

WATER RESOURCE MANAGEMENT, WATER SENSITIVE URBAN DESIGN AND INTEGRATED WATER RESOURCE MANAGEMENT

Submission to the Standing Committee on Agriculture, Fisheries
and Forestry Inquiry into Future Water Supply for Rural
Industries and Communities

On behalf of the Planning Institute of Australia
(Victorian Division)

Purpose	2
Introduction.....	3
The State of the Environment.....	4
Critical Challenges	8
The Importance of Regional Catchment Strategies and Planning Schemes	8
How successful are Regional Catchment Strategies in helping with environmentally sound planning for land use and development?	8
What can be done to improve the relationship of the Regional Catchment Strategies with the statutory process?.....	11
The need for improved water conservation, and management of sewerage, stormwater, grey and black water	13
Some Key Concepts Defined.....	13
Everyone has a role to play	16
Commonwealth Government.....	16
State Government.....	17
Local Government and Local Government Associations	19
The role of Water Authorities	20
Private and Public Developers.....	20
Building Partnerships and Alliances	22
Summary	22
References	23

In the words of Haas et al (2003)

“As our understanding of environmental threats deepens and broadens, it is increasingly clear that many environmental issues cannot be simply understood, analyzed, or acted upon. The multifaceted relationship between human beings, social and political institutions, and the physical environment in which they are situated extend across disciplinary as well as geopolitical confines, and cannot be analysed or resolved in isolation.”¹

¹ Peter Haas, Sheila Jasanoff and Gene Rochlin – series editors in the ‘Series Foreword’ to Dolsak, N and Ostrom, E. (Ed) (2003) *The Commons in the New Millenium: Challenges and Adaptations* Cambridge and London: The MIT Press

Purpose

This document's aim is to encourage the move towards a more integrated approach to water resource management and land use and development planning across Australia. In it, we:

- Identify some critical challenges;
- Sets out a framework for improving the relationship between land use and water resource planning;
- Provides some definitions for and encourages improved water conservation through the use of water sensitive urban design, and integrated water management; and
- Encourages a process for nurturing active citizen participation, and the engagement of industry and commerce and governments at all levels to work towards solutions for the challenges we as a nation collectively face.

About the Planning Institute of Australia

In 1996, the Royal Australian Planning Institute RAPI (Victorian Division) as we were known then, set out a Policy Statement on Ecologically Sustainable Development which defined ESD, set out some guiding principles and conceptual models and objectives and made recommendations for best practice. In October 2000, RAPI national office released its policy on livable communities: *Livable Communities: A National Agenda*. This policy saw a need to ensure provision of affordable housing and strategic infrastructure; promoted a regional focus; sought to improve urban design for communities; set the environment as a baseline; and emphasized the need for a national COAG agreement on livable communities.

In September 2003, the Planning Institute of Australia (PIA) as we are now known agreed to a national policy on Water and Planning. The PIA national water policy complements the Institute's policy on livable communities. It should also fall within an overview framework of a policy on sustainability and sustainable development which is currently being drafted. The PIA national secretariat is forwarding our water policy to the Standing Committee under separate cover.

The history of this paper

This submission is based upon the PIA Victorian's draft water and planning policy adopted by the Victorian Board in August 2003, during the process of formulating our national policy on water. Many members of the PIA Victorian Division contributed the material contained herein. There may therefore be a bias towards the Victorian situation in the contents. However we believe that many of the issues and opportunities for improvement outlined, may well translate to the national level and other States and Territories, and apply to metropolitan as well as rural and remote regions. We trust that this information will make a positive contribution to the Standing Committee's important task.

Introduction

Water resource management – a global problem

2003 has been proclaimed by the United Nations General Assembly as the International Year of Freshwater. The United Nations has also proclaimed 22 March of each year as World Water Day. The theme of World Water Day in 2003 was "Water for the Future." This year the UN called on each one of us to maintain and improve the quality and quantity of fresh water available to future as well as present generations. At the 2000 Millennium Summit, world leaders agreed to reduce by half, by the year 2015, the proportion of people who are unable to reach, or to afford safe drinking water or live with basic sanitation (the Millennium Development Goal).

The importance of water

The journey within this paper starts with the knowledge that water is fundamental to all life on earth – as such, and in many ways its value is priceless. While water is a renewable resource through the hydrological cycle, it is naturally subject to periods of shortage and glut through climatic fluctuations. In the natural environment, water quality depends principally upon soil and atmospheric conditions and by-products from the very life-forms it supports. The natural environment, particularly high canopied trees and dense vegetation stimulates the hydrological cycle - the loss of vegetation has the reverse effect -reducing the level of atmospheric water and affecting the volume and location of precipitation. There is thus an intimate connection between water and the health of the natural environment.

Water is critical to biodiversity, playing a principal role in maintaining the diversity of life-forms that have evolved in different climatic regions and ecosystems. Human society heavily relies upon natural systems. Placing an economic and anthropocentric construct upon the natural environment, water supports and enables 'ecological services' – it supplies an essential ingredient that creates and sustains the pool of living matter which is drawn upon by human beings in their day to day life. Water is therefore a natural resource, a commodity, a factor of production, and is itself an ecological service. Water is also a common pool resource², the equitable sharing of which, amongst the numerous 'stakeholders' is critical for survival.

Water quality and availability is increasingly affected by human demands for water, the methods of its collection, storage, refinement and distribution, and the extent of and by-products arising from the use of water. Water quality is imperiled by human habitation and economic activity, by runoff by hardened surfaces causing turbidity and pollution (chemical, particulate, litter and sewage). The natural environment has a certain capacity to accommodate pollution, to oxygenate water, to filter impurities and refresh water. Human endeavor and demand for water has destroyed or severely degraded this capacity in some places, and is projected to continue to do so unless water resource and land management practices are modified quickly.

² In 1990, Elinor Ostrom defines a common pool resource "...as a natural or human made resource system that is sufficiently large as to make it costly (but not impossible) to exclude potential beneficiaries from obtaining benefits from its use. To understand the processes of organizing and governing CPRs, it is essential to distinguish between the resource system and the flow of resource units produced by the system, while still recognizing the dependence of the one on the other."

Irrespective of, but exacerbated by the current drought, clean and fresh water is increasingly in short supply. It can no longer be seen as an infinite resource available for free and unrestricted use from waterways and groundwater reserves. Nor can we afford to continue with the concept of waste-water, or the wasteful use of water. Water is a vital resource that must be managed sustainably - not only for the benefit of humans but also for the whole environment – all biological, human and other animal life forms.

The establishment and maintenance over time of a strong and positive water-ecosystem-human relationship - that is, a mutually supporting relationship between water resource management, ecosystem health and biodiversity, and human endeavor in urban and rural industries and communities - should be a primary outcome of a national water policy.

Integrated natural resource management, catchment and land use planning, water conservation and water sensitive urban design are all tools that can be used to manage the evident imperilment to the quality and quantity of available water and ensure that a balance is struck between human use and the maintenance of all other life-forms and ecological services. Much can be done by planning and related professions, governments, businesses and the community at large to value and use water resources in a more fitting manner.

