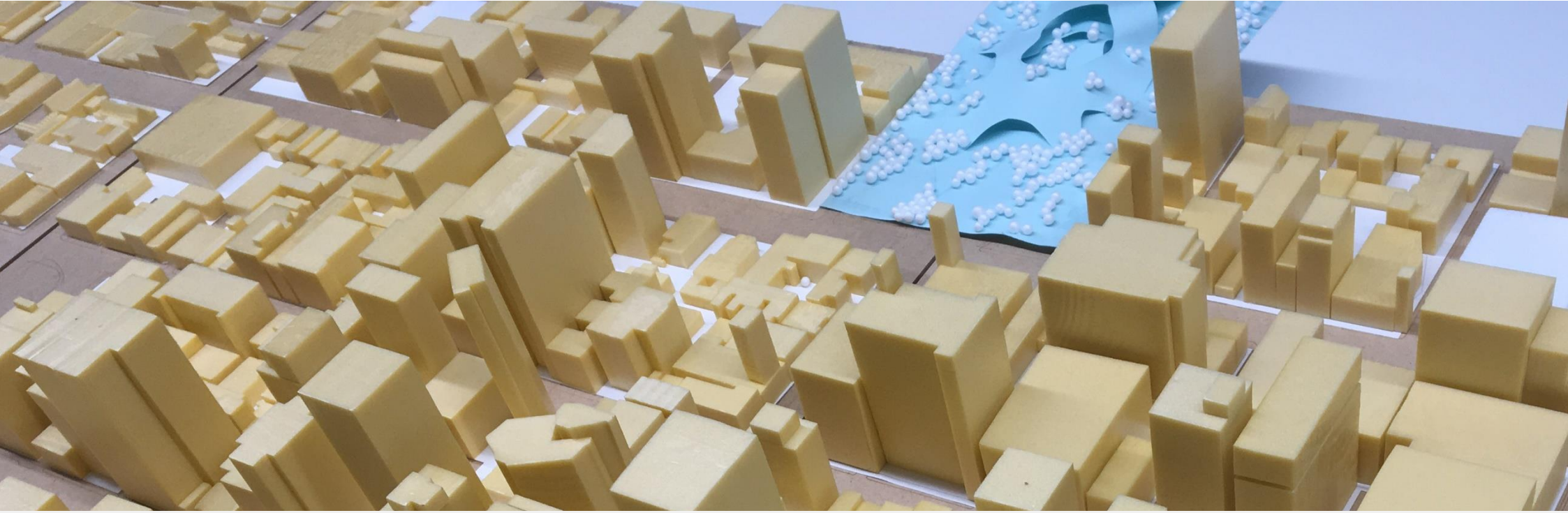

Constructing a business case for water sensitive investments

A guideline for local government

October 2018

CRC for Water Sensitive Cities

wave CONSULTING

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Disclaimer

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 a 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 a large amount of open space and roads, and as a planning authority that oversee 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 as well as 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 194 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 are:

- Water savings
- Nutrient reductions
- Freedom from water restrictions
- Improved stream health
- Improved amenity
- Cooler temperatures
- Flood mitigation and avoided damages
- Avoided (downstream) infrastructure

The evidence shows that households are willing to pay for some benefits, with freedom for water restrictions and improved stream health topping the list. Melbourne and Sydney residents were on average willing to pay between $100 and $240/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 greened 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 chapters:

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 values, it is important that a business case is accompanied by advocacy, the development of a clear pitch or proposition, and where possible source external funding contributions.

The CRCWSC's IRP2 has more products and tools to deliver in 2018 – 2020, that local government members will benefit from 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)*:** 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 (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 that 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 (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 (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 (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 (Department of Economic Development, 2018). The costs and benefits identified in an economic assessment typically occur over a number of years. In order 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 approach*:** 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 capitalized amenity values of green infrastructure.

***Life satisfaction analysis*:** Welfare estimations of public goods (health, environment) are estimated based on life satisfaction surveys (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 approach*:** An approach that relies on estimating the contribution of an environmental good in producing a market good (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. (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) techniques: Stated preference techniques use surveys to understand their preferences. Contingent Valuation and Choice Experiments are prominent examples of stated preference techniques (Holguín-Veras et al., 2016).

***Travel cost method*:** A method that recognises the value of recreational and environmental sites by analysing observed travel time and expenditure of visitors (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 (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 (Holguín-Veras et al., 2016).

1 Introduction

Investment in water sensitive infrastructure is critical in transforming our cities to become more liveable, sustainable, resilient and productive. 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.

All sectors will benefit from this re-imagination 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 a large amount of open space and roads, and as a planning authority who oversee 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 as well as positive environmental and social outcomes.

It can often be difficult to identify the immediate benefits of water sensitive investments. The benefits of water sensitive investment extends over a period of time, across a range of sectors and often in just one location. Therefore, justifying large upfront capital expenditure can be difficult.

This guideline outlines our current knowledge on 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, 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. The purpose is to assist in changing the way we design, build and manage our cities and towns. The CRCWSC does so 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.

This project focuses on one of the CRCWSC's research projects, Integrated Research Project 2 (IRP2) - Comprehensive economic evaluation framework. (https://watersensitivecities.org.au/content/project-irp2/). This guideline aims to translate the outcomes from this project for local government.

The IRP2 aim is "*… 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, p. 21).

