Acheron Valley Watch Inc. Submission to Sustainable Water Strategy Northern Region

We would like to dedicate this submission to Professor Peter Cullen.
His scientific rigor and his clear and understandable ways of communicating complex issues will keep guiding us in our own endeavours to protect the natural environment of our catchment area.

15th of March 2008

From:
Acheron Valley Watch Inc.
[redacted]

To:
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Sustainable Water Strategies Branch
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Acheron Valley Watch Inc. – Who we are

Acheron Valley Watch Inc. is a not for profit community group concerned about the well being of the local communities, natural and rural environments, scenic landscape and cultural heritage of the Acheron Valley/Cathedral Range area, including the Acheron River Catchment. Acheron Valley Watch engages in activities that strengthen co-operation and communication with planning and decision making bodies, local residents and the broader public. Acheron Valley Watch Inc. is grateful for the opportunity provided by the Victorian Government to comment on the North Victorian Sustainable Water Strategy.

A. Summary Recommendations

In light of the past years of severe drought affecting the Northern Region of Victoria and other rural areas of Australia, and in light of the scientific forecasts of climate change impacts on our region, Acheron Valley Watch Inc. strongly recommends that the following points should be considered as part of a sustainable water strategy for the Northern Victorian Region:

1. The need for prioritising the environmental requirements according to the Water (Resource Management) Act 2005, especially: s.4, 4B(1) and s.11, 22C (c) and (d), and the need for an alignment of the Victorian water strategy and policy measures with the Federal Murray-Darling Basin Initiative and related policies;
2. A market system that reflects the true environmental costs in water prices, by adopting the "user-pays" principle to finance environmental recovery work and to remove bias against environment;
3. A 'recycled water' target in analogy of the 'renewable energy' target and related incentives to stimulate behaviour change in consumers (residential and corporate across all sectors, urban and rural);
4. Policy measures made according to science-based decisions rather than driven by interest group pressure;
5. The establishment of science-based ecological targets and corresponding stream flow management plans and ground water management plans for all rivers and aquifers/catchments (water balance account) and the resolution of the over-allocation problem, i.e. as proposed by the Productivity Commission (2006, p. xxii).
6. The coherent establishment of water accounting systems and the use of life cycle assessment used for comparing policy measures and/or technical infrastructure solutions against each other to determine the most (cost-)efficient policy mix;
7. The assessment of cumulative and indirect impacts of single policy measures and of combinations of policy measures under different climatic scenario forecasts;
8. The adoption of the precautionary principle, i.e. in relation to the link between surface and ground water, or in relation to cumulative or indirect impacts of policy measures, or combinations of policy measures;
9. A critical re-evaluation of the extension of the water grid, with respect to incompatibilities with environmental objectives at a supra-regional level (Murray Darling Basin) and at a sub-regional level (catchment level of tributaries to the Murray river).

Dr. Rita Seethaler, chair person 15th of March 2008

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Acheron Valley Watch Inc.

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B. Detailed Comments with respect to specific parts of the report

Errors / Typos

Page number	Item / comment
39	Figure 3.3 Annual inflows into the total River Murray system The dimension on the vertical axis a factor of 10 too low and does not correspond to the average inflow data provided for the lines in the graph (11,631 GL/yr and 5936 GL/yr).
46,47	Table 3.6 Scenario B and Table 3.7 Scenario D Some of the figures presented in the tables do not correspond to the figures presented in the summary text of the blue text boxes. Table 3.6/text box page 46:"Overall water availability could be reduced by 19 per cent in the Murray system" should be "25%" Table 3.7/text box page 47: "Overall water availability could be reduced by 27%" should be "33%".
63	Figure 4.2 Net trade of water shares Some of the graph's legend is not readable because it is covered by the map.

Comments re Chapter 1

AVW refnum.	Page number	Item / comment
2	12	Section: What is a sustainable water strategy, Col 1, Para 2 Relevant factors that we can influence: climate change, land use, population growth – their impacts on water demand patterns need to be discussed. I.e. given scarce resources, what population growth is environmentally sustainable in different Australian regions including North Victoria? This discussion needs to be held now because it impacts on future resource availability.
3	13	Section: What is a sustainable water strategy, Col 2, bullet point 5 "Help protect rivers …" Delete "help". In accordance with the Water (Resource Management) Act 2005, s.11, 22C) the government not only needs to "help", rather it has an OBLIGATION to protect and restore aquifers from impacts of drought, climate change and over-allocation. Similar to the Central Region Sustainable Water Strategy, the North Victoria Sustainable Water Strategy should therefore include an objective to "maintain and enhance the health of rivers and aquifers". In doing so, a set of **ecological objectives** should be formulated for each river system of the North Victorian Region with a clear definition of environmental flow requirements going beyond the mere leftovers from consumptive use and emergency watering of drought refuges. This would also be in line with the first principle of "Our Water Our Future" that recognises the fundamental importance of a healthy environment (DSE, 2004, p. 12)..
4	12	Section: Guiding principles Add another sub-section with an additional guiding principle: " **Decoupling water use and embodied water from economic growth**" – based on the idea of "Factor Four" a book first published by Ernst Ulrich von Weizsäcker, Amory and Hunter Lovins in 1995, promoting the idea of doubling wealth by halving resource use". This principle means that we should constantly strive to achieve the same or an increase in output with less resource input, thus increasing water efficiency in the production / consumption processes.
5	13	Section: Guiding principle Add another sub-section with an additional guiding principle: "**Regional equity in Allocation**". Policy measures such as infrastructure measures, pricing and incentives and markets should be operated in a way that does not cause or accentuate regional inequity in terms of water availability.