Actions considered in this paper include improving the integration of catchment management and land use planning, and applying and in all planning schemes and the use of water saving devices, water sensitive urban design and integrated water management methods as a central design feature in all residential, industrial, and commercial developments. By introducing best practice planning and development standards and practices we can make substantial reductions in pollution, improve water quality in waterways, water catchments and coastal environments, and better support economic and social well-being.

The State of the Environment

Total water use in Australia

The 2001 Australian State of Environment (SoE) identified Australians as one of the highest consumers of water per capita in the world. Total water use in Australia for 1996/97 was 24 058 GL (NLWRA 2001a), an increase of 65% from 1985 (AWRC 1987).³

- In 1985 82% was extracted from surface waters (12 000 GL/year), while 18% per cent was extracted from groundwater resources (2600 GL/year).
- In 1996/7 Seventy-nine per cent of water used was from surface waters (19 109 GL), while 21% was from groundwater resources (4962 GL) (NLWRA 2001a).

Water use category	1985 Review ^A	1996/97 Review ^B	Percentage change
Irrigation	10 200	17 935	76
Urban / industrial	3 060	4 754	55
Rural	1 340	1 369	2
TOTAL	14 600	24 058	65

^A AWRC 1987.
^B NLWRA 2001.

³ It must be noted that some of the increase was due to improved accounting of water use.

Rural water use

Irrigation is by far the greatest use of water in Australia, using 75% of water extracted. Over the period 1985 to 1996/97, irrigation water use grew at a faster rate than urban/industrial water use - increasing by 76% between 1985 and 1996/97 (NLWRA 2001a). Rural water use, which consists primarily of stock and domestic water use, has increased slightly, but now only is 6% of total water use in Australia.

The SoE also noted:

- Total annual water use in Australia between 1985 and 1996/97 increased by **65%** to 24 058 GL/year.
- Over the past 20 years, the area of irrigated land has almost doubled in New South Wales and Queensland, and there has been a 75% increase in the annual volume of water used for irrigation between 1985 and 1996/97.
- Drinking and industrial water use has increased by **55%** between 1985 and 1996/97.

The SoE 2001 documented a 90% increase in groundwater use across Australia between 1985 and 1996-97, to about 5000 GL/year. The SoE reported on the over-development of groundwater resources with the rate of extraction exceeding the rate of recharge in many areas, including the Great Artesian Basin, many small aquifers in the Murray-Darling Basin, the Perth Basin and aquifers along the east coast of Australia (Figure 21). Groundwater available for allocation has reduced substantially in the last decade, and is now over-used and over-allocated in many Groundwater Management Units (GMUs).⁴

The problem of over allocation of groundwater and surface water through current licensing systems in several Australian States, including Victoria and New South Wales is well recognized by the National Competition Commission.⁵

In addition, a 'bring forward' effect has been caused new water trading mechanisms, which allow sleeper and dozer licences to be traded, thereby bringing forward consumption of water use which would otherwise be delayed, at a time of significant and prolonged national drought is cause for considerable concern.⁶

Water use in human settlements

In terms of Human Settlements, the SoE 2001 report noted in the 1996-97 financial year, 8% of water use in Australia was by the domestic sector, 22% was used for industrial and commercial purposes, and the remainder used by the rural sector (Table 25). A key feature is that, while shares between sectors in recent years have been relatively stable, water use has been growing in volumetric terms across all sectors. On a global scale, the dominance of the agricultural sector is not an unusual feature, although Australia's use is higher than most

4 Jonas Ball, Sinclair Knight Merz Pty Limited (2001) 'Inland Waters Theme Report' *Australia State of the Environment Report 2001 (Theme Report)* Canberra: CSIRO Publishing on behalf of the Department of the Environment and Heritage URL = <http://www.deh.gov.au/soe/2001/inland/water01-1.html#totalwateruse>

5 Cope, D. (2002) 'Water Reform: Who Pays for the Environment?', Paper prepared for the National Competition Council by Deborah Cope, Principal Pirac Economics November 2002

6 Department of Natural Resources in conjunction with rural water authorities (2001) *The Value of Water: A Guide to Water Trading in Victoria* Melbourne: Government of Victoria

industrial countries; for example, agricultural usage is 33% in Europe and 49% in North America (Smith 1998).

Table 25: indicates the Annual water use by (GL) sectors, 1977-1997.

Table 25: Annual water use by (GL) sectors, 1977-1997. [HS Indicator 2.3]					
Year	Domestic	Industrial ^A	Commercial	Rural	Total water use
1977	1 780 (10%)	890 (5%)	534 (3%)	14 596 (82%)	17 800
1983-84	1 790 (12%)	790 (6%)	481 (3%)	11 540 (79%)	14 600
1993-94	1 704 (9%)	4 195 (22%)	498 (3%)	12 179 (66%)	18 575
1994-95	1 799 (9%)	4 114 (19%)	522 (2%)	14 706 (70%)	21 142
1995-96	1 691 (9%)	4 397 (22%)	463 (2%)	13 325 (67%)	19 875
1996-97	1 829 (8%)	5 174 (20%)	509 (2%)	15 522 (70%)	22 186

^AThe 1993-94 to 1996-97 industrial sector volumes include losses due to environmental flows, seepages and evapotranspiration, as well as water use by the water supply, sewerage and drainage services industry. The 1977 and 1983-84 industrial sector volumes do not include losses due to environmental flows, seepages, and evapotranspiration.
Source: AWRC (1981); DPIE (1987); ABS (2000f).⁷

In Victoria every day more than 4.5 million Victorians use services provided by the water and wastewater industry. The Victorian water industry uses almost 4 million megalitres of water annually, the delivery of which is undertaken through 27 water industry businesses.⁸ But the legacy of poor management, misuse and overuse of water resources is increasingly apparent. In 2002, only 22% of Victoria's major rivers and tributaries could be considered in good or excellent condition, whilst 44% were moderately impacted and 34% were in poor or very poor condition.⁹ Along with surface water, groundwater is also under threat from pollution and/or over-exploitation. Put another way, Victoria's rivers are sick. Less than 30% of rivers are in good condition; more than 60% of native fish species are threatened with extinction; and algal blooms have increased 100% since 1995.¹⁰

EPA Victoria point to industrial, commercial, mining and agricultural land use practices that have in some cases resulted in contamination of land and groundwater – contamination sources include poor waste disposal practices, spillages and other emergencies, unsewered urban development, and the use of underground tanks and pipelines to store or convey petroleum products that in many situations have severely degraded groundwater quality through leakage;¹¹ along with increasing salination primarily due to widespread land clearing.

