



## Water Sensitive Urban Design: facilitating adoption by local Councils

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### 1. Exploring the issues *ourselves*

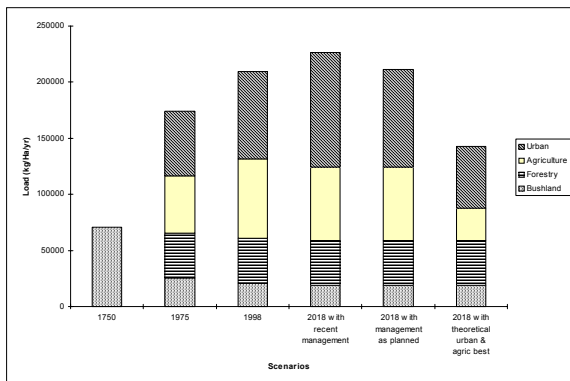
- thinking into uneases, uncertainties, ...
- thinking widely: many points of view, many disciplines
- thinking from 'caring for the whole', rather than from advocacy

### Exploring issues at Wyong

#### Evaluating environmental priorities

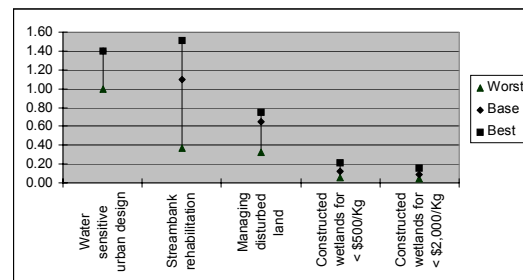
- State of the Environment Report:  
comparing environmental domains (land, water, air, biodiversity, ...)
- Tuggerah Lakes Adaptive Management program:  
prioritising within water cycle management (and Estuary Management Planning reviewing)

#### Opportunities for managing nutrient loads



**Figure 1** Projected nitrogen loads entering the Tuggerah Lakes under various scenarios

#### Capacity to fund change



**Figure 2** Comparison of cost-effectiveness of nutrient management options from a Council perspective

Ratio of reduction in nitrogen load / Council funds spent in the catchment of the Tuggerah Lakes.

## 2. Testing legitimacy

<i>Testing ...</i>	<i>How we tested</i>	<i>Advice outputs</i>	<i>Commitments</i>	<i>Current status</i>	<i>For future action</i>
<i>Environment within Council's overall agenda</i>	<ul style="list-style-type: none"> <li>State of the Shire process</li> </ul>	<ul style="list-style-type: none"> <li>Environment a key issue for the Shire</li> <li>Council is a large player in local environmental management</li> </ul>	<ul style="list-style-type: none"> <li>Management Plan aligned with State of the Shire: social, economic and environmental objectives</li> <li>Additional funds committed (2002/03)</li> </ul>	<ul style="list-style-type: none"> <li>Wider community consultation around State of Shire commencing</li> </ul>	<ul style="list-style-type: none"> <li>Community conversation on Shire directions</li> <li>State Government support</li> </ul>
<i>Water cycle within Council's environmental agenda</i>	<ul style="list-style-type: none"> <li>State of the Environment reporting: prioritising environmental domains</li> </ul>	<ul style="list-style-type: none"> <li>Scenario testing indicates water is one of three key risk areas</li> </ul>	<ul style="list-style-type: none"> <li>Increasing funding for water cycle management (1997 through 2001)</li> </ul>		
<i>Commitment to WSUD within water cycle management agenda</i>	<ul style="list-style-type: none"> <li>Adaptive Management project: relative importance of pollutants and land uses</li> <li>Drainage strategy: dollars per unit of nitrogen management</li> <li>Porters Creek Wetland Management Plan</li> </ul>	<ul style="list-style-type: none"> <li>Nutrients and sediments are key pollutants</li> <li>The community and Council can afford WSUD</li> <li>WSUD is cost-effective from a Council perspective</li> <li>WSUD is essential for protecting major wetlands</li> </ul>	<ul style="list-style-type: none"> <li>Management Plan commitment to WSUD</li> </ul>		
<i>WSUD in subcatchment planning - new urban areas</i>	<ul style="list-style-type: none"> <li>Warnervale District Centre project</li> <li>Industrial Precincts project</li> </ul>	<ul style="list-style-type: none"> <li>Foundations for DCPs and s94 contribution plans</li> </ul>	<ul style="list-style-type: none"> <li>Commitment to WSUD in both new district centre and new industrial precincts</li> </ul>	<ul style="list-style-type: none"> <li>Awaiting final advice</li> </ul>	WSUD approach for use in all new DCPs and as input to DCP revisions
<i>WSUD in subdivision design</i>	<ul style="list-style-type: none"> <li>Warnervale District Centre project</li> <li>Residential subdivision trial</li> </ul>	<ul style="list-style-type: none"> <li>Resolution of design details</li> </ul>	<ul style="list-style-type: none"> <li>Approach to most design details worked out</li> </ul>	<ul style="list-style-type: none"> <li>Working with developer on subdivision proposal</li> </ul>	
<i>WSUD at lot level - new urban areas</i>	<ul style="list-style-type: none"> <li>Residential subdivision trial</li> <li>Other staff investigations</li> </ul>	<ul style="list-style-type: none"> <li>Importance of lot level management, particularly water tanks</li> </ul>	<ul style="list-style-type: none"> <li>Including water tanks in new community buildings</li> <li>Draft DCP requiring 5,000 L water tanks</li> </ul>	<ul style="list-style-type: none"> <li>DCP being considered</li> </ul>	<ul style="list-style-type: none"> <li>DCP finalisation and adoption</li> </ul>

