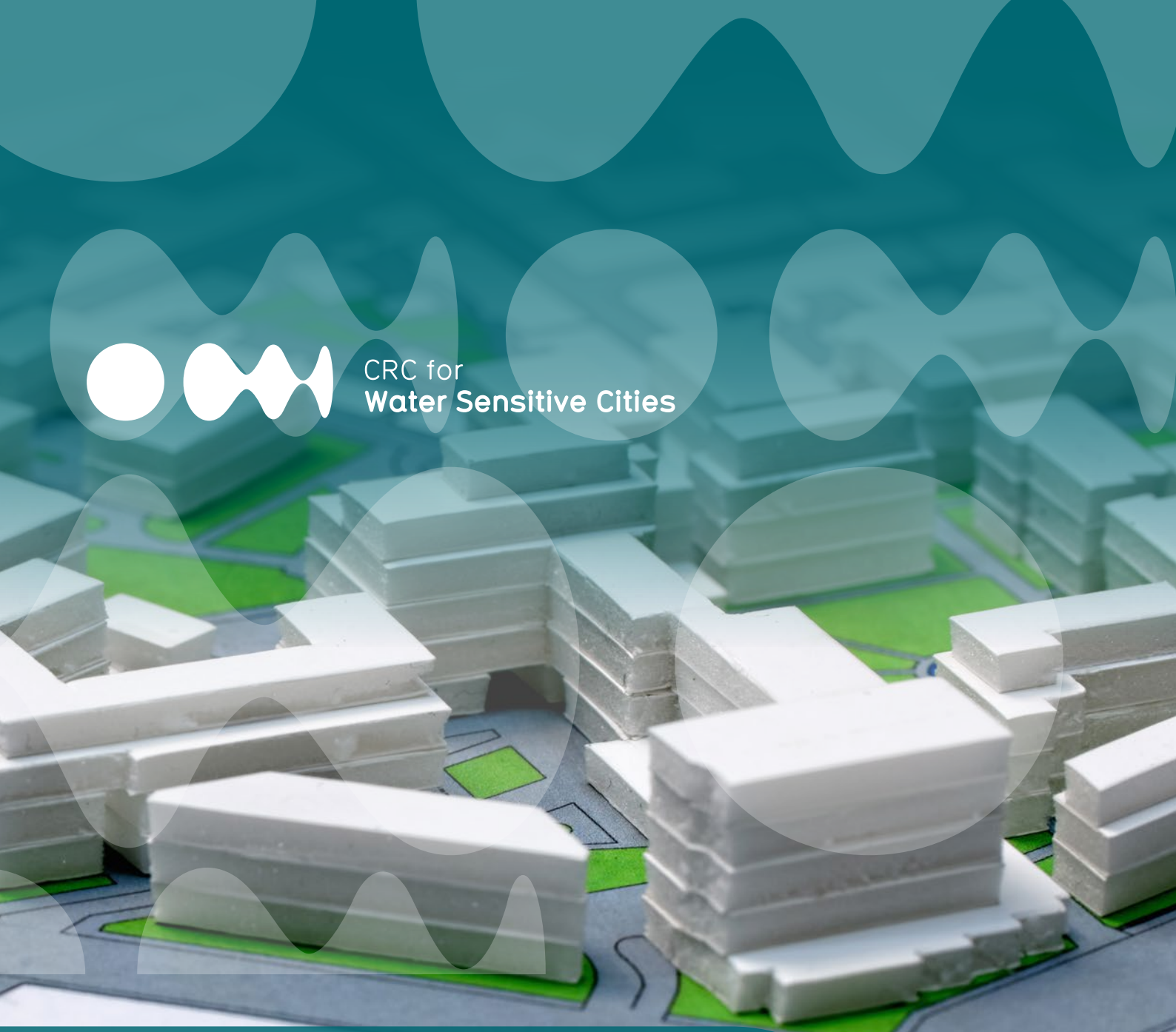
CRC for
Water Sensitive Cities



Constructing business cases for water sensitive investments: a handbook for local government

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Constructing business cases for water sensitive investments: a handbook for local government

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Executive summary

Investment in water sensitive infrastructure is critical in transforming our cities to become more liveable, sustainable, resilient and prosperous. Both the public and private sector have a role in redesigning and improving water management as part of this transition to water sensitive, low carbon, green cities.

Local government has a specific role in the transition to a water sensitive city, as the owner and manager of roads and a large amount of open space, and as a planning authority that oversees private development.

Investing in water sensitive assets supports the transition to water sensitive cities and delivers multiple benefits including improved water quality, increased water quantity, and positive environmental and social outcomes.

The benefits of these services are often not considered when making investment decisions due to a lack of monetised values for these services. The CRCWSC Integrated Research Project 2 (IRP2) aims to develop a comprehensive economic evaluation framework. It focuses on enabling authorities and local government to make better decisions and have more supporting evidence in understanding the overall economic value of these investments.

The CRCWSC reviewed 700 studies of non-market valuations and completed new research into the community's willingness to pay for water sensitive investments. Based on this work, the benefits that local government should consider when constructing a business case include:

- water savings
- nutrient reductions
- freedom from water restrictions
- improved stream health
- improved amenity
- cooler temperatures
- flood mitigation and avoided damages
- avoided (downstream) infrastructure
- improved sustainable use of groundwater

The evidence shows households are willing to pay for some benefits, with freedom from water restrictions and improved stream health topping the list. Melbourne and Sydney residents were on average willing to pay between $100 and $240 a year for these benefits. Property prices were found to increase as a result of water sensitive investments, with lifts of $18,000 for rainwater tanks and $45,000 for a green neighbourhood.

The methods that are used to calculate these non-market valuations of benefits are categorised into revealed preferences, stated preferences and benefit transfer.

A business case should include the following issues (each discussed as a separate section):

1. The problem
2. The context
3. The options
4. The project
5. Business as usual
6. Costs
7. Benefits
8. Stakeholders
9. Timeframes
10. Assumptions

Beyond a focus on the non-market valuations, it is important that a business case is accompanied by advocacy, a clear pitch or proposition and, where possible, external funding contributions.

The CRCWSC's IRP2 will deliver more products and tools by 2020, which will benefit local government members as they are released.

Glossary

The terms in this glossary are taken from the CRCWSC's report Review of non-market values of water sensitive systems and practices: an update (2017), unless otherwise stated.

Choice experiment (CE) method: A non-market valuation technique where willingness to pay is elicited by surveys in which people can choose between different bundles of goods with varying characteristics. The goods could be market or non-market goods (Source: Meyer et al., 2014).

Contingent valuation (CV) method: A non-market valuation technique where people are asked in surveys about their willingness to pay to avoid (or gain) a given decrement (or increment) of a particular non-market good, or about their willingness to accept its deterioration by receiving a certain amount of compensation (Source: Meyer et al., 2014).

Control or prevention costs, averting behaviour: This method relies on the assumption that it is possible to quantify the economic value of externalities in terms of the avoidance costs of implementing actions that prevent the damage produced (Source: Holguín-Veras et al., 2016).

