Workshop Report

Life Cycle Costing Information and Tools to Help Drive Water Sensitive Urban Design:

A Workshop to Design a National Project

Final

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For: WSUD Program
Sydney Metropolitan Catchment Management Authority
By: André Taylor
André Taylor Consulting

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Author(s):	André Taylor.
Reviewer(s):	Kate Black (WSUD Program), Sarah Jones (Water by Design Program), Emily Kaye (Clearwater Program) and Shaun Leinster (DesignFlow).
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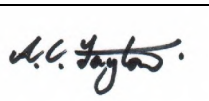
Signed:	
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Executive Summary

Purpose of this report

This workshop report describes a new project, which aims to provide stakeholders who make critical decisions about water sensitive urban design (WSUD) assets with the *costing* information and tools they need. It describes the background to this project and the key outcomes of a workshop on 23 November 2009 involving key stakeholders from Melbourne, Sydney and Brisbane. It includes a project plan and identifies opportunities for new partners to become involved with this initiative and thereby help to overcome this common barrier to the successful implementation of WSUD across Australia.

Background to the workshop

Research at the national and regional level across Australia over the last decade has consistently identified that inadequate life cycle costing (LCC) information and tools is a significant barrier to the adoption of WSUD. Some attempts have been made to overcome this barrier, such as the inclusion of a life cycle costing module in versions 3 and 4 of the MUSIC model (see: www.toolkit.net.au), and the collation of real costs associated with WSUD assets in various cities. These attempts, however, have not:

- Fully identified the different needs of stakeholders who are involved in the design, approval, construction, maintenance and asset management aspects of WSUD assets.
- Provided all of these stakeholders with easily accessible, reliable, up-to-date life cycle costing data and estimation tools that meet their specific needs. For example, the life cycle costing module in MUSIC currently uses costing data that was gathered from around Australia in 2003. At that time, reliable costing data was sparse, and since then the design of many WSUD assets has evolved. In addition, MUSIC is typically used in the *design* phase of the process that delivers on-ground WSUD assets, so this tool is not often used by maintenance personnel.

To identify a way forward, a workshop was convened by the WSUD Program (Sydney Metropolitan Catchment Management Authority) that involved representatives from the Victorian Clearwater program, the Queensland Water by Design program, the eWater CRC, Landcom and the City of Sydney, as well as specialist consultants. In addition, seed funding ($30,000) for the project has been provided by the Sydney Metropolitan Catchment Management Authority.

Aims of the workshop

The principal aims of the workshop were to:

- Consider and critically review options to address this barrier to WSUD.
- Design an initiative with a national focus that would provide stakeholders with the life cycle costing information and tools they need to make critical decisions about WSUD assets.
- Build a ‘project plan’ for this initiative that defines the necessary tasks, timeframes and resources, as well as clarifying who is/are responsible for delivering funded tasks.

Key workshop outcomes

A National project was scoped that had the following objectives:

- To understand the entire WSUD asset delivery process (i.e. from design to decommissioning), the stakeholders involved, the specific needs of these stakeholders in relation to LCC information and tools, as well as barriers and opportunities (e.g. potential levers to encourage the use of LCC tools).
- To identify relevant information that is available that can potentially meet some of the stakeholders’ needs (e.g. sets of costing data that have already been gathered by developers or local government authorities).
- To identify costing data that could be readily obtained / generated to meet stakeholder needs (e.g. costing data derived from unit rates).
- To identify the best tools (e.g. a national website / resource centre, spreadsheet models, web-based cost estimation tools, costing modules in MUSIC, etc.) to deliver LCC information to key stakeholders in the form they need.
- To identify high value / low cost projects that could be delivered within one year (i.e. ‘Phase 1’).
- To develop a prioritised ‘project plan’ that sets out the tasks needed to meet identified stakeholder needs.

- To ensure that all outputs from the project are consistent with existing systems and standards (e.g. the National Asset Management Strategy, asset management reforms within local government, etc.).
- To use the project to raise the profile of the issue, recruit partners across Australia and build a funding base that enables all key tasks to be delivered.

Tasks were identified to meet these objectives. Subject to funding, it is proposed that the following tasks be delivered over 2010 (Phase 1):

Task Summary	Products and Outcomes	Timeframe	Resources
1. Needs analysis Undertake workshops in Melbourne, Sydney and Brisbane to: ▪ map the process that involves the design, approval, construction, maintenance and asset management of WSUD assets; ▪ identify key stakeholders involved in each step of the process; ▪ identify their specific needs for LCC data and estimation tools; and ▪ prioritise stakeholder needs and benchmark these priorities against other WSUD-related capacity building initiatives[1]. Analyse the workshop data and report on the tasks needed to gather the LCC data and tools to meet the needs of these stakeholders.	**Product:** ▪ A needs analysis report. **Desired outcomes:** ▪ A deeper understanding of who they key stakeholders are and their specific costing needs. ▪ A revised project plan for the national costing project.	First half of 2010.	Cost: ~ $40,000. $20,000 is currently available from the Sydney Metropolitan Catchment Management Authority. Clearwater (Victoria) has agreed in principle to fund the costs associated with a Melbourne-based workshop, (including a facilitator and summary report). Clearwater will also provide in kind support for work in Melbourne. Additional funding is being sought for this critical task.
2. Costing website: a) Establish a website / on-line resource centre that can provide a central point to access up-to-date Australian WSUD life cycle costing data, models and other resources (e.g. key papers, costing protocols, etc.). b) Add all available costing data to the site.	**Product:** ▪ On-line resource centre for WSUD practitioners across Australia. ▪ By mid 2010, the website would be established, but simply provide details of its aims, proposed content, and the national life cycle costing project (e.g. tasks, contacts and how to get involved). ▪ By the end of 2010, it would also include outcomes from Tasks 4 and 5, key costing papers, etc. **Desired outcomes:** ▪ WSUD practitioners would have easy and free access to the best available costing information in order to make better decisions regarding WSUD assets.	a) Mid 2010. b) End of 2010.	Cost: Minimal (mainly in-kind resources). The eWater CRC has offered to assist with this task given their information technology capacity and experience.
3. Marketing and communication strategy: Design a simple marketing and communication strategy to inform stakeholders of the life cycle costing initiative and encourage their involvement. This task could be done in conjunction with the establishment of the web site (Task 2a).	**Product:** ▪ Marketing and communication strategy. **Desired outcomes:** ▪ Awareness among stakeholders of the life cycle costing project and website. ▪ Use of the information and tools placed on the website. ▪ New project partners to help deliver all aspects of the project and ensure it meets the needs of stakeholders across Australia.	First half of 2010.	Cost: Minimal (mainly in-kind). Potentially resourced through the capacity building program partners and their stakeholders.
4. Data collection protocol: Revise the protocol developed by the CRC for Catchment Hydrology (Taylor, 2006) for collecting and organising life cycle costing data for WSUD assets.[2]	**Product:** ▪ An up-dated data collection protocol to ensure that stakeholders who are collecting costing data are using a methodology that allows this data to be used for life cycle costing purposes (e.g. developing 'size-cost algorithms' for WSUD best management practices [BMPs]). **Desired outcomes:** ▪ Asset managers who collect WSUD costing data would use best practice methodologies. ▪ The ability to use the resulting data sets in future costing exercises (e.g. to update 'size-cost algorithms' in MUSIC.	End of 2010.	Cost: ~ $5,000 to $10,000. Currently unfunded. Partners are being sought.