1.3 VicRAP - Victorian Regional Advisory Panel

In each region, the CRCWSC has established regional advisory groups to facilitate information sharing and collaboration.

VicRAP is the Victorian stakeholders group comprising of members from state government, water authorities, local government, researchers, and consultants.

The VicRAP regional manager works with all members of the group to develop a business plan each financial year. This guideline was set as a priority for the financial year 2017/2018.

1.4 Guideline development

This guideline was developed using the following method.

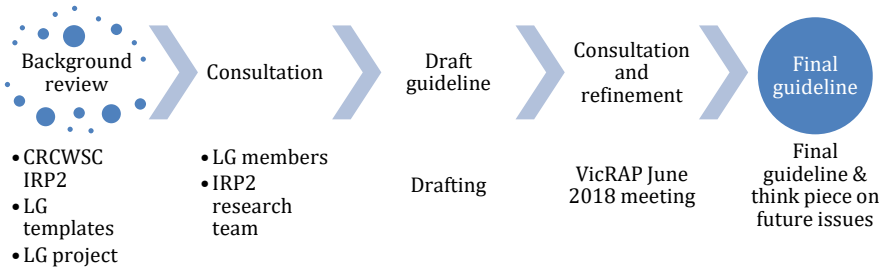


Figure 1. Guideline development process

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. They are assets that 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 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

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, however these assets are usually outside the core responsibilities of local government. In this guideline the following forms of water investments were not considered:

- Wastewater treatment
- Recycled water schemes
- Groundwater allocations and extractions

- Centralised water supply systems

3 Constructing a case within local government

Each organisation and local government body is different, with distinct processes and expectations regarding the development and presentation of a business case. This section details the key issues to consider when generating a business case within local government.

3.1 The narrative and pitch

Firstly, to construct a business case there must be a story. It should fit within a narrative that is established within council, and that is supported by and consistent with various other projects across council. This implies that the project is promoting a broad vision and meeting community needs.

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

3.2 Considering the strategic direction of council

All strategies should align with council policy and strategic direction. In most instances local government officers will realise the Council Plan will refer to community values and healthier environments, whereas the council's Climate Change policy will 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 will 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:

- These series of tree pit upgrades with passive irrigation in an activity centre, an investment of $250,000, will increase economic turnover by 7%
- This $2 million project reduces catastrophic flooding for 320 residents; or
- This $1.2 million project reduces our reliance on potable water by 40%; or
- 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

3.3 The budget and revenue

Councils are sensitive to budget constraints and in Victoria they have been facing 'rate capping' since 2014. Officers need to be adept at delivering multiple benefits, therefore utilising multiple components of the council budget.

By establishing a cross council working group, an exploration into sourcing contributions from a range of teams and groups within local government will be possible. For example, specific teams will have a budget to deliver programs with a water sensitive open space, recreational services, community safety, urban renewal, and how to explore the use of developer contributions that are collected in the local area that the project is proposed.

External collaboration, between individual councils connected by common waterways, is particularly pertinent for water initiatives. As 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, provides an example of a formalised approach to inter-council collaboration.

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 are 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.

Local government is particularly familiar and aligned with delivering local services for local communities, compared to other tiers of government. Local

government are in the best position to put forward a proposition in which the community benefits. Data and research that captures the interests and vision of the local community is always valuable in presenting a case for water sensitive investments.

3.5 External funding

In Victoria 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 for the project. Some possible sources for funding are: DELWP (under the Water for Victoria program), EPA (funding from prosecutions of pollution incidents), Melbourne Water (Living Rivers and River Health Incentives, Liveability Team), State Government & Sustainability Victoria, corporate donations (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.

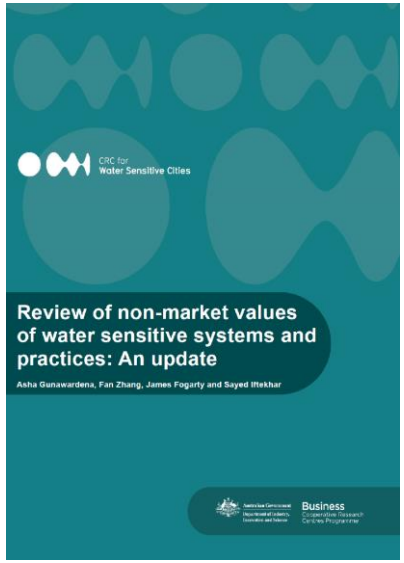
3.6 Advocate, advocate, advocate

The 2014 CRCWSC publication on 'Strategies for Preparing Robust Business Cases' was helpful in stating that the business case itself, i.e. the document, will only get you so far, and that 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.

4 Capturing the benefits

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

The CRCWSC reviewed 194 studies from across the world, to obtain the latest data and research on non-market valuations (Gunawardena et al., 2017). 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.

4.1 Benefits in context of an economic framework

Benefits must be seen in the context of the costs of a project. In 2016, the CRCWSC published a report titled '*Enhancing the economic evaluation of WSUD'*, which included a figure to illustrate how an economic framework links costs and benefits. Figure 2, shown below, is a useful reference for LGAs, to utilise and adapt when building a business case for WSUD assets. Further discussion on the issue of costs can be found in Section 6.6.

4.2 Direct water savings

The water industry is already adept at documenting and including the cost per kilolitre savings associated with projects that replace the cost of 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. Houtven et al. (2017) completed a meta study of various willingness to pay research project. 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 (2017 $AUD).

