Sustainable Total Water Cycle Management Strategy

Volume I:

Summary Document

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For

Hornsby Shire Council

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Sustainable Total Water Cycle Management Strategy

Volume 1: Summary Document

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I agree that this report reaches the standard set by the Institute for Sustainable Futures, University of Technology, Sydney.

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Institute for Sustainable Futures

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REPORT VOLUMES

VOLUME I: PROJECT SUMMARY

VOLUME II: SUSTAINABLE TOTAL WATER CYCLE MANAGEMENT STRATEGY

VOLUME III: TOTAL WATER CYCLE MANAGEMENT MODELLING

VOLUME IV: PROJECT PROCESS REPORT

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ABBREVIATIONS

DEC	Department of Environment and Conservation
DIPNR	Department of Infrastructure, Planning, and Natural Resources
E2	
EUM	end use model
HSC	Hornsby Shire Council
HN CMA	Hawkesbury Nepean Catchment Management Authority
SKM	Sinclair Knight Merz
SOJI	Statement of Joint Intent
SWC	Sydney Water Corporation
UTS	University of Technology Sydney
WSUD	water sensitive urban design

1 BACKGROUND

Council has shown leadership in successful water quality management since the break out of algal blooms in Berowra Creek in the early 1990s. Their response to water quality problems through the formation of a partnership approach with key government agencies and the community – through the Statement of Joint Intent (SOJI) - produced the Berowra Creek Water Quality Management Strategy in Hornsby Shire. Consequently, through the implementation of a variety of actions involving many stakeholders, Council successfully eliminated algal blooms and enhanced water quality in Berowra Creek.

Now, Council is showing leadership again with their acknowledgement of the need for a broader approach to the water cycle. Council's Water Catchments Team has recognised the need to expand traditional thinking of water quantity and quality, to include an understanding of the total water cycle. A better understanding of the water balance in the Shire and the implications of all activities on the water balance is essential to face the new challenges. One of the major challenges in sustainably managing the total water cycle will come from development pressures within the Shire. The development of new and/or existing settlements will create greater water consumption needs, place further pressure on the waterways of the Shire to absorb nutrient flows, and produce greater waste water demands.

Council's recognition of the need to tackle these challenges using a strategic approach places it at the forefront in sustainable water cycle management and provides the inspiration for this project. The work of the Statement of Joint Intent (SOJI) Committee (acting as steering group) and the project team comprising the Water Catchments Team, the Institute for Sustainable Futures (UTS), and Sinclair Knight Merz, has produced this report including the two key outputs:

a strategic planning actions instrument known as the Hornsby Shire Council Sustainable Total Water Cycle Management Strategy, and

a modelling package to better understand, interact with and manage the water cycle.

1.1 Report Structure and Deliverables

The accompanying documentation comprises four documents. A brief outline of each document follows.

Volume 1 Summary Report: a strategic overview of the Sustainable Total Water Cycle Management Strategy project; project summary and future directions.

Volume 2 Sustainable Total Water Cycle Management Strategy: introduction and framework of the Strategy followed by the Strategy document.

Volume 3 Total Water Cycle Management Modelling: review of hydrological and urban water modelling approaches; detailed E2, end use model (EUM) and Options model reports; and scenario manager manual.

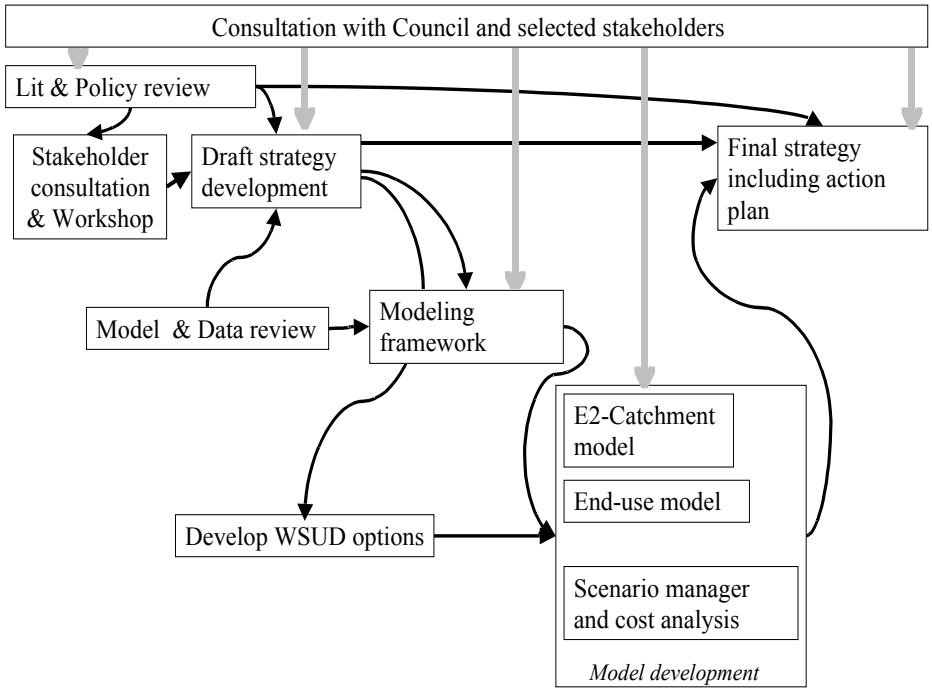
Volume 4 Process Report: Summary of key input processes in the project; the literature and policy review and a report on the outcomes of the stakeholder consultation.

