



Western Australia

*Economic Regulation Authority*

---

# **Inquiry on Urban Water and Wastewater Pricing**

**Draft Report**

**18 March 2005**



<b>TABLE OF CONTENTS</b>	i
<b>1 EXECUTIVE SUMMARY</b>	<b>1</b>
<b>2 HOW TO MAKE A SUBMISSION</b>	<b>11</b>
<b>3 INTRODUCTION</b>	<b>12</b>
3.1 Terms of Reference	12
3.2 Review Process	13
3.3 Background to the Inquiry	14
3.3.1 National Water Initiative	15
3.3.2 Productivity Commission Review of National Competition Policy	15
3.3.3 State Water Strategy	16
3.4 The Rationale for Price Regulation	16
3.5 Assessment Methodology	18
3.5.1 The Assessment Framework	18
<b>4 WATER CORPORATION</b>	<b>23</b>
4.1 Background	23
4.2 Service Standards	24
4.2.1 Water Corporation Proposal	24
4.2.2 Issues Paper Submissions	27
4.2.3 Authority Assessment	27
4.3 Balancing Water Supply and Demand	30
4.3.1 Background	30
4.3.2 Demand Projections	32
4.3.3 Water Availability and Use	34
4.3.4 Source Development Plan	38
4.3.5 Competition in the Water Industry	45
4.3.6 Demand Management	46
4.4 Revenue Requirement	54
4.4.1 Background	54
4.4.2 Operating Expenditure	54
4.4.3 Capital Expenditure	57
4.4.4 Depreciation	65
4.4.5 Rate of Return	66
4.4.6 Initial Regulatory Asset Value	68
4.4.7 Total Revenue Requirement	71
4.5 Tariff Structures	75
4.5.1 Meeting Efficiency Objectives	75
4.5.2 Meeting Demand Management Objectives	84
4.5.3 Meeting Social Objectives	91
4.5.4 Adjusting for Externalities	97
4.5.5 Wastewater Pricing	103

<b>4.6</b>	<b>Options for Pricing Reforms and Their Impacts</b>	<b>111</b>
4.6.1	Option 1: Set the usage charge to LRMC	111
4.6.2	Option 2: Introduce a two-block inclining tariff	113
<b>5</b>	<b>AQWEST</b>	<b>117</b>
<b>5.1</b>	<b>Background</b>	<b>117</b>
<b>5.2</b>	<b>Service Standards</b>	<b>117</b>
5.2.1	AQWEST Proposal	117
5.2.2	Authority Assessment	119
<b>5.3</b>	<b>Balancing Water Supply and Demand</b>	<b>120</b>
5.3.1	Background	120
5.3.2	Demand Projections	120
5.3.3	Source Development Plan	121
5.3.4	Demand Management	123
<b>5.4</b>	<b>Revenue Requirement</b>	<b>124</b>
5.4.1	Methodology	124
5.4.2	Operating Expenditure	125
5.4.3	Capital Expenditure	126
5.4.4	Depreciation	128
5.4.5	Rate of Return	129
5.4.6	Initial Regulatory Asset Value	130
5.4.7	Total Revenue Requirement	131
<b>5.5</b>	<b>Tariff Structures and Pricing Reform</b>	<b>133</b>
<b>6</b>	<b>BUSSELTON WATER</b>	<b>134</b>
<b>6.1</b>	<b>Background</b>	<b>134</b>
<b>6.2</b>	<b>Service Standards</b>	<b>134</b>
6.2.1	Methodology	134
6.2.2	Busselton Water Proposal	134
6.2.3	Authority Assessment	135
<b>6.3</b>	<b>Balancing Water Supply and Demand</b>	<b>136</b>
6.3.1	Background	136
6.3.2	Demand Projections	136
6.3.3	Source Development Plan	137
6.3.4	Demand Management	140
<b>6.4</b>	<b>Revenue Requirement</b>	<b>141</b>
6.4.1	Methodology	141
6.4.2	Operating Expenditure	142
6.4.3	Capital Expenditure	143
6.4.4	Depreciation	144
6.4.5	Rate of Return	145
6.4.6	Initial Regulatory Asset Value	146
6.4.7	Total Revenue Requirement	147
<b>6.4</b>	<b>Tariff Structures and Pricing Reform</b>	<b>149</b>
<b>7</b>	<b>REGULATORY MODELS</b>	<b>150</b>

<b>7.1</b>	<b>Background</b>	<b>150</b>
<b>7.2</b>	<b>Price and Revenue Caps</b>	<b>150</b>
7.2.1	Individual Price Caps	150
7.2.2	Weighted Average Price Cap (or Tariff Basket)	151
7.2.3	Weighted Average Revenue Cap	152
7.2.4	Revenue Cap	152
7.2.5	Risk Considerations	153
<b>7.3</b>	<b>Form of Price Path</b>	<b>153</b>
7.3.1	Service Provider Proposals	154
7.3.2	Issues Paper Submissions	154
7.3.3	Authority Assessment	156
APPENDIX 1: SUMMARY OF DRAFT FINDINGS AND RECOMMENDATIONS		157
APPENDIX 2: INQUIRY TERMS OF REFERENCE		170
APPENDIX 3: LIST OF SUBMISSIONS		175
APPENDIX 4: RATE OF RETURN		176
APPENDIX 5: INDEPENDENT SOURCE DEVELOPMENT PROPOSALS		187
APPENDIX 6: GLOSSARY AND ABBREVIATIONS		190

# 1 EXECUTIVE SUMMARY

## Introduction

This draft report provides the preliminary findings and draft recommendations of the first independent inquiry into water and wastewater pricing in Western Australia. The Economic Regulation Authority is undertaking the Inquiry under direction by the Treasurer, in accordance with section 32(1) of the *Economic Regulation Authority Act 2003*.

The purpose of the Inquiry is to inform the Government's decisions on the level and structure of urban water and wastewater prices and on the form of price regulation that the Government should apply to the Water Corporation, AQWEST and Busselton Water.

This draft report has been informed by a public consultation process, which involved interested parties providing written submissions to the Authority in response to an Issues Paper that was published in July 2004. The methodology that has been followed in the Draft Report is consistent with the one presented in the Methodology Paper that was published in October 2004. The three water businesses provided their pricing submissions in December 2004 in a form that was consistent with the Methodology Paper. Consultants were employed to provide economic and technical advice on the water businesses' proposals.

In keeping with transparent decision-making, the Authority has placed all submissions received from the water businesses and interested parties on the Authority's website. The consultants' reports have also been published on the website.

## Policy Objectives

In considering the appropriate level and structure of urban water and wastewater pricing, and within the context of the Terms of Reference for this Inquiry, the Authority has been guided by the following policy objectives:

- Signalling the *scarcity value of water*, which may arise due to infrastructure constraints or limited hydrological capacity, so that water is allocated to its highest value use;
- *Managing demand* through tariff structure adjustments, where price is one tool for managing the supply-demand balance;
- Enhancing the efficiency of service delivery in the absence of a competitive market. *Regulatory mechanisms* should allow water providers to recover their cost of service delivery and earn a commercial rate of return on capital while promoting efficient service delivery;

- Controlling the *revenue requirements* of water businesses so as to prevent monopoly pricing of services to customers;
- Reflecting the net cost of *environmental externalities*, with the aim of either recovering costs associated with meeting environmental standards or sending a price signal to water users which modifies their consumption habits so as to avoid future environmental costs; and
- Setting tariff structures to meet *social objectives* related to the equitable distribution of costs to different customer groups.

### **Scarcity Value of Water**

In considering efficient water pricing, attention needs to be given to the relative scarcity of water – in terms of the economic cost of securing additional supplies for urban water users.

The concept of long run marginal cost (LRMC) provides guidance for setting efficient prices as it conveys a scarcity signal to customers – or a measure of the future costs to overcome supply infrastructure constraints. From a hydrological perspective, water is not scarce in South West Western Australia. About 22 per cent of sustainable surface water yield in the South West region is being used, while about 40 per cent of groundwater sustainable yield is being extracted. However, the economic and environmental costs of fully developing these water sources may, in some cases, be prohibitively high.

The LRMC calculation involves an assessment of the optimal sizing and sequence of measures for bringing supply into balance with demand. The assessment also needs to take account of customer willingness to pay for maintaining particular levels of supply availability and reliability – or the amount customers are willing to pay to avoid water restrictions of a particular severity and frequency.

The Water Corporation has proposed a demand management and source development program to overcome its water supply constraints. The Water Corporation is also working with Harvey Water to gain access to the water that is made available by reducing water losses in Harvey Water’s irrigation network.

Other than the arrangement with Harvey Water, further consideration could be given to purchasing or leasing water from non-urban water users. Given that the Water Corporation’s total supply of water to customers represents just 25 per cent of total water use in the South West region, there may be scope for water trading to assist in meeting growing urban demand.

While rural water pricing and trading issues are not within the scope of this Inquiry – the Treasurer’s announcement of this Inquiry signalled that rural water pricing issues would be the basis for a subsequent Inquiry – the prices paid for irrigation water are clearly relevant for setting efficient urban prices. The lack of an effective water-entitlement trading regime within and between sectors impedes the discovery of water’s ‘true’ scarcity value. For example, prices paid for water by irrigators (who use 40 per cent of water in the South West region) do not reflect the opportunity

value of that water in other uses – such as urban uses. The prices paid for rural water generally reflect delivery costs only.

The Authority suggests that more effort should be devoted to establishing an effective trading framework whereby non-urban water users would be given the opportunity to sell or lease water entitlement to the Water Corporation at a market price.

Based on the Water Corporation's source development plan, the Authority estimates the LRMC of supply to be approximately \$1.00 per kL. This could be an overestimate given that an effective water-trading regime is not in place. It is also likely to be overestimated because the Water Corporation's source development program is based on the objective of maintaining a security buffer to limit the risk of a total sprinkler ban to a one in 200 year event. This objective warrants closer examination as customers may be willing to trade-off supply availability and reliability in return for lower water prices that would eventuate from the deferral of source development expenditure.

The maintenance of a high security buffer influences the timing of bringing different source development options online. For example, the Water Corporation's decision to schedule the desalination plant ahead of South West Yarragadee has largely been driven by the need to meet the supply reliability target. Due to delays in gaining environmental approval for Yarragadee, the Corporation has proposed to bring desalination online, despite it being a more expensive option.

The Authority is of the view that consideration should be given to postponing desalination, which would allow time for the environmental assessment of South West Yarragadee to be completed. Subject to environmental approval, South West Yarragadee would provide customers with a cheaper source of water. It is acknowledged that this approach would increase the risk of total sprinkler restrictions in the short term. The Corporation estimates that the risk of a total sprinkler ban would increase from 8 per cent to 17 per cent in 2006-07. This increased risk needs to be weighed up against the potential benefit of lower cost water.

Busselton Water and AQWEST are able to supply water at a significantly lower LRMC than the Water Corporation. This is primarily because the water boards have a relatively abundant supply of groundwater and do not face the supply-demand imbalance problems currently experienced by the Water Corporation in meeting the needs of Perth consumers.

The LRMC calculations do not, however, build in a cost to reflect the opportunity value of the water licences being held by Busselton Water and AQWEST. These regional suppliers have licences to extract 26 GL, yet only 10 GL is currently being utilised. In the case of Busselton Water it is estimated that, based on demand projections, it will be another 40 years before the provider's groundwater allocation will be fully utilized. AQWEST's water allocation will not be fully utilised for another 25 years. Therefore, in principle, there is an opportunity for these regional suppliers to sell or lease part of their unused allocation to the Water Corporation.

For example, the 45 GL that the Water Corporation is proposing to source from the Yarragadee aquifer could be supplemented with up to an additional 16 GL of unused allocation from the regional water providers. Owing to the lack of a water market, the prices charged by Busselton Water and AQWEST may not reflect the value of this potential sale to the Water Corporation. If an effective water market were operating, these opportunity values would be internalised into the commercial operations of the water providers and long-run marginal costs adjusted accordingly.

### **Demand Management**

Marginal cost pricing has a role to play in managing water demand. Not only does it fulfil a revenue-generating function for funding new capital investments and demand management programs, it has the potential to shape customer's long-term consumption decisions – such as investments in water saving alternatives. Including marginal cost in the usage charge sends a scarcity signal to consumers to enable adjusted behaviour and deferment of capital expenditure. Faced with higher water prices, customer decisions to either maintain or decrease consumption will reflect customers' willingness to pay the costs associated with their consumption behaviour – with these costs being conveyed by the usage charge.

Demand management pricing can also be utilised as a tactical instrument in times of shortages. There is scope for increasing prices beyond marginal cost in times of scarcity to meet specific demand management objectives. However, there is a risk that pricing above LRMC may cause customers to over-invest in water saving alternatives, which can result in greater costs being incurred by society than if demand were met by additional water sources. For this reason, the limitations of using price as a tactical instrument to manage demand needs to be recognised.

The effectiveness of pricing as a demand management tool relies on customers being responsive to price. Based on a literature review, residential demand for water is relatively insensitive to price, implying that minor changes in price would not bring about significant reductions in water consumption. However, changing the current residential water tariff so that the usage charge is equated to LRMC would increase the average annual water *usage* costs of Perth households from \$130 to \$250, which could have a significant impact on water usage. Total costs would rise by only \$12 because there would be a concomitant reduction in the fixed service charge.

### **Regulatory Mechanisms**

The Authority is of the view that the most appropriate form of price regulation for the Government to apply to the Western Australian water industry is one that is light-handed, providing certainty to service providers over a three-to-five year period.

The Authority favours a pricing structure that allows maximum flexibility to the water businesses whilst still promoting outcomes that are in the public interest. Under the individual price cap approach, price paths for specific services are set for the term of the regulatory period, with explicit efficiency factors built into the price path.

Price caps are currently used by IPART to regulate water providers in NSW and the Victorian Essential Services Commission has capped prices for 2004/05, with a view to using a “tariff basket” approach in future years.

The tariff basket approach contemplated by the Victorian ESC has a number of appealing attributes in circumstances where concern is primarily with allowing a regulated service provider a substantial incentive and freedom to set economically efficient prices. While this approach has merit in the setting of efficient prices from the perspective of the service provider, it weakens a regulator’s ability to regulate prices in such a manner so as to achieve social or environmental objectives in water pricing.

While there are merits in exploring the tariff basket approach further, the Authority considers that, in the case of water, individual price caps could be a more effective means of achieving public policy objectives, such as ensuring that water prices reflect LRMC.

In relation to the length of the price period, the Authority considers that the significant uncertainty associated with climate and the Water Corporation’s source development plan justifies restricting the initial price period to three years.

As the water boards have relatively small capital expenditure programs and secure water supplies, it would be appropriate to apply a longer price period. The main uncertainty for the water boards relates to the future of their governing legislation. On the assumption that any change to the water boards’ legislation occurs before 2006/07, the Authority considers that a price period of five years would be appropriate.

## **Revenue Requirements**

Over the four-year period commencing 2005/06 and finishing in 2008/09, the Water Corporation has proposed “across the board” price increases equal to the Consumer Price Index. In addition, two specific water price increases are proposed to finance the cost of the desalination plant (13.5 per cent in 2006/07) and to recover the costs of water trading with Harvey Water (2.1 per cent in 2008/09).

Under a regulatory pricing approach, water charges would depend on the Water Corporation’s revenue requirement determined by a rate of return on the regulatory asset value, depreciation and operating and maintenance expenditure.

The Water Corporation has proposed a regulatory asset value of \$9,100 million at December 2006, which is the value that preserves the ‘status quo’ of the Corporation’s forecast prices and revenues, and by implication, the value of the Corporation’s business were the Government to introduce cost-based regulation.

The Authority’s consultants have checked the Corporation’s proposed asset value by constructing a set of regulatory accounts. This calculation produced an asset value of \$9,575 million, which is within 10 per cent of the Corporation’s proposal. Therefore, the Authority accepts the Corporation’s regulatory asset value as being an appropriate value that preserves the revenue and average prices currently forecast for the period 2004/05 to 2008/09.

Reductions in the Corporation's revenue requirements could be achieved through reductions in operating costs (which reduce requirements by approximately 2.8 per cent), and a change in the source development programme that brings forward the development of the South West Yarragadee Aquifer and postpones development of the desalination plant (approximately 0.9 per cent).

In addition, evidence from other utilities suggests that greater project partnering and alliances with the private sector could deliver capital expenditure savings over the current approaches. Capital expenditure savings of 10 per cent on the Water Corporation's forecasts would give rise to a reduction in revenue requirements of approximately 0.8 per cent for the period to 2008/09.

The Authority, therefore, considers that the revenue requirements and average prices of the Water Corporation could be reduced by up to about 5 per cent from that proposed by the Water Corporation.

An assessment of regulatory asset values has also been made for AQWEST and Busselton Water from a starting point of determining the asset values that would preserve (in a cost-based methodology) current and forecast prices and revenues of each of the businesses. Both of these businesses are, however, generating revenues in excess of levels necessary to maintain the businesses and finance capital expenditures and lower regulatory asset values (with correspondingly lower revenues and average prices) would be possible without compromising the businesses.

For AQWEST, the initial regulatory asset value that would preserve forecast revenue and average prices is estimated to be \$22.7 million in 2006/07.

For Busselton Water, the regulatory asset value that preserves current and forecast revenues is estimated to be \$3.9 million in 2006/07.

With their current financial structure and absence of obligations to make dividend payments, the initial regulatory asset values for both AQWEST and Busselton Water could be set at zero in 2003/04 (with a concomitant reduction in customer charges by 21 per cent and 7 per cent respectively, in 2006/07). This can be achieved without compromising the viability of the businesses and without requiring the businesses to take on debt.

For both AQWEST and Busselton, however, the appropriate initial regulatory asset value, and hence the revenue requirement and average prices, could be affected by mooted reforms to the water boards' governing legislation, which could require the water boards to make dividend payments to the State Government.

### **Environmental Externalities**

The Authority is of the view that it would be reasonable to pass on to customers those resource management costs that are directly attributable to current consumption activities. The cost of repairing any damage caused by supply decisions made in the past might be better funded by Government.

As the Water Corporation does not incur the costs of water resource management, revenue generated from the charge should be passed back to Government.

While the Authority supports the principle of a resource management charge, care should be taken to ensure that the environmental standards and targets set by Government reflect an “efficient” level of environmental quality, which may need to be established using surveys of community willingness to pay for public environmental goods. Also, the environmental outcomes should be delivered at least cost.

In principle, there is economic justification for using pricing to internalise other environmental costs such as the impact of reduced natural stream flow and lower groundwater levels that are not currently being addressed by environmental programs. However, in Western Australia, not enough is known about these costs to establish a measurable and defensible externality charge.

### **Social Objectives**

A number of social issues must be considered when setting prices for water and wastewater services. Common social objectives are to ensure that water for non-discretionary use is available to all customers at an “affordable” price and that costs are allocated “fairly and equitably.”

One of the goals of effective price regulation and oversight is to ensure that community welfare considerations are met using mechanisms that minimise unwanted distortions in efficient water use.

Under current arrangements, a five block inclining tariff is used to fund discounts on water for basic needs, which improves the affordability of water for low-income families. The Authority is of the view that it would more efficient to achieve this social objective through providing low-income households with concessions on the fixed charge because all water consumption contributes to LRMC.

One of the drawbacks of inclining tariffs is that, depending on where the step is positioned, they can penalise large families that have above-average non-discretionary water requirements. However, large families could be provided with ‘water savings packages’ that include free water saving products to assist them in reducing their water bill. Victoria has adopted this approach.

On the issue of Customer Service Obligations (CSOs), the Authority is indifferent to whether the uniform tariff policy is funded by a direct government payment or a reduction in dividend requirement. However, under both of these models the Water Corporation should be required to provide economic justification (rather than an accounting justification as it does presently) for the amount of CSO payment (or dividend reduction). That is, the Water Corporation should submit to Government a detailed breakdown of the efficient marginal costs of water delivery to each of its customer groups (by location). This would aid in making the true economic cost of the CSO transparent.

Under a regulatory framework where prices are controlled, requiring the Water Corporation to fund the CSO internally is not a favoured model because it would encourage the Water Corporation to use potentially inefficient cross-subsidy pricing to meet its CSO.

## Options for Pricing Reform

The Authority has focussed its attention thus far on considering options for reforming the Water Corporation's residential pricing structures. A more detailed analysis of tariff structures including for commercial customers, with reference to the principles developed in this draft report, will be undertaken as part of the Final Report.

### *Residential Water Pricing*

The Authority's preferred option is to rebalance the residential water tariff so that a greater proportion of the Water Corporation's costs are recovered through the usage charge, whilst maintaining a demand management signal to high water using households.

One reform option considered in this draft report is to introduce a two-block inclining tariff and rebalance the tariff so that the majority of customers pay LRMC. Under this option the first block would comprise a usage charge of \$1.00 per kL for consumption up to 600 kL. The second block would comprise a usage charge of \$1.50 per kL for volumes above 600 kL. The positioning of the step takes into account the water needs of large families. The Water Corporation estimates that, on average, a six-member household uses approximately 600 kL in the absence of restrictions.

Unlike the existing block tariff, it is proposed that no discount be given on the usage charge to low-volume users. This is consistent with the principle that every additional unit of water consumed contributes equally to LRMC, regardless of whether it is used by high or low volume users. However, the higher usage charges would permit a significant reduction in the fixed charge, which would be of benefit to low volume (possibly low income) users – although it is acknowledged that this benefit would not be directly passed through to tenants, who do not pay the fixed charge.

The Water Corporation estimates that the fixed component could be reduced from \$149 to \$35 per annum with no change to total revenue (assuming demand does not change). However, a reduction in the fixed charge should be limited to a level that avoids low usage customers being subsidised by higher usage customers.

An indicative assessment of the distributive impacts of this tariff option – in terms of changes in water bills experienced by residential customers with differing consumption profiles - shows that:

- Because of the lower fixed charge, low volume customers using up to 150 kL per year receive a significant reduction in their total bill, ranging between \$26 and \$85 per annum depending on actual consumption. Almost 30 per cent of customers fit into this category.
- All customers using more than 230 kL of water would experience a higher total water bill. But the increase for households using the average amount of 250 kL per year is relatively small – only \$6.35 per annum.

- The 19 per cent of customers who are currently using between 350 to 550 kL would face bill increases of between \$39 and \$57 per annum, depending on actual consumption;
- The 7 per cent of customers who are currently using between 550 and 950 kL would face bill increases of between \$57 and \$152, depending on actual consumption; and
- Households consuming more than 950 kL per year would face a bill increase of \$152. However, only 1 per cent of customers fall into this category.

In summary, a two-block tariff option has a number of advantages over the current tariff structure:

- The tariff is rebalanced so that the usage charge for every unit of water consumed is more reflective of scarcity costs;
- The demand management ‘intent’ of the current five-block inclining tariff is retained without the complexity, thus clarifying the price-consumption relationship to customers;
- Low volume customers, which potentially include a larger proportion of low income households, would benefit from the tariff adjustment because their total bill would be reduced; and
- Depending on the exact positioning of the step, there would be an opportunity to minimise the impact of the two-block tariff on large families.

On balance, the Authority considers that a two-step inclining tariff offers advantages in managing demand. It would also bring Western Australia into line with tariff structures employed in other States.

As discussed above, the positioning of the step at 600 kL would minimise the impact on large families, although it is acknowledged that charges for consumption above 230 kL would, nevertheless be higher compared to existing arrangements. Again, the provision of ‘water savings packages’ may assist large families to minimise the impact of the higher usage charge. Similar assistance could be given to tenants.

One potential concern about the two-block tariff option, and as is the case with the current tariff, is that customers in the upper block are charged above LRMC, which could encourage some households to over-invest in water saving alternatives.

Further consideration will need to be given to the impact that the two-step option has including on the Water Corporation’s revenue variability, particularly when demand is constrained due to water shortages.

Further work is also required to identify the potential water savings associated with this option as well as the distributional implications.

To be effective the introduction of a two-step tariff would need to be combined with the provision of information to households to better inform customers of the tariff

approach and to more clearly separate water from wastewater charging. For example, moving to a system of quarterly billing and informing customers about the usage component and the fixed charge could assist with communicating the conservation signal more clearly to customers.

Furthermore, to help customers "benchmark" their current usage costs it may be beneficial to indicate the size of their previous bills – showing cost and volume. Moving to a quarterly billing cycle would, however, incur additional administration costs because it would require meters to be read four times a year instead of the current biannual reading.

### *Residential Wastewater Pricing*

The Water Corporation currently recovers the cost of its residential wastewater services through a rating system, which is based on customer's property values. Thus, a greater proportion of wastewater costs are recovered from high value properties and the wastewater bill paid by a customer does not necessarily reflect the cost of servicing a property. Western Australia and South Australia are the only states to base residential wastewater charges on property values. An alternative pricing arrangement would be to set a uniform charge equal to the 'per property' average cost of service delivery. This would remove the need for property valuation assessments, with a cost saving of \$2.4 million each year, and the need to make regular adjustments to charge rates in line with changes in property values.

The drawback of implementing a uniform charge is that it would result in considerably higher wastewater bills for residents in low-valued properties. Conversely, residents in high-valued properties would benefit from substantial reductions in their bill.

On balance, the Authority is of the view that decoupling wastewater charges from property values may have some merit, but distributional issues would need to be addressed.

### **Other Findings**

A complete listing of the Authority's preliminary findings and recommendations is provided in [Appendix 1](#).

### **Call for Submissions**

The Authority invites interested parties to consider the preliminary findings and recommendations discussed in this report and prepare a submission to the Inquiry.

Submissions must be received by **29 April 2005**.

## 2 HOW TO MAKE A SUBMISSION

The Economic Regulation Authority (Authority) invites interested parties to consider the issues discussed in this Draft Report and make a submission to the Inquiry.

Submissions on any matters raised in this Draft Report should be in written form and electronic form (where possible) and addressed to:

Inquiry on Urban Water and Wastewater Pricing  
Economic Regulation Authority  
Level 6 Governor Stirling Tower  
197 St Georges Terrace  
PERTH WA 6000

Email: [watersubmissions@era.wa.gov.au](mailto:watersubmissions@era.wa.gov.au)

Fax: (08) 92131999

Submissions must be received by Friday 29 April 2005.

In general, submissions from interested parties will be treated as in the public domain and placed on the Authority's website. Where an interested party wishes to make a confidential submission, it should clearly indicate the parts of the submission that are confidential.

The receipt and publication of a submission lodged by a person with the Authority shall not be taken as indicating that the Authority has knowledge either actual or constructive of the contents of a particular submission and, in particular, whether the submission in whole or in part contains information of a confidential nature. No duty of confidence will arise for the Authority in these circumstances.

Further information regarding this Inquiry can be obtained from:

Mr Greg Watkinson  
Acting Director, References and Research  
Ph (08) 92131965

Media enquiries should be directed to:

Mr Tony Dawe  
WardHolt Corporate Communications  
Ph (08) 92218722

### 3 INTRODUCTION

On 15 June 2004, the Treasurer requested the Economic Regulation Authority (Authority) to undertake an inquiry into the prices for water and wastewater services in urban Western Australia. This is the first independent inquiry into water pricing in Western Australia and is in accordance with section 32(1) of the *Economic Regulation Authority Act 2003* (Authority Act).

The purpose of the Inquiry is to inform the Government on the level and structure of water prices prior to its consideration of these matters in the 2006/07 financial year. The Treasurer has indicated that this Inquiry will ensure “accountability and transparency” in the way water prices are set.<sup>1</sup> The service providers covered by the Inquiry include the Water Corporation, AQWEST and Busselton Water. The Inquiry does not include other service providers, rural water prices or the pricing of drainage, trade waste, private groundwater extractions or developer’s contributions.

Currently, the Minister for the Environment has the statutory authority to approve water and wastewater prices that are put forward by the service providers during the Budget process. Each year the Water Corporation, AQWEST and Busselton Water make submissions to government on their proposed prices for the following year. After scrutiny by the Department of Treasury and Finance (or the Office of Water Policy in the case of AQWEST and Busselton Water), the proposals are considered by the Expenditure Review Committee and are subsequently considered by Cabinet and included in the Budget.

The Authority Act provides for the Treasurer to refer an Inquiry to the Authority to examine matters such as “prices and pricing policy in respect of goods and services provided” in the water industry. The Authority’s role is therefore advisory and it does not determine of prices or pricing policy as it would in a regulatory situation.

#### 3.1 Terms of Reference

The Terms of Reference ([Appendix 2](#)) state that the Inquiry is to only include services to urban areas. For this reason, the focus of the Inquiry has been on Perth, Bunbury and Busselton. The water service providers that are covered by the Inquiry include the Water Corporation, AQWEST and Busselton Water.

The terms of reference can be summarised by the following questions in relation to each of the three water businesses:

- Are the water businesses providing services that meet customers’ expectations?
- Are the water businesses operating efficiently?
- How much revenue do the water businesses need for financial viability?
- Are the water businesses collecting that revenue in an appropriate way, including consideration of social and environmental objectives?

---

<sup>1</sup> Treasurer’s media statement, 16 June 2004.

- Is there a better way to regulate the water businesses?

In undertaking the Inquiry, the Authority is cognisant of section 26 of the *Economic Regulation Authority Act 2003*, which requires the Authority to have regard to:

- the need to promote regulatory outcomes that are in the public interest;
- the long-term interests of consumers in relation to the price, quality and reliability of goods and services provided in relevant markets;
- the need to encourage investment in relevant markets;
- the legitimate business interests of investors and service providers in relevant markets;
- the need to promote competitive and fair market conduct;
- the need to prevent abuse of monopoly or market power; and
- the need to promote transparent decision making processes that involve public consultation.

### **3.2 Review Process**

The following review process has informed the Authority's Draft Report.

- On 22 July 2004, the Authority published an Issues Paper setting out the background to the Inquiry and the issues to be considered and inviting public comment. Thirty submissions were received in response to the Issues Paper.
- The Authority appointed technical and economic consultants, following a public tender process, to assist it in reviewing asset values, capital expenditures, operating and maintenance expenditures and cost allocations of the three service providers. The Request for Tender was published on 21 July 2004 and the selected tenderer, a consortium of The Allen Consulting Group in association with Arup Water, was appointed on 17 September 2004.
- A Methodology Paper was released on 15 October 2004, which described the methodology that the Authority would use to arrive at its pricing recommendations. The paper set out the questions that the Authority has sought to address, the information service providers were asked to provide in their pricing submissions and the methodology that the Authority intended to use in analysing the information from service providers.
- Draft pricing submissions were subsequently received from each service provider on 26 November 2004 and final submissions were received on 24 December 2004. The final pricing submissions have been published on the Authority's website.

Submissions on the Draft Report are due by 29 April 2005.

The Authority will be holding public forums in Perth, Bunbury and Busselton in May 2005 to discuss this Draft Report and any submissions that are received. Information about the time and venue for these forums will be provided on the Authority's website.

Following consideration of the submissions, the Authority will submit the Final Report to the Government by 12 August 2005.

### **3.3 Background to the Inquiry**

The impetus for this Inquiry was the National Competition Council's (NCC) 2003 assessment of Western Australia's progress in implementing the 1994 Council of Australian Governments (CoAG) water reform agreement. The NCC concluded that water pricing in Western Australia lacks transparency and does not conform to COAG principles:

The lack of transparency raises questions about whether water pricing principles have been met and will be in the future. The Council recommends a suspension of 10 per cent of competition payments for 2003–04 for non-compliance in this area. The suspension should be lifted and reimbursed when the Government establishes the Economic Regulation Authority and announces terms of reference for an investigation by the authority of water and wastewater pricing against the COAG pricing principles. (Assessment of governments' progress in implementing the National Competition Policy and Related Reforms 2003, Vol 1, p xl)

Further,

The Council considered that independent regulation of water and wastewater prices, where the regulatory authority applies the COAG pricing principles, would be consistent with the COAG water reform agreements including in relation to transparency in pricing. (Assessment of governments' progress in implementing the National Competition Policy and Related Reforms 2003, Vol 3, p 5.2)

Subsequent to the NCC report, the Western Australian Treasurer has asked the Authority to undertake an Inquiry into water and wastewater pricing, together with associated regulatory arrangements. The Authority is to 'have regard to' COAG pricing principles when undertaking this Inquiry. These principles, in essence, state that charges for water and wastewater should be based on full cost recovery and consumption-based pricing. In setting pricing arrangements, the following characteristics need to be considered:

- economic efficiency;
- equity;
- environmental impacts;
- administrative efficiency;
- customer acceptability and transparency; and
- revenue and price stability.

The principles include a role for independent economic regulators in pricing oversight, with the objective to prevent monopoly pricing while ensuring that returns

are sufficient to attract adequate levels of investment into the water and wastewater industry.

A number of other recent reports have relevance for this Inquiry. They include the establishment of a National Water Initiative, the Productivity Commission's review of National Competition Policy and Western Australia's State Water Strategy, which was released in 2003.

### **3.3.1 National Water Initiative**

In June 2004, the COAG water reform agreement of 1994 was 'revisited' and revised. The outcome of these discussions was the development of the National Water Initiative (NWI), which builds on earlier National Competition Policy (NCP) reforms and aims to achieve adoption of best-practice approaches to water management.

The official status of the reform is unclear, as the jurisdictions that originally signed the agreement have since withdrawn their support (Western Australia and Tasmania never signed). Nevertheless, a National Water Commission has been formed to implement the Initiative.

The following NWI objectives are of particular relevance to this Inquiry:

- continued implementation of full-cost recovery pricing for water in both urban and rural sectors;
- actions to better manage the demand for water in urban areas, including a review of temporary water restrictions, minimum water efficiency standards and mandatory labelling of household appliances, and national guidelines for water sensitive urban design; and
- implement better and more efficient management of water in urban environments, for example through the increased use of recycled water and stormwater.

Further information on the NWI is available at [www.coag.gov.au](http://www.coag.gov.au).

### **3.3.2 Productivity Commission Review of National Competition Policy**

Another national project with relevance to this Inquiry is the Productivity Commission's review of National Competition Policy (NCP). The purpose of this inquiry was to assist COAG in its 2005 review of NCP arrangements. In relation to water, the Productivity Commission released its draft proposals on 27 October 2004, which include:

All governments should complete outstanding NCP water requirements and give high priority to resolving the current uncertainty about the future of the National Water Initiative by recommitting to its reforms. In addition, the CoAG water reform process should give close attention to:

- developing ways to achieve more effective management of environmental externalities;
- exploring new opportunities for cost-effective water recycling; and
- ensuring that monitoring arrangements post-NCP provide a discipline on all governments to progress agreed water reforms." (pXXXVIII)

The final report for the review has been submitted to the Australian Government and is currently being considered by Parliament.

### **3.3.3 State Water Strategy**

In 2003 the Western Australian Government commissioned a Water Taskforce to undertake a wide-ranging review of water supply and use in Western Australia. The objective of the study was to develop a State Water Strategy that “ensures a sustainable water future for all Western Australians”.<sup>2</sup> There are a number of overlaps between this Inquiry and the State Water Strategy, given that the second-order objectives of the State Water Strategy include:

- improving water use efficiency in all sectors;
- achieving significant advances in water reuse;
- fostering innovation and research;
- planning and developing new sources of water in a timely manner; and
- protecting the value of our water resources.

In addition, the Strategy set a number of targets that could have a bearing on the Water Corporation’s costs and thus its revenue requirements. In particular, the Strategy aims to:

- reduce annual water consumption to 155 kL per person for domestic consumers served by the Perth component of the Integrated Water Supply Scheme (IWSS) by 2012; and
- recycle 20 per cent of treated wastewater by 2012.

These targets are taken into account when examining the Water Corporation’s cost structure and capital development program.

## **3.4 The Rationale for Price Regulation**

Urban water supply systems have a number of features that impact on how water services may be efficiently provided to the community. One of these features is due to the fact that urban water is a community resource, for which property rights have not been allocated. As such, market-determined prices are unavailable for signalling the relative scarcity value of water. Under ‘normal’ market conditions, resources that are capable of being traded would attract a scarcity price, which reflects users’ willingness to pay for the resource at the margin. Where scarcity prices are revealed, the resource would be efficiently allocated, maximising the sum of net benefits from water use by all users. However, in the case of water, regulated prices must be used to reflect scarcity values.

---

<sup>2</sup> Securing our Water Future, a State Water Strategy for Western Australia, 2003

Even if property rights could be assigned to water there would still be efficiency problems associated with water provision because:

- the provision of water services, as distinct from the resource itself, is characterised by natural monopolies. That is, because of the significant infrastructure required to store, treat and deliver water, it is difficult for a competitive market to be established in the supply of water services; and
- externalities, such as environmental damage and foregone outdoor recreational opportunities associated with extractive water use, which are generally not reflected in water delivery prices (water supply may also lead to positive externalities, such as the provision of boating on dams).

In addition, some form of government intervention may be appropriate to ensure that minimum health standards are achieved and that particular customer groups, such as low-income families, are not treated inequitably.

The regulation of water prices commonly seeks to achieve multiple policy objectives including the following:

- signalling the scarcity value of water, which may arise due to infrastructure constraints or limited hydrological capacity, so that water is allocated to its highest value use;
- managing demand through tariff structure adjustments, where price is one tool for managing the supply-demand balance;
- enhancing the efficiency of service delivery in the absence of a competitive market. Regulatory mechanisms should allow water providers to recover their cost of service delivery and earn a commercial rate of return on capital while promoting efficient service delivery;
- controlling the revenue requirements of water businesses so as to prevent monopoly pricing of services to customers;
- reflecting the net cost of environmental externalities, with the aim of either recovering costs associated with meeting environmental standards or sending a price signal to water users which modifies their consumption habits so as to avoid future environmental costs; and
- setting tariff structures to meet social objectives related to the equitable distribution of costs to different customer groups.

These objectives often involve trade-offs. For example, it is unlikely to be possible to implement prices that optimise economic efficiency while also meeting equity and fair pricing criteria. Pricing structures must be developed with consideration of the administrative practicalities and cost, revenue stability for the water provider, price stability for the customer, customer acceptability and transparency. This Inquiry starts by examining how prices can be set to promote efficiency. Subsequent sections examine how other policy objectives might be accommodated.

## 3.5 Assessment Methodology

The Authority released a methodology paper on 15 October 2004, which presented the approach the Authority is using in its assessment of each water business' pricing proposals. The methodology is summarised in Figure 3.1 and explained below with the relevant links to the Terms of Reference.

### 3.5.1 The Assessment Framework

**Step 1: Are service levels consistent with required standards and customer expectations?**

The first step of the framework is to examine whether levels of service provision proposed by each water provider are consistent with required service standards – as set out in the provider's operating licence, under legislation administered by the Authority, the Water and Rivers Commission and the Department of Environmental Protection. These standards include minimum levels of customer service, environmental management and health standards.

In an operating environment where prices are regulated, minimum service standards are often specified for water and wastewater providers to ensure that providers do not compromise service levels as a means of reducing costs. Government-imposed changes in mandatory standards could have an impact on service providers' cost structure and revenue requirements. Thus, regulatory pricing and procedures must take these changes into account when and if they occur. The Terms of Reference require the Inquiry to examine:

How changes in standards and operating conditions faced by the service providers impact on revenue requirements of the service provider.

While the performance targets set out in each water provider's operating licence are not under review, the Inquiry is to consider regulatory mechanisms that provide incentives for maintaining or improving service standards.

A related issue is the allowable adjustment of regulated prices to fund new or improved services that are above the minimum standard. In a regulatory system where the water provider can propose price increases for recovering the cost of improving services to above recognised standards, the provider should be required to verify that its customers support the higher levels of service proposed and are willing to pay the higher costs associated with service delivery. Where customers indicate that they are willing to pay for additional levels of unregulated services, the Authority will take a view on whether the service provider is appropriately incorporating customers' expectations within their expenditure program and whether this is being done efficiently.

**Step 2: Is the strategy to balance supply and demand appropriate?**

The service provider should have a robust strategy to balance supply and demand of services (water and wastewater) over the next thirty years. The Inquiry is to examine whether the capital works program and associated strategies for managing supply and demand are appropriate. The relevant part of the Terms of Reference is:

The Authority must give consideration to:

- [whether] any additional resources [are] needed to meet the required standards of quality, reliability and safety, including such matters as the protection and development of future water resources”; and
- considerations of demand management.

### Step 3: What is the efficient revenue requirement of each service provider?

The Authority has used a ‘building block’ approach to consider the revenue requirements of each service provider. The building block approach involves a “bottom-up” determination of total revenue requirement from component costs, as follows.

$$\begin{aligned}
 \text{Total Revenue} &= \text{Rate of Return} \times \text{Regulatory Asset Value} \\
 &+ \text{Depreciation of Assets} \\
 &+ \text{Forecast Operating and Maintenance Costs}
 \end{aligned}$$

Identifying an appropriate level of revenue requires determination of, among other things, an initial regulatory asset value, an appropriate rate of return on assets, an allowance for depreciation that reflects the aging of assets and an *efficient* level of operating and maintenance expenditure. The relevant parts of the Terms of Reference that relate to Step 3 are:

The Authority must review:

- the regulatory asset base of each of the service providers;
- the non capital cost forecasts of the service providers;
- the depreciation and forecast capital expenditure program of the service providers; and
- the appropriate rate of return on public sector assets, including appropriate payments of dividends to the Government of Western Australia.

The Authority must give consideration to:

- the methodology for assessing the revenue requirements of the service providers; and
- the cost of providing the services concerned, including a target for improvement in the efficiency in the supply of services.

### Step 4: What prices and tariff structures would promote efficiency?

Before considering social and environmental objectives, it is necessary to examine what prices and pricing structures would be required for maximising economic efficiency. A fundamental issue in pricing water and wastewater services is how to set price to get the efficiency gains related to marginal cost pricing, while providing an adequate level of revenue to the business to cover fixed costs and to attract investment. The relevant part of the Terms of Reference for Step 4 is:

The Authority must give consideration to:

- the current structure and level of urban water and wastewater prices.

### Step 5: How should prices be adjusted to meet social objectives?

Pricing structures designed to improve efficiency can have impacts on customers that may be viewed as inequitable or inconsistent with social objectives of government. Therefore, a fifth step of the assessment is to examine these trade-offs and investigate alternative pricing arrangements to minimise social impacts or perceived inequities. The relevant part of the Terms of Reference is:

The Authority must give consideration to:

- the social impact of the recommendations.

### Step 6: How should prices be adjusted for externalities?

Pricing is one policy instrument for addressing environmental externalities caused by water supply and use. An externality is any cost (or benefit) that is not taken into account in the production and consumption decisions of the water provider and water customer respectively. The relevant part of the Terms of Reference that relates to this step is:

The Authority must give consideration to:

- the need to maintain ecologically sustainable development, including by appropriate pricing policies that take account of all feasible options for protecting the environment;

### Step 7: Are existing tariff structures consistent with 'best practice' pricing and, if not, how should the gap be closed?

Steps 1 through 6 of the assessment process helps to build a picture of whether the current pricing arrangements are consistent with 'best practice' pricing in terms of promoting efficiency, investment and conservation of water. Where gaps exist, the Authority proposes some options for possible future tariff structures that could be more effective at meeting regulatory objectives. In this draft report an initial investigation is made into the potential impacts and implementation practicalities of the reform options. As specified in the Terms of Reference the Inquiry is to examine:

- the impact of pricing policies on borrowing, capital and dividend requirements and, in particular, the impact of any need to renew or increase relevant assets;
- the effect on and of general price inflation over the medium term;
- the social impact of the recommendations; and
- the effect of any pricing recommendation on the level of government funding (through Community Service Obligation payments).

### Step 8: What regulatory models could be applied?

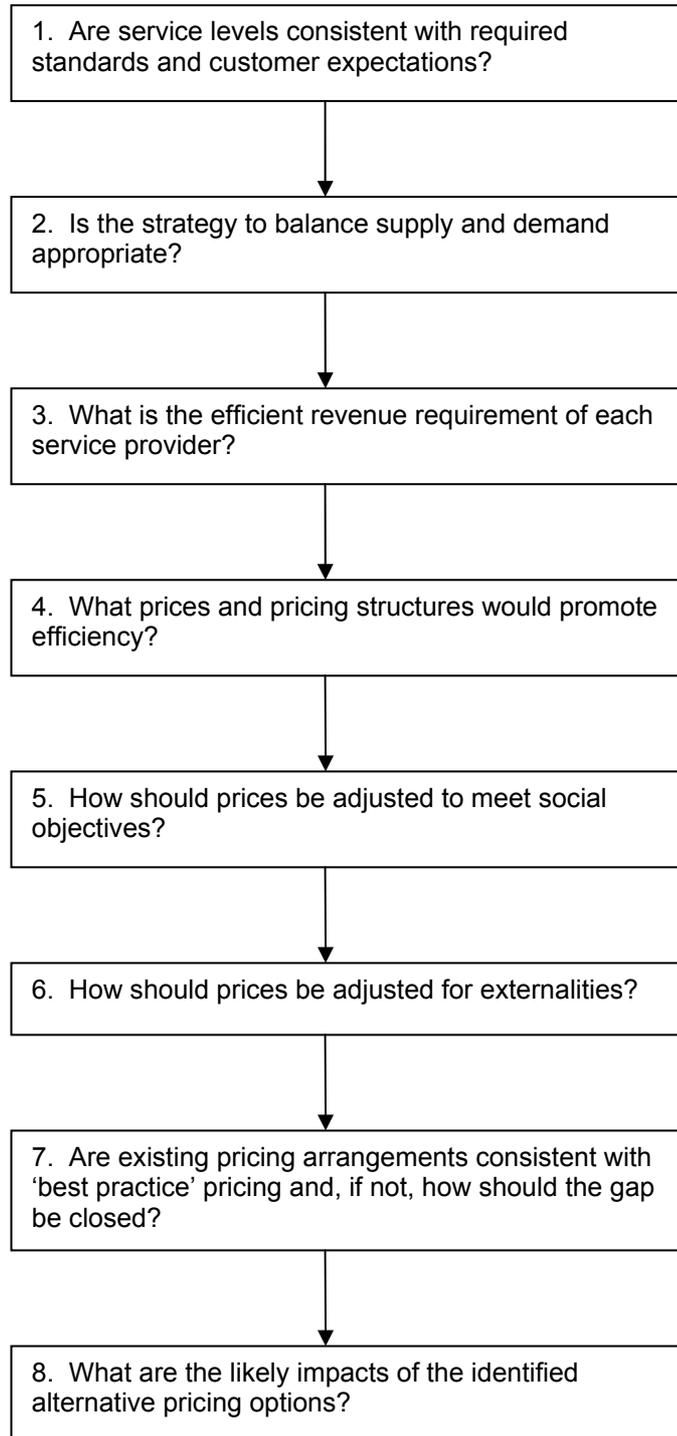
The final step of the assessment is an examination of what regulatory models are available for achieving the regulatory objectives. There are a number of approaches for directly or indirectly controlling the prices that a service provider may charge its customers. The approaches vary in terms of the incentives presented to service providers, the allocation risks associated with unexpected changes in water demand, the level of administrative complexity and the level of pricing flexibility they afford.

One element of a regulatory framework for tariff setting is the duration of the price path. The Terms of Reference require the Authority to examine:

- the most appropriate price path and period, including the requirement for periodic reviews of that price path.

Measures for promoting efficiency are also canvassed in this Inquiry.

**Figure 3.1 The Assessment Framework**



## 4 WATER CORPORATION

### 4.1 Background

The Water Corporation is a statutory corporation operating under the *Water Corporation Act 1995*. The Corporation was established as a commercially focused utility on 1 January 1996 following a restructuring of the water industry that also saw the roles of water resource manager (now Water and Rivers Commission) and regulator (now Economic Regulation Authority) separated from the functions of the utility. The Corporation is governed by a Board of Directors acting in accordance with Corporations Law, and the Board is accountable to the Minister responsible for the *Water Corporation Act 2005*.

The Water Corporation provides water, wastewater, drainage and irrigation services to both metropolitan Perth and regional centres across the State – in total the Corporation provides services to close to two million customers. In doing so, the organisation employs around 2,000 people and operates 246 water treatment plants, 113 dams and reservoirs and 713 bores in 106 bore fields.<sup>3</sup>

The operational activities of the Water Corporation are subject to regulation by four government agencies:

- Economic Regulation Authority – established on 1 January 2004, the Authority oversees the Corporation's Operating Licence which sets out the conditions under which the Corporation operates (a copy of the operating licence is available at [www.era.wa.gov.au](http://www.era.wa.gov.au)). The Authority also monitors the Corporation's performance and reporting processes.
- Department of Environment – prime functions include dealing with issues surrounding management of water resources, wastewater treatment and disposal, water allocations and trading of water allocations.
- Environmental Protection Authority – assesses the environmental impacts of significant projects.
- Department of Health – regulates drinking water quality.<sup>4</sup>

During the budget round each year, the Water Corporation makes a submission to the State Government on proposed prices for the upcoming year for consideration by the Department of Treasury and Finance. The submissions are further considered by the Expenditure Review Committee before being considered by Cabinet. Subject to revisions made in the review and assessment process, the Minister for the Environment approves by-laws that allow the Corporation to implement the proposed charges.

