

VicWater Working Group Position Paper



*Recycled Water Returned to
Stream for Environmental Flows*

June 2007
FINAL v3

TABLE OF CONTENTS

1.0 INTRODUCTION	1
1.1 <i>Purpose</i>	1
1.2 <i>Background</i>	1
1.3 <i>Scope</i>	2
1.4 <i>Definitions</i>	3
2.0 CURRENT SITUATION	4
2.1 <i>Water Authorities' Situation</i>	4
2.2 <i>Current Applications for Recycled Water in Regional Victoria</i>	4
2.3 <i>Examples of Beneficial Recycling to Stream</i>	5
2.4 <i>Regulatory Environment</i>	6
2.5 <i>Discussion on Regulatory Environment</i>	8
2.5.1 <i>Recycled Water Quality</i>	9
2.5.2 <i>EPA's Guidelines on Recycled Water to Waterways</i>	11
3.0 POTENTIAL BENEFITS AND DISBENEFITS	12
3.1 <i>General Philosophy / Triple Bottom Line Approach</i>	12
3.2 <i>Environmental & Social Barriers</i>	12
3.3 <i>Economic</i>	12
4.0 FUTURE OPPORTUNITIES AND CHALLENGES	14
4.1 <i>Opportunities</i>	14
4.2 <i>Challenges</i>	16
5.0 CONCLUSIONS	17
6.0 VICTORIAN REGIONAL WATER INDUSTRY POSITION	17

1.0 INTRODUCTION

1.1 Purpose

The purpose of this project is to develop a Victorian regional water industry position paper on the impacts and value of recycling water to stream for environmental flows.

1.2 Background

At the meeting of the Regional CEO's in June 2006, Steve Bird, CEO of VicWater, advised that Henry Jackson of Deacon's had discussed the possibility of conducting a seminar on the topic of recycled water (treated wastewater) discharged as environmental flows. The CEO's agreed that this was a worthy subject and referred to the example of the then recent and successful VicWater workshop with regulators which had included the EPA, DSE, DHS and the ESC.

It was also agreed that the industry needed to establish its position on recycled water as environmental flows before proceeding to a seminar. It was considered appropriate that a small Working Group be established to consider and report back on the issue before moving toward possibly holding a seminar. Allen Gale (who was attending the meeting *vice* Laurie Gleeson) was considered an appropriate Chair and it was further agreed that Officers from Central Highlands Water, North West Water, South Gippsland Water, Western Water and Barwon Water would initially be involved in the Working Group.

Membership of the Working Group comprised:

Allen Gale (Chair)	Goulburn Valley Water
Adam Polkinghorne	Barwon Water
Steve McKenzie	Central Highlands Water
Graeme Jackson	South Gippsland Water
Fiona Smith	North East Water
Anna May	Western Water
Henry Jackson	Deacons
Paul O'Brien	VicWater

A draft of the position paper was presented to and accepted by the RUWA CEO's in December 2006. Subsequently, Allen Gale and Steve Bird, CEO of VicWater met with and presented the paper to the following regulators:

- EPA
- DSE
- DHS
- CMA's

All parties agreed with the principles of the position paper, with some considerations requiring further discussion.

In addition, the draft position paper was forwarded to Melbourne Water and the metropolitan retailers for comment and a subsequent meeting was held with relevant representatives to clarify a few matters.

The draft position paper has been amended to reflect the key considerations from the various discussions.

1.3 Scope

It was agreed by the Working Group, and endorsed by the Regional CEO's at their meeting of 7 September 2006 that the position paper was to be a "high level" one that considers the various principles and issues to enable meaningful discussions with regulators and others. It was not intended that the position paper provide detail analysis or responses to the range of issues that need to be considered.

It is important to recognise that the return to stream is for **environmental flows** only rather than for downstream extraction and use.

The scope of work comprises:

- Identify current applications of recycled water for environmental flow purposes.
- Assess the magnitude of recycled water available for return to stream including current discharges and potential maximum discharges if all recycled water outside the metropolitan area was discharged to stream.
- Assess the quality of recycled water discharges to stream, recognising that this will vary on a case by case basis.
- Assess the potential benefits of recycled water return to stream for environmental flows, recognising that these will vary on a case by case basis.
- If return to stream for environmental flows is used, develop justifications for economic and other benefits (eg BE credits and offsets for water authorities).
- Assess on a concept level using sustainability principles return to stream for environmental flows in comparison to other options for the beneficial use of recycled water.
- Provide high level comment on potential legislative and other legal issues.

It is intended that the water industry use the position paper to work constructively with EPA, DSE and other relevant regulators in aligning views and outcomes on return to stream for environmental flows.

1.4 Definitions

The following definitions apply to this document:

- **Environmental Flows** – Water to protect stream health, which equates to the water regime needed to sustain the ecological values of water dependant ecosystems, including their processes and biological diversity, at a low level of risk (Environmental Flows for the River Murray, 2005).

In using this definition, the variability and timing of flows and / or releases need to be accounted for, rather than just providing a base flow.

- **Recycled Water** – Water taken from the treated wastewater stream and, if necessary, further treated to a quality where it can be reused for beneficial uses (WSAA 2006).

Or

Water derived from sewage or trade waste that has been treated for the purpose of reuse (Victorian Water (Resource Management) Act 2005).

2.0 CURRENT SITUATION

2.1 Water Authorities' Situation

The last ten years of extraordinary, increasingly dry conditions across the State have highlighted the potential value of recycled water for use in agriculture, for offsetting the use of potable supplies and for environmental flows.

Water Authorities have reuse objectives within their business plans. For flows to the environment to be accredited as reuse, the quality of the recycled water compared to the stream or wetland ambient quality is an issue, together with the volume and release pattern from the wastewater treatment plant (WWTP) to meet environmental objectives.

2.2 Current Applications for Recycled Water in Regional Victoria

The approximate quantities and uses made of recycled water by regional water authorities is set out in Table 1 below. It should be noted that these quantities are for the purpose of obtaining an order of magnitude assessment and should not be considered as absolutely definitive.

Table 1: Current Approximate Recycled Water Quantities and Uses for Regional Water Authorities in Victoria.