[1] This step is a 'reality check' to examine whether life cycle costing-related needs are high compared to other WSUD-related capacity building initiatives that could be funded (e.g. training, new guidelines, demonstration projects, etc.).
[2] The needs analysis (Task 1) would inform the overall need for, and features of, a revised protocol. Task 4 would therefore not be commissioned until Task 1 was complete.

Task Summary	Products and Outcomes	Timeframe	Resources
5. Collection and analysis of easily available, reliable LCC data: Identify, analyse and summarise reliable and recent costing data that is available for WSUD assets in Australia. [3]	**Product:** ▪ A summary of recent (e.g. within the last 5 years), real, reliable WSUD costing data from around Australia. **Desired outcomes:** ▪ Stakeholders would have easy access to this information to make better decisions while improved cost estimation tools are developed.	End of 2010.	Cost: ~ $30,000 (~$10,000 for a brief literature review and ~$20,000 for the collection of data from agencies). Currently unfunded. Partners are being sought.

Phase 2 tasks would be informed by the needs analysis (Task 1). These tasks would be identified in mid to late 2010, via a second workshop. It is *likely* this phase would include tasks that involve:

- The production of processed LCC data / information and new cost estimation tools (e.g. on-line / downloadable spreadsheets and cost estimation models) to meet the needs of specific types of stakeholders that were identified during Task 1. It is likely that this task would use a combination of two methodologies (i.e. the use of real costing data sets and the so-called 'unit rate' approach).
- Mechanisms to deliver these data and tools to stakeholders (e.g. via a future version of MUSIC as well as spreadsheets and cost estimation models on the proposed the costing website).
- Complimentary capacity building activities to build awareness of these resources and encourage their use.

The next steps to progress the project

The following actions are planned for the first half of 2010:

- Project partners will alert stakeholders to the existence of the costing project.
- Project partners will communicate with, and potentially engage, new partners from across Australia to help deliver the project plan.
- Project partners will seek funding for Phase 1. Related tasks will be commissioned by the Sydney Metropolitan Catchment Management Authority (SMCMA) as funding is secured. At this early stage, funding looks *likely* to be secured for the initial 'needs analysis' task (Task 1; $40,000). The SMCMA will coordinate the delivery of all Phase 1 tasks. However, to date, only $20,000 (SMCMA) and resources for the Melbourne-based portion of this task (Clearwater) has been secured. Agencies in Queensland, South Australia and Western Australia have also expressed interest in being involved.
- Commission Task 1 once funds are secured (SMCMA to coordinate).
- Begin work on Task 2 (SMCMA to work with the eWater CRC).
- Coordinate development of a marketing and communications strategy (SMCMA to work with project partners and the National Water Commission).
- A Steering Group meeting will be convened after the needs analysis task in mid to late 2010. This meeting will review the outcomes of the needs analysis, review available funding, revise the project plan and review governance arrangements. The SMCMA will coordinate this event.

Project contact:

Ms Kate Black, Program Manager, WSUD in Sydney Program,

Sydney Metropolitan Catchment Management Authority, ph. (02) 9895 6206, Kate.Black@cma.nsw.gov.au

[3] This task, like Task 4, would also commence after the needs analysis (Task 1) is complete.

1. Introduction

1.1. Aims of this report

This workshop report aims to:

- Provide a background to the issue of life cycle costing in the context of water sensitive urban design (WSUD), including the need for improved costing information and estimation tools.
- Summarise the aims, process and outcomes of a full-day workshop that was held on 23 November 2009 in Sydney to examine ways to provide stakeholders across Australia with the life cycle costing information and tools they need to make better decisions regarding WSUD assets such as bioretention systems and constructed wetlands.
- Document the steps needed to progress this project, including a 'project plan'.
- Provide an explanatory document to help engage potential project partners so the project can grow into a fully fledged national initiative and fulfil its potential.

1.2. Background to life cycle costing in the context of WSUD

The Australian Standard for Life Cycle Costing (Standards Australia, 1999) defines life cycle costing (LCC) as "the process of assessing the cost of the product over its life cycle or portion thereof" (p. 6). Practitioners involved with the design, construction and maintenance of WSUD assets often need to estimate an asset's life cycle cost as well as individual 'cost elements' (e.g. the capital or 'acquisition cost'). For example, during the preliminary design of a new urban development, an engineer may use tools such as MUSIC (Model for Urban Stormwater Improvement Conceptualisation; see www.toolkit.net.au) to compare the approximate costs of different stormwater 'treatment train' designs. Similarly, a maintenance engineer in a local government agency may want to predict the ongoing maintenance costs of newly constructed WSUD assets when preparing annual budget bids. Such stakeholders need easy access to reliable costing information for common types of WSUD assets and tools that help them to quickly generate cost estimates.