---

<sup>3</sup> Water Corporation Annual Report, 2004.

<sup>4</sup> Water Corporation Annual Report, 2004.

## 4.2 Service Standards

### 4.2.1 Water Corporation Proposal

#### 4.2.1.1 Regulated Services

The Corporation is expecting to continue to meet the standards that are specified in its operating licence with the Authority and the standards associated with health and environmental regulations.

The Corporation reports that in the recent audit of its operational licence, it met the requirements across all of the auditable elements. Its level of service provision in eight areas has *exceeded* its minimum regulatory requirements. These areas include customer complaints; drinking water quality; continuity, leaks and bursts; telephone answering, sewerage overflows on property and blockages; and services provided by agreement. The Corporation points out that it is ‘false economy’ to attempt to target the required standard more precisely because this could either jeopardise compliance in the future or may not result in cost savings – largely because costs are fixed.

In its submission in response to the Issues Paper, the Corporation provided information about its approach to the regulated areas of wastewater overflows, odour buffers and wastewater treatment and discharge.

- The Corporation indicated that its **wastewater overflows** per 100 kilometres of sewer are ranked second to lowest among the capital cities in Australia and that a major study of wastewater overflow risks and ways to reduce their frequency is nearing completion. According to the Corporation:

Preliminary estimates indicate that hundreds of millions of dollars would be needed to reduce the already low frequency of overflows into the river. We are examining more cost effective ways to manage this issue.

- In relation to **odour buffers**, the Corporation indicated it is working with government agencies to:

...develop a long term strategy to resolve ongoing land-use conflicts caused by urban encroachment into buffer zones around facilities like wastewater treatment plants.

The Corporation prefers a land management approach rather than the significant expenditure on **wastewater treatment** plants that would be required to reduce the odours. It has been working with the Department of Health and Department of Environment to prioritise investments in wastewater treatment and discharge. It is intending to review this plan in 2005 with increased stakeholder consultation.

#### 4.2.1.2 Unregulated Services

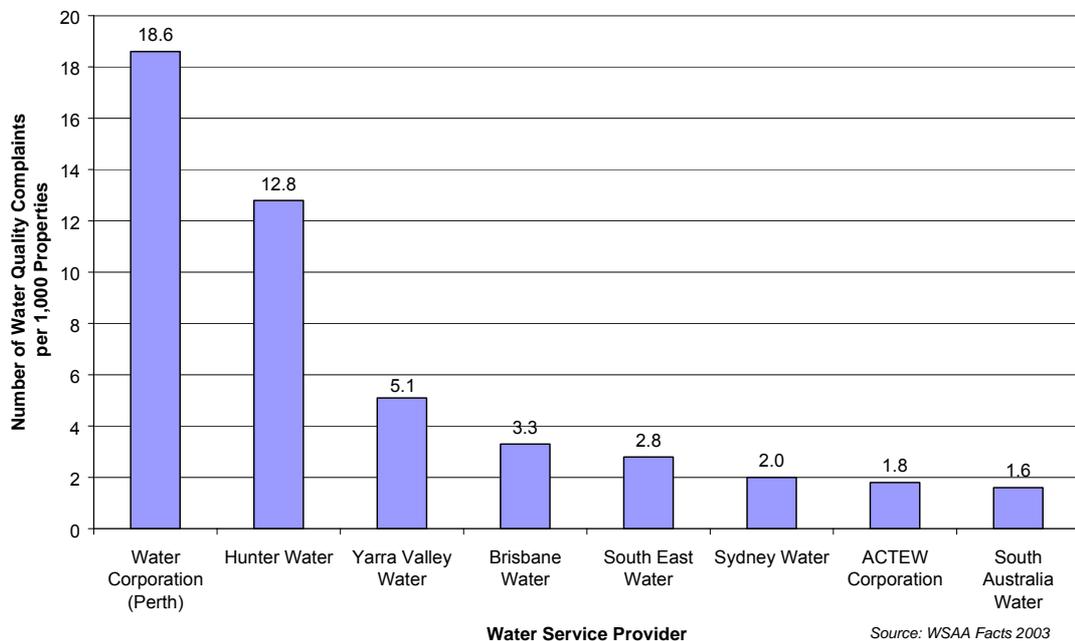
In relation to meeting customers’ expectations regarding unregulated services, the Corporation reports that it undertakes market research to monitor its customers’ perceptions of overall value. An example of the results from the September 2004 quarter is provided in the submission. The results indicate that residential customers generally consider accounts to be easy to understand, provide sufficient information and that the Corporation responds speedily to emergency situations.

One service attribute that does appear to be causing some concern among customers is the taste of water. Based on information from the Water Services Association of Australia (WSAA), the number of customer complaints about water quality (per 1000 connections) well exceeds the national average (Figure 4.1). Results from the Water Corporations own market research show that 35 per cent of residential customers are dissatisfied with the taste of their water. However, put another way, almost two thirds of customers rank water taste as good, very good or excellent. The Corporation indicates that:

While every opportunity is sought to provide affordable improvements in aesthetic water quality, other critical programs such as dam safety, water source development and compliance with health guidelines have taken priority in the Corporation’s budgeting process for the next five years.

The Corporation has indicated that further treatment of water to improve taste and odour issues would substantially increase treatment complexity and current operating costs while having no effect on drinking water quality from a health point of view. The Corporation also points out that customer willingness to pay for improvements to aesthetic water quality is relatively low. In a 2002 study conducted by Market Equity, 52 per cent of customers had a zero willingness to pay for taste improvements (when asked an “open-ended/unprompted” question about their willingness to pay). Only 7 per cent of respondents were willing to pay an expected cost per customer of \$30 (or more) per year for improved water taste.

**Figure 4.1 Comparison of Water Quality Complaints Between Water Service Providers**



The study also examined customer willingness to pay for a number of other unregulated service attributes, including the management of a number of environmental ‘externalities’ – some of which are being addressed by the

Corporation. The potential environmental improvements put to respondents for an assessment of their willingness to pay were:

- increased wastewater treatment (nutrient reduction) prior to ocean outfall;
- reduced odour surrounding wastewater treatment plants;
- improved management of urban stormwater prior to entering waterways;
- increased green energy use from 10 per cent to 30 per cent;

With the exception of ‘reduced odour’, the results indicate that approximately two thirds of respondents would be willing to pay the estimated cost of these projects (when presented with a yes/no choice). The annual cost of each project was assumed to range from \$6 to \$16 per customer. The Corporation points out that it is currently making progress on all of these projects.

The Corporation indicated in its Issues Paper submission that it will be developing greenhouse emissions targets and has developed an Energy Management Unit to “increase efficient energy use, lower energy cost and develop cost-effective renewable energy solutions.” The Corporation states:

Greenhouse emissions are currently 25 per cent less than ‘business as usual’ due to energy efficiency improvements, carbon sequestration through woodlots and capture/combustion of methane at some wastewater treatment sites.

The Corporation is working with the Department of Environment, Water and Rivers Commission, Swan River Trust and other stakeholders to establish a framework for the management and regulation of stormwater. It has also achieved nutrient reductions in its wastewater discharges through the progressive upgrading of treatment plants. The Corporation places a high priority on odour management despite the fact that customers do not appear to have a high willingness to pay for controlling odour. The Corporation justifies its actions on the basis that:

Department of Environment regulations and the possibility of legal action have lead to significant expenditure on odour control costs in recent years.

The 2002 study also examined customer willingness to pay for several ‘non-environmental’ service attributes. These included:

- increased levels of water recycling (from 1 to 10 per cent);
- improved availability and reliability of supply through various options (resulting in a lower incidence of water restrictions); and
- improved customer bill payment flexibility (choice of quarterly or annual payments).

The study found that there is relatively strong customer support for wastewater recycling. The Corporation has constructed a water recycling plant at Kwinana, which will increase the amount of wastewater reuse in the metropolitan area to about 9 per cent. Based on the 2002 survey results, customers are less willing to support

improved supply reliability, given the higher costs of these projects. On average, bill payment flexibility is not a major issue for most customers.

#### **4.2.2 Issues Paper Submissions**

The Conservation Council of Western Australia proposes that water should be treated to different quality standards, depending on its end use. It suggests that differential pricing for water should also be introduced according to its quality:

Where possible water quality should match the purpose for which it is used. Fully treated water for instance is not necessary to water the garden. Industrial users often use water of a quality much higher than that needed. The use of grey water and rainwater must be encouraged and pricing differential will assist in this process. (p6)

The Conservation Council also highlights some environmental impacts associated with the Water Corporation's activities:

Some regional water supplies are sub-standard and need to be improved. The Water Corporation's management of the environmental impacts of source development and sewerage extension is poor and more needs to be spent on this area. (p9)

The Office of Water Policy (OWP) makes the following submission about the potable water quality standards and standards for sewerage odours:

The OWP considers that the licences should set a standard for non-health related drinking water quality...In respect to sewerage services...the licence for the Water Corporation sets standards for overflows and blockages but does not address odours. (p10)

The Authority considers that the matters raised by the Office of Water Policy are matters that would need to be determined by the Minister of Health in relation to expanding the current standards to cover issues such as aesthetic quality in drinking water. Section 6 of the Water Corporation's licence requires the Corporation to report to the Authority the number of customer complaints in relation to sewerage odour.

#### **4.2.3 Authority Assessment**

##### **4.2.3.1 Regulated Services**

The Authority is satisfied that the Corporation is meeting the performance targets under its operating licence in an efficient way, and in particular that it is not over-investing in levels of service that exceed the requirements of its operating licence.

The Authority has sought assurance from the Corporation's other regulators (the Department of Health and Department of Environment) that they are satisfied that the Water Corporation complies with their regulatory requirements. The main matter of concern to the Department of Environment is that a strategy is developed to return the abstraction from the Gngangara Mound to a sustainable level.

##### **4.2.3.2 Unregulated Services**

The Authority has considered the findings of the 2002 survey by Market Equity that examined customers' willingness to pay for initiatives that could improve unregulated service levels.

While the results of this study give a general sense of customer priorities and trade-offs, the Authority is concerned that the valuation methodologies applied are not entirely appropriate for the purposes of robust benefit-cost analysis. Estimating trade-offs and values using a Choice Modelling framework may be more appropriate than the ‘referendum’ and ‘open-ended’ Contingent Valuation methods used in the study.

Stated preference valuation methods require careful application and interpretation to avoid misleading results. For example, under some question formats, stated willingness to pay may diverge from actual commitment – as is witnessed by the relatively low uptake of ‘green energy’ where electricity consumers have been given the choice of this alternative on their account. Given the current situation where water restrictions have been in place for a number of consecutive summers, it would be timely for another investigation of customer willingness to pay for improved supply availability and reliability. Again, alternative methods to the simple contingent valuation approach should be examined.

Another service attribute that may need to be re-examined is the provision of improved aesthetic water quality. It is noted that the Corporation is one of the few water businesses in Australia that only undertakes disinfection at the majority of its water treatment plants. Most other water providers employ full water treatment encompassing chemical dosing, filtration and disinfection. From a health perspective, Western Australia is able to undertake minimal treatment of its water because it is heavily reliant on groundwater, which requires less treatment than surface water. However, as a consequence, water taste can suffer. Given the level of customer dissatisfaction with water taste, it may be appropriate to re-examine what customers are willing to pay to improve this attribute.

With regard to the Conservation Council’s proposal to treat water to differing quality standards depending on its end use, the Authority’s view is that differential pricing based on water quality would have limited application in the urban context due to the prohibitively large cost of segmenting the distribution of potable and non-potable water to different end uses. However, there may be instances where recycled water could be delivered to large users of non-potable water (for example, golf courses and council gardens) at lower prices.

#### **Key Findings on the Water Corporation’s Service Standards**

**The Corporation’s proposed levels of service provision are consistent with required standards. The level of service provision in eight areas exceeded the minimum regulatory requirements. These areas include customer complaints; drinking water quality; continuity, leaks and bursts; telephone answering, sewerage overflows on property and blockages; and services provided by agreement.**

**The Authority is satisfied that the Corporation is meeting its mandatory performance targets in an efficient way, and in particular that it is not over-investing in levels of service that exceed the requirements of its operating licence.**

**While the Water Corporation has assessed its customer's willingness to pay for improvements to unregulated services, the Authority considers that additional work using more reliable methods may be warranted.**

## 4.3 Balancing Water Supply and Demand

### 4.3.1 Background

Around 240 gegalitres (GL) of water is currently considered by the Corporation to be the sustainable amount available for annual urban consumption through its Integrated Water Supply System. This amount of water comprises:

- 140 to 145 GL of dam inflow, which is the average annual inflow since 1997; plus
- 120 GL of water available from the Gnangara Mound; less
- 20 GL of dam evaporation each year.

Unconstrained consumption is currently estimated to be around 280 GL per year, implying that current water usage is therefore unsustainable by around 40 GL per annum, based on the developed water sources that are currently available.

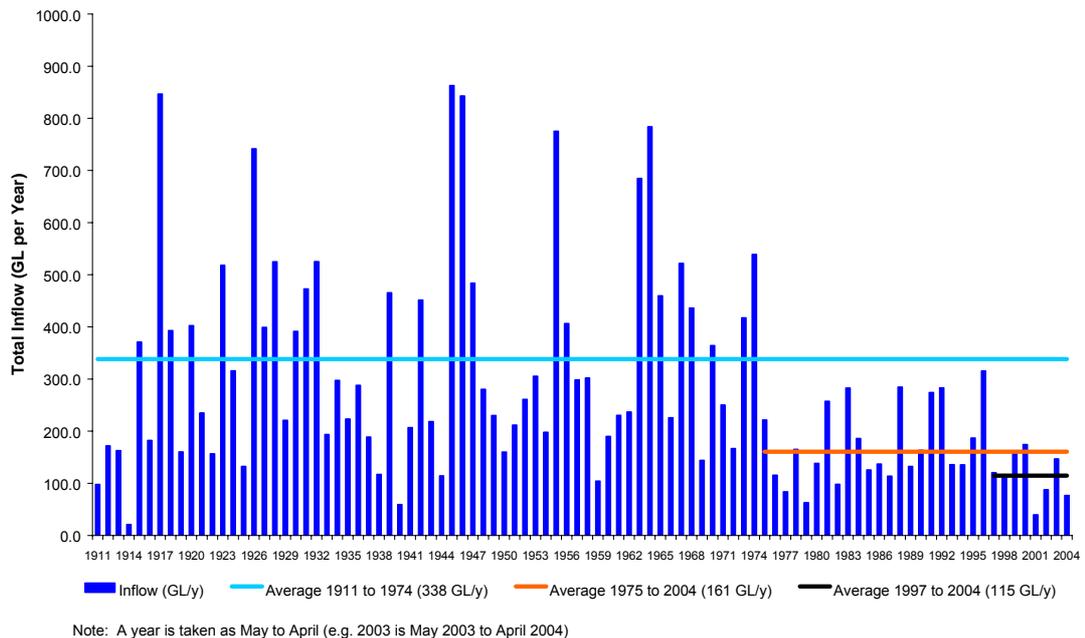
By 2025, this gap between supply and demand is projected to increase to 135 GL, assuming consumption is unconstrained.

The gap could be wider than owing to the future risk of climate change, and the adverse affect this could have on rainfall. There is a growing consensus among scientists that the global climate is warming as a result of the build-up of greenhouse gases in the atmosphere, and that the South West region of Western Australia is expected to become warmer and drier.<sup>5</sup>

Over the last 30 years, the South West of Western Australia has experienced below-average rainfall, resulting in lower than expected inflows (Figure 4.2). In the period 1911 to 2003, average inflows were 284 GL per year. However, in the 30-year period since 1975, average inflows have reduced to 164 GL per year – a decline of 120 GL on the long-term average since records began. Over the last seven years, average inflows have been even less, amounting to just 115 GL. While it cannot be confirmed that climate change is responsible for these reductions (for example, inflows are also influenced by catchment vegetation density), the risk of ongoing below-average inflows is being considered by scientists as a possibility.

---

<sup>5</sup> Indian Ocean Climate Initiative No 2, June 2004.

**Figure 4.2 Declining Streamflows in South West Western Australia**

Based on assumptions about climate change, population growth and future per capita demand (influenced by the uptake of water saving technology), the Corporation considers that an estimated 80 GL of additional source capacity will be required over the coming decade. To balance supply and demand, the Corporation has a range of options including:

- the development of new sources of water (for example, new dams, further groundwater development including of the South West Yarragadee, desalination, transporting water from the Kimberley and recycling);
- reallocation of water from non-urban users – for example, the purchase of irrigation water;
- demand management programmes – including rebates for installation of water efficient appliances, water-wise building standards, community education, ecolabelling, pricing and mandatory restrictions; and
- saving of water through the reduction of leakages and losses.

The Water Corporation is currently using a mix of these options in its long term planning to balance supply with demand. For example, over the next ten years, the Water Corporation plans to build a 45 GL desalination plant, purchase 17 GL of water savings from Harvey Irrigation, which will be made available from piping irrigation channels, construct new bores to access groundwater from South West Yarragadee aquifer and recycle wastewater for use by industry and golf courses.

If new sources were not developed, per capita annual consumption would need to fall from a current unconstrained level of 170 kL to 122 kL over the next 20 years to offset population growth. According to the Corporation, it is unlikely that this

reduction could be achieved through demand management measures. Therefore, a combination of approaches will be needed to balance supply with demand. The lowest cost options, for a given level of certainty, should be the ones implemented.

### **4.3.2 Demand Projections**

#### **4.3.2.1 Water Corporation Proposal**

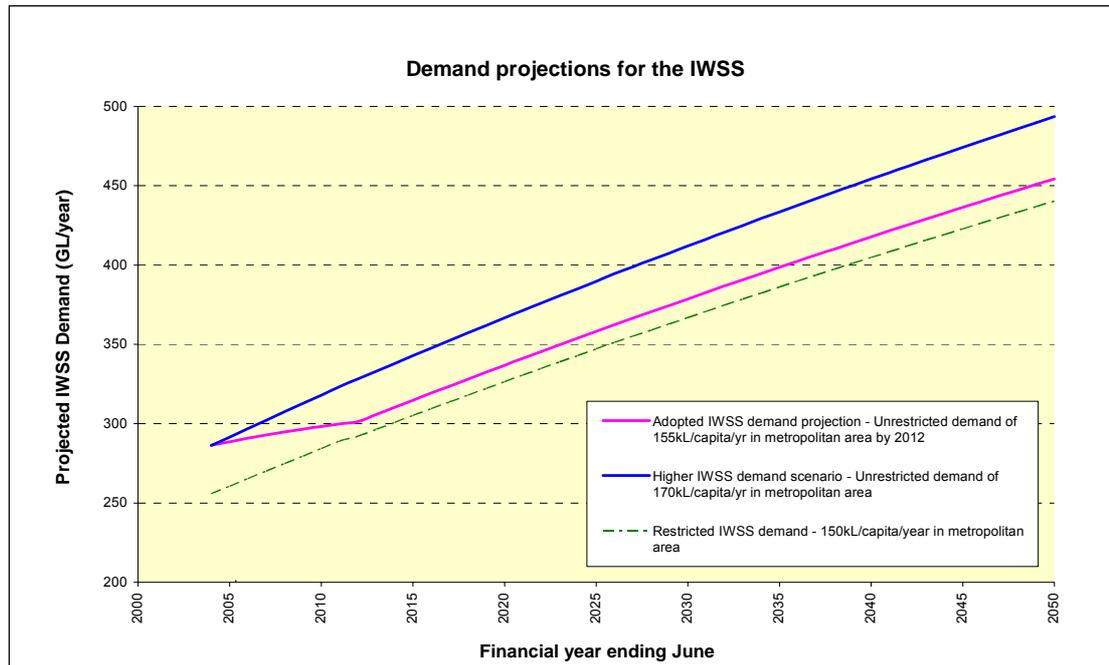
The Water Corporation bases its demand projections on population forecasts made by the Ministry for Planning in 2000 (now Department of Planning and Infrastructure) and an assumption of per capita demand.

In its proposal, the Corporation has based its per-capita water demand assumption on the State Water Strategy target to reduce unconstrained per capita demand from a current level of 170 kL per year to 155 kL per year by 2012. While current consumption is already at this level, this has been achieved through restricting sprinkler use to two days per week, in association with the Waterwise program which involves community education and rebates for water-efficient appliances. The Corporation is currently planning on the basis that restrictions will be eased as of 2006-07 and demand will be managed through, if necessary, more aggressive Waterwise initiatives.

The (Waterwise) programs put heavy emphasis on achieving the required savings through rebate assisted water efficient appliances and gardening practices, supported by strong community information, education and communications processes. (p20)

Overall, the Corporation considers that annual water savings of 34 GL can be achieved within seven years through its planned demand management program. However, the Corporation recognises that there is a degree of uncertainty around what is achievable and has therefore assessed the sensitivity of its planning using a less optimistic demand scenario of 170 kL per capita in the metropolitan area. Water demand projections out to 2050 under the various scenarios are illustrated in Figure 4.3. Under the assumption that per capita demand is capped at 170 kL, the Corporation will need to meet a demand of about 480 GL per year by 2050. If per capita demand can be reduced to 155 kL within 7 years, total water requirements would be just over 450 GL.

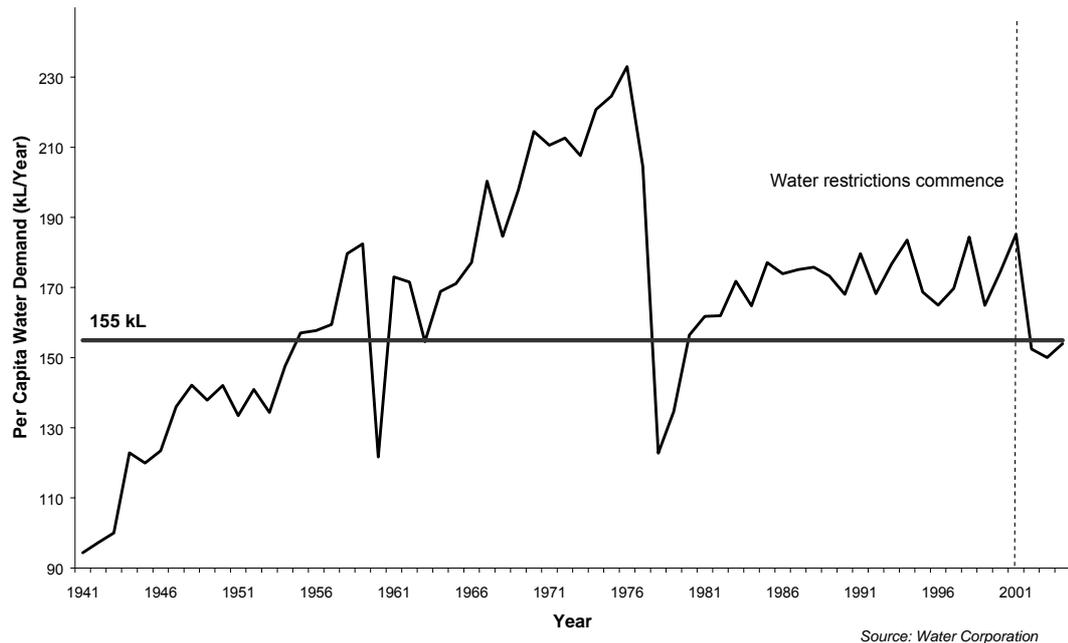
Figure 4.3 Demand Projections for the Integrated Water Supply Scheme



#### 4.3.2.2 Authority Assessment

The assumption made by the Corporation is that water restrictions will be eased in 2006/07 and yet demand will be maintained at 155 kL per person through the use of Waterwise rebates and community education. Such an outcome may be difficult to achieve without two-day per week sprinkler restrictions. As shown in Figure 4.4, prior to the introduction of current water restrictions in 2001/02, demand was around 185 kL per person. In the absence of higher water prices or other 'new' demand management initiatives, it is likely that per capita demand will rebound once restrictions are lifted or eased to 3 days per week sprinkler use.

**Figure 4.4 Historical Per Capita Water Demand for the Integrated Water Supply Scheme**



### Key Findings on the Water Corporation's Demand Projections

**The Authority considers that the Corporation's target of restraining demand to 155 kL per capita by 2012 may be optimistic, given that the Corporation plans to either remove sprinkler restrictions or ease restrictions to three days per week from 2006/07 onwards.**

### 4.3.3 Water Availability and Use

For the purpose of examining future water supply options it is necessary to understand total resource availability and current use. At present, about 70 per cent of water use in the South West region (Water Corporation and other users) comes from groundwater and the other 30 per cent is from surface water.

Based on figures from the Water Resources Assessment (conducted for the National Land and Water Resources Audit in 2000) total water use in the South West region is still below maximum sustainable yields – both for surface and groundwater (Table 4.1).<sup>6</sup> Sustainable yield is defined as the average volume that can be harvested for use each year (in a technical sense), without compromising the environmental integrity of the system. In the South West region, about 22 per cent of sustainable surface water yield is being used, while about 40 per cent of groundwater sustainable yield is being extracted.

<sup>6</sup> National Land & Water Resources Audit (2000), *Surface and Groundwater Management, Availability, Allocation and Efficiency of Use – State of Western Australia Water Resources Overview*

Therefore, from a physical perspective, water is not scarce. Indeed, now that seawater desalination technology is feasible, there is no true limit to water resources. But scarcity also has an economic interpretation. If water becomes a binding constraint to economic activity – including the well being of domestic customers –, then it is defined as a scarce resource. As such, water acquires a ‘scarcity value’ equivalent to users’ willingness to pay for the resource. Scarcity values reflect the cost of sourcing an additional unit of water, either through new source development, water savings, recycling or trading.

**Table 4.1 Water Availability and Use in Western Australia**

	South West region (GL per year)	Whole State (GL per year)
<b>SURFACE WATER</b>		
Sustainable yield	1,608	5,210
Use (1996/97)		
Urban, industry, mining	185	206
Stock water	7	22
Irrigation	170	430
<b>Total</b>	<b>362</b>	<b>658</b>
<b>GROUNDWATER</b>		
Sustainable yield	1,937	6,304
Use (1996/97)		
Urban, industry, mining	470	839
Stock water	14	18
Irrigation	265	281
<b>Total</b>	<b>749</b>	<b>1,138</b>
<b>TOTAL WATER RESOURCE</b>		
Sustainable yield	3,545	11,514
Use (1996/97)		
Urban, industry, mining	655	1045
Stock water	21	40
Irrigation	435	711
<b>Total use</b>	<b>1,111</b>	<b>1,796</b>

*Source: Water Resources Assessment 2000 (National Land & Water Resource Audit)*

It is informative to examine how the Water Corporation’s current supply system fits into the bigger picture of total water availability and use. In a non-drought year, the Corporation supplies about 280 GL of scheme water to its customers. Based on total use estimates by the National Land & Water Resources Audit (2000), this represents just 25 per cent of total water use in the South West region – where 1,111 GL is consumed annually (Table 4.1). The Corporation’s supply is an even smaller proportion of the State’s overall use of water (15.6 per cent).

A number of water users in the State’s South West region (including the Perth metropolitan area) consume water that is outside the Water Corporation’s integrated supply system. These include:

- irrigation users (about 435 GL)

- the mining industry, which pumps its own groundwater (200 GL);
- Perth households with private bores (89 GL);
- Perth parks and gardens reticulated with bore water (78 GL);
- stock and domestic water for farmers (21 GL); and
- urban users supplied by Busselton Water and AQWEST (10.5 GL).

Given the relatively large quantities of water used by the irrigation sector (40 per cent) there could be scope for the Water Corporation to purchase additional water from this sector to satisfy Perth's growing water demand. An example of this is the Corporation's purchase of 3 GL of water from Harvey Water in 2004, facilitated through reduced water losses in the irrigation network. This 'trade' enabled additional water to be supplied to urban users at a cost of approximately \$0.60 per kL. A further purchase of 14 GL is being planned.

Depending on infrastructure requirements, it may be economical to pursue further water trades. The lack of a transparent and reliable framework for trading water entitlements between different user groups is an impediment to the Water Corporation being able to purchase water from relatively 'low value' uses. Given the relative scarcity of water in Perth, and the high cost of developing new sources of water, more effort should be devoted to establishing a trading framework whereby irrigators, and other users, would be given the opportunity to sell their water at a market price.

The lack of framework for water entitlement trading *between* sectors also impedes the discovery of water's 'true' scarcity value. For example, prices of irrigation water entitlement do not reflect the opportunity value of that water in other uses – such as urban uses. The current price for irrigation water entitlement typically only reflects the opportunity for within-sector trades – and the market price for the entitlements reflect the value of water as an input to agriculture. Because irrigation entitlements are generally not transferable to the urban sector, the market values of these entitlements do not reflect the willingness to pay by urban users for that water. Therefore, there is potential for inefficient resource allocation – meaning that water may not be allocated at the margin to its highest value use.

If between-sector trading were not feasible, a second-best solution would be to ensure that rural water is priced appropriately (through regulatory means) to reflect its scarcity value. Currently, irrigation consumption decisions are made on the basis of the price of delivered water plus the market value of the entitlement (where there are opportunities to trade water to other irrigators). Adding a margin to this price to account for scarcity would signal to irrigators the 'true' cost of their water inputs. However, in the absence of a water market, estimating scarcity value can be difficult. It would involve an assessment of the marginal value of water to irrigators, households and commercial urban users. While rural water pricing is not within the scope of this Inquiry, allocation issues and the prices paid for irrigation water are clearly relevant for setting efficient urban prices. To this end, the Treasurer has announced that:

A further reference to the Authority is envisaged in mid 2005 for the investigation of broader water pricing issues. The second inquiry would examine the prices levied by service providers other than the Water Corporation and Water Boards, including rural water prices (Treasurers media statement, 16 June 2004).

### **Key Findings on Water Availability and Use**

**A basic principle of efficient water pricing is to ensure that prices reflect the relative scarcity of the resource – in terms of the economic cost of securing additional supplies for urban water users.**

**In the South West region, water is not scarce in a physical sense. About 22 per cent of sustainable surface water yield is being used, while about 40 per cent of groundwater sustainable yield is being extracted. However, the economic and environmental costs of developing this water may be prohibitive, rendering the resource scarce in an economic sense.**

**Relative scarcity is also influenced by the current allocation of water entitlements. The Water Corporation's total supply of water to customers represents just 25 per cent of total water use in the South West region. The irrigation sector accounts for 40 per cent of water use and mining accounts for 18 per cent. The remainder is used by AQWEST, Busselton Water, stock and domestic users and private residential groundwater users.**

**In addressing Perth's supply-demand imbalance, there may be more scope for purchasing additional water from these other sectors.**

**While rural water pricing and trading issues are not within the scope of this Inquiry, the prices paid for irrigation water are clearly relevant for setting efficient urban prices.**

**The lack of an effective water-entitlement trading regime within and between sectors impedes the discovery of water's 'true' scarcity value. For example, prices paid for water by irrigators do not reflect the opportunity value of that water in other uses – such as urban uses.**

**Where water entitlement is tradable within the irrigation sector, the market value of the *entitlement* indicates the scarcity value of water in agricultural production. The prices paid for rural water simply reflect delivery costs.**

**Because irrigation entitlements are generally not transferable to the urban sector, the market value of these entitlements does not reflect the willingness to pay by urban users for that water. Therefore, there is potential for inefficient resource allocation – meaning that water may not be allocated at the margin to its highest value use.**

**The Authority suggests that more effort should be devoted to establishing an effective trading framework whereby non-urban water users would be given the opportunity to sell or lease water entitlement to the Corporation at a market price.**

**If trading were not feasible, a second-best solution would be to ensure that rural water is priced appropriately (through regulatory means) to reflect its scarcity value.**

#### 4.3.4 Source Development Plan

This section examines the Water Corporation's source development plan from an economic perspective and makes an assessment of whether the plan is consistent with the goal of efficiently supplying customers long term needs. In addition to the Corporation's plan, a number of options have recently been put forward by independent parties. These are briefly described in [Appendix 5](#). However, the Authority has not examined these proposals in detail as it is not within the Inquiry's Terms of Reference.

##### 4.3.4.1 Water Corporation Proposal

Over the next 10 years the Corporation proposes to develop four new sources of water, including desalination, purchasing irrigation water from Harvey Water, extracting groundwater from South West Yarragadee aquifer and water recycling. These supply augmentation activities are expected to produce an additional 113 GL of water, of which 107 GL is potable. Details of these projects, together with the approximate cost of water from each source, are as follows.

- *Desalination Plant (\$1.11 per kL)* – Investigations into the viability of constructing a seawater desalination plant commenced in 2001. Tenders from two consortia to construct and operate the plant are currently being evaluated by the Corporation, with a decision on the preferred tenderer expected in April 2005. The plant will produce 45 GL of water per year. A pilot plant is currently in operation at the proposed site for the plant to confirm pre-treatment requirements and operational issues. Capital cost estimates for the scheme have been developed by independent sources and detailed hydraulic modelling has been utilised to determine the required pipeline water transfer requirements.
- *Harvey Water Trade (\$0.60 per kL)* – involves the purchase of additional water made available from the piping of irrigation channels and the subsequent elimination of seepage and evaporation from the old open channel irrigation systems. Work undertaken to date has yielded an additional 10 GL per annum and the Corporation is confident of achieving a total yield of 17 GL per annum once the project is complete.

- *South West Yarragadee Aquifer (\$0.85 per kL)* – This scheme involves the construction of new bores, a water treatment plant, a pump station and a pipeline to extract and transfer 45 GL of groundwater per annum into the Perth supply system. The South West Yarragadee Aquifer is a large resource of good quality water with an estimated sustainable yield of 300 to 400 GL per annum. It is envisaged that the scheme will be located approximately 250 kilometres south of Perth and connect into the southern section of the water supply network. Current abstraction from the aquifer is in the region of 60 GL per annum, which would rise to just over 100 GL per annum under the Corporation’s proposal, which is scheduled for 2009/10. However, environmental approval for this project has not yet been given, and the decision is dependent on the information requirements being met.<sup>7</sup>
- *Water Recycling* – The Corporation has indicated that its Kwinana Water Reclamation Plant will treat 6 GL per year of wastewater for use by industry, at a cost of around \$1 per kL (the majority of other recycled water schemes, which produce water of lower quality than will be produced by the Kwinana plant, cost less than \$0.50 per kL). Recycled water schemes for use on parks and golf courses are also being progressed, which will mean that the State Water Strategy target of 20 per cent reuse of treated wastewater is likely to be achieved.

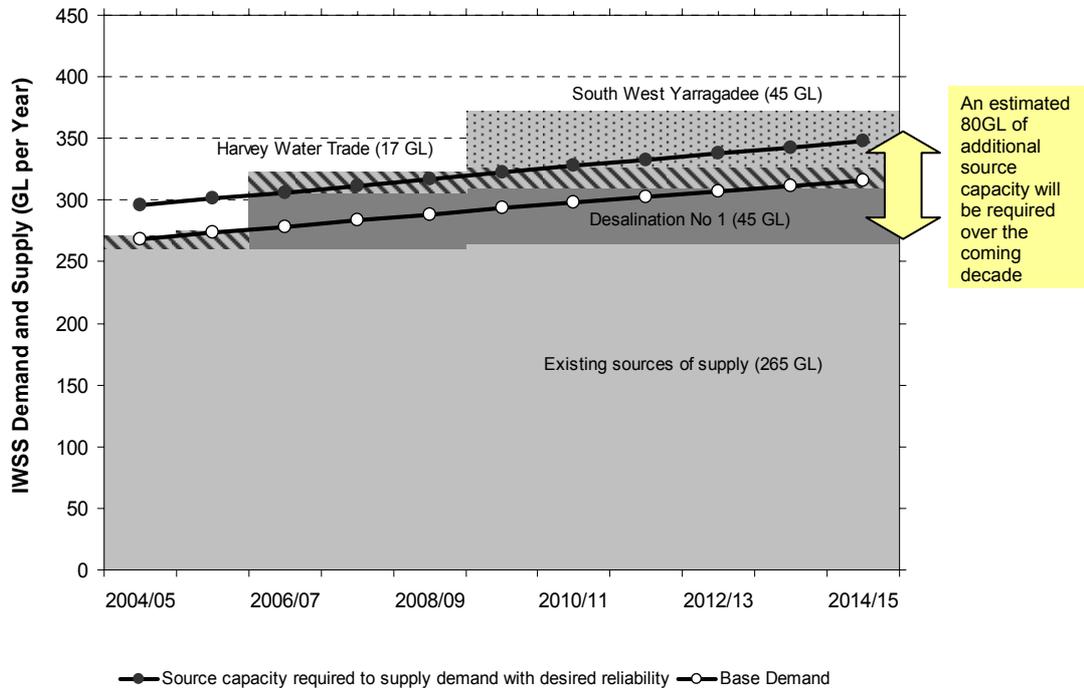
The timetable for bringing these sources on line is illustrated in Figure 4.5. The lower line shows projected base demand for water. The upper line represents the amount of water that would need to be available to limit the risk of a total sprinkler ban in any one year to 0.5 per cent (or a 1 in 200 year event). The chart shows that an additional 80 GL of source capacity will be required over the coming decade. This is based on the following assumptions:

- annual dam inflows of 141 to 145 GL, which is a continuation of average inflow since 1997;
- access to 120 GL of groundwater per year from the Gnangara Mound – which is a conservative assumption given that the Corporation currently has an approved abstraction licence of 156 GL and a base allocation of 152 GL;
- a supply buffer which aims to limit the probability of a *total* sprinkler ban to a 1 in 200 year event;
- population growth as projected by Ministry for Planning; and
- per capita demand being maintained at 155 kL per year.

---

<sup>7</sup> According to the Department of Environment, “The Waters and Rivers Commission is currently assessing the Water Corporation’s application for a licence to take water from the South West Yarragadee aquifer. The timing for this decision is dependent on information to be provided by the Corporation and also the assessment by the Environmental Protection Authority. The EPA will provide advice to the Minister for the Environment on the environmental acceptability of the development of the water resource and will rely on advice from the WRC. The Minister’s decision is also information-dependent. The Corporation is currently undertaking further work with the aim of meeting the information requirements, which are still being defined.” (Correspondence with the Department of Environment, 10 March 2005).

**Figure 4.5 Water Corporation Source Development Timetable, Assuming 7-Year Climate Trend and 155 kL per Capita Annual Demand**



In its pricing proposal, the Corporation indicates that water sources in addition to those described above could be required within the next decade, given the uncertainties regarding access to groundwater, climate and the achievement of the 155 kL per capita consumption target. Thus, it is considering a range of other potential sources and augmentation activities, including those put forward by independent parties. It is the Corporation's view that the alternative options put forward by independent parties do not have sufficient merit to displace options that are currently proposed in the Corporation's source development plan.

The process underlying the selection and ordering of capital projects involving long-term source development is one that encompasses a wide variety of issues and does not simply focus on costs alone. Discussion with the Corporation indicates that its long-term source development program has been developed with the aid of a 'certainty rating' based on complexity and the degree to which planning, investigation and approval has been advanced. Certainty ratings range between very high and low and are a guide to the level of project progression. Key among the factors assessed by the Corporation in determining future water sources are both social and environmental impacts. The following outlines the Corporation's assessment approach:

The Water Corporation has an interest in all potential source development proposals and continues to seek cost effective, reliable alternatives to add to our source development program. In assessing future source options, the Corporation considers technical, social, environmental and financial matters. An understanding of these aspects of any proposal is required before the viability of any source development option, relative to other options, can be considered. One of the key considerations at present is the speed that potential sources can obtain the required approvals. Another is the reliability of the water source. Both these criteria apply to the projects on the Corporation's current source development program and apply equally to any proposed new source. (Correspondence with the Authority, 2 February 2005)

The Corporation's current planning revolves around a *security buffer* to limit the likelihood of a total sprinkler ban to 1 in 200 years (or 0.5 per cent probability). This represents a significant increase in security from levels previously used by the Corporation in its earlier modelling – namely a 1 in 33 year likelihood of a total sprinkler ban (or 3 per cent probability) and a 1 in 10 year likelihood of some form of restriction. The justification for the higher security target is that:

Total sprinkler bans would have a massive economic and social impact, destroying the community's investment in established gardens and causing employment losses in the horticultural industry. The timing of new source development needs to be aligned with this objective. (Issues Paper submission, p32)

The Corporation has developed a method of calculating when a supply augmentation is needed to maintain its security of supply. A 'trigger point' for augmentation is established based on the supply capacity situation over a two-year period. Based on current consumption volumes, total sprinkler bans are required once storages fall below 120 GL. The Corporation estimates that, based on current groundwater availability, a buffer of 170 GL of storage is required to meet the security target of reducing total sprinkler bans to a 1 in 200 year event. Thus, the current trigger point for supply augmentation is 290 GL of storage. At the beginning of summer in 2004, peak storage was only 252 GL, indicating that the trigger for supply augmentation has already been passed – hence the current focus on developing new water sources.

If other sources such as desalination come online, the trigger point would be reduced. But with respect to additional groundwater and purchases of irrigation water, the Corporation indicates in its pricing submission that:

While the trigger could be reduced through additional groundwater availability (technically up to 165 GL per annum would be available under our licence conditions) and through additional trading with irrigators, neither of these is guaranteed to be sustainable under a repeat of 2001 and 2002. (p17)

#### 4.3.4.2 Issues Paper Submissions

The Environmental Protection Authority (EPA) is concerned that the current level of groundwater abstraction may be unsustainable:

Present water resource planning and management function is not meeting environmental regulatory standards, e.g. Gngangara Mound. (p1)

The Authority notes that the Corporation has approval to abstract the amount of groundwater and that its strategy to balance supply and demand assumes an annual level of abstraction that is 23 per cent lower than its current abstraction amount.

The Conservation Council of WA expresses concern about the expenditure on source development and the power consumption of the desalination plant:

The Water Corporation spends too much on new source development and not enough on water conservation and network maintenance (especially the sewerage network). More funding should be devoted to finding and repairing leaks and in replacing inefficient equipment such as older water using appliances. (p10)

The desalination plant must use renewable energy, for example, otherwise it is just contributing to global warming. (p9)

The Chamber of Commerce and Industry provides qualified support for the desalination plant:

CCI believes that the state's water supply must be capable of being maintained and be sufficient to meet growth. This is the reason for CCI's qualified support for the government's recently announced plan to build a desalination plant in WA. Although costly, the investment will improve certainty. (p15)

The Department of Treasury and Finance explains the importance of getting the sequencing of source development right:

Choice of the sequence of source development should account for the need to minimise inefficient investment decisions and ensure that the most efficient and cheapest water source is generally developed first. The opportunity cost of not developing sources in this way is funding for health, education, justice and other competing government spending priorities. (p14)

The issues raised in these submissions are discussed below.

#### 4.3.4.3 Authority Assessment

Most of the assumptions underpinning the Corporation's proposed source development program appear to be sound. On the supply side, projected inflows to surface water storages are sensibly conservative, given that rainfall may not return to the long-term average. Similarly, a conservative estimate of future yields from the Gngangara Mound has been made owing to questions about the sustainable extraction levels.

However, the objective of maintaining a capacity buffer to limit the risk of a total sprinkler to a 1 in 200 year event warrants further consideration. In other states, the security buffer is somewhat less. The ACT is currently reviewing its water supply options and security targets. Owing to the 2003 bushfires, drought and climate change forecasts, ACTEW is predicting that Canberra's current supply infrastructure will mean that the ACT will incur a complete ban on outdoor water use once every 25 years, and the ban will last for about 10 months (that is, 4 per cent of the time). This low level of water reliability is viewed by ACTEW as unacceptable and steps are being taken to augment supply.<sup>8</sup> A review of other Australian water utilities, which is cited in the ACTEW report, finds that currently there is consensus that the duration of restrictions (of any type) should not occur on average more than 1 year in 10, or *restrictions that involve a total sprinkler ban should be limited to a frequency of 1 in 25 years and last no longer than 0.5 per cent of the time*. This suggests that

---

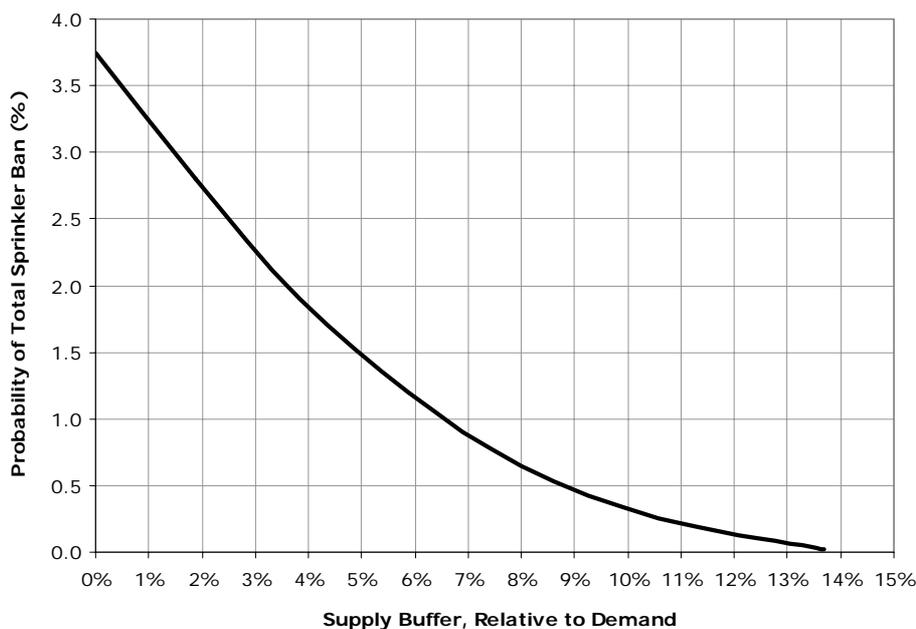
<sup>8</sup> ACTEW Corporation Ltd (December 2004), *Future Water Options for the ACT Region in the 21<sup>st</sup> Century - An Assessment of the Need to Increase the ACT's Water Storage*

east coast water providers are maintaining a lower supply buffer than the Water Corporation.

The selected security buffer should take into account the possibility that customers may be willing to trade off some reduction in supply reliability in return for lower water prices that would eventuate from the deferral of source development expenditure.

The cost of maintaining a high security buffer is reflected by the need to bring forward the development of new source development projects. Figure 4.6 shows a generalised relationship between the size of security buffer (measured as a per cent margin between supply and demand) and the risk of a total sprinkler demand. The Corporation's target level of reliability (0.5 per cent chance of a total sprinkler ban) is consistent with maintaining a 9 per cent margin between supply and demand. But if a higher risk were viewed as acceptable, a much lower margin would be required. For example, a 1 in 27 year risk (or 3.75% probability) corresponds to a zero buffer. At present, Perth is facing a 22 per cent risk of a total sprinkler ban.

**Figure 4.6 Supply Buffer and Probability of Total Sprinkler Ban**



*Source: Water Corporation*

The proposal to maintain a relatively high security buffer influences the timing of bringing different source development options online. Partly due to delays in gaining environmental approval for South West Yarragadee, the Water Corporation has scheduled the desalination plant ahead of South West Yarragadee (although having a source of water that is independent of climatic conditions was another consideration). The requirement to meet the supply security buffer has been the prime impetus for this scheduling, despite the fact that water from South West Yarragadee is projected to be significantly cheaper than desalinated water (\$0.85 per kL compared to \$1.11 per kL).

The Authority is of the view that consideration should be given to the economic merit of postponing desalination, which would allow time for the environmental assessment of South West Yarragadee to be completed. Subject to environmental approval, Yarragadee would provide customers with a cheaper source of water. This view is consistent with the Department of Treasury and Finance's submission that the sequencing of source development needs to be considered to ensure sound investment decisions.

It is acknowledged that postponement of desalination would increase the risk of total sprinkler restrictions, as shown in Table 4.2 which contains the results of modelling conducted by the Water Corporation. For example, in 2006-07, the probability of a total sprinkler ban is estimated to increase from 8 per cent to 17 per cent. This higher risk needs to be traded off against the potential for bringing forward the lower-cost Yarragadee option in place of desalination.

**Table 4.2 Probabilities of Total Sprinkler Restrictions With and Without the Desalination Plant**

	Desalination in 2006/07	No Desalination*
2005/06	22%	22%
2006/07	8%	17%
2007/08	1%	13%
2008/09	Less than 0.5%	14%

\* The decline in the probability of total sprinkler restrictions is attributable to the water trading with Harvey Water.

### **Key Findings on the Water Corporation's Source Development Plan**

**The Corporation has taken a conservative approach in its source development program with respect to future dam inflows and sustainable abstraction levels from the Gngangara Mound. This approach would appear to be prudent given concerns about climate change and the capacity of the Gngangara Mound.**

**However, the objective of maintaining a capacity buffer to limit the risk of a total sprinkler to a 1 in 200 year event seems conservative compared with the approach taken in other Australian jurisdictions.**

**The selected security buffer should take into account the possibility that customers may be willing to trade off some reduction in supply reliability in return for lower water prices that would eventuate from the deferral of source development expenditure**

**For example, while a delay in constructing the desalination plant will increase the risk of sprinkler bans in 2006/07, customers may be willing to bear this short-term risk if it means that a cheaper source of water from South West Yarragadee could be developed.**

**Future demand will also influence the source development plan. The Corporation's plan is contingent on unconstrained per capita demand being reduced from 170 kL to 155 kL per year. Sensitivity analysis around this target should be investigated.**

#### 4.3.5 Competition in the Water Industry

Some submissions in response to the Issues Paper expressed concern about the impediments faced by private, third party interests in competing in the delivery of services that are currently provided by the Water Corporation. While this issue is outside the scope of the Inquiry's Terms of Reference, it warrants mention here as an avenue for future investigation.

