Cooperative Research Centre for Water Sensitive Cities

Project Agreement

Project Number: TAP

Project Title: Tools and Products

Project Participants: Monash University; The University of Queensland; and The University to Western Australia

Australian Government
Department of Industry, Innovation and Science

Business Cooperative Research Centres Programme

THIS AGREEMENT IS MADE BETWEEN

CRC FOR WATER SENSITIVE CITIES LTD ABN 19 158 409 137 of Clayton in the state of Victoria (**Company**).

AND

The Project Participants set out in Schedule 1

Recitals

A. The Company is responsible for the governance, management and co-ordination of the Centre.

B. The Project Participants are participants in the Centre.

C. The Centre's Activities include overseeing the Research Programs. The Research Programs are overseen by the CRO who is responsible for the coordination and conduct of the Research Programs.

D. Within the Research Programs, the Centre determines the general nature of the research projects to be conducted and then in conjunction with the Project Participants, develops the detailed research project (**Project**). The Centre also manages the funding of the Project.

E. The Project to which this Project Agreement relates has been approved by the Board as a Project to be carried out by the Project Participants with funding from the Company as part of the Activities of the Centre.

F. By signing this Project Agreement, the Parties acknowledge their agreement to carry out the Project in accordance with the following terms.

PROJECT DETAILS

1 Dictionary

1.1 In this Project Agreement, unless the context otherwise requires, the following definitions apply:

(a) **BIP Participant** means the Party that has made the relevant Project BIP available to the Project.

(b) **Centre** means the Cooperative Research Centre for Water Sensitive Cities.

(c) **Centre IP** means the Centre IP arising from the Project.

(d) **Contributed Personnel** means the persons identified in Schedule 1 as the personnel who will conduct or be involved in the Project.

(e) **Participants Agreement** means either the Essential Participants Agreement or an Other Participant Agreement, entered into by the Company and a participant in the Centre.

(f) **Parties** means the Project Participants and the Company and **Party** means any one of them.

(g) **Project** means the project set out in Schedule 1.

(h) **Project BIP** means the Background Intellectual Property of the Parties described in Schedule 1 or that is subsequently made available to the Project under the Participants Agreement.

(i) **Research Project Proposal** means the proposal for the Project attached as Annexure C.

1.2 Words and phrases used in this Project Agreement that also appear in Schedule 1 [Definitions and Interpretation] of the Participants Agreement, and that are not specifically defined in this Project Agreement, will have the meaning given to those words and phrases in Schedule 1 of the Participants Agreement.

2 Paramountcy

If there is an inconsistency between this Project Agreement and a Participants Agreement, this Project Agreement will prevail to the extent of that inconsistency.

3 Application of Participants Agreement

The Project Participants acknowledge and agree that:

(a) the conduct of the Project forms part of the Centre Activities;

(b) all the provisions of the Participants Agreement that, expressly or by implication, apply to the conduct of Projects, will with any necessary amendment, be deemed to form part of this Project Agreement; and

(c) this Project Agreement will be read with and deemed to form part of the Participants Agreement.

4 Project

In consideration of:

(a) the payment of the Project Funds to the Project Participants by the Company; and

(b) the making available of the Project Contributions to the Project by the Parties,

the Parties will conduct the Project in accordance with this Project Agreement and the Participants Agreement.

5 Term

5.1 The Project will commence on the Project Commencement Date and will be completed on the Project Completion Date unless terminated earlier or otherwise agreed by the Parties.

5.2 A Project Participant may terminate this Project Agreement upon thirty days written notice to the other Parties, if another Project Participant:

(a) abandons the Project; or

(b) fails to achieve a Milestone or deliver a Deliverable within 60 days of the time specified in this Project Agreement,

and the Project Participant seeking to terminate has fully documented the work that it has completed and for which it has been funded before it gives notice of termination to the other Parties.

6 Payment and Project Contributions

6.1 Each Project Participant must make available to the Project, its Project Contributions in accordance with the Participants Agreement and Schedule 1.

6.2 The Company will:

(a) pay to the Project Participants the Project Funds; and

(b) distribute the Project Contributions,

in accordance with the Participants Agreement and Schedule 1.

6.3 In addition to its rights under the Participants Agreement, the Company may withhold some or all of the Project Funds and Project Contributions from a Project Participant that has not complied with the Project Agreement or the Participants Agreement in conducting the Project.

7 Performance

7.1 The Responsible Participant must ensure that the Project Leader fulfils the responsibilities and duties set out in Annexure A, in addition to any obligations set out in the Participants Agreement. The Responsible Participant must notify the Company upon becoming aware that the Project Leader is unable or is likely to become unable to fulfil the requirements in Annexure A for the duration of the Project.

7.2 In addition to any obligations under the Participants Agreement, each Project Participant must, and must ensure its Contributed Personnel, cooperate with the Project Leader, act in accordance with the Participants Agreement, and carry out its part of the Project to enable the Project to be conducted in accordance with this Project Agreement.

8 Meetings

8.1 The Project Leader must attend the following minimum number of meetings for the duration of the Project and for a period of up to [6] months following the Completion Date, either in person or using technology available to the meeting:

(a) scheduled workshops (industry focus) as requested by the Centre each Financial Year;

(b) scheduled workshops (research focus) as requested by the Centre each Financial Year; and

(c) all program meetings relevant to the Research Program to which the Project relates, as scheduled by the relevant Program Leader,

provided that the Project Leader has been provided with reasonable prior notice of the meeting.

8.2 The Project Leader may be excused from attending a meeting personally if:

(a) he or she has notified the CRC Executive of the reasons why they cannot attend, and suggested a nominee to attend in his or her place; and

(b) the CRC Executive consents to the nominee attending in the Project Leader's place.

If consent is provided and the nominee attends the meeting, the Project Leader will be deemed to have attended the meeting for the purposes of clause 8.1.

8.3 The Centre may vary the number and timing of workshops specified under clause 8.1(a) or (b) by notice to the Project Leader.

8.4 Attendance by any one of the persons listed in Annexure B, Item 7 will be deemed to comply with Clause 8.1.

9 Reporting

9.1 In addition to its obligations under the Participants Agreement, the Responsible Participant must report, or ensure that the Project Leader reports:

(a) as required by Item 10 of the Research Project Proposal;

(b) to the Company when requested, in the Approved Form notified by the Company from time to time;

(c) to the Program Leader of the Research Program for TAP, in relation to any issues adversely affecting or likely to adversely affect the Project (including any matter that the Project Leader considers will, or may, affect the ability of the Project to satisfy the Milestones or deliver the Deliverables, or to be completed within the Project Budget) as soon as practicable after that matter or issue comes to the attention of the Project Leader; and

(d) to the CRC Executive or Research Advisory Sub-Committee when requested.