Cost of Illness approach: An approach that uses the costs of health impacts (such as medical costs and lost wages due to illness) to estimate the value of a good or project (Source: Meyer et al., 2014).

Damage (restoration) costs approach: An approach that relies on quantifying the value of the impacts as the cost required to repair the damage and restore things to their original condition (Source: Holguín-Veras et al., 2016).

Discount rate: The discount rate is the percentage rate at which future values are reduced to bring them into line with today's values (Source: Department of Economic Development, 2018). The costs and benefits identified in an economic assessment typically occur over several years. To compare costs and benefits over time, the values attached to costs and benefits need to be converted and expressed in today's dollar value. This is referred to as 'discounting' future values.

Hedonic pricing method: A technique that uses existing market price information to estimate the impact of a project or services. For example, by comparing the prices of similar houses in different areas of a city, it is possible to estimate the capitalised amenity values of green infrastructure.

Life satisfaction analysis: Welfare estimations of public goods (health, environment) are estimated based on life satisfaction surveys (Source: Meyer et al., 2014).

Non-market valuation (NMV) methods: A (non-market valuation) method that relies on a range of specific valuation tools that can be used to estimate the monetary values that people place on intangible benefits and services. There are two main types of NMV techniques: stated preference methods and revealed preference methods.

Production function method: A technique that relies on estimating the contribution of an environmental good in producing a market good (Source: Meyer et al., 2014).

Replacement cost method: A method that considers the value of an ecosystem good or service and the costs of replacing that good or service (Source: Meyer et al., 2014).

Revealed preference methods: Revealed preference methods use existing market price information to calculate the implied non-market values of goods and services.

Stated preference (SP) methods: Stated preference methods use surveys to understand consumers' preferences. Contingent valuation and choice experiments are prominent examples of stated preference techniques (Source: Holguín-Veras et al., 2016).

Travel cost method: This method recognises the value of recreational and environmental sites by analysing observed travel time and expenditure of visitors (Source: Meyer et al., 2014).

Willingness to accept (WTA): Willingness to accept is the amount that a decision maker is willing to accept to give up using a good or service, or to accept a decrease in welfare (Source: Holguín-Veras et al., 2016).

Willingness to pay (WTP): Willingness to pay is the amount of money that a decision maker is willing to part with to procure a good or service, or to achieve a higher level of welfare (Source: Holguín-Veras et al., 2016).

1. Introduction

Investment in water sensitive infrastructure is critical in transforming cities to become more liveable, sustainable, resilient and productive. The public and private sectors have a role in redesigning and improving water management as part of this transition to water sensitive, low carbon, green cities.

All sectors will benefit from this reimagination of what it is to live, work and play in a metropolitan city.

Local government has a specific role in the transition to a water sensitive city, as the owner and manager of roads and a large amount of open space, and as a planning authority that oversees private development. Investing in water sensitive assets supports the transition to water sensitive cities and delivers multiple benefits including improved water quality, increased water quantity, and positive environmental and social outcomes.

It can often be difficult to identify the immediate benefits of water sensitive investments. The benefits extend over a long period of time, across a range of beneficiaries and are sometimes local and sometimes regional in spatial scale. Therefore, justifying large upfront capital expenditure can be difficult.

This guideline outlines our current knowledge of business case preparation methods for local government officers with a focus on water sensitive investments. Some of these methods and tools will apply to other sectors.

1.1 Audience

The audience for this guideline is local government officers in engineering, strategic planning, asset management, sustainability and financial management teams, who are often tasked with writing business cases for water sensitive projects.

1.2 The CRCWSC Integrated Research Project 2

The Cooperative Research Centre for Water Sensitive Cities (CRCWSC) was established in July 2012. Its purpose is to assist in changing the way we design, build and manage our cities and towns. The CRCWSC does this by valuing the contribution of water to economic development and growth, our quality of life, and the ecosystems of which cities are a part.

The CRCWSC is an Australian research centre that brings together many disciplines, world-renowned experts, and industry thought leaders who aspire to revolutionise urban water management nationally and internationally.

The CRCWSC established Integrated Research Project 2 (IRP2)—Comprehensive economic evaluation framework. IRP2 aims '… to develop, test and apply a broadly applicable framework for conducting integrated economic assessment to support business case development for investing in water sensitive, liveable and resilient cities'. (Fogarty, 2018)

This guideline aims to translate the outcomes from this research project for local government.

1.3 Guideline development

This guideline was developed using the following method:

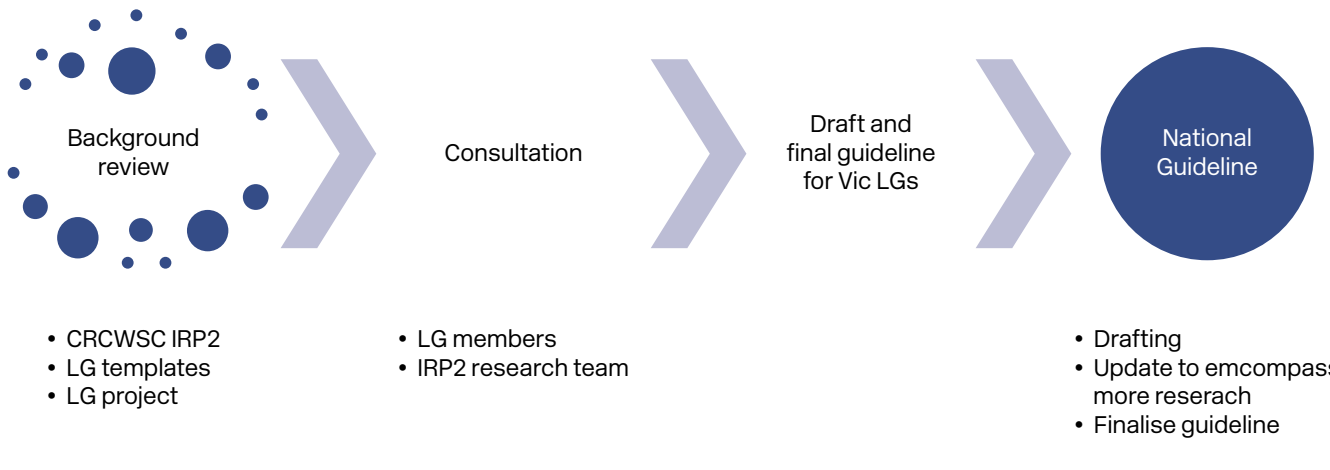


Figure 1. Guideline development process

2. Defining water sensitive investments

A water sensitive investment is a water asset that provides multiple tangible and intangible benefits, such as improved liveability, climate change mitigation, and ecological value. These assets contribute to the urban water system and aim to improve the flow of water and nutrients through the city using a holistic design approach. The benefits of these assets and associated services are often not fully considered when making investment decisions due to a lack of monetised values for these services.