The Chamber of Commerce and Industry is concerned that the current regulatory structure does not facilitate independent investment:

The availability of transparent pricing for the various elements of the water supply chain – supply, transmission, distribution and retail – is a critical factor that will limit the ability of potential market entrants to establish business viability. (p1)

However, CCI notes that in other cases, businesses have argued that the market structure of Water Corporation itself has prevented viable competition on technical constraints. Arguments have also been mounted by industry that the approach adopted by the Water Corporation to commercial terms and risks has impeded the adoption of innovative, alternative water supply solutions. The Water Corporation argue that considerable efforts have been made by the Corporation to address technical and commercial arrangements to facilitate opportunities with the private sector.

CCI has discussed commercial case studies with each of three proponents that have initiatives to supply potable water to Water Corporation. Each initiative is based in regional Western Australia. Two propose to supply large volumes of water – 50-60 GL – and one to supply up to 20 megalitres (across small plants supplying 1-2 megalitres each, and simultaneously contributing to desalination of landscapes and infrastructure protection), as wholesalers to Water Corporation for subsequent distribution through the existing water pipeline network.

All three have been unable to objectively analyse their business case due to what is described as inadequate supply chain pricing from Water Corporation. (p14)

The Shire of Mundaring is concerned that independent providers are prevented from operating in the wastewater market:

The high wastewater charge for metropolitan Perth suggest that there may be opportunities for private wastewater service providers to enter the market and other competitive wastewater options should this service become de-regulated and open to private industry....The de-regulation of wastewater service provision and greater private industry investment into wastewater service provision are key actions that would assist the Shire of Mundaring in meeting the needs of the community and planning for a sustainable future. (p1, 3)

##### 4.3.5.1.1 Authority Assessment

Although the potential for competition in the water and wastewater market is limited, the current structure and regulation of the Western Australian market could be deterring potential investors, which in turn could mean that urban water prices are too high.

In Melbourne and Sydney, the water sectors are structured so that bulk water supply activities are separated from distribution and retail activities. These two cities also have independent economic regulators setting the prices charged by the bulk water suppliers and distributors/retailers.

The Authority considers that a review of competition in the Western Australian water industry could assist in achieving better future tariff outcomes. The review could consider, among other things, the development of a more competitive and effective bulk water supply market in Western Australia.

#### **4.3.6 Demand Management**

There are a number of options for reducing customers' water consumption, including rebates for water efficient appliances (shower heads, rainwater tanks etc.), ecolabelling of appliances, building design standards, community education, water pricing and mandatory restrictions. These measures aim to reduce customers' discretionary use of water, as opposed to water for basic needs such as drinking, cooking and hygiene. The Water Corporation estimates that approximately 50 per cent of residential water is applied to gardens and outdoor use. The Water Corporation currently uses a mix of all the above options. It is also investigating the cost and scope for future water savings in leakage control – one element of its demand management program.

##### **4.3.6.1 Water Corporation Proposal**

The Corporation commenced two day per week sprinkler restrictions in 2001 and is considering removing restrictions in 2006/07 (or easing them to three days per week sprinkler use) when the desalination plant is commissioned and/or when drought conditions ease. Two day per week sprinkler restrictions have been the main contributor to reducing per capita consumption from 185 kL per year to 155 kL per year. The Corporation has advised that a total sprinkler ban could reduce per capita annual consumption a further 17 kL, which would bring consumption down to 138 kL per capita. But as discussed in the previous section, the Corporation does not favour total sprinkler bans owing to their disruptive economic and social impact.

The Corporation plans to replace two day per week sprinkler restrictions with three day per week sprinkler restrictions and an extended rebates program (along with education campaigns and other Waterwise programs) to achieve the State Water Strategy annual consumption target of 155 kL per capita. According to the Corporation:

Not only is demand management justified on social and environmental grounds, but the reduced water consumption allows for deferment of capital expenditure, savings in water operating and wastewater pumping costs. In the metropolitan area, this project (the Waterwise Program) is financially positive in the longer term based on a financial cost/benefit analysis. (p20 Issues Paper submission).

To date, the Corporation has administered \$15.6 million in government-funded rebates to customers who have purchased products under the Waterwise Rebate Scheme. The total amount of scheme water saved to date as a result of the rebate scheme is approximately 5 GL per annum, at a cost to government of \$0.31 per kL.

As the rebates only partially cover the cost of customer outlays for products covered under the scheme, the total cost of water saved would be somewhat greater than \$0.31 per kL.

The Corporation includes leakage detection, repair and pressure management as part of its demand management program. The Corporation estimates that this activity costs \$1.50 per kL of water saved and that there is potentially only 2.3 GL in savings that can be achieved. The Corporation's position is:

Although a full evaluation has not been undertaken for some time, previous economic evaluations of the Corporation's leak detection program have concluded that it would not be beneficial to pursue leak detection beyond the methods already employed. (p21)

[nevertheless] A review of the Corporation's approach to leakage management is currently being undertaken to determine the most appropriate future direction, for both metropolitan and country systems. In addition, the Corporation is working with the Water Services Association of Australia (WSAA) to improve the process of calculating an Infrastructure Leakage Index (ILI). There have been difficulties in the past determining an ILI which is consistent amongst water utilities. The development of an acceptable industry-wide process will enable more accurate benchmarking across Australia. (p21)

#### 4.3.6.1.1 Issues Paper Submissions

##### **On Water Restrictions**

The Chamber of Commerce and Industry advocates, where possible, market-based approaches to demand management:

In the context of water pricing, a greater concern is the growing tension between the views of those who would seek to constrain demand for water by regulating and prescribing who can use it, how, and when; and a more flexible, market-driven approach which allows proper pricing and the operation of the market to ensure that this scarce and valuable resource is used as effectively as possible. (p6)

CCI is a firm advocate of taking a market-based approach to demand management, where possible. (p7)

CCI believes that prohibitions, caps, targets and other proscriptive demand limitation measures are a last resort, appropriate only for overcoming urgent short term problems or where clear evidence of market failure demonstrates that a (suitably educated) community would not choose to use (properly priced) water resources in the manner which maximises its welfare. (p8)

Barnes also shares this view:

It is not government's place to dictate that a resident cannot have a lush tropical garden in a dry climate – it is a matter for that person to determine what he or she is willing to pay for that privilege. (p1)

The CSIRO notes that prices have not been increased as the climate has dried:

In normal markets, prices reflect supply and demand. In this regard, the drying of the climate in the past 28 years, and the additional drying since 1998, are not reflected in the price charged for Perth's household water.(p3)

The Department of Treasury and Finance considers that prices have a role in managing demand:

A more appropriate demand management strategy that will allow consumers more control over their water use is through price signals. Higher prices can be used to restrict excessive demand but at the same time allow consumers to find their own balance of demand and price. (p18)

The Department of Treasury and Finance also notes that watering restrictions are becoming less effective:

While restrictions have been effective in reducing demand by between 40 and 45 GL per year over the past few years, recently their effectiveness is thought to have been reduced, with consumers saving only between 35 and 40 GL over 2003/04. (p18)

While the Conservation Council of Western Australia agrees that price has a role, it considers that other options are also important:

Pricing is one of the most efficient ways of achieving efficiency, but not the only way. Education, market reforms and regulations are also important policy levers, but in times of scarcity, pricing should reflect the real value of the resource, as it does to a greater extent with fuel pricing. (p10)

The present water restrictions are considered a first step in sensitizing the Perth community to the need to convert their existing gardens to water wise gardens. (p6)

The Office of Water Policy considers that a price increase during watering restrictions would have a very small impact on consumption:

In the case where restrictions are already in place the reduction in consumption would be very small. In short, such price increases would mainly have a revenue effect. (p11)

The Western Australian Council for Social Service prefers alternatives to price increases when water is in short supply.

WACOSS believes that prices should not play a role in demand management when water is in short supply unless implemented only to those households with the capacity to pay. (p2)

As an alternative to using price increases and harsh restrictions on water when it is in short supply, WACOSS recommends the implementation of other strategies such as retrofitting for low-income households to reduce water consumption. Such schemes have been implemented in many places within Australia and overseas. In particular we draw your attention to sponsored retro-fitting programs, where low-income households have been provided with water saving appliances free of charge. These programs have occurred in the Kalgoorlie-Boulder region, in low-income residential areas of Sydney and are commonplace in the United States. The programs are either sponsored by Government or instituted by the utility providers themselves in recognition that they reduce consumption and thus reduce bills, resulting in a reduction in debt recovery costs for the utility providers. (p2)

## **On Rebates**

CSIRO provided the only submission that commented on the rebate scheme in detail:

The current subsidy scheme has been very effective in increasing consumers' adoption of scheme water saving devices, especially water-efficient washing machines and domestic bores. It is likely that each GL saved through this scheme has cost the government about \$3.25M. However the consumer pays over 60 per cent of the cost of most products and therefore the total cost of these savings is likely to be about the \$10M per GL, similar to the cost of bringing on a new water source. There are other benefits that flow to consumers from the purchase of these subsidised products, and there are uncalculated environmental (and sometimes social) costs of new sources, and these together probably mean that the subsidy scheme should continue even with a new source being developed. (p4)

#### 4.3.6.1.2 Authority Assessment

##### **Water Restrictions**

Water restrictions have the appeal of being fair in that all customers share the burden of water scarcity equally, but are not equitable to the extent that they do not provide for differences in circumstances between customers. Restrictions are, however, effective at delivering a relatively certain reduction in consumption, which is important for water managers in times of low reserves. Thus, restrictions are likely to remain a valuable tool for managing critical and unexpected shortages. Restrictions also potentially produce a downward shift in the demand for water over the longer term as households change their water consumption behaviour in response to an expectation of restrictions continuing in the future.

From an economic perspective, restrictions are an inefficient tool for managing demand because they do not ensure that available water resources are allocated to their most productive or highly valued uses. Restrictions prevent those customers that are willing to pay more to maintain reliable supplies from accessing water. Restrictions amount to a reduced quality of service, which imposes an implicit cost on the whole community.

The cost of water restrictions to household and commercial customers depends on the shape of their demand function for water and the severity, duration and frequency of restrictions. As such, the Authority recommends that, as a first step, household and commercial demand for reliable water supplies be estimated to allow a rigorous assessment of the relative costs and benefits of demand management through restrictions versus new source development. It is the Authority's view that priority attention is given to this task.

One way of estimating the household demand (and thus the cost of restrictions) is to use non-market valuation methods to estimate how much customers are willing to pay to avoid restrictions. Such a study has not been conducted in Western Australia, but studies have been undertaken in some other Australian jurisdictions. For example, in 2003 ACTEW commissioned a study to examine the costs of water restrictions to households and commercial customers. On average, Canberra households were found to be willingness to pay \$237 each year (as 'insurance') to avoid the possibility of total sprinkler bans being imposed every summer.<sup>9</sup> The survey did not determine customer willingness to pay to avoid the risk of less frequent or less severe restrictions.

A similar study for Western Australia would be valuable for determining the costs that water restrictions impose on the community. This data is needed to make informed decisions about the role that restrictions should play in balancing supply with demand.

---

<sup>9</sup> National Economic Research Associates and AC Nielson (2003), *Customer willingness to pay for attributes of water and wastewater services*, an unpublished report for ACTEW Corporation Ltd

## Rebates

The Authority is concerned that rebates may not be the most cost-effective way of reducing demand. The question is whether incentives should be given to customers to invest in water saving technology. The answer depends on whether the total cost per kilolitre of water saved (including the rebate *plus* the additional cost to the customer of installing the new technology) is competitive with other sources of water.

Table 4.3 shows the approximate amount of water that is saved by converting to more efficient water appliances, together with the cost of these products relative to 'traditional' products. Rebates for water-saving shower roses and front-loading washing machines are a reasonably cost-effective way of reducing water use because efficient appliances are not much more expensive than traditional 'inefficient' appliances. In the case of washing machines, the difference is negligible. However, the total potential water savings delivered from conversion to more water efficient shower roses and washing machines are relatively small.

The installation of rainwater tanks and bores can deliver much larger water savings. But the cost of these is large relative to the cost of scheme water. It is estimated that water supplied from a tank or bore costs \$1.09 or \$2.91 per kL, respectively, assuming the upfront capital cost of installing these appliances is annualised at 6 per cent over a 20-year life.

There are also potential environmental issues associated with encouraging private bore development. Recent observations that some bores are becoming saline may point toward problems of over-utilisation. Currently there is no usage charge applied to the private extraction of groundwater for residential use. This sends the signal to users that the resource is limitless. Where scarcity constraints apply, pricing could be appropriate. This needs more detailed examination to determine whether or not there is a scarcity issue and whether private extraction is impacting on the Corporation's future water reserves.

While the Corporation states that its Waterwise Program is financially positive based on a benefit-cost analysis, the details of this modelling are not available. Given the relatively high cost of achieving water savings from bores and rainwater tanks, the Authority suggests that the Waterwise rebate program be subject to a detailed review.

**Table 4.3 Cost of Water Savings to Consumers from Conversion to Water-Efficient Products**

Product	Difference in cost between a water-efficient and water-inefficient product (excluding rebate)	Water saving per product compared to an inefficient product (kL)	Cost per kL saved (10 year life)*	Cost per kL saved (20 year life)*
Washing machines	\$0	26	\$0.00	\$0.00
Shower roses	\$10	27	\$0.05	\$0.03
Garden bores	\$2,500	200	\$1.70	\$1.09
Rainwater tanks	\$2,000	60	\$4.53	\$2.91

\*Cost annualised at 6 per cent over product life

*Source: Product suppliers (cost), Water Corporation (water savings)*

### Leakage Reduction

The Authority does not currently have access to sufficient information for it to form a view on the Corporation's leakage control program.

Establishing an efficient leakage control program requires information about the size of water losses and where they are occurring in the system. The Authority is aware that this is not a straightforward process, because it is currently difficult to differentiate between real and apparent water losses. Because of poor metering accuracy, some of the apparent losses – as indicated by water that is unaccounted for – are due to metering error. This problem is an Australia-wide issue.

### Demand management pricing

In a competitive market, efficiency is achieved when prices of a service are equated to the cost of producing an additional (or marginal) unit of output. Pricing at marginal cost is efficient because it allows a customer to purchase services where the value to the customer is greater than the marginal cost of production, while at the same time ensuring that producers receive a return equivalent to the cost of supplying the additional service.

Marginal cost pricing has a role to play in managing water demand. Not only does it fulfil a revenue-generating function for funding new capital investments and demand management programs, it has the potential to shape customer's long term consumption decisions – such as investments in water efficient appliances.

Including marginal cost in the usage charge sends a scarcity signal to consumers to enable adjusted behaviour and deferment of capital expenditure. Faced with higher water prices, customer decisions to either maintain or decrease consumption will reflect customers' willingness to pay the usage charge. In this respect, pricing is more efficient than water restrictions because customers with a high value for water are not prevented from accessing the resource.

Demand management pricing can also be utilised as a tactical instrument in times of shortages. There is scope for *rebalancing tariffs* or *increasing prices* in times of scarcity to meet specific demand management objectives. The option of rebalancing tariffs is discussed in more detail in Section 4.6. Past experience with urban charging policies in other jurisdictions suggests that pricing can influence demand, albeit to a limited extent. For example, since consumption-based pricing was introduced in NSW, per capita residential demand for water in Newcastle has fallen by 13 per cent and in Sydney, consumption has dropped by 15.5 per cent.<sup>10</sup> But not all of this decline can be attributed to pricing as other programs, such as compulsory installation of dual flush toilets in new homes have also been introduced.

The effectiveness of pricing as a demand management tool relies on customers having an *elastic demand* for water – that is, demand must be responsive to price. A report by NERA (2001) summarises the results of a number of elasticity studies for urban and commercial water users.<sup>11</sup> On balance, these studies have found that:

- Household demand for water is relatively inelastic, ranging from -0.2 to -0.5, which implies that a 10 per cent increase in the price of water would reduce demand by 2 to 5 per cent;
- Long run elasticity is usually greater than short run elasticity, reflecting that over the longer term, customers can adjust to higher prices by changing their appliances and garden landscape, but consumption is relatively fixed in the short run by the existing ownership of durable goods;
- Demand elasticity is generally higher in summer than winter, reflecting the higher demand for discretionary (or outdoor) water; and
- Commercial customers generally have higher elasticities than residential customers, with estimates ranging between -0.25 to -0.75.

On the basis of these findings, the responsiveness to prices is relatively small. This is backed up by the observation that annual water and wastewater charges for the average Western Australian household only makes up about two per cent of total household expenditure – implying that residential customers could view water costs as incidental relative to their total budget. Further research is required to determine the demand elasticity of Perth households and commercial users. It is possible that elasticities may be slightly higher for Perth compared to other states because of private bore ownership, which provides a substitute source of water to scheme supplies.

The Authority's assessment of demand management pricing is contained in the Section 4.6 where specific pricing options are examined.

---

<sup>10</sup> Parry, T.G. (2002), 'Influencing Demand – Water Pricing', paper presented at Western Australian Water Symposium, Parliament House, Perth, 7-9 October 2002

<sup>11</sup> National Economic Research Associates (October 2001), *A Review of Melbourne's Water Tariffs – a Report for the Department of Natural Resources and Environment*

**Key Findings on the Water Corporation's Demand Management Program**

The Authority considers that the Corporation's target of reducing demand to 155 kL per capita by 2012 is optimistic, given that the Corporation is planning on the basis that sprinkler restrictions will be either removed or eased to three days per week from 2006/07 onwards.

Water restrictions are a useful fallback tool for addressing critical shortages when an immediate and certain reduction in demand is required. However, restrictions impose costs on customers and are inefficient compared to pricing.

Further research is required to estimate water demand functions that would provide information about customer's willingness to pay for water of a particular reliability. This would assist the Corporation to make efficient decisions about demand management versus source development options.

Short-term water restrictions could encourage long-term consumption changes at high cost to the customer, which would be inefficient if comparatively low-cost supplies are brought online in the medium term.

A close examination of the Waterwise Rebate Program would appear warranted, particularly the rebates offered for the installation of rainwater tanks and private bores.

The Authority does not currently have access to sufficient information for it to form a view on the Corporation's leakage control program.

Marginal cost pricing has a role to play in managing water demand. Not only does it fulfil a revenue-generating function for funding new capital investments and demand management programs, it has the potential to shape customer's long-term consumption decisions.

Demand management pricing can also be utilised as a tactical instrument in times of shortages. There is scope for *rebalancing tariffs* or *increasing prices* in times of scarcity to meet specific demand management objectives.

Indications are that residential demand for water is relatively insensitive to price, implying that minor changes in price would not bring about significant reductions in water consumption. Further research is required to determine the demand elasticity of Perth households and commercial users.

## 4.4 Revenue Requirement

### 4.4.1 Background

The Authority has assessed the Corporation's revenue requirements by using a 'building block' approach. This method is used to forecast the total revenue required for a predetermined period, assuming a particular level of demand for services. Prices and tariff structures are then formulated to recover this revenue.

The building block approach involves a 'bottom-up' determination of total revenue from component costs, as follows.

$$\begin{aligned} \text{Total Revenue} &= \text{Rate of Return} \times \text{Asset Value} \\ &+ \text{Depreciation of Assets} \\ &+ \text{Forecast Operating and Maintenance Costs} \end{aligned}$$

Identifying an appropriate level of revenue requires consideration of, among other things, the level of return on assets, the allowance for depreciation that is necessary to reflect the aging of assets and the efficient level of operating and maintenance expenditure. The asset value referred to in the formula above is often referred to as the 'regulatory asset value'. This value has the most significant impact on average price for services, as it tends to drive three quarters of a water business' revenue requirement. The regulatory asset value is increased each year by the net value of capital expenditure and reduced by depreciation.

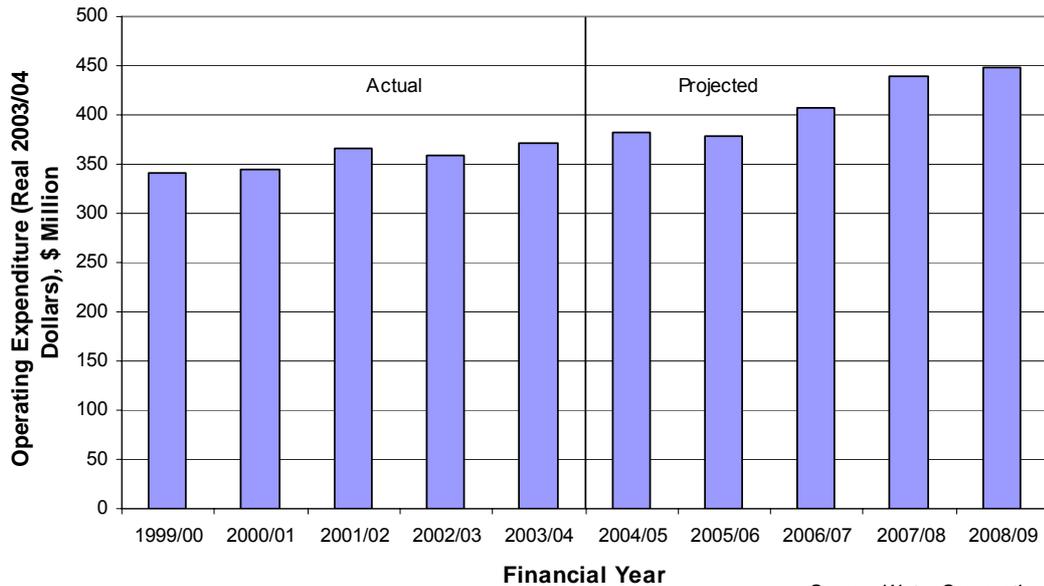
One way of determining an initial regulatory asset value is to consider the level of revenue that would be appropriate for the business, and then back-calculate the asset value given forecasts of operating and maintenance costs, depreciation and a rate of return on capital. This is the approach followed below. Each of the cost components is examined in turn before the RAV is considered.

### 4.4.2 Operating Expenditure

#### 4.4.2.1 Water Corporation Proposal

The Corporation demonstrates that its operating costs (before depreciation) have risen, in real terms, between -1.5 per cent and 6.2 per cent per annum over the last four years (Figure 4.7). Future operating costs are expected to follow historical trends, although the average increase in operating expenditure between 2004/05 and 2008/09 (in real terms) is expected to be 3.9 per cent compared to average rises of 2.1 per cent per year between 2000/01 and 2003/04. The operation of the desalination plant from 2006/07 will place significant upward pressure on operating expenditure.

**Figure 4.7 Water Corporation's Historical and Projected Annual Operating Expenditure (Real Values)**



Source: Water Corporation

According to the Corporation, efficiency results for the last seven years have ranged between -1.4 per cent and 4.3 per cent per annum. The target over this period has been to achieve a yearly operating cost efficiency of 2.4 per cent. The Corporation's current strategy to achieve efficiency gains is reflected in its Process Improvement Initiative, which was commenced in early 2004 with the objective of the Corporation becoming "the best performing utility in Australia without compromising service".

The Corporation has identified 65 initiatives, which are intended to deliver cost savings and improve process integration. The Corporation's Process Improvement Initiative includes:

- modifying the tactical asset management practices and changing the mix between preventative and corrective measures;
- rationalising software and hardware;
- making contract efficiency gains by alliance maintenance and operations contracts; and
- rationalising procurement practises including suppliers, consultancy, conferences, training and travel.

The Corporation estimates that the Initiative will deliver \$51.5 million in efficiency savings over the next five years. This is in addition to an estimated \$50 million in efficiency savings expected from economies of scale through business growth. The total efficiency savings is equivalent to 4.7 per cent of the projected base operating costs (i.e. excluding new levels of service).

#### 4.4.2.2 Authority Assessment

The Authority's consultants have analysed the Corporation's operating expenditure proposal and delivered a report which is posted on the Authority website. Based on the consultants' findings, the Corporation's proposed efficiency gains of around 5 per cent per annum are considered to be reasonable and founded on sound assumptions. The additional efficiencies achieved by economies of scale as customer numbers increase are based on past achievements and appear reasonable.

The consultants have found that while the Corporation's operating costs per serviced property are among the lowest of all water providers in Australia, other providers have higher population to staff ratios (Table 4.4). The disparity tends to indicate that staff levels at the Corporation are relatively high and that its lower operational costs may be due to the lower level of water treatment undertaken by the Corporation.<sup>12</sup>

**Table 4.4 Comparison of Staff Numbers Among Water and Wastewater Service Providers, 2002/03**

Organisation	Population served	Staff numbers (FTE)	Population served per FTE
Melbourne Consolidated (Water & Wastewater)	3,470,000	1,535	2,260
- Melbourne Water (wholesale)	3,470,000	501	N/A
- South East Water Limited (retail)	1,324,000	426	N/A
- City West Water Limited (retail)	619,000	218	N/A
- Yarra Valley Water Limited (retail)	1,527,000	390	N/A
Gold Coast Water	454,000	350	1,297
Sydney Water	4,198,000	3,516	1,194
Hunter Water	489,000	420	1,164
Brisbane Water	905,000	900	1,006
South Australian Water Corporation	1,077,000	1,190	905
<b>Water Corporation</b>	<b>1,426,000</b>	<b>1,983</b>	<b>719</b>

*Source: Water Services Association of Australia, WSAA Facts 2003 and respective company annual reports*

Based on the consultants' assessment, there is scope for around a 15 per cent reduction in total staff numbers to bring the Corporation's population to staff ratio up to 830, which is still well below that of other providers. This would result in a saving of \$20 million in operational costs in 2004/05, increasing to \$34 million in 2008/09.

A review of the Corporation's operating expenditure (Table 4.5) shows that labour and hired/contracted services are the largest cost items (other than depreciation). While the Water Corporation out-sources around half of its IT services and its

<sup>12</sup> The Corporation disinfects water supplies but, in the main, does not employ full water treatment encompassing chemical dosing, filtration and disinfection. Other states generally undertake full treatment. From a health perspective, Western Australia is able to undertake minimal treatment of its water because groundwater, which requires less treatment than surface water, makes up a large component of supply.

technical engineering consultancy services, there is potential for the Corporation to make further efficiency savings by out-sourcing functions such as:

- customer billing;
- call centre operations; and
- sewerage operating contracts.

These and other functions are currently outsourced by other Australian water providers, enabling lower staff levels for a given level of population served. For example, South Australia Water has outsourced the operation and maintenance of Adelaide's water and wastewater treatment to external contractors. Sydney Water supplies and treats almost three times the water and wastewater volumes of the Water Corporation with only a 77 per cent increase in the number of full time equivalent staff.

**Table 4.5 Breakdown of Water Corporation Operating Expenditure, 2003/04**

Expenditure Item	Value (\$m)	Share of total (%)
<b>Regulated business</b>		
Labour	130	21
Chemicals	13	2
Energy	35	6
Materials	15	2
Hired & Contracted Services	76	12
IT & Telecommunications	25	4
Cost of Assets Retired	25	4
Costs of Assets Sold and Disposed	7	1
Corporate Charges	23	4
Plant & Equipment	14	2
Other Expenses	20	3
Depreciation	243	40
Contestable business	12	2
<b>Total</b>	<b>626</b>	<b>100</b>

*Source: Water Corporation*

### 4.4.3 Capital Expenditure

#### 4.4.3.1 Water Corporation Proposal

The Corporation's five-year capital investment program totals \$3,048 million, and averages \$610 million per year. Figure 4.8 shows that the projected level of capital expenditure from 2005 to 2009 is significantly higher than historical capital expenditure. This is largely due to planned supply augmentation works. Upgrades of the wastewater treatment system are also planned.

**Figure 4.8 Water Corporation Historical and Projected Capital Expenditure and Developer Cash Contributions**

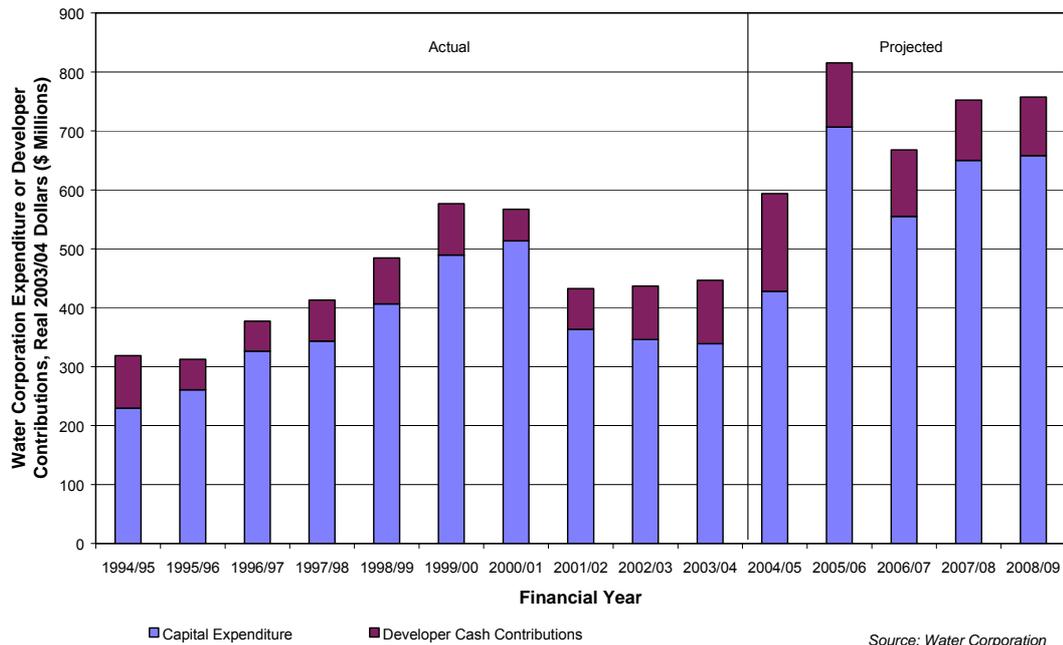


Figure 4.8 shows that developer contributions form one of the revenue sources that fund the Corporation's capital program, however this expenditure is excluded from capital expenditure for regulatory purposes. To include it would be incorrect because it would imply that the Corporation would earn a return on capital that it did not fund.

The Corporation has indicated that its capital works program needs to be framed within the State Government's budget constraints. Projects that are most urgent receive priority within this constraint. The Corporation identifies the following issues as being complicating factors in determining its Capital Investment Program:

- Changing water demand due to restrictions and rapid growth rates in the housing sector;
- An absence of a clear level of service priorities across all regulators;
- A limitation on capital funding from Government;
- A limitation on price rises for increased service levels set by Government;
- Long lead times to deliver service level improvements due to the increasing range and complexity of regulatory approvals; and
- Changing climate and associated needs impacting on long-term planning.

## Capital drivers

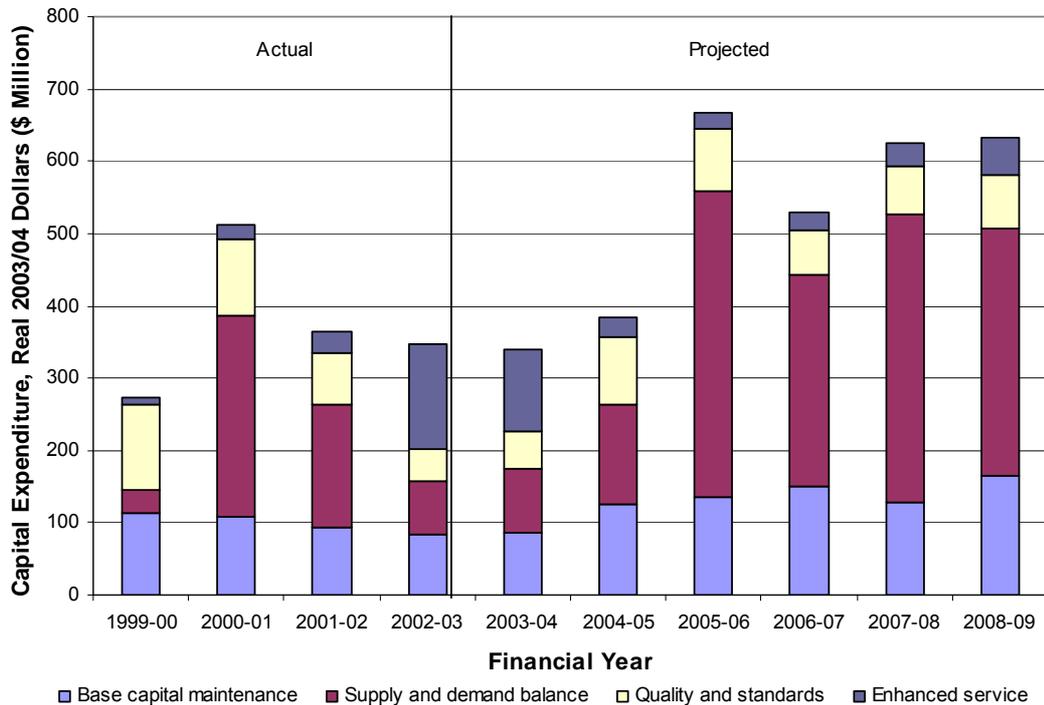
The Corporation uses four industry-standard capital drivers for the regulated capital investment program, which are based on those used by OfWAT and IPART. Capital projects to balance supply and demand, together with base capital maintenance, account for the major share of budgeted capital expenditure over the next four years to 2008/09 (Figure 4.9). Further details are as follows:

- *Base capital maintenance* – to maintain the current level of service to existing customers. Base capital maintenance is **\$801 million** or 23 per cent of the total program. Major projects include the Kalgoorlie Pipeline,<sup>13</sup> wastewater treatment, information technology, dam safety and remedial works, water distribution, water treatment, sewerage conveyance, customer meters and overflow risk management.
- *Supply and demand balance* – to meet capacity requirements assuming the recent 7-year streamflow trend continues, with consumption of 155 kL per person and groundwater extraction of 120 GL per annum. Capital expenditure on this category is **\$1,687 million** or 53 per cent of the total program. Major projects include the Perth Seawater Desalination Plant, South West Yarragadee Scheme, Harvey Water Trading, water distribution, Kalgoorlie Pipeline, other wastewater treatment and sewerage conveyance. Since the South West Yarragadee source option does not yet have regulatory approval it is possible that this option will not be part of the Corporation's capital expenditure in the future. In such circumstances, however, it would likely be replaced by a more expensive option, such as a second seawater desalination plant, which would require additional capital expenditure.
- *Quality and standards* – to meet standards that have been externally imposed. Capital expenditure on this category is **\$399 million** or 13 per cent of the total program. The major projects are the Infill Sewerage Program and compliance with the Australian Drinking Water Guidelines.
- *Enhanced service* – to enhance the level of service being provided to existing customers. Capital expenditure on this category is **\$167 million** or 5 per cent of the total program. The major project is country water treatment. Smaller projects include information technology to automate and link the Corporation's assets to central control systems, metropolitan area water treatment and odour control.

---

<sup>13</sup> The Authority is currently undertaking an inquiry into the cost of supplying bulk potable water to Kalgoorlie-Boulder and surrounding regions. The cost of transporting water from Perth to Kalgoorlie-Boulder will be compared to the cost of the proposal by United Utilities Australia to transport desalinated seawater by pipeline from Esperance to Kalgoorlie-Boulder. The findings of this inquiry may have implications for the Corporation's planned expenditure on the Perth to Kalgoorlie pipeline.

**Figure 4.9 Water Corporation Historical and Projected Total Capital Expenditure by Driver**



Source: Water Corporation

#### 4.4.3.2 Authority Assessment

The Authority's consultants have provided a general commentary on the Corporation's capital delivery process, its drivers and efficiency rather than an assessment of the exact magnitudes of budgeted expenditures (a copy of their report is available at [www.era.wa.gov.au](http://www.era.wa.gov.au)).

According to the consultants, the capital planning, business case and prioritisation process, which has recently been modified by the Corporation to incorporate whole-of-life costing of capital schemes, forms a sound basis for making capital investment decisions.

The previous planning methods used by the Corporation for prioritising investments led to significant internal delays – as observed by a review of a selection of projects. This increases overall project costs, in particular the Corporation's internal costs and therefore reduces overall efficiency. The revised capital prioritisation process using a risk based assessment tool at its centre should provide a better framework for decision-making.

From a high-level review of selected projects it can be concluded that, in general, the Water Corporation has historically under-estimated project capital costs, with actual costs exceeding both planning and approved implementation estimates. The Water Corporation has in the past dealt with this issue by delaying capital expenditure programs or projects to ensure the approved annual capital budgets are not exceeded. Assuming most projects in the five-year capital program are at an approved stage,

current capital budgets may need to be increased by 10 per cent (or \$60 million) per annum to cover capital forecasting inaccuracy. This budget figure could be higher if some key projects are only at the planning stage.

The Corporation's capital projects have historically been delivered in a relatively traditional manner generally using Water Corporation internal project managers. These delivery methods include:

- standard detailed design – including detailed design by consultants, preparation of contract documents, tendering, contract award/delivery and site supervision by Water Corporation personnel; and
- design and construction contracts – concept designs sufficient to detail performance requirements are prepared and contract documents prepared. Engineers and contractors tender for projects on a design and build lump sum or performance fee basis.

The Corporation is planning to deliver the desalination plant project using a paid tender approach, eventually developing an alliance proposal with one contractor. The alliance team will be responsible for the design and delivery of the project, which will be funded by the Water Corporation.

In an Australian context the above delivery strategies are still fairly common in the water industry, although increasing numbers of Build Own Operate or Build Own Operate & Transfer schemes are being procured using private investment.

Figure 4.10 depicts different stages of public and private participation among water companies in Australia. According to the figure, the level of public-private participation in most Australian water utilities is generally limited to the design and construction of assets. This is considered to be the case for the Water Corporation and as such it is classed as operating under the 'public operation' banner.

**Figure 4.10 Public-Private Participation in the Australian Water Industry**

	PUBLIC	PUBLIC OPERATION	PRIVATE OPERATION MAINTENANCE	OUTSOURCED CONSTRUCTION, OPERATION AND MAINTENANCE	PPP
OWNERSHIP	Delivered by Public Sector	Delivered by Public Sector	Delivered by Public Sector	Delivered by Public Sector	Delivered by Private Sector
FINANCE	Delivered by Public Sector	Delivered by Public Sector	Delivered by Public Sector	Delivered by Public Sector	Delivered by Private Sector
PLANNING	Delivered by Public Sector	Delivered by Public Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector
DESIGN	Delivered by Public Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector
CONSTRUCTION	Delivered by Public Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector
OPERATION	Delivered by Public Sector	Delivered by Public Sector	Delivered by Private Sector	Delivered by Private Sector	Delivered by Private Sector
RENEWAL	Delivered by Public Sector	Delivered by Public Sector	Delivered by Private Sector	Delivered by Public Sector	Delivered by Private Sector
EXAMPLE	Most pre 1990 water utilities	Most water utilities in Australia today	Melbourne retailers	Adelaide	Water treatment plants Sydney, Noosa WWTP

Delivered by Public Sector  
 Delivered by Private Sector

Source: Australian Water Industry Road mapping Project Discussion Paper, October 2004

Moving to a private procurement system requires a large organisational change and involves project partnering and alliance approaches. Entire capital programs are delivered by this method in the United Kingdom, providing economies of scale and resulting in the sharing of risk between all parties. Programs of this type, which provide capital delivery teams with problems to solve, rather than solutions to build, have historically demonstrated improved delivery performance and overall cost savings in the order of 10 to 15 per cent over traditional procurement approaches.

However, there are disadvantages and risks that need to be understood and managed when embracing public-private participation if the desired outcomes are to be achieved. As with any capital delivery strategy, there are examples of very good and very bad public-private transactions, with the remainder lying on a continuum in between.

#### 4.4.3.2.1 Base Capital Maintenance

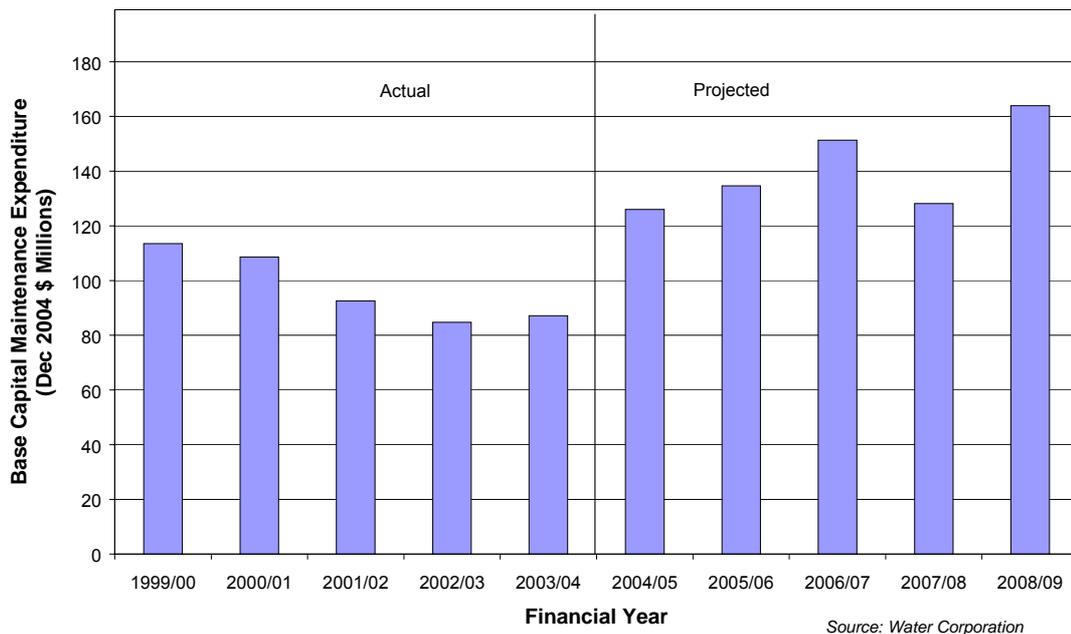
The level of acceptable base capital maintenance is dependent upon factors such as asset type, asset age, materials, construction standards and the way in which the asset is operated. A review of water and irrigation infrastructure assets within Australia, undertaken by the Institution of Engineers Australia in 2001 found that the average annual renewal expenditure allocated by the major utilities for water supply and wastewater assets is about 0.5 per cent of replacement value.

In 2003-04, the Corporation spent around \$85 million on base capital maintenance. Using the Corporation’s full asset replacement value estimate of \$16,703 million, the amount spent on base capital maintenance equates to just over 0.5 per cent of total

asset value and is therefore in line with the Australian average. A similar ratio of expenditure to asset values was achieved in both 2001/02 and 2002/03.

Looking forward, the Corporation's projections for base capital maintenance show an upward trend relative to current levels (Figure 4.11). Between 2004/05 and 2008/09, the average annual expenditure on base capital maintenance is projected to be around \$148 million or 52 per cent greater than the average annual expenditure for the five years to 2004/05.

**Figure 4.11 Water Corporation Historical and Projected Base Capital Maintenance Expenditure**



According to the Corporation, expenditure on base capital maintenance has been constrained since 2001 due to funding constraints and drought-related impacts, which has resulted in some base capital projects being delayed. As the Corporation argues that many of these projects can no longer be delayed, the Corporation is planning to increase expenditure on base capital maintenance in coming years.

In addition, a number of larger maintenance and rehabilitation projects are planned within the next five years. These include overflow risk management projects, an increase in the metropolitan water treatment program, higher expenditure on dam safety, Kalgoorlie pipeline refurbishment and replacement and higher IT expenditure.

While it is difficult to say that the Corporation's planned base capital maintenance will be sufficient to maintain asset quality into the future, the fact that the ratio of planned expenditure to assets is around double the Australian average suggests that the Corporation is not under-funding base capital maintenance relative to other service providers.

An advantage of adopting renewals accounting in the future (as discussed in Section 4.4.4 below) is that it would require a detailed consideration of the appropriate

amount of annual base capital maintenance expenditure that would maintain the network infrastructure in perpetuity. The regulator's role would be to assess the methodology used by the Corporation in estimating this figure. Based on currently available information, however, the consultants have no reason to believe that the proposed increase in base capital maintenance expenditure is inappropriate.

#### 4.4.3.2.2 Supply and Demand Balance

The majority of the Corporation's capital expenditure over the next five years is focussed on addressing the supply/demand balance, both in terms of responding to the dry climate as well as population growth. The supply/demand balance program has been recently modified by the Water Corporation and is now double the size of the \$836 million program proposed by Sydney Water over the next four years. A significant driver of the Corporation's investment program is its decision to maintain a high security buffer – one that limits the probability of a total sprinkler ban to 1 in 200 years. As discussed in Section 4.3, the Authority suggests that more investigation is needed to establish whether this level of security is justified on cost-benefit grounds.

Also discussed in Section 4.3 was the need to consider whether water could be accessed more cheaply through trading and reallocation. This may require additional investment in developing water trading frameworks for facilitating between-sector trades.

#### 4.4.3.2.3 Quality and Standards

The consultants have identified two issues in relation to the Corporation's proposed expenditure on quality and standards.

First, it is evident that over 380 contracts have been awarded over the eight years that the Sewerage Infill Program has operated (1994 to 2001/02). The average value of each contract was \$1.13 million. This Program might be better suited to a smaller number of larger framework contracts over a set period, say 3 to 5 years. This could provide economies of scale and certainty of work for contractors and reduce contract management input required by the Water Corporation. Overall savings of 5 to 15 per cent are thought to be achievable from adopting such an approach. Taking the mid-point and assuming additional savings of 10 per cent could be achieved would result in a total saving of \$22 million over the next five years.

Second, there may be value in the Corporation giving consideration to declaring some country water supplies 'non-potable' given the large potential increase in the costs of its Drinking Water Quality Program. The current annual cost of the Program is approximately \$110 million. In a recent review of the program, the Corporation estimates that capital costs are likely to increase to around \$390 million per annum over the next 10 to 15 years. The South Australian Water Corporation undertook a similar review of its Drinking Water Quality Program in 1996. In some small regional areas where water quality does not meet the required guidelines, the South Australian Water Corporation declared the water supply system 'non-potable' and provided residents with alternative arrangements, such as rainwater tanks, for sourcing water. The approach adopted in South Australia may provide a cost

effective solution and reduce budgetary pressures on Western Australia's Drinking Water Quality Program.

#### 4.4.3.2.4 Enhanced Service

The Corporation is one of the few water businesses in Australia that limits the treatment of water to disinfection at the majority of its water treatment plants. Of the 31 treatment plants operated by the Corporation in 2002/03, disinfection was the only form of treatment used at 22 of the plants. The Corporation, compared to other Australian water service providers, is heavily reliant on groundwater, which requires less treatment than surface water because it is already naturally filtered and contains only minor amounts of suspended material.

In contrast, the South Australian Water Corporation sources all its water from open catchments, or the River Murray, so it needs to remove a considerable amount of suspended material and organic matter prior to distribution. The South Australian Water Corporation operates six water treatment plants, all of them providing full water treatment encompassing chemical dosing, filtration and disinfection.

Disinfection is the simplest level of water treatment for potable supply, and is by far the cheapest. Further treatment by the Water Corporation to improve taste and odour issues would increase treatment complexity and current operating costs substantially while having no affect on drinking water quality from a health point of view. As discussed in Section 4.2, a comprehensive customer willingness to pay study would assist in determining whether public benefits outweigh the costs of such additional treatment.

### 4.4.4 Depreciation

#### 4.4.4.1 Water Corporation Proposal

The Corporation has proposed using a straight-line depreciation schedule based on the indexed regulatory asset value and standard asset lives. However, the Corporation has indicated that:

For future Pricing Inquiries it will be worth considering a renewals annuity methodology, as adopted in the UK. However, as the Water Corporation is proposing to write assets down to reflect revenue forecasts for the next five years, the choice of methodology will not affect the revenue level for this period. To avoid the additional complexities of the renewals approach in the initial Inquiry, it is therefore proposed to continue with the current depreciation plus return on assets methodology. (p29, Pricing Submission)

#### 4.4.4.2 Authority Assessment

Materials, construction standards, operating conditions and the level of ongoing maintenance generally dictate asset lives. However, the water industry follows general standards for water mains and sewers, which form the largest proportion of total assets for most water businesses.

The Corporation's determination of standard asset lives for water mains and sewers are within the typical range for engineering assets, although they appear to be at the lower end of the range identified.

The Water Corporation has indicated that it may consider infrastructure renewals accounting in the future. OfWAT has used this approach for the England and Wales water industry since 1989. Under renewals accounting, infrastructure assets are not depreciated.<sup>14</sup> Instead, the network is treated as a single asset system to be maintained in perpetuity, and an annual charge is made against profits for the costs of maintaining and replacing the network infrastructure at its current level of operations. OfWAT calculates the infrastructure renewals charge on the average forecast level of expenditure over a 15-year period. The Authority agrees with the Corporation that this is a matter that needs to be considered for future reviews.