		Water should not be shifted around by different policy measures leaving behind a regional imbalance in which one area is the donor area with a deficit of water resource compared to another area that is the receiver. No area should be worse off as a consequence of the water strategy.
6	13	Section: Guiding principles Add an additional guiding principle in the section of "Transparency" **Comparative cost/benefit analysis** for different policy options including a comparison of external costs and benefits (costs of a policy imposed on third parties, i.e. environmental costs or social costs established in monetary units to facilitate comparison).
7	13 (14-15)	Section: Guiding principles Add an additional section of "**Horizontal and Vertical Integration of the Water strategy"** addressing the need to coordinate the North Region Sustainable Water Strategy with the Central Region Strategy (horizontal integration) and with the Murray-Darling Basin Strategy (vertical integration upwards) and Regional River Health Strategies (vertical integration downwards) and to make its objectives compatible with the objectives and activities set out in these strategies.

Comments re Chapter 2

AVW refnum.	Page num.	Item / comment
7,10	14-16 (13)	Sections: Cooperative management arrangements across Australia / The Murray-Darling Basin Agreement / MDB Cap The **vertical integration** must ensure that policies under the North Victorian Region Water strategy are compatible with the National Plan for Water Security and especially the Murray Darling Cap. The independent authority undertaking basin-wide planning should also set the framework in the form of the Cap for Victoria within which the Victorian water strategy can operate. For example, the Victorian strategy should commit to stop diversions from the MDB from increasing, and should operate within the limits of diversion levels specified under the MDB agreement.
11	17	Section: MDB Cap, column 1, paragraph 2 "changes to the amount and patterns of delivery …" Every policy of the North Victorian water strategy should specifically be assessed with respect to its **cumulative impacts** on the MDB Cap (as proposed for example by Finlayson et al., forthcoming). For example, the expansion of ground water use or the expansion of the water grid, whilst they may have economic and social short-term benefits, may at the same time have negative cumulative environmental consequences on the Murray river or on catchments of its tributaries. These strategies may therefore contradict the objectives of the Living Murray Program on the one hand and the Regional River Health Strategies (i.e. the Goulburn Broken Regional River Health Strategy) on the other hand.
12	18-19	Sections: Current conditions of rivers / The importance of healthy aquifers, Figure 2.5 Interconnectivity between ground water and surface water should be addressed in catchment and sub-catchment water accounts, especially in light of the poor river basin conditions (percentage of river length in good or excellent conditions are below 50% in the North Victorian region!). Following Nevill (2007) an integrated management of groundwater and surface water in catchment/aquifer plans (or water allocation plans) is needed, and in case of doubt, the precautionary principle should be adopted using the assumption that relationship between surface water and ground water is 1:1 (where scientific data are not yet available). For all rivers minimum environmental flows should be determined on the base of environmental science, rather than on the base of past practice and particular claims of interest groups.

13, 14	19	Section: Water availability in the Northern Region, column 2 It should be recognized that the manyfold man-made infrastructures such as channels, pipes, dams and weirs, whilst underpinning the creation of an irrigation industry, are also of concern with respect to their environmental impacts on natural waterways and related flooding patterns needed for aquatic and wetland ecosystems. This inter-relation between cumulative impacts of man-made infrastructure networks and natural eco-systems is not well understood and should be subject to intensified research, before a further expansion of the proposed grid components should be undertaken. Of special relevance is the question in which way the system of storages and their regulation undermine natural flood patterns needed for the maintenance of wetlands and aquatic ecology of the rivers.
15	21	Section: Surface Water, Table 2.1 Explain why for some rivers, i.e. the Goulburn, the sub totals of what can be taken under entitlement (Col F) plus average environmental flow (Col G) plus distribution losses (col H) add up to a higher amount than the total resource (col A). Explain exactly how the North Victoria Sustainable Water Strategy will address the problem of over-allocation.
15b	16, 21,23	Figure 2.3, Table 2.1 and Table 2.2 Reconciliation of figures required: According to Figure 2.3 the long-term diversion of water amounts to 3859 GL/yr According to Table 2.1, total water under entitlement = 4095 GL/yr According to Table 2.2 annual allocation limit of groundwater = 409.9GL/yr Pus recycled water of 34 GL/yr Adds up to 4095+409.9+34 = 4535.9 GL/yr > 3859 GL Totals 4535.9GL/yr – 3859 GL/yr = 679.9 GL/yr difference. What does the difference of 679.9 GL mean? Is it reflecting over-allocation?
15c	23	Section: Stormwater Acknowledge the need for comparative cost analysis (life cycle analysis) for different policy options. For example: Water gained from stormwater treatment / recycling at $ 1000 per ML/yr is cheaper than water gained from 'water savings' delivered through added infrastructure components to the water grid. In the case of the Sugarloaf pipeline, one ML water delivered costs around $8000 to $15000! (depending on final cost of pipeline – lower cost assumption 650 Million $, higher assumption 1 Billion $ to deliver 75GL/year of water to Melbourne). Note that costs are spreadable over longer than 1 year period for different policy measures that are competing, i.e. Sugarloaf pipeline vs. storm water treatment and water recycling. Cost/benefit ratio depends on average lifetime of an infrastructure. Therefore, to make informed decisions, there is need to conduct **LIFECYCLE ANALYSIS**, which includes resource use (i.e. energy use for different measures) and environmental footprint in order to find most resource and cost efficient supply of water.
15d	27	Table 2.4 Explain why residential use in lower Murray has a much higher average per person per day than elsewhere. Is there a difference in data recording?
16	28	Section: Water use of households Comparison of Shepparton household and Melbourne household on a per person per day base needs further explanation. I suspect that the Shepparton average includes not only consumption for house and garden but also partly for stock. Difference in recording by the two different agencies (DSE and Goulburn Valley Water) may explain these results.
17	28, 29	Section: The environment's right to water Specify what the environmental entitlements are (water held in storage) for the different catchment areas of the North Victorian region.