<i>Testing ...</i>	<i>How we tested</i>	<i>Advice outputs</i>	<i>Commitments</i>	<i>Current status</i>	<i>For future action</i>
<i>WSUD in subcatchment planning - existing urban areas</i>	<ul style="list-style-type: none"> <li>• Drainage Strategy</li> <li>• Evaluation of contribution of natural wetlands to catchment performance</li> </ul>				<ul style="list-style-type: none"> <li>• Treatment of natural wetlands as drainage assets to increase funding</li> </ul>
<i>WSUD retrofits - engineering feasibility</i>	<ul style="list-style-type: none"> <li>• Subcatchment opportunities assessment: wetland focus</li> <li>• Piloting WSUD treatment of park</li> </ul>	<ul style="list-style-type: none"> <li>• Substantial opportunities for retrofitting with constructed wetlands</li> </ul>	<ul style="list-style-type: none"> <li>• Retrofit program currently funded to approx. \$300K per annum</li> </ul>		<ul style="list-style-type: none"> <li>• Expansion of WSUD retrofit agenda in established urban areas (have begun assessing park and drainage line opportunities)</li> </ul>
<i>Engineering performance of WSUD work</i>	<ul style="list-style-type: none"> <li>• Constructed wetland evaluations: <ul style="list-style-type: none"> <li>- four surface</li> <li>- one subsurface</li> </ul> </li> </ul>			<ul style="list-style-type: none"> <li>• Before monitoring complete for all</li> <li>• Early outcomes mixed ... awaiting more results</li> </ul>	<ul style="list-style-type: none"> <li>• Judgement re effectiveness of wetlands</li> <li>• WSUD monitoring at subdivision level in Warnervale</li> </ul>
<i>Ecological effectiveness of WSUD work</i>	<ul style="list-style-type: none"> <li>• Lake ecology impacts of constructed wetland retrofits</li> </ul>	<ul style="list-style-type: none"> <li>• Difficult to discern place specific effects in the Tuggerah Lakes</li> </ul>	<ul style="list-style-type: none"> <li>• Further ecological process studies</li> </ul>	<ul style="list-style-type: none"> <li>• Further macroalgae investigation in progress</li> </ul>	<ul style="list-style-type: none"> <li>• Input to reviews of strategy</li> </ul>
	<ul style="list-style-type: none"> <li>• Lake ecology investigations and monitoring</li> <li>• River ecology investigations and monitoring</li> <li>• Wetland ecology investigations and monitoring</li> </ul>	<ul style="list-style-type: none"> <li>• Preliminary reports ... baseline data gathered</li> </ul>	<ul style="list-style-type: none"> <li>• Long term evaluation to assess overall catchment performance (long term funding)</li> </ul>	<ul style="list-style-type: none"> <li>• Programs ongoing</li> </ul>	<ul style="list-style-type: none"> <li>• Periodic (10 years?) evaluation of overall success / failure of catchment management</li> </ul>