Water Authority	Total recycled water available for discharge (ML/annum)	Total recycled water discharged to streams (ML/annum)	Total recycled water discharged to ocean (ML/annum)	Total recycled water used for reuse (land based etc) (ML/annum)
Barwon Water	23770	0	20930	2840
Central Highlands Water	9130	8250	0	880
Coliban Water	9450	6270	0	3180
East Gippsland Water	2670	0	0	2670
Gippsland Water	21000	3960	15830	1210
GWM Water	2960	10	0	2950
Goulburn Valley Water	10060	2730	0	7330
Lower Murray Water	3310	0	0	3310
North East Water	8230	6040	0	2190
South Gippsland Water	3790	950	2710	130
Wannon Region Water	8670	20	6390	2260
Western Water	7360	1780	0	5580
Westernport Water	1210	0	1000	210
TOTALS	111610	30010	46860	34740

From Table 1 it can be seen that the total volume of recycled water is in the order of 112,000ML (112GL) of which some 30GL is currently returned to stream (or water body) in one form or another. The volume currently applied to land is similar to that currently returned to stream (35GL). The remaining 47GL that is discharged to the ocean is not readily available for return to stream, although there may be potential for effective use in wetland maintenance, or similar, as currently occurs in several locations around the state. However, for the purpose of discussion, the volume of recycled water readily available for return to stream is in the order of 65GL/annum.

This quantity may appear to be small in relation to total stream flows. For example, the annual flow in the Goulburn River is in the order of 1500 to 2000 GL/annum under normal irrigation situations. However, in the context of the current Living Murray commitments by the Victorian government, 65GL/annum is significant in comparison to the 145GL/annum committed for recovery under the Goulburn-Murray Water Recovery Package.

In smaller streams during dry climatic conditions, recycled water is particularly valuable for maintaining the low flow element of the stream to sustain aquatic ecosystems, for maintaining wetlands and for replenishing lakes. So, while the total volume of water may be small as a proportion of total natural flow, the value of the recycled water to the environment may be very significant.

Thus, there is a demonstrated value in returning recycled water to stream for environmental flows.

2.3 Examples of Potential Beneficial Recycling to Stream

The regional water authorities provided details on their current stream discharges from WWTP's and environmental flow status. This information is included as Appendix A.

A browse through this information shows, generally, a situation of licensed disposal, rather than the plant discharges being recognised for the resultant environmental benefit. However there are exceptions. In considering the potential for categorisation as beneficial recycling each application needs to be assessed on a case by case basis.

Some examples are of particular note that warrant consideration are:

- The Kyneton WWTP discharge into the Campaspe River is planned to be piped across to the Coliban River. This would give the opportunity to substitute environmental releases from Malmsbury Reservoir, to effectively increase the available volume of potable water.
- The Bairnsdale WWTP outflows to three constructed wetlands to sustain Macleod Morass, a significant RAMSAR wetland. The inflow constitutes 40% of flows through the morass, and the 1200 ML per annum is wholly accredited reuse for a highly beneficial environmental outcome.
- Morwell WWTP similarly outflows to the Morwell River Wetlands to sustain the ecosystem throughout the year. This is a high profile activity supported by a strong, active community partnership. Accredited reuse is achieved.
- The Bright Porepunkah WWTP is to be upgraded to tertiary standard in 2008. Discharge to the Ovens River is anticipated but groundwater recharge is not allowed within the SEPP guidelines. Groundwater recharge is beyond the scope of this paper, but it presents another beneficial environmental reuse opportunity, if the guidelines were more flexible.
- Beechworth WWTP currently treats to a secondary standard, and then discharges water into Spring Creek and could provide a high percentage of summer flows. North East Water is faced with the decision whether to upgrade the plant to meet water quality parameters for discharge to stream, or whether to expand reuse of the water on land at the current quality and deprive the stream of further flows.

- The Gisborne WWTP discharges to Jackson's Creek and has provided a high percentage of summer flows over recent years. Rosslynne Reservoir regulates Jackson's Creek. Due to Rosslynne Reservoir falling below critical limits, Bulk Entitlement amendments have been negotiated and resulted in minimum releases to Jackson's Creek. A stakeholder group identified the opportunity for recycled water to reduce the risk of algal blooms, to encourage the native fish population and migration between pools, to provide adequate water for agricultural extraction and to permit passive recreation. The most recent Bulk Entitlement amendment for Rosslynne Reservoir was negotiated in October 2006. This amendment does not require the creek to be maintained by WWTP flows ; rather reservoir releases have been temporarily ceased with the exception of emergency flushes as needed.
- Goulburn Valley Water discharges between 2000 and 3000 ML/annum to the Goulburn River at Shepparton, Alexandra and Eildon after physical-chemical treatment to remove phosphorus. Biological monitoring over some five years has demonstrated minimal impact on river health, limited to the mixing zone. Goulburn Valley Water is currently negotiating with EPA to have these flows recognised as beneficial.

Thus, there already are examples of recycled water providing a beneficial contribution to stream flows, for both small and large streams, albeit that more work is required to substantiate categorisation as beneficial recycling. There also are examples where the recycled water has been or will be categorised by EPA as environmental flow.

2.4 Regulatory Environment

The four regulators for the Victorian water industry all have an involvement in discharge of recycled water to stream. A brief summary of their respective roles and responsibilities follows:

EPA Environment Protection Act 1970

- The discharge of "treated wastewater" (recycled water) to surface waters requires an EPA licence subject to conditions that impose limits for various parameters based on the provisions of the SEPP (Waters of Victoria) (SEPP).
- However, the Scheduled Premises Regulations provide an exemption from the need for a licence if the discharge is an "effluent reuse scheme" that meets EPA approved "discharge, deposit and operating specifications". The Reuse Guidelines (EPA Publication 464) and the Risk Management Guidelines for Third Pipe Systems (EPA Publication 1015) are examples of such "specifications".
- The SEPP acknowledges that the "discharge of wastewater to surface waters to provide water for the environment ...is an acceptable form of re-use" if EPA can be satisfied that the wastewater "can be treated and managed to a level that will protect beneficial uses".
- There is no guidance as to what EPA considers to be an appropriate standard, either for the purposes of the SEPP or the Scheduled Premises exemption although the EPA Principles for the 2008-2013 Pricing Determination (Draft Principles) confirm that EPA is "currently developing guidance on reuse to waterways".