Typically, these investments include one or more of the following assets:

- bioretention systems
- passive irrigation systems
- constructed wetlands
- stormwater harvesting systems
- rainwater harvesting systems
- green roofs
- green walls
- stream naturalisation projects
- buffer zones and the reuse of existing land within or next to water infrastructure assets (e.g. retarding basins and treatment plants), for passive and active recreation or other community values
- groundwater allocations and extractions

2.1 Investments typically outside of local government's responsibility

There are many more water sensitive investments that other authorities consider and require business cases for, but these assets are usually outside the core responsibilities of local government. This guideline does not consider the following forms of water investment:

- wastewater treatment
- recycled water schemes
- centralised water supply systems

3. Constructing a case within local government

Each organisation and local government body is different, with distinct processes and expectations for developing and presenting a business case. This section details the key issues to consider when generating a business case within local government for a new project, including both the upfront capital and ongoing maintenance budget.

3.1 Considering the strategic direction of council

All potential projects should align with council policy and strategic direction. In most instances the Council Plan will refer to community values and healthier environments, whereas a council's climate change policy may refer to more resilient water sources for irrigation and acknowledge the role that green spaces play in extreme weather conditions. Council's integrated water management strategy/total watermark or equivalent strategy may refer to targets to improve waterway health and increase the use of alternative water sources.

Some new strategies that also fall within the scope of local governments include urban forest strategies, disaster mitigation strategies, resilient cities strategies, neighbourhood and place making strategies.

What's your pitch?

Each business case must have a clear proposition at its core. For example:

- For an investment of $250,000, these tree pit upgrades with passive irrigation in an activity centre will increase economic turnover by 7%.
- This $2 million project reduces catastrophic flooding for 320 residents.
- This $1.2 million project reduces our reliance on potable water by 40%.
- This $1.4 million green corridor will provide passive recreation for over 10,000 people a week and become the largest outdoor recreation site in our LGA.

3.2 The narrative and pitch

First, each business case needs a story. It should fit within a narrative that is established within council, and that is supported by and consistent with the strategic direction of other council projects. This approach demonstrates the project promotes a broad vision and meets community needs.

Although the entire business case is the pitch, the key is clearly and concisely communicating, in the first instance, the project aims and how they align with the vision.

3.3 The budget and revenue

Councils are sensitive to budget constraints and reluctant to increase rates, so officers need to be adept at proposing good value projects that deliver multiple benefits, therefore using multiple components of the council budget.

Often, budget for water sensitive projects can be sourced from a range of teams or divisions within a local government. For example, specific teams will have a budget to deliver programs, such as road or drainage retrofits and upgrades, open space improvements, recreational services, community safety, or urban renewal, which often have a singular objective. These projects can be optimised to deliver multiple water sensitive benefits through internal collaboration. By establishing a cross-council working group, it will be possible to explain how to source contributions from a range of teams and groups. Via this approach, officers can also explore using developer contributions that are collected in the local area.

Other opportunities arise from projects where water infrastructure (including waterways) crosses local government boundaries. Since water decisions made by councils located upstream affect those further down, an integrated water management approach can strengthen the business case for water investments and lead to more profound local outcomes. This collaboration could take the form of a regional strategy team and combined initiatives. The Elster Creek action plan, a joint project between four catchment councils and Melbourne Water, is an example of a formalised approach to inter-council collaboration and funding.

Council budgets and internal collaboration

Identifying and sourcing capital budget is a constant battle for council officers. It is important to work across council and identify where there are opportunities to combine budgets from other teams and departments, as projects deliver on their KPIs and work program. It is worth considering how to fund a water sensitive investment by sourcing funding from capital allocations, operating budgets, city renewal budgets, developer contributions, research grants, and offset funds.

Securing external funds from state and regional agencies helps to offset internal funding streams and adds credibility to the business case.

3.4 Community needs and interests

The main beneficiary of water sensitive investments is often the local community. Understanding their needs, their views, and the level of support for water sensitive investments can be critical in building a case.

Compared with other tiers of government, local government is particularly familiar and aligned with delivering local services for local communities. Local government is best placed to put forward a proposition that benefits the community. Data and research that capture the local community's interests and vision are always valuable in presenting a case for water sensitive investments.

3.5 External funding

In most Australian states and territories, there are several grant opportunities that may be available for a local government to consider. Through engagement with external agencies and organisations, officers may be able to source more capital funding. Some possible sources for funding are the Commonwealth and state governments, environment protection agencies, water authorities and utilities, corporate donations (e.g. Telstra Community Grants), and philanthropic trusts (e.g. Myer Foundation).

By sourcing external funding, no matter how small, the business case automatically has more credibility and weight.

3.6 Who will benefit?

While documenting the benefits of a water sensitive investment, it is worth noting who will benefit. The benefits are normally allocated to the following groups as part of a distributional analysis:

- council
- local community
- wider community
- private landowners
- developers
- commercial businesses (e.g. tourism and hospitality services)
- water authority
- waterways and bay manager.

3.7 Tools and products to calculate benefits

The CRCWSC IRP2 team has developed tools and products that will support local government in calculating the range of benefits from water sensitive investments. See Section 7 for more detail on CRCWSC IRP2 research.

3.8 Advocate, advocate, advocate

The 2014 CRCWSC publication Strategies for preparing robust business cases states the business case itself (i.e., the document) will get you only so far. Councils often consider a range of factors when making decisions, beyond the numbers in a business case.

For this reason, officers must also accompany the business case with internal advocacy. The ability to internally advocate is linked back to ensuring you have a very clear and compelling pitch, as well as a strong business case. Together, a clear pitch and a strong business case maximise the likelihood of a good community outcome.

4. Capturing the benefits

A business case needs to clearly document the benefits and what they are worth monetarily.

The CRCWSC reviewed over 700 studies from across the world, to obtain the latest data and research on non-market valuations—194 of these studies were then included in the 2017 update and 336 values included in the INFFEWS Value Tool (Gunawardena et al., 2017 and Pannell, 2015). They were categorised into the following themes:

- Green infrastructure
- Water supply and pricing
- Ecological and environmental value of water
- Improved groundwater quality
- Wastewater management
- Climate change mitigation
- Flood hazard reduction
- Non-point source pollution.

The conclusion from this review of the relevant studies was:

> *'Adopting water sensitive systems and practices has the potential to provide significant benefits in terms of improving liveability, providing amenity benefits, improving water quality, tackling climate change, reducing flood risk, protecting groundwater, securing water supply and supporting the environment and ecosystems.' (Gunawardena et al., 2017)*

This research and some other key studies have been used here to provide an overview of the latest research on the monetary values of the benefits that water sensitive investments deliver.

Benefits must be seen in the context of the costs of a project. The CRCWSC report, Enhancing the economic evaluation of WSUD (2016), illustrates how an economic framework links costs and benefits. Figure 2 (with yellow colours indicating the costs, and aqua representing the benefits) is a useful reference for local governments to use and adapt when building a business case for water sensitive urban design (WSUD) assets. Further discussion on the issue of costs can be found in Section 6.6.

