment & Land Management

IT'S A JOURNEY





TODAY

10 YEARS AGO

5 TOP TIPS FOR CREATING A WINNING IWM PLAN

ARODAN

1 WORK TOGETHER

CLEAR GOVERNANCE STRUCTURES AND ONGOING COMMITMENT





FOLLOW THE GAME GAME PLAN PLAN **DO YOUR HOMEWORK TO** TEAMWORK DELIVER TO BRAINSTORM **TIME AND** BUDGET SOLUTION ARGE

PLANNING-



3 FEED OFF THE CROWD UNDERSTAND AND PRIORITISE COMMUNITY VALUES



Ballarat City IWM Plan Development 5-Stage Journey





Local Context, Key Drivers and IWM Objectives Preliminary Assessment 3

IWM Project Shortlisting and Portfolio Assembly Portfolio Evaluation Recommendations and implementation plan

Engagement at three levels: steering group, technical group, stakeholders and community



Developing a joint vision



Key IWM Driver Population Growth & Urban Development

50 year time horizon for the study to **2066**

- 150% increase in dwellings
- 94% increase in wastewater generation
- 61% increase in urban stormwater
- 95% increase in total demand on potable water supplies



Key IWM Driver Supporting Waterway Health – too much and too little

The Yarrowee River will experience an increase of 11.5ML/year due to additional urban stormwater and treated wastewater flows. That's a 133% increase to current flows.



Expected urban excess volumes and reuse

The Moorabool River is one of Victoria's most flow stressed river systems. Over 60% of the average natural flow of the river system is harvested each year for Ballarat and Geelong, with over 80% of the average summer flows harvested.



Key IWM Driver Hotter, drier future and changing liveability expectations

Higher levels of liveability will enhance Ballarat's growting service sector attractiveness and encourage tourism.



Thermal images taken in a January 2017 heatwave show the impact of urban heat islands in Melbourne.

Eight IWM Principals, sorted into four IWM 'themes'

Support river health priorities and mitigate flooding risks.	ver health priorities ate flooding risks. Maintain and influence water efficiency		Develop a plan that reflects community and stakeholder values and outlines clear implementation pathways.	
	Support a safe and secure urban water supply and demand future.	Support a sustainable and productive economy.	Deliver strategic direction to enhance IWM outcomes within land use planning.	
Protect health of receiving water environments	Provide secure & sustainable water services	Support liveable communities	Deliverability	

PLAY A GOOD GAME AN OPTION ASSESSMENT WHICH IS ROBUST YET NIMBLE





























Project Identification

via the Preliminary Analysis Method (PAM)

The PAM was used to identify all potential water sources and end uses to generate a comprehensive list of possible projects

Source	Op	tion		Applicability yes/no	
PO	Wat	ter supply leaka			
PO	Adv	anced water ef	ficient practices - outdoor		
PO	Advanced water efficient practices - buildings				
GW	Gro	undwater harv	esting for open space irrigation		
GW	Gro	undwater harve	esting for non-potable uses in buildings		
GW	Groundwater harvesting for supplementary potable supply				
GW	Gro	undwater harve	esting for agricultural irrigation		
RW	Rair	nwater harvesti	ng for garden irrigation		
RW	Rain	nwater harvesti	ng for open space irrigation		
RW	Rainwater harvesting for non-potable uses in buildings				
RW	Rain	nwater intercep	ed by green roofs		
RW	Rain	nwater intercep	ted by permeable ground surface	ed by permeable ground surface	
SW	Sto	SW	Stormwater managed by non-vegetated device on-lot		
SW	Sto	SW	Stormwater managed by non-vegetated device in streets		
SW	Sto	SW	Stormwater managed by non-vegetated device in open spa	ce	
SW	Stc	SW	Stormwater managed by detention device on-lot		
SW	Sto	SW	Stormwater managed by detention device in streets		
SW	Sto	SW	Stormwater managed by detention device in open space		
SW	Sto	SW	Treated stormwater distributed to lake or water feature		
SW	Sto	SW	Treated stormwater distributed to land		
SW	Sto	SW	Treated stormwater distributed to evapotranspiration field	Treated stormwater distributed to evapotranspiration fields	
SW	Sto	SW	Treated stormwater distributed to environmental flows in v	vaterway	
		WW	Wastewater managed by class B treatment device		
		ww	Wastewater managed by class A treatment device		
		ww	Treated wastewater distributed to lake or water feature		
		ww	Treated wastewater distributed to land		
		WW	Treated wastewater distributed to evapotranspiration fields		
		WW	Treated wastewater distributed to environmental flows in waterway		
		WW	Treated wastewater harvesting for open space irrigation		
		WW	Treated wastewater harvesting for non-potable uses in buildings		
		ww	W Treated wastewater harvesting for agricultural irrigation		
		SWWW Shandied treated wastewater and treated stormwater for local uses			