Metropolitan Melbourne draws its water supply principally from catchments of the Thomson River and four Yarra River tributaries. In the first week of March 2003, metropolitan The SoE 2001 observed in most large cities, the volume output of stormwater and wastewater significantly exceeds the input from the existing water supply. The average volume of

7 Newton, P. et al (2001) 'Human Settlements Theme Report' *Australia State of the Environment Report 2001 (Theme Report)* Lead Author: Professor Peter W. Newton, CSIRO Building, Construction and Engineering Canberra: CSIRO Publishing on behalf of the Department of the Environment and Heritage, URL = <http://www.deh.gov.au/soe/2001/settlements/settlements02-6a.html#water>

8 Department of Natural Resources and Environment (DNRE) (2001) Price Review of Water, Drainage and Sewerage Services in Victoria.

9 DNRE (2002) Healthy Rivers, Healthy Communities and Regional Growth – Draft Victorian River Health Strategy - Detailed Summary p1

10 Contribution from Marcus Godinho, Executive Director of Environment Victoria

11 EPA Victoria (2003) EPA Victoria - Land and Groundwater - URL = <http://www.epa.vic.gov.au/Land&Groundwater/>

stormwater discharged nationally is about 3000 GL per year (Anderson 1995), whereas 1829 GL of domestic water was used nationally in 1996-97 (ABS 2000f). In the Melbourne metropolitan area, for example, the stormwater system comprises approximately 25 000 km of street drains, 1100 km of main drains and drainage channels, and 5000 km of waterways (Collett 1994). Stormwater is discharged into the environment at more than 1000 locations across Melbourne, of which nearly 400 discharge directly into Port Phillip Bay.¹²

Melbourne had an average daily consumption of 1,400 million litres of water - that's 1,400 Olympic size swimming pools per day.¹³ The 2002 report of the Water Resources Strategy for the Melbourne Area Committee dissected this consumption. Overall:

- 8% of Melbourne's water use was leakage;
- 60% of all metropolitan water use went to residential activities;
- 28% goes to commercial and industrial use
- 4% are miscellaneous (including unauthorised consumption, meter inaccuracies etc).

Looking at Residential water use, the Committee reported that:

- 60% of residential water is 'used in bathrooms, toilets and laundries, which produces 'grey and black water';
- 5% is used in the kitchen;
- while a massive 35% goes on home gardens.

Looking at Industrial and Commercial water use, the Committee reported that:

- 29% is used by major industrial activities;
- 61% by other commercial and industrial activities (not detailed); and
- 10% used by major commercial activities¹⁴

The Melbourne Area Committee makes the point that metropolitan water consumption per capita has decreased in the last decade.¹⁵ However, as the Melbourne metropolitan strategy predicts an increase of 1 million people in the metropolitan region by 2030, Melbourne's potential level of water consumption will continue to pose a particular challenge to water resources in the surrounding countryside. While Melbourne's water consumption per capita has reduced over the last decade, the growth in Melbourne's population – estimated at an additional 1 million persons by 2030, could despite these efforts see metropolitan Melbourne continue to drain further water from rural areas.

But what of the water use in rural townships? How many times have you visited Council public toilets on that long haul trip, to find ancient single flush toilets, consuming vast quantities of water and taps which do not turn off? In some rural Victorian towns, outdated sewerage and stormwater systems, some based on technology and infrastructure of two centuries ago, now need to be replaced following the EPA's review of urban discharge licences across the State. Much more needs to be done to reduce water wastage across the country.

The Victorian Government has taken many positive steps to improve Melbourne's rate of water consumption, and secure water for the future of the State.¹⁶ Nevertheless, a number of critical challenges remain before the entire community. Our success is not guaranteed.

12 SoE 2001 Human Settlement Theme Report – op cit

13 Contribution from Lisa Beechey Melbourne Water (tel 9235 2513)

14 Water Resources Strategy for the Melbourne Area Committee (2002) Planning for the future of our water resources: 21st Century Melbourne: a WaterSmart City: Strategy Directions Report Melbourne: Water Resources Strategy for the Melbourne Area Committee, Government of Victoria

15 AATSE and IEAust 1999 reported that during the 1990s, water use declined absolutely in Sydney and Melbourne and remained static in Hobart and Adelaide. AATSE & IEAust (1999) *Water and the Australian Economy*, Australian Academy of Technological Sciences and Engineering and Institution of Engineers, Australia

16 Department of Sustainability and Environment (2003) *Securing our Water Future: Green Paper for Discussion* Melbourne: Government of Victoria

Critical Challenges

The critical challenges are:

- To change systematically the way we design, build and maintain all urban areas - all residential, industrial and commercial land uses, and the supporting infrastructure, so that water resources are managed in a sustainable way and water based pollution is reduced and eliminated.
- To reduce the rate of water wastage in residential, commercial and industrial activities in both cities and rural areas, and to improve the planning for water and management of both groundwater and surface water as a vital natural resource. We have to stop regarding water from stormwater pipes and drains as 'waste water' – water treatment processes can now regenerate water to high standards for fit for purpose use. Water sensitive urban design and integrated water management techniques are making the concept of 'waste water' obsolete; and
- To maintain and build upon our national, State and local knowledge base about water resources and more effectively engage all water consumers in water governance.

These challenges are considered in more detail in the following sections.

The Importance of Regional Catchment Strategies and Planning Schemes¹⁷

Catchment management strategies and water allocation plans need to be linked more closely to land use planning – not only through municipal planning schemes and development assessment processes, but also through strategic planning exercises and works programs conducted in partnership. Another important dimension of catchment management-land use planning integration is the development and use of shared knowledge through interfaced GIS systems and pooled data on natural resource management, biodiversity, soils, water quality and other indicators of catchment health and wellbeing.

How successful are Regional Catchment Strategies in helping with environmentally sound planning for land use and development?

The East Gippsland region provides a good example of a strong relationship between East Gippsland Regional Catchment Strategy (1997) and planning process. All objectives and actions were put into joint natural resource and planning strategy approach but not all into Municipal Strategic Statement (MSS). An integrated approach by agencies (e.g. DOI and DNRE) predated the development of the release of the East Gippsland Regional Catchment Strategy in 1997. In addition, East Gippsland has a one to one relationship between the area covered by the Regional Catchment Management Strategy (RCS) and the East Gippsland Shire.

¹⁷ This section is a Discussion Paper arising out of a workshop of the PIA Victoria Environmental Planning Group held in May 2003. The workshop addressed three questions that essentially encompassed discussion of the strengths and weaknesses of the relationship between the regional catchment strategies and planning schemes and solutions for improvement. The PIA EPG is keen to pursue these matters with key stakeholders.

Provision of information on natural resources was seen as a major benefit of the RCSs. This includes both the Regional Catchment Strategies and the underpinning action plans (e.g. native vegetation, nutrient, floodplain, salinity etc). The RCSs have provided a sound conceptual and information basis for the inclusion of catchment planning in the State Planning Policy Framework.

The RCSs identify issues and actions that encourage a wide range of players to work together. They provide opportunities for planning to be proactive in natural resource protection, through the adoption of key directions and actions into the local planning schemes. In this capacity, the RCS can function to guide the MSS reviews in natural resource issues and statutory planning decisions.