### 3. Shaping a change process

	<i>Methods</i>	<i>Instances</i>
<b>Developing people</b>		
<i>Awareness and understanding</i>	Expert input	<ul style="list-style-type: none"> <li>• Research by Council professionals</li> <li>• Consultant input in learning by doing projects</li> <li>• LHCCREMS seminars</li> </ul>
<i>Competency</i>	Learning by doing	<ul style="list-style-type: none"> <li>• Learning by doing projects: 3 internally resourced, and 1 LHCCREMS</li> </ul>
<b>Developing the organisation</b>		
<i>Building informal commitment</i>	Developing informal networks	<ul style="list-style-type: none"> <li>• Learning by doing capacity building projects, in which staff from across Council departments and diverse disciplines worked together</li> <li>• Environmental Systems team networking across the organisation , providing advice, etc (matrix management charter)</li> </ul>
<i>Management systems</i>	Delivering legitimising formal commitments	<ul style="list-style-type: none"> <li>• Management Plan commitment to WSUD</li> <li>• Initial DCP with WSUD elements (education precinct DCP)</li> <li>• Interim WSUD approach while other planning instruments being developed               <ul style="list-style-type: none"> <li>- onsite detention and reuse for large irrigation projects (eg sports fields)</li> <li>- runoff capture and treatment to remove nutrients prior to drainage discharge (i.e. constructed wetlands)</li> <li>- low engineering / high nutrient absorption drainage treatments, such as grass swales and natural drainage lines</li> </ul> </li> </ul>
	Closing plan / do / review loops	<ul style="list-style-type: none"> <li>• Transforming SOE into high level review of Management plan</li> <li>• Collaborative organisational reviews - overall department environmental performance</li> <li>• Strengthening checking and correction in development control - quality assurance checks</li> <li>• Formal performance audits - eg erosion and sedimentation control</li> <li>• Tracking ecological outcomes at multiple spatial scales (wetlands, rivers, lakes)</li> </ul>
<b>Aligning the organisation and its context</b>		
<i>Working with State Government</i>	<ul style="list-style-type: none"> <li>• DLWC's Catchment Management Blueprints and River plans</li> <li>• Planning NSW's Central Coast Regional Planning Strategy</li> </ul>	
<i>Working with other Councils</i>	<ul style="list-style-type: none"> <li>• Collaborating in LHCCREMS WSUD program               <ul style="list-style-type: none"> <li>- model DCPs and policies (WSUD, erosion &amp; sedimentation control)</li> <li>- learning from each other</li> </ul> </li> </ul>	
<i>Working with developers</i>	<ul style="list-style-type: none"> <li>• Working on demonstration project with interested developer</li> <li>• Consultations with developers around draft DCPs</li> </ul>	
<i>Working with community</i>	<ul style="list-style-type: none"> <li>• WSUD a facet of State of the Shire program, and strategies outlined in SOE</li> <li>• Community consultation around retrofit sites (residents, schools, aged care facilities, ...)</li> </ul>	