9.2 The Quarterly reports required under Clause 21 of the Essential Participants Agreement must also contain a summary of the research progress made and expenditure of cash and in-kind contributions for the Project.

9.3 If requested by the CRC Executive or CRC Advisory Committee, the Project Participants must provide the CRC Executive or CRC Advisory Committee with any information reasonably requested in relation to the Project.

10 Milestones and Deliverables

10.1 Subject to this clause, the Milestones must be achieved, and the Deliverables must be delivered to the Company at the times specified in this Project Agreement.

10.2 A Project Participant is not required to achieve Milestones or deliver Deliverables to the extent that its failure to do so is attributable to the acts or omissions of other Project Participants or circumstances beyond its reasonable control.

11 Project Review

11.1 The Project will be reviewed by the CRC Executive and Research Advisory Sub-Committee in accordance with the Participants Agreement.

11.2 The Board may, on the recommendation of the CRC Executive or otherwise:

(a) implement variations to the Project; or

(b) terminate the Project, if following a review, the Board reasonably forms the view that the Project will not achieve its objectives,

provided the Board acts in accordance with the Participants Agreement.

12 Intellectual Property

12.1 Each BIP Participant makes available its Project BIP to the Project in accordance with the Participants Agreement.

12.2 All Centre IP will be owned by the Company. Each Project Participant will do all things reasonably necessary, including the signing of documentation, to vest the Centre IP in the Company.

12.3 Each Project Participant will on request from the Company provide the Company with information in relation to the Centre IP created by its personnel.

13 Contributed Personnel

13.1 Each Project Participant will make available its Contributed Personnel to conduct the Project in accordance with Schedule 1.

13.2 Subject to this clause, the Contributed Personnel of Project Participants remain subject to the terms and conditions of employment under which they are employed by Project Participants.

13.3 Each Project Participant will:

(a) take all reasonably practicable steps to ensure that any working environment where:

(i) its Contributed Personnel work; or

(ii) the Project is conducted,

is safe and without risk; and

(b) be responsible for the health and safety of:

(i) its Contributed Personnel at all times when they are at work; and

(ii) all other persons whose health or safety may be adversely affected by the conduct of the Contributed Personnel's actions.

13.4 Each Project Participant covenants and undertakes to procure that Centre IP created by any of its Contributed Personnel will be owned and dealt with according to this Project Agreement.

14 Commonwealth Obligations

The Parties acknowledge and agree that at any reasonable time any person designated by the Commonwealth Cooperative Research Centre Program may view the progress of the Project and that the Parties will give all assistance reasonably requested by such designated person.

Executed as an Agreement

EXECUTED by **CRC FOR WATER SENSITIVE CITIES LTD ABN 19 158 409 137** by its duly authorised signatory)

CEO/COFO

BEN FORMAGE
Print full Name

Beeby.
Witness

CLARE BEEBY.
Print Full Name

23/4/2018.
Date

EXECUTED by **MONASH UNIVERSITY ABN 12 377 614 012** by its authorised officer in the presence of)

Authorised Officer

Professor Pauline Nestor

Print full Name

Witness

Melody Bryan

Print Full Name

9 March 2018

Date

EXECUTED by **THE UNIVERSITY OF WESTERN AUSTRALIA ABN 37 882 817 280** by its authorised officer in the presence of)

Authorised Officer

ANTHONY FORTINA

Print full Name

Witness

CHRISTINE CASEY

Print Full Name

23 February 2018

Date

EXECUTED by **THE UNIVERSITY OF QUEENSLAND ABN 63 942 912 684** by its authorised officer in the presence of

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Authorised Officer

Sharon York

Print full Name

Witness

Colleen Ward

Print Full Name

17/4/18

Date

SCHEDULE 1 PROJECT DETAILS

Project Title	Item 1 of the Research Project Proposal.
Research Program (Recital B)	Tranche 2 Research Program.
Project Participants	The Company [CRC for Water Sensitive Cities Ltd] Name: Ben Furmage Position: Chief Operating and Finance Officer Address: PO Box 8000, Monash University LPO, Clayton Campus VIC 3800 Telephone: 613 9902 0542 Email. Ben.furmage@crcwsc.org.au Monash University Name: Prof. Pauline Nestor Position: Office of the Senior Vice-Provost and Vice-Provost (Research) Address: Monash University, 34 Exhibition Walk, Clayton VIC 3800 Telephone: 613 9905 6290 Email: pauline.nestor@monash.edu The University of Western Australia Name: Dr. Campbell Thomson Position: Director Research Services Address: Registrar's Office, The University of Western Australia, 35 Stirling Highway, Crawley, WA 6009 Telephone: 618 6488 3027 Email: campbell.thomson@uwa.edu.au The University of Queensland Name: Mr. Joe McLean Position: Director Research Partnerships Address: Cumbrae-Stewart building 72, The University of Queensland, ST LUCIA, QLD, 4072 Telephone: 617 3365 3559 Email: director.partnerships@research.uq.edu.au
Responsible Participant (clause 9)	Monash University

Contributed Personnel (clause 13)	Annexure B	
Project Funds (clause 4 and 6)	Annexure B. Payment of actual project expenditure will be made quarterly in arrears following approval of the quarterly project progress report and the financial reports (cash utilised and in kind contributions made) by the CRCWSC's Chief Research Officer.	
Project Contributions (clause 4 and 6)	Annexure B.	
Background IP (clause 12)	Outlined in section ANNEXURE C - Page 16	
Project Plan	*Project Leader* (clauses 8 and 9)	Item 3 of the Research Project Proposal.
	Project Commencement Date (clause 5)	1 July 2017 (FY1718 Q1)
	Project Completion Date (clause 5)	30 June 2020 (FY1920 Q4)
	Project Objectives	Annexure C
	Proposed strategy	Annexure C
	Milestones (clause 10)	Annexure C
	Deliverables (clause 10)	Annexure C
	Project Budget	Annexure B
	Third party contributions	Annexure B
	Resources	Annexure B
	Student requirements	Annexure B (The project budget includes funding for PhD scholarships for three years, with the CRCWSC agreeing to separately fund up to an additional six months for each scholarship, if required. Although all expenditure has to be finalised by Project Completion Date)
	New Assets or Capital Items	Item 17 of the Research Project Proposal

ANNEXURE A PROJECT LEADER RESPONSIBILITIES

Project Leaders have responsibility for and must fulfil the following duties in relation to the Project:

(a) Supervision of Project Activities in accordance with the Research Project Proposal.

