Alternate water supplies

Economic Values in IWM Evaluation – May 2023

Economic Values in IWM evaluation factsheets provide planners with guidance on the selection of values for estimating the economic value of benefits from integrated water management (IWM) projects. The economic values in these Fact Sheets have been chosen so they are directly relevant to investments in the Greater Melbourne area.
You can use the economic values in the Fact Sheets to establish high-level estimates of the potential benefits of proposed IWM and blue-green infrastructure investments. You can then use these high-level benefit estimates in economic analyses, including cost-benefit analysis. The factsheets are a joint initiative by Melbourne Water, Greater Western Water, South East Water and Yarra Valley Water for consistency in collaborative IWM investment evaluation.

Assessing the economic benefit of alternative water supply

Integrated Water Management (IWM) projects often reduce potable water consumption through demand management or through the supply of alternative water for the same end use (e.g. substituting potable water with recycled water, rainwater or treated stormwater). The economic assessment of alternate water considers the value of costs and benefits of alternative supply solutions to the community. These community values can be quantified through various mechanisms. Community values are separate from the value of potable water savings, meaning these values can be added together in an economic evaluation.

What are the different values that can be used?

There are two key values that can be considered when valuing the use of an alternative water:

1. **Property price uplift from access to alternate water:** There is existing evidence which indicates that residents and progressive businesses value sustainability features in the homes, offices, and communities. People's preferences for housing – as reflected by the prices paid for property – can be used to measure the values they hold for environmental and social factors that affect house price, including access to alternative water solutions.
2. **Community willingness to pay for alternative water use:** Willingness to pay (WToP) surveys can be used to estimate the value communities place on the benefit outcomes provided by alternative water. For example, a WToP survey could ask people about how much they would be willing to pay to drought-proof public parks in their neighbourhood using alternative water, so that the parks maintain a green condition and ovals can be used year-round rather than browning off if drought restrictions were in place. The value and robustness of the perceived benefits will depend on the WToP survey (e.g. what is asked and how it is framed) and the community being considered (e.g. age, income, education, location etc.). The validity of the results will also be time bound, as community preference change over time.

Importantly, WToP is also a non-use value - the value is assigned to the attribute regardless of who uses or benefits from it. For example, a community may be willing to pay a premium to ensure that a local business uses recycled water for their industrial process instead of high-quality drinking water. In this case, the community is not using the water directly but still exhibits a WToP. This WToP may be based on the community's environmental values, e.g. the desire to reduce wastewater discharge (which impacts receiving waterbodies) and reduce desalinated water use (which can be viewed as energy intensive).

When to use each value?

Property price uplift from access to alternate water: Values for property value uplift can be used where alternative water solutions are implemented at a property-scale and there is clear evidence that provision of this infrastructure increases the value of the property.

Community willingness-to-pay for alternative water use: This value can be used where there is a community WToP for alternate water use – this can include a WToP by those who directly benefit or those who indirectly benefit from the use of alternate water. WToP values need to be specific to the context regarding location, use type and application.

What values are appropriate to use and how to use them?

Table 1 outlines some scenarios where the above values are applicable.

Table 2 values are approximate and suitable for the early planning stage only. It important to test the sensitivity of the project to low, medium, and high value assumptions (+/-50%).

Last update: 25 October 2021

Alternate water supplies

Economic Values in IWM Evaluation – May 2023

Table 1: Scenarios for assessing alternate water supply benefits

Scenario	Values to Consider		Notes
	1. Property Price Uplift from Provision of Alternate Water	2. Community willingness to pay for alternative water use	
Irrigate an existing oval with recycled water.	**No**	**Yes**	WToP would indicate indirect benefits to the community whose preference may be based on attributes such as water security. Social and Environmental Values Tool (SEVT) on how to apply the values.
Install a rainwater tank on ten new residential buildings for toilet flushing and garden irrigation.	**Yes**	**Yes**	WToP may be applied as per above.
Supply of recycled water for toilet flushing and garden irrigation in 2,000 residential and 500 commercial buildings.	**Yes[1] Residential properties only**	**Yes**	Property uplift applies to standalone houses and townhouses only. Two WToP values can be used, one for residential and one for commercial. Refer to the SEVT on how to apply the values.
Implementation of a stormwater harvesting scheme to provide alternate water to public open space.	**No**	**Yes**	WToP would indicate indirect benefits to the community whose preference may be based on water security or enhanced environmental values. Refer to the SEVT on how to apply the values.