		Following from the remark that under existing arrangements, most systems do not have enough water to maintain ecological health of the rivers, wetlands and aquifers, and the quantified shortfall presented in Table 3.1, critically review the problem of using of Environmental Water Reserves (EWRs) for purposes other than the environment in the recent past. Using EWRs for purposes other than the environment is in contradiction with the Water (Resource Management) Act 2005, S4 4B (1) defining the objective of Environmental Water Reserves. Discuss the impacts and possible pressures of the Water Market, Pricing strategies and Water Grid extensions on the management of EWRs.
18,19	29, 30	Section: Surface Water If the environmental entitlements in the Northern Region are estimated to make up only 4% of the total EWR, explain how the flow regimes (environmental minimum flows necessary to maintain river health) can be guaranteed – especially when they are only available once high-reliability water shares are 100 per cent allocated – as in the case for the Barmah-Millewa Forest Environment Water Allocation. There is a concern that the environmental flow requirements always come second after irrigators needs, despite the desolate state of the Murray river and its tributaries.
20	33	Section: Surface Water, Col. 1, paragraph 2 The report proudly mentions the use of the "best practise" environmental flow assessment methodology (FLOW method), yet, environmental flow management plans have to date only been elaborated for a few selected rivers. Also, because in the past environmental flow management plans have been based on a compromise between different stakeholders, including powerful water user groups, there was no guarantee that the environmental minimum flow really reflected the environmental needs to maintain ecological communities and ecosystem services of the rivers and wetlands. In the future, it would therefore be appropriate to have independent assessments conducted through the Victorian Environment Assessment Council or a similar independent scientific panel.
21	35	Section: Groundwater / surface water interactions Provide hydrological mappings that indicate, where groundwater and surface water interaction is high / low (i.e for all tributaries to the Murray and divided by sub-catchment areas such as the upper dryland areas) and request the establishment of an integrated groundwater/ surface water allocation plan (i.e. according to the recommendations of Nevill, 2007).
22	36	Section: Population Growth Include consideration re the population growth in Melbourne, especially because it is used as reason for piping water from the Northern Region to the metropolitan area. There needs to be a broader discussion of how much population growth in the metropolitan area and regional centres is sustainable given the scarce resources and the large environmental per-capita footprint.

Comments re Chapter 3

AVW refnum..	Page num.	Item / comment
24	41	Table 3.4 The environment's share of water during average and dry years For the Goulburn in average years the environmental share of 1580GL/yr is reduced to some 450GL/yr (based on past experience). Under such circumstances, a diversion from the Goulburn via the extended grid (Sugarloaf pipeline) of 75GL/yr would amount to some 17% of the environmental share! This is a considerable percentage and will have adverse effects on the environment.
6	57	Section: Environmental Water Reserve In light of the recent Garnaut Report (2008) warning that the most recent evidence indicates that climate change is progressing faster than middle ground scenarios, there is need to re-think the role of Environmental Water Reserves and their prioritisation compared to high reliability shares for irrigation. A legislative process of a 15-year water resource review is too large of a time interval to respond to the impacts of climate change.

Comments re Chapter 4

AVW refnum.	Page num.	Item / comment
27	59	Table 4.1 Responses to manage scarcity – potential beneficiaries and scale of implementation This table focuses on potential beneficiaries of each of the policy measures. However, in two policy categories where the environment is not a beneficiary and hence the cell is left blank, the environment could in fact be adversary impacted – if environmental impacts of the respective policy are not taken into account. For example, the expansion of the water grid may adversely affect areas from where water is diverted away. Similarly, the use of ground water may be detrimental to the hydrology of a sub-catchment. The policy mix therefore needs to be combined with a set of minimum requirements that may not be under-cut. In the segment on "Progressing environmental management": add the following policy measures: - Determine environmental minimum flow regimes for the support of ecosystem functions and establish a stream flow management plan on scientific grounds, - Establish integrated catchment/aquifer management plans (water allocation plans producing a water balance account) including groundwater use and stop unauthorized use of groundwater, - Reduce over-allocation by buying back water for the environment in accordance with the minimum flow regimes set for surface waters, - Tighten the use of environmental water reserves – i.e. reduce the options to use EWRs for purposes other than the environment. - Study the cumulative environmental effects of any of the listed policies on the water balance account for the Northern Victorian Region first, before progressing to their implementation.
28	61	Section: Using the water market – description and benefits, column 1, paragraph 4, Urban water corporations "The Government remains committed to the policy of not allowing Melbourne water corporations to purchase water for Melbourne". This policy is being bypassed by the extension of the water grid with pipelines that bring water from the Northern Region to the Central Region and to the metropolitan area of Melbourne (Sugarloaf pipeline). Instead of the Melbourne water corporation it is the Government itself (tax payer) that finances the exploration and water diversion and de facto, provides the water back to the Melbourne water corporation for it to use the resource for the metropolitan area.
29	61	Section: Using the water market – description and benefits, column 1, paragraph 4, the environment Given the dire climate forecasts, the environment should not be allowed to act as a seller on the water market. The statement that this has not occurred since 2003/04 is misleading and incorrect – 10GL from Environmental Water Reserves of Lake Eildon were sold to Bendigo in 2007/08. Also, before the "water savings" from the Food Bowl Modernisation Projects are achieved, the Government plans to use environmental reserve water (10GL/year over two ears) from Lake Eildon for the diversion of 75GL to Melbourne (Project Impact Assessment for the Sugarloaf Pipeline, Appendix C). Hence, this practise is in contradiction with the Water (Resource Management) Act 2005, S.4 4B(1) Environmental Water Reserve Objective, the objectives of the Goulburn Broken Regional River Health Strategy and with objectives and targets of the Sustainable Water Strategy for the Northern Region presented in this discussion paper.
30	61	Section: Progress to date Similar to the requirement that permanent trade of groundwater can occur only in