#### 4.4.5 Rate of Return

A key element of the required revenue for a regulated entity is the rate of return (or cost of capital) that investors – both the providers of debt and equity – require in order to be compensated for the non-diversifiable risks associated with the assets in which they invest. In accordance with the approach most widely used and understood by industry, the finance community and other Australian utility regulators, the Authority has used the Capital Asset Pricing Model (CAPM) to estimate an appropriate **Weighted Average Cost of Capital (WACC)** for the Water Corporation's (regulatory) assets. The WACC is the average cost of debt and equity capital, weighted by the proportion of debt and equity to reflect the financing of the assets. The rationale and methodologies used by the Water Corporation and the Authority in estimating parameters of the WACC are described in detail in [Appendix 4](#). This section summarises the main findings.

##### 4.4.5.1 Water Corporation Proposal

The Water Corporation has proposed a real pre-tax WACC of **6.54 per cent**. Underlying this estimate are the following approaches to the parameters of the WACC model:

- a nominal risk-free rate of return of 5.84 per cent, estimated using the average of the nominal yield on the ten-year Commonwealth bond rate for the previous 20 trading days;
- a market risk premium of 6.0 per cent based on the ACCC's use of a market risk premium of 6 per cent and IPART's acceptance of a market risk premium of between 5 and 6 per cent;
- an equity beta of 0.78, based on the mid-point of the range of equity beta assumptions used by IPART in its recent determinations on metropolitan water service providers;

---

<sup>14</sup> OfWAT defines infrastructure assets, in broad terms, as underground assets, such as pipes. Non-infrastructure assets are above ground assets such as treatment works.

- a debt-to-asset ratio of 60 per cent based on the benchmark debt ratio commonly used by utility regulators in Australia;
- a debt margin of 1.10 per cent, based on the approach used by the Essential Services Commission assuming an appropriate credit rating for a utility business of BBB+ and a term of the debt instrument of 10 years;
- a statutory tax rate of 30 per cent based on recommendations for the corporate tax rate used by the ACCC and IPART; and
- a value for imputation credits (gamma) of 0.45, based on recent determinations by IPART for metropolitan water agencies.

#### 4.4.5.2 Authority Assessment

The Authority has adopted a pre-tax real approach in its calculation of the WACC. This approach conforms to the practice of other Australian utility regulators, particularly in relation to recent pricing determinations for water and wastewater services (IPART, May 2003; ICRC March 2004).<sup>15</sup> It has also been used in previous determinations on the cost of capital by the Authority, the Authority's predecessor agencies and the Water Corporation in its own estimation of the WACC.

The Authority calculates a real pre-tax WACC of **6.47 per cent** for Water Corporations regulated asset value. As this is very similar to the Corporation's proposal of 6.54 per cent, a rate of return of **6.5 per cent** has been assumed for the purposes of this Inquiry. However, the rate should be recalculated prior to the commencement of the 2006/07 financial year using the latest financial information.

In considering the WACC, the Authority has taken into account:

- the requirement under section 26(1) of the *Economic Regulatory Authority Act 2003* that the Authority have regard to the needs of investors (by encouraging investment, and having regard to the legitimate business interest of investors and service providers) as well as the long-term interests of consumers (in relation to price, quality and reliability of services; promoting competitive and fair market conduct; and preventing the abuse of monopoly power);
- the approach adopted by other utility regulators in Australia, including recent debates on the appropriate methodology for the estimation of the cost of capital;
- the approach adopted by the Authority and its predecessor agencies, OffGAR and the Office of the Rail Access Regulator in recent pricing determinations;<sup>16</sup>

---

<sup>15</sup> IPART (May 2003), *Prices of Water Supply, Wastewater and Stormwater Services from 1 July 2003 to 30 June 2005* [for Sydney Water Corporation, Hunter Water Corporation, Gosford City Council and Wyong Shire Council]; and Independent Commission and Regulatory Commission (March 2004), *Final Report and Price Direction - Investigation into prices for water and wastewater services in the ACT*.

<sup>16</sup> For example, Authority final determination on freight and urban rail rates of return, July 2000; OffGAR final decision on the Dampier to Bunbury Natural Gas Pipeline access arrangement,

- the approach used by the Water Corporation in its estimation of the WACC; and
- comments by other respondents to the Issues Paper in relation to the appropriate methodology for the estimation of the cost of capital.

While there is much agreement between the Authority and the Water Corporation on the approach used to determine the WACC and its parameters, there are some minor differences in the estimated values of some of the parameters (as discussed in [Appendix 4](#)).

#### 4.4.6 Initial Regulatory Asset Value

The task of setting an initial regulatory asset value for the assets used by a business in providing water and wastewater services involves determining a notional cost associated with the business's existing assets for the purpose of reflecting this cost in prices that the business is allowed to charge. This notional cost is the initial regulatory asset value.

##### 4.4.6.1 Water Corporation Proposal

The Corporation proposes two options for fixing a reference point for the initial asset value:

- Calculate revenue based on the Corporation's previously agreed return target of 6 per cent on assets constructed after 1996 and 4 per cent on those constructed before corporatisation; or
- Use the current revenue forecasts (pre-tax profit to the year 2008/09) adopted by the Department of Treasury and Finance to imply an asset value.

The Corporation's preferred methodology is the second option, which produces an opening regulatory asset value of **\$9100 million** in 2006/07.<sup>17</sup> This method is consistent, in a general sense, with the "line in the sand" approach to asset valuation. That is, it is proposed as the value that, if implemented in a framework of cost-based regulation of prices, would return a set of regulated prices and a value of expected revenue equal to current prices and expected revenue.

The Corporation acknowledges that there is a degree of circularity in setting the initial regulatory asset value, as this value is based on expected revenue, whilst revenue for the determination period is based on the asset value.

##### 4.4.6.2 Issues Paper Submissions

Only one submission was received in response to the issue of calculating an initial regulatory asset value. The Department of Treasury and Finance suggests that:

---

December 2003; OffGAR final decision on Tubridgi Gas Pipeline access arrangement, October 2001; OffGAR final decision on AlintaGas Networks gas distribution prices, June 2000.

<sup>17</sup> Although the Corporation did not explain in its submission why the first option is not preferred, it is likely to be because the first option would result in a significant increase in prices for customers.

The Authority should have regard to the COAG pricing principles as required, however it should also closely consider regulatory developments since the principles were set in 1994, current regulatory best practice and the asset valuation approaches applied by other regulators in Australia. This would suggest a consideration of the DORC methodology. During this process it should be recognised by the Authority that there is a degree of subjectivity in most valuation methodologies. (p21)

#### 4.4.6.3 Authority assessment

There is no particular methodology for determining what the regulatory asset value should be when first considering the setting of prices for services that reflect costs. Nor is there a single, “optimal” asset value for the purpose of calculating total revenue requirement. The initial regulatory asset value is highly dependent on the objectives that Government has for the water business – that is, whether it views the Water Corporation as being required to deliver a net positive dividend to government or whether zero dividends are deemed appropriate.

With regards to methodology, the only formal guidance provided for the regulatory valuation of assets of water service providers in Western Australia is the requirement of the guidelines for pricing of water services that were endorsed by the Agriculture and Resource Management Council of Australia and New Zealand which require assets be valued by the deprival valuation methodology unless another method is justified.<sup>18</sup>

Despite the standing of this guidance as part of an intergovernmental agreement, deprival value is an accounting concept developed for the purposes of monitoring the performance of government trading enterprises and has no particular economic merit in regard to determining an initial value of assets for regulatory purposes.

Determination of an initial regulatory asset value for the assets of an established business is not a straightforward exercise. Economic principles do not provide unambiguous guidance for the setting of a regulatory value for monopoly network assets at a particular point in time, but rather are typically interpreted as providing a feasible range, between the scrap value of the assets and a depreciated optimised replacement cost (“DORC”).

The determination of an appropriate initial regulatory asset value within this range is by necessity a pragmatic determination, with the most appropriate valuation determined by consideration of the particular circumstances of the regulated business and the outcomes of the valuation. This has been evident in past regulatory valuations of utility assets throughout Australia wherein regulators have given consideration to, inter alia, the reasonable expectations and legitimate business interests of the owners of regulated assets prior to determination of regulatory values, and the impacts of regulatory asset values on the users of the assets and the end users of the services provide by use of the assets. Taking these factors into account, regulated assets have been at various times valued at substantially less than, close to, and even in excess of DORC values.

---

<sup>18</sup> National Competition Council, June 1998, Compendium of National Competition Policy Agreements, Second Edition, p 112.

The \$9,100 million regulatory asset value proposed by the Corporation is the value that preserves the “status quo” of the Corporation’s forecast prices and revenues, and by implication the value of the Corporation business, were the government to introduce cost-based regulation of prices.

The Authority’s consultants have checked the Corporation’s determination of proposed asset value by constructing a set of regulatory accounts and determining the asset value that results in the value of a building block determination of total revenue to equate to a forecast of total revenue. This calculation gives an asset value of \$8,103 million at the commencement of 2003/04, which when “rolled forward”<sup>19</sup> in this calculation to 2006/07 indicates an average asset value for that year of \$9,575 million. Therefore, the consultant’s estimate is within 10 percent of the value proposed by the Water Corporation and, if anything, suggests that the Corporation’s proposal may be a relatively conservative estimate of the value consistent with current and forecast revenues and prices.

The regulatory asset value proposed by the Corporation is therefore accepted by the Authority as the value that preserves the revenue and average prices currently forecast for the period 2004/05 to 2008/09.

The regulatory asset value proposed by the Corporation is likely to lie between the DORC value of the Corporation’s assets (which is an upper bound estimate) and a lower bound value that is consistent with a level of regulated revenue sufficient for the business to be commercially sustainable into the future, which means being able to finance ongoing operations and new investment without further injections of funds from government.

A DORC value has not been estimated for the current study. However, the Corporation has provided information on **written-down replacement values** of assets, indicating a value of \$11,048 million at 30 June 2004. While the written down replacement value may not necessarily reflect an optimisation of assets, it is likely that the DORC value would be higher than the regulatory asset value proposed by the Corporation (which corresponds to a value of about \$8,000 million at 30 June 2004).

A substantially lower regulatory asset value than proposed by the Corporation could potentially be established while maintaining the commercial sustainability of the Corporation in terms of its ability to service debt and finance new investment through a combination of internal financing and debt. The practical minimum to the regulatory asset value that would still be consistent with maintaining the commercial sustainability of the Corporation is considered to be a value in the order of \$3,500 million, which would be consistent with a reduction in average prices by about one third. Such a low value would, however, substantially reduce the value of the business to the Government (through revenues from taxation and dividends) and require the Corporation to increase its debt by about \$500 million in the period to 2008/09.

---

<sup>19</sup> Annual addition of capital expenditure and subtraction of asset depreciation.

Moreover, the commercial sustainability of such a low regulatory asset value would only be possible as a result of the Corporation's existing financial structure, in particular the low level of debt and financial gearing of only 13 per cent debt to total assets in 2003/04. This level of gearing is very low for a utility business such as the Water Corporation. At a more representative gearing for this type of business (that is, a gearing of 50 to 60 per cent debt to total assets), the interest costs of the business would be greater and the business would need to generate greater revenues to meet obligations to service debt. Under such a financial structure, a regulatory asset value close to that proposed by the Water Corporation may be regarded as a minimum value consistent with the sustainability of the business.

Regardless of the value that is set as the initial value of the regulatory asset value, under a cost-based method of regulation, the regulatory asset value will trend towards a common value over time as new capital expenditure is added to, and depreciation subtracted from, the asset value.

Further information on setting the initial regulatory asset value is provided in the consultants' report which has been placed on the Authority website.

The Authority notes that the regulatory asset value proposed by the Authority does not include any component reflecting a value of rights to water resources. This is consistent with the absence of an effective market for water resources in Western Australia, and the absence of value ascribed to these rights on the Water Corporation's balance sheet.

#### **4.4.7 Total Revenue Requirement**

##### **4.4.7.1 Water Corporation Proposal**

The Water Corporation is proposing to set base prices and escalate these prices with inflation. Over the four-year period commencing 2005/06 and finishing in 2008/09, the Corporation has proposed 'across the board' price increases equal to the consumer price index (CPI).

In addition, two specific increases are proposed to finance water sourcing projects. In 2006/07 prices are proposed to increase by 13.5 per cent to recover the cost of the desalination plant. And in 2008/09 a further 2.1 per cent increase is proposed to finance the cost of purchasing water savings from Harvey Water.

##### **4.4.7.2 Authority Assessment**

If a rigorous cost-based methodology of price regulation were to be introduced for the Water Corporation, the prices that would be able to be charged would depend upon the costs forecast to be incurred by the Corporation, including a rate of return on, and depreciation of, the regulatory asset value ascribed to the Corporation's existing assets, capital expenditure and operating expenditure.

The analysis of regulatory asset value conducted by the Authority's consultants' has validated the Corporation's proposed value as the value consistent with preserving

current revenues. While these revenues are in excess of the minimum revenue requirements necessary to maintain the business and finance new investment (at least in the current situation of the very low level of gearing of the business), the Authority does not consider that there is reason for the Corporation's revenue to be adjusted to reflect a materially different regulatory asset value than proposed by the Corporation.

While the Authority does not consider that the revenue requirements of the Corporation should be reduced to reflect a lower regulatory asset value, reductions in the Corporation's revenue requirements could be achieved through identified opportunities for reductions in operating costs (particularly staffing costs) and a change in the source development programme that brings forward the development of the South West Yarragadee Aquifer and postpones development of the desalination plant. These initiatives could give rise to reductions in revenue requirements and average prices of approximately 2.8 per cent and 0.9 per cent, respectively, for the period to 2008/09.

In addition, evidence from other utilities suggests that greater project partnering and alliances with the private sector are likely to deliver capital expenditure savings over the current approaches in the order of 10 to 15 per cent. Also, overall savings of five to 15 per cent could be achieved in the contracting of infill sewerage works by increasing the scale of the contracts offered. Capital expenditure savings of 10 per cent on the Corporation's forecasts would give rise to reductions in revenue requirements of approximately 0.8 per cent for the period to 2008/09.

Taking into account potential efficiency gains in operating expenditures and capital expenditures, and capital cost savings from bringing forward development of the South West Yarragadee Aquifer in place of the desalination plant, the Authority considers that the revenue requirements and average prices of the Corporation could be reduced by up to about 5 per cent from the current forecasts of the Corporation.

## **Key Findings on the Water Corporation's Revenue Requirement**

### *Operating Expenditure*

While the Corporation's operating costs per property are among the lowest of all water providers in Australia, its staff levels are relatively high. There may be scope for up to 15 per cent reduction in total staff numbers, which would result in a saving of \$20 million in operational costs in 2004/05, increasing to \$34 million in 2008/09.

### *Capital Expenditure*

The Corporation's capital planning, business case and prioritisation process, which has only recently been modified, forms a sound basis for capital investment. However, a high level review of selected projects has shown that the Corporation has historically underestimated project capital costs. Historically, the Corporation has delivered projects in a relatively traditional manner, using internal project managers. Evidence from other utilities suggests that greater use of project partnering and alliances with the private sector are likely to deliver cost savings over the current approaches (in the order of 10 to 15 per cent).

The Corporation's capital expenditure program is driven by the need to balance supply and demand, although this expenditure is affected by the Corporation's reliability target of reducing the incidence of total sprinkler bans to a one in 200 year event (as discussed in the section on demand restrictions).

The Corporation's ratio of planned expenditure on base capital maintenance to assets is around double the Australian average, which suggests the Corporation is not at risk of under-funding its base operations.

Capital program areas where efficiency gains in capital expenditure should be possible include the infill sewerage program and the drinking water quality program. For example, overall savings of 5 to 15 per cent could be achieved in the contracting of infill sewerage works by increasing the scale of the contracts offered.

### *Depreciation*

The asset lives assumed by the Water Corporation are consistent with industry standards, although they appear to be at the lower end of the range identified.

### *Rate of Return*

An appropriate rate of return for the Corporation is 6.5 per cent (pre-tax real).

### *Initial Regulatory Asset Value*

The regulatory asset value proposed by the Corporation of \$9,100 million at 2006/07 is consistent with a value that preserves the revenue and average prices currently forecast for the period 2004/05 to 2008/09.

At its current level of debt liabilities, a substantially lower regulatory asset values could be established and still be consistent with the commercial sustainability of the Corporation's business. This would, however, reduce the value of the Corporation to the State Government, and increase the Corporation's future debt requirements.

*Total Revenue Requirement*

The Authority does not consider that the revenue requirements of the Corporation should be reduced to reflect a lower regulatory asset value.

However, reductions in the Corporation's revenue requirements could be achieved through identified opportunities for efficiencies in operating costs (particularly staffing costs), capital expenditures and a change in the source development program that brings forward the development of the South West Yarragadee Aquifer and postpones development of the desalination plant.

On the basis of these changes, revenue requirements and average prices of the Corporation could be reduced by about 5 per cent from the current forecasts of the Corporation.

## 4.5 Tariff Structures

### 4.5.1 Meeting Efficiency Objectives

#### 4.5.1.1 Background

Competitive markets facilitate efficient resource allocation and pricing because prices of a service are equated to the cost of producing an additional (or marginal) unit of output. Pricing at marginal cost is efficient because it allows a customer to purchase services where the value to the customer is greater than the marginal cost of production, while at the same time ensuring that producers receive a return equivalent to the cost of supplying the additional service.

However, in an industry such as the water services industry where economies of scale are required for efficient operation, basing prices on marginal costs would not recover all costs. This is because a large proportion (70 per cent or more) of water supply costs are fixed. Basing prices on marginal costs alone would not provide an appropriate return on capital, which, in turn, would discourage investment into the industry.

A fundamental issue, therefore, is how to set price to get the efficiency gains related to marginal cost pricing, while providing an adequate level of revenue to the business. Some broad criteria for meeting these dual objectives are as follows:

- All customers should pay at least the ‘avoidable cost’ of water supply services, which is the forward looking cost that the service provider could avoid by ceasing to provide service to that customer (avoidable cost includes both variable costs of supply and any fixed costs that are directly attributable to the service);
- At most, customers should pay the stand alone cost of providing the service – which is the cost of duplicating the service to a customer using least cost technology; and
- For the last unit of water supplied, the price charged to the customer should be equal or close to the marginal cost of service provision.

In practice, water providers throughout Australia recover costs using a two-part tariff comprising a fixed annual access charge and a usage charge. As fixed costs make up a large proportion of total water supply costs (typically 70 per cent), water providers have an incentive to recover most of their costs through the fixed charge component, which provides revenue stability. It also acts as a balancing item to ensure that the water provider earns adequate revenue during long periods of excess capacity when the revenue from usage charges would be insufficient.

The usage component of the tariff protects the water provider against the risk of significant increases in demand, which may result in higher than expected variable costs.

In practice, water providers commonly recover a proportion of their fixed costs through the usage charge. Water providers on the east coast typically have higher fixed to use ratios in their tariffs than the Water Corporation. For example, based on average household consumption of 250 kL per year, 47 per cent of the total bill paid by Water Corporation customers is made up of the usage charge. In Sydney, Canberra, Melbourne and Brisbane, the usage component ranges between 67 and 76 per cent. The higher the usage component in these jurisdictions suggests that a greater emphasis is being placed on using price as a demand management tool. This is discussed in more detail in Section 4.5.2.

#### 4.5.1.1.1 Short and Long Run Marginal Costs

In determining an appropriate usage charge that meets efficiency criterion, a distinction needs to be made between short run and long run marginal cost. Short run marginal cost (SRMC) is the cost of providing an additional unit of service on the assumption that all physical infrastructure is *fixed*.

In the case of long run marginal cost (LRMC), the assumption of fixed infrastructure is relaxed and current costs reflects the forward looking cost of meeting increases in demand over the next 30 years or so. Unlike SRMC, which reflect the variable costs supplying additional water, LRMC is a *concept* used for guiding the setting of efficient usage prices. LRMC indicates the relative scarcity of water and is therefore useful for signalling to customers the future costs to overcoming supply infrastructure constraints.

Because supply augmentation is characterised by large, lumpy investments, charging on a short-run basis would imply large price increases as the time nears to develop the next supply source. Setting charges on the basis of LRMC would smooth out price fluctuations. And because the prices incorporate forward-looking costs, customers may be able to make more efficient decisions regarding the purchase of durable water-using goods that influence demand over the longer term.

In calculating *efficient* LRMC, a full social benefit-cost analysis should be undertaken to assess the net benefit of alternative options for maintaining a long term balance between supply and demand. These options are discussed in Section 4.3. The LRMC calculation involves an assessment of the optimal sizing and sequence of measures for bringing supply into balance with demand. The assessment also needs to take account of customer willingness to pay for maintaining particular levels of supply reliability – or the amount customers are willing to pay to avoid water restrictions of a particular severity and frequency. This information is needed, together with cost estimates for maintaining a system with different levels of supply reliability, to determine an efficient reliability target.

Owing to significant uncertainties about factors influencing future water demand (including community willingness to pay for reliability) and hydrological constraints affecting supply, the calculation of LRMC should not be viewed as a prescriptive procedure for price setting. Rather it provides an envelope within which to set efficient usage prices.

Care must also be taken to differentiate between social LRMC and operator LRMC. The costs passed through to customers should reflect the costs incurred by the water operator in carrying out the least-cost (or ‘optimal’) supply-demand option. This option could comprise a package of measures including supply augmentation and demand management measures, such as rebates for water saving technology. But costs incurred by the customer, such as water restrictions and mandatory installation of water saving appliances for which there is no compensation, should not be included in the tariff calculation. If they were, customers would be ‘paying twice’.

In setting prices, the Government or regulator must be careful that the signals sent by those prices do not bring forward investment in solutions, which, if deferred by some years, might be available at lower cost or on a different scale and possibly in combination with other emergent technology. Consideration must also be given to the possibility of feedback loops where price increases can influence revenue requirements. For example, higher prices could lead to increased demand for water saving devices, which, in turn, could increase the cost of rebates (where the provider has a rebate program to encourage the uptake of water saving appliances).

#### 4.5.1.1.2 Precedents for using LRMC as a basis for setting prices

LRMC pricing is now well established in some jurisdictions. In the United Kingdom for example, the regulator (OfWAT) requires individual water companies to submit estimates of their LRMC for price determination purposes. These estimates are required to include the costs of demand management measures as well as the costs of any supply augmentation.

Victoria’s Essential Services Commission has embraced the concept of LRMC in its recent deliberations on water pricing.<sup>20</sup> The ESC is guided by the 2003 Water Industry Regulatory Order (WIRO), which sets out a detailed framework of pricing principles for the water industry. Specifically, one of the principles in the WIRO states that prices should be set so as to:

Provide incentives for the sustainable use of Victoria’s water resources by providing appropriate signals to water users about the costs of providing services, including costs associated with future supplies and periods of peak demands and/or restricted supply (ESC 2004).

While Melbourne Water and South East Water have made an effort to prepare LRMC estimates, it is the view of NERA (2001) that these estimates are not sufficiently robust to draw conclusions about either the direction or the extent to which usage charges should be changed.<sup>21</sup>

In New South Wales, the Independent Pricing and Regulatory Tribunal (IPART) – which is responsible for setting wholesale and retail water prices in Sydney – is attempting to align its pricing determinations with LRMC. However, it is being hampered by the absence of an agreed metropolitan water supply strategy and lack of

---

<sup>20</sup> ESC (February 2004), *Economic Regulation of the Victorian Water Sector*, Consultation Paper No.1

<sup>21</sup> National Economic Research Associates (NERA), 2001, *A Review of Melbourne’s Water Tariffs – a Report for the Department of Natural Resources and Environment*.

data about safe yields and the gap between supply and demand.<sup>22</sup> The Tribunal believes that the current pricing arrangements for Sydney water need to be reviewed in order to reflect concerns about scarcity.

#### 4.5.1.1.3 Recovery of Joint Overheads

The water provider must also recover joint overhead costs. For efficiency reasons, the recovery of joint costs should be facilitated by setting prices so as to minimise the impact on levels of usage. This efficiency objective would be met if costs are preferentially recovered from those customers with the least elastic demand – known as Ramsey pricing. In practice, the allocation of joint overheads is often dictated by social or equity objectives. The definition of what is ‘fair and reasonable’ is highly subjective and is usually influenced by political considerations. Social and equity objectives are discussed at further length below.

Other methods that are commonly used for allocating joint costs include:

- Allocation in proportion to total units of service consumed by each customer (sometimes proxied by meter size);
- Allocation in proportion to the direct operating costs attributable to each customer;
- Allocation in proportion to the revenues generated by each service; or
- Allocation according to the customer’s property value.

#### 4.5.1.1.4 Cost Allocation and Cross-Subsidisation

Cost allocation refers to the proportion of a water provider’s total costs that are recovered from different customer groups and from different services by way of pricing arrangements. The allocation of costs and setting of prices can be accomplished in one of two ways:

- an explicit allocation of total cost to each service/customer group, with prices being the outcome of the cost allocation; or
- allow selected prices to determine the cost allocation, where prices are formulated according to a range of commercial or other considerations and subject to a constraint that set prices should not recover more than the total cost of the service provider.

From a regulator’s perspective, both approaches are acceptable, provided prices meet the requirements for economic efficiency. Efficient pricing requires that, at minimum, prices for each service reflect the ‘avoidable cost’ of supplying that service to a customer group (that is, the costs that could be avoided if the customer was not serviced). Avoidable costs include the direct operating costs attributable to a particular service/customer group, comprising marginal costs and attributable

---

<sup>22</sup> IPART (July 2004), *Investigation into Price Structures to Reduce the Demand for Water in the Sydney Basin Final Report*

overheads. If customers pay less than the avoidable cost, the customer may choose to take the service even though they value it less than the cost to society of providing it. Alternatively, charging below the avoidable cost would provide customers with an incentive to keep using the service, even though there are cheaper ways of delivering it.

Cross-subsidisation between customer groups occurs when one group of customers is paying less than avoidable costs for a service and the revenue shortfall is picked up by another customer group. Similarly, cross subsidisation between services occurs when the prices charged for a particular service (for example, household water) recover less than the avoidable cost of supplying that service and the shortfall is picked up through charging higher prices for another service (for example, wastewater). Some cross-subsidisation policies involve charging different prices for an identical service while others involve uniform pricing of services with differing costs of delivery.

Cross-subsidisation distorts consumption and production decisions and thus results in allocative inefficiencies. Nevertheless, there may be sound commercial reasons for cross subsidising some services and customer groups – for example, if it is administratively too costly to pass through specific costs to individual or small categories of customers, gains may be made from using a simpler pricing structure.

#### 4.5.1.2 Water Corporation Proposal

The Corporation supports tariff reforms that have resulted in water prices reflecting the cost of service rather than being based on property rental values. The Corporation has also supported the elimination of free water allowances for residential and commercial customers to encourage efficient water use. In looking to the future, the Corporation states that:

As the Corporation's prices are regulated, the Corporation's commercial interests are met if the regulated prices raise sufficient revenue to provide an adequate return on investment. The specific tariffs adopted by Government will therefore only be detrimental to the Corporation's interest if they cannot raise sufficient revenue or are overly cumbersome to implement. As the current tariff structure does not result in either of these difficulties, the Water Corporation is happy to adopt the current tariff structure for the Base Prices. (p35)

The Corporation estimates short run marginal costs to be around \$0.08 per kL for water and about \$0.09 per kL for residential wastewater. This cost is based on the short-term costs of supplying an additional unit of service, if appropriate capacity already exists.

In its submission to the Issues Paper, the Corporation estimates the LRMC of water supply to be around \$0.80 to \$0.85 per kL. These estimates have since been revised upwards to \$0.87 and \$0.96 per kL. For wastewater, the LRMC is estimated to be approximately \$1.80 per kL. The Corporation supports the principle of LRMC pricing:

Water prices should reflect the long-run cost of achieving supply and demand balance. (p40)

As discussed in the Total Revenue Requirements section, the planned desalination plant and other supply augmentation activities are a major driver of LRMC. The

Water Corporation proposes to recover its increased capital costs by raising both the fixed and usage charge in 2006/07 and again in 2008/09.

#### 4.5.1.3 Issues Paper Submissions

Setting prices in accordance with principles of marginal-cost pricing has some support by stakeholders. The Department of Treasury and Finance submits:

Pricing at the long run marginal cost can help ensure that new sources are only developed in time for when the value consumers put on the additional water source exceed the cost of the water. (p4)

The CSIRO supports sending long-term price signals to consumers:

It can be argued that restrictions can be a more equitable way of allocating water reductions than prices, and restrictions have been successfully used to reduce demand for the past three summers. However when we have a drying climate, there is a need for a long term signal to consumers about the marginal cost of their next water source rather than an inability to use water, even if they are prepared to pay for a more expensive source. This is particularly important to those people who value their gardens highly or enjoy gardening as a hobby. (p3)

The Department of Treasury and Finance also comments on the difficulties associated with accurately estimating long run marginal cost.

One of the major threats to appropriate long run marginal cost pricing is accurately estimating what that cost is. Without a more certain strategic plan for the development of water resources in the State, the Authority can only rely on the Water Corporation's capital planning estimates to determine the long run marginal cost of providing water. While the ability of the Water Corporation to plan for the development of water sources in the State is not in question, potential conflicts of interest makes it inappropriate for such a task to be left to the service provider. (p30)

The CSIRO considers that the fixed service charge should not necessarily be tied to fixed costs:

There is no need for the structure of prices (i.e. the proportion that is fixed) to reflect the fixed-variable cost structure of the organisation because water elasticities are usually low and the revenue that comes to water utilities varies relatively little from year to year compared with many businesses. This is particularly true when a significant proportion of revenue comes from sewerage and drainage services that are based on rating properties rather than paying for the services that are provided...(p3)

The Department of Treasury and Finance considers that the fixed service charge should recover fixed cost and the volumetric charges should recover the long run marginal cost:

The access (or fixed fee) for water use is designed to recover the fixed costs incurred by a service provider to provide the customer, access to the service. Because of the nature of the water industry where much of the infrastructure could be considered 'fixed', it is necessary for the regulator to determine what costs are fixed overhead costs and what costs are variable. In the water industry much of the reticulation assets could be considered variable because they would not be necessary if it were not for the growth in demand. The remaining 'central' costs are considered fixed and should be recovered through the access charge.

The volumetric charges are designed to recover the long run marginal cost of developing and operating new water sources in order to meet growing demands at a time when the sustainable yield of surface and groundwater sources appear to be reliant on climate change. The cost of finding and accessing this resource is then considered to be the economic cost of water usage or its long run marginal cost. (p31)

As discussed above, the Authority's view is that there is no efficiency rationale to limit the recovery of fixed costs to the fixed charge or the recovery of variable costs to the usage charge.

In relation to the issue of cross subsidies, the Small Business Development Corporation is concerned about the differential in pricing between small businesses and households:

In terms of the actual tariff levels, it appears that, where smaller volumes of water are used, the tariffs for commercial users are considerably higher than for residential users. We are concerned that this penalises businesses and results in businesses cross-subsidising householders simply because of the perception of affordability. (p2)

#### 4.5.1.4 Authority Assessment

##### 4.5.1.4.1 Do customers at least pay the avoidable cost of the service?

Initial investigations into Western Australia's pricing arrangements have demonstrated that most metropolitan and non-metropolitan customers pay at least their direct operating costs (or avoidable cost) for water and wastewater services. That is, there is minimal cross subsidisation between different services.

It is estimated that only five per cent of the Corporation's water connections are in cross-subsidised schemes and less than one per cent of wastewater connections are in cross-subsidised schemes.

##### 4.5.1.4.2 Are usage charges consistent with LRM?

Based on the Corporation's proposed source development plan, the Authority's consultants estimate that the LRM for water provision is in the order of \$0.97 per kL, which is at the upper end of the Corporation's range.

Most residential customers pay a usage charge that is considerably less than LRM. An analysis of charges across customers that consume different volumes of water shows that only about 6 per cent of the Corporation's residential customers pay a usage charge that is equal to or more than LRM. The breakdown is as follows:

- 32 per cent of residential customers currently pay 41.6 cents per kL,
- 44 per cent pay 67.4 cents per kL;
- 18 per cent pay 91 cents per kL; and
- 6 per cent pay more than 91 cents per kL.

Thus it is apparent that a significant proportion of the Corporation's LRM is being recovered through the fixed charge rather than the usage charge. However, the current usage prices are recovering costs much in excess of SRMC, which the Corporation estimates to be 8 cents per kL.

#### 4.5.1.4.3 Are overheads recovered by minimising the effects on consumption decisions?

For the Corporation, joint overheads associated with water and wastewater services – when averaged across metropolitan and country users – are being recovered in direct proportion to operating costs.

However, when metropolitan and country users are examined separately, Perth customers are paying a disproportionately higher share of overheads (relative to their operating costs) than country customers. This is possibly a result of the ‘uniform tariff policy’, which requires the Water Corporation’s water charges (fixed and usage) to be identical for country and metropolitan users up to 350 kL. Under current arrangements, the Corporation receives a direct CSO payment from government to help offset the costs of the uniform tariff policy. Preliminary investigations indicate that some of the impost caused by the CSO is being met by the Corporation recovering a disproportionate share of overheads from metropolitan customers.

With regard to cost recovery from wastewater services, total revenue in 2003/04 substantially exceeded total operating costs for wastewater. This indicates that (with CSO payments excluded from consideration) the returns to the Corporation in excess of operating and depreciation (that is, returns on investment) are almost entirely recovered from the provision of wastewater services.

The Corporation has not undertaken any analysis of the allocation of costs to different customer classes (residential or commercial) so no conclusion can be drawn about cost allocation efficiency or methodology. However, for water services, there does not appear to be a significant difference in the amount of costs recovered from Perth residential and commercial customers. In 2003/04 each customer group paid similar prices per kilolitre (based on average consumption for each customer type). The average residential price was \$1.09 per kL and the average commercial price was \$1.24 per kL. For metropolitan wastewater services, the average commercial customer paid \$1485 in fixed charges and the average residential customer paid \$455. These figures are not directly comparable because commercial customers are charged on a ‘per fixtures’ basis, and many properties have multiple fixtures.

#### **Summary of Key Principles on Efficient Pricing**

**Efficient pricing requires that all customers pay at least the ‘avoidable cost’ of water supply services, which is the forward looking cost that the service provider could avoid by ceasing to provide service to that customer (avoidable cost includes both variable costs of supply and any fixed costs that are directly attributable to the service). At most, customers should pay the stand-alone cost of providing the service – which is the cost of duplicating the service to a customer using least cost technology. And for the last unit of water supplied, the price charged to the customer should be equal or close to the marginal cost of service provision.**

**Key principles (continued)**

The concept of long run marginal cost (LRMC) provides guidance for setting efficient usage prices as it conveys a scarcity signal to customers – or a measure of the future costs to overcome supply infrastructure constraints.

In calculating efficient LRMC, a full social benefit-cost analysis should be undertaken to assess the net benefit of alternative options for maintaining a long term balance between supply and demand. The costs passed through to customers should then reflect the costs incurred by the water operator in carrying out the least-cost (or ‘optimal’) supply-demand option.

In setting tariff structures, there is no efficiency rationale for fixed costs to be recovered solely through the fixed charge component or for variable charges to be recovered only through the usage component. The usage component should reflect LRMC, which includes both fixed and variable costs.

**Key findings:**

Based on the Corporation’s proposed source development plan, the Authority’s consultants estimate that the LRMC for water provision is in the order of \$0.97 per kL, which is at the upper end of the Corporation’s range (\$0.87 to \$0.96 per kL).

Only about 6 per cent of the Corporation’s residential customers currently pay usage charges above \$0.91 per kL. Thus it is apparent that a proportion of the Corporation’s LRMC is being recovered through the fixed charge rather than the usage charge.

However, all customers are paying usage charges well in excess of SRMC, which is estimated to be 8 cents per kL.

Initial investigations into Western Australia’s pricing arrangements have demonstrated that both metropolitan and non-metropolitan customers pay at least their direct operating costs (or avoidable cost) for water and wastewater services. It is estimated that only five per cent of the Corporations water connections are in cross-subsidised schemes and less than one per cent of wastewater connections are in cross-subsidised schemes. This implies that there is minimal pricing distortion between the two services.

The joint overheads associated with water and wastewater services – when averaged across metropolitan and country users – are generally being recovered in direct proportion to operating costs.

The Corporation’s rate of return on capital is almost entirely recovered from the provision of wastewater services.

The Corporation has not undertaken any analysis of the allocation of costs to different customer classes (residential or commercial) so no conclusion can be drawn about cost allocation efficiency or methodology.

#### 4.5.2 Meeting Demand Management Objectives

In setting tariff structures, there is a need to consider whether pricing can be used efficiently as an instrument for managing demand, and thus deferring the need for augmenting supply. There are several different approaches for using price as a demand management tool.

- **Rebalance tariffs.** Setting usage charges equal to LRMC often involves rebalancing tariffs such that a greater proportion of costs are recovered through the usage charge relative to the fixed charge, whilst maintaining revenue neutrality. Further rebalancing would result in a stronger ‘conservation’ price signal, which may be required to achieve specific demand management objectives. By comparison to other states, Western Australia’s water prices are weighted more heavily towards the fixed charge. For example, based on average household consumption of 250 kL per year, 47 per cent of the total bill paid by Water Corporation customers is made up of the usage charge. In Sydney, Canberra, Melbourne and Brisbane, the usage component ranges between 67 and 76 per cent. This disparity indicates that in the east, a greater emphasis is being placed on the use of price as a demand management instrument. One of the trade-offs of moving toward a higher usage component is that it can result in higher revenue instability for the service provider. Therefore, an appropriate balance must be struck between the two price components.
- **Inclining block tariffs.** One of the aims of this structure is to send a strong conservation signal to customers who use a large amount of water (another is to achieve social objectives, which is discussed in the next section). Inclining tariffs target discretionary water use, which tends to be more price-elastic. In Western Australia, the current structure of a five-block inclining tariff for residential customers was introduced by in 1994, and in 2003 the State Water Strategy recommended a continuation of this policy. Other states have tariffs based on one, two or at most three inclining blocks. IPART views inclining block tariffs as the most preferred pricing instrument for managing Sydney’s growing water demand. Currently Sydney residents are paying a single block tariff. IPART is recommending a two block inclining tariff, which it estimates will reduce residential demand by 6.4 per cent.<sup>23</sup> The possible conservation benefits of inclining block tariffs need to be balanced against their disadvantages – the main one being the penalties they impose on large families with high non-discretionary requirements. Studies conducted elsewhere in Australia have demonstrated that the single largest determinant of household water use is the number of occupants (NERA 2001).<sup>24</sup>

<sup>23</sup> IPART (July 2004), *Investigation into Price Structures to Reduce the Demand for Water in the Sydney Basin Final Report*

<sup>24</sup> National Economic Research Associates (October 2001), *A Review of Melbourne’s Water Tariffs – a Report for the Department of Natural Resources and Environment*

- **Seasonal pricing.** This is a form of ‘peak pricing’ that involves charging higher prices in periods characterised by peaks in demand. For Western Australia, it would mean charging higher prices in summer to discourage discretionary outdoor uses such as watering gardens and filling swimming pools. The efficiency argument behind seasonal pricing is motivated by the situation whereby a water provider’s capital expenditure program is highly influenced by requirements to meet peak demand. For example, Melbourne Water estimates that its supply system costs about 20 per cent more as a result of the extra capacity required to meet high demands on peak summer days, which can be up to 2.5 times average daily use.<sup>25</sup> While peak pricing is common in other utility and service industries, very few urban water providers in Australia have implemented seasonal pricing policies. Current metering technology is the main constraint to seasonal pricing, as it is not possible to read all meters simultaneously to coincide with the start and end of the peak period. The effectiveness of the policy would also depend on customer’s demand elasticity over summer.
- **Quarterly consumption charging.** An alternative to seasonal pricing is to maintain constant tariffs throughout the year but charge on the basis of quarterly consumption rather than annual consumption (as is currently the case in Western Australia). That is, customers could be charged according to their consumption in each quarter, with prices being determined by an inclining block tariff. The Victorian Essential Services Commission has recently adopted this approach in combination with a three-block tariff. While this system is possibly more effective at conveying pricing signals to customers, there is scope for inconsistent charging across customers (that is, different bills for customers using the same amount of water over the course of a year) because not all meters can be read simultaneously at the end of each quarter.

#### 4.5.2.1.1 Water Corporation Proposal

The Water Corporation has considered the possibility of increasing volumetric charges and reducing fixed service charges as a means of encouraging water conservation. However, in its submission to the Issues Paper the Corporation rejects the option of rebalancing charges on the grounds that it would lead to large increases in the water bill for large families – which use above-average volumes of water.

The Corporation considers that an inclining block tariff is an effective way of sending a price signal to high volume users:

The increasing scale maximises demand management as prices increase as customer consumption becomes more discretionary. (p41, Issues Paper Submission)

[in 2003] Water consumption charges over 550 kilolitres per annum were increased to provide a signal to high water users to reduce consumption. Charges were increased to \$1.20 per kilolitre for customers using between 550 and 950 kilolitres per annum, with higher users charged \$1.50 per kilolitre. (p23, Issues Paper Submission)

<sup>25</sup> National Economic Research Associates (October 2001), *A Review of Melbourne’s Water Tariffs – a Report for the Department of Natural Resources and Environment*

The Corporation defends its use of a five-block tariff on the grounds that it smooths the impact of consumption-driven price changes to customers. Furthermore, it believes that customers respond to average rather than marginal prices:

Reducing the number of steps has been considered in the past to help improve customer understanding, however, in practice customers rely on the total bill rather than referring to the cost per kilolitre to understand the cost of their day-to-day usage. (p23, Issues Paper Submission)

The Corporation has indicated that it does not generally support price increases during times of shortages for the specific purpose of managing demand:

If implemented, it is likely that such increases would prove unpopular and would be viewed with suspicion by water customers. Not only would intermittent price increases disadvantage large families and those unable to significantly alter their consumption, but would send a mixed price signal to customers who are making long term decisions about investments in water saving devices. (p. 38 Issues Paper Submission)

It also has some reservations about the cost-effectiveness of seasonal pricing:

A pricing structure which reflects seasonality has also been considered. This structure would require higher prices for usage in dry summer months and lower prices for the rest of the year. However, the cost of implementation (for example, revised meter readings) is significant and outweighs any economic benefits as most avoidable costs are not seasonal in nature.

Importantly, the Corporation estimates that peak demands do not account for a significant proportion of supply costs:

It has been estimated that the total value of costs that could be avoided by removing the January/February peak is less than 4 per cent of the total cost of supplying water. Seasonal pricing may become a more realistic option as the cost of meter reading technology reduces. Seasonal prices could be used to specifically target outdoor water use, although the Corporation considers the current tapered prices achieve this far more efficiently. (p23, Issues Paper submission).

#### 4.5.2.1.2 Issues Paper Submissions

Submissions received in response to the Issues Paper present mixed views about the effectiveness of price-based demand management.

##### *On rebalancing tariffs*

The CSIRO supports rebalancing tariffs:

For Water Corporation consumers, there is less incentive to invest in water conservation because:

- slightly more than half of the average annual charge for water is fixed; and
- half of the water is used inside the house, which is harder to reduce compared with more discretionary outdoor use (i.e. maybe only \$70 per annum is discretionary use in an average household).

...All other cities in Australia (including Bunbury and Busselton) have lower fixed charges than does Perth, thereby providing more incentive for consumers to affect their overall bill by reducing their consumption.(p3)

The Chamber of Commerce and Industry indicates that the businesses it surveyed support rebalancing water tariffs:

There was strong support in CCI's business survey for linking cost more closely to volumes of water used. (p10)

The Small Business Development Corporation supports rebalancing tariffs:

In keeping with a "pay for service and pay for use" approach, the SBDC would support the water usage charge making up a greater amount of the total water bill, provided the fixed service charge is levied on a fairer basis and reduced accordingly.(p3)

While the CSIRO indicates that rebalancing tariffs is likely to result in water savings, it also states that the amount of savings is difficult to estimate:

Given the cost of providing a GL per annum to the Integrated Water Supply Scheme (IWSS) is up to \$10M, any water savings that can result from a major rebalancing of fixed and variable costs would be significant. Some re-balancing options which are cost neutral to water consumers overall (but heavy users would pay more while lighter users would pay less) have estimated annual water savings of between 7 and 17GL, a considerable cost saving in deferred new sources if they were able to be realised. (p3)

The amount that consumers would decrease their water use were prices to rise (or a larger proportion of their bill were to be based on consumption) is notoriously difficult to assess. In many parts of Perth there is a self supply option (domestic bores) that is absent in many other parts of the world. In addition, about half of Perth's domestic consumption of scheme water is on lawns and gardens. These two factors make price elasticities likely to be larger in Perth than in comparable cities elsewhere in the world (i.e. more savings would be realised for a given increase in price). (p4)

According to the Department of Treasury and Finance, rebalancing tariffs may not be efficient if the current tariff structure is set appropriately:

The suggestion in the Issues Paper of increasing the volumetric charge relative to the access fee is difficult to justify on efficiency grounds, if those charges are already set at an appropriate rate (using the objectives of efficient pricing mentioned above) and recovering the appropriate costs. If the volumetric charge is set too low and is not restricting demand to the most efficient use then it should be amended, but not at the expense of the access fee, if that fee is set appropriately. (p33)

The Office of Water Policy's submission indicates that any water savings associated with rebalancing tariffs might be small:

Modelling undertaken by the Water Corporation (based on elasticity of demand estimates provided by CSIRO) indicates that even significant increases in price would lead to only small changes in the quantity of water consumed (elasticity estimates: in-house -0.04, ex-house -0.31). (p11)

### *On inclining block tariffs*

Byl supports higher tariffs than at present for higher usage:

We don't believe that the current pricing structure sufficiently makes people reduce the amount of water they use on non-essential items such as swimming pools. Maybe the basic allowance per household should continue to be charged at very cheap (subsidised) rates, but then the next 'brackets' should be a lot higher than they are at present. (p1)

The Conservation Council of Western Australia supports a usage charge that increases exponentially:

Steps are not necessary. The tariff should be exponential, not linear and the steps should be eliminated. This will discourage water wastage more efficiently. If price is to reflect cost and charges are to vary with usage, it follows that the current pricing structure for domestic supply – that penalises heavy users with higher average unit costs, and subsidises low-volume users – are not appropriate. (p11)

An exponential model is preferred, although a threshold has some advantages. 150 kL is too large for a threshold however. (p11)

Brooker supports a single step:

I would suggest...a low charge for less than 450,000 litres... a reasonable higher charge for above the limit... the abolishing of the fixed charge and linking to user pays. (p1)

The Department of Treasury & Finance supports fewer steps:

...a fewer, rather than larger, number of block tariffs and perhaps more frequent billing cycles would provide a clearer signal to consumers about how much their consumption is costing and therefore allowing them to respond to increases in prices more effectively. Having at least two blocks would allow low levels of consumption corresponding to 'water for life' to be priced differently from the price of a high consumption block which correspond to the full long run marginal cost of the water. (p6)

The Small Business Development Corporation supports the progressive tariff scale:

The SBDC has received little feedback from small businesses citing dissatisfaction with the current progressive tariff scale approach taken in Western Australia. The SBDC would therefore support retaining a progressive tariff scale for determining water usage prices so that small businesses using less water are not subsidising those businesses using more water. (p2)

### *On seasonal pricing*

There is a mix of views about the merits of seasonal pricing. The Chamber of Commerce & Industry does not support seasonal pricing:

CCI believes that seasonal pricing should only be adopted if the actual cost of supply/service provision is higher in any given season. CCI considers that because of the cost associated with changing metering or reading of meters, there would be no value in pursuing this option at present. (p10)

Hine considers that seasonal pricing would be inappropriate:

The suggestion that water should be charged at a higher rate in summer suggests that using water in a time of low supply is somehow unjustified and immoral. This argument actually makes no sense when our system is specifically designed to store water when it is raining for use when it is not. It could be equally argued that water should be more costly in winter because there is no need to water gardens when it is raining. (p3)

The Western Australian Council of Social Service considers that seasonal pricing would not be effective because bills would be sent in the following seasons:

If the aim of seasonal pricing is primarily to signal to customers the real cost of water supply, including social and environmental costs, then there appears to be significant structural barriers limiting the effectiveness of such strategies. In particular, it is likely that if the current billing and collection cycles remain, customers will not be aware of the price signal until up to four months after the water consumption has occurred. This could result in payment of water consumed in late Winter / Spring being paid for in Summer, and consumption in Summer being paid for in Autumn/ early Winter. This system would appear then to undermine the basic rationale for implementing seasonal water tariffs as a means of conserving water. (p4)

The Conservation Council of WA considers that higher prices in winter might be appropriate, but alternatives may be more efficient:

This [seasonal pricing] would be a good way to stop people wasting water in winter, when it is not necessary to water the garden. However regulation is probably more efficient for this purpose. (p11)

Elliot also agrees that higher prices in winter could be appropriate but is concerned about the affect of seasonal pricing on larger families:

Water prices should not be charged on a seasonal basis for the reasons suggested in the Issues Paper, namely impact on larger families and extra administration costs. However, if this were to be contemplated, surely the time to discourage the wasting of water is winter when one sees sprinklers being used while it is raining? (p3)

#### 4.5.2.1.3 Authority Assessment

The decision to use one or more of the price-based approaches to managing demand should be assessed on the basis of their likely effectiveness – which depends on customers’ demand elasticity and whether people respond to average or marginal prices. Tariffs with a large fixed component may encourage some customers to use *more* water in order to justify the large fixed service fee they are paying. This behaviour is consistent with decisions being made on the basis of average price rather than marginal price.