4.1 Willingness to pay studies

The CRCWSC IRP2 research team completed a large 'willingness to pay survey' in Sydney and Melbourne in 2015 and 2016 (Brent et al., 2017). Respondents were asked about their willingness to pay (WTP) more on their water bill for a range of benefits. This large project, with nearly 1,000 respondents across the two cities, revealed households did significantly value three of the five benefits included in the survey (Figure 3). There was statistically significant support to pay for freedom from water restrictions, cooler summer temperatures, and improvements to stream health. By contrast, there was no statistically significant support for WTP for reduced flash flooding and improved recreational and amenity services. According to Brent et al. (2017) these results imply respondents are either satisfied with the current level of service for these two benefits, or do not agree with mitigating the threats through increases to water bills.

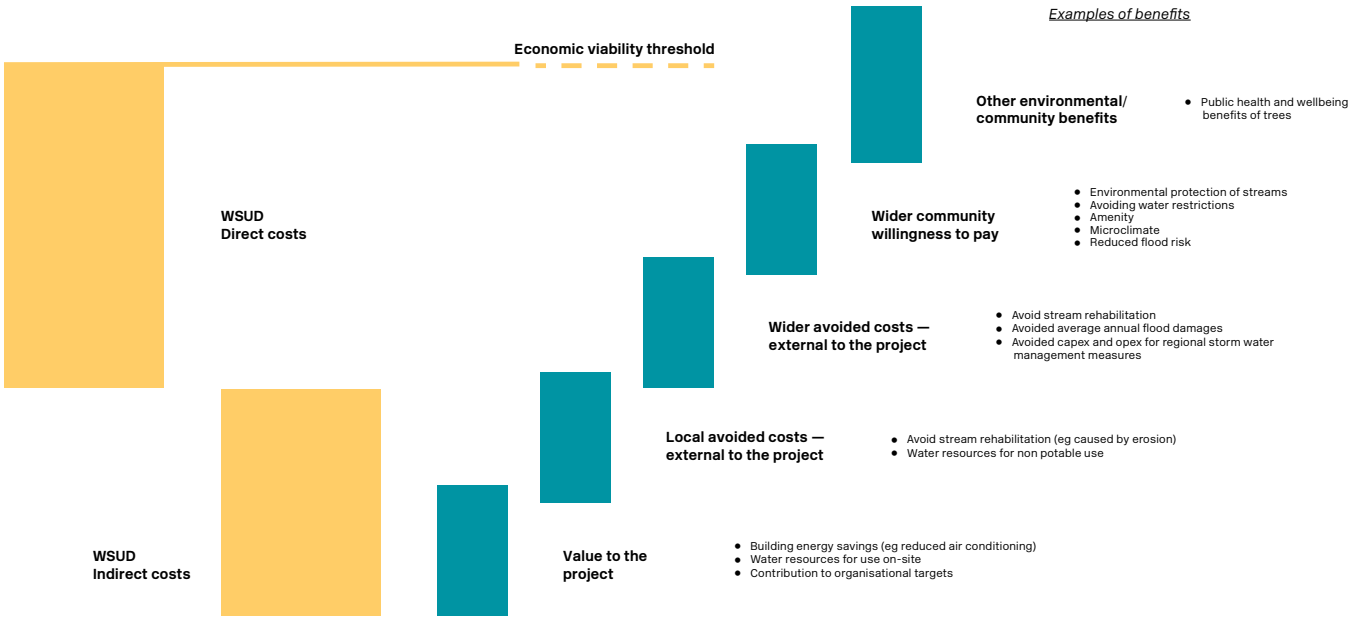
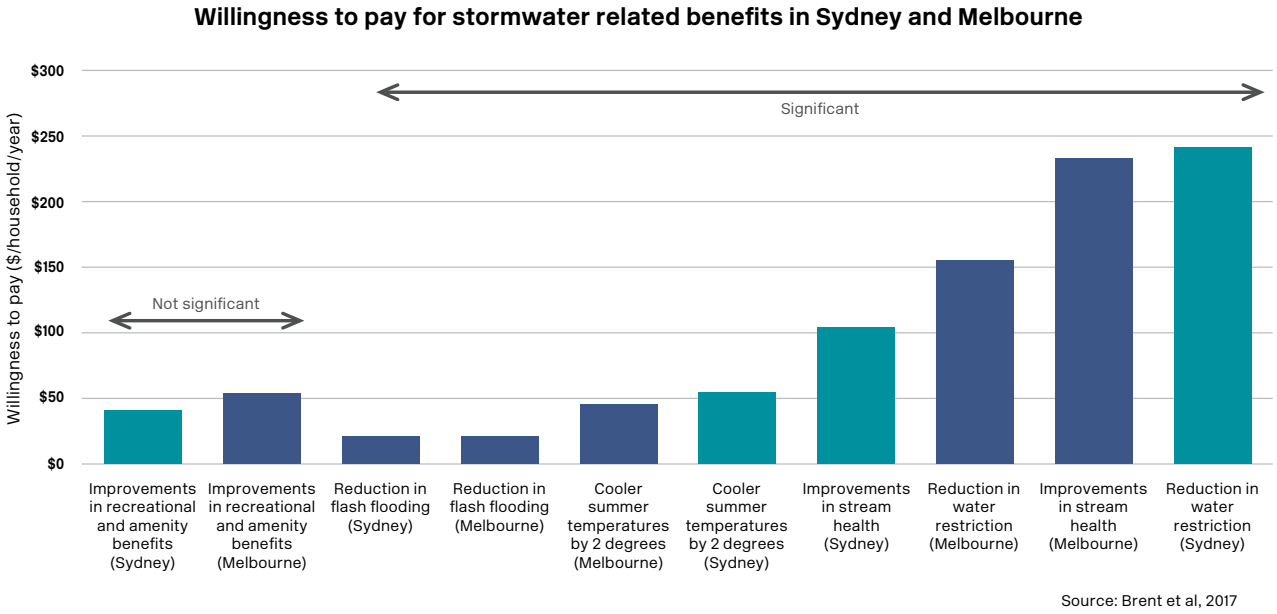


Figure 2. Total economic value framework (Source: CRCWSC, 2016)



Source: Brent et al, 2017

Figure 3. Benefits of water sensitive assets based on willingness to pay survey in Sydney and Melbourne.

In addition, the low valuing of these benefits may also reflect a lack of perceived relevance. For example, Zhai et al. (2006) discusses how the WTP for flood risk reduction may increase with flood experiences and proximity to a river, where the benefit is more relevant to the individual. The low WTP response for amenity benefits is likely related to a limited understanding of the relevance of this benefit to water sensitive investments, particularly as non-market valuation studies have shown that households are willing to pay a considerable amount for amenity improvements in general.

The Brent et al. (2017) study also reviewed the potential for benefit transfer, concluding, 'Benefit transfer tests indicate that findings are not significantly different between the study areas. This indicates that non market benefits of decentralised stormwater management can successfully be transferred across cities that exhibit differences within the range existing between Melbourne and Sydney' (Brent et al., 2017, p. 13). However, the analysis was restricted to the cities as a whole and does not identify likely influencers, such as income per capita, demographics, and environmental context within the cities, which can vary widely between local government areas.