4.3 Nutrient benefits

In Victoria there is already common acceptance of the benefit associated with reducing nutrients from entering the waterways and bays. This is generally documented as a benefit through Melbourne Water's Nitrogen charge of $6,645/kg, as a one off abatement fee.

4.4 Dollars per household

Benefits that go beyond the water and nutrient savings are discussed below.

The 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 more on their water bill for a range of benefits. This large project, led by Daniel Brent, with nearly 1000 respondents, revealed that households did significantly value three of the five benefits included in the survey. There was statistically significant support to pay for freedom from water restrictions, cooler summer temperatures, and improvements to stream health. There was no statistically significant support for the willingness to pay (WTP) for reduced flash flooding and improved recreational and amenity services. Brent et al. (2017) reported that the two benefits that were not statistically significant implies that 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.

In addition, the low valuing of these particular benefits may also be due to a lack of perceived relevancy. 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 relevancy of this benefit to water sensitive investments, particularly as NMV studies have shown that households are willing to pay a considerable amount for amenity improvements in general (Figure 3).

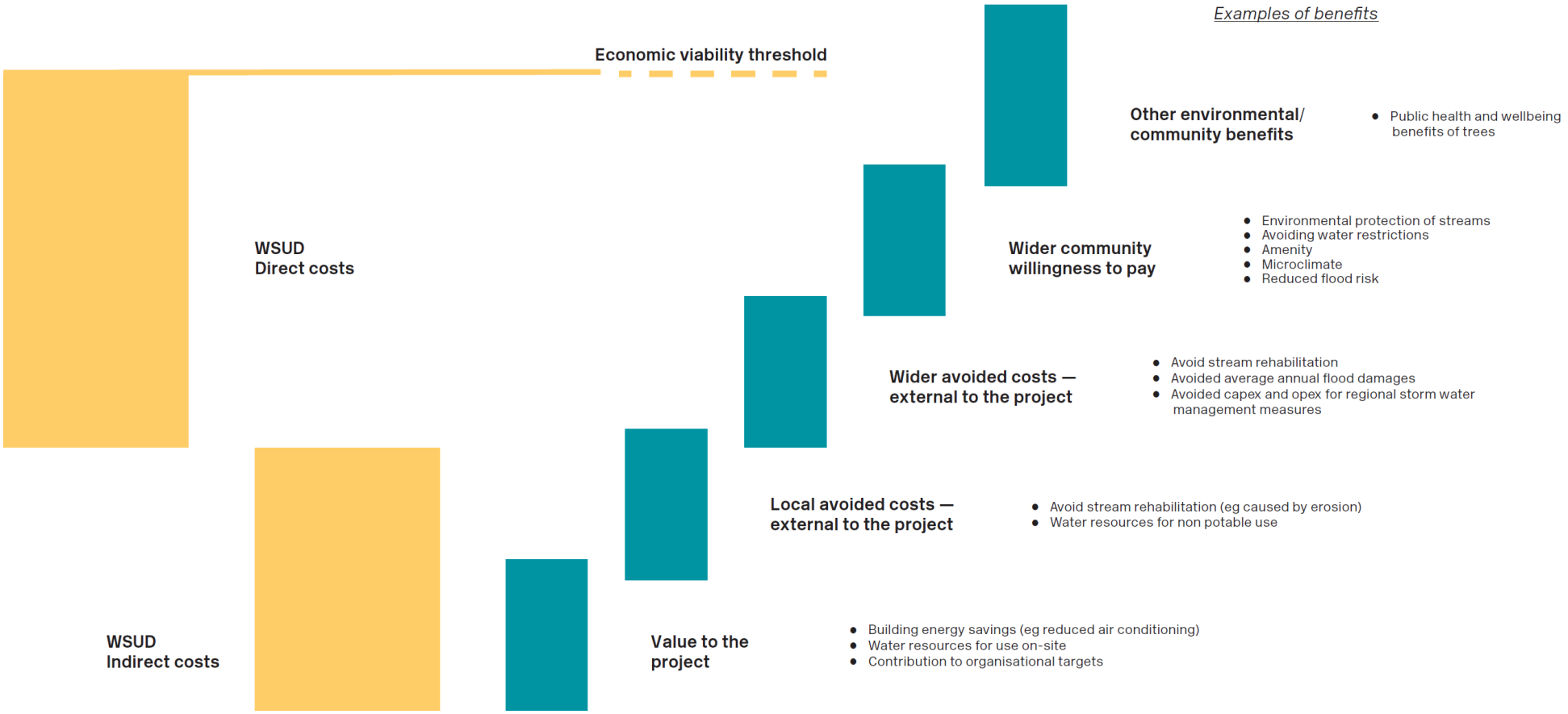


Figure 2. Total economic value framework (Source: CRCWSC, 2016)

