STORMWATER 2010
National Conference of the Stormwater Industry Association
Conference Proceedings

JUST WHAT WE NEED! A TOOLKIT FOR STORMWATER HARVESTING

Author/s:
Ryan Vandervalk, Sustainability Manager, STORM CONSULTING
Rodney Dedman, Manager of Water Policy, Victorian Department of Health
Mal Brown, Director and Environment Manager, STORM Consulting

Abstract

As a direct result of recent Victorian droughts and water restrictions, the conditions of many public parks and sports grounds have been jeopardised due to poor playing conditions. Reliable alternative water supplies are essential to maintain the physical infrastructure (i.e. condition of turf and soil on playing fields) in order to sustain the activities that support our health, wellbeing and economy.

The Victorian Department of Human Services has identified a clear nexus between stormwater harvesting and fostering community health and well-being. However, the Department was acutely aware that many Councils did not know how to identify, much less rank such projects. To this end the Department devised the notion of a Stormwater Harvesting Toolkit targeting local Councils to assist in the planning, investigation and prioritisation of stormwater harvesting projects across a municipality.

The Toolkit that has been developed is a spreadsheet-based model with a user-friendly interface that prompts for simple-to-collect information inputs. It processes the information to conduct a preliminary feasibility investigation, and then produces a scoping document which can then serve as a Brief to further the project by way of more detailed investigations and design.

Each project involves a quadruple-bottom line assessment which drives the ranking feature within the Toolkit.

This paper also presents the outcomes of two separate analyses from the Toolkit using urban and regional settings to prove the benefits of stormwater harvesting for public health and wellbeing in contrasting contexts.

The Toolkit also mirrors the risk management features of the Australian Guidelines for Water Recycling.

In summary, the Victorian DHS Stormwater Harvesting Toolkit is an empowering and capacity building tool targeting local government. It is simple to use, yet it produces useful outputs designed to further projects. With it, stormwater harvesting projects can be prioritised, planned and budgeted for with confidence that all costs and benefits are accounted for. The Toolkit expedites the investigative and decision making process to fast forward investment in healthy lifestyles.

Introduction

As a direct result of Victoria's ongoing droughts and water restrictions, the conditions of many public parks and sports grounds have been jeopardised due to poor playing conditions. Reliable alternative water supplies are essential to maintain the physical infrastructure (i.e. condition of turf on playing fields) in order to sustain the activities that support our health, wellbeing and economy.

The Victorian Department of Human Services (DoH) has identified a clear nexus between stormwater harvesting and fostering community health and well-being. However, the Department were acutely aware that many Councils did not know how to identify, much less rank such projects. To this end the Department devised the notion of a Stormwater Harvesting Toolkit targeting local Councils to assist in the planning, investigation and prioritisation of stormwater harvesting projects across a Local Government Area (LGA).

The Victorian DoH Stormwater Harvesting Toolkit is an empowering and capacity building tool targeting local government. It is simple to use, yet it produces useful outputs designed to further projects. With it, stormwater harvesting projects can be prioritised, planned and budgeted for with confidence that all costs and benefits are accounted for.

The Toolkit

The Toolkit is a spreadsheet-based model with a user-friendly interface that prompts for simple-to-collect information inputs. It processes the information to conduct a preliminary feasibility investigation, and then produces a scoping document which can inform local government health and well-being plans and also serve as a brief to further the project by way of more detailed investigations and design.

Because of the complexity of issues involved, the decision tree comprises multi-criteria analysis. The main criteria that have been included in the Toolkit are as follows:

- Planning – issues pertaining to permissibility, tenure in relation to each project component, planning and policy, etc
- Site/Physical constraints – available space, above or below ground tanks, baseflow available, catchment characteristics, water quality, etc.
- Socio-economic –community involvement and well-being, level of service, levelised cost, payback period, Triple Bottom Line (especially considering life cycle costs taking into account operational and maintenance costs), etc.
- Political – Council may favour a particular project because of the positive publicity it will generate that will provide a good demonstration to the rest of the community.