Research at the national and regional level across Australia over the last decade has consistently identified that inadequate life cycle costing information and tools is a significant barrier to the adoption of WSUD (see Lloyd , 2001; Lloyd *et al*., 2002; Colmar Brunton, 2005; Taylor & Fletcher, 2007; Wong, 2001). More recently, poor understanding of WSUD life cycle costs has also been identified as a barrier to appropriate asset management practices in South East Queensland (see Water by Design, 2009). Some attempts have been made to overcome this barrier, such as:

- The inclusion of a life cycle costing module in versions 3 and 4 of the MUSIC model. Although it is noted that the real costing data that were used to develop 'size-cost algorithms' in these versions of MUSIC were limited and were collected around 2003. As such, it is widely acknowledged that there is a need to update these algorithms.
- The development of a freely available Data Collection Form (Taylor, 2006) to help stakeholders to collect real costing data in a form that can be used to generate new 'size-cost algorithms' such as those in the MUSIC model.
- The development of an introductory guideline to life cycle costing involving structural stormwater quality management measures (Taylor, 2003) to help promote a consistent approach to LCC and common language in the WSUD industry.
- The provision of information from the literature on 'size-cost relationships' for WSUD assets (Taylor, 2003) to provide stakeholders with the best available costing information, albeit limited.
- The collation of real costs associated with WSUD assets in various cities and regions. For example Ecological Engineering (2007) prepared a summary of real life cycle costs for WSUD treatment systems in the South East Queensland region.
- The provision of papers that document costing information from real WSUD case studies and investigate costs associated with specific types of WSUD assets (see www.wsud.org, http://waterbydesign.com.au and www.clearwater.asn.au for examples).

Whilst these initiatives have helped some stakeholders to make more informed decisions about WSUD assets and some of these tools are widely used (e.g. the costing module in MUSIC), more work is needed to:

- Provide *improved estimates* of WSUD costs that reflect current 'best practice' designs and recent experience.
- Provide different stakeholders with easy-to-use, *improved cost estimation tools*. For example, stakeholders involved with the design and approval of WSUD assets could easily use the life cycle costing module in the MUSIC software, but this tool is not suited to maintenance and asset management staff who would have no other reason to purchase and learn how to use this software.

1.3. Background to the 2009 life cycle costing workshop

Currently, six regional 'capacity building programs' around Australia assist local stakeholders to promote sustainable urban water management, including WSUD. Three of the largest programs servicing Sydney, Melbourne and South East Queensland have recognised the need for improved life cycle costing information and estimation tools and have collaborated to provide national leadership on this issue and to pool resources. Although there is the potential for some WSUD costs to vary depending on an asset's geographic location (e.g. maintenance costs associated with vegetated WSUD measures), the fundamental needs of WSUD practitioners are thought to be similar around Australia.

As a first step, a full-day workshop was convened by the WSUD Program (Sydney Metropolitan Catchment Management Authority) on 23 November 2009 to examine ways to provide stakeholders with the life cycle costing information and tools they need to make better decisions regarding WSUD assets. The workshop involved representatives from the Victorian Clearwater program, the Queensland Water by Design program, the eWater CRC (custodians of the MUSIC software), Landcom (a large, NSW State government-owned development authority), the City of Sydney, as well as specialist consulting groups. In addition, seed funding ($30,000[4]) for the project was provided by the Sydney Metropolitan Catchment Management Authority.

The workshop was scoped to produce a 'project plan' that would start the process of gathering better costing information and building improved cost estimation tools, and could be used to engage other partners. The involvement of other partners is needed to ensure the project delivers outcomes that meet the needs of stakeholders across Australia and to allow all project tasks to be resourced.

[4] $10,000 of this funding was allocated to project development (e.g. convening the workshop and producing this report). The remaining $20,000 has been allocated to Task 1 (i.e. the needs analysis; see Section 3.3).

2. Workshop Aims and Process

2.1. Aims of the workshop

The aims of the life cycle costing workshop were to:

- Bring some of the key stakeholders together to discuss common needs and explore opportunities for collaboration.
- Consider and critically review the options to address this barrier to the uptake of WSUD and the maintenance of WSUD assets.
- Design a project with a national focus that would provide stakeholders across Australia with the life cycle costing information and tools they need to make critical decisions about WSUD assets.
- Build a 'project plan' that defines tasks, outcomes, products, timeframes, budgets, and roles and responsibilities.
- Produce a document that describes 'the problem' being addressed and a proposed way forward (i.e. this report) to help communicate with other stakeholders and engage new project partners.

2.2. The workshop process

The workshop was independently facilitated by Grahame Collier of T Issues Consultancy with the assistance of Lee Meredith (T Issues Consultancy). Participants included:

- Kate Black - WSUD Program, Sydney Metro Catchment Management Authority.
- Luke McPhail - eWater CRC.
- Alan Hoban – Water by Design program, South East Queensland Healthy Waterways Partnership.
- Matthew Napper – Landcom (New South Wales).
- Emily Kaye – Clearwater program (Victoria).
- Shaun Leinster – DesignFlow (Queensland).
- André Taylor – André Taylor Consulting (New South Wales).
- Greg Livingstone - City of Sydney.

The workshop began with an exploration of the participants' expectations and a review of the workshop's objectives. Relevant background information was discussed, including the importance of life cycle costing to WSUD uptake, the adequacy of existing information and tools, who the key stakeholder are and their needs, the status of existing life cycle costing information and tools, approaches used overseas, and the potential scope of the project (e.g. which types of WSUD assets should it address).