2 PROJECT PHASES

The project team has completed a number of stages in this project, all contributing to the two outputs, as shown in the figure below. The process has included interviews and feedback from a wide range of stakeholders, an analysis of current best practice with a focus on Council's current water policy and procedures, the iterative development of a strategy document, and the development and delivery of a broad modelling capability. This process was designed so that the findings from each stage could feed into the following stage or future stages of the process. The project team met regularly to update progress, seek feedback, clarification and agreement, and attain milestones. Meetings included quarterly presentations to the SOJI Committee, monthly progress report meetings, and regular phone conferences both within the team and between the consultant groups.

The project was influenced by a list of project criteria formulated by the Water Catchments Team. The project criteria include a range of issues for total water cycle management and hence shape, to varying extents, the direction of the Strategy. The project team needed a means of understanding each criteria's place and influence in sustainable total water cycle management. The Natural Step framework (Robert 2000) provided an excellent framework for the criteria, aligning sustainability principles with sustainability outcomes, consistent with Council's vision for sustainable total water cycle management.

Figure: the project phases



The project was broadly defined by 3 phases: the process phase, the modelling phase, and the strategy phase.

2.1 The process phase

This phase of the project involved two stages. The outputs from this phase are documented in volume 4 of the final report.

Stage 1 of the project was the policy and literature review. The review was important to inform the project team about best practice and Council practice prior to the stakeholder consultation stage. It also played a role throughout the strategy development phase, providing information on current strategies and actions, updating content knowledge, and seeding opportunities for new Council strategies and actions to embrace.

Stage 2 was the stakeholder consultation phase. The consultation stage followed Council's preference for a focus on individual interviews, including 19 managers within Council, and 9 external interviews including the SOJI Committee (representatives from SWC, DEC, DIPNR, community and Council) other key agency stakeholders such as the National Parks and Wildlife Service, and the Hawkesbury-Nepean Catchment Management Authority. This stage was important because it provided stakeholders the opportunity to voice their aspirations of Council, and showed the willingness of Council to gain internal and external involvement in shaping total water cycle management direction.

This stage also provided the project team with a group of Strategy users to reality-test the Draft Strategy during a later stage. For the project team, this stage produced information about the potential for sustainable total water cycle management by Council and produced many of the strategies and actions in the final document.

Most stakeholder feedback indicated that the Strategy was actively heading on a path to sustainable total water cycle management and key to instigating leading edge best practice. Some feedback provided additional actions, finessed actions, and refined timeframes. Finally, the HN CMA board indicated their desire to endorse the Strategy, following further follow up.

2.2 The modelling phase

This phase involved 4 stages. The outputs from this phase are in volume 3 of the final report.

Stage 3 was the review of urban water modelling. This stage reviewed hydrological models and water use models, highlighting the strengths of the E2 and end use models (EUM) for the purposes of Council. The model review was an important stage to provide a knowledge base for the Water Catchments Team about the model capability from the project and how it could be used.

Stage 4 was the development of E2 and EUM models. The models were developed to meet the unique situation and needs of Hornsby Shire. The E2 model is a hydrological model focussing on water and the environment. It predicts the flow of water volumes through the water cycle in the Shire. The EUM is a water use model focussing on water and people. It shows the sector breakdown of water use and forecasts future water use and waste water needs in the Shire.

Stage 5 was the development of the options model and scenario manager. The options model allows Council to understand interventions they make into the interactions between people and water use interaction. It sets up seven demand management options that influence water demand in residential, non-residential (i.e. business and industry) and Council sectors. It enables Council to compare options to reduce water demand on an equal basis as well as determine the least cost option and how costs can be shared through society. By predicting water use using different populations scenarios, and different options packages in the EUM-options models, along with water flow rates under development scenarios, Council users are able to model development scenarios and understand their impact in the

water cycle. A set of detailed instructions – a scenario manager – was also provided to ensure Council capability in managing scenarios.

2.3 The Strategy development phase

Stage 6 was the development of the Strategy. The outputs from this phase are in volume 2 of the final report.