(b) Managing the utilisation of Contributions provided by the Company and Project Participants and any other resources made available for the Project Activities.

(c) Ensuring the quality and timely delivery of Project Deliverables according to Milestones.

(d) Actively fostering and facilitating the research collaboration amongst Project Participants.

(e) Fostering integration of research outputs and insights across the Research Program and supporting the relevant Program Leader(s) in integrating research outputs across the Research Programs in the Centre.

(f) Identifying and effectively managing and mitigating Project risk and raising any risk or performance issues concerning the Project in a timely manner with the Program Leader.

(g) Attendance and active participation in Centre industry partner and research workshops.

(h) Preparation of timely quarterly reports to the CRC Executive (suitable to be shown to the Board) on Project progress and Project Budget expenditures.

(i) Identifying any Centre IP developed within the Project, maintaining proper records of the Centre IP developed and its use within the Project and notifying the Program Leader of such Centre IP and any potential future use of Centre IP within the Centre.

Annexure B Project Resources

Information displayed here is private and confidential

ANNEXURE C RESEARCH PROJECT PROPOSAL

Project Proposal

1. Project title: Tools and Products Subprogram

Summary: The aim of the Tools and Products (TAPs) subprogram is to enable industry adoption and utilisation of key intellectual property (IP) outputs from the CRCWSC research program to support mainstreaming of water sensitive technologies and practices. Building on the research outputs and tools developed in the CRCWSC Tranche 1, the TAP subprogram maintains, refines and harmonises the portfolio, and integrates research and outputs emerging from Tranche 2 activities.

The subprogram will primarily focus on the translation of knowledge-based IP into software based tools and products. For technology-based IP developed in Tranche 1 and Tranche 2, specific pathways for their further development and commercialisation will be identified and pursued directly with relevant industry partners (guided by CRCWSC Commercialisation Committee), and therefore are not currently covered in this subprogram description.

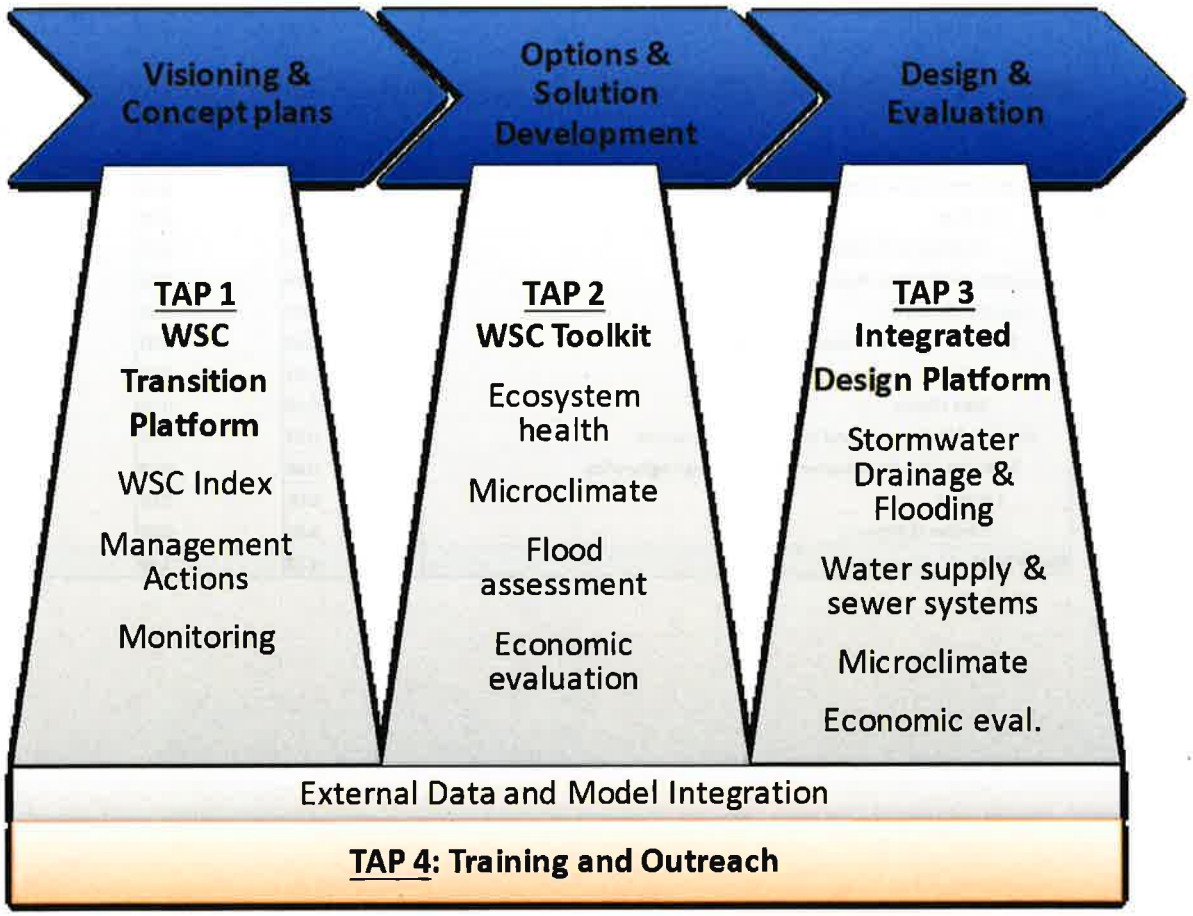

Figure 1. Subprogram overview

The four key projects of the subprogram are logically structured to provide support for WSC developments from a high-level strategy development to options evaluation and more detailed planning and implementation of WSC solutions.

- TAP-A: The Water Sensitive Cities Transitions Platform providing guidance in how to develop a common WSC objectives and transition strategies and evaluate targeted interventions.
- TAP-B: The Water Sensitive Cities Toolkit assists in creating and evaluating various concept designs and technology/policy solutions to address and promote water sensitive objectives and outcomes.
- TAP-C: The Water Sensitive Design Platform will provide planners, designers and engineers with more advanced integrated tools for the detailed Design of multifunctional and resilient water infrastructure solutions.
- TAP-D: Training and Outreach builds capacity within the industry for the application of the TAP's by providing training and guidance for the TAPs' application to a range of uses and implementation cases.

To facilitate the utilisation of the TAPs, the subprogram will work in close collaboration with industry partners to apply and refine the TAP's to demonstrate their value and develop confidence.