It is the Authority’s view that rebalancing tariffs has a role to play in managing demand, although this role may be limited because residential customers have a relatively inelastic demand. However, aligning the usage charge with LRMC would increase the average Perth household’s annual water *usage* costs from \$130 to \$250, which could have a significant impact on water usage. Note that under this option the household’s *total* water bill would rise by only \$12 because there would be a concomitant reduction in the fixed service charge – see the options in Section 4.6.

IPART has examined the potential impact of converting Sydney Water’s fees structure to a 100 per cent usage charge (that is, doing away with a fixed charge altogether). It estimates that this would reduce residential demand by approximately 5 per cent or a saving of 19 GL.<sup>26</sup> Further work is required to identify the potential water savings from rebalancing the Corporation’s water tariffs.

In conjunction with rebalancing tariffs, it could be beneficial to bill customers more frequently. For example, moving to a system of *quarterly billing* and unbundling the usage component from the fixed charge could assist with communicating the

---

<sup>26</sup> Independent Pricing and Regulatory Tribunal of New South Wales (July 2004), *Investigation into Price Structures to Reduce the Demand for Water in the Sydney Basin Final Report*

conservation signal more clearly to customers (not to be confused with quarterly consumption charging whereby customers are billed on the basis of their water use in each quarter rather than their annual consumption). Furthermore, to help customers ‘benchmark’ their current usage costs it may be beneficial to indicate the size of their previous bills – showing cost and volume. Moving to a quarterly billing cycle would, however, incur additional administration costs because it would require meters to be read four times a year instead of the current biannual reading.

There are some trade-offs with tariff rebalancing. The water provider would be exposed to greater revenue risk and, from an efficiency perspective, complete elimination of the fixed component could lead to a price that overstates the impact of increased demand on costs, including the costs of dealing with ‘excess’ demands.

Further analysis is required to assess whether demand management through pricing is more efficient than supply augmentation. Demand management would be an efficient policy if the loss in customer welfare associated with a specific increase in price (and a consequent reduction in water use) was less than the total cost of alternative options, such as improving reliability through supply augmentation.

One of the risks in using price as a tactical tool for managing demand is the over-recovery of costs, which could come about if scarcity is artificially induced through a less than socially optimal level of infrastructure investment. This underlines the importance of developing an integrated water management plan and subjecting the various management options to a comprehensive benefit-cost analysis. Tactical price adjustments also have the disadvantage of masking the long-term price signals that are needed to influence customers’ long-term consumption decisions.

The Authority supports the Water Corporation’s reservations about seasonal pricing. Based on Water Corporation calculations, servicing peak demands in Western Australia do not contribute significantly to supply costs. Furthermore, the cost of reading all meters simultaneously so as to facilitate a seasonal billing regime would be unacceptably high. Other disadvantages include the possibility of short-term price fluctuations masking price signals based on long run marginal cost (which are required to influence changes in long-term consumption habits) and lower revenue stability for the Corporation. Therefore, the Authority concludes that seasonal pricing is not, at present, a cost-effective tool for managing demand.

Beyond efficiency, the social impacts of price adjustments need to be considered. To help develop a better insight to the possible distributive impacts of tariff rebalancing and restructuring, the Authority has developed several possible reform options, including:

- Replacing the five-block tariff with a flat rate usage charge of \$1.00 per kL, reflecting LRMC; and
- Replacing the five-block tariff with a two-block tariff, with the first 600 kL of consumption charged at \$1.00 and additional volumes charged at \$1.50 per kL.

The modelling results of these options are described in Section 4.7. Preliminary conclusions and findings about the relative merits of the various proposed options are drawn from an analysis of the impacts.

### **Key Findings and Principles on Setting Prices to Manage Demand**

**There are four principal tariff mechanisms for managing demand – rebalancing tariffs, inclining block tariffs, seasonal pricing and quarterly consumption billing. The effectiveness of these mechanisms at reducing demand is dependent on customer’s demand elasticity.**

**From an efficiency perspective, price-based demand management would only be efficient if the loss in customer welfare associated with a price increase is less than the total cost of alternative options such as improving reliability through supply augmentation.**

**Compared to most other states, Western Australia’s water prices are weighted more heavily towards the fixed charge component. In the Eastern States, a greater emphasis is being placed on the use of price as a demand management instrument. One of the possible trade-offs of tariff rebalancing is greater revenue instability for the service provider.**

**Inclining block tariffs aim to reduce demand by targeting discretionary water use, which tends to be more price-elastic. One of the disadvantages of this tariff structure is the penalty it imposes on large families with high non-discretionary requirements.**

**Seasonal pricing involves charging higher prices in summer periods when demand is at its peak. Very few urban water providers have implemented seasonal pricing because of limitations in metering technology. As peak demand does not appear to contribute significantly to supply system costs, there is not a strong efficiency argument to introduce seasonal pricing. Furthermore, tactical price increases during times of shortages may confound longer-term price signals (that is LRMC), which are desirable for signalling long run scarcity.**

**Quarterly consumption charging is a system by which customers are billed on their quarterly consumption rather than their annual water use. The aim is to communicate price signals more effectively to customers regarding the cost of their water use. But, it can lead to inconsistent charging across customers, depending on the sophistication of metering.**

## **4.5.3 Meeting Social Objectives**

### **4.5.3.1 Background**

A number of social considerations enter the policy arena when setting prices for water and wastewater services. Common social objectives are to ensure that water for non-discretionary use is available to all customers at an ‘affordable’ price and that costs are allocated ‘fairly and equitably.’ One interpretation of this criterion is that costs should be allocated to those customers who have the greatest capacity to pay

for the service. Another interpretation is that tariffs should be equalised across all residential customers, regardless of their geographic location. This is reflected by the Government's uniform tariff policy. There is also a social issue relating to charging arrangements for tenants in multiple dwellings.

### **Affordability**

In Australia, water and wastewater services are generally viewed as a basic right – all households should have affordable access to a minimum amount of water for non-discretionary uses. This view is reflected in the Corporation's current pricing arrangements whereby:

- The first 150 kL of residential consumption is discounted – which is funded by high volume users who pay more under an inclining block tariff;
- Concessions apply to pensioners and seniors<sup>27</sup>; and
- GRV wastewater charging, which uses property value as a proxy for 'capacity to pay'.

### **Uniform Tariffs**

The uniform tariff policy aims to even out the prices charged to the Water Corporation's residential customers living in metropolitan and country areas, despite the fact that the costs of country service delivery generally exceed the cost of servicing an average metropolitan customer. The objective of this policy is to be founded on the notion that customers should not be 'penalised' for their choice of residential location. There could also be willingness on behalf of government to offset the 'higher costs of living' experienced by country residents – whether perceived or real.

### **Water Charges for Tenants**

Complexes of flats or units typically have a common meter, which makes it impossible to charge tenants individually. In practice, water providers usually average total consumption for the complex across all tenants and charge individuals based on this average consumption figure. The landlord typically pays the fixed component of the water tariff. The absence of individual consumption metering for tenants gives rise to a number of issues:

- There is scope for the usage charge to be inequitable because a charge based on average consumption will almost certainly mean that some individuals will be cross-subsidising other individuals.

---

<sup>27</sup> Perth pensioners receive a 50 per cent concession on the fixed service charge for water, wastewater and drainage and a 50 per cent concession on the first 150 kL. Seniors receive a 25 per cent concession on the fixed service charge and do not receive a concession on their usage charge.

- Calculating water bills on the basis of average consumption could weaken the demand management signal that would otherwise be conveyed by the usage charge. Group billing encourages individuals to ‘free-ride’ as they can share the cost of their high consumption with other tenants in the complex.
- Conversely, revenue-neutral rebalancing of tariff – which aims to recover a higher proportion of costs through the usage charge for the purpose of promoting efficiency and/or reducing demand – could be inequitable for tenants. This is because tenants would experience the volumetric price increase but would not receive the lower fixed charge.

#### 4.5.3.2 Water Corporation Proposal

In relation to the discount for the first 150KL of water usage, the Corporation states:

A continuing rationale (or social objective) for the low price of water for the first 150KL of use is to ensure every household has access to water to ensure a basic standard of hygiene i.e. at an affordable price. A similar overall water bill could be achieved by reducing the fixed service charge and increasing the consumption charge. However, this option has been rejected in the past due to the impact on certain customer groups such as tenants (who pay only the volumetric component of a water bill) and Seniors (who only receive a concession on the fixed part of the water bill). (p39)

Other options could be considered to provide assistance to low income households but providing targeted assistance has been difficult to achieve. The current concessions are acceptable as long as the lower price does not encourage wasteful water use. Evidence is that essential water use is not sensitive to the price charged. (p33)

In relation to the uniform tariff policy, the Corporation states:

The uniform pricing policy commenced in 1993-94 as part of the pay for service/pay for use tariff reform. Part of the Government’s vision was to have a State-wide consumption charge for average consumption, to end discrimination between metropolitan and country households. This concept has been maintained by successive Governments.

The provision of water at below cost to country towns is supported by Government. through a CSO payment to the Corporation for the loss associated with operating country schemes, which in 2003/04 totalled \$120 million.

In relation to the discount for pensioners and Seniors, the Corporation states:

The provision of pensioner and Seniors concessions is a directive from Government, administered by the Water Corporation. The Corporation therefore receives a Community Service Obligation (CSO) payment, which in 2003/04 totalled \$41.2 million. On 14 November 2004 the State Government announced that it would also extend these concessions to people living in retirement villages, park homes and caravan parks. (p39)

In relation to setting tariffs that increase in steps, the Corporation states:

Water consumption tariffs, increasing in steps, were originally introduced to the metropolitan tariff in 1985/86. Setting tariffs that increase in steps has always been seen as socially and environmentally responsible as it represents a higher water prices for higher water users. This concept has continued to be endorsed by successive Governments and is, in fact, currently being introduced in utilities across Australia. (p39)

#### 4.5.3.3 Issues Paper Submissions

Gregoriadis is concerned about the impact of higher usage charges on larger households:

An increase in the usage rate which applies above a certain level of consumption will be unfair and discriminatory to households like mine unless an adjustment is made for the number of people in the household.(p1)

The Office of Water Policy shares Gregoriadis' concerns:

A policy of significantly increasing prices (even if only applied during the summer months – on a seasonal basis pp 51) would have a negative social impact on lower socioeconomic groups especially those with large families. The limited impact that could be expected from such a policy, in terms of reduced demand, would need to be weighed against the negative social impact (in line with taking triple bottom line approach).(p11)

Elliot considers that it is more equitable to increase the fixed service charge rather than the usage charge:

If it becomes necessary to increase residential tariffs, it may be preferable to slightly increase the fixed charge rather than the cost for usage. This would be equitable, applying to all households, and would allow for concessions to pensioners seniors who would be disadvantaged by an increase in the usage price. It would also mean people with private bores who have minimal usage costs would bear their fair share of the costs associated with water service provision....(p2)

The Western Australian Council for Social Services is concerned about the affect that higher usage charges would have on tenants:

The proposition that average bills could remain the same with the reduction in fixed charges being matched by the increase of volume based charges ignores the fact that in property rental arrangements the owner pays the fixed charges and rates and the tenant pays the consumption charge. In this situation the tenant suffers the volumetric price increase without the projected equalising effect of the decreased fixed charges. People on low incomes form the vast majority of public housing tenants and a significant proportion of private rental tenants. Therefore these groups are likely to be disproportionately disadvantaged by the introduction of policies increasing water usage charges.(p3)

The Conservation Council of Western Australia considers that targeted assistance should be provided for households in need:

We recommend the development of a series of water savings packages providing alternatives for those who apply with genuine cases of hardship. Packages could include caps on water charges; water saving products such as low flow AAA rated shower heads, water flow constrictors, etc. (p6)

The Office of Water Policy considers that everyone should be able to access an amount of water for their basic needs at an affordable price:

The Authority will need to ensure that it regulates the price of water in such a way that each person in WA is provided access to the same amount of water to meet basic needs (however defined/agreed) and that this is affordable on a per capita basis rather than a per connection basis. (p3)

Once the required/agreed quantum of basic need is reviewed and determined, its affordability should be considered – in particular its affordability for the financially disadvantaged. (p4)

The Western Australian Council of Social Service prefers a tariff structure that is more cognisant of household size than the current structure:

The progressive tariff scale denies the reality that different size households require different amounts of water. Whilst concessions and rebates provide much needed assistance for particular low-income and disadvantaged households they are not available to all low-income households, nor do they provide adequate assistance. A more equitable pricing system than that of tiered consumption level pricing should be instigated. This system could perhaps be based on household consumption allowances calculated on the number of individuals in a residence (p3)

The Chamber of Commerce and Industry and the Department of Treasury and Finance comment on the current level of scrutiny and transparency of Community Service Obligation payments. The Chamber of Commerce and Industry submits:

Governments have a legitimate concern to protect the interests of potentially disadvantaged consumers in the markets for some essential goods and services. The financing of Community Service obligations should be equitable, be transparent, and be achieved in a way that has the least impact on competition and economic efficiency. (p15)

The Department of Treasury and Finance submits:

Given the amount of money provided in CSO funding, there may be merit in a greater level of scrutiny to ensure that CSOs are costed properly and there are appropriate incentives to achieve further efficiencies in CSO service provision. (p39)

#### 4.5.3.4 Authority Assessment

##### **Inclining block tariffs**

The use of an inclining block tariff to fund discounts on non-discretionary water, or lessen the impact of price increases on low-income households, is probably only partly effective in achieving its desired social aim. This is because the single largest determinant of household water use is the number of occupants. Therefore, inclining block tariffs are likely to penalise large families rather than target higher income households. Providing increased concessions on the fixed charge for low-income families would be a more efficient, less distorting, mechanism for making water affordable.

##### **Uniform tariff policy**

The policy of providing water at a uniform price to metropolitan and country users is a government objective aimed at fulfilling a perceived community demand for 'fair' treatment of country residents who, in the main, would otherwise experience higher water costs. It is not the task of the Authority to pass judgement on the appropriateness of this policy. However, it is within the Inquiry's Terms of Reference to examine the efficiency with which this policy is fulfilled.

The uniform tariff policy is a CSO that imposes a cost on the Water Corporation because the cost of supplying water to country users exceeds that of metropolitan customers (by about \$120 million). Currently the CSO is funded by a direct payment from government to the Corporation. Alternative arrangements could include:

- requiring the Water Corporation to fund the CSO internally with no compensation payment from government; or
- acceptance by government of a lower dividend payment from the water provider in exchange for undertaking the CSO.

Direct CSO payments to water providers are often preferred because it aids in promoting *accounting transparency* with respect to how much the CSO is costing. However, in the case of the uniform tariff policy, the Corporation is not required to submit to government a detailed breakdown of the efficient marginal costs of water delivery to each of its customer groups (by location), so it is difficult to verify whether the CSO payment actually reflects the true cost of the policy. Thus, the current arrangements lack *economic transparency*.

As discussed earlier in this section, under current CSO funding arrangements the uniform tariff policy does not appear to be causing inefficiencies in water provision because country customers are paying their ‘avoidable’ costs. But if the CSO payment was abolished and the Water Corporation was required to meet all costs internally, there could be an incentive for the Corporation to shift some of its country operating costs onto Perth users. Thus, there would be the potential risk of price distortions under this model.

The option of funding the CSO by allowing the Water Corporation to reduce its dividend payment to government would, in effect, produce the same outcome as the current arrangement whereby the Corporation is provided with a direct payment for the CSO. However, it would be less transparent from an accounting standpoint because the CSO would not appear as a line item on the Government’s accounts or the Corporation’s books.

From an efficiency perspective, the Authority is indifferent to whether the CSO is funded by a direct government payment or a reduction in dividend requirement. However, under both these models the Water Corporation should be required to provide economic justification for the amount of CSO payment (or dividend reduction) and this process should be as transparent as possible. Under a regulatory framework where prices are controlled, requiring the Corporation to fund the CSO internally is not a favoured model because there is the potential for it to use inefficient cross-subsidy pricing to meet its CSO.

### **Key Findings on Meeting Social Objectives**

**Inclining block tariffs can be used to improve the affordability of water for basic needs. However, providing concessions on the fixed charge would be a more efficient way of achieving this social objective.**

**One of the drawbacks of inclining tariffs is that, depending on where the step is positioned, they can penalise large families that have above-average non-discretionary water requirements.**

**From an efficiency perspective, the Authority is indifferent to whether the uniform tariff policy is funded by a direct government payment or a reduction in dividend requirement. However, under both these models the Water Corporation should be required to provide economic justification for the amount of CSO payment (or dividend reduction) and this process should be as transparent as possible.**

**Under a regulatory framework where prices are controlled, requiring the Corporation to fund the CSO internally is not a favoured model because there is the potential for it to use inefficient cross-subsidy pricing to meet its CSO.**

**Due to limitations in metering technology, charges for consumption in multiple dwellings must be averaged across all tenants. This produces some inequities and possibly inefficiencies but the costs of moving to a system of individual metering would be cost prohibitive.**

## **4.5.4 Adjusting for Externalities**

### **4.5.4.1 Background**

An externality is any impact (cost or benefit) caused by the supply, use or disposal of water that is not factored into the consumption or production decisions of customers or water provider respectively. Externalities principally relate to ‘uncosted’ environmental impacts but there may be circumstances where water supply activities reduce the availability of water to other users – known as a consumptive externality.

Externalities arise when the rights to water, or the environmental benefits associated with ‘natural’ river flows, are ill-defined. In the absence of a explicit rights, a water provider (and/or its customers) can impose costs on a third party water user or environmental beneficiary. Importantly, because rights are ill-defined, there is no market mechanism for allowing the affected party(s) to be compensated for the costs. Nor can a market be used to communicate the size of these costs through prices.

This section of the report focuses on environmental externalities and the role of pricing in addressing these externalities. Water-related externalities can be classified into four different types depending on where they occur along the water supply chain:

- Water harvesting activities – including the environmental impact of catchment management activities such as forest thinning;
- Storage stage – impacts from modified flows (changed volumes, duration, timing and frequency) and barriers to fish passage (unrelated to flow volumes);
- Transfer and extraction stage – possible disease transfer. In groundwater systems, excessive extraction may cause impacts on wetlands, cave systems and water quality; and
- Wastewater treatment and reuse – including greenhouse emissions, odours and high nutrient wastewater discharge.

These physical impacts can cause economic costs in terms of reduced recreational opportunities (fishing, swimming, boating), loss of tourism value and reduced amenity. Furthermore, people who derive non-use values from the knowledge that the environment is in ‘good shape’ may experience a loss in benefits.

As discussed above, externalities persist because property rights for environmental ‘goods’ tend to be ill-defined due to the fact that it is often difficult to identify who the beneficiaries are. For example, if people benefit from the knowledge that native aquatic species are being protected through the management of river flows, identifying which individuals are enjoying the benefits is problematic. Furthermore, the benefits of environmental good provision are often non-excludable, meaning that beneficiaries cannot secure exclusive enjoyment of the benefits. In other words, many environmental goods are ‘public goods’.

Because of the difficulties of establishing rights for public goods, governments have sought to ensure an ‘adequate level’ of environmental quality by setting minimum standards in the operating licences of water providers. Governments also directly fund resource management activities and capital works programs to achieve particular environmental objectives. A third way that governments intervene is through the setting of ‘sustainable yields’ for surface and groundwater resources, which limits the abstraction of water for consumptive use. All of these measures serve to increase environmental benefits but involve costs. Some benefits and costs are more transparent than others. For instance, the cost of reduced water availability and/or reliability for urban users, due to the requirement to meet environmental demands, is not readily observable or measurable. Similarly, the benefit of increased allocations to the environment is not easy to quantify in dollar terms.

An issue arises as to what extent pricing should be used to recover the costs of implementing environmental standards/programs, and to what extent pricing should be used as a tool for reallocating more water to the environment – through modifying consumption behaviour. In the former case, costs are actually outlaid by the water provider or government. In the latter case, the emphasis is on avoiding future ‘fix-up’ costs through setting an appropriate price signal before the damage is done. The effectiveness of such a policy relies on customers being responsive to price signals (an elastic demand for water).

In Western Australia, the main debate about externality charging has centred on the issue of whether the cost of water resource management activities, currently being incurred by government, should be passed through to water customers. Less attention has been paid to using pricing as a tool for reflecting other environmental costs which are not currently being addressed through corrective measures. These may include the impact of reduced natural stream flow and lower groundwater levels.

#### 4.5.4.2 Water Corporation Proposal

The Water Corporation has stated in its proposal that it is currently endeavouring to embed sustainability principles into all its decision-making. This means that:

In many (if not most) cases, externalities will be 'internalised' and included within the Corporation's cost structure.

Several examples are given, such as the Corporation's Busselton Environmental Improvement Initiative which is a \$1 million program to reduce agricultural runoff (nutrients) into Geographe Bay – as a means of offsetting the Corporation's own nutrient contributions to the Bay. Other programs include more stringent odour control at wastewater treatment plants and the planting of trees to offset greenhouse emissions from operating the proposed desalination plant. The Corporation includes these program costs in its proposed base prices.

On the issue of whether a resource management charge should be introduced to recover management costs incurred by the Department of Environment, the Corporation notes that the full cost of resource management should not be passed onto water customers because the beneficiaries of these activities extend beyond its customers:

The Corporation is concerned that if any such charge were to be implemented, it should apply equally to all beneficiaries of water resource management activities, not only to water utility customers.

The Corporation is silent on the issue of whether there is a role for charging to signal the 'hidden' environmental costs to customers that are not currently being addressed through management programs.

#### 4.5.4.3 Issues Paper Submissions

The Water and Rivers Commission (WRC), which is now part of the Department of Environment, identifies the cost of managing water resources in Western Australia to be \$46 million each year. These funds are provided to the Department of Environment for carrying out management activities. The WRC is of the view that water users should pay directly for management activities that generate benefits to them or address costs caused by their water use. Further:

Charges should not be the Rolls Royce levels of management but recover only the 'efficient' costs of water resource management activities. The charging regime should be adaptable and may be subject to revision.(p7)

The WRC proposes that resource management costs should be allocated as follows:

Environmental costs such as waterways and wetlands protection should be allocated to government as should costs of remedying damage caused by past use. Abstractor costs such as resource appraisal, allocation, protection and conservation of water quality and licensing should be allocated to abstracters. (p10)

Based on the above cost allocation principles, the WRC estimates that about \$15 million of the total resource management cost should be passed on to water customers. It recommends that a volumetric charge of approximately \$0.05 per kL be levied (equivalent to \$15 million averaged over the 329 GL water consumed by urban users). It notes that based on current consumption levels, this would result in 76 per cent of households paying a charge of less than \$16 per year.

The Conservation Council of WA and the Environmental Protection Authority support the water resource management charge. The Conservation Council submits:

CCWA and World Wildlife Federation strongly support, in principle, the introduction of a new Water Resource Management Charge. (p15)

According to the Environmental Protection Authority:

It would be consistent with 'user pays' for water pricing to reflect management costs including protection of the environment. (p1)

The CSIRO considers that the water resource management charge will, in particular, help to improve the management of the groundwater sources used for Perth, Bunbury and Busselton:

Were such charges to be introduced they probably should include all licensed water users, not just water service providers who provide the highest quality and value use. Increasingly however, Perth, Bunbury and Busselton are using confined groundwater sources and their proportion relative to other water users is locally very high. These sources are less likely to be contaminated and are more reliable than streams and superficial aquifers. There is a possibility that a water resource management charge for using these aquifers could be considered in return for a longer term (even perpetual) licence for a proportion or share of the sustainable yield, and policies that reserve these sources for public water supplies. Such a charge could result in improved management of these valuable resources and the resulting increase in water prices to consumers would be relatively minor. (p5)

The Chamber of Commerce and Industry explains some of the principles that it considers need to be in place before a water resource management charge is introduced:

Before imposing water management charge, the need for such measures should be clearly made, and any charging regime should as close as practicable reflect the actual management cost associated with the consumption of water. Water management activities need to be appropriately prioritised and delivered efficiently. Further, any charging regime must be accompanied by demonstrable improvements in water management and ultimately efficient and effective service delivery, and/or reduced costs to industry in other activities. (p11)

The Department of Treasury and Finance indicates that other jurisdictions have introduced water resource management charges, but is concerned that the Department of Environment could have a potential conflict of interest:

This is obviously a cost which results from water use and increases with increased water use. An appropriate charge may also promote a greater awareness of environmental issues in the community and an awareness of how water supply services can impact on the environment. Many States and Territories (excluding WA) have started charging consumers to recover costs for the management of the water resource to ensure its sustainability. (p4)

One issue ... is the potential conflict of interest in the provision of water resource management services. The concern lies with the environmental regulator, the DoE, setting the service standards, providing the service and potentially setting the levels of cost recovery. (p33)

#### 4.5.4.4 Authority Assessment

The Authority is of the view that it would be reasonable to pass on to customers those resource management costs that are directly attributable to current consumption activities. This would be in accordance with COAG principles. However, government should fund the cost of repairing damage caused by supply decisions made in the past. This is consistent with the principles set out by the WRC above and is also consistent with IPART's view on cost sharing.<sup>28</sup>

The Authority has not undertaken an assessment to estimate what this would mean for Water Corporation customers in terms of a specific environmental charge, although the WRC estimates that a volumetric charge of approximately \$0.05 per kL should be levied (equivalent to \$15 million averaged over 329 GL of water consumed by urban users). Given that some environmental impacts are independent of the volume of water supplied, it may be more appropriate for resource management costs to be recovered using a fixed charge. Further investigation is required to determine the environmental cost drivers.

As the Water Corporation does not incur the costs of water resource management, revenue generated from the charge should be passed back to government.

While the Authority supports the principle of a resource management charge, care should be taken to ensure that the environmental standards and targets set by government reflect an 'efficient' level of environmental quality. Also, the environmental outcomes should be delivered at least cost. The Authority therefore proposes that resource management programs be subject to comprehensive social benefit cost analysis.

Similarly, any new standards imposed on the Water Corporation should first be subjected to a benefit cost analysis. If the Corporation is required to meet higher environmental standards, the increased cost to the Corporation should be made explicit, together with an estimation of the benefits and beneficiaries.

In principle, there is economic justification for internalising other environmental costs that are being imposed by water supply/use/disposal activities but that are not currently being addressed by environmental programs. However, estimating these costs is difficult because most environmental impacts are 'public good' in nature. Non-market valuation surveys would be required to estimate values. Furthermore, often the scientific knowledge about cause and effect relationships is poorly

---

<sup>28</sup> Independent Pricing and Regulatory Tribunal of New South Wales, Department of Land & Water Conservation Bulk Water Prices, Determination No. 3, December 2001.

understood, making it difficult to identify the extent to which particular water supply activities are responsible for impacts. In some instances, water pricing may not be the most efficient instrument for addressing the externality. To address this issue a comprehensive review of all externalities that are currently not being addressed by environmental standards should be undertaken with a view to developing an understanding of the magnitude of the externalities and what instruments would best be suited to addressing them.

The ACT government has set a precedent for externality charging in Australia through the introduction of its Water Abstraction Charge (WAC). It passes on a charge not only for actual incurred costs of resource management but also for:

- Environmental costs imposed on downstream water users – such as the cost of increased salinity; and
- A scarcity charge, reflecting the opportunity cost of using water in the ACT instead of letting it flow downstream to irrigation users. This component of the WAC is set to equal the traded value of water.

The ACT has been able to introduce these charges because it has demonstrated that the costs are measurable and, thus, defensible. But because the costs are not actually incurred by the ACT government, there is risk that the government could be viewed of raising a tax – which is unconstitutional. The ICRC is of the view that this risk is minimised because the ACT government has established a clear link between water consumption and externality costs.<sup>29</sup>

#### **Key Findings on Adjusting for Externalities**

**The Authority is of the view that it would be reasonable to pass on to customers those resource management costs that are directly attributable to current consumption activities. The cost of repairing damage caused by supply decisions made in the past should be funded by government.**

**As the Water Corporation does not incur the costs of water resource management, revenue generated from the charge should be passed back to government.**

**Consideration should be given to recovering resource management costs with a fixed charge rather than a volumetric charge. A usage charge would only be appropriate if a significant proportion of costs vary with the amount of water supplied.**

**While the Authority supports the principle of a resource management charge, care should be taken to ensure that the environmental standards and targets set by government reflect an ‘efficient’ level of environmental quality. Also, the environmental outcomes should be delivered at least cost.**

<sup>29</sup> Baxter. P. (February 2005), ACT Independent Competition and Regulatory Commission, *Pricing and Regulation – Outcomes of the ACT’s Pricing Review: Pricing Externalities*

**In principle, there is economic justification for using pricing to internalise other environmental costs that are not currently being addressed by environmental programs. However, in Western Australia, not enough is known about these costs to establish a measurable and defensible externality charge. Furthermore, there may be more efficient instruments for managing these costs.**

## 4.5.5 Wastewater Pricing

### 4.5.5.1 Background

Wastewater services involve the acceptance, transport and treatment of wastewater followed by the disposal of the end products of treatment. Acceptance and transport requires an extensive network of pipes and sewers that can receive waste from individual properties and deliver it to a treatment plant. Broadly, there are three different types of wastewater:

- Domestic wastewater – which is discharged by both residential and non-residential customers. In Perth, the majority of wastewater is classed as domestic waste;
- Trade waste – the non-domestic component of non-residential wastewater, including liquid waste from manufacturing processes, some commercial and research activities and heating/cooling plants; and
- Stormwater.

Wastewater has some characteristics that differ from water. First, residential demand for wastewater services is highly price inelastic because households have limited opportunities to reduced discharge to the sewer. Therefore, compared to water, it is less critical to establish a usage charge for residential wastewater, because a tariff comprising just a fixed component would be a reasonably efficient way of recovering costs. Table 4.6 summarises the charging regimes in each jurisdiction. With the exception of Victoria, most states employ a fixed charge to recover all costs associated with residential wastewater. This is partly because of the limited efficiency gains to be had from establishing a two-part tariff and partly because it is difficult to measure the quantity of wastewater discharged from residential properties. However, in Melbourne residents are levied a two-part tariff with the usage charge based on water consumption adjusted by a discharge factor and seasonal factor.

The fixed charge in Western Australia is levied on the basis of residential property value. Under this system, the charges paid by individual customers do not necessarily reflect service delivery costs, with households in affluent suburbs paying a disproportionately higher share of total costs. South Australia operates a similar system. All other jurisdictions have adopted a uniform fixed charge that reflects the average ‘per property’ cost of wastewater services. In Perth, the average residential wastewater charge is significantly higher than the average bills experienced by residents in other states.

A second way in which water differs from wastewater is the heterogeneity of the wastewater product. Developing efficient charging policies for *non-residential* customers is complicated by the fact that these customers discharge wastewater of varying qualities, ranging from domestic sewage to potentially hazardous trade waste. Depending on the type of waste discharged, different costs are imposed on the acceptance and treatment system. The methods for charging non-residential customers vary widely from state to state. Most have developed charging arrangements that differentiate between commercial customers that discharge predominantly domestic waste and those that discharge trade waste. Wastewater service providers in all states have developed ‘acceptance’ policies to deal with the acceptance of potentially hazardous trade waste. Trade waste customers are generally charged more to reflect the higher costs they impose on the sewage system.

With the exception of South Australia, all states apply a two-part tariff for non-residential customers but the specific structure of this tariff varies (Table 4.6). For example, there are several ways of levying the *fixed* component:

- a uniform charge across all commercial customers (Melbourne, Canberra, Brisbane);
- a fixed charge that is adjusted by the number of sewage fixtures (Perth); or
- a fixed charge based on property value (Adelaide and Sydney).

The basis for setting *usage* charges also differs from state to state. Some states are using sophisticated methods to monitor discharge levels, while others are using proxies such as water consumption or the number of sewage fixtures to establish a usage fee. Perth commercial customers are levied a usage charge based on the assessed volume of discharge, with a free 200 kL allowance per property. The amount of wastewater discharged by non-residential properties is generally correlated to water consumption, although there are some circumstances where water input is a poor proxy for discharge. For example, large office premises use significant amounts of water for evaporative cooling towers, much of which is lost to the atmosphere.

A third issue to consider in the pricing of wastewater services is the linkages between water and wastewater operations. Because wastewater generation, transportation, treatment and disposal are part of the entire water cycle, efficient charges for wastewater services cannot be developed in complete isolation from water charges. This is particularly relevant if a usage charge applies to wastewater services and this charge is set on the basis of water consumption.

Table 4.6 Wastewater Charging Arrangements in Each State

City	Residential	Non-residential		
		All non-residential customers	Domestic waste	Trade waste
Perth	Fixed service charge based on property gross rental value (GRV).	Fixed service charge based on the number of fixtures.	Usage charge based on the assessed volume of discharge	Annual permit fees  Quality-quantity charges, which are generally fixed for particular industry types  Activity-based charges to cover the cost of inspection/monitoring
Melbourne	Fixed service charge – uniform across all customers  Usage charge based on water consumption adjusted by a discharge factor and seasonal factor.	Fixed service charge – uniform across all customers.	Usage charge based on water consumption less trade waste volumes.	Agreement fees apply to 4 categories of users.  Usage and quality charges apply to 3 categories of users.
Sydney	Fixed service charge – uniform across all customers.	Fixed service charge based on the assessed annual value (AAV) of the property or based on the size and number of water meters.	Usage charge for those firms discharging >500 kL pa. Charge is levied on volumes exceeding this amount.	Agreement fees and waste quality charges based on a per kg basis. An 'equivalent domestic mass' is netted off to avoid double charging
Canberra	Fixed service charge – uniform across all customers	Fixed service charge	Usage charge based on the number of fixtures in excess of 2.	No additional charge levied on trade waste. No specific charge on volume or toxicity of waste.
Brisbane	Fixed service charge – uniform across all customers	Fixed service charge – same fee charge for residential customers	Usage charge based on the number of pedestals.	Usage charge based on the type of industry (4 categories) defined by volume and quality.
Adelaide	Fixed service charge based on property value	Fixed service charge based on property value.	No usage charge.	Charges apply for concentrations that exceed acceptance levels.

Source: Allen Consulting Group

#### 4.5.5.2 Water Corporation Proposal

In relation to options for reforming residential wastewater charging, the Corporation states:

Unlike water services, residential customers are required to use the wastewater system due to the public health and environmental impact of alternatives. With no level of use decision to be made, the charging structure can be used to achieve an “equitable” recovery of costs. The standard alternative to valuation based charges for residential customers is a fixed service charge. This has the advantage of simplicity and low administrative costs. While a flat charge is equitable in that everyone pays the same amount for the same service, its implementation is inequitable as the changes result in significant increases in the bills of low income earners. (p42, Issues Paper Submission)

In relation to the relatively high wastewater prices in Western Australia, the Corporation states:

The benchmarking exercise [with SA Water] found the Corporation’s higher capital costs are driven by:

(a) Lower density: The physical layout of Perth means that the Corporation requires more pipe per property (approximately 18 metres) compared with most other cities (for example, Adelaide requires 15 metres per property).

(b) Wastewater pump stations: Perth’s topography is relatively flat compared with many other cities and, therefore, requires more pumping to convey wastewater to wastewater treatment plants. Not only does Perth require more pump stations, they are also significantly larger to cope with the greater volume that cannot be conveyed by gravity. (p20)

#### 4.5.5.3 Issues Paper Submissions

The Office of Water Policy considers that there are no benefits associated with changing the current GRV-based approach:

The Office of Water Policy would not support a move away from GRV based charging unless it is accompanied by a significant reduction in the average bill for wastewater charges, to bring it into line with other states. There is no efficiency or equity benefit to be gained by moving away from the current charging arrangements. The fact that this form of charging creates some additional administration costs (which are paid to Government) for the Water Corporation should not override the principle of ‘ability to pay’ implicit in the current arrangements. (p5)

The Chamber of Commerce and Industry considers that the current GRV-based pricing arrangement is the “most practical” approach:

While wastewater pricing should in principle reflect the cost of wastewater service provision and wastewater treatment, the recovery of wastewater through un-metered water flow from residences means that it is not feasible, or at least not cost-effective, to greatly change this system. As a consequence, rating of properties according to property Gross Rental Value (GRV) and similar means would seem to be the most practical means of charging for wastewater services. Alternative proxies might include a flat charge per household (which might be fairer than a GRV bases system, if less progressive), or a fee based on scheme water used (on the grounds that wastewater production and scheme water consumption will be at least partly linked). In either case, pricing policy for wastewater charges should as much as practicable reflect actual costs to ensure the pricing system does not inhibit potential new entrants competing and supplying services in a wastewater market. (p10)

However, the Conservation Council of WA prefers an alternative pricing structure:

[Wastewater service charges should be] based on the number of toilets per residence, not on the property value (p11)

The Department of Treasury and Finance considers that the GRV-based approach is inequitable but notes the difficulties associated with moving to a flat charge:

The current valuation based charges for wastewater lead to considerable distortions in charging whereby some customers are paying up to \$2,500 for a service, where the average cost per customer is approximately \$450. Using this example it is clear that the current charging system is inequitable.

In 2002, the Minister for Government Enterprises established an inter-agency working group to investigate the removal of valuation-based charges, which involved the investigation of the Water Corporation's residential wastewater charge. Because of the embedded distortionary effects of the current valuation based charging system, the shift to a flat charge would have meant some customers would pay slightly more for the same service.

The Authority should consider this matter further and recommend on the most appropriate form of implementation of a State-wide flat charge for residential wastewater. (p35)

The following submissions were received in relation to commercial wastewater charges:

The Small Business Development Corporation is concerned about the fixed service charges that apply to businesses and supports the move away from GRV-based charging.

The SBDC does have some concerns about the validity of the service charges and, in particular, whether they are sufficiently equated to the actual cost of providing the service. Currently there is a significant difference between the service costs levied on premises that has, for example, one wastewater outlet and premise that has five outlets, or a premise that has a 20mm water meter compared to one with a 50 mm meter... An alternative approach that could be examined is the Brisbane City Council model which is applied by basing the fixed service fee on a percentage of the customer's water consumption charge. (p2)

The SBDC supports the move away from service charges based on the gross rental value (GRV) of properties. The SBDC received complaints in the past from small business operators who experienced considerable increases in water or wastewater charges simply as a result of land value increasing, and from small businesses located in central business districts and metropolitan shopping centres which have high GRV but relatively little water or wastewater infrastructure or usage. (p1)

The Australian Hotels Association is concerned about the Corporation's administration of wastewater charges.

In respect of wastewater charges we have been advised that up to 70 per cent of hotels have been issued a discharge factor that appears to be incorrect and requires review. (p1)

#### 4.5.5.4 Authority Assessment

Preliminary investigations by the Authority find that charges applied to residential wastewater customers are recovering at least the 'avoidable cost' of supplying the wastewater service. Therefore, there is no evidence to indicate that non-residential customers are cross-subsidising residential customers.

The observation that Perth residents are being charged comparatively high wastewater bills relative to eastern states counterparts warrants further investigation. It may be the case, as stated by the Water Corporation, that service delivery costs are,

on average, higher in Western Australia than elsewhere owing to Perth's lower density housing and flat topography. However, as discussed in Section 4.6.1, the Authority notes that the Corporation's return on assets is almost entirely recovered from the provision of wastewater services, suggesting that it is able to extract more rent from wastewater due to the nature of its inelastic demand.

The Authority does not believe there is a strong efficiency argument for introducing a usage charge for residential customers. This is mainly because opportunities to reduce discharge to sewer are limited and the means of measuring discharge are imprecise. While it would be feasible to implement a usage charge based on the number of flushing fixtures, this is a relatively poor proxy for discharge volumes because it does not reflect intensity of use.

Subject to social considerations, the Authority is of the view that it would be desirable to replace the GRV system of charging for residential wastewater with a fixed uniform charge. The benefits of this reform include:

- Wastewater charges that are cost reflective and transparent.
- Reduced risk of over-recovery of costs in an unregulated system. With GRV pricing there is the potential for over-recovery of costs – and vigilance is required to prevent this through the adjusting of charge rates as property prices increase.
- A saving in administration costs. Under the current system property valuation services cost in the order of \$2.4 million each year; and
- The reform would bring Western Australia into line with most other Australian states that have already converted their residential wastewater charges to a uniform average charge.

However, there would be significant social impacts from moving to a uniform fixed charge, and these would need to be addressed. The main concern is that of higher charges for low-income households residing in low value properties. Conversely, residents in high-value properties would face substantial reductions in their bill.

Some of the submissions received argue for GRV charging to be retained on the basis that it allocates costs to those customers who have the capacity to pay, and is therefore viewed as a fair allocation of costs. However, the Authority notes that GRV charging is an imperfect way of achieving this outcome because a proportion of low-income households live in established, wealthy suburbs.

On balance, the Authority is of the view that decoupling wastewater charges from property values has merit, principally because it makes pricing more cost reflective and transparent. However, distributional issues would need to be addressed. A transitional phase-in period could be considered as a way of allowing affected households time to adjust to the higher bills.

Another way to reduce the impact of higher bills on low-income households would be to introduce the reform at the same time as rebalancing water tariffs, with the logic being that the lower water bills experienced by low-volume users (which generally coincide with low-income households) would partly offset the higher

wastewater bill. However, a preliminary analysis of the impacts of this ‘hybrid approach’ shows that residents in low-value properties would nevertheless be adversely impacted.

Further analyses of the issues associated with residential wastewater charging will be undertaken in the Final Report.

With respect to the Water Corporation’s non-residential wastewater charging, the Authority has not made a comprehensive assessment of the new charging system introduced in 2003-04. The adoption of a usage charge based on assessed volume of wastewater discharged will assist the Corporation to move towards cost-reflective pricing. However, there appears to be an issue with small commercial offices being charged significantly higher prices than residential customers despite the fact that their discharge is essentially the same volume and type to domestic waste. The new charging regime may need to be refined to recognise that a substantial but imprecisely known proportion of the non-residential base discharges waste that is little, if any, different in quality and concentration from domestic-type waste, requiring little or no pre-treatment.

#### **Key Findings on the Water Corporation’s Wastewater Pricing**

**Charges applied to residential wastewater customers are recovering at least the ‘avoidable cost’ of supplying the wastewater service. Therefore, there is no evidence to indicate that non-residential customers are cross-subsidising residential customers.**

**Most jurisdictions recover the costs of providing wastewater services to residential customers through a fixed service charge. The Authority does not believe there is a strong efficiency argument for introducing a usage charge for residential customers. This is mainly because opportunities for customers to reduce their discharge are limited and the means of measuring discharge are imprecise.**

**Western Australia and South Australia are the only states to base residential wastewater charges on property values. A more transparent pricing arrangement would be to set a uniform charge equal to the ‘per property’ average cost of service delivery. This would remove the need for property valuation assessments, with a cost saving of \$2.4 million each year, and the need to make routine adjustments to charge rates in line with changes in property values.**

**While a valuation based charge may be viewed as more equitable, because it attempts to recover a higher proportion of costs from high-income households, it is an imperfect way of achieving this social objective.**

**On balance, the Authority is of the view that decoupling wastewater charges from property values has merit, principally because it makes pricing more cost reflective and transparent. However, distributional issues would need to be addressed.**

**The Authority has not undertaken a comprehensive assessment of the Corporations new charging system for commercial wastewater, so no conclusions can be drawn at this stage.**

## 4.6 Options for Pricing Reforms and Their Impacts

On the basis of the principles discussed in previous sections, the Authority has developed several alternative pricing structures for further consideration. The proposed options are designed to assist in deliberations about tariff structures that may be more effective at meeting economic, social and environmental objectives than the current structures. An indicative assessment is made of the distributive impacts of each reform option – in terms of changes in water bills experienced by residential customers with differing consumption profiles. Further analysis may be required to ‘fine tune’ these estimates. Furthermore, the modelling does not build in potential changes in demand and associated revenue impacts for the Corporation. Nor does it examine in detail the impact on revenue stability. The analysis is limited to examining changes to residential water tariffs. An analysis of commercial tariff structures will be undertaken prior to the release of the Final Report.

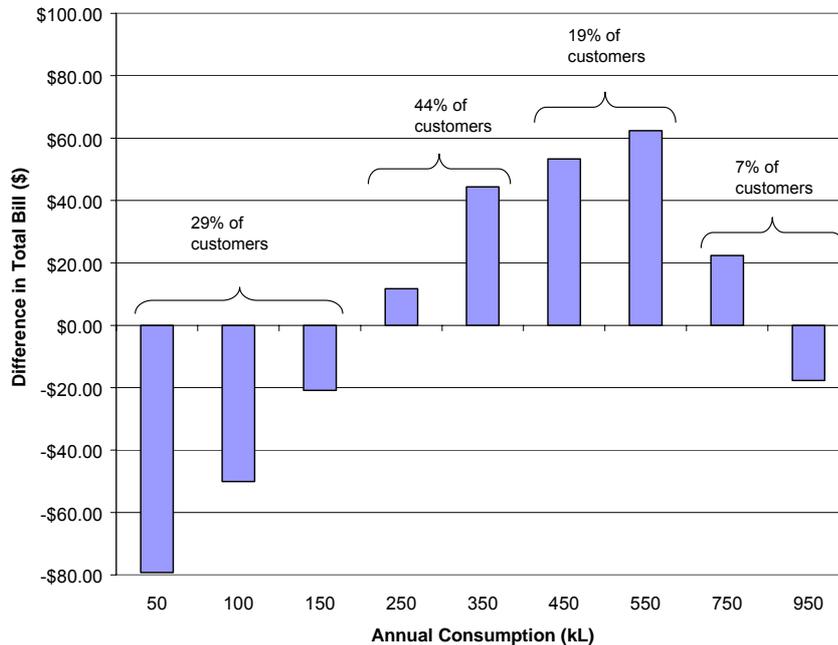
### 4.6.1 Option 1: Set the usage charge to LRM

Under this option, the current water tariff would be rebalanced so that a greater proportion of the Corporation’s costs are recovered through the usage charge. The existing five block inclining tariff would be replaced with a single flat rate usage charge, set equal to the approximate LRM of \$1.00 per kL. By comparison, the average household consuming 250 kL per year currently faces a usage charge of 67.4 cents per kL. By moving to a higher usage charge, the fixed charge could be reduced from \$149 to \$40.55 while maintaining the same revenue (assuming no change to current consumption levels).

Figure 4.12 shows the change in total bill (\$ per year) faced by *residential* customers consuming different volumes of water. The main distributive impacts are as follows:

- The 29 per cent of customers who are consuming up to 150 kL per annum get a total bill reduction. Despite the fact that each unit of water used is more expensive, the total bill reduces because of the significant reduction in the fixed charge.
- The 44 per cent of customers who are consuming between 150 and 350 kL would experience a higher total bill, owing to the higher usage charge. However, the increase for households using the average amount of water (250 kL per year) is relatively minor – an increase of only \$11.75 per annum.
- The 19 per cent of customers consuming between 350 and 550 kL per annum would face bill increases of between \$44 and \$62 per annum, depending on their actual consumption.
- Compared to the existing inclining block structure, a flat rate charge would spread the burden of costs more evenly across high and low volume users. Therefore, very high volume users would actually experience a *lower* total bill. Customers using above 862 kL, which accounts for about 5 per cent of the customer base, would fit into this category.

**Figure 4.12 Change in Total Annual Bill for Residential Customers Under Option 1 (Flat Usage Charge Equal to LRMC)**



The flat rate usage charge option has a number of advantages over the current tariff structure:

- The tariff is rebalanced so that usage charges for every unit of water consumed are more reflective of scarcity costs;
- A flat rate charge is considerably less complex than the current five-block structure, which could assist in communicating to customers the financial implications of using water – every kL they use costs another dollar; and
- Low volume customers, which potentially include a larger proportion of low income households, would benefit from the tariff adjustment because their total bill would be significantly reduced.

As is always the case with any tariff structure, not all objectives can be met completely and there will be some tradeoffs.

First, profit risk is often a concern of service providers when considering a move towards higher usage-based pricing. Water providers are cautious about adopting a tariff structure that is highly sensitive to demand fluctuations – for instance during times of water restrictions. However, this does not appear to be a significant issue in the case of Option 1. Water restrictions in 2003-04 reduced demand by 45 GL, which resulted in lost revenue of \$39 million<sup>30</sup>. If the same level of restrictions were imposed and a usage charge of \$1.00 per kL applied, revenue losses would be \$45 million – which is not significantly greater than under the current tariff system. Therefore, revenue volatility is not expected to be substantially different under

<sup>30</sup> Water Corporation personal communication, February 2005

Option 1. This is partly because, under the existing inclining block tariff where high volume users are charged \$1.50 per kL, these ‘top-end’ users cause a large proportion of the revenue loss. This gearing of revenue to high volume users would be removed under Option 1. The other stabilising factor is the relatively inelastic demand for water at volumes less than 150 kL. Raising the price of this water is essentially the same as increasing the fixed charge.