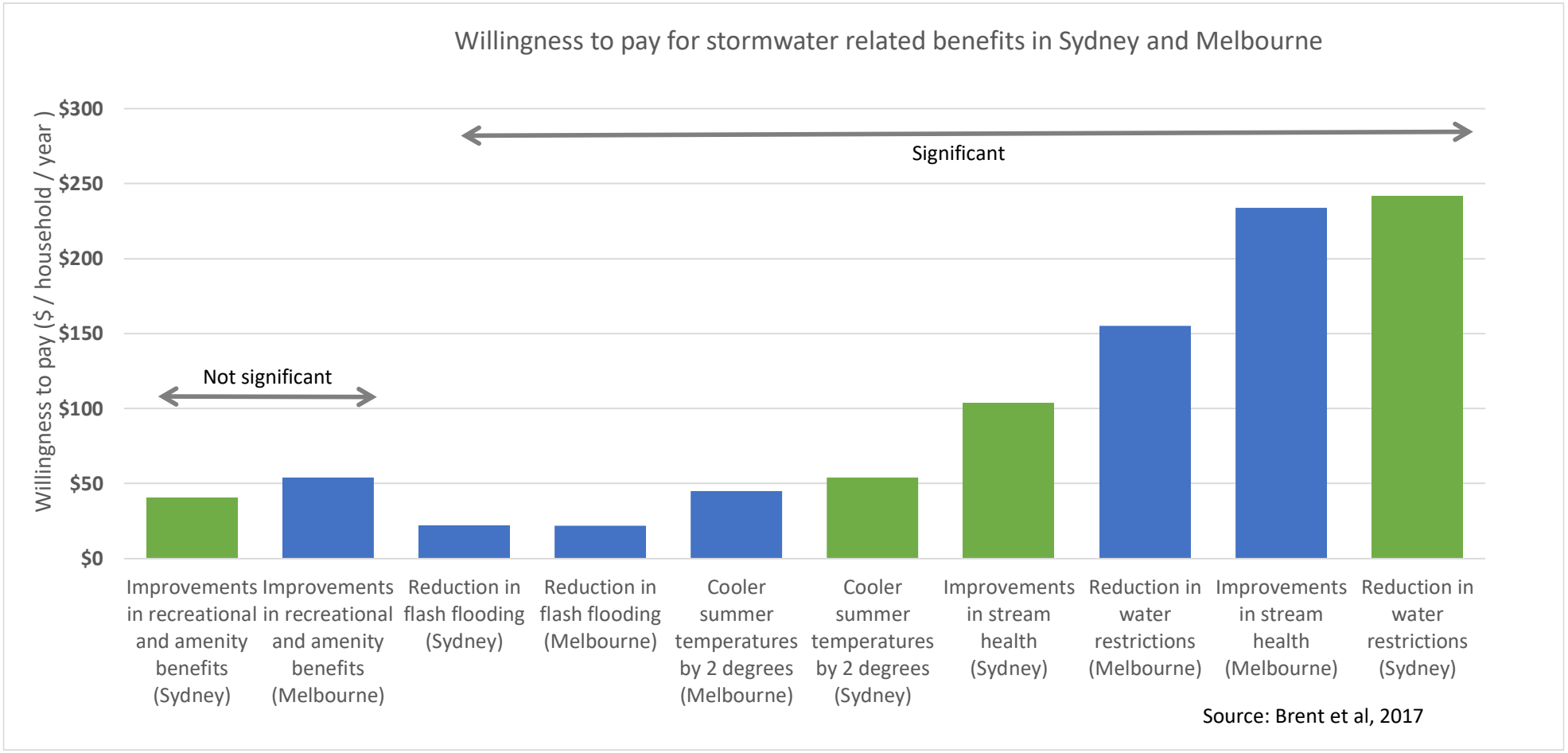


Figure 3. Benefits of water sensitive assets based on willingness to pay survey in Sydney and Melbourne (Source: Brent et al., 2017)

The Brent et al. (2017) study is also important in that it reviewed the potential for benefit transfer. The result was "*Benefit transfer tests indicate that findings are not significantly different between the study areas. This indicates that nonmarket benefits of decentralized 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 separate out likely influencers such as income per capita, demographics, and environmental context within the cities, which can vary widely between LGAs.

While transferring findings from existing studies is useful way of reducing project costs, in contrast to conducting a survey in-house, care must be taken when applying findings in new contexts to ensure they relate.

4.5 Dollars per property

Various preference studies have investigated the price of water sensitive investments and have been able to relate particular investments with 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 figures are shown in Figure 4.

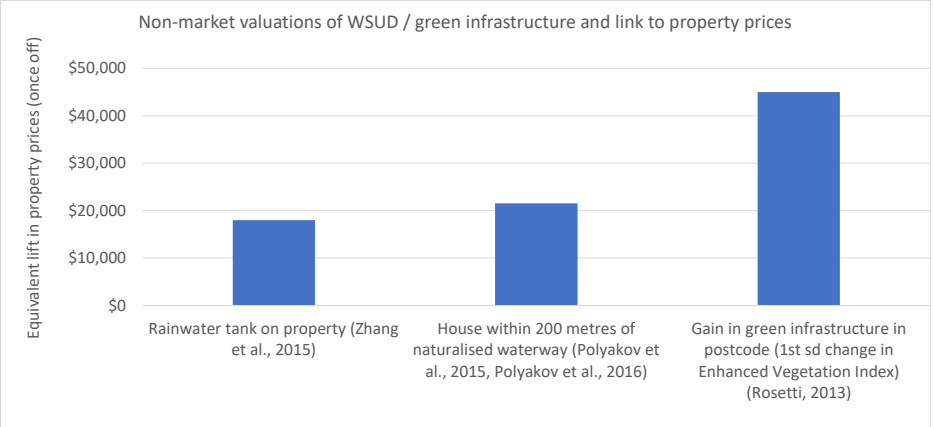


Figure 4. Revealed price of water sensitive investments as a function of property prices (Sources: Zhang et al., 2015, Rosetti, 2013, Polyakov et al., 2015)

In addition to these absolute values for increases in property prices due to water sensitive investments, Pandit et al. (2014) completed a study on the relative increase in property price within 300 metres of wetlands. The results are shown below in Figure 5, showing how the increase is a function of proximity to the wetland.