Essential Services Commission (ESC)

- The ESC is empowered to regulate prices for “prescribed services”, which include “retail sewerage services” and “retail recycled water services” and which also include services provided “in connection with” these services.
- It might be argued that “return to stream” of recycled water falls within the definition of retail sewerage services, although the existence of the definition of retail recycled water services makes this argument difficult to maintain. The absence of a retail customer for the recycled water services in the current scenario makes it difficult to insist that it is a “prescribed service”.
- Assuming, for the moment, that ESC has jurisdiction to regulate prices for return to stream services, the ESC’s comments in the June 2005 Water Price Review are relevant. The ESC acknowledges that recycled water projects are often associated with drivers that are quite different from traditional water and sewerage projects and that may limit the ability of the water business to fully recover the projects’ costs. In such a case, it is necessary to demonstrate to ESC that:
 - (i) There has been a cost / benefit analysis undertaken;
 - (ii) The water business has clearly identified “the basis on which any revenue shortfall is to be recovered”, and
 - (iii) If the revenue shortfall is to be covered by non-recycled water customers:
 - (A) The project is required by “specified obligations”, and
 - (B) Consultation has been undertaken with the relevant non-recycled water customers about their willingness to pay.

DSE – Water Act 1989 (Water Act)

- The Water Act defines “water” as “water, whether or not it contains impurities” and is different from the recently of inserted definition “recycled water”, which is “water derived from sewage or trade waste that has been treated for the purposes of reuse”.
- The “Environmental Water Reserve” (EWR) is defined as any water set aside for the environment.
- Division 1A of Part 4 of the Water Act provides for “environmental entitlements”, whereby the Minister for Water may allocate water to the environment (including, but not limited to, for the maintenance of the EWR). Section 48B allows the allocation to be made from “water in a waterway”, groundwater or “water (other than recycled water) in any works of (a water business)”.

- Division 1B and 1C of Part 2 of the Water Act provides for the long term planning for water resources with a focus on the balance between the EWR and consumptive purposes. Other statutory tools, such as bulk entitlements, will be informed by these processes.
- Section 36 allows an Authority to apply for a bulk entitlement (BE) to “water in a waterway”, “groundwater or “water (other than recycled water) in any works of (a water business)”. The BE process also allows the Minister to impose conditions on a BE for purposes that include “protection of the environment”, returning water to the source” and maintenance of the EWR. Pursuant to this power, the Minister has, on at least on occasion, suspended an Authority’s obligation to maintain “passing flows”, and replaced it with an obligation to ensure not less than certain volumes are discharged to the waterway from a WWTP, together with monitoring obligations.

Department of Human Services – Safe Drinking Water Act 2003 (SDWA)

- The SDWA requires risk management plans to be prepared for the supply of potable water and requires water intended for drinking to meet certain specified criteria.
- The addition of recycled water to surface waters that, downstream, inputs into drinking water supplies, should be acknowledged in the relevant risk management plan and steps undertaken to ensure it does not compromise relevant standards.

2.5 Discussion on Regulatory Environment

The current legislative regime does not appear to acknowledge the role played by recycled water as an element of water within a waterway. Certainly there is no acknowledgement of the shandying that regularly occurs by the discharge of recycled water to waterways.

The only acknowledgement of such a discharge appears to be as a discharge of “wastewater” under the *Environment Protection Act*. The recognition given to recycled water as a resource appears to be limited to a product to be supplied direct to the customer by agreement, rather than as part of the general water resource in a waterway.

There is therefore considerable potential for clarity to be provided by way of legislative amendment to provide for such recognition if it was perceived as necessary to do so. Certainly, pressure should be brought to bear on EPA to provide guidance as to what will amount to “an acceptable form of reuse” under the SEPP and the Scheduled Premises Regulations.

Additionally, it appears likely that the resourcing of infrastructure to treat wastewater to a sufficient standard for “return to stream” purposes will be regulated by the ESC in some form (although the amendment of the Water Industry Regulatory Order would provide clarity). Certainly the EPA anticipates that that will be the case and it has set out its thoughts on the matter in its Principles for 2008-2013 Pricing Determination (*EPA Publication 1069*), it therefore appears likely that it will be necessary to work within ESC’s guidance on recycled water projects in this regard.

EPA’s Principles for the 2008-2013 Pricing Determination (Section 21, pgs 7 and 8) acknowledge that recycled water to stream is a viable option – “sewage may also be considered to be recycled if it can be reused within a waterway or aquifer to provide water for the environment. However, this water must be treated and managed to provide a demonstrated benefit to the waterway. It is expected that any impacts on beneficial uses where unable to be avoided, will be offset (see below) to provide equal or greater overall benefit to the waterway. EPA is currently in the process of developing guidance on re-use to waterways. EPA is also working with DHS to develop criteria for recycling treated wastewater via managed aquifer recharge and recovery, as part of the Government’s White Paper”.

Two key points for discussion from the above statements by EPA are:

- The recycled water quality required.
- EPA guidelines on recycled water to waterways.

2.5.1 Recycled Water Quality

If EPA continues with its current recycled water quality expectations then there is little scope for cost effective return of recycled water to stream as environmental flows. The requirements for nutrient levels and progressive reduction of mixing zones do not align for the Triple Bottom Line (TBL) direction being encouraged by EPA. This applies particularly where biological monitoring has been used to monitor receiving water health. There is an inconsistency in applying numerical values if biological monitoring indicates acceptable ecological outcomes. Thus, recycled water to stream should be assessed on an **ecological** basis to determine the benefits and impacts on social and economic aspects as well as environmental (ie. TBL). This approach is based on the assumption that “disposal” of poor quality wastewater to a stream is unacceptable and that ecological risk assessment will preclude such an occurrence, It is also assumed that public health risks will form a component of the total risk assessment.