Group exercises helped to scope a national project with many tasks (see Section 3.3). The scoping process initially described project objectives, outcomes and products. A SWOT analysis was then undertaken to test and refine the proposed project. Discussions also helped to summarise available data / products that could be used by the project, the likely cost of various tasks, and their timeframes. The participating organisations also discussed the extent to which they could provide assistance to the project in terms of financial contributions, in-kind assistance and project governance. Proposed tasks were initially classified into three groups: those that could be delivered in the next six months; those that could be delivered in the following six-months; and those that were long-term. Finally, the workshop also produced a draft Terms of Reference for the Steering Group that would oversee the project.

Following the workshop, the managers of the WSUD Program, Clearwater and Water by Design capacity building programs participated in a follow-up teleconference to clarify their involvement, particularly in relation to resourcing and governance arrangements. The outcomes of this discussion have been included in this report.

3. Workshop Outcomes

3.1. Outcomes from preliminary discussions

Scope of the project

Preliminary discussions addressed the issue of the project's scope. It was agreed that in the long-term, a national life cycle costing project should seek to provide stakeholders with information and tools that relate to assets across the entire urban water cycle (i.e. stormwater, wastewater and water supply). In the short term, however, the focus should be on WSUD assets that manage stormwater quality (e.g. constructed wetlands and bioretention systems).

The participants discussed which types of WSUD assets should be the focus of the project. Participants thought that these should include the assets ('best management practices'; BMPs) included in version 4 of MUSIC (i.e. constructed wetlands, buffer/filter strips, vegetated Swales, bioretention systems, infiltration systems, ponds, sedimentation basins and rainwater tanks) as well as common gross pollutant traps with proprietary designs. It was, however, agreed that consultation was needed with stakeholders on this 'list of BMPs'. Key stakeholders to be consulted include local government officers (i.e. development assessment, maintenance and asset management staff), developers and their consultants.

Stakeholder needs and the importance of costing information to the delivery of WSUD assets

The participants expressed a variety of views on:

- the importance of costing information to particular stakeholders;
- the quality of cost estimates needed by these stakeholders; and
- the information and tools needed by different stakeholders.

These discussions led to agreement that different stakeholders had significantly different needs with respect to costing information and estimation tools. For example, it is likely that a design engineer would be satisfied with an updated version of the life cycle costing module in MUSIC that allows him / her to generate trusted estimates of cost elements (e.g. total acquisition cost, establishment maintenance costs, typical annual maintenance costs, infrequent renewal costs, and decommissioning costs). Asset management and maintenance staff in local government authorities, however, are likely to prefer a simpler, web-based spreadsheet and/or cost estimation tools that they can use to obtain maintenance cost estimates as well as information on the necessary machinery and human resources to perform routine maintenance tasks. Maintenance staff may also require information on the maintenance costs typically associated with poorly designed systems, as well as those that represent current 'best practice'. In addition, developers and their consultants are likely to be principally interested in total acquisition costs. Consequently, a 'needs assessment' that clarifies the different needs of key stakeholders was perceived to be a high priority task for the project.

Approaches used elsewhere

André Taylor reported on discussions between the Auckland Regional Council and Monash University that were held several years ago (~2006) in relation to a similar project. These discussions developed an alternative approach to generating costing information and estimation tools that did not rely on gathering numerous high quality data sets from real projects, as in practice, such data sets are very rare. The alternative approach is briefly described below.

To help identify typical capital costs (i.e. total acquisition costs), several real WSUD BMPs would be selected that represent the desired design category (e.g. current best practice). Suitably qualified consultants / contractors would then be engaged to provide cost estimates for the design and construction, as well as establishment maintenance costs, where relevant (i.e. the cost of maintaining vegetation during the first two years of operation). A standard template would be provided to ensure that cost estimates from different BMPs are comparable. Such data would be used to generate algorithms that relate the size of the BMP (e.g. the size of a constructed wetland's macrophyte zone) to various cost elements (e.g. the total acquisition cost).

To help identify maintenance costs (e.g. typical annual maintenance costs and infrequent renewal costs), a schedule of maintenance tasks would be prepared for each BMP (e.g. mowing the grass for a grassed swale). Maintenance contractors would then be engaged to estimate the frequency that these tasks would be needed, the human resources required (for a given BMP size), the maintenance equipment required, and the cost each time the task is done. This would produce 'unit rates' for maintenance activities that would be specific to a geographic region and could be used to estimate all maintenance costs. This process could be repeated in different geographic areas if stakeholders thought the estimates were not transferable to other locations.

Cost estimation tools would then be developed to allow stakeholders to generate estimates of cost elements (e.g. typical annual maintenance costs) and the overall life cycle cost. The costing module in MUSIC already does this. An alternative approach would be to use a freely available web-based cost estimation tool. Ideally, such tools would allow stakeholders to undertake life cycle cost analyses for 'treatment trains' that involve several BMPs as well as single BMPs.

Participants noted that there was potential to use this approach in Australia, particularly for maintenance costs, and therefore should be considered in the design of the life cycle costing project.

3.2. Project objectives

A national life cycle costing project was scoped that had the following objectives:

- To understand the entire WSUD asset delivery process (i.e. from design to decommissioning), the stakeholders involved, the specific needs of these stakeholders in relation to LCC information and tools, as well as barriers and opportunities (e.g. potential levers to encourage the use of LCC tools).
- To identify relevant information that is available that can potentially meet some of the stakeholders' needs (e.g. sets of costing data that have already been gathered by developers or local government authorities).
- To identify costing data that could be readily obtained / generated to meet stakeholder needs (e.g. costing data derived from unit rates).
- To identify the best tools (e.g. a national website / resource centre, spreadsheet models, web-based cost estimation tools, costing modules in MUSIC, etc.) to deliver LCC information to key stakeholders in the form they need.
- To identify high value / low cost projects that could be delivered within one year (i.e. 'Phase 1').
- To develop a prioritised 'project plan' that sets out the tasks needed to meet identified stakeholder needs. This would include defining roles and responsibilities for the delivery of all funded tasks.
- To ensure that all outputs from the project are consistent with existing systems and standards (e.g. the National Asset Management Strategy, asset management reforms within local government, etc.).
- To use the project to raise the profile of the issue, recruit partners across Australia and build a funding base that enables all key tasks to be delivered.