Often projects are not investigated and subsequently the benefits are ignored simply because risks are not known and the means to qualifying and quantifying them are too onerous and / or complex. It could be said that there is no stormwater harvesting scheme that is impossible due to catchment characteristics, as all issues can be overcome by treatment. It becomes an issue of whether or not it is cost-effective to account for poor catchment condition for the given volume of water.

In the Toolkit, the following key factors have been adopted for consideration and include:

- Land use limited to residential or commercial uses;
- Agricultural use;
- Industrial use, major roads or freeways;

- A significant proportion of the catchment comprising corroding roofs;
- Extensive construction activity;
- Eroding stream banks or other significant sources of sediment;
- On-site sewage management systems (e.g. septic tanks);
- Wastewater (e.g. sewage) treatment plants discharging into the catchment;
- Contaminated sites;
- Areas with acid sulphate soils.

Quadruple Bottom Line Assessment

Going beyond the risk management framework, each project has a quadruple-bottom line assessment undertaken which drives the project ranking feature within the Toolkit.

Environmental benefits are costed and based on:

1. an amount of $2,000/kg of Nitrogen derived from harvested stormwater, which is what drainage and catchment authorities are typically prepared to pay to prevent it entering receiving waters.
2. reduced carbon emissions as a result of fewer car trips

The other more obvious environmental and social benefit is that of avoided mains water use, however the monetary value of this dwindles into insignificance when the wider benefits are accrued. Council staff estimate extra users based on simple demographic prompts in relation to distances and population surrounding any given facility.

Technical feasibility is determined in part from 4th decile daily rainfall data built into the Toolkit. DoH intentionally chose an amount lower than the median as a *de facto* way to account for climate change.

The Toolkit also cross references various related policies and regulations and encourages a preventive risk management approach.

Health and wellbeing benefits of stormwater harvesting projects are costed at a benefit of $336 / extra user of a facility, a figure that has been agreed upon during the development of the Toolkit (Bramhill, 2009).

Quantifying the benefits

To summarise the widespread effectiveness of the Toolkit, the following example is considered:

- assume 79 councils state-wide analyse 3 projects each
- one project is selected with average of 10.5ML/annum potable water saving

- capital cost assumed of $490,000
- $15,000 assumed for annual operations and maintenance.
- Assuming 68,705 people in the average municipality, and a 10% increase in activity uptake across local users and sports clubs equates to 13,690 extra users per annum in each municipality.

Therefore, for each municipality:

Annual health care cost deferred	$4.6M
Annual value of informal networking stimulating the local economy	$2.1M
Value of nitrogen removed from waterways over the 30 life of the project	$912K
Deferred greenhouse gas emissions over the 30 year life of the project	1,332t CO_2
Lifetime supply cost of water using NPV method	$2.10/kL
Total value of annual benefits	$7.6M
Total value of annual costs	$15K
Capital expenditure	$490K
Return on investment	15.5
30 year lifetime benefits using NPV method	$89.7M
30 year lifetime costs using NPV method	$0.66M

This is just for one 'average' project, in one 'average' municipality - if each council in Victoria was to implement just one scheme by utilising the Toolkit, it would realise 1.1 million extra participants across the state.

Total value of annual benefits	$600M
Total value of annual costs	$1.2M
Capital expenditure	$38.7M
Deferred greenhouse gas emissions over the 30 year life of the project	105,000t CO_2
30 year lifetime benefits using NPV method	$7.1B
30 year lifetime costs using NPV method	$52M
Net 30 year revenue saving using NPV method	$7.05B

Overall, an annual net benefit of $545 per person, or $6,455 per person over the life of the project can be achieved.

Discussion

Stormwater in this context is a resource that if used effectively can assist with improving health and wellbeing through the creation of healthy spaces. In recognising stormwater as an underutilised resource for irrigation purposes, the Toolkit incorporates site specific parameters to identify stormwater harvesting opportunities. By referencing this to current stormwater and water recycling guidelines it also encourages the prevention of events that could produce risks to human health.

One of the aims of the water policy section within DoH is to protect and enhance the health and wellbeing of Victorians in relation to all uses of water. As a part of this work the department is assisting Councils to mitigate the degradation of open space recreation assets through identifying stormwater as a reliable alternative water supply option for irrigation.