A TBL assessment (possibly using Life Cycle Analysis proposed by EPA) may demonstrate that environmental disbenefits from lower recycled water quality are more than offset by the economic benefits of the capital and operating costs avoided for higher treatment and the environmental benefits of greenhouse emissions avoided from power and chemicals usage for higher recycled water quality. In addition, the social benefits of maintaining flow in a small stream may offset the alternative of, say, land-based recycling.

The following two cases studies exemplify the above:

- About 2000ML/annum of recycled water from Shepparton WWTP is discharged to the Goulburn River after chemical treatment primarily to remove phosphorus when land-based recycling cannot be employed during the wetter months. Biological monitoring has been undertaken for some five years. Current recycled water quality and proposed EPA licence limits are set in Table 2.

Table 2: Shepparton WWTP Current Recycled Water Quality and Proposed EPA Licence Limits

Parameter	Unit	Current Recycled Water Quality		Proposed EPA Licence Limits	
		Median	Maximum	Median	Maximum
BOD	mg/L	13	84	5	10
Filtered BOD	mg/L	4	53	NS	NS
TSS	mg/L	7	87	10	15
Total N	mg/L	8.6	19.7	10	15
NH ₃ -N	mg/L	5.1	13.0	2	5
P	mg/L	0.3	3.6	0.5	1.0
e. coli	org/100mL	10	1700	200	1000

Notes • N/S = Not Specific
 • Numbers in bold indicate non-compliance with proposed EPA licence limits

The current quality of the recycled water is high, and it complies with current licence conditions. Biological monitoring has demonstrated only a minor impact on receiving water. To meet the proposed quality would necessitate significant additional physical – chemical treatment, particularly for ammonia, at an additional cost of about \$400/ML. The greenhouse emissions would be in the order of 700 tonnes of CO₂ equivalent per year for power and production of chemicals.

On this basis the disbenefits far outweigh the potential benefits from increasing the quality of the recycled water from Shepparton WWTP.

The Beechworth WWTP consists of a lagoon based treatment system incorporating two primary lagoons, six secondary lagoons operating in series and a final polishing lagoon. It also includes a Chemical Assisted Sedimentation plant (CAS), which achieves phosphorus, suspended solids and BOD reduction before discharge to Spring Creek. Some water is reused on site for pasture growth, but there is currently insufficient land available to store and reuse all recycled water from the plant. Options are being evaluated for the future management of the site.

Of the 370ML/annum of recycled water produced, 320ML is discharged to stream and 50ML is reused for land based irrigation. The current quality and EPA licence limits are set out in Table 3.

Table 3: Beechworth WWTP Current Recycled Water Quality and EPA Licence Limits

Parameter	Current Recycled Water Quality		EPA Licence Limit	
	Median	Maximum	Median	Maximum
BOD (mg/L)	7	42	15	25
<i>E. coli</i> (org/100mL)	5	20	100	
SS (mg/L)	7	16	20	30
Total N (mg/L)	13	23	15	20
NH ₃ -N (mg/L)	11	23	2	5
Total P (mg/L)	0.34	0.93	1	2

The most significant non-compliant parameter is ammonia. Options to meet the licence limit range from additional winter storage and purchase of additional land to a new biological nutrient removal facility with discharge to Spring Creek. The

costs for these options range between about \$500 and \$1100/ML. Greenhouse gas emissions could increase by about 1.6 tonnes CO₂ equivalent/annum.

The recycled water from Beechworth WWTP is a significant proportion of the dry weather flow in Spring Creek and the ammonia compliance issues are during winter when flows are at their maximum.

Thus, compliance with EPA's licence limit for ammonia will be extremely expensive for North East Water customers for marginal, if any, benefit to the receiving stream.

These two case studies highlight that, on a sustainability basis, it is difficult to justify a recycled water quality that satisfies (or may even exceed) environmental needs. They indicate that the **appropriate** quality may indeed be less than EPA's current default position of tertiary treatment. Thus, each case should be based on an ecological risk assessment, as outlined in EPA's environmental objectives.

2.5.2 EPA's Guidelines on Recycled Water to Waterways

EPA has been working for a considerable time on guidelines on recycled water to waterways but, for a number of reasons, has not released a draft for discussion. Advice from EPA's Tim Fisher (per. comm. 31 August 2006) was that a discussion paper should be released "reasonably soon". He indicated that, due to staff constraints, the release has been delayed and nothing has been released to date.

It is most important that a dialogue be developed between VicWater and EPA to discuss the views and findings of this position paper and to have EPA's discussion paper reflect the views and findings, rather than having opposing views.

3.0 POTENTIAL BENEFITS AND DISBENEFITS

3.1 *General Philosophy / Triple Bottom Line Approach*

The environmental and social benefits of environmental flows are well researched and documented. Economic assessments are less common and more difficult to quantify, but it is evident that an economic benefit is provided by environmental flows.

When considering recycled water returned to stream as a source of environmental flows, further work is required to assess the risks posed by the use of recycled water against the additional benefits, including increased available volumes and freeing up of current potable water allocations used for environmental flows. The use of site-specific and discharge-specific reviews, utilising holistic assessment methods, will be required.

From an economic perspective, water authorities understand the value of raw water and have developed a value for recycled water from a supply to customer perspective. This knowledge provides a foundation for assessing the economic benefit of recycled water for return to stream.

3.2 *Environmental & Social Barriers*

The key barriers to the acceptance of recycled water returned to stream as an environmental flow stem from issues related to quality of the discharge and education of the related risks. Engineering related issues, such as flow control etc, can be managed although not without economic impacts.

The quality of recycled water returned to streams presents a range of risks to stakeholders associated with the stream flow, including the stream ecology, recreational users and downstream potable water users. Quantifying the level of risk is the difficult task.

A number of recycled water discharges to stream already exist as a licensed 'disposal' method and are, in some cases, required under licensing conditions, highlighting that recycled water can be beneficial to streams. Considering this, it is not unreasonable to expect that an appropriate risk minimisation strategy could be developed, through the cooperation of regulators and other stakeholders, to enable recycled water to be classified as an environmental flow.