#### 4. Learning by doing models we've tried

	Character of project	Project objectives	Capacity building objectives	Facilitation	Expert input	Project legwork	Difficulties we've encountered	What achieved re capacity building
<b>Constructing two constructed wetlands</b>	Actual	<ul style="list-style-type: none"> <li>Design and build two constructed wetlands</li> </ul>	<ul style="list-style-type: none"> <li>Develop skills in retrofitting established urban areas</li> </ul>	Consultant	Consultants	In house	<ul style="list-style-type: none"> <li>needed to have stronger input re strategy</li> </ul>	<ul style="list-style-type: none"> <li>Greater organisational depth in wetland design</li> </ul>
<b>Warnervale District Centre master plan</b>	Actual	<ul style="list-style-type: none"> <li>Develop WSUD component of master plan</li> <li>Input to new DCP standards</li> </ul>	<ul style="list-style-type: none"> <li>How to do WSUD in a commercial / retail / medium density residential context</li> </ul>	Consultant	Consultants	Consultant	<ul style="list-style-type: none"> <li>challenges of getting engineering design to respond to ecological dynamics</li> </ul>	<ul style="list-style-type: none"> <li>understanding of issues and what a strategic approach to WSUD looks like</li> </ul>
<b>Porters Creek Wetland Management Plan (600 Ha wetland)</b>	Actual	<ul style="list-style-type: none"> <li>Development bushland management strategy for within the wetland, and catchment management strategy for urbanising surrounds</li> </ul>	<ul style="list-style-type: none"> <li>Looking at urban areas from perspective of receiving ecosystems</li> </ul>	Internal	Consultants	Consultant	<ul style="list-style-type: none"> <li>challenges of getting ecological science to respond to engineering and planning context</li> </ul>	<ul style="list-style-type: none"> <li>organisational understanding of wetlands as expressions of catchments</li> </ul>
<b>WSUD in Warnervale residential subdivision (LHCCREMS Water Cycle Games project)</b>	Possible	<ul style="list-style-type: none"> <li>Test out WSUD strategy in the detail in an actual case</li> <li>Input to new DCP standards</li> </ul>	<ul style="list-style-type: none"> <li>How to do WSUD in a standard residential subdivision</li> </ul>	Internal	Consultants	In house	<ul style="list-style-type: none"> <li>challenges that design details pose</li> <li>generalising from research to local cases</li> </ul>	<ul style="list-style-type: none"> <li>resolution of many design details</li> </ul>

##### *Overall capacity building achievements*

- establishing legitimacy of WSUD approach , organisational commitment strengthening
- building informal organisational networks
- new 'champions' emerging: ownership broadening
- substantial strengthening of organisational expertise

##### *Key recommendations re process*

- pay very close attention to planning-engineering / ecology interfaces
- actual cases work better: better closure, stronger ownership
- external expert input is essential; other tasks can be resourced however's practicable
- the most effective organisational development model we've used (though it does not stand alone)

## 5. Opportunities of regional programs: LHCCREMS' experience

- Funding expert input
  - conferences
  - input to learning by doing projects
- Facilitating networking about WSUD across all levels, within and between Councils
- Catalyst and support for organisational investigation of WSUD opportunities
- Developing products for use across the region
  - model DCPs and policies
  - training materials
  - collections of technical papers
  - practice guidelines for professionals and tradespeople

## 6. Key organisational change conclusions

### Difficulties to look out for in WSUD projects

- being *on* a collective learning curve
  - for example:
    - environmental performance uncertainties (eg nutrient removal by swales under larger flows)hence, a willingness to experiment and take some risks
- cross-disciplinary communication: using ecological dynamics as design criteria for engineering work
  - for example:
    - taking “total average annual flows” as a measure of “sensitivity”, when wetlands are responding to wetting and drying cycles
- complications in design *detail*
  - for example:
    - longevity of subsurface drains and implications for maintenance costs
    - swales and their resilience re vehicle movements: car parking, garbage trucks (what can be excluded where?, reinforced grass?, ...)
    - environmental performance uncertainties (eg nutrient removal by swales under larger flows)

### For capacity building projects

- leverage *actual* projects for capacity building work: better closure, stronger ownership
- involve a wider circle of people in deliberations and decisions
- resource people with expert input (eg consultants) and someone to do legwork

### For overall change management

- build the capacity of the organisation (networks, management systems), as well as of the people
- work to align the organisation and other stakeholders with each other, don't focus solely within the organisation
- work with all levels / aspects of the organisation (not relying over much on “champions”)
- focus on key decisions that legitimise further shifts in organisational activities
- use available funds and staff time (whether internal or external) to transform existing processes (eg State of the Environment reporting, a project to build a wetland, planning a district centre), rather than create new processes, whenever one can.