A second trade-off with Option 1 is the impact it is likely to have on large families. The Water Corporation estimates that households with six family members consume, on average, about 600 kL (in the absence of restrictions). As shown in Figure 4.1.2, households consuming around 550 kL of water will experience a bill increase of approximately \$60 per annum. For higher consumption levels, say 750 kL, the impact is lessened to \$22 per annum. Given these impacts, it may be necessary to follow Victoria’s lead and offer water savings packages to large families to assist them in managing their water consumption.

Thirdly, a reduction in the fixed charge to \$40.55 may result in a proportion of customers not paying their avoidable costs of service delivery. These are customers who use very little or no water. Further investigation is warranted to ascertain what proportion of the customer base this constitutes.

A fourth trade-off associated with a flat rate usage charge is that it removes the strong conservation pricing signal to high volumes users that is currently in place under the five-block inclining tariff. If demand management through pricing is a focus for the Water Corporation and for government, there may be merit in considering a two-step inclining tariff, which aims to maximise the benefit of the price signal by targeting the recovery of costs to high volume users while maintaining a relatively simple tariff structure. This option is explored below.

#### **4.6.2 Option 2: Introduce a two-block inclining tariff**

This option would involve replacing the existing five-block inclining tariff with a two-block tariff, together with rebalancing the pricing structure such that a greater proportion of total costs are recovered through the usage charge. In developing a block tariff, consideration must be given to the position of the step. In this option it is proposed that the step be positioned at 600 kL, which the Water Corporation has indicated to be the average use of a six-member household (in the absence of restrictions)<sup>31</sup>. The tariff is structured such that customers using up to 600 kL are charged at LRMC (\$1.00 per kL), while customers using more than 600 kL are charged \$1.50 per kL for their usage. This step is chosen as a means of minimising the impact of the inclining tariff on large family households, who have a larger non-discretionary requirement for water.

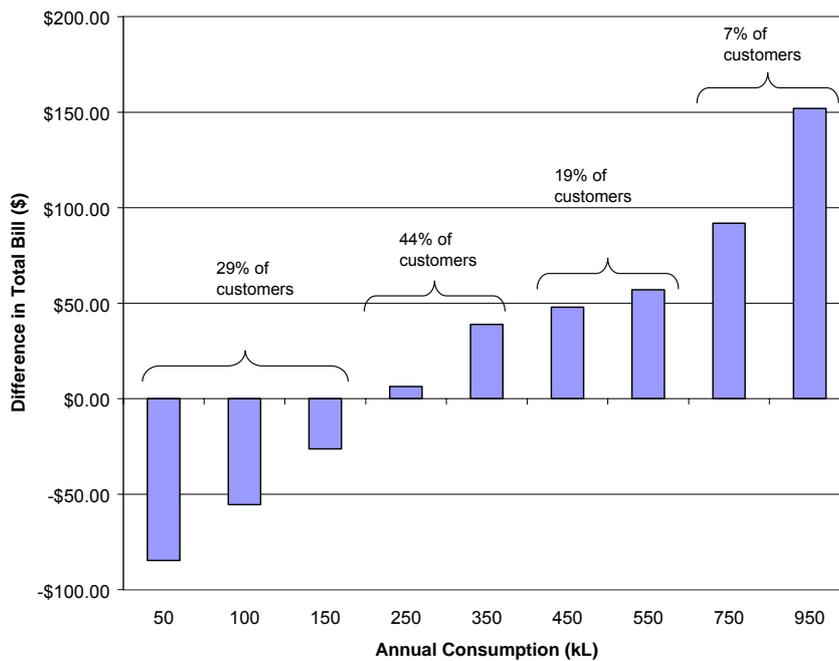
Unlike the existing block tariff, it is proposed that no discount be given on the usage charge to low-volume users. This is consistent with the principle that every additional unit of water consumed contributes equally to LRMC, regardless of whether it is used by high or low volume users. However, the higher usage charges would permit a significant reduction in the fixed charge and this is of benefit to low

---

<sup>31</sup> Water Corporation, personal communication, February 2005

volume (possibly low income) users – although it is acknowledged that this benefit would not be directly passed through to tenants, who do not pay a fixed charge.

**Figure 4.13: Change in Total Annual Bill for Residential Customers Under Option 2 (Two-Step Tariff)**



The Water Corporation estimates that the fixed component could be reduced from \$149 to \$35.15 with no change to total revenue (assuming demand does not change). The reduction is greater under Option 2 than Option 1 because the inclining block tariff recovers more revenue from high-volume users.

Figure 4.13 illustrates how the total water bill would change for customers consuming different volumes of water. The main distributive impacts are as follows:

- Because of the lower fixed charge, low volume customers using up to 150 kL per year receive a significant reduction in their total bill, ranging between \$26 and \$85 depending on actual consumption. Almost 30 per cent of customers fit into this category.
- All customers using more than 230 kL of water would experience a higher total water bill. But the increase for households using the average amount of 250 kL per year is relatively small – only \$6.35.
- The 19 per cent of customers who are currently using between 350 to 550 kL would face bill increases of between \$39 and \$57 per annum, depending on actual consumption.

- Unlike Option 2, very high volume customers would experience substantially higher bills under this inclining block structure. For example, a household consuming 950 kL or more per year would face a bill increase of \$152. However, only 1 per cent of customers fall into this category.

In summary, the two-block tariff option has a number of advantages over the current tariff structure:

- The tariff is rebalanced so that usage charge for every unit of water consumed is more reflective of scarcity costs;
- The demand management ‘intent’ of the current five-block inclining tariff is retained without the complexity, thus clarifying the price-consumption relationship to customers;
- Low volume customers, which potentially include a larger proportion of low income households, would benefit from the tariff adjustment because their total bill would be significantly reduced; and
- Depending on the exact positioning of the step, there would be an opportunity to minimise the impact of the two-block tariff on large families.

On balance, the Authority considers that a two-step inclining tariff does have a beneficial role to play in managing demand. Reducing the number of steps in the water tariff to two steps would improve the conservation signal to customers by making the price-consumption relationship more transparent on customer’s bills. It would also bring Western Australia into line with tariff structures employed in other States. The social objective of making basic water requirements affordable to all households is upheld under the proposed two block tariff because low-volume (potentially low income) users would be better off under the proposed structure. As discussed above, the positioning of the step at 600 kL would minimise the impact on large families, although it is acknowledged that charges for consumption above 230 kL would, nevertheless be higher compared to existing arrangements. Again, there may be scope to assist these households by providing them with free water saving appliances.

**Key Findings on Pricing Reforms**

**The Authority recommends that the Water Corporation give further consideration to rebalancing tariffs so that usage charges reflect LRMC. This would improve efficiency by more clearly signalling to customers the underlying long run cost of supplying water, where scarcity constraints exist.**

**The Authority proposes that, in conjunction with tariff rebalancing, the number of tariff steps be reduced in order to simplify the price signals to customers and to bring the tariff structure into line with those in other States.**

**For the purpose of collecting views and perspectives from stakeholders, the Authority has developed two options – a flat rate usage charge and a two-block inclining tariff. Both result in low volume users experiencing a reduction in their water bill due to a lower fixed component. At average consumption levels of 250 kL per annum, customers would experience a small increase in their bill of \$12 (flat rate) or \$6 (two-step).**

**The choice between a flat rate or two step charge essentially hinges on whether a desired role for the tariff structure is to reduce demand. On balance, the Authority considers that a two-step inclining tariff does have a beneficial role to play in managing demand.**

**The analysis indicates that under the proposed two-step tariff, large families with above-average water requirements would be likely to experience an increased bill, in the order of \$60 per annum for a household using 600 kL per annum. Therefore, it is recommended that ways to compensate these customers be examined, such as free water savings packages to assist households in managing their water consumption.**

## 5 AQWEST

### 5.1 Background

Bunbury Water Board, trading as AQWEST-Bunbury Water Board, provides potable water services to the Bunbury-Wellington region, including water sourcing, treatment and distribution operations. The organisation is a self-funding State Government Statutory Authority, which employs around 30 full time equivalent staff.<sup>32</sup>

AQWEST holds an Operating Licence issued by the Authority, which is valid until 2022. The licence establishes conditions under which AQWEST is able to operate, including aspects such as terms of operations, standards and requirements that must be met and geographic areas to be served. A copy of AQWEST's licence is available at [www.era.wa.gov.au](http://www.era.wa.gov.au).<sup>33</sup>

### 5.2 Service Standards

This section examines whether AQWEST's proposed levels of service provision are consistent with its regulated environmental, health and service standards. AQWEST's operating licence is granted under the *Water Services Coordination Act 1995* and sets out standards in relation to customer complaints, processing of complaints, development and implementation of a customer charter, community consultation, availability and connection of services, drinking water quality, water pressure and flow, continuity of supply and drought response.

The performance targets in AQWEST's operating licence are not under review as part of this Inquiry (this would be outside the scope of the Terms of Reference). However, for unregulated services, the Authority will take a view on whether AQWEST is appropriately incorporating customers' expectations within its expenditure program.

#### 5.2.1 AQWEST Proposal

In its submission, AQWEST reported that:

The level of service provided by AQWEST accords very well with both the requirements of the various regulators and the expectations of its customers and shareholders, the people of Bunbury.

However, AQWEST's annual customer satisfaction surveys between 1998 and 2004 show:

...a decline in customer satisfaction in a number of areas particularly overall satisfaction with AQWEST services, overall drinking water quality and planning for the future. (p8)

---

<sup>32</sup> AQWEST (2003), *Annual Report 2002-03*.

<sup>33</sup> Economic Regulation Authority, Operating Licence (Water Supply Services) for the Busselton Water Board.

AQWEST's 2004 customer survey shows that, although AQWEST's key performance indicator (KPI) target of 85 per cent overall customer satisfaction was not met, actual overall satisfaction was still high at 81 per cent. However, the survey also indicated four areas in which customer satisfaction was considerably below target:

- AQWEST is planning effectively for the future: 53 per cent of customers (target 85 per cent);
- AQWEST charges fairly for its services: 68 per cent of customers (target 85 per cent);
- no interruption to water service: 69 per cent of customers (target 85 per cent); and
- water supplies are of an acceptable quality: 75 per cent of customers (target 85 per cent);

In relation to water quality, 10 per cent of customers disagreed that water supplies were of an acceptable quality (the highest level of disagreement of all performance areas surveyed).

According to AQWEST,

The surveys indicate that AQWEST's customers are becoming more demanding and are expecting a higher level of service than in the past. AQWEST believes that its customers would be willing to pay the cost associated with the higher level of service that is being demanded. (Issues Paper submission, p8)

AQWEST receives approximately 9.8 complaints per 1000 connections and believes that an appropriate target is 4 complaints per 1000 connections. "Dirty water" complaints associated with iron and manganese were the most common water quality related complaint received by AQWEST (134 over the last three years).

Sampling undertaken in 2004 indicated that AQWEST was generally in compliance with the Australian Drinking Water Guidelines, although pH, iron and manganese were occasionally outside the 1996 Australian Drinking Water Guidelines.

AQWEST cites evidence that the current standards for iron and manganese in the Guidelines do not prevent accumulation of these elements in pipes, and it therefore intends to adopt more stringent targets for iron and manganese.

In June 2004 AQWEST entered into a Memorandum of Understanding with the Department of Health which set standards in relation to drinking water quality, water sampling, water quality incident protocols, source protection, catchment management, use of pesticides, and public education and information

AQWEST anticipates that some investment will be required to reduce the number of dirty water complaints, although the work has not been fully scoped and the costs have therefore not been included in current projections.

According to AQWEST,

Preliminary work has been conducted to determine viable options for reducing dirty water complaints and to reduce Fe and Mn to 0.1 and 0.02 mg/l respectively. However, cost estimates have not been prepared at this stage. Work is expected to include some rationalisation of treatment facilities, process investigation and optimisation, installation of improved monitoring and control equipment, and more targeted flushing programs. It is expected that these items will increase the 5 year capital works program to some extent. (p8)

### 5.2.2 Authority Assessment

AQWEST has in almost all cases complied with its operating licence standards over the past five years. There have been occasional non-compliant samples in relation to non-health related chemical quality standards, although overall compliance has been achieved.

AQWEST's customer surveys indicate that customers may be willing to pay for higher levels of service, particularly in relation to non-health related drinking water quality. However, AQWEST has not yet determined the program of expenditure that may be required to address its customers' expectations. In developing this program, AQWEST will need to develop a greater understanding of customers' willingness to pay for service level improvements.

The Department of Health noted in correspondence with the Authority that one omission from the AQWEST submission is the potential cost of complying with the 1996 Australian Drinking Water Guidelines:

The Guidelines reduce the tolerance levels for compliance failure (by a log reduction) while increasing the complexity of the management system to demonstrate competency. The result has to be an increased requirement to spend human and physical resources to manage and understand the system. Both Water Authorities are only entering into this system while the Water Corporation has been working towards 1996 ADWG compliance for at least four years. (The Water Corporation's water quality management staff have increased from approximately 4 to 12 during this time.)

Further, the Department of Health notes that:

there is the real possibility of tightening water quality goals that will require the introduction of treatment trains at substantial cost (eg the control or removal of precursors associated with the formation of trihalomethanes and associated disinfection by products).

Where possible, AQWEST should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.

**Key Findings on AQWEST's Service Standards**

**AQWEST complies with its regulatory requirements regarding service standards. However, customer satisfaction levels, while still high overall, have been declining recently, particularly in relation to non-health related drinking water quality. A greater understanding of customers' willingness to pay for service level improvements, particularly in relation to non-health related drinking water quality, is needed for the development of an appropriate program of expenditure to meet customer expectations. In addition, AQWEST should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.**

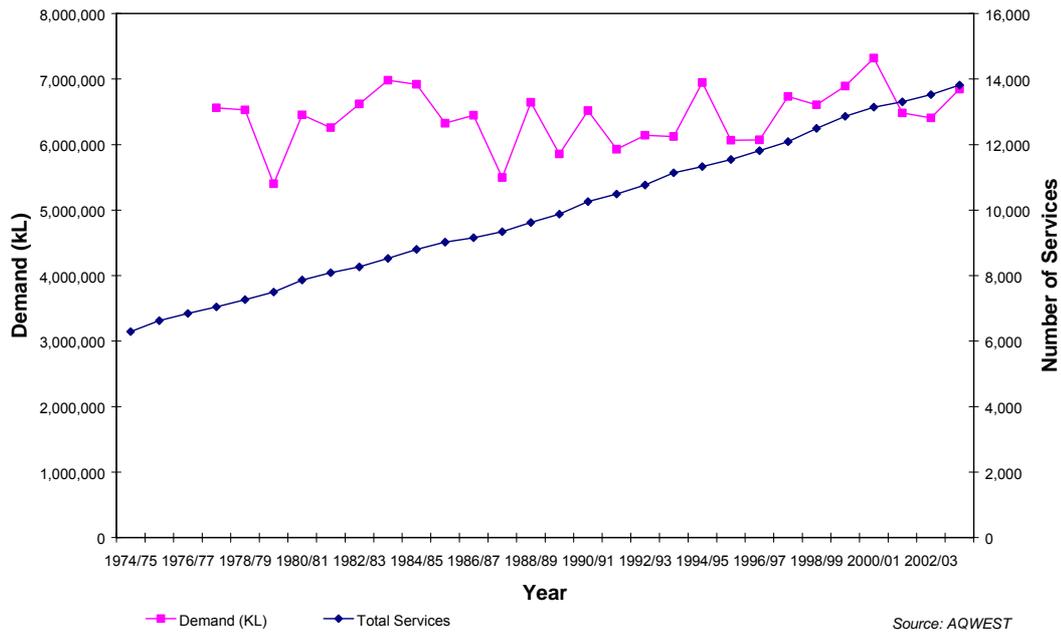
**5.3 Balancing Water Supply and Demand****5.3.1 Background**

Climate change is not a significant risk to AQWEST's strategy to balance supply and demand because AQWEST's water source is groundwater rather than surface water. AQWEST has approval to extract up to 9.2 GL of groundwater per annum from the Yarragadee Formation and has a current application with the Department of Environment for a further 4 GL, which will take its total to 13.2 GL. This abstraction amount is in excess of AQWEST's current demand (estimated to be 7.2 GL in 2004-05) and will meet expected demand until at least 2030 (assuming growth in water demand continues at 2.7 per cent per annum).

**5.3.2 Demand Projections****5.3.2.1 AQWEST Proposal**

In its submission, AQWEST demonstrates that the total number of connections has grown at a relatively constant rate (averaging approximately 2.7 per cent per annum) while total demand has remained relatively steady (Figure 5.1).

AQWEST attributes the decline in demand per customer to the introduction of user pays, inclining block tariffs, demand management programs, water conservation, increasing housing density and the aging of the population (Pricing submission, p11). AQWEST has taken these factors into account in making projections of future demand. It has developed high, medium and low demand scenarios out to 2050.

**Figure 5.1 AQWEST Demand Versus Service Growth**

### 5.3.2.2 Authority Assessment

AQWEST has made assumptions regarding future demand growth, based on analysis of over 25 years of historical data on service growth, demand per service, peak daily demand and average daily demand. Average demand projections therefore incorporate clearly established historical trends such as the declining demand per service. Scenarios for 95 per cent minimum and maximum demands have also been employed, which is appropriate for the analysis of risks when planning investments.

#### Key Findings on AQWEST's Demand Projections

**The Authority considers the demand forecasts used by AQWEST appear to be appropriate.**

### 5.3.3 Source Development Plan

#### 5.3.3.1 AQWEST Proposal

As indicated above, AQWEST expects that its groundwater supplies are sufficient to meet average demand for potable water until 2045 and maximum demand until 2030. There is no need for further source development, although AQWEST envisages that further investment in treatment facilities may be required in 2007 and 2010.

According to AQWEST,

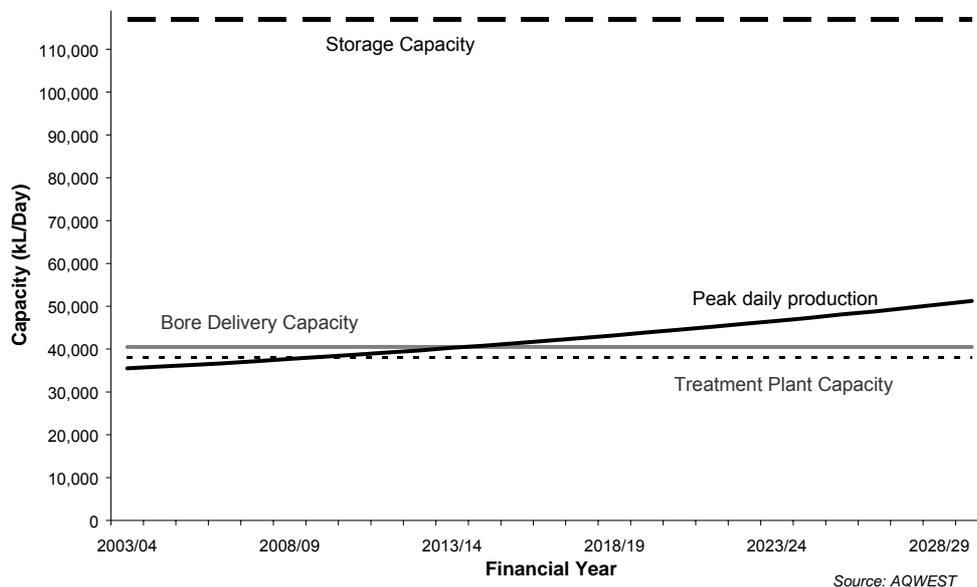
The next source of supply can be relatively easily and quickly bought on line. Thus, only a minimal security buffer is required, and is available at essentially no cost to consumers. (p13, Pricing Submission).

AQWEST has indicated that it can augment its system in small increments. It considers that its 2.5ML buffer in treatment plant capacity has proven itself to be sufficient historically and “is considered to be so into the future”.

### 5.3.3.2 Authority Assessment

Figure 5.2 shows AQWEST’s long-range forecast for the future levels of peak daily production along with its current capacity constraints.

**Figure 5.2 AQWEST Long Range Peak Daily Production Forecasts Alongside Current Capacity Constraints**



AQWEST operates its system with a bore delivery capacity of 130 per cent of peak daily demand, a treatment plant capacity of 107 per cent of peak daily demand (2.5 ML/day) and about 4 days of treated water storage capacity at peak flows.

This approach is seen to be a reasonable mix between bore and treatment plant capacity and storage to minimise the risk of system failure. Based on historical performance, AQWEST can be seen to be maintaining adequate security buffers for the satisfactory operation of potable water systems. Since 1999-2000, AQWEST has consistently exceeded its target service standard on supply interruptions and has never had to implement restrictions due to drought.

The chart above indicates that AQWEST’s current treatment plant capacity will be unable to meet the levels of production required by around 2009-10. Similarly, bore delivery capacity will be exceeded by production requirements by around 2014-15.

### **Key Findings on AQWEST's Source Development Plan**

**AQWEST is maintaining adequate security buffers for the satisfactory operation of its potable water system. In order to meet future forecast demand, AQWEST will need to invest in additional treatment plant capacity before 2009/10 and additional bore delivery capacity by 2014/15.**

#### **5.3.4 Demand Management**

##### **5.3.4.1 AQWEST Proposal**

According to AQWEST,

The total range of Demand Management Strategies except for retro fitting household water saving devices has been employed by AQWEST. The key elements of this program have been:

- Pricing structure
- Water loss program
- Meter replacement program
- Public relations program (p15, Pricing Submission)

AQWEST believes that its most effective strategy for demand management has been to change the pricing structure to penalise excessive usage. AQWEST's current pricing structure increases progressively from \$0.37 per kL for usage up to 150KL per annum to \$2.12 per kL for usage above 1000KL per annum.

AQWEST also indicates that it spends \$25,000 on water conservation publicity and that this is the only cost that it can directly attribute to demand management.

In addition,

AQWEST intends to introduce a user pays based charging mechanism over the next 5 year period. It is expected that this pricing regime will significantly reduce the industry and commercial demand. (p11, Pricing Submission)

AQWEST's unaccounted for water is currently 13.5 per cent, down from 19.6 per cent in 1999/2000. AQWEST's target for unaccounted for water is 10 per cent, which it envisages could be met by 2007 depending on the success of its loss management program, which costs approximately \$0.15 million per year. According to AQWEST,

Return on investment is considered very good when all cost savings are taken into account, eg the volume of water saved, additional revenue and deferment of capital expenditure. Payback generally occurs within the first year of leakage reduction programmes being implemented. (p18, Pricing Submission)

The strategy followed by AQWEST to reduce its losses include meter replacement, metering of fire services and night flow analysis followed by leakage detection and repair.

### 5.3.4.2 Authority Assessment

AQWEST estimates that its current average per capita consumption is 163 kL per person per year, which is only slightly higher than per capita consumption in Perth (159 kL), despite the fact that Perth customers face more severe water restrictions (AQWEST customers are encouraged but not required to restrict their sprinkler use).

As AQWEST does not currently have a supply constraint, and is unlikely to have one for the next twenty-five years, it could be considered unnecessary to allocate significant expenditure or change pricing structures to reduce demand. However, any water saved through demand management (in addition to the currently unused allocation of water) does potentially have an alternative use as a water source for the IWSS. Strategies to reduce demand would be economic up until the point where the social and economic costs of reducing demand by 1 GL becomes less than the potential net revenue to AQWEST from leasing 1 GL of unused water to the Water Corporation or other customers.

#### Key Findings on AQWEST's Demand Management

**As AQWEST is unlikely to have a supply constraint for 25 years, from a local perspective, its demand management strategies could be considered inefficient. However, from a regional perspective, such strategies could be appropriate if they efficiently “free-up” water for use in Perth.**

## 5.4 Revenue Requirement

### 5.4.1 Methodology

The Authority has considered the revenue requirements of AQWEST in accordance with a “building block” approach to determining a forecast of total revenue for a predetermined period. Prices are then derived that, on the basis of demand forecasts, are expected to deliver this revenue.

The building block approach typically involves a “bottom-up” determination of total revenue from component costs, as follows.

$$\begin{aligned}
 \textit{Total Revenue} &= \textit{Rate of Return} \times \textit{Regulatory Asset Value} \\
 &+ \textit{Depreciation of Assets} \\
 &+ \textit{Forecast Operating and Maintenance Costs}
 \end{aligned}$$

Identifying an appropriate level of revenue typically requires consideration of, among other things, the level of return on assets, the allowance for depreciation that is necessary to reflect the aging of assets and the efficient level of operating and maintenance expenditure.

Identifying an appropriate level of revenue for AQWEST is slightly different than for the Water Corporation because AQWEST is not required to pay dividends. The focus of the analysis for AQWEST is therefore on ensuring that average revenue is

just sufficient to cover operating and maintenance costs and provide for asset replacement and new investments.

The analysis in this section is undertaken by constructing a set of regulatory accounts, which has as inputs a projection of efficient operating and capital expenditure. A regulatory asset value is determined as the value that, for a given rate of return and assumption of asset lives, delivers sufficient revenue to cover operating and maintenance costs and provide for asset replacement and new investments.

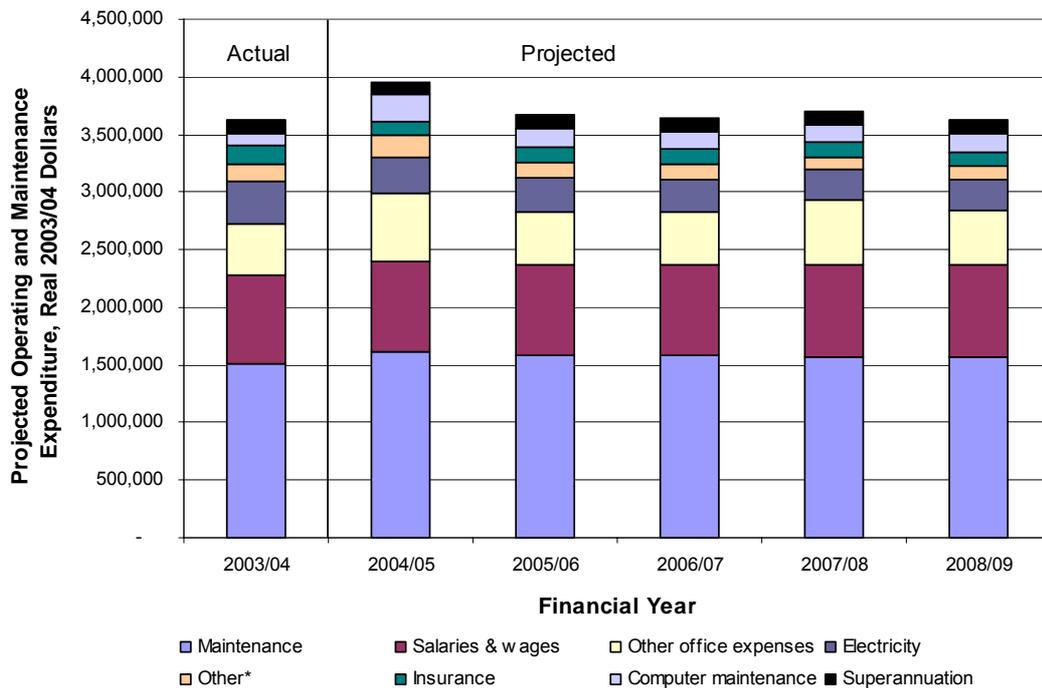
### 5.4.2 Operating Expenditure

#### 5.4.2.1 AQWEST Proposal

AQWEST has an annual operating and maintenance expenditure of approximately \$3.5 million. Its biggest cost item is maintenance, which amounts to approximately \$1.5 million. AQWEST expects that its expenditure will grow at an average annual rate of 2.2 per cent in real terms over the five year period 2004-05 to 2008-09, although most of this increase will occur in the first year of this period (Figure 5.3).

Based on information provided by AQWEST, its operating expenditure on a ‘per connection basis’ is slightly below the average for Victorian water utilities (Figure 5.4).

**Figure 5.3 AQWEST Projected Operating and Maintenance Expenditure**



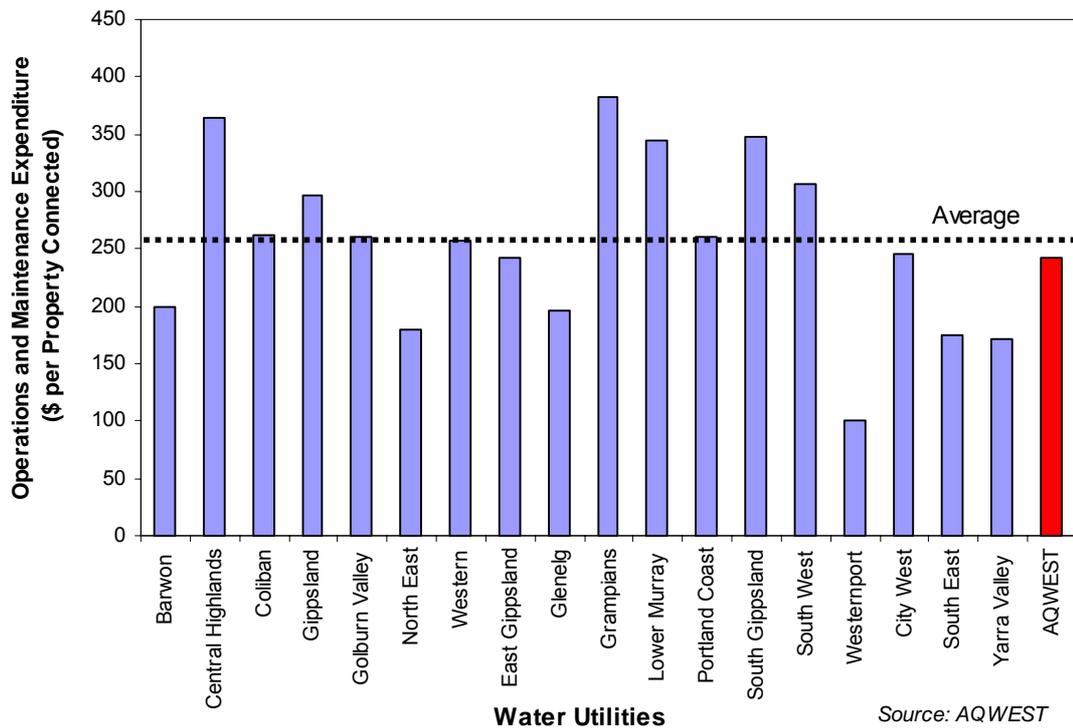
Source: AQWEST

\* “Other includes rent, legal expenses, other service expenses and bad debts.

\*\* The higher expenditure in 2004/05 includes extraordinary items such as expenditure on public relations, computer upgrades and maintenance.

Source: AQWEST

**Figure 5.4 AQWEST and Victorian Utilities Operations and Maintenance Expenditure, 2003/04**



#### 5.4.2.2 Authority Assessment

Operating costs are predicted to increase from \$501 per ML produced in 2003/04 to \$542 per ML produced in 2008/09, a total increase of 8.2 per cent. Operating costs per connection are also predicted to increase, from \$248 in 2003/04 to \$258 in 2008/09, an increase of 4.0 per cent.

Assuming efficiencies in operation can be achieved to counteract future levels of inflation, a target cost of \$550 per ML produced has been chosen. This is slightly below AQWEST's predictions for operating cost per ML in 2004/05 but inline with general predictions. The target cost relates to direct operating costs and excludes depreciation. Using this as a target cost, AQWEST's current operating expenditure predictions appear satisfactory.

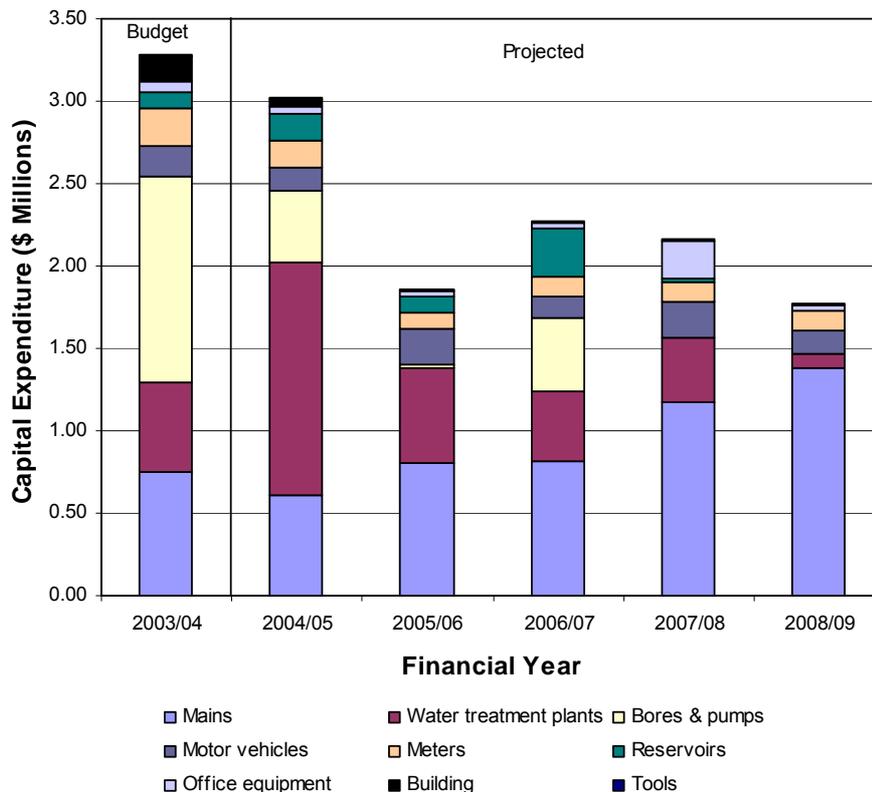
Alternatively, using a target direct operating cost of \$280 per connection, which is the average operating costs per connection of a selection of comparable organisations (including Busselton Water, Gosford City Council, Central Gippsland Regional Water Authority and Central Highland Regional Water Authority) also shows that AQWEST's estimates appear reasonable.

### 5.4.3 Capital Expenditure

#### 5.4.3.1 AQWEST Proposal

AQWEST's capital program for the period 2004/05 to 2008/09 amounts to around \$11 million or just over \$2.4 million per year, as shown in Figure 5.5 below.

Figure 5.5 AQWEST Capital Expenditure Projections



Source: AQWEST

The most significant item of capital expenditure is mains (\$5.5 million out of \$14 million). The remainder of the capital program includes water treatment plants (\$3.4 million), bores and pumps (\$2.15 million), motor vehicles (\$1.1 million), meters (\$0.8 million) and reservoirs (\$0.6 million).

The large expenditure in 2003/04 was \$1.4 million on redrilling and upgrading bores and pumps, while the large expenditure in 2004/05 includes \$1.4 million on water treatment plants (treatment plant capacity is expected to be unable to meet projected demand by 2009/10).

The increased mains expenditure from 2007/08 is due to the construction of a new large diameter trunk main to allow bulk water distribution around the network. This work will allow water from different treatment plants and storages to be distributed around the network and assist in ensuring alternative supply options are available in case of a mains burst or treatment plant failure.

#### 5.4.3.2 Authority Assessment

AQWEST's proposed capital expenditure includes \$3.4 million that is funded by cash contributions from developers. For regulatory purposes, the capital expenditure program is typically reduced by the amount of expected cash contributions from developers. Otherwise, AQWEST would earn a return on capital that it did not fund. The capital expenditure program for regulatory purposes is therefore in the order of \$8 million.

The capital program shown above has been developed using an asset management process, which was recently audited (in 2005). While the asset management process is considered to be reasonably sound, the most recent operational audit and asset management review (by KPMG in January 2005) noted some areas of concern. Capital cost estimates are derived by AQWEST from a number of sources including external consultants, tender estimates, previous costs and internal estimates. The auditors found that for several major projects “there was no comprehensive project evaluation report that provides the AQWEST Board with the necessary justification to approve these projects.” In addition, the auditors noted that AQWEST has not adequately implemented discounted cash flow techniques in their assessment of project proposals and that consideration of non-asset solutions was not adequately documented.

AQWEST is currently reviewing its asset management plan and network hydraulic model, both of which feed into the capital planning process. Results from this review are yet to be finalised and implemented, but would be expected to improve the capital planning process.

Given that the size of the capital program is just over \$2.4 million per annum and is generally made up of a number of small projects, only minor savings via changes to the capital delivery process are thought to be achievable.

AQWEST’s asset management plan indicates the majority of assets are relatively new with only 15 per cent – \$9 million out of \$60 million – of assets (as measured by fair value) in the latter half of their economic life. Of the assets that are nearing the end of their economic life, approximately one third (\$3 million) have only 20 per cent of their economic life remaining and therefore may require replacement prior to 2008/09. The risk of unidentified high value capital expenditure related to asset replacement in the period to 2008/09 is therefore considered to be low.

#### **5.4.4 Depreciation**

##### **5.4.4.1 AQWEST Proposal**

AQWEST believes that its proposed level of depreciation is appropriate and that its depreciation methodologies are reasonable.

AQWEST sets aside an amount, each year, for asset replacement; that is, it takes each of its assets, establishes its useful life, and depreciates the asset over this useful life, to ensure that the asset can be replaced at the end of its useful life. (Pricing submission, p22)

##### **5.4.4.2 Authority Assessment**

A review by the Authority’s technical consultants shows that the standard asset lives assumed by AQWEST are in line with the typical range of standard asset lives for similar classes of assets.

## 5.4.5 Rate of Return

### 5.4.5.1 Methodology

Although AQWEST does not make dividend payments to shareholders or finance new investment by debt, the Authority indicated in the Methodology Paper that it will be giving consideration to the likely cost of capital to AQWEST in terms of the opportunity cost of capital that may be invested in system expansions. AQWEST was invited to, but was not asked to, provide an estimate of the rate of return that might be relevant to its business.

### 5.4.5.2 AQWEST Proposal

AQWEST did not provide an estimate of an estimate of the rate of return that might be relevant to its business.

### 5.4.5.3 Authority Assessment

The Authority has undertaken an assessment of the rate of return that might be relevant to its business, set out in [Appendix 4](#). The Authority considers that the rate of return for AQWEST (and Busselton Water) should be considered similarly to that for the Water Corporation, with the exception of the assumption as to the level of financial gearing of the business and a consequent change to the equity beta value that captures the exposure of the business to systematic risk.

Based on empirical evidence from the cost structures of other utilities, a standard gearing assumption for large utility businesses – of similar size to the Water Corporation – is 60 per cent. However, for the regional water providers (Busselton Water and AQWEST) such a level of gearing may not be achievable given the relatively small sizes of the businesses and the exposure of the businesses to cost perturbations. For this reason, the Authority considers that it is appropriate to assume a lower level of gearing of 40 per cent.

The assumed level of financial gearing of the businesses affects the appropriate assumption as to the equity beta<sup>34</sup>. For a given asset beta (i.e. the level of exposure of the entire business to systematic risk, rather than just the returns to equity), the equity beta will vary in proportion to the level of financial gearing. That is, a lower level of financial gearing will correspond to a lower equity beta. For AQWEST and Busselton Water, an equity beta value of 0.52 at 40 per cent gearing is equivalent to an equity beta of 0.78 for the Water Corporation at 60 per cent gearing.

In this particular situation, the lower gearing assumed for AQWEST and Busselton Water (and upward effect on the rate of return) is largely offset by the lower equity beta (and downward effect on the rate of return). The Authority thus considers that a regulatory rate of return of 6.5 per cent (pre-tax real) is appropriate for these businesses.

---

<sup>34</sup> The equity beta ( $\beta_e$ ) for an entity is a measure of the degree to which the returns to equity for that entity vary with the returns to the stock market in general. It is defined by the covariance between the return on equity,  $R_e$ , and the return to the market portfolio,  $R_m$ , divided by the variance of the return of the market portfolio.

## 5.4.6 Initial Regulatory Asset Value

### 5.4.6.1 AQWEST Proposal

AQWEST was not asked to provide a proposal for the initial value of the regulatory asset value. However, AQWEST has commented on its commercial arrangements and governing legislation:

The application of normal commercial assessment of AQWEST's activities is not considered possible or reasonable because of the restriction of the Act. Legal advice has shown that the intent of the Act did not envisage normal commercial activities such as profit making, profit sharing, taxation, joint ventures, contracting out, contracting in, sponsorship, and normal commercial incentives for Board Members and Staff. Despite nine years of effort AQWEST has been unable to gain the necessary support for the Act to be changed. (p2, Issues Paper Submission).

AQWEST does not support some of the proposed changes to the legislation, for example:

AQWEST does not pay a dividend to the State and there is a lot of recorded evidence and argument that supports that position. AQWEST would strongly resist any move to change that situation. (p5, Issues Paper Submission).

In addition, AQWEST does not support debt financing its capital program:

The asset replacement reserve method of funding future asset purchases is both prudent and in accordance with the precepts of inter-generational equity. There appears no a-priori advantage in shifting to debt financing of asset replacement, as this risks a return to AQWEST's days of near insolvency in the Eighties. (p41)

### 5.4.6.2 Issues Paper Submissions

The Department of Treasury and Finance has commented on the water boards' commercial restrictions:

Significant changes to the Water Boards Act 1904 (the WB Act) were highlighted in a legislative review of the WB Act (completed in 1998) and competitive neutrality reviews of both Boards (completed in 1999). (p11)

And

The OWP [Office of Water Policy] is currently preparing drafting instructions for new legislation to replace the existing WB Act, which is to be modelled on the WC Act as a 'best practice' example of enabling legislation for a commercialised water services provider.

Significant additional requirements on the Water Boards under legislation modelled on the WC Act will include the payment to government of an annual dividend and an amount in lieu of local government rates and taxes.

The WC Act also requires the appointment of a shareholder (representing the interests of government), which would impact on the way in which Board members are appointed.

Furthermore, the Water Boards would be required to submit a SCI and SDP to the shareholder Minister for approval. (p11)

### 5.4.6.3 Authority Assessment

The Authority has considered an appropriate regulatory asset value for AQWEST from the perspective of determining a value consistent with preserving forecast revenues (and hence average prices). This approach produces a regulatory asset value of \$16.1 million in 2003/04 (which corresponds to a value of \$22.7 million at the commencement of 2006/07).

There are two factors that require particular consideration when setting an initial regulatory asset value for AQWEST. The first is that the price and revenue forecasts of AQWEST are sufficient for AQWEST to be accumulating substantial financial reserves (increasing by amounts between \$1 and \$2 million each year) and generating substantial investment income. The second is that the financial structure of AQWEST is highly conservative, with the business carrying no debt and making no dividend payments to the State. This is a substantially different structure to that which would be expected for a typical business of this nature.

Under its current financial structure and in the absence of requirements to pay a dividend, the forecast revenues of AQWEST are considered to be substantially in excess of the minimum level necessary to sustain the business. The financial reserves and investment income of the business are such that the regulatory asset value could conceivably be set at zero in 2003/04, with a concomitant reduction in customer charges 21 per cent in 2006/07, without compromising the viability of the business and without requiring the business to take on debt. A regulatory asset value as low as \$10 million could be sustained if AQWEST was financially structured and operated on a more commercial basis, such as with a level of debt consistent with a balance sheet gearing of, say 40 per cent (\$8 million in 2003/04) and requirements to make dividend payments.

The Authority notes that the regulatory asset value proposed AQWEST does not include any component reflecting a value of rights to water resources. This is consistent with the absence an effective market for water resources in Western Australia, and the absence of value ascribed to these rights on AQWEST's balance sheet.

### 5.4.7 Total Revenue Requirement

As efficiency gains have not been identified for AQWEST, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to the AQWEST's governing legislation.

#### **Key Findings on AQWEST's Revenue Requirement**

##### *Operating Expenditure*

**AQWEST's operating expenditure proposal maintains its operating expenditure per property at a level that is consistent with the levels achieved by similar organisations.**

*Capital Expenditure*

While AQWEST's capital planning processes has some weaknesses, as identified by a recent audit, given that the size of the capital program is just over \$2.4 million per annum and is generally made up of a number of small projects, only minor savings via changes to the capital delivery process are thought to be achievable.

*Depreciation*

The asset lives assumed by AQWEST are consistent with industry standards.

*Rate of Return*

An appropriate regulatory rate of return for AQWEST is 6.5 per cent (pre-tax real).

*Initial Regulatory Asset Value*

The initial regulatory asset value for AQWEST that would preserve forecast revenue and average prices would be \$16.1 million in 2003/04, corresponding to a value of \$22.7 million in 2006/07.

With its current financial structure and absence of obligation to make dividend payments, AQWEST's initial regulatory asset value could be set at zero in 2003/04 (with a concomitant reduction in customer charges by 21 per cent in 2006/07) without compromising the viability of the business and without requiring the business to take on debt.

Alternatively, if AQWEST were to be treated as a typical commercial entity (by assuming a financial structure of 40 per cent debt to total assets, a reduction in cash reserves to some minimal amount and the payment of cash surpluses out as dividends), the lower bound of a regulatory asset value consistent with maintaining the financial viability of the business would be in the order of \$10 million. Under this scenario, customer revenue would be 7 per cent lower in 2006/07 than proposed by AQWEST.

The appropriate value for the initial regulatory asset value within this range of values depends on mooted reforms to AQWEST's governing legislation.

*Total Revenue Requirement*

As efficiency gains have not been identified for AQWEST, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to AQWEST's governing legislation.

## 5.5 Tariff Structures and Pricing Reform

Busselton Water and AQWEST are able to supply water at a significantly lower long run marginal cost (LRMC) than the Water Corporation. This is primarily because the water boards have excess capacity in existing supply infrastructure and additional water sources (in the South West Yarragadee) are available locally.

The LRMC calculations do not, however, build in a cost to reflect the opportunity value of the water licences being held by Busselton Water and AQWEST. These regional suppliers have licences to extract a total of 26 GL, yet only 10 GL is currently being utilized. In the case of Busselton Water it is estimated that, based on demand projections, it will be another 40 years before the provider's groundwater allocation will be fully utilized. AQWEST's water allocation will not be fully utilised for another 25 years. Therefore, in principle, there is an opportunity for these regional suppliers to sell or lease part of their unused allocation to the Corporation.

For example, the 45 GL that the Water Corporation is proposing to source from the Yarragadee aquifer could be supplemented with up to an additional 16 GL of unused allocation from the regional water providers. Owing to the lack of water market, the prices charged by Busselton Water and AQWEST may not reflect the value of this potential sale to the Water Corporation. There may be a case for the LRMC estimates for AQWEST and Busselton Water to reflect the value in potential sale of water to the Water Corporation and for prices in Bunbury and Busselton to reflect this value.

The Authority will consider these matters further as it prepares the Final Report.

## **6 BUSSELTON WATER**

### **6.1 Background**

Busselton Water is a public self-funding corporation that is responsible for delivering potable water to residents of Busselton and surrounding areas. The objectives of Busselton Water include:

- provision of services – to provide high quality water at a minimum long term cost to customers;
- management of resources – to assess, plan and manage the use and protection of the resources purchased by and entrusted to the organisation for the benefit of customers; and
- management of water resources – to plan, manage and conserve available water resources.

The organisation employs 23 full-time equivalent staff, of which nearly half work in construction and maintenance. The remainder of staff are involved in activities of administration, finance, customer service and operation of water treatment plants.

Busselton Water holds an Operating Licence issued by the Economic Regulation Authority, which is valid until 2021. The licence establishes conditions under which Busselton Water is able to operate, including aspects such as terms of operations, standards and requirements that must be met and geographic areas to be served. A copy of the licence is available at [www.era.wa.gov.au](http://www.era.wa.gov.au).

### **6.2 Service Standards**

#### **6.2.1 Methodology**

The first step in the framework is to check that Busselton Water's proposed levels of service provision are consistent with its environmental, health and service standards requirements.

The performance targets in Busselton Water's operating licence are not under review as part of this Inquiry (this would be outside the scope of the Terms of Reference). However, where customers indicate that they are willing to pay for additional levels of unregulated services, then the Authority will take a view on whether Busselton Water is appropriately incorporating customers' expectations within its expenditure program.

#### **6.2.2 Busselton Water Proposal**

According to Busselton Water:

The Board believes that the Standards of Service contained in the Operating Licence are both appropriate and adequate. We have evidence that between 96 per cent and 98 per cent of customers believe that the Standards of Service they receive currently are sufficient and therefore it must be assumed that customers generally would not be favourable towards paying extra charges for any modification of the Standards of Service. (p 4 Issues Paper Submission)

Of particular concern to the Busselton community is the retention of chemical-free water. Busselton Water notes:

Residents are adamant that they do not desire chlorination or fluoridation of the water supply, preferring the use of Ultra Violet Irradiation as the means of disinfection, and a reliance on the natural fluoride contained in the water provided.