3.3. Project plan

A project plan was developed that included 'Phase 1' tasks that could realistically be delivered in 2010, and 'Phase 2' tasks that would be on hold until Phase 1 is complete and additional resources are secured.

Phase 1 tasks (2010)

Task 1: Needs analysis

Task Summary	Products and Outcomes	Timeframe	Resources
1. Needs analysis Undertake workshops in Melbourne, Sydney and Brisbane to: ▪ map the process that involves the design, approval, construction, maintenance and asset management of WSUD assets; ▪ identify key stakeholders involved in each step of the process; ▪ identify their specific needs for LCC data and estimation tools; and ▪ prioritise stakeholder needs and benchmark these priorities against other WSUD-related capacity building initiatives[5]. Analyse the workshop data and report on the tasks needed to gather the LCC data and tools to meet the needs of these stakeholders.	**Product:** ▪ A needs analysis report. **Desired outcomes:** ▪ A deeper understanding of who they key stakeholders are and their specific costing needs. ▪ A revised project plan for the national costing project.	First half of 2010.	Cost: ~ $40,000. $20,000 is currently available from the Sydney Metropolitan Catchment Management Authority. Clearwater (Victoria) has agreed in principle to fund the costs associated with a Melbourne-based workshop, (including a facilitator and summary report). Clearwater will also provide in kind support for work in Melbourne. Additional funding is being sought for this critical task.

This task seeks to clarify the life cycle costing needs of various stakeholders and gather details relating to these needs that are not currently available. It would develop a project framework using the preliminary framework shown in Figure 1. This framework would describe:

- the process that typically leads to the delivery of WSUD assets;
- the stakeholders involved in this process;
- the drivers that are creating a need for high quality costing information and tools amongst stakeholders;
- the *specific* needs of these stakeholders with respect to life cycle cost information and estimation tools (e.g. the type of costing information they need, the degree of certainty they require, the type of cost estimation tools they want, linkages with existing software / systems, the types of BMP design categories they need costing data for, etc.);
- opportunities to promote the use of new cost estimation tools;
- the relative value of meeting each stakeholder's needs in order to prioritise the project's subsequent tasks; and
- the nature of life cycle costing tools that would meet the needs of each stakeholder group.

[5] This step is a 'reality check' to examine whether life cycle costing-related needs are high compared to other WSUD-related capacity building initiatives that could be funded (e.g. training, new guidelines, demonstration projects, etc.).

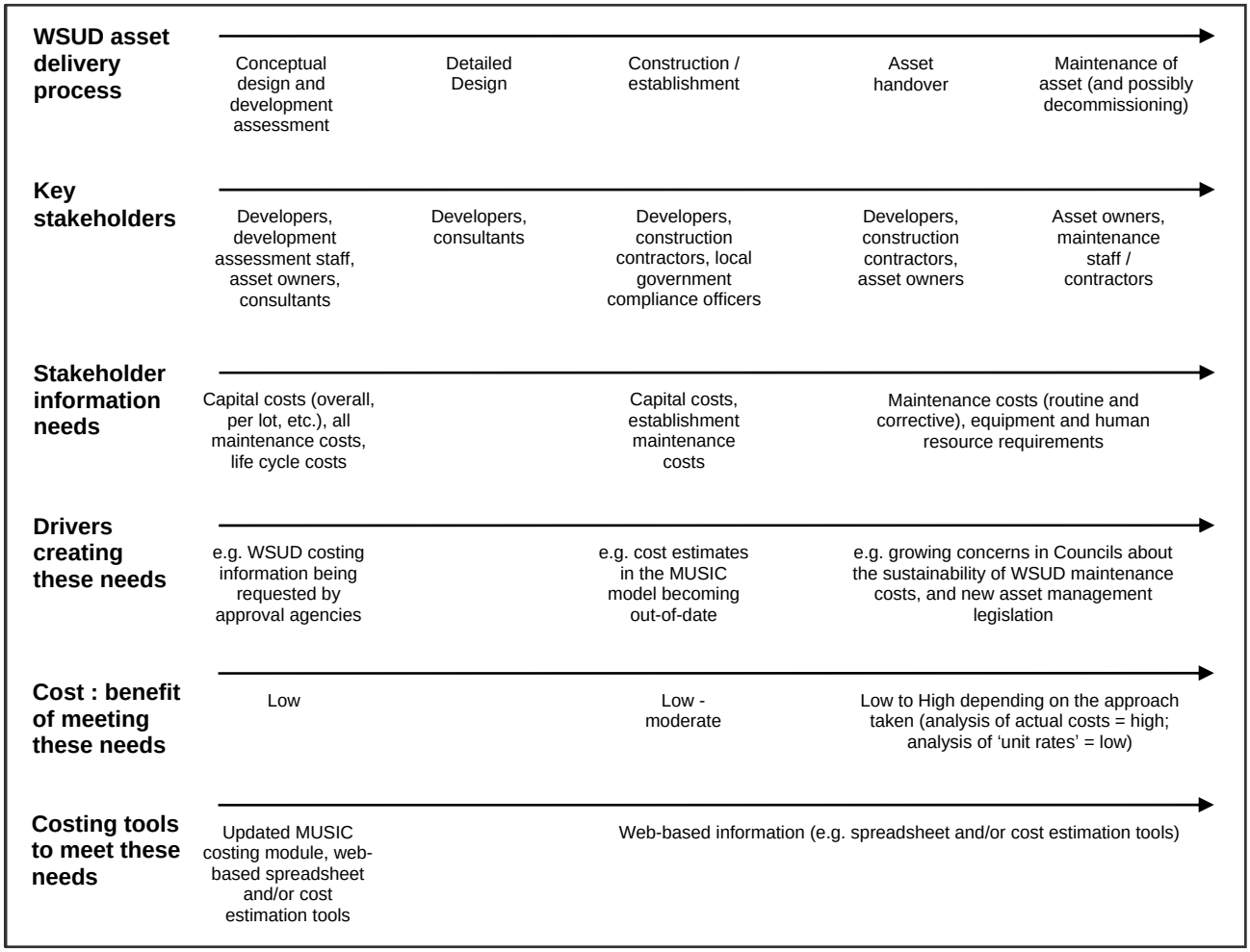

Figure 1 – A preliminary conceptual framework for the life cycle costing project (to be further developed through the 'needs analysis' task)

Task 1 would also involve reviewing the tasks documented in this report and recommending amendments to the project plan, where appropriate. This task would also help to design a web site (see Task 2) that allows different stakeholder groups such as designers and maintenance practitioners to quickly find costing data and estimation tools that are of most use to them.