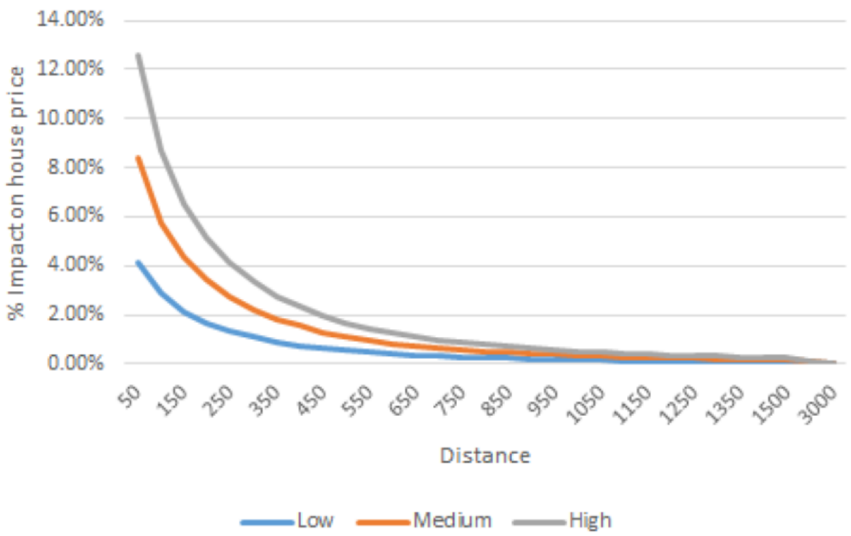


Figure 5. House price increase due to wetlands (Source: Pandit et al., 2014)

Another issue relevant for local government that is linked to cost or value of property is the **avoidance of above floor flooding**. To quantify this, the industry develops 'stage-damage curves' that link the depth of the flood to the direct cost of the damage (there are also indirect and intangible costs), which vary according to the size of the house. The State of Queensland (2002) published a stage-damage curve, in 1992 dollars, which is summarised as:

- Small houses: damage costed at $17,643 to $1,881 (when flooding varies from 1.8 deep to 0.1 metres over flood level)
- Medium houses: damage costed at $18,868 to $5,115 (when flooding varies from 1.8 deep to 0.1 metres over flood level)
- Large houses: damage costed at $32,768 to $11,743 (when flooding varies from 1.8 deep to 0.1 metres over flood level)

The benefit is therefore the avoidance, or reduction in flooding, associated with a water sensitive investment.

4.6 WSUD and flooding

The evidence and research is growing in how to effectively link small scale WSUD asset across a catchment to mitigation of minor to major flooding.

Tam et al. (2010) looked at the empirical evidence in the use of rainwater tanks to tackle flooding. Their conclusion was 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.*" (Tam et al., 2010, p. 178). Note that this paper didn't find it economical in other cities like Adelaide, Melbourne, Perth and Canberra.

For local government that can geographically link their proposed investment to a local flooding problem, with modelling to support the link, there may be significant benefits in terms of avoided annual average flood damages.

What about the value of greenery and trees?

Greenery and trees are particularly valued by the community and have been shown to be worth over $10,000, in today's dollars (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.

Trees are great! But by themselves they aren't necessarily a function of, or directly linked to, a local water sensitive investment. Green infrastructure, on the other hand, has both water and greenery benefits. Combining canopy, greenery and green infrastructure projects could be one way of increasing the WTP for water sensitive outcomes, and gain access to related external fund.

4.7 Avoided infrastructure and reduced maintenance

A special mention is made here in terms of capturing the benefits associated with avoiding infrastructure and reduced maintenance of existing infrastructure, through the delivery of a new water sensitive investment.

The avoidance of upgrading other infrastructure, such as downstream drains and pits, is a clear and direct benefit that council is often in a good position 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 Who will benefit?

While documenting the benefits of a water sensitive investment, it is worth noting who will benefit. The benefits are normally allocated into the following groups in the process of running a distributional analysis:

- Council
- Local community
- Wider community
- Private land owners
- Developers
- Commercial businesses (e.g. tourism and hospitality services)
- Water authority
- Waterways & bay manager

4.9 Tools and products to calculate benefits

The CRCWSC IRP2 team are currently developing 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 upcoming CRCWSC IRP2 research.

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 as a clear case can be made to indicate 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 the environmental economics discipline more broadly use in determining non-market valuations. The market and non-market methods are mapped in Figure 6. Definitions of each term contained within the Non-market methods are provided in the glossary of this guideline, with relevant methods discussed below in more detail. The 'market methods' are beyond the scope of this guideline, and as such are not included.