2. **Subprogram leader:** Christian Urich (Monash University)

3. **Steering Committee**

Name	Affiliation	Organisation	Role	TAP#
Sara Lloyd	E2 Design	Consultant	VIC-RAP	A
Nicholas Deeks	GHD	Consultant	WA-RAP	B
Cintia Dotto (or Warwick Bishop)	Water Technology	Consultant	VIC-RAP	B
Gary Henderson	KBR	Consultant	QLD	C
Martin Allen	Department of Environment, Water and Natural Resources	Govt	SA	B
Rhys Coleman	Melbourne Water	Utility	VIC-RAP	C
Cath Thrupp	Brisbane City Council	Local Govt	QLD-RAP	A
Sadeq Zaman	Marrikville, Inner West Concil	Local Govt	NSW-RAP	C
Giles Pickard	City of Subiaco	Local Govt	WA-RAP	B
Andrew Allen	Manningham City Council	Local Govt	VIC	B
Christian Urich	Monash	University	VIC	A
Steven Kenway	UQ	University	QLD	B
Gavin Winter	QUT	University	QLD	B
Matt Hipsey	UWA	University	WA	C
Keshab Sharma	UQ	University	QLD	C

4. Project aim(s) and objectives

The aim of the Tools and Products (TAPs) subprogram is to enable industry adoption and utilisation of key intellectual property (IP) outputs from the CRCWSC research program to support mainstreaming of water sensitive technologies and practices. Building on the research outputs and tools developed in the CRCWSC Tranche 1, the TAP subprogram maintains, refines and harmonises the portfolio, and integrates research and outputs emerging from Tranche 2 activities.

The subprogram will primarily focus on the translation of knowledge-based IP into software based tools and products. For technology-based IP developed in Tranche 1 and Tranche 2, specific pathways for their further development and commercialisation will be identified and pursued directly with relevant industry partners (guided by CRCWSC Commercialisation Committee), and therefore are not currently covered in this subprogram description.

TAPs activities and objectives

The proposed main activities in this subprogram are focused on addressing current limitations as identified by CRCWSC participants and research of the existing knowledge-based IP and tools/products and further consolidate and integrate outputs from ongoing research to support the development of industry-ready TAPs that can be used to:

- Diagnose the current state of a city's water system and identify targeted management actions to improve water sensitivity;
- Evaluate and assess the impact of green infrastructure solutions from precinct to catchment scale, based on evidence-based quantification of multiple benefits, to support the development robust business cases;
- Plan and design integrated, multifunctional and resilient solutions from precinct to catchment scale that consider the complex interactions and future uncertainties within the urban water system, including its broader urban environment; and
- Support collaboration amongst researchers, industry, government and community stakeholders through platforms that enable, and encourage sharing of data, knowledge and perspectives.

To facilitate widespread utilisation of the TAPs, the program will address the following objectives:

- Harmonise the suite of CRCWSC TAP offerings in a consolidated portfolio
- Develop guidance for the TAPs' application to a range of uses and implementation cases.
- Address key limitations of TAPs developed in Tranche 1 to support their transition to industry-ready products.
- Apply relevant TAPs as part of Integrated Research Projects (IRPs), strengthening the research activities and providing opportunities for ongoing updates and refinements of the TAPs.
- Apply TAPs in partnership with industry to selected case studies as part of the CRCWSC Regional projects (REG), to 'ground-proofing' the TAPs, demonstrate their value, develop practical experience and confidence by end-users, and build industry capacity for their application.

- Increase the visibility and demonstrate the benefits and value of TAPs through applications during synthesis workshops and other CRCWSC activities.
- Build industry capacity to apply TAPs through user manuals, tutorials, training sessions, workshops and other activities.
- Promote the TAPs to the broader water industry.

5. Structure of the TAP Subprogram

The TAPs subprogram is proposed to comprise four main projects which are logically structured to provide support for WSC developments from high-level strategy development to options evaluation and more detailed planning and implementation of WSC solutions.

- TAP-A: The Water Sensitive Cities Transitions Platform
- TAP-B: The Water Sensitive Cities Toolkit
- TAP-C: The Water Sensitive Design Platform
- TAP-D: Training and Outreach

Prioritisation

Within each TAP project, CRCWSC industry participants and researchers have identified a number of priority activities that provide an overall framework for achieving the TAP program's objectives. These priorities were identified with the aim of ensuring targeted and resourceful development and the delivery of core functionality of components within the TAPs.

These priorities are subject to further evaluation as the TAP program progresses, in response to the emerging research outputs from Tranche 2 activities that are yet to be scoped in detail, changes in industry needs, and industry response to the tools as they are developed and refined. Early in the project, the project teams will establish a detailed assessment and confirm prioritisation of key components. The project teams will then be responsible for identifying and responding to any new developments in research output and/or industry need and, if necessary, adjust the focus of the activities within the TAPs in consultation with the project steering committee. Changes in priority will be subject to approval by the CRCWSC executive.

Project Plans

Based on the prioritisation, the project teams, in collaboration with the project steering committee, will develop detailed project plans (see Appendix B) for each of the TAP's and their components. These project plans are subject to approval by the CRCWSC executive.

The project plans include

- Prioritisation of key activities in response to the key objectives as outlined in this proposal
- Requirements for research synthesis of T1 and T2 research outputs
- Integration of the developed TAP's with CRCWSC tools and other industry products
- Software development plans specifying input and outputs, interfacing protocols, algorithms, graphical user interface requirements, testing procedures, data security documentation standards, release and testing cycles

- Requirements for ongoing update and maintenance
- Identification of commercialising potential based on the Opportunity Matrix Structure and Purpose (see Appendix A)

6. TAP-A: Water Sensitive Cities Transitions Platform
Team: Briony Rogers, Postdoc (TBA), Cath Thrupp, Sara Lloyd, Chris Chesterfield, Christian Urich

The aim of the Water Sensitive Cities Transition Platform is to guide stakeholders in how to steer the transition to more water sensitive practices and outcomes through targeted strategic interventions.

Expanding on the Water Sensitive Cities Index, the Transition Platform will integrate CRCWSC research outputs as a suite of tools and templates that will enable stakeholders to:

- Benchmark and diagnose a city's water sensitive performance
- Prioritise and design management actions
- Represent a city's water sensitive vision and set targets
- Support monitoring and evaluation of implemented management actions
- Share data, knowledge and perspectives within and across cities, creating the facility to host a global knowledge network on water sensitive city transitions.