Project Assessment Selected Performance Indicators

Potable water use reduction (ML/year	Urban excess reduction (ML/year) Nitrogen reduction	Water for amenity and culture (ML/year) New greening	Time of construction, regulation inconsistencies, organisational capacity, health hazards, approval requirements
	(kg/year)	in urban area (ha)	
Protect health of receiving water environments	Provide secure & sustainable water services	Support liveable communities	Deliverability



Portfolio Options 1-4 Objective Performance



Portfolio Detailed Design Example

Project C and D: Stormwater supply to dual pipe

Project E: Recycled water supply to dual pipe



Portfolio 3: Projects C, D, E

Wastewater Treatment Plants

- Ballarat North (BNWWTP)
- Ballarat South (BSWWTP)

Pipelines & Basins

- Connected retarding basins
- Stormwater collection pipe (wetland to storage)
- Stormwater distribution pipe (storage to dual pipe network)
- Recycled water distribution (BNWWTP to dual pipe network)

Development areas





5 SUCCESS ISN'T ALL **ABOUT THE MONEY A DUAL ASSESSMENT OF MONETISED AND NON-MONETISED** BENEFITS

Cost-benefit analysis

For each project:

- Map out all costs (capital, operating and renewal), benefits and avoided costs across 50 years
- Discount to present day and produce benefit-cost ratio



What benefits could we monetise?

- Potable substitution the main direct use benefit
- Other values reflect environmental and aesthetic benefits
- Avoided costs of 'base case' (e.g. avoided rainwater tanks on new dwellings)

Benefit	How measured?	Type of benefit
Potable substitution	Avoided cost of water supply	Direct use
Agricultural value of water used	Change in productive capacity produced	Direct use
Pollution abatement waterways	Avoided cost of nitrogen abatement	Indirect use and non-use
Community value for recycled water and stormwater reuse	Choice modelling (stated preference)	Non-use
Community value for waterway health improvement	Choice modelling (stated preference)	Non-use
Waterway restoration value	Property price increase (hedonic pricing - revealed preference)	Indirect use
Improved street tree health (increased canopy cover	Property price increase (hedonic pricing - revealed preference)	Indirect use
Increased public open space	Property price increase (hedonic pricing - revealed preference)	Indirect use

Waterway restoration value

Aesthetic improvement



Passive street tree irrigation The value of bigger, healthier trees



Dual assessment

Using economic and scored outcomes

Economic analysis

- Phased lifecycle costs
- Monetised benefits where possible
- Benefit-cost ratio
- Understanding of distribution of costs and benefits

Scored performance analysis

- Series of performance indicators developed for IWM objectives
- Quantitative and relative where possible
- Qualitative and relative for risk and delivery indicators



Three types of IWM initiatives







Targeted Moves

Projects and initiatives that are 'ready to go' and will have immediate benefits

Planning for Growth

Outcomes that can support growth and be delivered through development

Strategic Investments

Large scale investigations and initiatives that support strategic long-term projects

e.g.

- Revegetating urban rivers
- Extended recycled water supply

e.g.

- Stormwater-fed street trees
- Stormwater harvesting for oval irrigation

e.g.

- Aquifer storage and recharge
- Large scale alternative supplies

WHAT A WINNER!

1 Set up clear governance structures and ongoing commitment

- **2** Do your homework to deliver to time and budget
- **3** Understand and prioritise community values
- **4** Undertake an option assessment which is robust yet nimble
- **5** Present a dual assessment of monetised and non-monetised benefits

Thank you

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