The ultimate beneficiaries of this exercise are the community, as it is their assets that are being improved so that recreational activities can take place on grounds that are well-maintained, safe and sustainable. Engaging the wider community in sport and recreational activities has many positive flow-on effects, both direct and indirect, including:

- Increased fitness, general health and productivity at work or school which indirectly stimulates the economy and reduces the burden on our already strained health care system.
- Using the facilities for leisure time offers a healthy alternative to antisocial behaviour, criminal activities and social displacement.
- Social interaction gained during recreational activities boosts local social capital, while formal and informal networking increases social awareness

- The fact that each facility will be irrigated from sustainable sources creates an educational component and talking point within itself, which may influence networking topics and facilitate community connectedness.

The development of this Toolkit enables Councils to undertake feasibility assessments of possible stormwater harvesting and reuse schemes in a manner consistent with current stormwater policies and regulations, while also recognising the need to protect public health and wellbeing through a comprehensive and realistic risk management process.

This project has a clearly defined target audience – local government, being the managers of public open space assets. Therefore, this needed to be considered at all critical points of the project to ensure that this was useful, understandable and efficient.

The manual developed to instruct users on how to use the Toolkit explains that a collaborative approach delivers the best results and involves a project manager (to organise the collation of data from specialised areas in Council i.e. parks and gardens staff; planners; drainage engineers).

Feedback from stakeholder workshops highlighted that when trialling the Toolkit they found that this approach not only worked well, but also stimulated cooperation and dialogue between Council departments that may not have otherwise occurred.

The knowledge and information gaps that the project has addressed are quite diverse. To address gaps identified between Councils, Consultants, Academics and Government bodies and regulators, the Toolkit addresses them by:

- Bringing Council departments together to work collaboratively on a project;
- Bridging the gap between evidence proposed by academia and standards and guidelines adopted by regulators and presenting them to Councils in a tangible and relevant manner;
- Utilising the knowledge and experience of consultants to form a link between all relevant bodies;
- Engaging and involving stakeholders from each respective group in progress meetings to ensure the Toolkit addresses relevant factors.

More relevant to the bottom line of Councils is that for each assessment undertaken using the Toolkit, up to $7,000 may be saved for an equivalent feasibility study, which could now be done in the space of 4 hours using only internal resources. In addition to the time saved in procuring and preparing briefs, the Toolkit becomes a very efficient and powerful instrument.

The power of the outputs to inform budgeting and financial decisions also brings the decision makers at Councils closer to the operators.

The most fundamental benefits of this project are to simplify risk management and decision making in a new area of investigation that is beyond the grasp of many Council employees. This Toolkit empowers relatively untrained staff to plan, investigate and determine the feasibility of stormwater harvesting projects, and to prioritise these across an LGA.

The Toolkit will enable a roll-out of projects across the state that will encompass and deliver the most contemporary principle of stormwater management, i.e. considering it as a valuable community resource. This has multiple benefits in relation to reducing mains water demands, and the consequent benefits to receiving waters (less pollution).

Conclusions

The DoH Stormwater Harvesting Toolkit has gone well beyond what a guideline can do. It has revolutionised a stormwater harvesting and reuse culture which is really in its infancy and in which it would otherwise have taken years for the industry to have the capacity built sufficiently to deliver projects across the state of Victoria.

It has brought the benefits of stormwater harvesting to the decision making table in a way that no other tool could have done. It selectively and successfully targets local government who are the key implementers of harvesting projects.

The Toolkit was specifically devised to respond to and provide a community health and social well-being benefit which is a remarkably fresh way to approach what would normally be a purely technical issue. Going beyond the social aspects, the Toolkit provides a multi-criteria assessment tool which addresses a broad range of technical, environmental and economic factors. To this end, its quadruple bottom line features are unimpeachable.

The Toolkit will be "live" with the ability to adapt it over time. Its accessibility to the populace is a feature of its success. The Toolkit also opens up a broad range of further research opportunities across a range of social disciplines.

References

Bramhill, P. (2009). An Estimate of the Economic and Health Value and Cost Effectiveness of the Expanded WHI Scheme 2009. Natural England Technical Information Note TIN055 First edition 10 July 2009 [www.naturalengland.org.uk]