Figure 2. Water Sensitive Cities Transition Platform and Tools

The platform will integrate three main tools that support users to develop transition strategies and implementation plans. Each tool can be applied individually for a particular purpose, or as a coherent suite to guide a city from its water sensitive vision to the development and monitoring of implementation plans. The tools will be accessed through an intuitive and easy to use web interface that provides interactive visualisation and reporting functionality.

Water Sensitive Cities Index

The Water Sensitive Cities Index is an existing tool developed in Tranche 1, which provides users with the capability to assess a city's water sensitivity against 7 goals, comprised of 34 indicators across social, technical and environmental dimensions.

This TAP sub-project will implement the following enhancements to the Water Sensitive Cities Index:

- Improve its diagnostic capabilities to identify current strength and weaknesses, informed by insights from IRP1 case study processes
- Add functionality that allows a city's water vision to be visualised and communicated using the WSC Index
- Add functionality to support benchmarking and comparison of results across multiple cities
- Improve its reporting functionality

Water Sensitive Cities Management Actions

The Management Actions tool will support users to identify and design strategies and actions that address priority objectives and support a city's transition to its water sensitive vision. This TAP sub-project will:

- Develop prioritisation functionality, underpinned by the Transition Dynamics Framework (developed in A4.1 and tested and refined in IRP1). This will support users to identify and design strategies and actions that address priority objectives and accelerate a city's water sensitive transition.
- Develop a database of management actions and strategies that may help a city in its water sensitive transition, synthesised from research outputs[1] across Program A, B, C and D. The database will be structured based on the goals and indicators of the Water Sensitive Cities Index to ensure alignment across the Transitions Platform.
- Develop functionality to share knowledge, experience and insights on management actions with others to support city-to-city learning

Water Sensitive Cities Monitoring

The aim of the Water Sensitive Cities Monitoring tool is to support target setting, the development of implementation plans and ongoing monitoring and evaluation processes. The TAP sub-project will:

- Improve functionality to set short, medium and long-term targets
- Develop functionality to quantify indicators with measures that are relevant for local contexts
- Develop a user interface that packages the designed management actions and quantified targets into an implementation plan
- Develop functionality to monitor progress and evaluate the impact of management actions in the implementation plan

[1] Research outputs include, for example:
- Effective behaviour change mechanisms and strategies to accelerate community water sensitive cities-related literacy and desired water sensitive behaviour (Project A2.1, A2.2, A2.3)
- Guidance for governance and risk allocation frameworks (Project A3.1, A3.2, A4.1)
- Strategies for influencing the political dynamics of decision making (Project A3.3)
- Urban waterway management frameworks that will support decisions for optimising management and restoration efforts over a range of scales (B2.2/3)

Development and Rollout

Individual components of the Transitions Platform will be developed at different stages and released for industry application when ready for testing.

The *Water Sensitive Cities Index* is currently in a limited-release beta testing phase and available for application within CRCWSC activities. Based on user feedback, the tool will be refined before a first version will be released. The Water Sensitive Cities Index is currently being applied to case studies as part of IRP1 for further testing and refinement, as well as through a consulting service provided by the CRCWSC and selected industry partners. A release to the CRCWSC partners is planned for the end of 2017 (see M1). After this release, the WSC-Index will be actively updated and maintained. The development of additional functionality will require additional 3rd party's investment.

The *WSC Management Actions* and *WSC Monitoring tool* will be newly developed in close collaboration with IRP1 researchers and industry partners. The tools have been identified as a key priority for the CRCWSC. The development phase will include the conceptualisation and development of the tools and synthesis of T1 and T2 research outputs to feed into the Management Action Database. Further, this phase, will involve the tools' application and refinement through the IRP1 case studies if applicable. After this period, the tools will be made available to CRCWSC partners in a limited rollout to test and refine their usability. This is likely to include training for interested CRCWSC participants to set up the tool for consulting and service provision, and for city stakeholders to use the tool in their water sensitive transition planning. Based on the user feedback the tool will be refined before a first version will be released.

The development of the WSC Monitoring tool is subject to industry contributions as outlined in the Budget section.

Key Activities

Specific details on the activities and their prioritisation will be further developed in close collaboration with the project team and with the guidance of the project steering committee during the first phase of the project using the proposed Opportunity Matrix (see Appendix A). To ensure targeted investment the project will focus on activities with the highest priority (1). Activities with the lowest priority (3) are subject to 3rd party investment.

Activity	***Output***	***Resources***		***By***	***Priority***
Water Sensitive Cities Index					
Improve usability based on user feedback and minor updates based on IRP1	Release of industry ready WSC-Index	6 M PA[2] 0.5 FTE 3 M PD[3] 0.6 FTE	**Information is private and confidential**	Dec 17	1

[2] Programming Assistant (PA)
[3] Postdoc (PD)

Management Actions Tool					
Develop the prioritisation tool	User friendly online tool to define and priorities management actions	9 M PA 0.5 FTE 6 M PD 0.6 FTE		Sep 18	1
Develop the management action database	User friendly online database of management actions and strategies based on T1 and IRP1 and IRP2 outputs	6 M PA 0.5 FTE 12 M PD 0.6 FTE		Dec 18	1
Develop the city to city learning component	Enhanced functionality that enables cities to share knowledge, experience and insights on management actions with others	6 M PA 0.5 FTE 3 M PD 0.6 FTE		Jun 19	2
Water Sensitive Cities Monitoring (only developed if co-investment is available industry)					
Develop an online tool to support the development of implementation plans	*User friendly online tool that packages the designed management actions and quantified targets into an implementation plan, including support for ongoing monitoring and evaluation*	*9 M PA* *0.5 FTE* *3 M PD* *0.6 FTE*		*Jun 20*	*3**
** subject to 3rd party investment*					

Timeline of tasks and project milestones

TAP-A **The Water Sensitive Cities Platform**

Year	1				2				3			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Refinement of the WSC Index		1.1										
Development of the Management Actions Component												
Develop the prioritisation tool					1.2							
Develop the management action database							1.2.1					
Development of city to city learning component								1.2.2				
Development of the Monitoring and Evaluation Component												
Develop an online tool to support the development of implementation plans									1.3*			1.3.1 *

Milestones

1.1 Public release of Water Sensitive City Index Tool

1.2 Beta release of Management Actions Tool; 1.2.1 Release of Manamgent Action Database 1.2.2 Release of City to City learning component

1.3* Beta release of the Monitoring and Evaluation Tool; 1.3.1* Release of additional functionlity and usability improvements

*) subject to 3rd party investment

7. TAP-B: Water Sensitive Cities Toolkit

Team: Christian Urich, Project Coordinator/RA (TBA), Cintia Dotto, Gavin Winter, Nicholas Deeks, Martin Allen, Giles Pickard, Andrew Allen, Gavin Winter, Steven Kenway, Chris Chesterfield

The aim of the Water Sensitive Cities Toolkit is to assist planners, designers and engineers in assessing the multiple benefits of green infrastructure solutions in terms of their biophysical and ecological impacts, and combined with an economic evaluation framework to provide the basis for robust water sensitive business cases.