		water supply protection areas as part of an approved groundwater management plan, there should be "approved environmental stream flow management plans" for all rivers in the North Victorian region with determined minimum environmental flows (survival flow rates) before trading can occur. These survival flow rates should act as threshold below which no low-reliability water shares should be traded and high-reliability shares should be drastically reduced. Thus, tradeable limits should be based on these environmental considerations at a sub-catchment and single tributary base.
31	64	Section: How much water can be traded? Question re 4% limit on amount of water shares traded out of an area – review 2009 or sooner? There should not be more than 4% of water traded out of an area – area meaning sub-catchment of tributaries of the Murray River or major groundwater areas/aquifers. Also, this regional "cap" should be extended to any amounts of water being moved around through the extended water grid without the transaction being linked to trade (i.e. water moved to Melbourne through the Sugarloaf pipeline outside the water trade). In every case the moving of water between areas should not happen before environmental considerations/assessment (water balance accounts) are taking place to make sure that no water is diverted out of an area into another area before minimum environmental flows and groundwater levels are not met.
32	64	Question: Other mechanisms to deal with third party impacts of water trade, i.e. stranded assets or social change. It may be necessary for the public sector to buy back water shares and delivery shares when irrigation crops are no longer viable and environmental flows need to be augmented. In some instances, financial assistance and extension should be provided to irrigators to change over to new farming practises or new crops that are more water efficient.
33	65	Section: Who can trade water Investment in water savings in the distribution system to enable water allocation to the environment is a good idea at least in theory. Independent audits must ensure that the "savings" truly occur (the independent third party auditing requirement is similar to accreditation of carbon credits, to ensure that carbon credits are truly generated). Environmental trade by direct market operations is a good tool to meet short time emergency situations.
34	65	Question: Guiding principles for the Government to enter water market on behalf of the environment. Need for: - scientifically based data on quantities needed under different scenarios for the Murray and its wetlands and for each sub-catchment area; these minimum requirements also include appropriate flood cycles for wetlands. - quantification of minimum environmental flows and groundwater management plans; - Prioritisation between user groups including the environment to ensure maintenance of environmental values; - Independent assessment and auditing body (outside party politics) with the necessary scientific expertise, i.e. similar to the Federal Reserve Bank or the ACCC. - Remuneration system for farmers to compensate them for environmental services / maintenance of eco-system services / compensation for water rights surrendered on behalf of the environment. - Internalising environmental costs in the market price = adoption of the "user pays principle" to cover environmental costs of different water uses.
35	66	Section: Trading water separately from land Question: What is your view on the 10% limit to total amount of water shares that can be held by non-landholders? Explain in this paragraph what the 10% refers to – what is 100%? The total

		tradeable water amount? It is important to prevent speculation that could arise from unbundling and artificially drive water prices up to the detriment of the present farming community: The 10% is a necessary "safety valve", and the regulation of water use at the location where MIS operate is a good mechanism for industries that produce irrigation crops without owning the land (lease basis). Also, environmental costs should be integrated into the water price.
36	66	Section: New types of trading transactions Question: Leasing and hedging? Other transaction forms? In theory, water leasing is helping the water to find it's way to the most profitable irrigation industry within a region and an irrigation season. For this to occur a requirement is low transaction costs and market transparency (market transparency, where buyer and seller have access to real-time information on the current state of the water market). Whilst hedging might make sense from an individual player's point of view, who can lower his inter-temporal risk, with respect to the high natural climatic variability in Australia, large-scale hedging operations may be detrimental to the water market / irrigators / the environment as a whole because they artificially render the system inflexible. Temporally locked into contractual arrangements, the price system cannot react to climatically driven changes in water availability. Environmental minimum flow requirements should be given priority and be used to override hedging arrangements in extreme drought situations.
37	66	Question: additional options to maximise opportunities of interstate trade? - National water register of entitlements - On-line real-time market information for connected catchment systems
38	67	Section: Description and benefits For more drought resistant species/crops, reducing the number of years with very low or zero allocation is more reasonable. Less water each season but more steady over the years is an incentive for the industry to move to more drought resistant water efficient crops/practices (=topic for whole farm planning courses!). This is probably the case for dryland farming as well as irrigation. Buying back high-reliability shares for the environment transforming a part of them into low-reliability shares may be necessary.
39	68	Sections: Key considerations in moving forward Question: Changes made to existing water shares to best meet water users' needs? Connect water shares should somehow be linked to best practise standards for the buyer of high reliability shares: the buyer should demonstrate that his practises meet best practise standards and that his facilities don't waste water. The same rule could be implemented for households who need to demonstrate best practise/ quality standard of appliances. A similar rule is adopted in the electricity market, where service companies only deliver electricity to those users whose connection to the grid meets the compulsory safety standards (illegal and unsafe grid connections are sanctioned).
40	68/70	Question: Minimum level of reliability set for water shares If climate change scenario B or worse sets in, minimum level of reliability might be set down to 50% or even less. Mix of measures from page 70: 1. 3. 4. 5. 8. Measure 7 where possible, depending on type of crop. Measures 2, 6, 9 only shift water between users and years – not convincing because there might be winners and losers and interregional in-equity issues.
41	68	Section: changing seasonal allocation policy (communal reserve) Question: options that would change communal reserve to decrease risk of very low or zero seasonal allocations in dry years? Question: communal reserve to increase allocations for low-reliability entitlements. Change communal reserve to allow 40-50% of next years allocation (50% for high-reliability share) and 30% for current low reliability share). For some