Factors to consider

- Double Counting – In cost-benefit analyses, this can be a significant risk if the analysis includes both estimates of market benefits (property price uplift) and results from a WToP survey and there is an overlap in the benefits they are measuring.
  The method used for property price uplift (hedonic pricing) infers that the reason that house prices have risen is that potential property owners anticipate their access to the alternate water infrastructure, value the extra benefits that this would provide to them, and raise the price they are willing to pay for the house as a result. A WToP survey conducted on the wider community would also include these potential property owners in the survey, therefore to include both values would be a double count.
- Bill Impacts – It is important to identify if the WToP assessment has been conducted for the project in isolation or an assessment of the bill (impacting the wider customer base). Regarding bill increases, the WToP is the maximum bill increase at or below which a customer would agree to a service improvement. For all large scale, major project, a WToP should be assessed at a whole-of-bill level.

[1] The original study for property uplift does not include commercial buildings nor residential apartment buildings and the price premium may relate to the ability to use recycled water for irrigation during water restrictions.

Using WToP – WToP is only required in support of a project where there will be a resultant customer bill impact. To recover the costs from customers WToP is often used to demonstrate customer support for the project and its outcomes. However, WToP studies are complex to design and there is conjecture about the reliability of WToP studies to accurately reflect customers' ability/acceptance to pay. There is also no direct correlation between the value of the benefit and the ability of community or agencies to invest in a project. When designing a WToP study consideration should be given to:

- Customers preferences in relation to prices overall e.g. as part of engagement/ research underpinning price submissions have customers indicate an overall WToP.
- Availability of grants / contributions by beneficiaries to reduce the reliance on WToP from customers
- How frequently the value has been used and if the total benefit claimed exceeds the WToP value
- The context in which the WTooP was derived and the transferability of the WToP value e.g. timeframe, setting, project
- The similarity between the population that the WToP survey was conducted on, and the population of Greater Melbourne that the values are being applied to.

For further guidance on how to design a robust WToP study consult WSAA (2019).

How to evaluate economic values in IWM evaluation in 'todays dollars'?

It is essential that the costs and benefits used in an economic analysis are compared on an equal footing. This means all costs and benefits should either include or exclude inflation. When transferring values from the Fact Sheets you will need to make this adjustment to include or exclude inflation yourself.

Typically, cost benefit analysis is undertaken using a real discount rate (i.e. excluding inflation). This means that the discount rate applied does not consider how the value of money will change into the future due to inflation. Instead, all costs and benefits, both now and in the future, are presented in 'todays dollars'. With 'today' representing the year of the analysis.

For example, imagine an IWM business case is being prepared in 2023 to consider the costs and benefits associated with a recycled water project. It is proposed that the project will be constructed in 2025, the cost estimate for the project was prepared in 2019 and the potable water saving benefits due to project are expected to be realized in 2030.

This project's costs and benefits should both be expressed based on their value in 'todays dollars', i.e. in real dollars based on the year of the analysis (in this case 2023). This means that the:

- Cost estimate from 2019 needs to be adjusted to reflect the inflation from 2019 to 2023. This can be done based on the Consumer Price Index (CPI) published by the Australian Bureau of Statistics (ABS), the Reserve Bank Australia's Inflation Calculator or the ESC's CPI converter (2021)[2].
- The benefit value used to monetize the potable water savings should be adjusted to reflect the inflation. For example, if the values are in $2019 , they need to be inflated to $2023.

References

Bennett,J; McNair, B., Cheesman,J. (2016) Community preferences for recycled water in Sydney, Australasian Journal of Environmental Management, 23:1, 51-66. (in SEVT v2.5)

Brent et al. (2017) Valuing environmental services provided by local stormwater management, Water Resources Research(53, 4907-4921 (in SEVT v2.5)

Marsden Jacob Associates (2013) Economic Viability of recycled water schemes, Australian Water Recycling Centre of Excellence, Brisbane, Australia.