This phase ran the length of the project and all stages of the project informed its development. The Strategy was guided by some key principles:

- Strategic direction: the Strategy informs, guides, and directs Council at a level of detail that will lay a framework for better decision making to meet the Council's vision for the water cycle;
- A total water cycle focus: the Strategy expands traditional thinking of water quantity and quality, to an understanding of the total water cycle. A better understanding of the water balance in the Shire and the implications of all activities on the water balance is key;
- Concentrated on Council control, influence, and concern in Hornsby Shire: the strategy involves and gains support of stakeholders in a framework of understanding key areas of control and influence by Council, and where there is a need for concern;
- Bringing together strategies, plans, and actions: links the broader Council goals and planning processes to achieve the vision; and
- Local community involvement: where the local community need to be consulted, best practice process will be used.

The Strategy is set out so that each Council Division can understand what actions they are responsible for, and how their actions contribute to attaining the overall Vision. The Strategy was re-drafted over several iterations across stakeholders. The final document aims to provide strategic direction for Council to achieve a vision for a sustainable total water cycle.

3 IMPLEMENTING PROJECT OUTCOMES

This project produced two key outputs which form new capabilities for Council as they move towards sustainably managing the total water cycle. The Strategy and modelling capability should be used in an adaptive management framework to continually ensure that Council is moving towards their water cycle vision.

The Strategy outlines Council aspirations for the total water cycle, the means to achieve these aspirations, and the use of monitoring and metrics to measure progress. It also provides information on the stakeholders that need to be involved and some indication of when they would ideally implement the action and at what cost. By setting out the Strategy by Council Division, ownership and responsibility for the Strategy among the Divisions is encouraged while facilitating cross-Divisional collaboration.

The models provide Council with the best available knowledge about the water balance in the Shire and how the actions of the Hornsby community interact with the water balance. Using the models to run development scenarios, Council now has the capability to experiment with alternative management options and is able to predict the implications of their decisions on the water cycle. By testing the alternatives, the findings can aid decision making based upon triple bottom line outcomes.

The models and Strategy are valuable tools for predicting the consequences of management responses to development pressures. Hornsby Shire is required to house an additional 10,590 people between January 2004 and June 2010 – an increase of 6.97%. The existing water cycle conditions indicate the implications of increased and changing land use on the water cycle, in terms of water quality, ecosystem health, and water consumption. Consequently, the impending development pressure in Hornsby Shire is a key focus for implementing the Strategy and using the new modelling capability.

As novel scenarios arise and modelling practices develop, Council is encouraged to seek further assistance in enhancing their models. Model design will advance over time and updated and enhanced applications of their current package would be beneficial for their scenario modelling. Similarly, Council should continue to strengthen and extend partnerships with research organisations to collaborate on best practice water cycle research applications.

4 MOVING FORWARD

This project illustrates Council's leadership in a new era for managing the total water cycle. It progresses a successful focus on water quality by Council and state government agencies (guided by obligations to SOJI), by enabling Council to pursue total water cycle management actions, with involvement from stakeholders, based upon Council's most effective and appropriate forms of influence and intervention. Council's management actions can reflect this change – with regulations used in areas they can control, incentives and partnerships where they can exert influence, and concern for issues that may affect them. This framework for action will be implemented in response to current pressures – namely development of an increasingly fragile receiving system to house an increasing population.

The results of this project include a process and tools to improve decision making for urban development and land use change in the Shire, relating to the impact on water resources in ecological, social, and economic terms. This project has equipped Council to assess the sustainability of alternative management scenarios (either a development scenario or management options) by consulting with stakeholders, using modelling analysis of biophysical and socio-economic aspects of the water cycle and related landscape and urban systems, all directed by an integrated planning framework.

Specifically, this project has achieved a new approach to managing the water cycle in Hornsby Shire. Council staff, decision makers and stakeholders now have strategic direction, clearly defined by the new Strategy. This Strategy directs stakeholder activities in an integrated manner by providing vision; sustainable outcomes to strive to achieve; tasks and responsibilities; and guidance for implementation through stakeholder, timeframe and cost information.

In addition, this project has enabled Council to translate their water cycle vision into strategic actions by delivering new modelling tools capable of analysing and assessing strategies at the catchment and sub-region level. Council now has an integrated whole of catchment water cycle model calibrated to run on a daily time step to observed streamflow data. It estimates flows, and concentrations and loads of constituents, in streams within the catchment and can be used to test different management actions and future scenarios.

Furthermore, this project has delivered to Council modelling capabilities to understand the current and future nature and scale of water demand. It allows Council to understand how their influence may impact on the water balance over time and identify the way people interact with water in the Shire, thereby promoting more efficient and effective water use through Council interventions.

Implementation of the Strategy should be a priority for Council. With increasing pressures from population growth and associated future urban development, increased demand on water resources coupled with implications of climate change, the need for integrated water cycle management in the Australian context has never been greater. The Hornsby Shire Council Total Water Cycle Management Strategy identifies and defines the priority for these actions.