The renewed Glenelg Hopkins Regional Catchment Strategy (2003) is seen as a good example of how the RCS can be both a high level strategic document as well as a detailed implementation plan document.

Overall, the RCS is an important document that is designed to identify and prioritise environmental issues in a selected region. As a strategic document, it does provide planners with information on government and community agreed environment priorities in a catchment based system.

What are the problems?

The role of the RCS

There is a need for greater clarity on the role of many Regional Catchment Strategies. The Glenelg Hopkins Regional Catchment Strategy 2003 – 2007 provides a good description of the role of an RCS:

The RCS is the primary planning framework for land, water and biodiversity in the region and is the overarching strategic document under which are nested various action plans, such as the River Health Strategy and Salinity Plan. It seeks to create close links with local government and influence the planning schemes under their control. It has been developed by the people living and working in the area in close consultation with the regional community, other regional organisations and State and Federal Governments. The development of the strategy reflects the commitment of natural resource management agencies across the region to the principles of integrated catchment management, sustainability and adaptive management.

Separation between land management, and land use and development

Historically there has generally been a lack of interaction between the various Victorian land management and planning agencies. The recent formation of the Department of Sustainability and Environment now brings together the land use planning and management functions. How this translates regionally to the role of the newly formed Department of Primary Industries is not clear at this stage.

In addition, too much attention and quite unreal expectation have been placed on the Planning and Environment Act regarding environment and land management issues. Review is needed of the functional and statutory relationships between the Planning and Environment Act 1987 and the Catchment and Land Protection Act 1994 and other environmental legislation and programs.

Planning system preoccupied with control emphasis

The planning system is seen as largely reactive, designed on an advocacy basis and concerned with control of land use and development. The regional catchment strategies are generally more pro-active and incentive based to encourage action for sound catchment management.

Lack of strong relationship between natural resource agencies, catchment management authorities (CMAs) and local government

CMA's were first formed during the mid-1990s and tended to reflect a natural resource management (NRM) perspective patterned after the former Department of Natural Resources and Environment (NRE). The CMA relationship with strategic and statutory planning through Local and State Government levels was not as strong as it might have been. (A major issue that didn't help with the development of the relationship with local government during the initial establishment of some of the CMAs was the proposal for a catchment levy. This was scraped after the election of the current government). With the recent formation of DSE, greater integration of NRM and planning functions is more likely. Instead of RCS objectives being facilitated through the planning-development approvals process, planning referrals from Local Government to NRM managers in various agencies are generally seen only as a formal statutory process rather than the opportunity to achieve catchment planning objectives through the provision of information.

In addition while many of the Environmental Officers and Environmental Planning Officers of Local Councils have worked closely with CMAs to develop and implement natural resource programs (e.g. Coast Care, Native Vegetation Management, Flood Management, Stream Improvements, Storm Water Management,) this is not necessary translating across to the planning process.

Misunderstanding of how planning functions work by natural resource management agencies

Natural resource management agencies have (at least prior to the formation of DSE) dealt predominantly with land management. In the area of farming the vast majority of land is zoned rural and the issues for natural resource protection revolve around land management. So it has been true that there has been limited understanding of the planning system (with the exception of Native Vegetation Retention clearance controls). The emphasis has been on catchment planning to work as partnerships between the government and the community to identify risks to long term sustainability of natural resources and implement best management practices.

Natural resource managers and planners speaking a different language

A significant problem seems to be that traditional Town and Strategic Planners tend to speak a different language than the Natural Resource Managers, and vice versa. Town and Strategic Planners tend to be driven by zoning plans and rules of the Planning Scheme and what is permitted and what is not. On the other hand, Natural Resource Managers tend to be more focused on the protection or improvement of environmental conditions, and associated action. The RCS is also seen as dominantly as rurally orientated and as of reduced relevance to major section of the regional audience. There is a general concern that the presence and importance of the RCSs is not well acknowledged or used.

Some attitude of not wanting the RCS to influence planning

There may be some instances where the RCS is seen as a potential impediment to planning decisions for the generation of economic development. The environmental component of the 'triple bottom line' is viewed as a potential threat.

Statutory planners overloaded

With the high workloads on statutory planners it was suggested that they do not have the capacity to allocate the time for consideration of complex environmental issues. The pressure on statutory planners is well recognised and in turn raises the issues of resources (both information and process) required to address the environmental issues. Are referral authorities providing the available environmental information? An initial environmental concern is in the area of proposed amendments dealing with whole subdivisions and larger parcels of land and the process for handling these and in particular the degree of support that is given to statutory planners through the referral process.

Lack of whole of catchment approach in planning scheme decisions

There is a tendency for planning documentation to be concerned with the specific area or site only rather than within the context of the catchment as a whole, as required by the SPPF. So there is a lack of a strategic catchment planning approach to environmental issues. There is also concern of a lack of comprehensive natural resource information coming from CMAs in the planning process.

Natural resource information from RCS and supporting documents not being used.

This links strongly to the previous issue. There is a rapidly increasing level of information on natural resources being prepared through a range of action plans that underpin the regional catchment strategies. Good examples of this are native vegetation, salinity, river health, and pest plants and animals. This information does not appear to be being accessed for the planning process. This information is collected at different scales and may be useful at the strategic rather than detailed local level. There may also be concern about accuracy of natural resource information going from strategic to detailed local level. At the same time, much of the detailed GIS and other NRM data has not been well integrated for statutory and strategic planning purposes, let alone for catchment management planning at the sub-catchment and local community levels.

Differing formats

Different formats in documents result in lack of consistency. This exacerbates problems of use and interpretations of RCSs, particularly where councils may be in more than one CMA region. This also raises the issue of the lack of consistency in terminology between the RCSs and planning structure (e.g. objectives, opportunities and constraints, strategies, etc). This makes the translation from RCS to planning scheme more difficult.

What can be done to improve the relationship of the Regional Catchment Strategies with the statutory process?

A number of initial recommendations are detailed below. They are offered as constructive proposals, based on the extensive practical experience of those who participated in this workshop. It is recognised that each one would require further work and resources for implementation.

Planning Schemes

Improve the relationship between the Statewide Planning Policy Framework and the Local Planning Policy Framework for environmental issues.

1. Incorporate reference to the natural resource issues from the regional catchment strategies and underpinning natural resource action plans into the Local Planning Policy Framework

of each planning scheme. Showing which areas are covered by which RCS when multiple regions are involved.