Education of stakeholders, including regulators and water authorities, will be an important part of the process and must be transparent, in terms of risks versus benefits, in order to ensure the best possible outcome.

3.3 *Economic*

It is clear that the return to stream of recycled water is a valuable contribution to environmental flows. This being the case it then follows that a value should be assigned to these recycled waters. The issue becomes just what value is assigned.

If no value is placed on the recycled water then the economic justification for return to stream as against other alternatives will be difficult to achieve. In comparison to the most prevalent current alternative of land based reuse there is a need, generally, to provide a significantly higher level of treatment for return to stream. If no value, or a low value is placed on the recycled water then there would need to be compelling environmental and social benefits to encourage water authorities to undertake the further processing required to achieve the desired quality. Legislative or regulatory directives would most likely be the only means of otherwise encouraging this change.

In some circumstances, a rational basis for recognition of the value of return to stream of recycled water is bulk entitlement (BE) credits or offsets. Under BE credits or offsets the increased quantity returned to stream would be offset against the BE allocated for a water authority, thus resulting in a net increase in BE. Volumes that are currently discharged are generally already allocated to extractive users or the environment in the bulk entitlement conversion process and thus cannot be allocated twice. With a current price of permanent water entitlement of \$1,200 to \$1,500 per megalitre the value of the current discharge to stream is in the order of \$40M. In the extreme, if the total recycled water produced by the regional water authorities was returned to stream for environmental flows the value would be in the order of \$160M.

In addition there is a value from temporary discharge payments at a rate up to the commercial value of temporary water entitlements. This value varies from location to location depending on whether the stream is regulated or unregulated, but is likely to be in the range of \$10 to \$50 per megalitre. This equates to an annual value in the order of \$1.2M for current discharge, with an extreme of \$4M/year. In years such as 2006 where temporary water is being purchased for in excess of \$600/ML the value is significantly more.

In assessing the value relative to the cost of purchasing on the water market, an interesting concept put forward by the CMA's is that of a "working river" or "ecosystem service". Under this concept the value of the recycled water is determined by the impact on the receiving stream. If the quality of the recycled water is such that the stream is not used for further enhancement of the quality then the discharger should be entitled to payment for that water. On the other hand, if the stream is used for further "treatment" of the recycled water then the discharger should pay for use of the river. The concept warrants further consideration.

Regardless of the means of assessment, these values highlight the importance of regulators recognising the significance of return to stream as environmental flows.

4.0 FUTURE OPPORTUNITIES AND CHALLENGES

4.1 *Opportunities*

Over the past 10 years a 30 to 60% reduction in stream flow has been recorded in the central region of Victoria. Climate change forecasts predict a further 19 to 30% reduction in stream flows by 2055 in the central region of Victoria.

Watercourses are a vital community asset and are major drawcard for recreation and regional tourism. In a community, watercourses are associated with a 'sense of place' and 'belonging' and provide for significant ecosystems that support native plant and animal species. Recycled water returned to stream for environmental flow can contribute to and protect the intrinsic values of our watercourses.

112 GL of recycled water is produced in regional Victoria annually. Removing recycled water from our waterways will further critically impact on stream flow for depleted rivers and will reduce the reliability of supply for downstream water users who depend on these flows. If the true value of recycled water in streams is recognised as a viable resource this water could help protect and maintain the environmental, social and economic benefits that a stream flow provides.

Returning recycled water to stream can open up a number of opportunities that the current water recycling practice of pipes and pumps do not realise. Table 4 outlines the advantages and disadvantages between pumping and piping recycled water compared to returning naturally to stream:

Table 4: Comparisons Return to Stream and Pumping/Piping Recycled Water

	<i>Recycled Water Return to Stream</i>	<i>Pumping and Piping Recycled Water</i>
Advantages	<ul style="list-style-type: none"> Increasing stream flow and the ability of the waterway to have a more natural flow pattern. An increase in stream flow typically improves water quality assuming the recycled water is of a sufficient quality for that stream. Typically recycled water is gravity feed to stream and utilise watercourse to distribute thereby reducing greenhouse gas emissions. Add to existing source of water and infrastructure for the environment, recreation, irrigators and consumers. Recycled water may substitute raw water supplies for irrigators, water businesses and environmental water reserves, saving the environmental flow of streams. The true economic value of recycled water returned to stream can be realised and negotiated with stakeholders. 	<ul style="list-style-type: none"> Water can be pumped to irrigators and consumers over distances and heights creating a new source of water where otherwise it may not be available. Revenue can be generated through the purchase of recycled water.
Disadvantages	<ul style="list-style-type: none"> Possible additional emissions from an increased treatment process. Possible cost if additional treatment is required. 	<ul style="list-style-type: none"> A decreased stream flow by removing recycled water from watercourse. A large reduction in stream flow typically decreases stream water quality. Greenhouse emissions may be produced from the pumping and installation of pipe network. Upfront and life cycle cost associated with pumping and pipe network design, construction and maintenance.

Recycled water is a source of water that can play a key role in the substitution of both raw and drinking water supplies, as new water for fit for purpose uses and as environmental flow to ensure adequate maintenance of stream health for Victoria’s stressed waterways.

The opportunity to substitute raw water supplies with recycled water for irrigators, environmental water reserves and other bulk water entitlements and decrease pumping and pipe networks that create capital expenditure, greenhouse emissions and increased life-cycle costs should also be taken.

In particular, the opportunity to utilise recycled water to increase stream flow and improve water quality is important, especially during these times of reduced alternative supplies.

4.2 Challenges

The challenges relate primarily to legislative and regulatory matters. As discussed above, the technical issues can be managed. The conditions under which these technical issues are applied need to be firmly resolved between legislators, regulators and the water industry.

The Water Act itself is unclear as to whether recycled water is able to be included in a BE or the EWR, although current discharges of waste water are already included in allocations of downstream bulk entitlements and licences as they are generally already included in yield calculations. In each case, the legislation prohibits the allocation of recycled water for the relevant purpose where the recycled water is located in the “works” of an Authority/ Melbourne Water/ licensee.