		perennial crops, a season without any water could be terminal, and this is why overall fluctuations in seasonal variability should be lowered. But always securing 100% of high-reliability shares could also be seen as a counter productive incentive to keep growing water-intensive crops in a climate that is no longer suitable for such crops. It is difficult to decide on the trade-off between "current allocation of low-reliability entitlements" and next year's high-reliability entitlements. Also, with climate scenario B or D emerging, environmental water reserve / water amounts for the MDB cap should be maintained at least to a survival minimum flow rate and 10 year maximum interval between wetland flooding: With respect to flooding of wetlands, scientific evidence suggests that it would be necessary to induce wetland flooding on a yearly base to restore wetland eco-system functions (Cottingham et al., 2003). Also, one needs to bare in mind that people and industries can move around and adapt, whereas ecosystems are bound to their location and hence are less resilient.
42	68	Question: Give up some of the entitlements to increase reliability? The insurance idea, of reducing average availability by say 20% either by Government purchase or by individual share owners from (i.e. from 1GL to 0.8GL). "Give up" is the individual insurance model, or governmental 'buy out' is the public insurance model (both can co-exist in parallel, similar to superannuation models in western nations) and individual contributions can be made compulsory to increase inter-temporal risk reduction. The government's involvement in this risk management would also alleviate the problem of over-allocation of water.
43	69	Section: Allowing individual carry-over Question: allowing individual reserve management? Carry-over measures on individual level increase the farmer's choice and give an incentive to make inter-temporal planning (longer term planning and thinking about different scenarios). But carry-over of unused water should maybe not exceed 1/3 of the farmer's seasonal total entitlements and any unused water exceeding 1/3 could go into communal pool. This way, there is some balance between individual insurance and some feeding into the communal pool for the next season.
44	69	Section: Balancing between types of entitlement Question: options to rebalance between high and low-reliability water? There are equity considerations to be taken into account. It depends on the financial power of the share owners: If high-reliability shares are increasingly purchased by wealthy / large enterprises who can spread their risks (i.e. MIS) there would be a trend to "crowding out" traditional owners, so that low-reliability shares were then mainly owned by more vulnerable enterprises. Whereas reducing the amount within each category increases the overall security (and also tackles over-allocation), a re-allocation between categories must take into account the social and environmental impacts. Maybe introducing best-practise requirements (for equipment and procedures) attached to the purchase of high-reliability shares could be an option.
45	69	Section: Changing policies to manage losses Question: adjusting length of irrigation season Depends strongly on the type and mix of farming activity in a catchment. While reducing irrigation length may be o.k. for some crops and allows for at least one crop (i.e. pasture) it may be difficult for others (i.e. horticulture). Whole farm planning help finding a mix of activities that reduce inter-temporal risk and increase resilience (i.e. add farm forestry component, etc.).
46	69	Question: reserves covering distribution losses? Sourcing and funding? This is a typical network problem, where economies of scale make it easier and cheaper to use main arteries (supply through large trunks) compared to the fine distribution to the more distant parts of the system. Smaller more distant users are "punished", but leaving them out would create social and environmental costs. On the short term, water could be sourced to a small part from carry-over amounts and

		from communal pools. On the mid-term, drought recovery money (tax payer) should be used to help these farmers to diversify their activities away from water-intensive crops to crops that are less reliant on irrigation. This would further increase their resilience in view of Scenario B or D.
47	69	Question: Defer allocations at very low levels to save distribution losses and improve allocations in following year? This decision depends again on the types of crops and their tolerance. Deferring of allocations should be accompanied by drought relief programs in order to alleviate extreme cases of severity, and also by extension, to re-assess the move to a diversification of crops.
48	72	Section: Key considerations moving forward "Melbourne's bulk entitlement from the savings will be capped at 75GL". Given that Victoria is not part of a national Murray-Darling Water Agreement and in the current situation of over-allocation of water in the Murray Darling Basin, the poor health of wetlands along the Murray, the poor health of aquifers and river quality of the tributaries in the North Victorian region, Melbourne should not have a bulk entitlement of 75 GL. Furthermore, the "savings" from the Food Bowl Modernisation Projects must be investigated and attested by an independent expert panel before they were allocated to any user.
50	73	Section: improving on-farm efficiency Question: adaptation of salinity management program. Introduction of climate change related topics into the program of Whole farm plans (DPI only starts to do this now!). Connecting grant applications to whole farm planning (making WFP a prerequisite for receiving grants or permits). Reorientation of CMA based grant schemes and of National Landcare Program grant schemes towards increasing resilience of the farming sector. Using landcare networks for disseminating relevant information and practises. Increasing activities organised by Greenhouse Alliances and establishing Greenhouse Alliances in regions that haven't got them yet.
51	74	Question: Methods to maximise on-farm water efficiency Compulsory farm based hydrological assessments and farm based water accounting systems to understand 'embodied water' per output, based on this information, establishment of water management plan. (Similar trend with carbon accounting, once the carbon emissions trading scheme starts in 2010 – farmers will be required to conduct life cycle assessment for CO2-e and should do so for water as well). Improve pre-scheduled allocation announcements and/or continuous accounting to improve information to irrigators on likely water availability, which facilitates water-use and investment decisions (Productivity Commission, 2006, p. xxx).
52	74	Question: exit strategies? Extension to explore dryland farming, i.e. farm forestry for timber and bio-energy as new options in light of the National Emissions Trading Scheme and Feed-In Tariffs that will provide income from energy production and from carbon credits. Early retirement pension packets for farmers aged 55 years or older, as used in other industries; Re-training options allowing entrance into other industries (i.e. eco-tourism). However, these possibilities are limited. Very promising were the recent drought relief programs providing farmers with paid off-farm environmental work. This should be considered as a long-term strategy or even integrated into regular farm work with compensation of farmers for their environmental services. User-pays principle should be adopted whereby environmental price component should be added from which these eco-services would be paid.
53	74	Question: Extension of salinity zones? Low water flows in the Campaspe River (20 times lower than historic averages in 2007) had a massive impact on water quality with dramatic increase in salinity. Water from another sub-catchment area was used to flush out the salt. The extension of the water grid (Sugarloaf Pipeline, Goulburn-Murray Interconnector,