Should chlorination or fluoridation be proposed in the future, the added cost would not be acceptable to customers, but more importantly, the community would reject the added chemicals as a matter of principle. (Pricing submission, p1)

### 6.2.3 Authority Assessment

Operational audits covering the period 2000 to 2005 show that Busselton Water is achieving high to acceptable levels of compliance with its Operating Licence requirements.

The most recent Office of Water Policy customer satisfaction survey<sup>35</sup> indicates a very high overall level of customer satisfaction with the water service provided by Busselton Water (96 per cent). Busselton Water's own customer surveys indicate very high levels of overall customer satisfaction (100 per cent in 2003 and 98 per cent in 2004). Busselton Water customers are also highly satisfied that their water tariffs are fair (91 per cent in 2003 and 96 per cent in 2004).<sup>36</sup>

The Authority has sought assurance from the Busselton Water's other regulators (the Department of Health and Department of Environment) that they are satisfied that the Busselton Water's proposal complies with their regulatory requirements.

The Department of Health noted in correspondence with the Authority that one omission from the Busselton Water submission is the potential cost of complying with the 1996 Australian Drinking Water Guidelines:

The Guidelines reduce the tolerance levels for compliance failure (by a log reduction) while increasing the complexity of the management system to demonstrate competency. The result has to be an increased requirement to spend human and physical resources to manage and understand the system. Both Water Authorities are only entering into this system while the Water Corporation has been working towards 1996 ADWG compliance for at least four years. (The Water Corporation's water quality management staff have increased from approximately 4 to 12 during this time.)

Further, the Department of Health notes that:

there is the real possibility of tightening water quality goals that will require the introduction of treatment trains at substantial cost (eg the control or removal of precursors associated with the formation of trihalomethanes and associated disinfection by products).

---

<sup>35</sup> Office of Water Policy (January 2004), "A Report on the 2003 Water & Sewerage Customer Satisfaction Survey".

<sup>36</sup> Busselton Water annual report, 2003/04, p8.

Where possible, Busselton Water should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.

**Key Findings on Busselton Water's Service Standards**

**Busselton Water is achieving high service standards and high levels of customer satisfaction. However, Busselton Water should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.**

## **6.3 Balancing Water Supply and Demand**

### **6.3.1 Background**

Busselton Water has approval to extract up to 17 GL of ground water per annum from the Leederville and Yarragadee Aquifers. This abstraction amount is well in excess of Busselton Water's current demand (estimated to be 3.7 GL in 2004/05) and will meet the Busselton region future needs until 2046 (assuming growth in water demand continues at 3.7 per cent per annum).

### **6.3.2 Demand Projections**

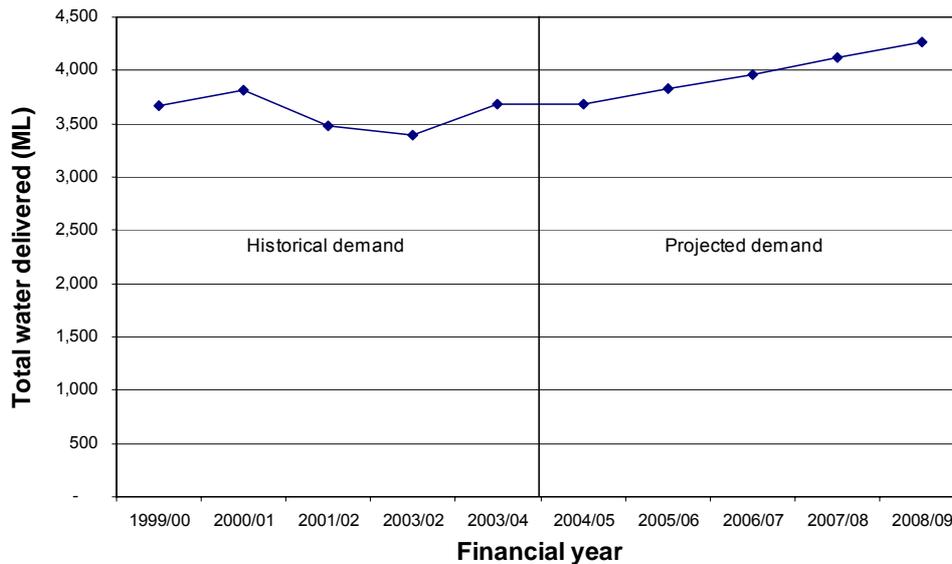
#### **6.3.2.1 Busselton Water Proposal**

Busselton Water's forecasts of demand have been based on an assumption of 3.7 per cent growth in the number of connected properties. This growth assumption is the average of the predictions of the Shire of Busselton and the Australian Bureau of Statistics. Annual consumption per property is assumed to remain constant at 386 kL per connected property over the forecast period.

Busselton Water's projection of total water delivered is shown in Figure 6.1 below.

According to Busselton Water:

The annual forecasts of demands are determined by reviewing historical data that includes service demands. The projected demands are based on historical data, assessing impacts that may affect demands and expected growth in service numbers. The spatial distribution of demands is based on identified areas of growth and a water supply distribution program is used to simulate the demands at each Water Plant.

**Figure 6.1 Busselton Water Historical and Projected Total Water Delivered**

Source: Busselton Water

### 6.3.2.2 Authority Assessment

Busselton Water's assumption that demand per connection will remain at 386 kL per connected property for the forecast period may overestimate the demand projection. Demand has decreased from 435 kL per connected property over the last four years, which Busselton Water attributes in part to the impact of Water Corporation's water conservation publicity on Busselton customers. It is likely that demand per connection will continue to reduce, albeit at a slower rate as assumed by AQWEST, as public awareness regarding water conservation continues to increase.

#### **Key Findings on Busselton Water's Demand Projections**

**The demand projections proposed by Busselton Water, which assume constant consumption per property, may be too high. It is possible that consumption per property may continue to decline over the forecast period.**

### 6.3.3 Source Development Plan

#### 6.3.3.1 Busselton Water Proposal

As indicated above, Busselton Water expects that its groundwater supplies are sufficient to meet average demand for potable water until 2036. There is no need for further source allocations.

According to Busselton Water:

The timing of source development depends on the location of new subdivisions and areas of increasing demand. Most existing bores are relatively new and will serve the Board's purpose for a number of years. It is tentatively planned to construct a replacement bore and a new production bore over the next 5 years (say 2007/08).

Busselton Water considers that its systems are sufficient to meet demand in both the short-term and long-term. In relation to a short-term security buffer, Busselton Water has indicated that:

The water supply infrastructure has standby capacity, namely:

- Minimum of 12 hours reserve storage under peak demand conditions at each tank.
- Standby production bores for each Water Treatment Plant.
- Standby delivery pumps at each Water Plant.
- Backup diesel delivery pumps at each Water Plant.
- A number of mobile Generators that allow continued operation of selected Water Plants during an extended power outage.
- Looping of distribution mains within the network to allow bi-directional supply to all large areas of demand.

Busselton Water regularly update their Risk Management Plan to identify vulnerable areas and plan infrastructure to minimise the risk of loss of supply to these areas.

Minimal storage facilities are required as Busselton Water relies on ultraviolet light, not chlorination, for disinfection. Short durations between supply, treatment and final use are required to avoid bacteriological problems developing within the storage and distribution network. Busselton Water is planning to build additional storage in 2005/06 to meet the expected increase in peak daily demand.

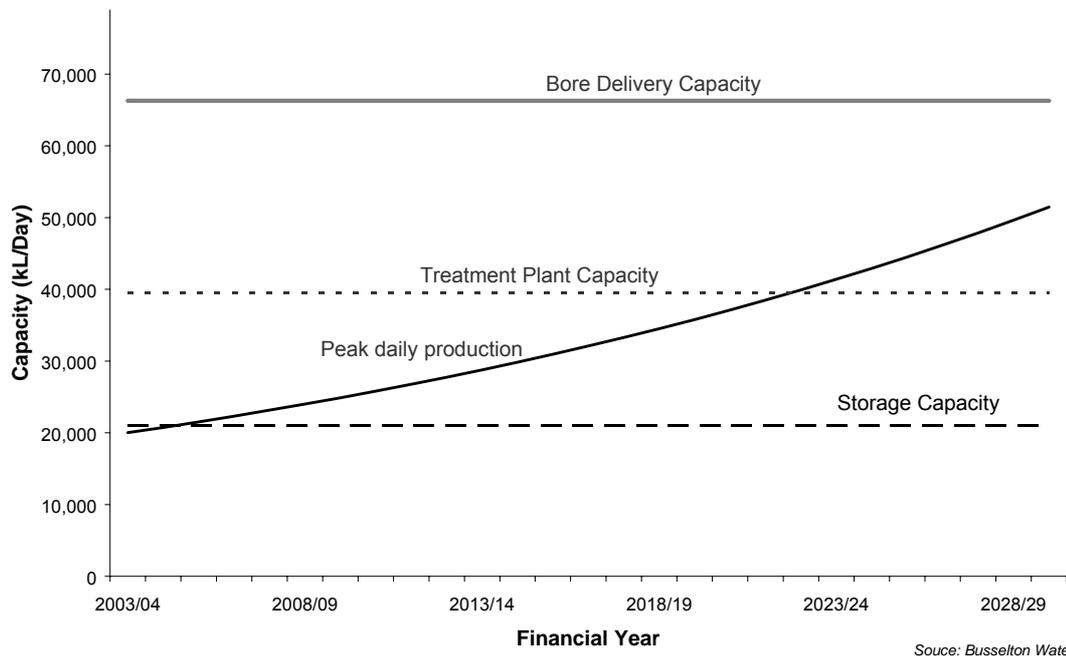
To meet its long-term supply needs, Busselton Water has indicated that:

A ten-year development plan is produced every three years that projects growth in service numbers and peak day demands. Triggers are identified based on system performance parameters that are demand based to plan for upgrading infrastructure.

#### 6.3.3.2 Authority Assessment

The following chart shows that Busselton Water currently has a storage capacity of 20 ML, a treatment plant capacity of 40 ML/day and a bore delivery capacity of 67 ML/day (Figure 6.2).

**Figure 6.2 Busselton Water Long Range Peak Daily Production Forecasts Alongside Current Capacity Constraints**



The chart shows that Busselton Water’s bore capacity, at more than three times the magnitude of peak day demand, may be unnecessarily high. The current infrastructure has the capacity to supply and treat up to the licensed abstraction volume of 12 GL per annum although annual consumption in 2008/09 is forecast to be 4.5 GL. In comparison to AQWEST, Busselton Water has a significantly higher bore delivery capacity, while its demand is around 60 per cent of AQWEST’s demand.

The key constraint for the organisation is a potential lack of storage capacity. Treated water storage is currently about 12 hours under peak daily flows. Typically, water authorities would maintain at least two to three days of treated water storage as a minimum to allow time to fix system problems. However, treated water storage is kept purposely low to distribute water quickly following treatment to avoid bacteriological problems as the water is not chlorinated. Busselton Water has included \$1.4 million in its five-year capital program to provide for greater storage capacity.

Busselton Water’s customers are highly confident that Busselton Water is planning effectively for the future (97.5 per cent in 2004, 86 per cent in 2003).<sup>37</sup>

<sup>37</sup> Busselton Water Annual Report, 2003/04, p8.

**Key Findings on Busselton Water's Source Development Plan**

**Busselton Water is maintaining very high bore delivery capacity and relatively low storage capacity. While the low storage capacity is consistent with ultra-violet light disinfection, rather than chlorination, the high bore delivery capacity appears unnecessarily high.**

**6.3.4 Demand Management****6.3.4.1 Busselton Water Proposal**

According to Busselton Water:

At the micro level, BWB benefits from the advertising campaigns of the Water Corporation for wise water use and water restrictions as well as government subsidies for water efficient appliances. It is probable that the 7 per cent decrease in total water consumption in 2002-2003 (see 'Water Performance Information on 32 Major Western Australian Towns 1999/2003, Authority) resulted from these programs. For all practical purposes they are more or less what BWB would undertake in any event but come at no cost. (p4 Pricing Submission)

and

The Board is of the view that the sprinkler bans, which currently remain in force at Busselton (i.e. Sprinklers not to be used between the hours of 9.00am and 6.00pm daily) is acceptable to the local population. As there is an adequate supply of water for our purposes, contained within the Leederville and Yarragadee Aquifers, further restrictions are unnecessary. Further restrictions, such as the banning of the use of sprinklers or limiting sprinkler use to a certain number of days per week, would have a detrimental affect on the revenue capacity of the Board, who do not experience the same problems as the metropolitan area in resourcing sufficient water to meet our requirements. (p2 Issues Paper Submission)

In relation to managing leakages and losses, Busselton Water states:

The unaccounted water use is in the order of 400ML/annum or 10 per cent of production. This is below average for unaccounted water.

The main source of leakage has been identified as failed Asbestos Cement reticulation pipe and leaking valves and fittings. The Asbestos Cement Pipe is being replaced by a recurring annual program or when a section of asbestos pipe has failed. The leaking valves are repaired during an ongoing maintenance program. (p5, Issues Paper Submission)

**6.3.4.2 Authority Assessment**

Busselton's current water usage is 184 kL per person per annum. This is higher than current per capita consumption in Perth (159 kL per person per year) and in Bunbury (163 kL per person per year).

As Busselton Water does not currently have a supply constraint, and is unlikely to have such a constraint for the next thirty years, it may not be efficient to constrain demand. However, any water saved does potentially have an alternative use as a water source for the IWSS. While Busselton Water may not be able to sell water to the Water Corporation for many years (e.g. not until the Corporation establishes the infrastructure to transport water from the South West Yarragadee to Perth), as the possibility of trading gets closer, Busselton Water will find it more economic to

invest in demand management. As discussed in relation to AQWEST, strategies to reduce demand would be economic up until the point where the social and economic costs of reducing demand by 1 GL becomes less than the potential net revenue to Busselton Water from leasing 1 GL of unused water to the Water Corporation or other customers.

### **Key Findings on Busselton Water’s Demand Management**

**As Busselton Water is unlikely to have a supply constraint for 30 years, from a local perspective, its demand management strategies could be considered inefficient. However, from a regional perspective, such strategies could be appropriate at a time when water could be sold for use in the IWSS.**

## **6.4 Revenue Requirement**

### **6.4.1 Methodology**

The Authority has considered the revenue requirements of Busselton Water in accordance with a “building block” approach to determining a forecast of total revenue for a predetermined period. Prices are then derived that, on the basis of demand forecasts, are expected to deliver this revenue.

The building block approach typically involves a “bottom-up” determination of total revenue from component costs, as follows.

$$\begin{aligned}
 \textit{Total Revenue} &= \textit{Rate of Return} \times \textit{Asset Value} \\
 &+ \textit{Depreciation of Assets} \\
 &+ \textit{Forecast Operating and Maintenance Costs}
 \end{aligned}$$

Identifying an appropriate level of revenue typically requires consideration of, among other things, the level of return on assets, the allowance for depreciation that is necessary to reflect the aging of assets and the efficient level of operating and maintenance expenditure.

Identifying an appropriate level of revenue for Busselton Water is slightly different from the Water Corporation because Busselton Water is not required to pay dividends. The focus of the analysis is therefore on ensuring that average revenue is just sufficient to cover operating and maintenance costs and provide for asset replacement and new investments.

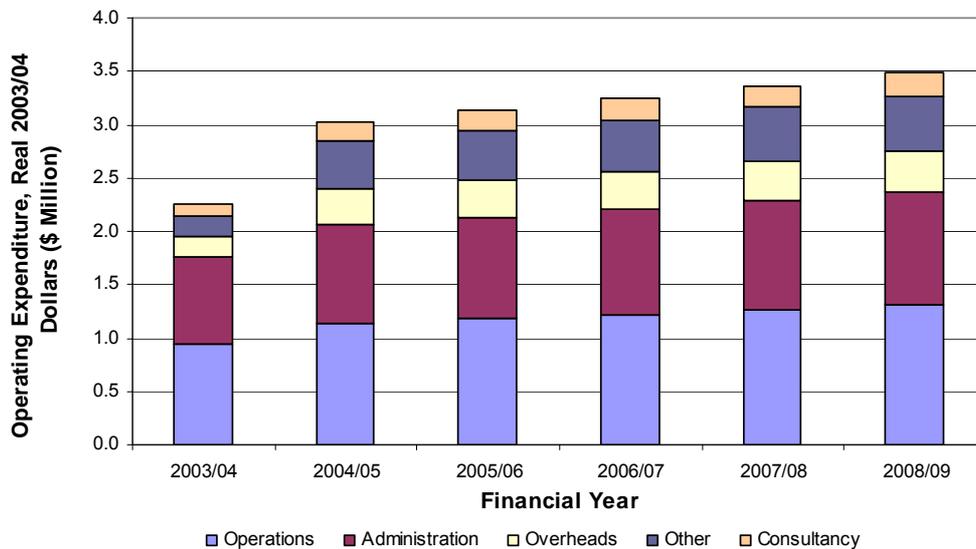
The analysis in this section is undertaken by constructing a set of regulatory accounts, which has as inputs a projection of efficient operating and capital expenditure. A regulatory asset value is determined as the value that, for a given rate of return and assumption of asset lives, delivers sufficient revenue to cover operating and maintenance costs and provide for asset replacement and new investments.

## 6.4.2 Operating Expenditure

### 6.4.2.1 Busselton Water Proposal

Busselton Water's forecast of operating expenditure is shown in Figure 6.3 below.

**Figure 6.3 Busselton Water Operating Expenditure Forecasts**



Source: Busselton Water

Operating expenditure is forecast to grow at an average rate of 3.7 per cent over the forecast period.

### 6.4.2.2 Authority Assessment

Available indicators suggest that Busselton Water is providing its services to a high standard. The organisation is also maintaining its facilities to a very high standard as is evident by a low level of leaks and bursts (around 9 per 100 kilometres) and the high level of water quality that is supplied to customers (water quality compliance currently stands at 100 per cent).

Busselton Water does perform some functions that would generally be expected to be outsourced. These include the undertaking of a large amount of development-related mains laying work and the manufacture of its own pipes and fittings. Such activities could be outsourced at a lower cost to the organisation.

There is also some scope to reduce operating costs in areas such as core operations and administration. As indicated above, Busselton Water is currently maintaining facilities that far exceed future requirements. There is potential to rationalise current system capacity to reduce operations and maintenance expenditure. Alternatively, Busselton Water could utilise its current excess capacity by supplying bulk water to other customers, for example, the Water Corporation in the event that it is economic to build a pipeline to transport the water to Perth.

Based on 2003/04 operating costs, a target cost of \$600 per ML in 2004/05 has been chosen (excluding depreciation). This is slightly above Busselton Water Board's internal target cost, but is seen to be achievable based on operating costs in 2003/04. An alternative target cost of \$300 per connection in 2004/05 is also seen to be reasonable given the size of the organisation. These target costs allow a range of suggested operating costs to be developed.

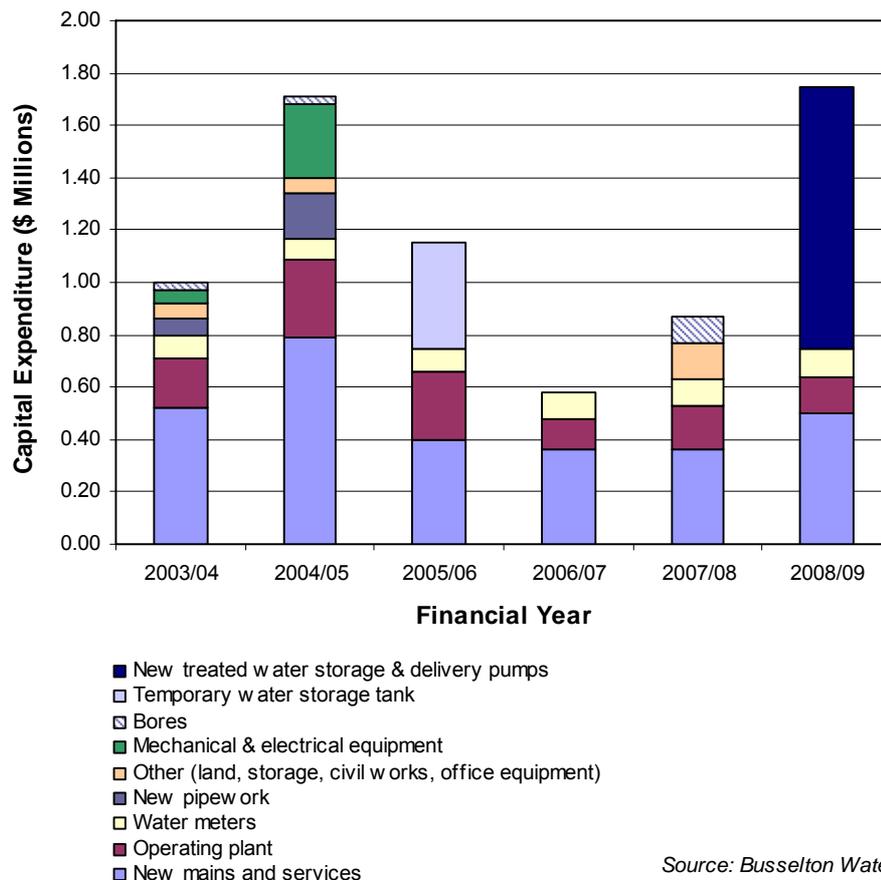
Busselton Water's current operating expenditure predictions are 20 per cent higher than the target cost of \$600 per ML. However, using a target overall operating cost of \$300 per connection shows the current Busselton Water estimates are almost identical. As the Busselton Water Board estimates for operating costs fall within the target range these are considered to be reasonably efficient operating cost forecasts.

### 6.4.3 Capital Expenditure

#### 6.4.3.1 Busselton Water Proposal

Busselton Water's capital program for the period 2003/04 to 2008/09 amounts to around \$7 million or just over \$1 million per year, as is shown in Figure 6.4 below.

**Figure 6.4 Busselton Water Capital Expenditure Forecasts**



The most significant item of capital expenditure is new mains and services (\$2.5 million out of \$6 million). The remainder of the capital program includes new

treated water storages (\$1.4 million), operating plant and machinery (\$1 million) and water meter replacement (\$0.5 million).

#### 6.4.3.2 Authority Assessment

Busselton Water's proposed capital expenditure includes \$5.5 million that is funded by cash contributions from developers. For regulatory purposes, the capital expenditure program is typically reduced by the amount of expected cash contributions from developers. Otherwise, Busselton Water would earn a return on capital that it did not fund. The capital expenditure program for regulatory purposes is only \$0.5 million (compared to total capital expenditure of \$6.1 million).

As discussed above, Busselton Water presently operates a system capable of sourcing, treating and distributing water in far greater quantities than projected to 2008/09. The key constraint for the organisation is the lack of storage capacity and the capital works program appropriately provides for greater storage capacity.

A detailed examination of Busselton Water's capital delivery processes has not been undertaken due to the small scale of the operations. Typical small-medium scale procurement practices are considered appropriate including:

- standard design, tender and construction contracts;
- design and build performance based contracts;
- framework contracts for suppliers and/or consultants; and
- in-house field teams for maintenance, monitoring, replacement and minor works.

The grouping of smaller projects to create economies of scale, or large individual projects may warrant further review of capital delivery practices, although projects of this size are not in the current five-year capital works plan.

Given the size of the customer-funded capital program is less than \$1 million per annum only minor savings via changes to the capital delivery process are thought to be achievable.

One issue that could affect the overall capital program value will be the transition of developer contributions from cash contributions to in-kind donations of constructed assets. Developers are increasingly tending to undertake their own mains laying work. As this practice becomes more widespread, it will result in a reduction in the value of the organisation's capital program

### 6.4.4 Depreciation

#### 6.4.4.1 Busselton Water Proposal

Busselton Water has indicated that its depreciation is calculated in relation to economic life principles. Busselton Water's consultants reviewed the asset lives in 2003.

#### 6.4.4.2 Authority Assessment

A review by the Authority's technical consultants shows that the standard asset lives assumed by Busselton Water are in line with the typical range of standard asset lives for similar classes of assets.

### 6.4.5 Rate of Return

#### 6.4.5.1 Busselton Water Proposal

Busselton Water did not provide an estimate of an estimate of the rate of return that might be relevant to its business.

#### 6.4.5.2 Authority Assessment

The Authority has undertaken an assessment of the rate of return that might be relevant to its business, set out in [Appendix 4](#). The Authority considers that the rate of return for AQWEST (and Busselton Water) should be considered similarly to that for the Water Corporation, with the exception of the assumption as to the level of financial gearing of the business and a consequent change to the equity beta value that captures the exposure of the business to systematic risk.

Based on empirical evidence from the cost structures of other utilities, a standard gearing assumption for large utility businesses – of similar size to the Water Corporation – is 60 per cent. However, for the regional water providers (Busselton Water and AQWEST) such a level of gearing may not be achievable given the relatively small sizes of the businesses and the exposure of the businesses to cost perturbations. For this reason, the Authority considers that it is appropriate to assume a lower level of gearing of 40 per cent.

The assumed level of financial gearing of the businesses affects the appropriate assumption as to the equity beta<sup>38</sup>. For a given asset beta (i.e. the level of exposure of the entire business to systematic risk, rather than just the returns to equity), the equity beta will vary in proportion to the level of financial gearing. That is, a lower level of financial gearing will correspond to a lower equity beta. For AQWEST and Busselton Water, an equity beta value of 0.52 at 40 per cent gearing is equivalent to an equity beta of 0.78 for the Water Corporation at 60 per cent gearing.

In this particular situation, the lower gearing assumed for AQWEST and Busselton Water (and upward effect on the rate of return) is largely offset by the lower equity beta (and downward effect on the rate of return). The Authority thus considers that a regulatory rate of return of 6.5 per cent (pre-tax real) is appropriate for these businesses.

---

<sup>38</sup> The equity beta ( $\beta_e$ ) for an entity is a measure of the degree to which the returns to equity for that entity vary with the returns to the stock market in general. It is defined by the covariance between the return on equity,  $R_e$ , and the return to the market portfolio,  $R_m$ , divided by the variance of the return of the market portfolio.

## 6.4.6 Initial Regulatory Asset Value

### 6.4.6.1 Busselton Water Proposal

Busselton Water considers that the initial value of its regulatory asset value should be \$13.3 million at 30 June 2004, which it considers is in accordance with the views of the National Competition Council:

Due to the small size of the Board's operations, the Board agrees with National Competition Council's acceptance of the application of AASB 1041 account standard is sufficient. (p3 Issues Paper Submission).

Busselton Water has commented on its commercial arrangements and governing legislation:

Successive Governments have been constantly approached by the Board, and that of AQWEST (Bunbury) for legislative change to enable the operations to be more centred on grasping business opportunities, expanding our services to invest in future water markets etc, but to date, it has been to no avail. The Board respectfully suggests that the enquiry should be another avenue to progress change, which will create a level playing field being available for all participants in the water industry in Western Australia. (p2 Issues Paper Submission)

Busselton Water does not support some of the proposed changes to the legislation, for example:

The question as to whether the Busselton Water Board and AQWEST should be required to pay dividends to government is one, which has been addressed on a number of occasions. During 1999 at a meeting held between the two Water Boards, the then Minister for Water Resources Dr Kim Hames and the then Under Treasurer, Mr. John Langoulant, it was resolved in favour of the arguments put by the Board, that since Government has never made any financial commitment to the Boards, and that all of their assets and infrastructure have been funded by the respective communities in which they serve, the payment of dividends by AQWEST and Busselton Water Board was totally inappropriate with regard to their current operations. (p4, Issues Paper Submission)

### 6.4.6.2 Issues Paper Submissions

The Department of Treasury and Finance has commented on the water boards' commercial restrictions:

Significant changes to the Water Boards Act 1904 (the WB Act) were highlighted in a legislative review of the WB Act (completed in 1998) and competitive neutrality reviews of both Boards (completed in 1999). (p11)

And

The OWP [Office of Water Policy] is currently preparing drafting instructions for new legislation to replace the existing WB Act, which is to be modelled on the WC Act as a 'best practice' example of enabling legislation for a commercialised water services provider.

Significant additional requirements on the Water Boards under legislation modelled on the WC Act will include the payment to government of an annual dividend and an amount in lieu of local government rates and taxes.

The WC Act also requires the appointment of a shareholder (representing the interests of government), which would impact on the way in which Board members are appointed.

Furthermore, the Water Boards would be required to submit a SCI and SDP to the shareholder Minister for approval. (p11)

### 6.4.6.3 Authority Assessment

The Authority has considered an appropriate regulatory asset value for Busselton Water from the perspective of determining a value consistent with preserving forecast revenues (and hence average prices). This approach produces a regulatory asset value of \$4.5 million in 2003/04 (which corresponds to a value of \$3.9 million at the commencement of 2006/07).

There are two factors that require particular consideration when setting an initial regulatory asset value for Busselton Water. The first is that the price and revenue forecasts of Busselton Water are sufficient for Busselton Water to be accumulating substantial financial reserves (increasing by amounts between \$0.5 and \$1.4 million each year) and generating substantial investment income. The second is that the financial structure of Busselton Water is highly conservative, with the business carrying no debt and making no dividend payments to the State. This is a substantially different structure to that which would be expected for a typical business of this nature.

Under its current financial structure and in the absence of requirements to pay a dividend, the forecast revenues of Busselton Water are considered to be substantially in excess of the minimum level necessary to sustain the business. The financial reserves and investment income of the business are such that regulatory asset value could conceivably be set at zero in 2003/04, with a concomitant reduction in customer charges by over 7 per cent in 2006/07, without compromising the viability of the business and without requiring the business to take on debt. Such a low asset regulatory asset value could still be sustained if Busselton Water was financially structured and operated on a more commercial basis, such as with a level of debt consistent with a balance sheet gearing of, say 40 per cent (\$8 million in 2003/04) and requirements to make dividend payments.

The Authority notes that the regulatory asset values indicated for Busselton Water do not include any component reflecting a value of rights to water resources. This is consistent with the absence of an effective market for water resources in Western Australia, and the absence of value ascribed to these rights on the Busselton Water Board's balance sheet.

### 6.4.7 Total Revenue Requirement

As efficiency gains have not been identified for Busselton Water, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to Busselton Water's governing legislation.

**Key Findings on Busselton Water's Revenue Requirement***Operating Expenditure*

Busselton Water's operating expenditure proposal maintains an efficient level of operating expenditure per property.

*Capital Expenditure*

Busselton Water's capital expenditure program is almost entirely funded by developers. The capital delivery practices are adequate given the size of the capital program is less than \$1 million per annum.

*Depreciation*

The asset lives assumed by AQWEST are consistent with industry standards.

*Rate of Return*

An appropriate regulatory rate of return for Busselton Water is 6.5 per cent (pre-tax real).

*Initial Regulatory Asset Value*

The initial regulatory asset value for Busselton Water that would preserve forecast revenue and average prices would be \$4.5 million in 2003/04, corresponding to a value of \$3.9 million in 2006/07.

With its current financial structure and absence of obligation to make dividend payments, Busselton Water's initial regulatory asset value could be set at zero in 2003/04 (with a concomitant reduction in customer charges by 7 per cent in 2006/07) without compromising the viability of the business and without requiring the business to take on debt.

Even if Busselton Water were to be treated as a typical commercial entity (by assuming a financial structure of 40 per cent debt to total assets, a reduction in cash reserves to some minimal amount and the payment of cash surpluses out as dividends), the initial regulatory asset value could be reduced to zero without compromising the viability of the business and without requiring the business to take on debt.

The appropriate value for the initial regulatory asset value within this range of values depends upon mooted reforms to Busselton Water's governing legislation.

*Total Revenue Requirement*

As efficiency gains have not been identified for Busselton Water, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to Busselton Water's governing legislation.

## 6.5 Tariff Structures and Pricing Reform

Busselton Water and AQWEST are able to supply water at a significantly lower long run marginal cost (LRMC) than the Water Corporation. This is primarily because the water boards have excess capacity in existing supply infrastructure and additional water sources (in the South West Yarragadee) are available locally.

The LRMC calculations do not, however, build in a cost to reflect the opportunity value of the water licences being held by Busselton Water and AQWEST. These regional suppliers have licences to extract a total of 26 GL, yet only 10 GL is currently being utilized. In the case of Busselton Water it is estimated that, based on demand projections, it will be another 40 years before the provider's groundwater allocation will be fully utilized. AQWEST's water allocation will not be fully utilised for another 25 years. Therefore, in principle, there is an opportunity for these regional suppliers to sell or lease part of their unused allocation to the Corporation.

For example, the 45 GL that the Water Corporation is proposing to source from the Yarragadee aquifer could be supplemented with up to an additional 16 GL of unused allocation from the regional water providers. Owing to the lack of water market, the prices charged by Busselton Water and AQWEST may not reflect the value of this potential sale to the Water Corporation. There may be a case for the LRMC estimates for AQWEST and Busselton Water to reflect the value in potential sale of water to the Water Corporation and for prices in Bunbury and Busselton to reflect this value.

The Authority will consider these matters further as it prepares the Final Report.

## **7 REGULATORY MODELS**

### **7.1 Background**

In order to promote efficiency in the urban water industry and achieve social and environmental goals, some form of regulatory price control is required. Section 3.4 discusses the rationale for regulating water and wastewater prices. This section examines the various regulatory approaches that can be taken.

Regulatory pricing intervention can take various forms, ranging from a highly prescriptive approach to a ‘light touch’ approach. While prescriptive approaches give a high level of price certainty to customers, their effectiveness at achieving efficiency and equity goals is dependent on the quality of information available to the regulator. A light touch approach, which allows the water provider greater flexibility in setting prices subject to regulatory guidelines, reduces the amount of detailed information required by the regulator and puts pricing decisions in the hands of water businesses – who often have a better understanding of cost functions and demand elasticities than the regulator.

For some services, it may be sufficient for the regulator to simply allow the service provider to propose prices that comply with a number of regulatory principles, rather than prescribe specific tariffs or weighted caps. The Victorian Essential Services Commission is considering such an approach for services that are required by a small number of specific classes of customers such as developers, commercial firms discharging trade waste and users of recycled water.

The type of regulatory model used for Western Australia water providers should also take into account their corporate structure and enabling legislation. For example, the appropriate method for funding Community Service Obligations may differ depending on whether the water provider is a privatised corporation with franchise monopoly, or a government trading enterprise, such as the Water Corporation.

There are a number of options for directly or indirectly controlling the prices a water provider charges for its services. The approaches vary in terms of the incentives presented to water providers, the allocation of risks associated with unexpected changes in water demand, and the level of pricing flexibility they afford. In addition, the different pricing mechanisms differ in their administrative complexity.

### **7.2 Price and Revenue Caps**

#### **7.2.1 Individual Price Caps**

Under this approach, prices are approved by the regulator/government at the commencement of a defined ‘regulatory period’ and escalated annually in line with inflation (eg, the CPI). The water provider must adhere to the approved prices and no adjustments are allowed within the regulatory period. It is common for an explicit

‘efficiency factor’ (X) to be incorporated in the price path which reduces allowable price increases below the inflation trend (i.e. CPI-X).

Individual price caps are prescriptive in that price paths for specific services are set for the term of the regulatory period, with explicit efficiency factors built into the price path. Whilst this provides price-certainty for the water business and a strong incentive to improve efficiency, the provider is unable to make price adjustments in response to changes in its operating costs or changes in demand for its services over the regulatory period. Price caps are currently used by IPART to regulate water providers in NSW and the Victorian Essential Services Commission has capped prices for 2004/05, with a view to using a tariff basket approach in future years.

### **7.2.2 Weighted Average Price Cap (or Tariff Basket)**

This form of control limits price increases on the basis of a weighted average of the prices of a basket of services. The weights are usually based on the actual quantity of service sold, fixed with reference to a base year. The water provider is able to adjust prices (known as rebalancing) within the basket, provided that the weighted average increase in prices is within the overall cap. The cap is escalated in line with inflation and an efficiency factor (e.g. CPI-X).

The tariff basket approach is a less prescriptive form of regulation because it allows water businesses to rebalance their prices for individual services, provided the weighted price does not exceed the cap. However, the tariff basket is difficult to administer when a business seeks to introduce new prices or substantially change existing tariff structures during the regulatory period. It could also reduce the regulator’s ability to set prices to achieve particular social objectives or to signal the ‘hidden’ social costs of externalities. To date, tariff baskets have not been applied to water businesses but are used to regulate electricity and gas businesses.

Tariff baskets have a number of appealing attributes in circumstances where concern is primarily with allowing a regulated service provider a substantial incentive and freedom to set economically efficient prices. Depending on how broad or narrow the basket is defined, the service provider is given the flexibility to allocate its costs (via the prices it charges) to different customer groups and services provided the average price across all users/services, weighted by the quantities of services sold to each user group in the previous year, remains within the cap.

The tariff basket form of price control has a number of key incentive properties and advantages:

- the service provider is given considerable flexibility in setting its own prices, which reduces the need for detailed market information to be collected by the regulator;
- the service provider is given an incentive to set their tariffs to reflect the underlying cost of service provision and thereby minimise profit risk;
- the service provider has an incentive to raise tariffs on services that are experiencing the fastest demand growth; and

- there is an incentive to provide different services and different levels of service quality according to market demand.

While this approach has merit in the setting of efficient prices from the perspective of the service provider, it weakens the regulator's ability to regulate prices in such a manner as to achieve social or environmental objectives in water pricing. For example, if the delivery of a particular service involves a high externality cost to the environment (which is not incurred by the water business), intervention may be required by the regulator to ensure that the externality cost is reflected in the price charged for the service. If there are a large number of such constraints to 'allowable' pricing, the value of the tariff basket is diminished.

### **7.2.3 Weighted Average Revenue Cap**

Instead of prices being regulated, this form of control limits the water provider's average revenue per ML of water sold. Prices can be rebalanced, provided that the adjustment does not result in the average revenue cap being exceeded. The cap is set on the basis of a benchmark revenue requirement set by the regulator, together with a demand forecast.

The application of a weighted average revenue cap indirectly controls price through placing a cap on average revenue per ML of water sold, thus allowing the water provider some flexibility to adjust the prices and quantities of different services supplied. A potential downside of greater pricing flexibility is higher price volatility for customers. As with the direct price controls discussed above, this form of control does not restrict the water provider from expanding its customer base. The Independent Competition and Regulatory Commission (ICRC) has recently opted for a weighted average revenue cap to regulate water prices in the ACT.<sup>39</sup>

### **7.2.4 Revenue Cap**

Another indirect method of controlling price is to cap revenue. Under this approach, the maximum revenue that can be earned by the water provider is set at the commencement of a regulatory period. The water provider is free to adjust prices, quantity or costs, provided that revenue does not exceed the stipulated cap. This mechanism provides water businesses with an incentive to improve efficiency and a disincentive to sell more water – thus, a potentially useful tool for achieving conservation targets. However, this form of control is problematic because the water provider is exposed to the risk of unexpected increases in demand. In this instance, the water provider would have to meet the new demand by lowering costs or lowering price below its revenue requirements to stay within the cap.

Alternatively, when demand is lower than expected – perhaps due to enforced restrictions – the water provider would have an incentive to increase prices, which would impose additional costs on consumers (higher prices for a less reliable service).

---

<sup>39</sup> Independent Commission and Regulatory Commission (March 2004), *Final Report and Price Direction - Investigation into prices for water and wastewater services in the ACT*

### 7.2.5 Risk Considerations

All of these price control mechanisms require the regulator and water provider to have good information about future water demand, at least over the duration of the regulatory period. Demand projections are needed as a basis for establishing efficient revenue targets and, subsequently, setting efficient prices or revenue caps. In circumstances where demand increases significantly and unexpectedly, the marginal cost of meeting this demand may exceed forecasts. Under a regime of regulated prices or revenue, the water provider is exposed to this risk. Similarly, consideration must be given to the issue of who bears the risk of unexpected changes in the water provider's obligations. Options for managing these risks are to:

- allow some pass through of costs within the regulatory period;
- build uncertainty into the approved prices by requiring the water provider to submit a costing for contingencies, reflecting uncertainty; and
- adjust prices at the end of the regulatory period to compensate for the higher than expected costs incurred.

### 7.3 Form of Price Path

The Terms of Reference for the Inquiry require the Authority to consider:

the most appropriate price path and period, including the requirement for periodic reviews of that price path.

The relevant factors when considering the appropriate time period for a price path are:

- *Certainty about prices.* A set price path over a number of years provides certainty for customers and the regulated business regarding the prices over that period. If prices are set cost-reflectively, longer price periods can provide greater certainty than short price paths where prices are re-set at shorter intervals. However, if prices are not set cost-reflectively, or if there are a number of unexpected changes in costs or demand during the regulatory period, longer price periods could result in larger imbalances between costs and prices, and price shocks as prices are rebalanced at the start of the next regulatory period.
- *The costs of carrying out price reviews.* Price reviews require considerable time, cost, effort and information requirements on the part of the service provider and the regulator. Less frequent reviews impose a lower regulatory burden on the industry.
- *Experience of other utility regulators.* A number of different price path durations are currently used by other jurisdictions. For example, in New South Wales, IPART uses a 2-year price path for urban water service providers (2003/2005). Victoria's ESC uses a 3 year price path, while the Australian Capital Territory's ICRC uses a 4 year price path for ACTEW (2004/2008).

- *Experience of water regulation in Western Australia.* This is the first review of urban water and wastewater prices in Western Australia. As such, the industry has no experience of price regulation. In this context, a shorter initial price period is appropriate, with the possibility of longer periods in the future.
- *Uncertainty in the Western Australian water industry.* The Western Australian water industry faces considerable uncertainty over the next few years regarding the development of future water sources and available supplies, climate change, and changes in legislation of the industry. The length of the price period would need to be short enough to adapt to developments in the management of the supply/demand balance and the organisation of water businesses.

### 7.3.1 Service Provider Proposals

Each of the service providers questioned the relevance of using price controls to provide efficiency incentives in the case of public utilities (as opposed to privatised utilities). According to the service providers, the incentives for efficiency in this context derive from efficiency targets and budgets agreed with Government (in the case of Water Corporation) and from the fact that the customers themselves are the shareholders (AQWEST and Busselton Water).

- **Water Corporation:**

The Corporation is not a private organisation. It already has efficiency targets included in the budget agreed with Government. Pricing should reflect these targets. To provide the appropriate incentives, targets set should be realistic and robustly calculated.

The Corporation supports a five-year price path with a mid term review.

- **AQWEST:**

Public utilities have entirely different performance incentives to the private sector. Board Members do not benefit, employees do not benefit and there is no share price to set benefits to shareholders. In essence the model being discussed has little relevance to the water utilities in WA. As an example in Bunbury if you increased shareholder benefit at the expense of the customer it would have no relevance as they are the same.

[The length of the price period should be] 2- 3 years.

- **Busselton Water:**

Any efficiency gains recognized “along the way” are grasped reflecting more on our “community owned” status and the need of the Board to be frugal at all times as our performance is very much in the public domain.

...prices would best be set at two year regulatory periods.

### 7.3.2 Issues Paper Submissions

Several other respondents to the Issues Paper commented on the issue of incentives for service providers. The Chamber of Commerce supports light-handed regulation:

While clearly the Authority must act to ensure fair market conduct, it is CCI’s view that this can and should be achieved with light-handed regulation. (p2)

The Office of Water Policy also indicates a preference for light-handed regulation:

Light-handed regulation allows the service providers to move forward with the business of providing essential infrastructure. Heavy-handed regulation can lead to an atmosphere of uncertainty that could see under-investment in significant infrastructure. This is of particular importance in the water industry, where (as demonstrated in the Issues Paper) Western Australia has faced a long-term reduction in streamflows.

...it could be argued that what is required is that service providers be given certainty within a light-handed regulatory regime. (p7)

The Office of Water Policy also makes the point that under the current process of State government approval of water prices, the Authority is not in a position to prescribe the level of prices by means of a long-term price path:

...the existing regulatory regime cannot independently guarantee a price path. In Western Australia (as indicated in the Economic Regulation Implementation Committee's Position Paper), the Government will set prices, with final responsibility for tariffs lying with the Industry Minister for Water, not the Authority. A price path over any reasonable period would appear, in the first instance, to pre-empt Government decisions in any one year. (p8)

The Department of Treasury and Finance supports the setting of efficiency targets for service providers:

Under the building block/CPI approach, a price path is set for the service provider. This approach provides incentives for the service provider to 'beat' the efficiency targets set by the regulator during the period of the price path. It also provides it with a degree of certainty as to the regulatory environment it will operate under for that period. (p35)

In relation to existing operating efficiency targets applied to the Water Corporation, its prices and financial forecasts are underpinned by operating efficiency target assumptions. For a monopoly utility it is expected that an operating efficiency factor be incorporated into expenditure forecasts and price paths, to simulate competitive pressures and economies of scale achieved through growth that otherwise would be sought by competitive businesses to ensure their continued operations. (p22)

In relation to the length of the price period, the Department of Treasury and Finance provides the following comments:

Clearly there needs to be a balance between setting a long enough period that provides sufficient incentives for the service provider to pursue additional efficiency gains beyond those set by the regulator, and a short enough period that recognises uncertainties associated with how the market will develop. (p36)

Given the above, it is considered that for this first review, a price path of three years may be appropriate. However, unlike New South Wales and Victoria where the next major water source is unknown, Western Australia has already decided to proceed with a desalination. This provides the Authority with greater certainty in regards to the Water Corporation's capital expenditure and may allow the setting of a longer price path, perhaps five years. (p36)

However, the Conservation Council considers that:

[Prices] should be reviewed annually by an independent body.(p7)

### 7.3.3 Authority Assessment

The Authority is of the view that the most appropriate form of price regulation for the Western Australian water industry is one that is light-handed, providing certainty to service providers over a three-to-five year period.

The Authority favours a pricing structure that allows maximum flexibility to the water businesses whilst still promoting outcomes that are in the public interest. While there are merits in exploring the tariff basket approach further, individual price caps would provide greater certainty in achieving specific government objectives.

In line with the Essential Services Commission's approach, it is suggested that for some customers – such as developers, commercial firms discharging trade waste and large users of recycled water – it may be sufficient for the service provider to propose prices that comply with a number of regulatory principles, rather than prescribe specific tariffs or weighted caps.

In relation to the length of the price period, the Authority considers that due to the significant uncertainty associated with climate and the Water Corporation's source development plan, an initial price period of five years is too long. The Authority considers that a three-year initial price period would provide the appropriate balance between longer-term price certainty, a shorter-term review of prices, and the cost of carrying out regulatory reviews.

As the water boards have relatively small capital expenditure programs and secure water supplies, it would be appropriate to apply a longer price period. The main uncertainty for the water boards relates to the future of their governing legislation. On the assumption that any change to the water boards' legislation occurs before 2006/07, the Authority considers that a price period of five years would be appropriate.

#### **Key Findings on the Form of the Price Path:**

**The Authority favours a pricing structure that allows maximum flexibility to the water businesses whilst still promoting outcomes that are in the public interest. While there are merits in exploring the tariff basket approach further, individual price caps would provide greater certainty in achieving specific government objectives where large customer groups are involved.**

**The Authority's preliminary recommendation is for an initial price period of three years for the Corporation, given the uncertainty associated with climate and the Corporation's source development plan.**

**The Authority's preliminary recommendation is for an initial price period of five years for AQWEST and Busselton Water, on the assumption that any change to the water boards' governing legislation will be made by 2006/07.**

## **APPENDIX 1: SUMMARY OF DRAFT FINDINGS**

### **Water Corporation**

#### **Service Standards**

The Corporation's proposed levels of service provision are consistent with required standards. These areas include customer complaints; drinking water quality; continuity, leaks and bursts; telephone answering, sewerage overflows on property and blockages; and services provided by agreement.

The Authority is satisfied that the Corporation is meeting its mandatory performance targets in an efficient way, and in particular that it is not over-investing in levels of service that exceed the requirements of its operating licence.

#### **Balancing Water Supply and Demand**

##### **Demand Projections**

The Authority considers that the Corporation's target of restraining demand to 155 kL per capita by 2012 may be optimistic, given that the Corporation plans to either remove sprinkler restrictions or ease restrictions to three days per week from 2006/07 onwards.

##### **Water Availability and Use**

A basic principle of efficient water pricing is to ensure that prices reflect the relative scarcity of the resource – in terms of the economic cost of securing additional supplies for urban water users.

In the South West region, water is not scarce in a physical sense. About 22 per cent of sustainable surface water yield is being used, while about 40 per cent of groundwater sustainable yield is being extracted. However, the economic and environmental costs of developing this water may be prohibitive, rendering the resource scarce in an economic sense.

Relative scarcity is also influenced by the current allocation of water entitlements. The Water Corporation's total supply of water to customers represents just 25 per cent of total water use in the South West region. The irrigation sector accounts for 40 per cent of water use and mining accounts for 18 per cent. The remainder is used by AQWEST, Busselton Water, stock and domestic users and private residential groundwater users.

In addressing Perth's supply-demand imbalance, there may be more scope for purchasing additional water from these other sectors.

While rural water pricing and trading issues are not within the scope of this Inquiry, the prices paid for irrigation water are clearly relevant for setting efficient urban prices.

The lack of an effective water-entitlement trading regime within and between sectors impedes the discovery of water's 'true' scarcity value. For example, prices paid for water by irrigators do not reflect the opportunity value of that water in other uses – such as urban uses.