4.2 Direct water savings

The water industry is already adept at documenting and including the cost per kilolitre savings associated with projects that reduce existing potable water use. The value of alternative water supplies extends beyond a direct saving, to that of a water supply that is not subject to central water supply restrictions during periods of drought. Van Houtven et al. (2017) completed a meta study of various WTP research projects.

The study documented the 'freedom from water restrictions' benefit and found that it varies from $3 a month to $33.50 a month per household.

Tam et al. (2010) looked at the empirical evidence in the use of rainwater tanks to reduce mains water supply sources. The study concluded that, 'using rainwater is an economical option for households in Gold Coast, Brisbane, and Sydney. Recommendations of suitable tank sizes for different household environments are also proposed'. But, the paper didn't find it economical in other cities, such as Adelaide, Melbourne, Perth and Canberra.

4.3 Nutrient benefits

In several Australian states, the benefit associated with reducing nutrients from entering the waterways and bays is accepted. For example, in Melbourne, the water authority (Melbourne Water) uses a one-off rate $6,645 per kilogram of Total Nitrogen as an abatement fee for works that reduce stormwater pollutants from entering Port Phillip Bay.

4.4 Property values

Various preference studies have investigated the price of water sensitive investments and been able to relate investments to increases in property values.

The main studies that will be useful for local government are Zhang et al. (2015), Rosetti (2013) and Polyakov et al. (2015). These studies capture the equivalent price per property of various water sensitive investments. Some key estimates are shown in Figure 4.

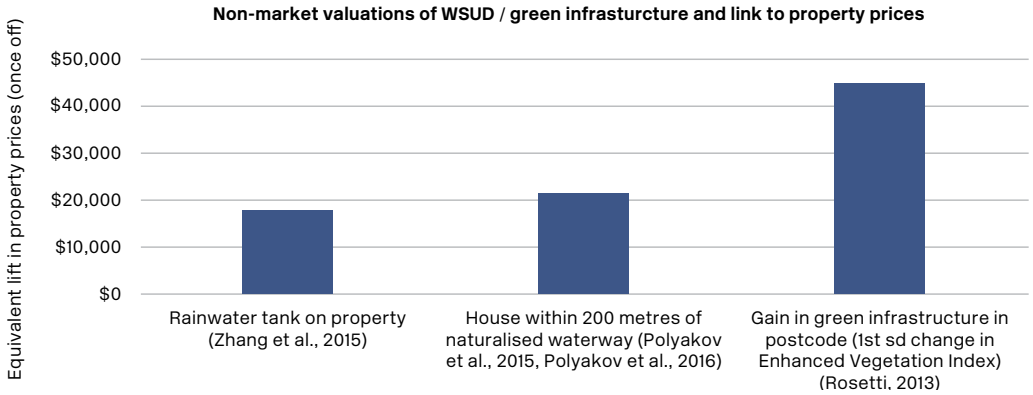


Figure 4. Revealed price of water sensitive investments as a function of property prices. (Sources: Zhang et al., 2015, Rosetti, 2013, Polyakov et al., 2015)

Pandit et al. (2014) completed a study on the relative increase in property price within 300 metres of wetlands. The results show how the increase is a function of proximity to the wetland (Figure 5).

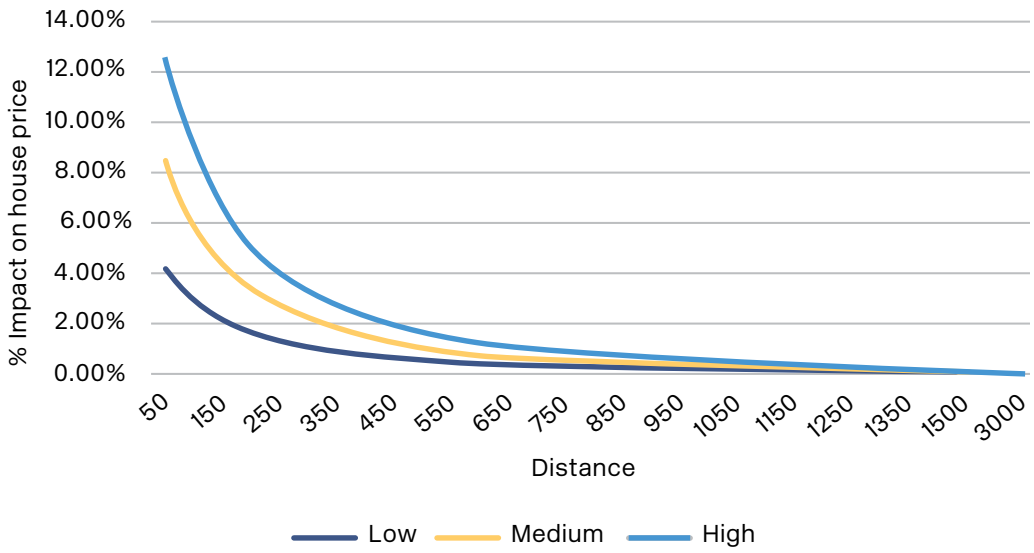


Figure 5. House price increase due to wetlands (Source: Pandit et al., 2014)

Avoiding above floor flooding is another issue linked to the cost or value of property. This benefit can be quantified using 'stage-damage curves' that link the depth of the flood to the direct cost of the damage. These curves vary according to the size of the house and may include indirect and intangible costs.

As part of the review and recommendations from the Brisbane 2011 flood, new stage-damage curves were developed which recognise the complexity and variability of the factors that affect the stage-damage curve. For example, it varies based on whether the use/zoning is residential or commercial; whether there is internal or external damage; and by type of building and footings (single storey or multi storey, free standing or joint, slab on ground or footings).

Chapter 6 of the Brisbane River Strategic Floodplain Management Plan technical evidence report (amended final) (BMT WBM, 2018) contains a number of relevant tables and figures, including stage-damage curves which show mean maximum figures per lot varying between $12,000 and $229,000.

The extrapolated benefit is the avoidance of, or reduction in, tangible and intangible impacts from flooding, associated with a water sensitive investment.

4.5 Mental health benefits

Sugiyama et al. (2008) examined the relationship between urban greenery and mental health. They found that those who perceived they had a green neighbourhood had a 40–60% chance of having better physical and mental health, compared with those who perceived they lived in the lowest green neighbourhood.

A recently released report by the Water Services Association of Australia (2019), Health benefits from water centric liveable communities, is a good reference if this benefit is important to your project.

Other literature has looked in detail at the concept of a 'natural deficit', which acknowledges that time spent in nature and in natural settings has a range of mental health benefits (and, by extension, a water sensitive investment contributes to more natural spaces for community to visit and enjoy). This concept was developed by an American, Richard Louv, but this mental health issue and the term 'nature deficit' is not an official term used in the medical or psychological disciplines.

What about the value of greenery and trees?