		Goldfields Superpipe) need to be assessed with respect to their cumulative impacts on the surface water quality when shifting water out of the catchment into another. In general, drought will reduce salinity outbreaks, however increased use of bore water may bring additional salt to the surface. In this context, decentralised small-scale desalination installations should be considered that would have to be powered with renewable energy (of grid solar panels) to have a low carbon footprint. Five broad approaches to managing salinity either used separately or in combination are proposed by the Productivity Commission (2006, p. XLII) and should be considered for the North Victorian Sustainable Water Strategy.
54	75	Section: Water conservation for homes and businesses Question: Voluntary premium for conservation and recycling? In analogy to the energy market, where big increase can be observed in the number of customers that are prepared to pay an environmental premium on renewable energy (Green Energy), this diversification of products offered should be used in the water market as well. Customers, especially in urban regional centres and metropolitan areas are increasingly willing to contribute their share to the solution of climate change and drought related problems. In the energy market, customers are willing to pay up to 10% more for their electricity and this model could be used for an environmentally friendly water supply premium.
55	75	Section: Water conservation targets Extend water management plan WaterMAP use to businesses with less than 10ML consumption on a voluntary base and offer extension. (Similar to energy audits = integrate water, energy, waste management etc. into an environmental auditing and accounting system).
56	75	Section: Water conservation targets (provide reference) "… In 2007, the 30 percent target was reached in Melbourne" These figures are contested by some of the professionals. More conservative estimations talk about 15% per capita reduction. But with increasing population growth scenarios, these individual efficiencies will be outweighed by an overall increase in water consumption – As a consequence, there is need to an even greater reduction in per capita demand to allocate shrinking water resources to more users.
57	75	Section: Drought response planning Water restrictions should be called differently – i.e. 'water saving measures', to give them a positive connotation and to allow people to successfully build new habits.
58	75	Section: Efficient Use of Environmental Water, paragraph 3 "Environmental water used multiple times" means that use of water released down the Goulburn River should be considered, given the dramatic quality loss of downstream wetlands along the Murray River, before bulk entitlements from the Goulburn-Broken Catchment are allowed for metropolitan Melbourne.
59	76	Question: Options available to improve efficient use of environmental water through construction of works? All the water savings achieved from renovation works on irrigation systems should be evenly split between use for irrigation and the environment. Re-routing of water to support different tributaries of the Murray during very low flow periods will probably become more frequent if Scenario B or D materialises for the coming decades. Pumping systems to deliver water into icon wetlands and weirs to keep water longer in the wetlands.
60	76	Question: ways to integrate consumptive water and needs of a river? - Increase of efficiency and self-sufficiency measures for *urban water users* – rainwater tanks, treatment of grey water up to the quality of drinking water (as done in many large metropolitan areas around the world); treatment of recycled water and treatment of urban run-off before this water is released back into rivers; - *Farm-based* increase of water efficiency and diversification of production including change to dryland farming practises and crops that don't need irrigation, impose farming processes that protect waterways (prohibition of

		direct access of stock to waterways), regulation of weed-control practises near waterways, monitoring and control of nutrient loads of run-off as some of the topics for increased extension and possible regulation (municipality + CMA level). - In the *water ways* themselves: installations such as fish ladders, erosion control, where possible removal and replacement of willows with indigenous trees, maintaining snags in the water to leave aquatic habitat intact, maintenance of environmental water reserves as insurance against environmental emergencies and prohibition of their use for other purposes, i.e. not to be used for the bulk entitlement for Melbourne via the Sugarloaf pipeline in the time span before the Food Bowl savings are achieved.
61	77	Section: Progressing environmental management Outline and key challenges : ….to provide survival flows"… and second column, paragraph 3 …" trade-offs between environmental functions or assets". It is important to first determine and then prioritise the need for "survival flows" during extreme drought conditions, because of the irreversible consequences that the loss in habitat and biodiversity brings with it. From an economic point of view, the cost/benefit calculations of single stakeholders (land owners, farmers, consumers, etc.) do not include external effects on the natural functions of the eco-system. In the absence of effective price signals that would include environmental costs, the protection of minimum survival flows as a priority must therefore be imposed by regulation. Their priority becomes even more important if harsher climate scenarios materialise over the coming decades. In this context, there is also need for debate with respect to population growth (metropolitan, regional centres, rural) that is possible with respect to available resources and eco-footprint.
62	77	Section: Protect priority areas Question: Refuges that enable environmental recovery from drought – other priority areas? In addition to the Murray river, its wetlands and its tributaries, more attention should be paid to the Upper Catchment Areas (the dryland areas). Stopping deforestation and old-growth logging in these areas, stepping up preventive measures of fire control, intensification of their protection as bio-diversity pools and inflow areas for the catchment. The statutory 15-year review of water resources should be conducted much more often, i.e. 5-7 years given the dramatic climate change forecasts and the past decade of severe drought conditions. A timely implementation of the River Health Strategies is needed.
63	78	Section: Smarter use of existing environmental water reserve Column 1, paragraph 2, …"that the community understands environmental water entitlements …" There is need for a community education program on bio-diversity values and how they relate to water resources available for the environment (I.e. a good first approach is Prof. David Lindenmayer's recent publication ("On borrowed time-Australia's environmental crisis and what we must do about it, 2007). The quantification of environmental values in monetary terms has an important signal function especially when they are linked to their contribution to the tourism sector. Community education programs in all sectors of the population (school curricula and on professional level in whole farm planning) should be intensified. Bio-diversity payments should be made available to those land holders that are actively engaging in the restoration of environmental system services on their land (i.e. bush return funds, similar to carbon credits).
64	78	Question: Second step of Living Murray Initiative – information needs? - Stream flow management plans for all tributaries of the Murray river that are based on *scientific assessment* of environmental flows needed to maintain river health (rather than merely reflecting the outcome most powerful interest groups); - Recognition of close link between groundwater and surface water and related double counting of available water resources (Victorian Catchment