Task 2: Costing website

Task Summary	Products and Outcomes	Timeframe	Resources
2. Costing website: a) Establish a website / on-line resource centre that can provide a central point to access up-to-date Australian WSUD life cycle costing data, models and other resources (e.g. key papers, costing protocols, etc.). b) Add all available costing data to the site.	**Product:** ▪ On-line resource centre for WSUD practitioners across Australia. ▪ By mid 2010, the website would be established, but simply provide details of its aims, proposed content, and the national life cycle costing project (e.g. tasks, contacts and how to get involved). ▪ By the end of 2010, it would also include outcomes from Tasks 4 and 5, key costing papers, etc. **Desired outcomes:** ▪ WSUD practitioners would have easy and free access to the best available costing information in order to make better decisions regarding WSUD assets.	a) Mid 2010. b) End of 2010.	Cost: Minimal (mainly in-kind resources). The eWater CRC has offered to assist with this task given their information technology capacity and experience.

The intent of Task 2 is to provide a 'one-stop-shop' for WSUD costing information that can grow in profile and value over time as better costing information is gathered and tools are developed. In the short term, this website would provide information on the project described by this report. Overseas websites like the USA's www.bmpdatabase.org perform a similar role, however, they tend to report information on BMP performance and cost. Such a national website has not yet been established in Australia, largely because local government is the 'coal face' for managing WSUD in Australia and this tier of government often has difficulty resourcing national initiatives.

Task 3: Marketing and communication strategy

Task Summary	Products and Outcomes	Timeframe	Resources
3. Marketing and communication strategy: Design a simple marketing and communication strategy to inform stakeholders of the life cycle costing initiative and encourage their involvement. This task could be done in conjunction with the establishment of the web site (Task 2a).	**Product:** ▪ Marketing and communication strategy. **Desired outcomes:** ▪ Awareness among stakeholders of the life cycle costing project and website. ▪ Use of the information and tools placed on the website. ▪ New project partners to help deliver all aspects of the project and ensure it meets the needs of stakeholders across Australia.	First half of 2010.	Cost: Minimal (mainly in-kind). Potentially resourced through the capacity building program partners and their stakeholders.

Task 3 reflects that new partners are needed to help the project identify and meet stakeholder needs across the country and to provide additional resources so that all tasks can be delivered. The strategy would include activities to attract funding to the project directly from key organisations, as well as indirectly through grants and trusts.

Task 4: Data collection protocol

Task Summary	Products and Outcomes	Timeframe	Resources
4. Data collection protocol: Revise the protocol developed by the CRC for Catchment Hydrology (Taylor, 2006) for collecting and organising life cycle costing data for WSUD assets.[6]	**Product:** ▪ An up-dated data collection protocol to ensure that stakeholders who are collecting costing data are using a methodology that allows this data to be used for life cycle costing purposes (e.g. developing 'size-cost algorithms' for WSUD BMPs). **Desired outcomes:** ▪ Asset managers who collect WSUD costing data would use best practice methodologies. ▪ The ability to use the resulting data sets in future costing exercises (e.g. to update 'size-cost algorithms' in MUSIC.	End of 2010.	Cost: ~ $5,000 to $10,000. Currently unfunded. Partners are being sought.

[6] The needs analysis (Task 1) would inform the overall need for, and features of, a revised protocol. Task 4 would therefore not be commissioned until Task 1 was complete.

It is widely acknowledged that the collection and documentation of costing data for WSUD assets is generally poor across Australia. This prohibits the use of some methodologies that use real costing data sets to develop cost estimation tools (see Taylor & Fletcher, 2007). Task 4 is designed to foster consistency among asset managers who collect costing data so that these data sets can be used in future costing exercises. The protocol would also provide a simple template for reporting cost elements and the overall life cycle cost of a WSUD asset. This template could, in the future, be linked to standard development conditions that require developers to provide approving authorities with this information.

The existing protocol / data collection sheet (Taylor, 2006), whilst addressing the basic issues, has the potential to be improved. For example, it could separate 'typical annual maintenance costs' into two sub-cost elements for vegetated systems (i.e. establishment costs over the first two years and subsequent maintenance costs). It could also better categorise the assets, so that it is clear whether the costed asset represents a current 'best practice' design, a 'sub-standard' design or a 'gold-plated' design with many additional features.

It is the acknowledged, however, that the updated costing protocol would not act as a *driver* to encourage people to collect high quality costing data for the benefit of stakeholders across Australia. Such a driver does not currently exist. The identification of possible drivers would be undertaken during the needs analysis task (Task 1).

Task 5: Collection and analysis of easily available, reliable LCC data

Task Summary	Products and Outcomes	Timeframe	Resources
5. Collection and analysis of easily available, reliable LCC data: Identify, analyse and summarise reliable and recent costing data that is available for WSUD assets in Australia. [7]	**Product:** ▪ A summary of recent (e.g. within the last 5 years), real, reliable WSUD costing data from around Australia. **Desired outcomes:** ▪ Stakeholders would have easy access to this information to make better decisions while improved cost estimation tools are developed.	End of 2010.	Cost: ~ $30,000 (~$10,000 for a brief literature review and ~$20,000 for the collection of data from agencies). Currently unfunded. Partners are being sought.