The community particularly values greenery and trees, with studies estimating these features add more than $10,000 (in today's dollars) to the sales price of houses (Donovan and Butry, 2010). Another study by Netusil et al. (2014) found that a 10% increase in tree canopy in the street was associated with an increase in property sale prices of $18,707. A study in Perth found that a 10% increase in canopy cover adjacent to public open space was worth $17,264 per property (Pandit et al., 2014).

The benefit of trees can be delivered without specific water diversions to them (they can rely solely on rainwater), although CRCWSC research found that irrigated trees provide a greater cooling effect than unirrigated street trees.

4.6 Distributed storage and flooding benefits

There's growing evidence and research about how to effectively link small scale WSUD assets across a catchment to mitigate minor to major flooding.

Myers et al. (2017) investigated the relationship between imperviousness, infill development, WSUD assets and downstream flooding, in a large study in Adelaide, South Australia. They demonstrated that peak flows of frequent flooding could be reduced by 25% with 5,000 litre rainwater tanks on lots (with specific configurations for outlets and reuse).

If you can create a local link between proposed investment and a local flooding problem, supported by modelling link, there may be significant benefits in terms of avoided annual average flood damages.

4.7 Avoided infrastructure and reduced maintenance

A special mention is made of capturing the benefits associated with avoiding infrastructure and reducing maintenance of existing infrastructure, by delivering a new water sensitive investment.

Avoiding upgrading other infrastructure, such as downstream drains and pits, is a clear and direct benefit that council is often well placed to analyse and document and include in a business case. Data from renewals programs and capital plans are a good source for this purpose.

4.8 Groundwater and water sensitive investments

The CRCWSC identified two studies that explicitly explore the benefits associated with investments and the sustainable management of groundwater. This is an important issue in Western Australia and some other states and territories.

The first study considered the economic values associated with the value of groundwater of the Gnangara Mound (a groundwater region in the Swan Coastal Plain) (Marsden and Whiteoak, 2006). The paper outlines the following values (all reported in $/kilolitre/year):

- Value of groundwater for public water supply
- Value of groundwater for industrial and commercial use (general commercial, general industry and power thermal, mining/processing)
- Value of groundwater for horticulture and agriculture use
- Value of groundwater for public open space (public parks, gardens, and recreation areas in an urban setting)
- Value of groundwater for domestic use (domestic urban and domestic rural—private domestic/residential purposes in an urban/rural setting, including inside use and garden watering, typically outside the range of integrated water supply scheme)
- Value of groundwater for garden bores (unlicensed)

The second study reviewed groundwater allocations for equitable and efficient outcomes (Iftekhar and Fogarty, 2017). This paper could be useful for local government officers where there is a need to be involved in a groundwater management plan, or where they see groundwater as an appropriate source for new water supply to support environmental and social outcomes (i.e. irrigation of open spaces).

Mennen et al. (2017) explored the most cost-effective way to maintain open space. For the case study area (Perth), they found 5%, 10% and 15% saving in the volume of water used to irrigate public open space can be achieved for average per kilolitre water costs of $0.38, $0.43, and $0.62, respectively. More information is available here.

5. How do you calculate a monetary benefit?

If there is no explicit price for a particular benefit, a non-market valuation is needed to determine the price or value. Determining the value or price of the benefits, as outlined in Section 4, is important to make a clear case that the benefit matches or exceeds the cost.

The CRCWSC IRP2 program aim is to develop evidence for valuations of water sensitive investments. This evidence is collated using different methods and theories, broadly based on non-market valuations.

This section summarises the main non-market valuation methods that the IRP2 team, and environmental economists more broadly, use. Figure 6 maps the market and non-market methods. The guideline glossary defines each non-market valuation method, with relevant methods discussed below in more detail. The 'market methods' are beyond the scope of this guideline, and as such are not included.

5.1 Revealed preferences

Revealed preference is the method in which individuals disclose a preference and price for a product or service based on a behaviour or signal in another market.

Pearce (2002) stated, *'Individuals' preferences for a non-marketed good are **revealed** through the inspection of other markets. A second form of revealed preference relates to property—land and housing—markets'.*

Property values are a common method for inferring the value of a water sensitive investment. Zhang et al. (2015) used this method in reporting that a rainwater tank has a one-off value of $18,000 per property.

5.2 Stated preferences

Stated preference is a method that elicits 'the willingness to pay from the use of questionnaires' (Maler, 1991). Individuals state their willingness to pay for a product or service, which is then used to determine the non-market value.

There are two types of stated preferences: contingent valuation and choice experiment. (These terms are defined in the glossary.)

Windle and Rofle (2014) is an example of a contingent valuation study. Researchers asked residents of Brisbane about their willingness to pay for reduced beach sand erosion on nearby beaches (between Gold Coast and Sunshine Coast; 75 kilometres of beaches). The study found residents were willing to pay, and the regional net present value of this was $80 million and $257 million (depending on discount values and different samples of the population).

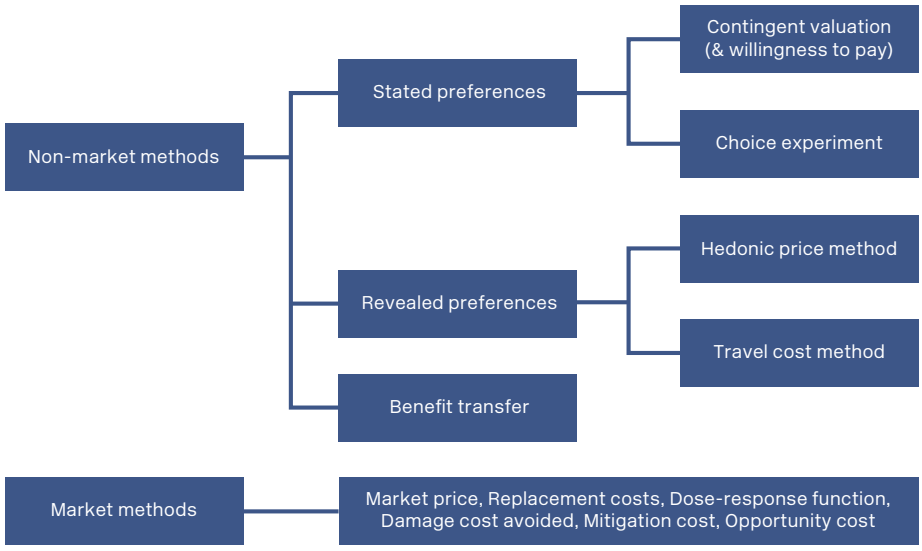


Figure 6. Non-market valuation methods (modification of figure in CRCWSC publication, Iftekhar, 2018)

MacDonald et al. (2015) is an example of a choice experiment study. The study, conducted in Adelaide, estimated the total value of a project which could achieve multiple outcomes including ensuring 25 days a year of water clarity, increasing seagrass area from 60% to 70% of the original area, and protecting five reef areas. The study found that the total value of the project to households in the Adelaide was $67.1 million

5.3 Benefit transfer

Benefit transfer is a technique used to take the results of one study, at one location, and use the data for a project in a different location. Benefit transfer is useful when there are no funds to do any specific research or valuations of the site or study area, but it can be risky because it assumes the valuation would be similar in a different environment. Valuations can be adjusted to reduce this risk, by considering for example, income, purchasing power or expert opinion.