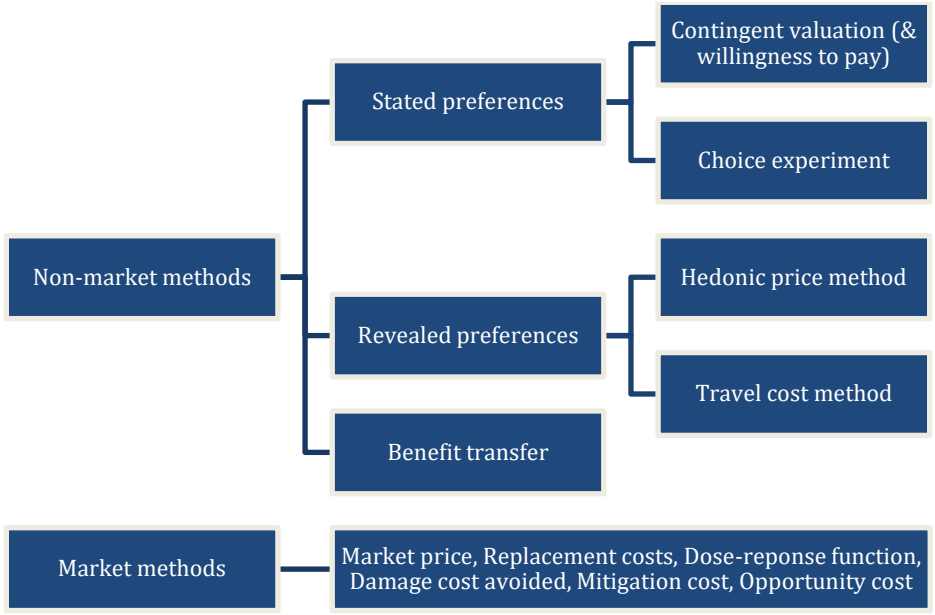


Figure 6. Non-market valuation methods (modification of figure in CRCWSC publication, Iftekhar, 2018)

5.1 Revealed preferences

Revealed preferences 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.

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 are developing a range of tools, including the Benefit Cost Analysis Tool, it is unlikely there will ever be a model that will produce a rigorous and site specific answer to understanding whether there is a business case or not. Localised knowledge, site specific research, and clear communication are equally as important in building an effective business case.

Pearce (2002) states that "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 used to infer 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 preferences are a method that elicit "the willingness to pay from the use of questionnaires" (Maler, 1991). Individuals state their willingness to pay for a product or service and that 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 within the glossary.

An example of contingent valuation can be found in the Greening the Pipeline project, in the City of Wyndham, where the research team and Melbourne Water have started a study to ask the community what they are willing to pay to extend the pilot project and invest more in creating green space over this old existing asset.

An example of a choice experiment study is a study from Adelaide. MacDonald et al. (2015) completed a choice experiment survey to estimate the total value of a project which could achieve multiple outcomes including: ensuring 25 days per 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, South Australia was $67.1 M.

5.3 Terminology

To confidently present a business case to council executives, a sound understanding of financial terminology will help in pitching the project. In local government you have the option of using internal expertise from the finance team or bring in external expertise in the form of economic consultants.

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 of the theory, it is useful for practitioners to learn more about the basic theories and terms used that will underpin a business case.

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

5.4 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 traditional benefit cost analysis.

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 states:

> *"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"* (Baker and Ruting, 2014).

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

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 their own templates and requirements, but these sections should 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, that 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 – community interest and support for environmental values and protection.
- Financial – increasing costs of water or spending of levy money.
- Compliance/regulatory – projects delivered to meet planning conditions and the need to meet best practice design standards.

6.2 The context

This section of the business case provides context to of the problem and the importance of the project. This is where a reference to the value of water in the environment and the need to take action on climate change is required. The City of Melbourne put significant emphasis on this issue in their business cases, as it is one of the key issues executives need to address. This therefore enables 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 and of other locations, and variations to costs, benefits, and delivery methods. This section of the business case illustrates that there has been due diligence of the preferred option.

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

6.4 The project

A clear description of the project is presented in this section. This should capture the design, the key attributes (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 of the business case details what council used to do, or traditionally would do when faced with the design and construction of a particular water asset. This highlights the variation between how things were

designed and built (and their associated benefit or lack of benefit) in the past in comparison with the new proposal.

6.6 Costs

This section of the business case details the costs of the project. Ideally this section presents a range of costs, which then link to the range of benefits.

It is important to note who will be paying for the 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 particular 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 of the council area).

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.

6.7 Benefits

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

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

Section 4 of this guideline provides a summary of potential benefits and the research to underpin how they can be quantified.

6.8 Stakeholders

The purpose of this section is to document who (internally and externally) has been consulted in the design and feasibility stages of the project. Depending

on the scale of the project, council may be required to complete an engagement plan and report back on the results of the engagement.

Community consultation is important and should be captured in this section of the business case. Council officers are generally aware that the community can have a major influence on the 'social licence' of council to deliver water sensitive investments.

Council often require multiple managers to sign off on a project, and each should be aware of their involvement, risks and resourcing requirements prior to the completion of 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. Ensure this is outlined in the case.