Task 5 aims to quickly gather the best available costing information from around the country, given some water management agencies have invested time in gathering local data. Whilst the project would seek readily available data for all BMPs currently included in the Music model (version 4), the *focus* would be on data that relates to constructed wetlands, bioretention systems and common types of gross pollutant traps.

The task would involve a brief literature review, the collection of data from a small number of agencies and data analysis. Advanced statistics (see Taylor & Fletcher, 2007) would not be undertaken at this stage. Workshop participants thought that some high quality data could be easily extracted from large development agencies (e.g. Landcom), and from local government authorities who have already commissioned local projects to gather such data (e.g. Brisbane City Council). This task has the potential to be time-consuming, so it would *only* gather easily accessible data. It would also seek to transform the data into forms that are needed by key stakeholders (e.g. develop 'size-cost algorithms' for different types of BMPs). Consequently, it needs to be completed after the needs analysis (Task 1). Outputs from this task would be placed on the project's website (see Task 2b).

[7] This task, like Task 4, would also commence after the needs analysis (Task 1) is complete.

Phase 2 tasks (2011 onward)

Phase 2 tasks would be informed by the needs analysis (Task 1) and available funding. These tasks would be identified in mid to late 2010, via a second workshop involving all project partners. It is *likely* this phase would include tasks that involve:

a) The production of processed LCC data / information and new cost estimation tools (e.g. on-line / downloadable spreadsheets and cost estimation models) to meet the needs of specific types of stakeholders that were identified during Task 1. It is *likely* that this task would use a combination of two methodologies:

- use of real costing data sets (see Task 5); and
- use of the approach described in Section 3.1 where cost elements are broken down for typical BMPs, then suitably qualified WSUD practitioners then estimate associated costs, frequencies and resource requirements for each element (i.e. the so-called 'unit rate' approach).

This task would help to update the 'size-cost algorithms' in MUSIC, so advanced statistical analysis would be needed as well as collaboration with the MUSIC development team within the eWater CRC.

b) Mechanisms to deliver these data and tools to stakeholders (e.g. via a future version of MUSIC as well as spreadsheets and cost estimation models on the proposed the costing website).

c) Complimentary capacity building activities to:

- build awareness of these resources (e.g. marketing and communication activities involving the project partners); and
- encourage their use (e.g. standard development conditions that require developers to provide councils with costing information for WSUD assets using the national website's cost estimation tools and reporting protocols).

3.4. SWOT analysis of the proposed project

Workshop participants conducted an analysis of the project's strengths, weaknesses, opportunities and threats (SWOT). The outcomes of this analysis are summarised in Figure 2.

The SWOT analysis highlighted the importance of:

- Doing the needs analysis task (Task 1) carefully to ensure that products (e.g. cost estimation tools) represent high priority needs, and are customised for particular stakeholders, easy to use and compatible with existing stakeholder processes and systems.
- Engaging key stakeholders as partners to the project (e.g. the National Water Commission and large, influential water agencies).
- Attracting additional funding in 2010.
- Preventing the project from getting too big and complex.
- Not relying on the availability of high quality, real costing data sets in order to develop useful cost estimation tools.

Strengths	Opportunities
▪ Addresses a real industry need and seeks to overcome a significant barrier to the successful delivery of WSUD. ▪ Potential for a national approach leading to cost efficiencies, greater profile / status of the project and greater potential for the long term maintenance of the products. ▪ The project will be founded on a clear understanding of stakeholder needs. ▪ Flexibility (e.g. the project's scope will be informed by the needs analysis task) ▪ Existing systems, processes, information, resources and lessons learnt act as a good starting point. ▪ The project would greatly assist agencies who do not have in-house resources to gather any costing information. ▪ Based on a robust framework to supply data and tools to stakeholders (see Figure 1). ▪ National collaboration helps to create a sense of momentum.	▪ Provides a 'window of opportunity' to get started, build momentum, show some leadership and attract funding. ▪ Potential for a consistent approach to be taken nationally. ▪ Increased awareness of the urgency to do work in this area. ▪ Opportunity to involve multiple stakeholders. ▪ New legislation relating to asset management provides a potential driver for the use of new costing tools. ▪ Potential to bring costing data together and consolidate efforts across Australia. ▪ Potential for better national collaboration on a key WSUD / sustainable urban water management issue. ▪ Helps to foster a common costing language among stakeholders.
Weaknesses	**Threats**
▪ Lack of real, high quality costing data sets around Australia. ▪ Lack of a 'lead agent' that has a long term future, national focus, a strong commitment to this issue and can 'own' the project's products. ▪ The potential for products to be developed without the end users or lead agent in mind. ▪ The current absence of strong regulatory 'levers' to encourage stakeholders to collect and report costing data, and to use cost estimation tools. ▪ Many local government agencies have a 'reactive culture', and do not proactively estimate future WSUD asset costs. ▪ Many local government agencies are under-resourced and have a high turnover of staff. This can affect the uptake of new tools and best practice approaches. ▪ The perceived level of complexity may hinder stakeholder involvement.	▪ Inadequate funding and resourcing. ▪ Low levels of product uptake by industry or local government. ▪ Lack of national leadership (i.e. a 'lead agent') and funding. ▪ Lack of alignment with powerful processes / reforms currently taking place in asset management as well as existing local government systems. ▪ Unwillingness of critical players to participate as project partners (e.g. large water agencies). ▪ A reactive rather than proactive approach to this issue. ▪ The scope of the project could get too big, leading to a 'monster project' that gets dropped. ▪ The level of complexity could be too large for the level of available resources. ▪ Providing stakeholders with information on costs without equivalent information on benefits may discourage some stakeholders from investing in WSUD assets.