Why can't I just run a model?

If only you could run a model and get an answer to the non-market valuation of a potential water sensitive investment.

While the CRCWSC IRP2 team is developing a range of tools, including the Benefit Cost Analysis Tool and the Value Tool, localised knowledge, site-specific research, and clear communication will always be important in building an effective business case.

5.4 Terminology

A sound understanding of financial terminology will help in confidently presenting a business case and pitching the project to council executives. In local government you have the option of using internal expertise from the finance team or bringing in external economic consultants.

5.5 Limitations

Water and environmental assets can be difficult to analyse with a traditional economic model. Water supply constraints and environmental and social values are often beyond the scope of a benefit cost analysis. As the CRCWSC report on non-market valuations stated, 'the market price can be an unreliable indicator of value' (Gunawardena et al., 2017).

In addition, there are limitations in both the revealed and stated preference methods. Some limitations include data availability, sample sizes and representation of the population, bias in survey results, and inadequate knowledge from survey participants. There are also limitations in the benefit transfer method. The Productivity Commission stated (Baker and Ruting, 2014):

> *'The evidence suggests that transferring value estimates from one site to another is likely to be very imprecise (and possibly misleading) unless there is a high degree of similarity between the 'study' and 'policy' contexts (in terms of the environmental features, policy outcomes and population characteristics). These seemingly obvious cautions are often not observed.'*

Sensitivity analysis can help officers understand how sensitive the results are to data limitations and key assumptions. If your estimates do not change significantly under a range of different assumptions, you have a robust business case

WTP: wastewater treatment plant or willingness to pay?

Economic theory and frameworks are critical to underpinning a business case. While local government officers don't have to understand all the theory, it is useful for officers to learn more about the basic theories and terms that underpin a business case.

Economic theory comes with its own language and acronyms. As one example, when discussing economic benefits, it's important to be clear that WTP stands for willingness to pay, not a wastewater treatment plant!

The key message is to be aware of the limitations and engage with environmental economics experts to ensure the appropriate method is used in the right context.

5.6 CRCWSC INFFEWS Tool and Resources

The CRCWSC IRP2 team has developed a set of tools and resources referred to as the Investment Framework for Economics of Water Sensitive Cities (INFFEWS), including a Benefit Cost Analysis Tool, a Value Tool, and detailed resources to guide their application and decision making processes.

Registered CRCWSC users can apply the custom built (and evidence based) Benefit Cost Analysis Tool when developing a business case or evaluating projects to assist in decision making.

The Value Tool is a comprehensive database that includes a ranking from the researchers of their confidence in the study and results. It gives registered CRCWSC users access to the best data on non-market values for their projects. Several of these studies are highlighted below.

Information on these tools and other research papers is available at https://watersensitivecities.org.au/content/project-irp2/.

Click here for the individual reports:

- Estimating the economic benefits of urban heat island mitigation—economic analysis
- Estimating the economic benefits of urban heat island mitigation—biophysical aspects
- Assessment of non-market benefits of WSUD in a residential development: Belle View case study

Is that a bargain?

A key concern and ongoing issue for local government officers is being able to benchmark the cost of the proposed infrastructure. Ultimately, officers need to know that the cost estimate is reasonable. The ability to compare a project cost estimate to similar projects in other jurisdictions helps provide some context to why this project and its estimated cost is a reasonable and equivalent investment that other organisations are making.

6. Key chapters to a business case

This section outlines the main chapters that are generally required in a business case. Each organisation will have its own templates and requirements, but these sections cover the key elements required for a business case.

6.1 The problem

The business case must present a project that addresses a problem. Problems usually fall into the following categories:

- Delivering on strategy/policy—This is an organisational problem, normally stated as a pollution reduction target or potable water saving target, which the council has adopted in response to an environmental values problem.
- Environmental threat—The problem councils often focus on from a stormwater management perspective is pollution in waterways.
- Managing risk—Projects that aim to drought-proof a reserve are important in reducing the risk of a water shortage or expensive water to support passive and active recreation.
- Community need—This addresses a community interest and support for environmental values and protection.
- Financial—The project addresses the increasing costs of water or spending levy money.
- Compliance/regulatory—Projects meet planning conditions and address the need to meet best practice design standards.

6.2 The context

This section of the business case provides context for the problem and its importance. This is where a reference to the value of water in the environment and the need to act on climate change is required. The City of Melbourne puts significant emphasis on this issue in its business cases, because it is one of the key issues executives must address. It allows officers to reinforce the strategic need for their project.

6.3 The options

Before the preferred option is presented, it is useful to highlight the range of options that were considered in the process of addressing the problem. This would normally account for variations in scale (i.e., larger wetlands or storage sizes), consideration of other water sources, consideration of other locations, and variations to costs, benefits, and delivery methods. This section of the business case illustrates there has been due diligence of the preferred option.

The options should include a 'do not act' scenario. This outlines the implications of not acting, while linking back to the problem and describing what will happen if this project does not proceed.

6.4 The project

This section clearly describes the project. It should capture the design, the key attributes (e.g. area of the project, number of plants, interaction with other assets), access, maintenance, staging, change to hydrological cycle (flooding, pollution reduction, water saving), and the vision for the project.

6.5 Business as usual

This section details what council used to do or traditionally would do when faced with designing and constructing a water asset. It compares how things were designed and built in the past (and their associated benefit or lack of benefit) and the new proposal.

6.6 Costs

This section details project costs, ideally presenting a range of costs that then link to benefits.

It is important to note who will be paying these costs. In some instances, officers may be able to secure external funding for the project (see Section 3.5 for more detail).

Councils normally include a contingency in their cost estimates of 10%.

Costs can be allocated over multiple financial years, reducing the impact of the infrastructure on any one budget year.

Ideally, the project would include costs to monitor and evaluate the impact and performance of the assets over time. This is something that is often neglected. At a minimum, a project should monitor water usage.

Costs should be benchmarked against other similar projects (preferably outside the council area).

6.7 The options

This section should clearly show how the council and the community will benefit from this project, both in tangible (and monetary) and intangible terms.

Many benefits cannot be monetised, but it is still important to acknowledge the intangible benefits that a project will deliver.

Sections 4 and 5 of these guidelines summarise potential benefits and the research to underpin how they can be quantified.

6.8 The project

This section documents who (internally and externally) has been consulted in the project's design and feasibility stages. Depending on the scale of the project, council may need to complete an engagement plan and report back on the results of the engagement.

Community consultation is important and should be captured. Local government officers are generally aware the community can have a major influence on council's 'social licence' to deliver water sensitive investments.

Council often requires multiple managers to sign off on a project, and each should be aware of their involvement, risks and resourcing requirements before completing the business case.