There is the potential for argument that recycled water that is discharged to a waterway and therefore “shandied” may be allocated to a BE or the EWR, as is current practice. However, this appears to defeat the distinction recently created between “water” and “recycled water”.

To the extent that there remains uncertainty, amendment of the Water Act appears necessary to provide the needed clarity, which would then allow other uncertainties to be resolved. For example, the “sale” of recycled water to downstream users would also clarify questions as to the ESC’s jurisdiction by providing a “retail customer” of recycled water services. Likewise, the inclusion of recycled water as part of an EWR would also resolve uncertainties regarding the ability to trade recycled water as part of that EWR.

While there is less uncertainty regarding the current regime under the Environment Protection Act, that regime also appears to require amendment or embellishment to facilitate the use of recycled water for the purposes of environmental flows. In particular, under the current regime, Guidelines are required to provide certainty under both the exemption provisions of the Scheduled Premises Regulations and clause 31 of the SEPP.

Alternatively, a more radical regime overhaul would provide for the regulation of water on a “fit for purpose” basis, rather than on its source or origin.

5.0 CONCLUSIONS

The following conclusions are drawn from this high level review of return of recycled water to stream for environmental flows:

1. The recycled water available from regional Victoria water authorities for return to stream for environmental flows is small in the context of total stream flows. However, in the context of water to be saved under the current Living Murray initiative, it is significant. In many other instances across the State, the contribution of recycled water to maintain low stream flows and to support wetlands in dry conditions is also critical to sustaining entire aquatic ecosystems.
2. There are several existing examples of recycled water providing substantial benefits as environmental flow sources in Victorian streams and other waterways. Acknowledgement of these examples by regulators has not been readily forthcoming.
3. The current regulatory regime makes it difficult to return recycled water to stream for environmental flows.
4. A total sustainability approach, in which return to stream is assessed on a risk assessment basis, including ecological risk, is likely to result in a much more favourable position for return to stream, particularly with the quality of recycled water required.
5. The value of return to stream of recycled water needs to be addressed on a case by case basis rather than as a default for all discharges.
6. In the event of return to stream for environmental flows being the most beneficial use of recycled water then the economic value of this water should be recognised and a monetary payment made for the recycled water by the stream manager and downstream water users who may benefit from the increased reliability of supply.
7. In the extreme, the monetary value of the recycled water could be the same as the monetary value for extractions from the receiving stream.
8. Considerable meaningful discussions will be required between regulators and the Victorian water industry on the concept of return to stream of recycled water for environmental flows to resolve an agreed position, taking account of the findings in this position paper and EPA's discussion paper on return to stream.

6.0 VICTORIAN REGIONAL WATER INDUSTRY POSITION

The high level review by the Working Group has identified the issues and opportunities for recycled water as environmental flows. As a result the Working Group's position is that recycled water returned to stream for environmental flows should be recognised as a beneficial use.

To enable recycled water returned to stream to be recognised as environmental flows, the Working Group makes the following recommendations:

1. The Victorian water industry (VicWater) resolves to work with regulators and legislators to have recycled water returned to stream for environmental flows recognised as a beneficial use.

2. The Victorian water industry (VicWater) works collaboratively with EPA in the first instance to achieve an agreed position on recycled water returned to stream for environmental flows based on this position paper. This position should be reflected in EPA's draft, but yet to be released, discussion paper on this issue.
3. The Victorian water industry (VicWater) works actively with stream managers to have a monetary value assigned for recycled water returned to stream for environmental flows.
4. The quality required for recycled water returned to stream for environmental flows be determined on a total sustainability basis using TBL analysis to reflect the wider environmental, social and economic impacts.
5. Amendments be made to legislation to accommodate recycled water returned to stream for environmental flows.

References

1. Environmental Flows for the River Murray, South Australia's framework for collective action to restore river health, 2005-2010. Government of South Australia, 2005.
2. WSAA, 2006 - Refilling the Glass - Exploiting the issues surrounding water recycling in Australia. WSAA Position Paper N°.2 (Draft) November 2006.
3. EPA Publication 1069, November 2006 - Principles to establish EPA environmental obligations for water businesses for the 2008 - 2013 pricing determination.
4. Personal communication Allen Gale and Tim Fisher of EPA, 31 August 2006.

Appendix A

Barwon Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Colac water reclamation plant (Lake Colac - no continuous outlet from lake)	Tertiary BNR	1730	Assumed to be moderate based on only continuous input into lake. Little info on other inputs to Lake (2700Ha surface area).	No	<ul style="list-style-type: none"> • Currently meeting tertiary licence requirements • Minimal reuse (onsite only) currently with no significant opportunities identified to date. • Closed lake system makes assessment of impacts difficult. 	New licence issued mid-2006 with no discussions regarding environmental flows.

Central Highlands Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Ballarat North (Burrumbeet Ck)	Tertiary BNR upgrade to be completed late 2007	2044	Low % of annual flows but can be up to 100% of summer flows	No	<ul style="list-style-type: none"> Tertiary upgrade to be completed 07/08. Further upgrade to additional class A std for nominal 50% of capacity 08/09. Realistic potential for 100% reuse to be achieved within 5-10 years. No CMA assessment of environmental flow requirements. 	None
Ballarat South (Yarrowee Ck)	Tertiary BNR	6108	Low % of annual flows but can be up to 100% of summer flows	No	<ul style="list-style-type: none"> Currently meeting tertiary licence requirements. Minimal reuse at present but resource flagged for potable substitution in long term water resource plans. No CMA assessment of environmental stream flow requirements. 	None

Coliban Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Bendigo (Bendigo Creek)	Tertiary BNR	5000	Low % of annual flows but considerable portion of summer flows	Yes	<ul style="list-style-type: none"> Currently meeting EPA licence requirements. Plan is to ultimately eliminate discharge to creek and use water for recycled water substitution purposes in urban area. 	EPA have for some time indicated that options for reuse should be pursued, due to perceived build up of nutrients in Bendigo Creek. There is an issue to be resolved with a number of downstream diversifiers from the creek who were encouraged to establish infrastructure to use water that was discharged into the creek (by a predecessor to Coliban Water).
Castlemaine (Campbells Creek)	Tertiary BNR	1000	Low % of overall flows but 100% summer flows	NO	<ul style="list-style-type: none"> Currently meets EPA licence requirements. Longer term plan is to enhance treatment (RO) and reuse on orchard areas in Harcourt. 	No detailed discussions at this stage
Kyneton (Campaspe River)	Tertiary	400	Very low % of total flows	YES	<ul style="list-style-type: none"> Meets EPA licence requirements. Future plan is to extend a pipeline across to the Coliban River and use the water as a partial substitute for environmental flows currently released from Malmsbury Reservoir. 	Have had detailed discussions with EPA and other agencies on this and currently in process of undertaking studies to justify the use of reclaimed water as an environmental flow. Seen by EPA as test case.