2. Allocate a section of the MSS to the relevant RCS(s) both as a reference document and as a local environmental strategy. This section could also include a map
3. Apply a proactive approach to planning schemes taking the opportunities to incorporate natural resource information in the form of spatial data. One example of this is salinity where salinity overlays are being applied in planning schemes. The same applies for floodplains. Opportunities currently exist for the inclusion of information on native vegetation from the regional vegetation management plans.
4. Translate information from RCS and underpinning documents to a scale of mapping of natural resource information useful to statutory planners and inclusion in municipal GIS systems.
5. Develop catchment planning strategic checklist for planners to encompass environmental issues based on SPPF Environment section and referral processes. (However, such a checklist must be given more respect than has been given to the Coastal Management Guidelines checklist in recent times.)
6. Increase use overlays covering land management issues such as salinity and native retention. Until these overlays are available, the referral process needs to be used more constructively.
7. Further progress the MAV project on 'Integrating Local Land Use Planning and Regional Catchment Planning'.
8. Develop PLANET training programs, in conjunction with land management and referral authorities.

Catchment Management Authorities

9. Employ people with statutory planning qualifications in CMAs. This is seen as helping to address the 'language' issue or bridge the gap between natural resource managers and planners. This has already commenced and it would be useful to review the effectiveness of this approach in developing relationships between the RCSs and planning schemes.
10. Advance the role of the CMAs in providing natural resource advice in the statutory planning process (e.g. scheme amendments).
11. Increase the profile of the RCSs to the relevant local governments as each renewed RCS is launched. And promote regional natural resource issues to local government and other land managers. The CMA is seen as being the main organisation to provide leadership in this process but would need to be strongly coordinated with DSE, DPI and Water Authorities as major land and water managers.
12. Involve statutory and strategic local government planners more in the development of more 'planner friendly' formatting for environmental issues. This would help bridge the gap between natural resource managers and planners.

Sub regional planning

13. Promote a more sub regional approach applying and encouraging a local level integrated approach with partnerships between local government, agencies and community. This is currently happening under the Landcare Program and other programs but needs a strong and ongoing support infrastructure for long term success. An example is the Southern Otway Landcare Network's Catchment Management Plan that integrates regulations, policies and regulations from the Commonwealth, State and Local Government levels in a form that can be clearly understood and implemented by local land owners in cooperation with the Corangamite CMA, Colac-Otway Shire and other State and Federal agencies.

State Level Action

14. Review the Planning and Environment Act to deal more with the relationship between land use and development and land management.
15. Apply a more directive role on natural resource issues from a statewide level. This includes the need to look at information from the National Land and Water Audit.
16. Develop clear targets for natural resource management. This is currently being developed as part of the Renewal of the Regional Catchment Strategies. There are three levels of targets being developed; aspirational, catchment condition and work targets.

The need for improved water conservation, and management of sewerage, stormwater, grey and black water

The challenge is to systematically change the way we design and build all urban areas - all residential, industrial and commercial land uses, and the supporting infrastructure - so that water resources are managed in a sustainable way and water based pollution is reduced and eliminated. We have to stop regarding water from stormwater pipes and drains as 'waste water' – water treatment processes can now regenerate water to high standards for completely safe reuse. Water sensitive urban design and integrated water management techniques are making the concept of 'waste water' obsolete.

Some Key Concepts Defined

Water Sensitive Urban Design (WSUD) is often confused with the terms Ecologically Sustainable Development (ESD) and Water Cycle Management. In fact, the three terms are all intrinsically linked as shown in Figure 3.1. According to Wong (2002) whereas ESD pertains to a wide spectrum of matters concerning sustainable development, WSUD pertains more specifically to the interactions between the urban built form (including urban landscapes) and the urban water cycle as defined by the three urban water streams being potable water, wastewater, and stormwater.



Figure 3.1 Interactions between ESD, WSUD and the Urban Water Cycle

Water Sensitive Urban Design - Guiding Principles

The guiding principles of WSUD are centred on achieving integrated water cycle management solutions for new urban release areas and urban renewal developments linked to an ESD focus aimed at:

- reducing potable water demand through water efficient appliances, rainwater and greywater reuse
- minimising wastewater generation and treatment of wastewater to a standard suitable for effluent re-use opportunities and/or release to receiving waters
- treating urban stormwater to meet water quality objectives for reuse and/or discharge to surface waters
- using stormwater in the urban landscape to maximise the visual and recreational amenity of developments.

There are both technical and non-technical issues associated with the successful implementation of WSUD principles and practices and these are drawn out in the case studies.

Potable Water Demand Reduction

One of the core initiatives of WSUD is water conservation and reuse, thus making developments less reliant on external water sources. Conservation initiatives ensure the most efficient use of available water, whereas reuse initiatives ensure available water sources are used for the most appropriate purposes. Sustainable water resource management benefits both the life and operation of water supply infrastructure and allows better provisions to be made for environmental flows.

Stormwater Management

Best practice urban stormwater management aims to meet multiple objectives including:

- Providing flood conveyance
- Protecting downstream aquatic ecosystems
- Removing contaminants
- Promoting stormwater elements as part of the urban form.

A fundamental requirement of a stormwater system is to provide a conveyance system for safe passage of stormwater runoff to avoid nuisance flooding and flood damage to public and private property.

In contrast to this requirement, a stormwater system should also provide on-site stormwater retention to protect downstream aquatic ecosystems from increased flow volumes and rates associated with urbanisation. This also avoids increased flooding along downstream waterways and drainage systems and helps to maintain the hydrologic regime of the downstream system.

Typical urbanisation produces many contaminants that can be blown or washed into waterways and affect the health of streams and waterways. Best practice stormwater management provides for treatment of runoff to remove water borne contaminants to protect or enhance the environmental, social and economic values of receiving waterways.

Stormwater elements (such as waterways and wetlands) can become an asset for conservation and recreation in developments. Integration of stormwater conveyance and treatment systems into the overall urban and landscape design of urban residential areas is now an essential part

of urban design and can lead to better accepted, more environmentally friendly urban areas. This is known as Water Sensitive Urban Design.

Wastewater Management

Modern wastewater management is a multi-objective activity. Wastewater management has the traditional objective of protection of public health, the contemporary objective of pollution control, protection of aquatic ecosystems, and the emerging objective of providing an important water resource to reduce potable water demand. For wastewater to represent a viable alternative resource to potable water, it requires an appropriate level of treatment (for the intended reuse) and reasonably close proximity to the reuse site (to ensure delivery is feasible).

Wastewater treatment technology is no longer a restriction to most wastewater reuse opportunities. Currently available wastewater treatment technology can satisfy almost any reuse quality and provide very high standards of public health protection. However, the use of some artificial endocrine active chemicals in the food and pharmaceutical industries has the potential to limit wastewater reuse for potable purposes.

Wastewater treatment technologies can also provide a high level of protection to aquatic ecosystems. While sophisticated wastewater treatment systems may not be widely employed to protect aquatic ecosystems as their primary objective, the technology is available. An important element of wastewater management and aquatic ecosystem protection is the prevention of sewer overflows. The focus on the prevention of sewer overflows tends to be very site specific, but includes activities such as:

- Domestic water conservation and the reduction of wastewater flows
- Improved wet-weather performance of sewers (ie. less stormwater infiltration and reduced sewer overflows)
- Distributed primary treatment (local interceptors) and impervious small bore sewer systems

Current reuse of wastewater is largely limited by either treatment costs, to satisfy particular reuse requirements, or by the distance between the wastewater treatment plant and the reuse site. Greenfield sites offer more opportunities for reuse with initiatives such as:

- Local treatment plants and reclaimed water reticulation (third pipe) systems
- Distributed primary treatment (local interceptors) and small bore sewer systems.