Building on Tranche 1 outputs, this TAP project will further integrate and harmonise a range of key CRCWSC research outputs as easily accessible tools, including the assessment of stream health and ecosystem indicators, downscaled future rainfall data, microclimate assessment and the urban metabolism.

Expanding on the Water Sensitive Cities Toolkit, the focus of the project will be to strengthen following key areas:

- **Rapid assessment of the impacts of various concept designs on the total urban water cycle**
  Building on the frameworks developed in the Projects B1.2 Conceptual city-region scale urban metabolism evaluation framework and C3.1 Platform combining SeweX, EPAnet, ASM/ADM, an urban metabolism model will be integrated. This will allow quantification of the different streams of the urban water system, including water quality and quantity as well as energy demands. This will strengthen the Water Sensitive Cities Toolkit's capabilities to support testing and comparison of different water management solutions across system boundaries.

- **Quantification of multiple benefits**
  Building on a range of CRCWSC T1 research outputs this will include, depending on the identified priorities:
    - Strengthening the stream health and ecosystem health assessment (Projects B2.1 & B 2.2/3)
    - Strengthening surface groundwater interaction (Project B2.4)
    - Integrating a simplified flood damage assessment (Project B4.1)
    - Strengthening the microclimate assessment (Project B3.2)
    - Updating core components based on outputs of IRP4

- **Economic evaluation**
  Expanding the current evaluation model integrated in the WSC-Toolkit and development of the cost-benefit analysis tool, based on the research outputs of IRP2.

- **Increased functionality and linkages to non CRCWSC Tools**
  By further modularisation to allow the Toolkit's different components to be used individually, in combination with non CRCWSC Tools (e.g. UNDO) or as a suite of tools to assess the multiple benefits of complex green infrastructure solutions for a range of case studies.

- **Improved usability**
  By updating the desktop application based on the initial feedback from the beta release. Further, depending on the identified priorities, linking the Water Sensitive Cities Toolkit to the *Integrated Design Platform* (see below), developed as part of Project A4.3. This will allow the Toolkit to be accessed through an intuitive online interface, including interactive visualisations and analysis of results. Further, the link to the *Integrated Design Platform* will give users access to common GIS data (cadastral maps, building footprints), biophysical data, socio-demographic data and past and future climate data, that combined with the users' own datasets enables a rapid develop of complex case studies.

Development and Rollout

The Water Sensitive Cities Toolkit is currently in beta phase and available on request for testing with active support of the CRCWSC. Based on user feedback of the beta release in mid 2017 the tool will be refined before a first version will be released by the end of 2017. This is likely to include training for interested CRCWSC participants, to set up the tool for consulting, and service provision.

To ensure targeted investment and potential uptake by industry of the developed tools, the TAP's subprogram will develop detailed project plans for each tool. Updated and newly developed components will be developed in close collaboration with industry and made available to CRCWSC partners continuously in the form of beta testing programs.

To demonstrate the functionality and applicability, to test and improve new elements, and to develop capacity in industry, the tools will be applied to one case study in each region to be defined in collaboration with the RAPs. Further, depending on the case study the tools will be applied in IRP2, IRP3 and IRP4, and as part of the Regional Implementation Projects and Research Synthesis activities.

Based on user feedback, the tools will be refined before a first version will be released to the CRCWSC partners. After the stable release, the WSC-Toolkit will be actively updated and maintained.

Key Activities

Specific details on the activities and their prioritisation will be further developed in close collaboration with the project team and with the guidance of the project steering committee during the first phase of the project using the proposed Opportunity Matrix (see Appendix A). To ensure targeted investment the project will focus on activities with the highest priority (1). Activities with the lowest priority (3) are subject to 3rd party investment.

Activity	*Output*	*Resources*		*By*	*Priority*
Improved usability					
Improve the usability and functionality based on user feedback and minor updates based on the IRPs	*Release of industry ready WSC-Toolkit*	*6 M PA 0.5 FTE* *3 M RA[4] 0.5 FTE*	**Information is private and confidential**	*Jun 18*	*3**
Quantification of multiple benefits					
Integration of the microclimate assessment model developed in B3.2	Improved microclimate algorithms	6 M PA 0.5 FTE 3 M RA 0.5 FTE		Dec 17	1
	Improved usability with co-investment	*3 M PA 0.5 FTE*		*Dec 19*	*3**
Update models with T1 outputs	e.g. Improved health and ecosystem module or flood damages assessment	6 M PA 0.5 FTE 3 M RA 0.5 FTE		Jun 18	2
Rapid assessment of the impacts of various concept designs on the total urban water cycle					
Develop the metabolism assessment tool based on B1.2	Tool for assessing the urban metabolism as part of the WSC-Toolkit (shared with TAP-A)	6 M PA 0.5 FTE 6 M RA 0.5 FTE		Dec 18	2
	Improved usability with co-investment	*3 M PA 0.5 FTE*		*Jun 19*	*3**
Evaluation					

[4] Research Assistant (RA)

Synthesise IRP2 outputs into a user-friendly tool	Robust economic evaluation module as part of the WSC-Toolkit (Depending on IRP2)	9 M PA 0.5 FTE 6 M RA 0.5 FTE		Dec 19	1
	Improved usability with co-investment	*3 M PA* *0.5 FTE*		*Jun 20*	*3**
Synthesise IRP3 outputs into a user-friendly tool	Depending on IRP3	9 M PA 0.5 FTE 6 M RA 0.5 FTE		Dec 19	1
	Improved usability with co-investment	*3 M PA* *0.5 FTE*		*Jun 20*	*3**
** subject to 3rd party investment*					

Timeline of tasks and project milestones

TAP-B The Water Sensitive Cities Toolkit

Year	**1**				**2**				**3**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Assessment of Impacts												
Develop the metabolism assessment tool based on B1.2					**2.2**	**2.2.1 ***						
Multiple Benefits												
Integration of the improved microclimate assessment model developed in B3.2		**2.1**	**2.1.1 ***									
Update models with T1 outputs			**2.3**									
Evaluation												
Synthesise IRP3 outputs into a user-friendly tool										**2.4**		**2.4.1 ***
Synthesise IRP2 outputs into a user-friendly tool										**2.5**		**2.5.1 ***
Improved usability and functionality								**2.6***				

Milestones

2.1 Beta release of Microclimate Assessment 2.0; 2.1.1*Stability and usability improvements
2.2 Beta release of Urban Metabolism Tool; 2.2.1* Stability and usability improvements
2.3 Existing models improved and additional components integrated based on T1 outputs
2.4 Depending on IRP3; 2.4.1* Stability and usability improvements
2.5 Tool for economic evaluation released; 2.5.1* Stability and usability improvements
2.6* WSC Toolkit release with improved usability and functionality
***) subject to 3rd party investment**

8. TAP-C: Integrated Design Platform

Team: Keshab Sharma, Matt Hipsey, Christian Urich, **Project Coordinator/RA (TBA)** Gary Henderson, Rhys Coleman, Sadeq Zaman.