East Gippsland Water

Table 1 - Wastewater for EGW received and reused by town

Town System	Inflow ML	Released ML	Reuse		Non-Reuse		
			ML		%	ML	
Bairnsdale	1189	1182	1182	100		0	51 ML is used in irrigation, the balance 1131ML is beneficial re-use in one of the few remaining “freshwater wetlands” on the Gippsland Lakes. The whole lakes & wetlands are RAMSAR wetlands. EGW diverts the treated water into 3 constructed wetlands where upon the water flows through Macleod Morass. There is a MOU b/n EGW & Parks Victoria guaranteeing that EGW to supply the water, This arrangement resulted from 5 years of consultative meetings with all stakeholders. The treatment plant supplies something like 40% of water flows in the Morass. A five year long working party determined this outcome. Tertiary treatment plant with ph removal etc
Paynesville	380	289	289	100		0	
Lindenow	25	21	21	100		0	The treated effluent from the treatment plant here also discharges into a self contained wetland.
Lakes Entrance	698	629	629	100		0	Farms, golf courses & treelots.
Metung	135	149	149	100		0	Farms
Dinner Plain	41	42	42	100		0	Irrigation of Alpine woodlands
Omeo	30	20	20	100		0	Farm
Orbost	315	276	276	100		0	Farm & treelots.
Mallacoota	137	65	65	100		0	Farm & treelots.
Cann River#	4	0	0	-		-	Farm
Total	2954	2674	2674	100		0	

#New system – storage being filled

All the rest are class ‘C’

Gippsland Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF) STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year) 2005/06	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Drouin (Shillinglaw Creek)	Secondary (Tertiary in 2006-DAFF plant polishing)	186	H	Yes (irrigation)	<ul style="list-style-type: none"> Creek ephemeral, heavily degraded (urban stormwater, agricultural runoff) Discharge only when irrigation not available & storage lagoon freeboard reached Impact on subsequent receiving environment (King Parrot Creek) would have to be considered 	No discussions to date, unlikely to be considered EF
Moe (Moe River)	Tertiary (BNR)	2054	L	Some (diversion to lagoons)	<ul style="list-style-type: none"> Currently meeting tertiary licence requirements River heavily degraded, due to agricultural impacts 	No discussions to date, unlikely to be considered EF
Morwell (Morwell River Wetlands)	Tertiary	620	H	Some (diversion to lagoons)	<ul style="list-style-type: none"> Flow sustains artificial wetland throughout year 	Consider beneficial use of treated wastewater, to satisfaction of regulator
Neerim South (Red Hill Creek)	Tertiary (BNR)	17	M	No	<ul style="list-style-type: none"> Creek heavily impacted by agricultural activities-low flow across open paddocks Landcare have been active in fencing off sections, so quality may improve with time 	Possibility has been flagged to the EPA, for future consideration
Rawson (Coopers Creek)	Tertiary	33	H	No	<ul style="list-style-type: none"> Discharged into headwaters of creek. Virtually no natural flow (spring-fed). Creek catchment is heavily impacted by agricultural activities and blackberries. 	Possibility has been flagged to the EPA, for future consideration
Warragul (Hazel Creek)	Tertiary	1436	L	Some (diversion to lagoons)	<ul style="list-style-type: none"> Creek heavily impacted by upstream urban runoff. 	No discussions to date, unlikely to be considered EF.

Goulburn Valley Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Shepparton (Goulburn River)	Tertiary Actiflo for the removal of Phosphorus	1876	Low % of annual flows winter flow only	No	<ul style="list-style-type: none"> • Currently meeting tertiary licence requirements. • 60% reuse and continuing to develop more reuse opportunities. • Minimum flows in Goulburn River have been established and are managed by Goulburn-Murray Water. 	Currently negotiating with the EPA to recognise the environmental flow as a beneficial flow to the Goulburn River.
Alexandra (Goulburn River)	Tertiary DAFF	208	Low less than 1 % annual flows winter flow only	No	<ul style="list-style-type: none"> • Currently meeting tertiary licence requirements. • 30% reuse and continuing to develop more reuse opportunities. • Minimum flows in Goulburn River have been established and are managed by Goulburn-Murray Water. 	Currently negotiating with the EPA to recognise the environmental flow as a beneficial flow to the Goulburn River.
Eildon (Goulburn River)	Tertiary DAFF	200	Low less than 1 % of annual flows	No	<ul style="list-style-type: none"> • Currently meeting tertiary licence requirements. • Reuse options to be investigated over the next three year. • Minimum flows in Goulburn River have been established and are managed by Goulburn-Murray Water. 	Currently negotiating with the EPA to recognise the environmental flow as a beneficial flow to the Goulburn River.

GWM Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
GWMWater WWTP's (all)					<ul style="list-style-type: none"> • Currently no WWTP releases water as environmental flow. • No current plans for reclaimed water to be returned to environmental flow. 	