These systems address the issue of proximity of reclaimed water sources and demand sites. In developed areas, sewer mining is a potential option to provide local reclaimed sources close to reuse sites.

Splitting the wastewater stream into greywater (laundry and bathroom) and blackwater (toilet and kitchen) can also increase opportunities for reuse. For example in developed areas, where other options for reuse are limited (eg. wastewater treatment is too far away) the use of greywater for toilet flushing becomes a useful retrofit opportunity to reduce potable water demand.

The main factor determining wastewater reuse opportunities is economic and revolves around the cost for treatment and distribution versus the low (and un-realistic) cost of potable water.¹⁸

¹⁸ Acknowledgements for this contribution to Dr Tony H F Wong, Principal, Ecological Engineering Pty Ltd, PO Box 12, Darling South VIC 3145, Australia tony@ecoeng.com.au

Everyone has a role to play

Commonwealth Government

Water rights, entitlements and obligations

National reforms of the water industry include the allocation of private water rights and the separation of water rights from land property rights. This provides the framework for the trading of water from the source property to another location, sometimes within and sometimes outside of the host catchment; sometimes permanently, sometimes temporarily. The implications of water trading are not yet clear. Close monitoring of the outcomes is essential. Many policy issues emerge in this regard. Water rights and entitlements should be accompanied by clear obligations, and an enforcement regime to ensure compliance. Markets should operate transparently, and breaches – be they in spirit or intent, within water trading in practice or the emerging water market generally should be acted upon quickly.

What specific implications may arise from permanent and temporary trading of water and the separation of water rights from land property are still not clear. National monitoring reporting and monitoring through both the State of Environment and National Competition Council need to be linked. Feedback identifying critical degradation of the environment, water quality and quantity needs to be specifically used to modify action.

We must continue to build our knowledge of water resources and its economic, social and environment contributions; and governance solutions that might be applied for more effective resource management. In this respect, in recent times a number of Parliamentary and government inquiries have been conducted into water related issues, making sensible and critical recommendations for action.

The recommendations of the following reports should be reconsidered for their relevance to the Standing Committee on Agriculture, Fisheries and Forestry Inquiry into Future Water for Australia's Rural Industries and Communities.

- **A Full Repairing Lease: Inquiry into Ecologically Sustainable Land Management 1998**
- **Coordinating Catchment Management – Report of the Inquiry into Catchment Management 2000**
- **The Value of Water: Inquiry into Australia's Management of Urban Water 2002**

State based inquiries that are worthy of review for findings and recommendations are:

- **Auditor General of Victoria (1993) Salinity March 1993 – an early report, but this report dealt with the economic, social and environmental implications of salinity in Victoria, particularly in the northern irrigation areas of the State.**
- **Auditor General Victoria (2000) Non-Metropolitan Urban Water Authorities: Enhancing performance and Accountability November 2000 Melbourne: Government of Victoria**
- **Environment and Natural Resource Committee (2002) Inquiry into the Allocation of Water Resources for Agricultural and Environmental Purposes Melbourne: Government of Victoria URL = http://www.parliament.vic.gov.au/enrc/water_alloc/report/default.pdf.htm**

Water Pricing

As at 2004, the Victorian Essential Services Commission will take on a key role in overseeing the pricing of water in Victoria. Some critical pricing issues are emerging. Pricing should encourage careful water use, but contain recognition of social and environmental as well as economic values.

How should water for the environment be costed, protected, and provided for in the emerging Water Industry? Should subsidies be provided for environmental flows and allocations of water for the environment? Should water conservation programs be provided for low income households and 'community good' water users? Should subsidies such as the first home owners scheme be refocused to encourage consumers to buy housing which has water and energy conservation systems installed? These public policy questions lie before us.

State Government

The Planning System

The Victorian State Government has outlined its strategy for metropolitan Melbourne. Policy Direction 7 in the Metropolitan 2030 strategy, in particular sets out a blueprint for a greener and water conserving city. This calls for:

- Sustainable water use;
- Less waster, more reuse and recycling;
- Reduced use of energy;
- Better air quality; and
- Land-use planning that protects habitat and biodiversity.

The State Planning Policy framework and Victoria Planning Provisions should provide a clear framework for planning schemes and the overall planning system to facilitate water sensitive urban design and integrated water management in all forms of urban development. For example, SPPF Section 15: Environment could include a new section on Water Conservation and Pollution Reduction; SPPF Section 18: Infrastructure could be amended, along with Section 44: Land Management Overlays and Section 52: Particular Provisions, to focus achievements on water conservation and pollution reduction.

- Currently, the Best Practice Guidelines (Urban Stormwater Best Practice Environmental Management Guidelines) are referred to in the VPPs at clauses 15 and 18. These sections need more in terms of dealing with water cycle management and pollutant reduction. An integrated approach is needed that includes potable water, stormwater and waste water. It should recognise that capture of urban stormwater as a substitute water source is not the only outcome required - what's not captured at the source and moved to the sewerage system must be treated before it is used/released.
- The objectives from the Best Practice Guidelines should be inserted in the VPPs, possibly as a Particular Provision, so that a clear standard is set. The objectives require reductions in nitrogen, phosphorus, suspended solids, litter and flows from the typical urban load before release to receiving waters.
- There are a number of techniques available to achieve reductions in any given development, ranging from rainwater tanks plumbed to toilet flushing to constructed bio-retention systems that provide water quality treatment before release to the urban drainage system. Flexibility in meeting environmental performance should be left to the developer. The techniques are outlined in the Best Practice Guidelines and

Melbourne Water is working on a technical design manual that will be able to be used across Victoria.

- The ABM view is that development should provide at minimum some proportion of these reductions. The ABM approach - which focuses more on smaller infill sites which are somewhat constrained - is that a minimum level of on-site compliance with the best practice objectives should be set for each development, with the remaining compliance component accommodated on-site or purchased from Melbourne Water or other agency constructing water quality treatments, such as wetlands. (A type of credit purchase system). The minimum level of on-site compliance would take account of the risk of urban runoff to receiving waters.
- A Particular Provision could:
 - establish the performance standard based on the Guideline objectives;
 - set a default minimum on-site compliance;
 - allow for scheduling in a higher level of on-site compliance in certain circumstances, and
 - require purchase of any remaining treatment requirement from Melbourne Water or a Council or CMA undertaking water quality improvements.
- As with car parking plans, a site-based stormwater management plan could be required whether or not a planning permit is required (eg for single dwellings on larger lots).
- Many of the clauses in the VPPs already refer to stormwater. Zone and overlay provisions may need revision. The SPPF could contain the overarching policy and the Particular Provision indicates how stormwater is to be dealt with). There is a need to examine this fine detail more closely by the Department of Sustainability and Environment at the time a VPP amendment is prepared.¹⁹

Environment Protection

EPA Victoria have a primary role in maintaining water quality and increasingly in encouraging reduction in water wastage. EPA has commenced new programs in water usage audits for industries in Melbourne (as part of Melbourne's Water Resources Strategy). This focussed on the top 200 water users. The EPA's Environmental Audit Unit²⁰ is involved in water use monitoring, review and audit. It is anticipated that this may be a focus of the Governments review of the water industry. Further details are available at the DSE website: www.dse.vic.gov.au.