6.9 Timeframes

A key issue is that water sensitive assets provide benefits and returns on investment over a long period but require capital and costs up front. Figure 7 captures this concept, and that the benefits may increase over time. The business case should document how benefits accrue over time.

6.10 Assumptions

A robust business case will clearly state the major assumptions underpinning it. These include:

- the discount value (see the glossary for definition)
- timeframes (for delivery and benefits)
- future cost of potable water (or the long run cost of water)
- availability of land
- contribution to council targets.

The business case should also discuss the sensitivity of the results to changes in these assumptions.

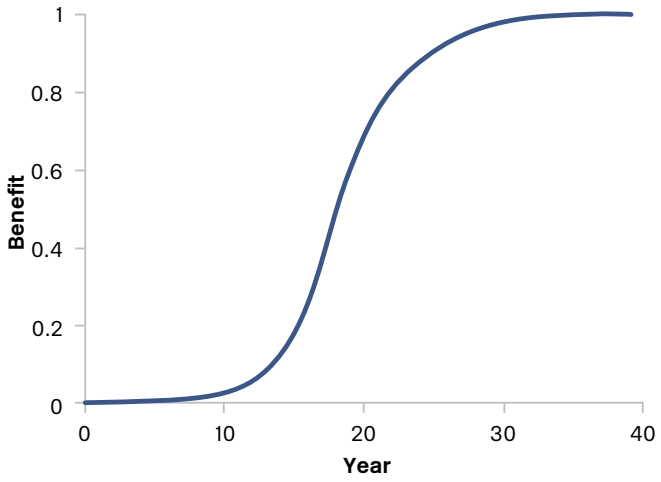


Figure 7. Typical pattern of project benefits over time (Pannell, 2015)

7. Further research

Beyond the data and research outlined in Section 5, the CRCWSC will release release more research, tools and publications about valuing water sensitive investments, including:

- Assessment of non-market benefits of liveability improvement in Melbourne: Greening the Pipeline case study
- Assessment of the demand for recycled water in the Subiaco Strategic Water Resource Precinct
- People's preferences for better infill developments: A case study in Adelaide and Melbourne
- Final report on the financial approaches and models to foster public and private investment in water sensitive systems and practices.

More detail on the status and delivery of these publications can be found on the IRP2 webpage: https://watersensitivecities.org.au/content/project-irp2/ or by emailing the team at inffews@crcwsc.com.au.

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Appendix A—Case studies

Case study: The business case for constructed wetland at Mint St (Knox)

The context

Knox City Council developed a Water Sensitive Urban Design Strategy in 2010, which guides its approach to the design and construction of WSUD assets across the municipal area. The Council has a budget allocated each year for new capital and renewal projects. This has reduced the need to present an in-depth business case for each project.

Mint St is a constructed wetland that was identified as an opportunistic project and was clearly important in delivering the Council's WSUD Strategy. The project went through a systematic process of considering stakeholder interests, Council drivers, technical design and feasibility, opportunity to get external funding, and ability to maintain the asset over its life cycle.

The drivers

In choosing projects, Council is driven to a focus on protecting 'high value catchments' through disconnection of impervious areas, and to take advantage of opportunistic projects as they arise. Melbourne Water has an objective of providing no more than 50% of the capital funding for a project, so the ability to source internal funds is important.

The innovations

Knox City Council developed its own template to review a project from a technical, flood mitigation, environmental, economic and social perspective. This has helped to compare and prioritise projects for delivery under the Knox WSUD Strategy and for funding by its specific stormwater/ WSUD budget.

The outcomes

The Mint St wetland has now been constructed and, as per its intent, the staff identified that there was a potential for a new wetland in the Dandenong Creek floodplain, and it would deliver a range of biodiversity and amenity benefits, as well as water quality benefits.

The prioritisation process also enabled Council to gradually work through the design of these projects and continue to engage with internal and external stakeholders to facilitate buy-ins to the project.

The challenges

The challenge is to identify and document the non-market benefits, and document how the community was engaged and how supportive they are of a WSUD project. Another challenge for projects that don't include a stormwater harvesting component is to calculate the return on investment, when the biodiversity and amenity benefits are intangible. Knox's prioritisation process is useful but can't overcome these large industry issues of quantifying intangible benefits.

From a technical perspective, Mint St was challenging because many existing trees in the reserve needed to be preserved and, in terms of constructing a new local asset, the local residents were not keen to see their views of the reserve and creek blocked. Council also prefers above ground storages, but this can be challenging for a gravity fed stormwater system.

The lessons

Funding the implementation of a WSUD strategy for all of Council has reduced the need to mount a business case and document the costs and benefits of one individual project. Sourcing external funding is critical to delivering more projects.

A template to prioritise projects has provided a systematic way to compare projects and, with new CRCWSC research, the template can be updated to account for a variety of benefits that WSUD investments deliver.

Case study: A business case for stormwater harvesting at Alma Park

This case study was written using Port Phillip data, and we acknowledge the contribution and effort by Sam Innes, Alastair McHarg and George Kompos.

The context

As part of delivering on its 2010 Water Plan: Toward A Water Sensitive City strategy, the City of Port Phillip recently completed an internal business case for a new project at Alma Park, St Kilda East. The project is a proposed stormwater harvesting scheme, and the business case considered the costs, benefits, implementation, and stakeholders.

The drivers

The benefits were relevant to both the Council and the wider community. To date, the benefits have focused on three issues:

- direct water saving costs
- indirect environmental savings as costed as a function of kilograms of nitrogen going into Port Phillip Bay (at $6,645/kg)
- improvements to local amenity.

The innovations

Intra-council collaboration was effectively administered, with engagement of different teams within City of Port Phillip. These areas included Project Services, Finance, Open Space and Recreational Services, Sustainability and Transport, and the Portfolio Director.

The Finance team is not often represented during this process for WSUD projects and was a critical part of drafting a rigorous business case.

The outcomes

The business case started in September 2017, with approval to do preliminary designs and concepts. In regular consultation with Councillors, this progressed to detailed design and is now ready for the tendering process. Over this period, the Council has rigorously studied the options, costs, and range of benefits. Like many projects, the costs and benefits change over time, as further analysis and groups are consulted and new information comes to hand.

City of Port Phillip also engaged with external partners and was able to secure a funding contribution from Melbourne Water.

The challenges

A challenge in the concept and detailed design stage was documenting the benefits of the proposed project.

The business case went through several iterations. Initially a concept was developed, followed by further feasibility, and a detailed design. Finally, Council engaged a quantity surveyor to review the cost estimates. The project is now forecast to cost more than $2 million.

A lack of industry-wide data to check the validity of cost estimates was a major problem for the business case process.

The lessons

For future business cases, Council's Water and Capital Planning Working Group is very keen to incorporate the latest evidence and understanding of the range of benefits that these projects deliver. Council believes the key to creating better business cases is to consider the community's willingness to pay for improved amenity, greener parks and recreational spaces, biodiversity benefits and cleaner beaches.

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