Lower Murray Water

Don't have any

North East Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Beechworth (Spring Ck)	Secondary (with chemical polishing)	318ML	Low % of annual flows (<5%) but high percentage of summer flows.	Some (dependant on time of year)	<ul style="list-style-type: none"> Currently reusing 14% of flow with option to move to 100% reuse (Class C). Currently evaluating options to upgrade the site (either 100 % reuse or plant upgrade). 	None
Bright/Porepun kah (Ovens River)	Secondary	Nil	Flow data not available from DSE	Some	<ul style="list-style-type: none"> Tertiary upgrade planned for 2008. Change from land disposal to water disposal at this time. Currently reuse 21.5ML pa. 204ML discharged to land. 	Some discussions re groundwater recharge, but SEPP does not allow groundwater discharges.
Wodonga (Murray River)	Tertiary BNR	3825ML	Low % of river flows, but 50% of raw water extracted for potable use	No	<ul style="list-style-type: none"> Minimal reuse (Class B) at present but resource flagged for potable substitution in long term water resource plans. 	None
Myrtleford (Ovens River)	Secondary	275ML	Flow data not available from DSE	Some	<ul style="list-style-type: none"> Currently evaluating options to upgrade the site 	None
Wangaratta (Reedy Ck)	Secondary with chemical polishing	1198ML	Low % of annual flows but can be up to 100% of summer flows	Some	<ul style="list-style-type: none"> Long term option to move to 100% reuse. Currently reuse approx 28% of flows. 	None

South Gippsland Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Korumburra (Foster Creek)	Tertiary completed 2006.	500	High % of annual flows up to 100% of summer flows.	No	<ul style="list-style-type: none"> Stock and domestic extraction severely depletes the stream flows and the stream would cease to flow without the treatment plant inflow, and some farmers would also be deprived of S & D water. 	<ul style="list-style-type: none"> Local EPA state that flows to the creek for environmental flows provide an excellent outcome but are unable to examine or approve as reuse (as distinct to disposal) as the guidelines are only in draft form. No CMA involvement to date.

Wannon Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Simpson WRP (Unnamed Creek – tributary of Sunday Creek)	Secondary	18	Low to Medium %	No	<ul style="list-style-type: none"> Currently meeting EPA licence for max of 36 ML/year discharge to stream. 	<ul style="list-style-type: none"> EPA has expressed their desire to reduce flows to stream. 50% reuse to land has been set as the default for the next Water Plan

Western Water

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Gisborne RWP (discharge to Jackson's Creek)	<ul style="list-style-type: none"> Currently Vic EPA Class B Secondary treatment with phosphorus reduction Upgrade of RWP to cater for higher flows and nitrogen reduction to be complete 07/08. 	<p>RW Vol. Produced - 399 ML/yr</p> <p>RW Vol. Available for discharge - 322 ML/yr</p>	<p>Low % of annual flows. Higher % of summer flows and when reservoir releases stop.</p>	<p>No</p>	<ul style="list-style-type: none"> Currently undertaking a review for possible extension of the recycled water scheme (to land) to meet 100% recycling target. Jackson's Creek is considered a regulated reach of the Maribyrnong Catchment due to releases from Rosslynne Reservoir. Rosslynne Reservoir currently at 6.7% capacity. 	<ul style="list-style-type: none"> Two temporary amendments to the bulk entitlements from Rosslynne Reservoir have been negotiated by BE holders. The Jan 04 BE amendment required a minimum release of treated wastewater from Gisborne (10 ML/month) and Sunbury (60ML/month) RWPs to Jackson's Creek. A fish survey and water quality testing was conducted along Jacksons Creek. The Nov 04 BE amendment maintains many of the requirements of the Jan 04 BE amendment but included additional information regarding minimum daily passing flow at certain points along Jackson's Creek and water quality requirements. This BE amendment expired in Nov 05. A new BE amendment is still in negotiation. A stakeholder workshop was conducted, minutes taken and a project plan prepared to assist a further BE amendment. Stakeholders invited included EPA, DSE, SRW, CMA, Local Council, MW, Irrigators, Local Friends Group. All stakeholders acknowledged that min flows are desired to reduce the risk of algal blooms, to encourage native fish population and migration between pools, and to provide adequate water for agricultural extraction, and passive recreational use. The stakeholder workshop identified a mixing zone study, which has been commissioned by WW, as the first step to assess the impact of using RW for EFs.

Western Water Cont ...

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Sunbury RWP (discharge to Jackson's Creek)	<ul style="list-style-type: none"> • Currently Vic EPA Class B • Tertiary including phosphorus and nitrogen reduction. • Upgrade of RWP to cater for higher flows and increased nitrogen reduction 06/07. 	<p>RW Vol. Produced – 2066 ML/yr</p> <p>RW Vol. Available for discharge – 1161 ML/yr</p>	Low % of annual flows. Higher % of summer flows and when reservoir releases stop..	No	<ul style="list-style-type: none"> • Current recycled water scheme has capacity to recycled 100% (2,200 ML/yr). • Jackson's Creek is considered a regulated reach of the Maribyrnong Catchment due to releases from Rosslynne Reservoir. • Rosslynne Reservoir currently at 6.7% capacity. 	

Westernport Water

CURRENT STREAM DISCHARGES FROM WWTP'S & ENVIRONMENTAL FLOW (EF)STATUS

Treatment Plant & Receiving stream	Water Quality (Secondary, Tertiary, BNR)	Quantity (ML/year)	Significance of discharge on receiving stream (H/M/L)	Capacity to vary flows throughout year?	Description of issues re Environmental Flows	Status of EF discussions with regulators? Have regulators indicated a position re EF's?
Cowes	Secondary	1200	Nil	Nil	<ul style="list-style-type: none"> Ocean Outfall 	Nil
King Rd	Secondary	120	Nil	Nil	100% reuse on site	Nil

Document Version	Date Issued	Date Reviewed	Reviewer	Date Approved	Issued To	Quantity	Format
Draft v1	15/11/06		A. Gale		Working Group	1 Electronic	Word
Draft v2	21/11/06	21/11/06	A Gale		VicWater Board	1 Electronic	Word
Final for Presentation to CEO's	27/11/06	27/11/06	A. Gale	27/11/06	Regional CEO's	Electronic	pdf
Draft Final v3	07/06/07	08/06/07	A. Gale	08/06/07	Working Group	Electronic	Word / pdf

Cover photographs from www.dse.vic.gov.au (in order from left to right are) Merri River catchment, south west Victoria. Tainjil River, in the forested north-western part of the La Trobe Basin, 1989. www.envict.org.au Loddon River