EPA's Water and Catchment Strategies play a key role in water reuse and recycling programs, which includes aspects of water sensitive urban design.²¹

¹⁹ Contribution from Esther Kay, Environment & Land Management Pty. Ltd.

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Mobile 0417 532 197; Email kay.elm@bigpond.com

²⁰ Liz Radcliffe manages the EPA's Environmental Audit Unit (9695 2688)

²¹ Don Williams (9695 2510) and Noelene Okeefe (9695 2534) have done lots of work with local government and planning organisations on domestic wastewater management and recycling.

Local Government and Local Government Associations

Many local Councils are already beginning to embrace new techniques to better manage pollution and runoff from metropolitan areas. The Association of Bayside Municipalities²² for leading by example, in their efforts to implement new stormwater management concepts. Bayside City Council, along with the City of Kingston and City of Port Phillip are working in partnership as pilots in the development of "Clean Stormwater – a Planning Framework." The implementation of this framework will see water sensitive urban design as an integral component of many new developments and redevelopments in the municipalities.²³

The Municipal Association of Victoria is currently undertaking a series of projects on stormwater management, natural resource management and local government capacity building. Amongst a number of crucial programs aimed at clarifying natural resource and land use planning relationships and local government capacity building is the "Waterways" from the Stormwater Capacity Building Program.²⁴

Model Planning Provisions, Design Guide and Capacity Building Toolkit for and by local government: - A NSW Case Example

The Lower Hunter and Central Coast Regional Environmental Management Strategy - LHCCREMS -the Strategy - is an initiative of the Local Governments of Gosford, Wyong, Lake Macquarie, Newcastle, Port Stephens, Cessnock and Maitland. The Strategy is an innovative and highly successful regional initiative currently being implemented by the seven Councils that comprise the Lower Hunter and Central Coast Region. Developed in 1995 through an extensive twelve-month regional community consultation process, Lake Macquarie, Maitland, Newcastle, Port Stephens, Cessnock, Gosford and Wyong Councils endorsed the LHCCREMS Strategy in early 1996. Implementation of the Strategy commenced in 1996 based on the prioritisation of a range of key regional issues identified in the consultation phase of its development.²⁵

The Strategy was developed to assist, support and resource local government to more efficiently develop and implement environmental management programs. It seeks to facilitate a regional approach to improved environmental management throughout the Lower Hunter and Central Coast by actively encouraging greater co-operation between member Councils, other authorities, and industry and community groups. The Strategy has led to the emergence of the Urban Water Cycle Management Capacity Building program, which has produced Model Planning Provisions, a Design Guide and Capacity Building Toolkit.

- The Design Guide is provided in PDF form on a CDROM;
- The Toolkit is provided in a hard copy folder; and

22 The ABM is comprised of the 10 Councils that have coastal frontage to Port Phillip Bay. Its purpose is to identify, resolve and advise on matters of common interest to the bayside Councils and to improve the overall management of the coastal environment, of which they are a key stakeholder and decision maker. Its value is that it can approach such matters on a bay-wide or regional basis. Further details can be found at: <http://www.abmonline.asn.au/reports.cfm>

23 Contribution from Dr Phillip Johnstone Manager Environmental and Social Research, Bayside City Council tel 9599 4345
Copies of the cd rom Clean Stormwater – A Planning Framework are available from Phillip Johnstone – www.bayside.vic.gov.au

24 Contribution from Nina Rogers, Environment Resource Officer, Municipal Association of Victoria Tel Tel: 03 9667 5519
Fax: 03 9667 5550 – information drawn from: "Water Ways" Edition 4, May 2003 the fourth edition of the newsletter of the Capacity Building Program for Best Practice Urban Stormwater Management.

25 Contribution from Kirsty Winter, Lower Hunter & Central Coast Regional Environmental Management Strategy; Phone 02 4962 0921 Facsimile 02 4962 0966

E-mail: enviro@huntercouncils.com.au Website: www.lhccrems.nsw.gov.au

- The Model Planning Provisions are provided on a CDROM in a printable PDF format and a Word format for those who would like to adapt some of the information for their planning documents etc.
- Additionally, the Model Planning Provisions have very recently undergone a revision and the new version has just been released.

There is a charge for these resources and for the purpose of maintaining a standardised ordering system we have a publications order form available on our website.²⁶

The role of Water Authorities

In Victoria, Catchment Management Authorities are working with Councils to introduce new water sensitive design approaches to the treatment of sewerage and stormwater discharge. Examples include winter storages for country towns and summer reuse instead of discharge to waterways.²⁷

In Melbourne for example, Melbourne Water and the City of Knox collaborated to produce a 'Water Sensitive Urban Design' brochure. This is an example of clear and simple information that opens the door for everyone to participate.²⁸

Melbourne Water has an extensive program of waterway rehabilitation and stormwater treatment works. These projects are designed to improve local areas and receiving waterways and to reduce pollutant loads into Port Phillip and Western Port Bays. GHD is currently designing a number of these projects, including wetlands at Taylors Lakes and Banyule Flats as well as a number of litter trap and waterway rehabilitation projects. GHD's Andrew Prout advises that the current stormwater design practice in industry for these projects includes consideration of environmental protection and improvement, water quality improvement, landscaping, civil engineering and flood protection. Benefits of our expanding range of design processes include:

- More attractive urban environments
- Water features in our urban areas
- Less erosion of our waterways due to reduced peak flows
- Lower pollutant loads flowing into our waterways
- Flow regimes in our urban waterways that better support a diverse waterway environment and habitat
- The return of life to our waterways, including fish and platypus in urban streams.²⁹

Private and Public Developers

Developers and new home buyers are also beginning to catch on to the substantial savings that come from water sensitive urban design, but more needs to be done in this area.

One of the most exciting examples of water sensitive urban design and integrated waste management is found in the Aurora Project in Epping North. A partnership between the

²⁶ An on-line order form is provided on: <http://www.lhcrems.nsw.gov.au/publications/>

General information on the program can be found at: <http://www.lhcrems.nsw.gov.au/main.php>.