		Management Council, Catchment Condition Report 2007, p. 33); - Establishment of groundwater plans and use of groundwater caps and Environmental Water Reserves to protect groundwater integrity; - Evaluation of interconnectivity of surface and ground water and building integrated "water accounting systems" for all tributaries of the Murray; - Assessment of cumulative effects of different water policies that impact the environment – especially the assessment of possible negative environmental impacts of the water grid extension, the diversion of water out of the North Victorian Region and the increased use in ground water; - Community education on the effects of different practises on a farm-based level and on a catchment level, dissemination of information on water needs of the environment and corresponding policies.
65	79	Section: Water donations Question: incentives to encourage individuals to donate water to the environment. - Allowing maximum percentage of carry-over (i.e. 50%) and the equivalent percentage is donated to the environment but without transfer fees. - Philanthropic institutions buying entitlements on water market. - Managed investment schemes are required to 'donate' 10% of their water entitlements to the environment; - lower the extraction cap if "survival flow levels" are not reached or only just reached.
66	80	Section: Managing "sleeper licenses" Question: Options to manage sleeper licenses to minimise future risks? In a situation where minimum environmental flows (survival flow rate) could not be met if sleeper licences were activated, the water authorities (or CMA) should buy a large percentage of them back and use them as environmental water entitlement. Alternatively, the activation of sleeper licenses in very low flow seasons could be restricted.
67	81	Section: Water pricing, Description and progress, column 2, first dot point. " … structuring water prices to reward water conservation …" According to the National Water Initiative the key element of "our water our future" pricing reform is to "structuring water prices to reward water conservation and encourage efficient use of alternative, more sustainable sources of supply". Some of the policies proposed in the Northern Region Sustainable Water Strategy undermine this principle: for example, allowing the use of ground water or the enlargement of the water grid with bulk entitlements for the metropolitan area of Melbourne will slow down the behaviour change towards more water efficient consumption patterns. Instead, pricing mechanisms and grant/pay-back schemes should be used in combination to support the transit to more household based and farm based water efficiency helping consumers to spread out the relatively high up-front costs of retrofitting their systems. Such pricing mechanisms and grant/pay-back schemes combined are already successfully used in the renewable energy / energy efficiency sector.
68	82	Section: Urban pricing structures … to examine and further develop pricing structures that encourage sustainable use …" Rebate schemes that allow the up-front costs of retro-fitting to make water use more efficient (rainwater harvesting, grey water recycling on a household base, efficiency measures for different appliances. The rebate schemes could be organised similarly to the ones used in the energy sector: the energy bill is kept at the same level to cover retro-fitting costs over several months/years until these costs are paid off. After that the energy bill reflects the lower usage levels. Thus, in the same way the water corporation includes retro-fitting costs in a long term payback system where future savings are accounted against current investments.
69	82	Section: Rural pricing structures Question: What should be taken into account when developing options for introducing different prices for different levels of service delivered by rural supply

		systems in the N. Region? Different users achieve a different performance in terms of water used per $ of value added (or revenue). For example, in Table 4.2 add a column at the end that shows litres per $ of value added. Greenfield (292L/$) and Horticulture (399L/$) use less water per $ value added than small users, residual opportunistic etc. A first price component should be the reliability of water entitlements (high reliability premium). The water then goes to high performance sectors. A second price component could be reflecting environmental externalities: using drinking water quality for uses that don't require potable water quality should be more expensive than the use of recycled water.
70	83	Question: issues to consider before adopting Pyramid-Boort option of increasing the fee for additional outlets to encourage reconfiguration …?
71	83	Question: Any other options to change pricing structures to encourage reconfiguration of inefficient or costly delivery infrastructure? Grant schemes that pick up the up-front costs of retrofitting, while prices are kept the same until retro-fitting costs are paid off.
72	84	Section: Expanding the water grid Outline and key challenges: … Key challenges in the progression of other interconnections include the minimising of downstream impacts on all users and the environment …" In this statement the authors recognise the potential for negative effects of the water grid expansion as a key challenge. When water is shifted around for economic, demand-related purposes, this can create an imbalance between catchments with negative environmental impacts. Also, the newly proposed grid extension allowing water to move outside the Murray Darling basin and the catchments of its tributaries and to leave the Northern Region in direction of Melbourne may create an inter-regional imbalance to the detriment of the environment. This may also be in contradiction with plans for the Murray Darling Basin national water plan.
73	84	Section: Description and Benefits, column 1, paragraph 1 "… that enables water to be moved when and where it is needed most." The question here arises: Who defines and decides where and when water is needed most? The strongest lobby group? The government by decree? Such generic statements are dangerous because they turn their focus away from the decision process. The focus is only on technical feasibility, but the real difficulty in using the grid is making value judgements regarding needs. Firstly, the environment has always had a weak advocacy (otherwise we wouldn't have such a river health problem with the Murray and its tributaries). When water "moves to the highest values", the economic price signals are not necessarily compatible with the highest environmental value or high environmental health. Market prices that do not reflect environmental costs do not lead to a (Pareto) optimum outcome. Secondly, in this strategy paper, bulk entitlements are proposed in order to alleviate water restrictions in urban areas and Melbourne – but such arrangements circumvent the market and pricing signals altogether! Such water allocation are arranged totally outside the market (similar to a totally monopolistic way or a cartel) by shifting a pre-determined amount of water through the new grid extension to Melbourne without considering the economic and environmental costs of using drinking water for uses that do not require potable water quality. Such operations are not achieving a (Pareto) optimum outcome either. Instead, they slow down the path of behaviour change towards increased water efficiency.
74	84	Section: Progress to date, column 1, paragraph 1 "Over time, build infrastructure such as channels, pipes, dams and weirs has been added to the region's natural infrastructure of rivers, wetlands and floodplains. This has helped to better meet the needs of urban and rural water users." This statement reflects a very supply sided, technology driven frame of mind. It