Marsden Jacob Associates. (2014). The value of recycled water infrastructure to the residents of Rouse Hill, Australian Water Recycling Centre of Excellence, Brisbane, Australia (in SEVTv2.5)

SEVT (2021) Social and Environmental Values Table (version 2.5), prepared by Marsden Jacob Associates for Melbourne Water.

Water Services Association of Australia (WSAA). (2019). Willingness to Pay, Principles for a robust study. August 2019, https://www.wsaa.asn.au/publication/willingness-pay-studies-%E2%80%93-principles-and-guidance, last accessed

[2] For the ESC's CPI converter (2021) contact MIEG.

Sept.2021. .

Zhang , F., Polyakov, M., Fogarty, J. Pannell, D. (2015). The capitalized value of rainwater tanks in the property market of Perth, Australia. Journal of Hydrology 522: 317-325. (in SEVT 2.5)

Useful resources

Iftekhar, M.S, Gunawardena, A., Fogarty, F., Pannell, D. and Rogers, A. (2019). INFFEWS Value tool: Guideline (Version 2): IRP2 Comprehensive Economic Evaluation Framework (2017 – 2019). Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.

INFFEWS Non-Market Value Tool and resources (2022), CRC Water Sensitive Cities, https://watersensitivecities.org.au/investment-framework-for-economics-of-water-sensitive-cities-inffews-value-tool/

last accessed May2023.

IWM economic valuation community of practice

The economic values in these Fact Sheets have been chosen so they are directly relevant to investments in the Greater Melbourne area. You can use the economic values in the Fact Sheets to establish high-level estimates of the potential benefits of proposed IWM and blue-green infrastructure investments. You can then use these for preliminary high-level benefit estimates in economic analyses, including cost-benefit analysis.

Keep up to date with what's happening

Factsheet last update: December 2021.

For more information about this factsheet please contact your water utility representative

Melbourne Water: e: grace.tjandra@melbournewater.com.au
Greater Western Water: e: sam.innes@gww.com.au
Yarra Valley Water: e: rita.kale@yvw.com.au/ e: Janet.Wade@yvw.com.au
South East Water: e: e: David.Cappellari@sew.com.au
Barwon Water: e: vicki.pinder@barwonwater.vic.gov.au

Table 2: Recommended economic values for benefit

Economic benefit	Description	Value	Unit	Payment Frequency	Base year	Source
1. Property Price Uplift						
Residential (Houses)	Value of recycled water (third pipe) infrastructure to households	0.7%	% of average property price for houses	One-off	2013	The value of recycled water infrastructure to the houses and townhouses in Rouse Hill (Marsden Jacob Associates 2014). This does not apply to apartments.
Residential (Houses)	Value of recycled water (rainwater tanks) infrastructure to households	0.4%	% of average property price for houses	One-off	2012	The capitalised value of rainwater tanks in the property market of Perth, Australia (Zhang et al. 2015)
2. Community willingness to pay for alternative water use						
Recycled Water (Residential – Houses)	Household willingness to pay per year for eliminating exposure to water restrictions in Melbourne (currently full range of restrictions are applied to outdoor water use)	$170[1]	$/Level/House hold/Year	Annual	2014	Brent et al. (2017) In Social and Environmental Values Tool (SEVT)
Recycled Water (Residential Non-Use)	Willingness to contribute to recycled water schemes (western Sydney homes)	$225[1]	$/ML	Annual	2012	Unit cost value ($/kilolitre) ranges from 0.45-1.22. Bennett et al (2016)
Recycled Water (Commercial and Industrial Non-Use)	Willingness to contribute to recycled water schemes (business and industry)	$1,465[1]	$/ML	Annual	2012	Unit cost value ($/kilolitre) ranges from 2.06-3.8. Bennett et al (2016)
Recycled Water (Council use irrigation)	Willingness to contribute to recycled water schemes for irrigation use	667[1]	$/ML	Annual	2013	Unit cost value ($/kilolitre) ranges from $1.49-1.51 from Marsden Jacob Associates (2013)

Note: [1] Value is in Base year and needs to be adjusted to the year of the business case.