The aim of the Integrated Design Platform is to support users to plan and design integrated, multifunctional and resilient water infrastructure solutions from precinct to catchment scale, taking into consideration scenarios of the complex interactions and future uncertainties within the water system and its broader urban environment.

Building on Tranche 1's DAnCE4Water software, the Integrated Design Platform provides an interface (conceptual and computational) to integrate conceptual and complex biophysical models, urban and infrastructure development models, and socio-economic models. This enables detailed assessment of water sensitive policy, design and infrastructure solutions across the urban water system under many different scenarios. The Integrated Design Platform will harmonise and integrate CRCWSC Tranche 1 research outputs to expand its detailed assessment capabilities.

Depending on the identified priorities and case study application this will include:

- Improvements to the existing urban water cycle model by harmonising it with the urban metabolism framework developed in Projects B1.3. This will allow the effects of different water management options from household to city scales to be quantified across the urban water streams.

- Improvements to the detailed assessment of the interactions between decentralised and centralised water systems including drainage, water supply and waste water systems (Project C3.1).

- Improvements to the stress testing of adaptation options under deeply uncertain climate change and urban development scenarios (Project B4.1, B4.2, A4.3)

- Development of new interfaces to software products currently used by industry, such as TUFLOW or eWater source, depending on the case study application. As demonstrated in Project B4.1's developed interface between DAnCE4Water and MIKEFLOOD, this will allow complex and already established models to be linked with the Integrated Design Platform, enabling detailed assessment of infrastructure adaptation options across the urban water system.

- Development of built form and infrastructure templates (drawing on outputs from Projects D5.1, A4.3, B4.1 and B4.2) to streamline the generation of complex adaptation scenarios at parcel level detail. Scenarios could consider a range of adaptation measures, including centralised and decentralised infrastructure options across a range of scales, as well as planning and land use policies.

- Improvements to the economic evaluation model, expanding the current evaluation model and integrating the newly developed cost-benefit analysis tool, based on the research outputs of IRP2

- Harmonisation of the framework and computational platform shared between the Water Sensitive Cities Toolkit and the Integrated Design Platform. Further integration will allow:
    - Models to be shared across the two platforms
    - Common access to databases such as GIS (parcels, building footprints), biophysical data, socio-demographic data and past and future climate data. Combined with users' own datasets, this will enable rapid development of complex case studies.
    - A common web interface that provides interactive visualisations to communicate complex results and enables users to apply the tools in collaborative situations
    - Access to cloud computing capacities that provide the computational power to test many different strategies and scenarios

Development and Rollout

The Integrated Design Platform is currently in beta phase and available on request for CRCWSC guided testing. Based on user feedback, the tool will be refined before a first version will be released. The rollout will involve training for CRCWSC consultant partners in the set up of the tool, and for users on an individual case study basis.

To ensure targeted investment and potential uptake by industry of the developed tools, the TAP's subprogram will develop detailed project plans for each tool. Updated and newly developed components will be made available to CRCWSC partners continuously in the form of beta testing programs. To improve and test new functionality, the Platform will be applied to one case study in each region to be defined in collaboration with the RAPs. Further, depending on the case study the Integrated Design Platform will be applied in IRP2 and IRP4, and as part of the Regional Implementation Projects and Research Synthesis activities.

Based on user feedback, the tool will be refined before a first version will be released to the CRCWSC partners. After the stable release, the Integrated Design Platform will be actively updated and maintained.

Key Activities

Specific details on the activities and their prioritisation will be further developed in close collaboration with the project team and with the guidance of the project steering committee during the first phase of the project using the proposed Opportunity Matrix (see Appendix A). To ensure targeted investment the project will focus on activities with the highest priority (1). Activities with the lowest priority (3) are subject to 3rd party investment.

Activity	***Output***	***Resources***		***By***	***Priority***
Integrated Performance Assessment					
Improve assessment of the interactions between decentralised	Improved integrated performance assessment model with focus	6 M PA 0.5 FTE 6 M RA 0.5 FTE	**Information is private and confidential**	Jun 18	1

and centralised water systems (A4.3, B1.2, C3.1, IRP4)	on in-fill development (IRP4)				
Build interfaces to external programs for integrated assessment	*Interfaces to e.g. SEWER X, TUFLOW, SOURCE, Reservoir or wetland models*	*6 M PA 0.5 FTE* *3 M RA 0.5 FTE*		*As required*	*3**
Improve performance assessment under future uncertainties	User friendly tool to stress test solutions under future scenarios	3 M PA 0.5 FTE 3 M RA 0.5 FTE		Jun 18	2
Evaluation					
Synthesise IRP4 outputs into a user-friendly tool	Depending on IRP4	9 M PA 0.5 FTE 6 M RA 0.5 FTE		Dec 19	1
	Improved usability with co-investment	*3 M PA 0.5 FTE*		*Jun 20*	*3**
Improved usability					
Harmonise the framework and web platform to be shared between the Water Sensitive Cities Toolkit and the Integrated Design Platform	*A web tool for the WSC-Toolkit and the integrated planning tool sharing models and data*	*6 M PA 0.5 FTE* *3 M RA 0.5 FTE*		*Jun 18*	*3**
** subject to 3rd party investment*					

Timeline of tasks and project milestones

TAP-C **The Water Sensitive Design Platform**

Year	1				2				3			
Quarter	1	2	3	4	1	2	3	4	1	2	3	4
Integrated Performance Assessment												
Improve assessment of the interactions between decentralised and centralised water systems (A4.3,				3.1								
Build interfaces to external programs for integrated assessment	Dependent on co-investment*											
Improve performance assessment under future uncertainties				3.2								
Evaluation												
Synthesise IRP4 outputs into a user-friendly tool										3.3		3.3.1 *
Tool												
computational platform between the Water Sensitive Cities Toolkit and the Integrated Planning and Design Platform				3.4*								

Milestones

3.1 Improved model integrated assessment

3.2 User friendly tool to stress test solutions under future scenarios

3.3 Depending on IRP4; 3.3.1* Stability and usability improvement

3.4* Framework and platform developed to share tools between TAP2 and TAP3

*) subject to 3rd party investment

9. TAP-D: Training and Outreach

Team: Christian Urich

Aim of Training and Outreach is to build capacity within the industry for the application of the TAP's by providing user documentation, training and guidance. To facilitate the utilisation of the TAPs, the program will work in close collaboration with industry partners to apply and refine the TAP's to demonstrate their value and develop confidence. TAP's.