		neglects the fact that bracing nature with "artificial networks" has reversed environmental flows, has over-allocated water and has helped to deplete natural resources to an extent that is almost beyond repair! In the mean time, continuing to follow this supply sided paradigm of dominating the natural system with an artificial grid has caused the most wasteful habits in the users. In urban areas, drinking water is used only once and often for purposes that do not require potable quality. Furthermore, population growth and the objective of economic growth are used as legitimation to continue in the same way. But are they still desirable given that the natural system is already struggling to sustain our current economies?
75	84	Section: Progress to date, column 2, paragraph 2 " From 2010, it will transfer one –third of the water savings obtained through the first stage of the Food Bowl Modernisation Project to Melbourne." The 75GL p.a. diverted from the Goulburn River, tributary of the Murray, to Melbourne will augment inter-regional disparity. The Goulburn river, although classified as a Heritage River (no water diversion allowed from a heritage river) becomes the drip-feeder system to urban communities – both the regional cities of Bendigo and Ballarat (goldfields superpipe) and Melbourne (sugarloaf pipeline). The aquifer of the Goulburn river will miss out on this water, and so will the Murray river. The extension of the grid is therefore in contrast with the local River Health Strategy of the Goulburn Broken Catchment and with the Living Murray Initiative of the Ministerial Council – the Victorian Government acts thus against both regional policy objectives and inter-state agreements.
76,77	84	Section: Moving Forward, paragraph 2 Murray-Goulburn Interconnector – "Key considerations include ensuring that its operation would have no adverse environmental impact on the iconic Barmah-Millewa forest and the connecting river systems, and that it would not compromise the activities of downstream users through changed operating rules." The different new elements of the water grid will affect the Goulburn in a cumulative way: - the Murray Goulburn interconnector - the pipeline to Broadford - the Sugarloaf pipeline to Melbourne (transfer out of MD basin) - the Goldfields pipeline to Bendigo and Ballarat and interstate trade on the water market adds to it as well, with all the grid elements combined having a huge potential to cause regional imbalances between catchments. The argument that urban water use in the Northern Region is only 5% is not convincing, because the different small to medium sized interventions can no longer be assessed in isolation. As a consequence, the cumulative negative environmental impacts of all the interventions combined on the Goulburn River and the Upper Goulburn Dryland catchment area and downstream on the Murray river could be considerable. Furthermore, the grid extension is simply revenue driven. But as long as cumulative environmental system effects are not well understood and the related environmental costs not integrated as costs into market prices, they will be ignored by market mechanisms. "Minimising downstream impacts" as proposed in this report is therefore an empty phrase that will not be implemented.
78	86	Section: New and alternative sources of water, Overview and key challenges "Both groundwater and alternative sources, such as recycled water, could help meet local needs. However, both sources are already heavily used and together represent only about 10 % of the available water resource in the Northern Region". This statement suggests that recycled water is already heavily used, but the previous chapter on stormwater and urban recycling (Section 2, p. 24) shows that this is actually not the case. Apart from a few stormwater and water recycling projects on seven facilities throughout the northern regions (aerodrome, sporting grounds, market gardening, one residential subdivision, hospital+health care facilities, race course = all up 0.5GL) that are certainly useful demonstration projects, there is no widespread generalised application of these practises. Also,

		most of Melbourne's stormwater goes untreated and unused into Port Philip Bay and water recycling is not a widespread practise amongst residential and industrial users there either. Using those "wasted" resources first should be an absolute priority before diverting water out of the Murray river system.
80	87	Section: Alternative sources of water In analogy of the renewable energy target, Federal and State governments should set recycled water targets and increase these progressively to respond to the emerging climate change and drought scenarios (B or D). As environmental damage is currently not a cost factor in water prices (instead of 'user-payed' it is paid by the tax payer), of course there is no market incentive for water corporations to move to new recycling technologies. Arguments that storm water treatment and water recycling are more costly forms of supplying water compared to other water supply measures (i.e. Sugarloaf pipeline, Desalination) are completely erroneous because they mask the fact that without the environmental cost component internalised, the water pricing system is biased. Internalising environmental costs of river/aquifer restoration into the market prices will lead to a comparative advantage for rain water harvesting, stormwater treatment and water recycling measures in rural and urban areas. Thus, market prices reflecting the "true costs" of water use, combined with grant/pay-back systems to alleviate the upfront costs for retro-fitting individual systems would create the necessary market based incentives for the residential and corporate sectors to move towards increased water efficiency.

Appendix 5

AVW refnum.	Page num.	Item / comment
81	126	Figure 5.1 Estimated amount of water required to meet environmental flow recommendations for major rivers in the Northern Region This table shows a recommended environmental average flow of 137-199.6 GL per year for the Goulburn River. The data also indicate that under the base case (long term average based on historic data since 1981) additional environmental water flows of 21.1-71.8 GL/year are needed to meet the recommended environmental flows. The additional amount of water needed increases dramatically with the medium climate change scenario B (36.6-119.9 GL/yr) and with the Scenario D that reflects a continuation of past decade of extreme drought years (49.7-153.7 GL/yr). The range of additional water to meet environmental needs is in the same order of magnitude of the proposed water diversion from the Goulburn river to Melbourne via the Sugarloaf pipeline (annual average of 75GL). The policy of the water grid extension to allow a diversion of water from the Goulburn to Melbourne is thus diametrically opposed to the additional environmental flow requirements recommended by the Government for the Base Case scenario and more so for the more likely scenario B or D.

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