An on-line order form is provided on: <http://www.lhcrems.nsw.gov.au/publications/>

²⁷ Contribution from Ron Edwards, Gutteridge Haskin and Davies

²⁸ Copies of the brochure are available by calling Melbourne Water on 131722

²⁹ Contribution from Andrew Prout GHD

Urban and Regional Land Corporation and Yarra Valley Water, with the aid of project consultants Coomes Consulting Group and Murphy Design Group, and, on the Aurora project will see the on-site treatment of sewerage and reticulation of recycled water to the household (toilet, garden) and open space via a "third pipe system". The development will also pilot a project whereby rainwater will be used to supply water to the gas boosted solar hot water system for the household. This holistic approach to the water cycle will result in up to a 69% reduction in the importation of potable water to the residential estate and thereby conserve a precious resource.

The Urban and Regional Land Corporation (now VicUrban)

A recent seminar held by PIA Victoria in Beechworth addressed the important relationship between land use planning, development controls and water management. Participants called for more opportunities to undertake integrated development projects such as those undertaken by Vic Urban, in rural areas, and engaging rural developers in new water sensitive design and integrated water management approaches to rural- urban developments. [notes from this seminar are attached to this submission].

Learning from Demonstration Projects in Urban Sustainability

A win-win-win 'blue print' approach to sustainable development is being applied by the Urban and Regional Land Corporation (now trading as VicUrban) in the planning for the new Aurora community in the outer northern Melbourne suburb of Epping North. The project team's starting point was to ask 'What do we have to do and who will help us create a truly triple bottom line development?' The solution? A comprehensive package for urban development that aims to embed positive outcomes for the community in economic, social and environmental terms, to give people a lot more choice through better design, applying water sustainability and environmental management principles. The Local Structure Plan for Aurora draws on a 17-point statement of goals and objectives developed by the project team to guide the planning process.

Commencing with an assessment of the natural environment, required urban densities to ensure greater housing choice and walkable catchments and supporting infrastructure such as walking and cycle paths and roadways, the location of shops and schools were designed to respect and protect higher value ecosystems. Principles of convenient distance, safety, and multiple use and site permeability were in-built. "People will walk if they are offered local destinations and supportive infrastructure is designed to encourage them. Higher densities and co-location of key facilities enable a viable public transport system and provision of above-standard public open space by generating higher volume of trips to predictable destinations.

Waste water will be reused in domestic toilets and supplement "rain gardens" that will be incorporated in the private open space of each dwelling. Water sensitive urban design principles are visible throughout, including roadside swales, choice of street and landscape species and low water consumption techniques in each dwelling. Details of open space maintenance via Council or bodies corporate are still emerging. Community development and education strategies are also being prepared as important complements to any blueprint planning for the development, to ensure implementation / day to day living actually carries through the intentions of strategic planning for Aurora.³⁰

Educational Institutions and Centres of Expertise

30 Contribution from Bernadette George of BG Solutions – based on a presentation given at the PIA Victoria Seminar on Water Sustainability and Planning' 16 May 2003, Beechworth

Monash University's Cooperative Research Centre for Catchment Hydrology has developed an innovative model of stormwater quality - "MUSIC", which is leading towards the use of stormwater ponds, wetlands and on-site treatment of waste water in industrial areas. A recent example of a Water Sensitive stormwater system designed using the MUSIC model was by Gutteridge, Haskin and Davies (GHD) for Moltoni Corporation on the former Geelong Cement Industrial site. GHD worked with Moltoni and the City of Greater Geelong to apply water sensitive design and integrated water management systems in the redevelopment of the Geelong Cement industrial site. Andrew Prout of GHD estimates that up to 80 % of urban stormwater pollutant loads will be removed instead of being discharged to the Moorabool and Barwon Rivers. In addition a range of sustainable ponds and wetlands will be part of the rehabilitated environment.

CSIRO (1999) Urban Stormwater Best Practice Environmental Management Guidelines (BPEMG) were developed to support the implementation of best practice by all key stakeholders. The guidelines are the product of considerable research and technical review of a wide range of urban stormwater management issues and measures. Planners, engineers, educators and managers within local government, catchment management organisations and the community will find the guidelines useful.

Building Partnerships and Alliances

1. The role of Professionals and Professional Organisations

Organisations such as the Planning Institute of Australia, the Royal Australian Institute of Architects, and professional bodies covering the activities of Plumbers, Engineers and builders and other professions that are broadly involved in the development industry should be encouraged and enabled to form new alliances for improved water resource management.

2. Motivating Consumers and Markets

Consumers are more than users of water, they are the communities that inhabit rural and regional areas. Community survival depends on rational water usage, and sound resource management. Growing consumer awareness has led to a greater acceptance of water saving policies throughout Victoria, and no doubt elsewhere. Consumers and markets need to be clearly informed of the economic, social and environmental consequences of poor water management. The collection and provision of this information to consumers and markets becomes a critical success factor for integrated water management policy initiatives.

Summary

This paper has provided definitions and suggested directions relating to the role of land use planning, urban design and development control in relation to water resource management. We believe this makes a positive contribution to the formulation of national policies on water, for both urban and rural communities and industries. To restate the challenges:

- The challenge is to change systematically the way we design, build and maintain all urban areas - all residential, industrial and commercial land uses, and the supporting infrastructure, so that water resources are managed in a sustainable way and water based pollution is reduced and eliminated.

Catchment management strategies and water allocation plans need to be linked more closely to land use planning – not only through municipal planning schemes and

development assessment processes, but also through strategic planning exercises and works programs conducted in partnership. Another important dimension of catchment management-land use planning integration is the development and use of shared knowledge through interfaced GIS systems and pooled data on natural resource management, biodiversity, soils, water quality and other indicators of catchment health and wellbeing.

Water sensitive urban design and integrated water management techniques need to be promulgated across the land use planning and development industry, within business and commerce. It makes sense, and cents, to plan and develop with an eye to the future.

- The challenge is to reduce the rate of water wastage in residential, commercial and industrial activities in both cities and rural areas, and to improve the planning for water and management of both groundwater and surface water as a vital natural resource. We have to stop regarding water from stormwater pipes and drains as ‘waste water’ – water treatment processes can now regenerate water to high standards for fit for purpose use. Water sensitive urban design and integrated water management techniques are making the concept of ‘waste water’ obsolete.

Not only metropolitan Melbourne but all cities and towns have to minimise the diversion of scarce water from rural areas and the natural environment, to sustain our economic base and environmental heritage. The capacity to update outdated water related infrastructure is a critical issue. Specific programs need to be promoted consistently across the national.

- The challenge is to maintain and build upon our national, State and local knowledge base about water resources and more effectively engage *all* water consumers in water governance.

Australian communities are generally capable, willing and able to contribute directly to the challenge before the nation of governing water resources more effectively, efficiently and equitably. Communities do however need support to build their capacity; and communities, governments and businesses need to look closely at the governance arrangements to enliven civic engagement.

We cannot afford to overlook and ignore the data and messages within insightful inquiries and research in recent times. Water supply and consumption data is now quite old – predominantly 1996-7. If we are to manage water resources properly, we must be able to quantify and make regularly available, data about water resources, consumption, licensing and trading, along with the state of our environment.

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