To support a widespread utilisation of the TAP's the project will

- Develop an organising framework to structure the TAPs identifying links between TAPs and other non CRCWSC tools to achieve broader outcomes. Aim of this framework is to provide industry with guidance on how the TAPs and other non CRCWSC tools can be applied to support the implementation of water sensitive technologies and practices.
- Develop user documentation and a case study database to showcase successful application, to demonstrate added value and to develop industry confidence and engagement
- Run annual workshops and training seminars in the different regions
- Actively promote the TAP at national and international conferences

Key Activities

Activity	*Output*	*Resources*		*By*	*Priority*
Develop an organising framework to structure the TAPs	Framework of how the TAP's link to achieve broader outcomes	6 M RA 0.5 FTE	**Information is private and confidential**	Jun 18	1
Application Support		36M RA 0.3 FTP			1
Administrative Support		36M RA 0.2 FTP			1

Timeline of tasks and project milestones

TAP-D Training and Outreach

Year	**1**				**2**				**3**			
Quarter	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**	**1**	**2**	**3**	**4**
Develop an organising framework to structure the TAPs				4.1								
Case Study Support												
Run annual workshops and training seminars												
Visualisation platform	Dependent on co-investment											

Milestones

4.1 Organising framework has been established

10. Resources and Budget Summary

Information displayed here is private and confidential

IN-KIND (TBC)	FY17/18	FY18/19	FY19/20
TAP-D			
Christian Urich (Sub-Program Lead)	0.40	0.40	0.40
TAP-A			
Briony Rogers	0.05	0.10	0.10
Chris Chesterfield	0.05	0.10	0.10
Cath Thrupp	0.05	0.05	0.05
Sara Lloyd	0.05	0.05	0.05
TAP-B			
Gavin Winter	0.05	0.05	0.05
Nicholas Deeks	0.05	0.05	0.05
Cintia Dotto	0.05	0.05	0.05
Greg Ingelton	0.05	0.05	0.05
Giles Pickard	0.05	0.05	0.05
Andrew Allen	0.05	0.05	0.05
Gavin Winter	0.05	0.05	0.05
Steven Kenway	0.05	0.05	0.05
TAP-C			
Keshab Sharma	0.10	0.10	0.10
Matt Hipsey	0.05	0.05	0.05
Gary Henderson	0.05	0.05	0.05
Rhys Coleman	0.05	0.05	0.05
Sadeq Zaman	0.05	0.05	0.05

APPENDIX A

Opportunity Matrix Structure and Purpose

An opportunity matrix allows commercial opportunities relevant to their projects to be recorded. It also encourages the consideration of multiple opportunities while confining the scope of broader statements of value into more commercially actionable opportunities.

Opportunity Matrix

IP Asset(s)	• The specific piece of IP generated by the research (eg, report, finding, relationship, etc.) • If multiple pieces of IP are being combined to generate the product/services • identify this • If any assumptions about key IP requirements are being made identify these
Product/Services	• Description of the proposed application for the IP; • Any potential development requirements or partners to deliver the application • Any notable key performance requirements the IP must meet.
Potential Markets	• Description of the markets (i.e. industry and sector which best describes the proposed application of the product or service). • Includes relative sizing and dynamics of that industry relevant to the product/services
Value Proposition	• A simple statement of the value the product/services would represent to a potential markets (note this may be the same for multiple entries, eg, low cost, high efficiency evaporation)
Freedom to Operate	• Identify the barriers to market entry for all the identified products and services, both technical and commercial (eg, related infrastructure requirements or capital requirements) • Evaluate the regulatory environment and compliance requirements associated with the identified market/s and the proposed products and services.
Competitive Advantage	• What particular advantage does this product/services have when compared to the existing products/services being used currently to satisfy the identified market need. (note this may be the same for multiple entries, eg, lower cost, faster implementation)
Competitors/Partners	• Identify existing competitors and/or partners (products and servicing strategies) • within the identified market/s
Evidence/Source	• Provide source or basis for intelligence • Justify the analysis.
Priority Rating (High/Med./Low)	• Establishes the relative priority of this opportunity when compared to all the other opportunities which can be pursued with this innovation
Next Steps / Key Questions	• What activities need to be undertaken to develop these product/s services within the market identified?

APPENDIX B

Project Plan Template

Aim of the project plans is to ensure targeted and resourceful development to delivery core functionality for the proposed tool. The project plan should follow the structure as outlined below.

1. Summary

2. Industry Priority

Prioritisation in response to the key development objectives as outlined in the proposal

3. Research Synthesis

Describe the T1 and T2 research outputs the software builds upon and how these outputs will be translated into a tool.

4. Link TAPs & Industry Products

Describe how the proposed tool will link to TAP's developed by the CRCWSC and other industry products.

5. Development Plan

5.1 Development Process

Describe the development and rollout process

5.2 Software specification

- Development Platform
  Describe on which platform the software will be developed and which interfacing protocols will be used.

- Input and Output data

- Software Architecture
  - Describe the different modules of the software and how the modules are linked to complete calculations
  - Describe the main algorithms
  - Define the underlying data structure e.g. database layouts
  - Describe synergies between projects, e.g. potential to share components, code

- Graphical User Interface
  - How are inputs managed
  - How are outputs configured
  - How are parameters configured
  - Describe how the GUI will look like and how it will be manipulated

- Data Security

- Testing
  - Describe the testing procedure and define standard tests to ensure that the underlying algorithms are working correctly
- Extensibility
  - Explain how the software can be extended

- Maintenance and Updates
  - Describe the maintenance requirements
  - Describe how the underlying data can be updated based on the latest research outputs e.g. in the economics model

- Documentation
  - Define standards for technical and user documentation

6. Timeline and Deliverables

7. Resources

8. Risk Management

9. Commercialisation Potential (see Opportunity Matrix Structure and Purpose)