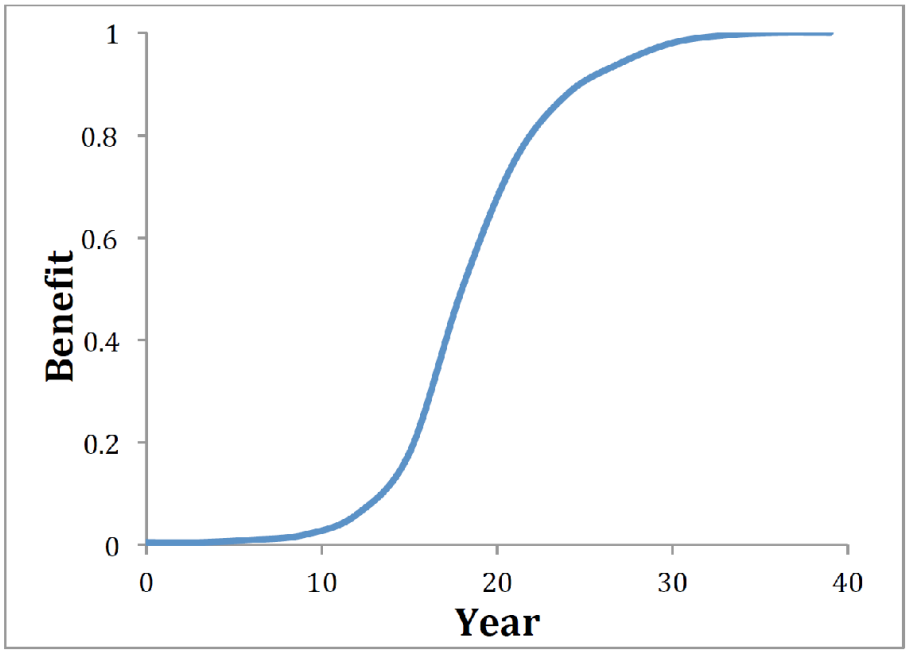


Figure 7. Typical pattern of project benefits over time (Pannell, 2015)

6.10 Assumptions

A robust business case will be clear on the major assumptions that underpin it. These include:

- The discount value (see Glossary for definition)
- Timeframes (for delivery and benefits)
- Future cost of potable water (also known as the long running cost of water)
- Availability of land
- Contribution to council targets

7 Upcoming research

Beyond the data and research outlined in Section 4, there is further research, tools and publications that the CRCWSC will release over the next two years.

This includes:

1. Benefit: Cost Analysis and Strategic Decision Making for Water-Sensitive Cities
2. Benefit: Cost Analysis Tool Guidelines
3. Benefit: Cost Analysis Tool User Guide
4. Non-market values of water sensitive systems and practices: Benefit transfer guideline
5. An economic literature review on the valuation of the benefits in UHI mitigation
6. Development of four landscape scenarios to model the effectiveness of water sensitive urban design in different temperatures.
7. The results from heat mitigation modelling using four landscape scenarios using the SURFEX and CRCWSC's TARGET models.

More detail on the status and delivery of these products can be found on the IRP2 webpage: https://watersensitivecities.org.au/content/project-irp2/.

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Why did the chicken cross the road without a business case?

Because it saw a water sensitive asset. Or maybe because it was a good thing to do, for the individual chicken and for the wider chicken community.

Sometimes the industry and authorities make decisions for reasons beyond the numbers in a business case, so don't be concerned if everything doesn't fit into a business case. The business case is a tool, one of many tools at the disposal of local government, in advancing the case for a smarter and more liveable city.

9 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 their 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 have 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 their 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 their 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 has 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 have been engaged and how supportive they are of a particular 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 as there were many existing trees in the reserve that needed to be preserved, and in terms of constructed a new local asset, the local residents were not keen to see their views of the reserve and creek blocked. Council also prefer 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 their *Water Plan: Toward A Water Sensitive City* strategy signed off by council in 2010, 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 was drafted and sent to the executive for approval.

The drivers

The benefits included in this business case were relevant to both to the Council itself and to 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 to the 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 included: Project Services, Finance, Open Space and Recreational Services, Sustainability and Transport, and the Portfolio Director. Finance are not often represented during this process for WSUD projects, and were a critical part of ensuring a rigorous business case was drafted for the executive management.

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 been rigorously studying 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 for this project went through several iterations. Initially a concept was developed, then further feasibility, and then detailed design, and finally a quantity surveyor was engaged 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 & capital planning working group is very keen to incorporate the latest evidence and understanding of the range of benefits that these projects deliver. Consideration of the willingness of the community to pay for improved amenity, greener parks and recreational spaces, biodiversity benefits and cleaner beaches are believed to be a key to creating better business cases.

10 Appendix B – Summary of research papers and LGA relevance

Table 1. Summary of CRCWSC research and data.

Title	Author(s)	Year	Format	Key message / summary	Relevance for LGAs
NMV database	CRCWSC	2018	Database	Referred to in CRC summaries of IRP2	High
IRP2 Case studies WP5.1: Greening the Pipeline, Melbourne	CRCWSC	2018	Online page	WTP study on green infrastructure in Melbourne's West.	High
IRP2 Case studies WP5.2: Subiaco Wastewater Precinct, Perth	CRCWSC	2018	Online page	Case study on use of land adjacent to a wastewater treatment plant, as described in *Social preferences for land uses in wastewater treatment plant buffer zones: A choice experiment analysis.*	Low
IRP2 Case studies WP5.3: Residential development with WSUD, Perth	CRCWSC	2018	Online page	An integrated economic evaluation framework would help identify and quantify: the costs and benefits associated with converting an open drain into a living stream, where the area is flood prone, and; the ongoing benefits, liabilities, and responsibilities of different stakeholders and the revenue needed for the project to be viable from the perspective of each individual stakeholder, and as a whole.	High
IRP2 Case studies WP5.4: Urban renewal with flood management context, Melbourne	CRCWSC	2018	Online page	The Arden-Macaulay case study provides an opportunity to explore benefits associated with infill development, which can be transferable to other infill developments.	High
IRP2 Case studies WP5.5: Urban redevelopment (City of Salisbury) case study, Adelaide	CRCWSC	2018	Online page	IRP2 will conduct an economic evaluation of a range of different WSUD solutions at the allotment, street and precinct scales to determine the system and community wide benefits, and compare with the business as usual base case.	High
IRP2 Comprehensive Economic Evaluation Framework (2017–2019): An Overview	Fogarty, J.	2018	Presentation	Overview of whole IRP2 program.	High
Social preferences for land uses in wastewater treatment plant buffer zones: A choice experiment analysis	Iftekha, S., Burton, M., Zhang, F., Kininmonth, I., & Fogarty, J.	2018	Journal	Field experiment (choice modelling) to test customer preferences on how land around a treatment plant could be used for different purposes.	Medium