Figure 2 – Outcomes from the SWOT analysis

3.5. Available costing data / products that could assist the project

Workshop participants nominated the following data and products that could assist the project:

- The data collection protocol developed by the former CRC for Catchment Hydrology (Taylor, 2006).
- Costing information in the recent Water by Design Business Case for WSUD in South East Queensland (contact: The Water by Design program).
- The costing algorithms in MUSIC version 3 and 4, as documented in Chapter 7 of the MUSIC model's user manual.
- Costing information relating to stormwater harvesting projects from Queensland (contact: DesignFlow).
- Costing information in Landcom's draft maintenance guidelines / book (contact: Landcom).
- A 2007 Victorian report by Nick Somes that includes unit rate costing data for bioretention systems (contact: EcoDynamics).
- Data collated by Ecological Engineering (2007) for Brisbane City Council.
- Data from Coomera Waters in South East Queensland (contact: Austcorp and DesignFlow).
- Data from government owned development authorities (e.g. VicUrban, Landcom, SA Land Development Agency, etc.).

- The introduction to life cycle costing paper developed by the former CRC for Catchment Hydrology (Taylor, 2003).
- Background papers on life cycle costing (e.g. Standards Australia, 1999; Taylor & Fletcher, 2007).

3.6. Available resources from partners

The Sydney Metropolitan Catchment Management Authority (SMCMA) has contributed $30,000 to the project as seed funding. The first $10,000 has been allocated to project scoping activities, and the remaining $20,000 is available for Task 1. At the workshop, the SMCMA invited the Water by Design and Clearwater capacity building programs to each match the $20,000 funding commitment to help fund Phase 1. The Clearwater capacity building program has subsequently committed to providing in-kind support in the form of Steering Group participation and resources to undertake the Melbourne component of Task 1.

At the workshop, all of the capacity building programs agreed to investigate opportunities for funding and the engagement of additional partners. A two-page summary of this report was prepared in December 2009 to help this process. However, future involvement and funding will be dependent on the outcomes of Task 1 (i.e. the needs analysis). Workshop participants also noted the potential for the capacity building programs to assist with the needs analysis task in their respective States (e.g. help to identify participants, a suitable venue, etc.).

The eWater CRC agreed to assist the project by investigating opportunities to provide information technology support to help establish a suitable web site (see Task 2). In addition, the eWater CRC would incorporate new ‘size-cost relationships’ that are identified by the project into future versions of the MUSIC model.

Landcom agreed to seek funding for the collation of Landcom’s own costing data to support Task 5.

Following the workshop, consultation between the SMCMA and government agencies in South Australia and Western Australia indicated additional resources to help fund Tasks 1 and 5 could potentially be provided if the scope of these tasks extended to these two States. In addition, Blacktown City Council expressed interest in being involved with Tasks 4 and 5.

4. The Way Forward

4.1. Next steps

The next steps to progress the project are outlined below:

- Project partners will alert stakeholders to the existence of the costing project.
- Project partners will communicate with, and potentially engage, new partners from across Australia to help deliver the project plan.
- Project partners will seek funding for Phase 1. Related tasks will be commissioned by the Sydney Metropolitan Catchment Management Authority (SMCMA) as funding is secured. At this early stage, funding looks *likely* to be secured for the initial 'needs analysis' task (Task 1; $40,000). The SMCMA will coordinate the delivery of all Phase 1 tasks. However, to date, only $20,000 (SMCMA) and resources for the Melbourne-based portion of this task (Clearwater) has been secured. Agencies in Queensland, South Australia and Western Australia have also expressed interest in being involved.
- Commission Task 1 once funds are secured (SMCMA to coordinate).
- Begin work on Task 2 (SMCMA to work with the eWater CRC).
- Coordinate development of a marketing and communications strategy (SMCMA to work with project partners and the National Water Commission).
- A Steering Group meeting will be convened after the needs analysis task in mid to late 2010. This meeting will review the outcomes of the needs analysis, review available funding, revise the project plan and review governance arrangements. The SMCMA will coordinate this event.

4.2. Governance arrangements for the project

It was agreed that the workshop participants would form a Steering Group for the project, with the Sydney Metropolitan Catchment Management Authority coordinating the delivery of Phase 1 tasks. The coordination role for Phase 2 would then be taken up by another program partner. The Water by Design capacity building program has expressed an interest in this role, however, a firm commitment would be based on the availability of their resources which would occur in June 2010. The Steering Group's membership would initially include partners who are providing cash and/or in-kind resources.

Workshop participants developed a draft Terms of Reference for the Steering Group. It was agreed that the group's key role will be to:

- Ensure the project has a national focus.
- Fully understand and address stakeholder needs with respect to WSUD costing information and estimation tools.
- Coordinate the delivery of tasks in the project plan.
- Revise the project plan after Task 1 (the needs analysis).
- Seek additional funding and project partners.
- Ensure that the project builds on previous work and is coordinated with related initiatives.

At the next meeting of the Steering Group, the following governance issues will need to be discussed and resolved:

- Finalisation of the draft terms of reference (see above).
- Documentation required (in addition to the finalised workshop report and project plan) to formalise the relationship between project partners.[8]

[8] One partner has expressed a desire for a document such as a memorandum of understanding.

- The Group's membership.
- A succession plan, so that a 'lead agent' can own and maintain the project's products in the longer term.

4.3. Marketing and communication activities

Task 3 in the project plan involves the development of a marketing and communication strategy. In the interim, project partners will help to:

- Alert WSUD stakeholders to the existence of the project using the two-page summary of this report and the full report as communication tools. In particular, the three capacity building programs have the potential to use their e-Newsletters and the many events they coordinate to raise awareness of the project.
- Seek new project partners (e.g. the National Water Commission, Engineers Australia, Australian Water Association, Institute of Public Works Engineering Australia, large water agencies, researchers with an interest in WSUD and costing, and publicly-owned land development agencies) and resources.

4.4. Contact for more information

The principal contact for this project is Ms Kate Black (Program Manager, WSUD in Sydney Program), ph. 02 9895 6206, e-mail: kate.black@cma.nsw.gov.au.

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