Title	Author(s)	Year	Format	Key message / summary	Relevance for LGAs
State of knowledge of non-market values of water sensitive systems and practices	Iftekhar, S.	2018	Presentation	Review of various CRC projects and studies. Results and data notes in other specific documents.	Very high
The most cost-effective ways to maintain public open space with less water: Perth case study	Mennen, S., Fogarty, J., & Iftekhar, M. S.	2018	Journal	Relevant reference, but unsure of economic model used to calculate results.	High
Benefit: Cost Analysis of water-sensitive projects and policies	Pannell, D.	2018	Presentation	Overview of various BCA studies, theory and CRC projects	Medium
Equitable and efficient systems of water utility charges in the face of a changing water supply mix.	Fogarty, J., Polyakova, M., & Iftekhara, M. S.	2017	Paper / journal	Economics of alternatives to water supply and services for centralised systems	Low
Review of non-market values of water sensitive systems and practices	Gunawardena, A., Zhang, F., Fogarty, J., & Iftekhar, S	2017	Industry note	Summary of research into Non-Market Valuation methods for water sensitive activities. 180 studies reviewed, with research categorised into Revealed or Stated Preferences, and by 8 water related themes.	Very high
Impact of water allocation strategies to manage groundwater resources in Western Australia: Equity and efficiency considerations.	Iftekhar, M. S., & Fogarty, J.	2017	Journal	Summary of review of methods to allocate groundwater.	Low
Stakeholder Needs Assessment Report. IRP2 - Comprehensive Economic Evaluation Framework (2017 – 2019).	Iftekhar, S., Siebentritt, M., Pannell, D., Fogarty, J., Tapper, N., Gunawardena, A., Whiteoak, K.	2017	CRC report	Appendix B has some good data on tools.	Medium
Review of existing Benefit: Cost Analysis (BCA) tools relevant to water-sensitive cities. Milestone Report (Work Package 3.1)	Pannell, D.	2017	CRC milestone report	Comprehensive body of work looking at design of the upcoming BCA tool as per CRC IRP2 work program. Good review of 5 existing BCA tools.	Very high

Title	Author(s)	Year	Format	Key message / summary	Relevance for LGAs
Cost-effective Strategies to Reduce Nitrogen and Phosphorus Emissions in an Urban River Catchment	Polyakov, M, White, B. and Fan Zhang.	2017	Industry note	Looked at abatement measures (e.g. incentives, restrictions, etc.) for Canning Rivers. Calculated NPV for a few different options.	Medium
Valuing Environmental Services Provided by Local Stormwater Management	Brent, D. A., Gangadharan, L., Lassiter, A., Leroux, A., & Raschky. P. A.	2016	Paper	Random sample of 1000 households in Melbourne and Sydney, for a willingness to pay study on value of decentralised stormwater infrastructure.	Very high
Enhancing the economic evaluation of WSUD. Melbourne, Australia: Cooperative Research Centre for Water Sensitive Cities.	CRCWSC	2016	CRC report	Comprehensive economic evaluations on the prices that households are willing to pay for various water benefits and services, and cost-benefit analysis of implemented WSUD projects.	Very high
Economic analysis and funding options for Eastbank Lake Precinct	Marsden Jacob Associates	2016	Consultant report - MJA	Estimated that $55,000 was the value of the health benefits of this proposed integrated water management. Also quantified recreational benefits, and land value uplift.	High
Evidence-based raingarden design to promote community acceptance (A4.1)	Dobbie, M., & Farrelly, M.	2015	Presentation	Social survey of residents that live near raingardens at four different sites.	Medium
Valuing living streams	Fogarty J. , Zhang F. , and Polyakov M.	2015	Industry note	Study of Bannister Creek in Perth. Showed increase in value of houses within 200 metres was $17,000 to $26,000.	High
The capitalized value of rainwater tanks in the property market of Perth, Australia	Zhang, F., Polyakova, M., Fogarty, J., Pannell, D.	2015	Journal	Rainwater tank = $18,000 per property benefit. Value is more than financial return on water savings. Based on analysis of 77,234 properties sold over the period 2008-2012 in the Perth metropolitan area. But restricted to include single family homes less than 5,000 m2. Of this sample, 155 had rainwater tanks.	High
Strategies for preparing robust business cases	CRCWSC	2014	CRC report	Focuses on process and key issues in approaching a business case, as opposed to the costs and benefits. Need to also consider what has changed since the report was released when using.	High
Ranking projects for water sensitive cities: a practical guide	Pannell, D. J.		CRC report	In-depth explanation of how to go about looking at comparing options between projects. Explains BCA and uncertainties and issues to look out for.	Medium