Where water entitlements are tradable within the irrigation sector, the market value of the *entitlement* indicates the scarcity value of water in agricultural production. The prices paid for rural water simply reflect delivery costs.

Because irrigation entitlements are generally not transferable to the urban sector, the market value of these entitlements does not reflect the willingness to pay by urban users for that water. Therefore, there is potential for inefficient resource allocation – meaning that water may not be allocated at the margin to its highest value use.

The Authority suggests that more effort should be devoted to establishing an effective trading framework whereby non-urban water users would be given the opportunity to sell or lease water entitlement to the Corporation at a market price.

If trading is not feasible, a second-best solution would be to ensure that rural water is priced appropriately (through regulatory means) to reflect its scarcity value.

### Source Development Plan

The Corporation has taken a conservative approach in its source development program with respect to future dam inflows and sustainable abstraction levels from the Gngangara Mound. This approach would appear to be prudent given concerns about climate change and the capacity of the Gngangara Mound.

However, the objective of maintaining a capacity buffer to limit the risk of a total sprinkler to a 1 in 200 year event seems conservative compared with the approach taken in other Australian jurisdictions.

The selected security buffer should take into account the possibility that customers may be willing to trade off some reduction in supply reliability in return for lower water prices that would eventuate from the deferral of source development expenditure

For example, while a delay in constructing the desalination plant would increase the risk of sprinkler bans in 2006/07, customers may be willing to bear this short-term risk if it means that a cheaper source of water from South West Yarragadee could be developed.

Future demand will also influence the source development plan. The Corporation's plan is contingent on unconstrained per capita demand being reduced from 170 kL to 155 kL per year. Sensitivity analysis around this target should be investigated.

## Demand Management

The Authority considers that the Corporation's target of reducing demand to 155 kL per capita by 2012 is optimistic, given that the Corporation is planning on the basis that sprinkler restrictions will be either removed or eased to three days per week from 2006/07 onwards.

Water restrictions are a useful fallback tool for addressing critical shortages when an immediate and certain reduction in demand is required. However, restrictions impose costs on customers and are inefficient compared to pricing.

Further research is required to estimate water demand functions that would provide information about customer's willingness to pay for water of a particular reliability. This would assist the Corporation and Government to make efficient decisions about demand management versus source development options.

Short-term water restrictions could encourage long-term consumption changes at high cost to the customer, which would be inefficient if comparatively low-cost supplies are brought online in the medium term.

A close examination of the Waterwise Rebate Program would appear warranted, particularly the rebates offered for the installation of rainwater tanks and private bores.

The Authority does not currently have access to sufficient information for it to form a view on the Corporation's leakage control program.

Marginal cost pricing has a role to play in managing water demand. Not only does it fulfil a revenue-generating function for funding new capital investments and demand management programs, it has the potential to shape customer's long-term consumption decisions.

Demand management pricing can also be utilised as a tactical instrument in times of shortages. There is scope for *rebalancing tariffs* or *increasing prices* in times of scarcity to meet specific demand management objectives.

Indications are that residential demand for water is relatively insensitive to price, implying that minor changes in price would not bring about significant reductions in water consumption. Further research is required to determine the demand elasticity of Perth households and commercial users.

## Revenue Requirement

### Operating Expenditure

While the Corporation's operating costs per property are among the lowest of all water providers in Australia, its staff levels are relatively high. There may be scope for up to 15 per cent reduction in total staff numbers, which would result in a saving of \$20 million in operational costs in 2004/05, increasing to \$34 million in 2008/09.

## Capital Expenditure

The Corporation's capital planning, business case and prioritisation process, which has only recently been modified, forms a sound basis for capital investment. However, a high level review of selected projects has shown that the Corporation has historically underestimated project capital costs. Historically, the Corporation has delivered projects in a relatively traditional manner, using internal project managers. Evidence from other utilities suggests that greater use of project partnering and alliances with the private sector are likely to deliver cost savings over the current approaches (in the order of 10 to 15 per cent).

The Corporation's capital expenditure program is driven by the need to balance supply and demand, although this expenditure is affected by the Corporation's reliability target of reducing the incidence of total sprinkler bans to a one in 200 year event (as discussed in the section on demand restrictions).

The Corporation's ratio of planned expenditure on base capital maintenance to assets is around double the Australian average, which suggests the Corporation is not at risk of under-funding its base operations.

Capital program areas where efficiency gains in capital expenditure should be possible include the infill sewerage program and the drinking water quality program. For example, overall savings of 5 to 15 per cent could be achieved in the contracting of infill sewerage works by increasing the scale of the contracts offered.

## Depreciation

The asset lives assumed by the Water Corporation are consistent with industry standards, although they appear to be at the lower end of the range identified.

## Rate of Return

An appropriate rate of return for the Corporation is 6.5 per cent (pre-tax real).

## Initial Regulatory Asset Value

The regulatory asset value proposed by the Corporation of \$9,100 million at 2006/07 is consistent with a value that preserves the revenue and average prices currently forecast for the period 2004/05 to 2008/09.

At its current level of debt liabilities, a substantially lower regulatory asset values could be established and still be consistent with the commercial sustainability of the Corporation's business. This would, however, reduce the value of the Corporation to the State Government, and increase the Corporation's future debt requirements.

## Total Revenue Requirement

The Authority does not consider that the revenue requirements of the Corporation should be reduced to reflect a lower regulatory asset value.

However, reductions in the Corporation's revenue requirements could be achieved through identified opportunities for efficiencies in operating costs (particularly staffing costs), capital expenditures and a change in the source development program that brings forward the development of the South West Yarragadee Aquifer and postpones development of the desalination plant.

On the basis of these changes, revenue requirements and average prices of the Corporation could be reduced by about 5 per cent from the current forecasts of the Corporation.

## **Tariff Structures**

### **Meeting Efficiency Objectives**

Efficient pricing requires that all customers pay at least the 'avoidable cost' of water supply services, which is the forward looking cost that the service provider could avoid by ceasing to provide service to that customer (avoidable cost includes both variable costs of supply and any fixed costs that are directly attributable to the service). At most, customers should pay the stand-alone cost of providing the service – which is the cost of duplicating the service to a customer using least cost technology. And for the last unit of water supplied, the price charged to the customer should be equal or close to the marginal cost of service provision.

The concept of long run marginal cost (LRMC) provides guidance for setting efficient usage prices as it conveys a scarcity signal to customers – or a measure of the future costs to overcome supply infrastructure constraints.

In calculating efficient LRMC, a full social benefit-cost analysis should be undertaken to assess the net benefit of alternative options for maintaining a long term balance between supply and demand. The costs passed through to customers should then reflect the costs incurred by the water operator in carrying out the least-cost (or 'optimal') supply-demand option.

In order to signal water scarcity to customers, the usage component of a two part tariff should reflect LRMC.

In setting tariff structures, there is no efficiency rationale for fixed costs to be recovered solely through the fixed charge component or for variable charges to be recovered only through the usage component.

Based on the Corporation's proposed source development plan, the Authority's consultants estimate that the LRMC for water provision is in the order of \$0.97 per kL, which is at the upper end of the Corporation's range (\$0.87 to \$0.96 per kL).

Only about 6 per cent of the Corporation's residential customers currently pay usage charges above \$0.91 per kL. Thus it is apparent that a proportion of the Corporation's LRMC is being recovered through the fixed charge rather than the usage charge.

However, all customers are paying usage charges well in excess of SRMC, which is estimated to be 8 cents per kL.

Initial investigations into Western Australia's pricing arrangements have demonstrated that both metropolitan and non-metropolitan customers pay at least their direct operating costs (or avoidable cost) for water and wastewater services. It is estimated that only five per cent of the Corporation's water connections are in cross-subsidised schemes and less than one per cent of wastewater connections are in cross-subsidised schemes. This implies that there is minimal pricing distortion between the two services.

The joint overheads associated with water and wastewater services – when averaged across metropolitan and country users – are generally being recovered in direct proportion to operating costs.

The Corporation's rate of return on capital is almost entirely recovered from the provision of wastewater services.

The Corporation has not undertaken any analysis of the allocation of costs to different customer classes (residential or commercial) so no conclusion can be drawn about cost allocation efficiency or methodology.

### Managing Demand

There are four principal tariff mechanisms for managing demand – rebalancing tariffs, inclining block tariffs, seasonal pricing and quarterly consumption billing. The effectiveness of these mechanisms at reducing demand is dependent on customer's demand elasticity.

From an efficiency perspective, price-based demand management would only be efficient if the loss in customer welfare associated with a price increase is less than the total cost of alternative options such as improving reliability through supply augmentation.

Compared to most other states, Western Australia's water prices are weighted more heavily towards the fixed charge component. In the Eastern States, a greater emphasis is being placed on the use of price as a demand management instrument. One of the possible trade-offs of tariff rebalancing is greater revenue instability for the service provider.

Inclining block tariffs aim to reduce demand by targeting discretionary water use, which tends to be more price-elastic. One of the disadvantages of this tariff structure is the penalty it imposes on large families with high non-discretionary requirements.

Seasonal pricing involves charging higher prices in summer periods when demand is at its peak. Very few urban water providers have implemented seasonal pricing because of limitations in metering technology. As peak demand does not appear to contribute significantly to the Corporation's supply system costs, there is not a strong efficiency argument to introduce seasonal pricing in Western Australia. Furthermore, tactical price increases during times of shortages may confound longer-term price signals (that is LRMC), which are desirable for signalling long run scarcity.

Quarterly consumption charging is a system by which customers are billed on their quarterly consumption rather than their annual water use. The aim is to communicate price signals more effectively to customers regarding the cost of their water use. But, it can lead to inconsistent charging across customers, if all meters cannot be read simultaneously.

### **Meeting Social Objectives**

Inclining block tariffs can be used to improve the affordability of water for basic needs. However, providing concessions on the fixed charge would be a more efficient way of achieving this social objective.

One of the drawbacks of inclining tariffs is that, depending on where the step is positioned, they can penalise large families that have above-average non-discretionary water requirements. Consideration should be given to compensating affected households.

From an efficiency perspective, the Authority is indifferent to whether the uniform tariff policy is funded by a direct government payment or a reduction in dividend requirement. However, under both these models the Water Corporation should be required to provide economic justification for the amount of CSO payment (or dividend reduction) and this process should be as transparent as possible.

Under a regulatory framework where prices are controlled, requiring the Corporation to fund the CSO internally is not a favoured model because it would encourage the Corporation to use potentially inefficient cross-subsidy pricing to meet its CSO.

Due to limitations in metering technology, charges for consumption in multiple dwellings must be averaged across all tenants. This produces some inequities and possibly inefficiencies but the costs of moving to a system of individual metering would be cost prohibitive.

### **Adjusting for Externalities**

The Authority is of the view that it would be reasonable to pass on to customers those resource management costs that are directly attributable to current consumption activities. The cost of repairing damage caused by supply decisions made in the past should be funded by government.

As the Water Corporation does not incur the costs of water resource management, revenue generated from the charge should be passed back to government.

Consideration should be given to recovering resource management costs with a fixed charge rather than a volumetric charge. A usage charge would only be appropriate if a significant proportion of costs vary with the amount of water supplied.

While the Authority supports the principle of a resource management charge, care should be taken to ensure that the environmental standards and targets set by government reflect an 'efficient' level of environmental quality. Also, the environmental outcomes should be delivered at least cost.

In principle, there is economic justification for using pricing to internalise other environmental costs that are not currently being addressed by environmental programs. However, in Western Australia, not enough is known about these costs to establish a measurable and defensible externality charge. Furthermore, there may be more efficient instruments for managing these costs.

### **Wastewater Pricing**

Charges applied to residential wastewater customers are recovering at least the ‘avoidable cost’ of supplying the wastewater service. Therefore, there is no evidence to indicate that non-residential customers are cross-subsidising residential customers.

Most jurisdictions recover the costs of providing wastewater services to residential customers through a fixed service charge. The Authority does not believe there is a strong efficiency argument for introducing a usage charge for residential customers. This is mainly because opportunities for customers to reduce their discharge are limited and the means of measuring discharge are imprecise.

Western Australia and South Australia are the only states to base residential wastewater charges on property values. A more transparent pricing arrangement would be to set a charge equal to the ‘per property’ average cost of service delivery. This would remove the need for property valuation assessments, with a cost saving of \$2.4 million each year, and the need to make routine adjustments to charge rates in line with changes in property values.

While a valuation based charge may be viewed as more equitable, because it recovers a higher proportion of costs from high-income households, it is an imperfect way of achieving this social objective.

On balance, the Authority is of the view that decoupling wastewater charges from property values has merit, principally because it makes pricing more cost reflective and transparent. However, distributional issues would need to be addressed.

The Authority has not undertaken a comprehensive assessment of the Corporation’s new charging system for commercial wastewater, so no conclusions can be drawn at this stage.

### **Options for Pricing Reform and Their Impacts**

The Authority suggests that the Water Corporation give further consideration to rebalancing tariffs so that usage charges reflect LRMC. This would improve efficiency by more clearly signalling to customers the underlying long run cost of supplying water, where scarcity constraints exist.

The Authority proposes that, in conjunction with tariff rebalancing, the number of tariff steps be reduced in order to simplify the price signals to customers and to bring the tariff structure into line with those in other States.

For the purpose of collecting views and perspectives from stakeholders, the Authority has developed two options – a flat rate usage charge and a two-block

inclining tariff. Both result in low volume users experiencing a reduction in their water bill due to a lower fixed component. At average consumption levels of 250 kL per annum, customers would experience a small increase in their bill of \$12 (flat rate) or \$6 (two-step).

The choice between a flat rate or two step charge essentially hinges on whether a desired role for the tariff structure is to reduce demand. On balance, the Authority considers that a two-step inclining tariff does have a beneficial role to play in managing demand.

The analysis indicates that under the proposed two-step tariff, large families with above-average water requirements would be likely to experience an increased bill, in the order of \$60 per annum for a household using 600 kL per annum. Therefore, it is recommended that ways to compensate these customers be examined, such as free water savings packages to assist households in managing their water consumption.

## **AQWEST**

### **Service Standards**

AQWEST complies with its regulatory requirements regarding service standards. However, customer satisfaction levels, while still high overall, have been declining recently, particularly in relation to non-health related drinking water quality. A greater understanding of customers' willingness to pay for service level improvements, particularly in relation to non-health related drinking water quality, is needed for the development of an appropriate program of expenditure to meet customer expectations. In addition, AQWEST should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.

### **Balancing Water Supply and Demand**

#### **Demand Projections**

The Authority considers the demand forecasts used by AQWEST appear to be appropriate.

#### **Source Development Plan**

AQWEST is maintaining adequate security buffers for the satisfactory operation of its potable water system. In order to meet future forecast demand, AQWEST will need to invest in additional treatment plant capacity before 2009/10 and additional bore delivery capacity by 2014/15.

#### **Demand Management**

As AQWEST is unlikely to have a supply constraint for 25 years, from a local perspective, its demand management strategies could be considered inefficient.

However, from a regional perspective, such strategies could be appropriate if they efficiently “free-up” water for use in Perth.

## **Revenue Requirement**

### **Operating Expenditure**

AQWEST’s operating expenditure proposal maintains its operating expenditure per property at a level that is consistent with the levels achieved by similar organisations.

### **Capital Expenditure**

While AQWEST’s capital planning processes has some weaknesses, as identified by a recent audit, given that the size of the capital program is just over \$2.4 million per annum and is generally made up of a number of small projects, only minor savings via changes to the capital delivery process are thought to be achievable.

### **Depreciation**

The asset lives assumed by AQWEST are consistent with industry standards.

### **Rate of Return**

An appropriate regulatory rate of return for AQWEST is 6.5 per cent (pre-tax real).

### **Initial Regulatory Asset Value**

The initial regulatory asset value for AQWEST that would preserve forecast revenue and average prices would be \$16.1 million in 2003/04, corresponding to a value of \$22.7 million in 2006/07.

With its current financial structure and absence of obligation to make dividend payments, AQWEST’s initial regulatory asset value could be set at zero in 2003/04 (with a concomitant reduction in customer charges by 21 per cent in 2006/07) without compromising the viability of the business and without requiring the business to take on debt.

Alternatively, if AQWEST were to be treated as a typical commercial entity (by assuming a financial structure of 40 per cent debt to total assets, a reduction in cash reserves to some minimal amount and the payment of cash surpluses out as dividends), the lower bound of a regulatory asset value consistent with maintaining the financial viability of the business would be in the order of \$10 million. Under this scenario, customer revenue would be 7 per cent lower in 2006/07 than proposed by AQWEST.

The appropriate value for the initial regulatory asset value within this range of values depends on mooted reforms to AQWEST’s governing legislation.

## Total Revenue Requirement

As efficiency gains have not been identified for AQWEST, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to AQWEST's governing legislation.

## Busselton Water

### Service Standards

Busselton Water is achieving high service standards and high levels of customer satisfaction. However, Busselton Water should review the expenditure requirements associated with meeting existing or new service standards, such as the 1996 Australian Drinking Water Guidelines.

### Balancing Water Supply and Demand

#### Demand Projections

The demand projections proposed by Busselton Water, which assume constant consumption per property, may be too high. It is possible that consumption per property may continue to decline over the forecast period.

#### Source Development Plan

Busselton Water is maintaining very high bore delivery capacity and relatively low storage capacity. While the low storage capacity is consistent with ultra-violet light disinfection, rather than chlorination, the high bore delivery capacity appears unnecessarily high.

#### Demand Management

As Busselton Water is unlikely to have a supply constraint for 30 years, from a local perspective, its demand management strategies could be considered inefficient. However, from a regional perspective, such strategies could be appropriate at a time when water could be sold for use in the IWSS.

### Revenue Requirement

#### Operating Expenditure

Busselton Water's operating expenditure proposal maintains an efficient level of operating expenditure per property.

## Capital Expenditure

Busselton Water's capital expenditure program is almost entirely funded by developers. The capital delivery practices are adequate given the size of the capital program is less than \$1 million per annum.

## Depreciation

The asset lives assumed by AQWEST are consistent with industry standards.

## Rate of Return

An appropriate regulatory rate of return for Busselton Water is 6.5 per cent (pre-tax real).

## Initial Regulatory Asset Value

The initial regulatory asset value for Busselton Water that would preserve forecast revenue and average prices would be \$4.5 million in 2003/04, corresponding to a value of \$3.9 million in 2006/07.

With its current financial structure and absence of obligation to make dividend payments, Busselton Water's initial regulatory asset value could be set at zero in 2003/04 (with a concomitant reduction in customer charges by 7 per cent in 2006/07) without compromising the viability of the business and without requiring the business to take on debt.

Even if Busselton Water were to be treated as a typical commercial entity (by assuming a financial structure of 40 per cent debt to total assets, a reduction in cash reserves to some minimal amount and the payment of cash surpluses out as dividends), the initial regulatory asset value could be reduced to zero without compromising the viability of the business and without requiring the business to take on debt.

The appropriate value for the initial regulatory asset value within this range of values depends upon mooted reforms to Busselton Water's governing legislation.

## Total Revenue Requirement

As efficiency gains have not been identified for Busselton Water, the total revenue requirement for the forecast period is entirely dependent on the initial value of the regulatory asset value. The appropriate value for the initial regulatory asset value, and hence for the revenue requirement and average prices, depends on mooted reforms to Busselton Water's governing legislation.

## Regulatory Models

### Form of the Price Path

The Authority favours a pricing structure that allows maximum flexibility to the water businesses whilst still promoting outcomes that are in the public interest.

While there are merits in exploring the tariff basket approach further, individual price caps would provide greater certainty in achieving specific government objectives where large customer groups are involved.

The Authority's preliminary recommendation is for an initial price period of three years for the Corporation, given the uncertainty associated with climate and the Corporation's source development plan.

The Authority's preliminary recommendation is for an initial price period of five years for AQWEST and Busselton Water, on the assumption that any change to the water boards' governing legislation will be made by 2006/07.

## APPENDIX 2: INQUIRY TERMS OF REFERENCE

### INQUIRY ON WATER AND WASTEWATER PRICING

#### Terms of Reference

---

I, ERIC RIPPER, Treasurer (following consultation with the Minister for the Environment and the Minister for Government Enterprises) and pursuant to section 32(1) of the *Economic Regulation Authority Act 2003* (the ERA Act), request that the Economic Regulation Authority (the Authority) undertake an Inquiry into the water and wastewater pricing of the Water Corporation (as established by the *Water Corporation Act 1995*) and the water pricing of the Bunbury Water Board and Busselton Water Board (as established by the *Water Boards Act 1904*).

The Authority is to investigate and report on the following matters related to the pricing of water and wastewater services in Western Australia:

- the appropriate charging structures and recommended tariff levels for the Water Corporation's and the Bunbury and Busselton Water Board's urban water supply services (residential and non residential); and
- the appropriate charging structure and recommended tariff level for the Water Corporation's urban wastewater services (residential and non residential).

Section 26 of the ERA Act requires the Authority to have regard to certain matters:

- the need to promote regulatory outcomes that are in the public interest;
- the long-term interests of consumers in relation to the price, quality and reliability of goods and services provided in relevant markets;
- the need to encourage investment in relevant markets;
- the legitimate business interests of investors and service providers in relevant markets;
- the need to promote competitive and fair market conduct;
- the need to prevent abuse of monopoly or market power; and
- the need to promote transparent decision-making processes that involve public consultation.

In conducting its investigation, the Authority must review:

- the regulatory asset value of each of the service providers;
- the non capital cost forecasts of the service providers;

- the depreciation and forecast capital expenditure program of the service providers; and
- the appropriate rate of return on public sector assets, including appropriate payments of dividends to the Government of Western Australia.

The Authority must give consideration to, but will not be limited to, the following matters:

- the methodology for assessing the revenue requirements of the service providers;
- the most appropriate price path and period, including the requirement for periodic reviews of that price path;
- the current structure and level of urban water and wastewater prices;
- the cost of providing the services concerned, including
  - a target for improvement in the efficiency in the supply of services.
  - any additional resources needed to meet the required standards of quality, reliability and safety, including such matters as the protection and development of future water resources.
  - how changes in standards and operating conditions faced by the service providers impact on its revenue requirements;
- the impact of pricing policies on borrowing, capital and dividend requirements and, in particular, the impact of any need to renew or increase relevant assets;
- considerations of demand management;
- the effect on and of general price inflation over the medium term;
- the need to maintain ecologically sustainable development, including by appropriate pricing policies that take account of all feasible options for protecting the environment;
- the social impact of the recommendations; and
- the effect of any pricing recommendation on the level of government funding (through Community Service Obligation payments).

In developing its recommendations the Authority is to have regard to the following policies:

- the pricing principles of the 1994 CoAG water reform agreement (as set out in Appendix to this reference);
- the Western Australian State Government's Uniform Pricing Policy;
- the Western Australian State Government's Sustainability Policy;

- the Western Australian State Government's Community Service Obligations Policy; and
- the pricing mechanisms available to the utility service providers through the *Water Agencies (Powers) Act 1984* and the *Water Boards Act 1904*.

The Authority will release an issues paper as soon as possible after receiving the reference. The paper is to facilitate public consultation on the basis of invitations for written submissions from industry, government and all other stakeholder groups, including the general community.

A draft report is to be made available by 18 March 2005 for further public consultation on the basis of invitations for written submissions.

A final report is to be completed by no later than 12 August 2005. This will ensure that any recommendations adopted by the Government are available for implementation in 2006/07.

### **APPENDIX 3.**

#### **GUIDELINES FOR THE APPLICATION OF SECTION 3 OF THE COAG WATER REFORM AGREEMENT (THE COAG PRICING PRINCIPLES)**

- 1 Prices will be set by the nominated jurisdictional regulators (or equivalent) who in examining full cost recovery as an input to price determinations should have regard to the principles set out below.
- 2 The deprival value methodology should be used for asset valuation unless a specific circumstance justifies another method.
- 3 An annuity approach should be used to determine the medium to long-term cash requirements for asset replacement/refurbishment where it is desired that the service delivery capacity be maintained.
- 4 To avoid monopoly rents, a water business should not recover more than the operational, maintenance and administrative costs, externalities, taxes or tax equivalent regime (TERs), provision for the cost of asset usage and cost of capital, the latter being calculated using a weighted average cost of capital.
- 5 To be viable, a water business should recover, at least, the operational, maintenance and administrative costs, externalities, taxes or TERs (not including income tax), the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement (as noted in (3) above). Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome.
- 6 In applying (4) and (5) above, economic regulators (or equivalent) should determine the level of revenue for a water business based on efficient resource pricing and business costs. Specific circumstances may justify transition arrangements to that level.
- 7 In determining prices, transparency is required in the treatment of community service obligations, contributed assets, the opening value of assets, externalities including resource management costs, and tax equivalent regimes.

*Notes:*

- The reference to “or equivalent” in principles 1 and 6 is included to take account of those jurisdictions where there is no nominated jurisdictional regulator for water pricing.
- The phrase “not including income tax” in principle 5 only applies to those organisations that do not pay income tax.
- “Externalities” in principles 5 and 7 means environmental and natural resource management costs attributable to and incurred by the water business.
- “Efficient resource pricing” in principle 6 includes the need to use pricing to send the correct economic signals to consumers on the high cost of augmenting water supply systems. Water is often charged for through a two-part tariff arrangement in which there are separate components for access to the infrastructure and for usage. As an augmentation approaches, the usage component will ideally be based on long-run marginal costs so that the correct pricing signals are sent.
- “Efficient business costs” in principle 6 are the minimum costs that would be incurred by an organisation in providing a specific service to a specific customer or group of customers, or the minimum amount that would be avoided by not providing the service to the customer or group of customers.
- Efficient business costs will be less than actual costs if the organisation is not operating as efficiently as possible.

### **APPENDIX 3: LIST OF SUBMISSIONS**

AQWEST

Australian Hotels Association (Western Australia)

Busselton Water Board

Chamber of Commerce and Industry (CCI)\*

Colin Albert Brooker

Colin Scott

Conservation Council of WA Inc\*

CSIRO\*

Danielle Fleming

Department of Treasury and Finance (DTF)\*

Douglas Major

Edward Metcalfe

Environmental Protection Authority\*

Ian Barnes

Ken Gilbert

Lyla Elliot\*

Office of Water Policy

Paul and Lisa Byl

Perth Water Users

Philip Hine

Property Council of Australia\*

Robert Bowyer

Shire of Mundaring\*

Simon Joel

Small Business Development Corporation

Strati Gregoriadis

Sue Toby

WACOSS\*

Water and Rivers Commission\*

Water Corporation

- Time extensions given

## APPENDIX 4: RATE OF RETURN

In determining an appropriate rate of return for assets associated with urban water and wastewater services, the Authority must have regard to the matters set out in section 26(1) of the *Authority Act 2003*. Thus, the rate of return must be determined in a way that takes into account the needs of investors (by encouraging investment, and having regard to the legitimate business interest of investors and service providers) as well as consumers (by having regard to the long-term interests of consumers in relation to price, quality and reliability of services; promoting competitive and fair market conduct; and preventing the abuse of monopoly power). Investors have a right to expect a return on the value of their assets equal to the cost of capital associated with the regulated activities. The objective is to set the rate of return to ensure that investment funds continue to be drawn to the regulated industry, while at the same time ensuring that customers pay no more than is necessary to provide the service at an efficient level of investment.

### Estimating the Rate of Return

Assets are often financed by a combination of debt and equity. Thus, the returns from an asset must compensate both the providers of debt and the equity holders. For this reason, the term “Weighted Average Cost of Capital” (WACC) is often used to refer to the average cost of debt and equity capital, weighted by a proportion of debt and equity to reflect the financing arrangements for the assets, i.e.,

$$WACC = R_e \frac{E}{V} + R_d \frac{D}{V}$$

where  $R_e$  is the return on equity,  $E/V$  is the share of equity,  $R_d$  is the cost of debt, and  $D/V$  is the share of debt.

The formulation of the WACC preferred by the Authority is the post-tax (Officer) WACC:

$$WACC = R_e \frac{E}{V} \frac{1 - T_c}{(1 - T_c(1 - \gamma))} + R_d \frac{D}{V} (1 - T_c)$$

where  $T_c$  is the corporate tax rate and  $\gamma$  is the value of franking credits created (as a proportion of their face value).

There are several approaches to estimating the expected rate of return on equity, of which the Capital Asset Pricing Model (CAPM) is the most widely used by the finance community, regulated businesses and by regulators of utility industries in Australia.<sup>40</sup> The Authority has therefore used the CAPM methodology to estimate the cost of capital for the provision of urban water and wastewater services.

The most common formulation of the CAPM estimates directly the required return on the equity share of an asset as a linear function of the of the risk free rate and a

<sup>40</sup> Other models include Arbitrage Pricing Theory, the Fama-French Model and the Dividend Growth Model.

component to reflect the risk premium that investors would require over the risk free rate:

$$R_e = R_f + \beta_e (R_m - R_f)$$

where  $R_e$  is the required rate of return on equity,  $R_f$  is the risk-free rate,  $\beta_e$  is the equity beta and  $(R_m - R_f)$  is the market risk premium.

### Choice of WACC Methodology

The CAPM and WACC models provide estimates of post-tax returns to investors. However, the revenue benchmarks used to determine regulatory price controls are based on pre-tax revenue streams. This means that regulators need to make assumptions about regulated companies' tax liabilities and adjust either the WACC or the pre-tax revenue streams. "Pre-tax" approaches transform the post-tax WACC into a pre-tax WACC by making an assumption about the effective tax rate for the regulated entity. "Post-tax" approaches involve modelling the taxation liabilities and calculating a tax allowance to be added to the cash flows of the regulated entities. The WACC may also be expressed in real terms (indexed for inflation) or nominal terms (no indexation for inflation).

While all regulators of utility industries in Australia use the CAPM to estimate the cost of capital, there is no clear precedent on the form of the WACC to be used (i.e., pre-tax or post-tax, real or nominal). A pre-tax real WACC has been generally preferred by IPART, the ICRC, the Authority and its predecessor OffGAR, while the ACCC, QCA and the ESC have used a post-tax nominal form of WACC in recent decisions.

In its recent determination on the preferred WACC methodology for electricity networks, the Authority re-stated its preference for a pre-tax real WACC approach, using a forward transformation approach to convert the post-tax (Officer) WACC formulation to a pre-tax formulation.<sup>41</sup> Under the forward transformation methodology:

- the nominal post-tax (Officer) WACC is grossed up by  $(1 - T_c)$  to obtain the pre-tax nominal WACC; and
- the pre-tax nominal WACC is then adjusted for inflation using the Fisher equation.<sup>42</sup>

In its submission, the Water Corporation used a forward transformation approach to determine its estimate of the real pre-tax WACC.

In line with the approaches adopted by Australian water regulators, the predecessor to the Authority and the Water Corporation, the Authority has adopted a **real pre-tax** approach to its determination of the WACC for the purposes of this pricing recommendation.

<sup>41</sup> Economic Regulation Authority (25 February 2005), "Determination of the preferred methodology for calculating the weighted average cost of capital for covered electricity networks".

<sup>42</sup> The Fisher equation describes the relationship between the real interest rate ( $R$ ), the nominal interest rate ( $r$ ) and the inflation rate ( $i$ ), as follows:  $R = (1+r)/(1+i) - 1$ .

## Weighted Average Cost of Capital – Water Corporation

In order to estimate the cost of capital for Water Corporation using the CAPM, values must be determined for the following parameters:

- the risk free rate ( $R_f$ );
- the market risk premium ( $R_m - R_f$ );
- the equity beta ( $\beta_e$ );
- the benchmark financing structure ( $D/V$  and  $E/V$ );
- the benchmark debt margin ( $DM$ ); and
- the value of the imputation credits ( $\gamma$ ).

### Risk free rates

Australian regulators all adopt some form of the following approach to estimate risk free rates:

- the nominal risk free rate is derived from a recent average (20, 30 or 40 days) of the yields on 5-year or 10-year Commonwealth bond rates;
- the real risk free rate is derived from a recent average of the yields on 5-year or 10-year Commonwealth index-linked bonds over the same period;
- the difference between these two rates, estimated by using the Fisher equation, provides a measure of inflation.

The Water Corporation has used the average of the nominal yield on the ten-year Commonwealth Bond rate for the previous 20 trading days to estimate a nominal risk free rate of 5.84 per cent.

In response to the Issues Paper, the Department of Treasury and Finance supported the use of a 20-day moving average of the 10 year Commonwealth Bond to determine the risk free rate.

When making final determinations on WACC, the Authority prefers to use a 20-day moving average of observed rates of return on 10-year Commonwealth government bonds. However, for the purposes of this Inquiry, and since water and wastewater prices will not be determined until 2006/07, the Authority has used Water Corporation's estimate of the nominal risk free rate of **5.84 per cent**. However, the rate should be recalculated prior to the commencement of the 2006/07 financial year using the latest financial information.

### Market risk premium

The market risk premium is the average return of the market above the risk free rate. One approach for estimating the market risk premium is to use historical data on

equity premiums. Historically, equity premiums in Australia have been around 6 to 7 per cent, although recent evidence suggests that Australian market risk premiums have been declining over the past fifty years.<sup>43</sup>

The precedent amongst Australian utility regulators is to adopt a market risk premium of between 5.0 per cent and 6.0 per cent. IPART has used a 5.0-6.0 per cent range of market risk premiums in recent decisions in water, gas and electricity. Other regulators have consistently used a market risk premium of 6.0 per cent.

The Water Corporation has used a value of 6 per cent for the market risk premium, citing the ACCC's use of a market risk premium of 6 per cent<sup>44</sup> and IPART's acceptance of a market risk premium between 5 and 6 per cent.<sup>45</sup>

In its response to the Issues Paper, the Department of Treasury submitted that, on the basis of its review of market risk premiums used in a variety of determinations across different utility sectors, it believed that a market risk premium of 6 per cent was appropriate.

The Authority has adopted a market risk premium of **6 per cent** for the purposes of this Inquiry. This value is in accordance with recent market evidence of market risk premiums in Australia, recent precedents in regulated utility industries in Australia, the proposal by Water Corporation and the views of the Department of Treasury.

### Equity Beta

The equity beta ( $\beta_e$ ) for an entity is a measure of the degree to which the returns to equity for that entity vary with the returns to the stock market in general. It is defined by the covariance between the return on equity,  $R_e$ , and the return to the market portfolio,  $R_m$ , divided by the variance of the return of the market portfolio.

Since most regulated industries are not listed on the stock exchange, and information on dividends, returns on capital and changes in market value of equity is not available, regulators commonly use proxy equity betas, based on equity beta values for other listed entities that have similar assets and face similar systematic risks. Systematic risks are those risks associated with the returns to an entity that cannot be costlessly eliminated through portfolio diversification, eg, economy wide factors such as unexpected changes in real aggregate income, inflation, proxies for risk aversion and long-term real interest rates.

To derive relevant proxy betas, regulators select comparable entities based on the characteristics of the regulated entity's assets and market, and adjust these to account for differences in gearing levels.

---

<sup>43</sup> The Allen Consulting Group (January 2005), "Electricity Networks Access Code 2004: Advance Determination of a WACC Methodology", report to the Economic Regulation Authority, p23.

<sup>44</sup> As referred to in a commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation.

<sup>45</sup> For example, IPART (May 2003), and other IPART price determinations in electricity distribution (June 2004) and gas distribution (July 2000).

The most relevant comparators for deriving a proxy equity beta value for Water Corporation are:

- first, other regulated water and sewerage service providers in Australia;
- secondly, other regulated utilities in Australia (gas distribution, electricity distribution, gas transmission, electricity transmission).

Recent regulatory determinations for water and wastewater service providers have shown proxy equity beta values of 0.9 or below. IPART, in its May 2003 determinations on water, wastewater and stormwater service providers in NSW used equity beta values in the range of 0.65 to 0.9. ICRC in the ACT assumed an equity beta value of 0.9 in its final determination on water and wastewater service provider, ACTEW. For regulated gas transmission and distribution activities, Australian regulators have used proxy beta values ranging between 0.9 to 1.33 in recent decisions. Equity beta values for regulated electricity distribution and transmission activities have been lower than for gas, with a range between 0.71 and 1.14.

The Water Corporation have accepted the beta assumptions outlined in the recent determinations by IPART on metropolitan water service providers of between 0.65 and 0.90.<sup>46</sup> The mid-point value of 0.78 has been adopted by the Water Corporation for the purpose of its calculation of WACC.

In response to the Issues Paper, the Department of Treasury and Finance submitted that it:

...would support the use of an equity beta that is comparable to that used in recent water industry price determinations for entities with similar risk profiles, providing it reflects the chosen gearing ratio.

The Authority has accepted the Water Corporation's proposed equity beta value of **0.78**, which is within the range of recent regulatory decisions on equity betas for similar water industry service providers in Australia.

### **Gearing**

Australian utility regulators have conventionally assumed a benchmark debt-to-asset ratio of 60 per cent. This is around double that of the average firm on the Australian stock exchange.<sup>47</sup> Recent pricing determinations by IPART and ICRC for water and wastewater services also employed benchmark gearing ratios of 60 per cent.<sup>48</sup>

In its submission, the Water Corporation accepted the finding of other Australian regulators, including IPART, that a debt-to-assets ratio of 60 per cent is appropriate for the calculation of the WACC.

---

<sup>46</sup> IPART (May 2003).

<sup>47</sup> The average equity beta of 1 for the average firm with an average gearing level of 30 per cent implies that the average equity beta for the market would be around 1.75 if the average gearing level were the same as a regulated firm (60 per cent).

<sup>48</sup> IPART (May 2003); ICRC (March 2004).

The submission by the Department of Treasury and Finance in response to the Issues Paper expressed support for the use of a benchmark gearing ratio:

Given the legislation of the Water Corporation, and the proposed legislation of AQWEST and Busselton Water, requiring that they behave in a commercial manner, it is reasonable to expect that the gearing ratio used in calculation of the WACC for these organisations will reflect that of publicly listed firms.

The Department of Treasury and Finance also noted that:

... an actual increase in the gearing ratio of a government entity does not necessarily result in an increase in the State's net debt position since the entity could undertake an equity-debt swap with the State.

In line with current regulatory practice in Australia, the Authority has therefore assumed a benchmark gearing ratio of **60 per cent**.

### **Cost of debt**

The cost of debt is commonly presented as a margin over the risk free rate. A benchmark margin can be estimated on the basis of the weighted average cost of debt for a typical debt portfolio. The debt margin can be seen to comprise two components:

- an interest rate premium over the risk free rate; and
- an allowance for transaction costs incurred in arranging the debt facilities.

The interest rate premium for a regulated entity can be estimated from observed yields on corporate bonds of corporations with comparable activities and credit ratings to those of the regulated entity. A regulated utility with 60 per cent gearing is most likely to be rated at BBB+.<sup>49</sup> Recent evidence from CBA Spectrum and Bloomberg indicate that yields on 5-year corporate bonds rated BBB+ are between 85 to 100 basis points, and 10-year bonds rated BBB+ are between 100 and 130 basis points.<sup>50</sup>

In addition to the interest rate premium, there are several types of transaction costs associated with raising debt, such as gross underwriting or arrangement fees, and other direct costs associating with debt issuance, such as legal fees and credit rating fees. A review by The Allen Consulting Group found debt raising costs for utility businesses in Australia to be between 8 and 12 basis points.<sup>51</sup>

In estimating the cost of debt, the Water Corporation adopted the same approach as the Essential Services Commission, which noted that the appropriate credit rating that a utility business should be able to maintain if it were geared as assumed by the Commission is BBB+, with the term of the debt instrument being 10 years.<sup>52</sup> On the basis of a debt margin in February 2004 of 1.10 per cent, and the Corporation's

---

<sup>49</sup> See Allen Consulting Group (January 2005), *ibid*, p43.

<sup>50</sup> The Allen Consulting Group (January 2005), *ibid*, p44.

<sup>51</sup> The Allen Consulting Group (January 2005), *ibid*, p45.

<sup>52</sup> Essential Services Commission (18 March 2004), "Economic regulation of the Victorian water sector – estimating a return on and of capital investments", Workshop Discussion Paper.

estimate of the risk free rate of 5.84 per cent, the Corporation's estimate of the cost of debt is 6.94 per cent.

In response to the Issues Paper, the Department of Treasury and Finance noted the following regarding the cost of debt margin:

It could be argued that the estimated interest rate savings to agencies borrowing through the WA Treasury Corporation rather than through the corporate bond market is greater than the current government guarantee fee. The DTF acknowledges that a case could be made for the guarantee fee to be increased to better reflect the value of the guarantee.

and

Overall, the DTF supports the application of a debt margin that is comparable to commercial borrowing practices and wider finance industry benchmarks for an industry of similar risk or structure...The debt margins used by other regulators in recent water pricing decisions have ranged from 70 to 100 bps.

In view of empirical evidence, and taking into account Water Corporation's submission and comments by the Department of Treasury and Finance, the Authority has, for the purpose of this Inquiry, assumed a total debt margin of **112.5 basis points**, comprising:

- an interest rate premium over the risk free rate of **100 basis points**; and
- debt-raising costs of **12.5 basis points**.

### **Corporate Tax Rate**

There has been some debate amongst regulators as to whether WACC determinations should use the statutory corporate tax rate, or effective tax rates.<sup>53</sup> Many companies have effective tax rates that are well below the statutory rate. However, verifying a company's effective tax rate would require modelling of taxation cash flows, which would be highly complex with substantial information requirements. The benefit of using the statutory rate is that it is simple to apply. There is the risk, however, that using the statutory tax rate will overestimate the returns required by companies to meet tax obligations.

The Water Corporation noted in its submission that its effective tax rate is significantly less than the statutory long term corporate tax rate of 30 per cent, and that there has been debate over whether the statutory tax rate or effective tax rate should be used in the WACC calculation. However, the Water Corporation accepted the recommendations by the ACCC and IPART on the use of the statutory rate of 30 per cent.<sup>54</sup>

The Authority will use the statutory tax rate of 30 per cent for the purpose of this Inquiry. This is in accordance with previous decisions by the Authority and its

---

<sup>53</sup> See IPART (August 2002), "Weighted Average Cost of Capital: Discussion Paper", p8.

<sup>54</sup> Commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation; and IPART (May 2003).

predecessor agencies, proposal by Water Corporation and recent regulatory decisions in the water industry.<sup>55</sup>

### Value of Imputation Credits

The value of imputation credits, or gamma, measures the value of a dollar of imputation tax credit to shareholders. A low value of gamma implies that shareholders do not obtain much relief from corporate taxation through imputation and therefore require a higher pre-tax income in order to justify investment. Recent regulatory decisions have employed a gamma value of 0.5, except for IPART, which uses a range between 0.3 and 0.5. A gamma value of 0.5 is supported by the results of a recent study by Hathaway and Officer.<sup>56</sup>

In its submission, the Water Corporation has proposed a value for gamma of 45 per cent, citing studies by Hathaway and Officer in 1996 that concluded that an average of about 45 per cent of the tax collected from companies is redeemed as franking credits on personal tax.<sup>57</sup> Further, the Corporation noted the recent price determinations by IPART for metropolitan water agencies, in which a gamma factor between 50 per cent and 30 per cent was assumed.<sup>58</sup>

The Authority will use a value for gamma of 50 per cent for the purpose of this Inquiry. This is in accordance with previous decisions by the Authority and its predecessor agencies, and consistent with the Authority's recent determination on a WACC methodology for electricity networks. It is also within the range used by other regulators.

### Authority Draft Recommendation on WACC – Water Corporation

Table A3.1 below summarises the WACC parameters proposed by the Water Corporation and those used by the Authority to determine a recommended cost of capital. The Authority calculates a real pre-tax WACC of 6.44 per cent for Water Corporation's regulated asset value. As this is very similar to the Corporation's proposal of 6.54 per cent, a rate of return of **6.5 per cent** has been assumed for the purposes of this Inquiry.

The slight difference between the Water Corporation's estimate and the Authority's estimate is due to:

- different estimates of the debt margin (1.10 per cent for the Water Corporation and 1.125 per cent for the Authority); and
- different values for gamma, the value of franking credits (45 per cent for the Water Corporation and 50 per cent for the Authority).

<sup>55</sup> IPART (May 2003); ICRC (March 2004).

<sup>56</sup> Hathaway, N. and R. R. Officer (1999), *The Value of Imputation Tax Credits*, Unpublished manuscript, Graduate School of Management, University of Melbourne.

<sup>57</sup> As cited in a commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation.

<sup>58</sup> IPART (May 2003), *ibid.*

The WACC should be recalculated prior to the commencement of the 2006/07 financial year using the latest financial information. This may result in a real pre/tax WACC higher or lower than 6.5 per cent, due to changes in market parameters such as the real and nominal risk/free rates of return.

**Table A3.1 Draft Recommendation on WACC for Water Corporation**

CAPM Parameter	Notation	Water Corporation Proposal	Authority Draft Recommendation
Nominal risk free rate of return ( per cent)	$R_{fn}$	5.84	5.84
Real risk free rate of return ( per cent)	$R_{fr}$		3.26
Market risk premium ( per cent)	MRP	6.00	6.00
Equity beta	$\beta_e$	0.78	0.78
Debt margin ( per cent)	DM	1.10	1.125
Corporate tax rate ( per cent)	t	30	30
Franking credit value	$\gamma$	0.45	0.50
Debt to total assets ratio ( per cent)	D/V	60	60
Equity to total assets ratio ( per cent)	E/V	40	40
Nominal pre/tax cost of debt ( per cent)	$R_{fn} + DM$	6.94	6.97
Nominal post/tax cost of equity ( per cent)	$R_{fn} + \beta_e * MRP$	8.82	10.52
Expected inflation ( per cent)	$(1 + R_{fn}) / (1 + R_{fr}) - 1$	2.50	2.50
Nominal post/tax WACC ( per cent)		6.44	6.39
Nominal pre/tax WACC ( per cent)		9.20	9.10
<b>Real pre/tax WACC ( per cent)</b>		<b>6.54</b>	<b>6.44</b>

## Weighted Average Cost of Capital – AQWEST and Busselton Water Board

### Methodology

Although AQWEST and Busselton Water Board do not make dividend payments to shareholders nor finance new investment by debt, the Authority indicated in the Methodology Paper that it will be giving consideration to the likely cost of capital to AQWEST and Busselton Water Board in terms of the opportunity cost of capital that may be invested in system expansions. AQWEST and Busselton Water Board were invited to, but were not asked to, provide an estimate of the rate of return that might be relevant to its business. Neither AQWEST nor Busselton Water Board provided estimates of rates of return in their submissions.

The Authority has adopted the same approach for the estimation of a cost of capital for AQWEST and Busselton Water Board as for the Water Corporation, as outlined in above. To summarise, the Authority has:

- used the Capital Asset Pricing Model (CAPM) to estimate the return on equity;
- calculated a post/tax nominal Weighted Average Cost of Capital (WACC) using the Officer formula; and

- converted the post/tax WACC to a pre/tax real WACC using a forward transformation approach.

The approach adopted by the Authority in estimating the WACC parameters for AQWEST and Busselton Water Board are the same as for Water Corporation, with the exception of the assumption as to the level of financial gearing of the business and a consequent change to the equity beta value that captures the exposure of the business to systematic risk..

Based on empirical evidence from the cost structures of other utilities, a standard gearing assumption for large utility businesses – of similar size to the Water Corporation – is 60 per cent. However, for the regional water providers (Busselton Water and AQWEST) such a level of gearing may not be achievable given the relatively small sizes of the businesses and the exposure of the businesses to cost perturbations. For this reason, the Authority considers that it is appropriate to assume a lower level of gearing of 40 per cent.

The assumed level of financial gearing of the businesses affects the appropriate assumption as to the equity beta. For a given asset beta (i.e. the level of exposure of the entire business to systematic risk, rather than just the returns to equity), the equity beta will vary in proportion to the level of financial gearing. That is, a lower level of financial gearing will correspond to a lower equity beta. For AQWEST and Busselton Water, an equity beta value of 0.52 at 40 per cent gearing is equivalent to an equity beta of 0.78 for the Water Corporation at 60 per cent gearing.

#### **Authority Draft Recommendation on WACC – AQWEST and Busselton Water**

Table A3.2 below summarises the WACC parameters used by the Authority to determine a recommended cost of capital for AQWEST and Busselton Water. The Authority calculates a real pre/tax WACC of 6.44 per cent for Water Corporation's regulated asset value. For the purposes of this Inquiry, the Authority will adopt a real pre/tax WACC for AQWEST and Busselton Water of 6.5 per cent.

**Table A3.2 Draft Recommendation on WACC for AQWEST and Busselton Water Board.**

CAPM Parameter	Notation	Authority Draft Recommendation
Nominal risk free rate of return ( per cent)	$R_{fn}$	5.84
Real risk free rate of return ( per cent)	$R_{fr}$	3.26
Market risk premium ( per cent)	MRP	6.00
Equity beta	$\beta_e$	0.52
Debt margin ( per cent)	DM	1.125
Corporate tax rate ( per cent)	t	30
Franking credit value	$\gamma$	0.50
Debt to total assets ratio ( per cent)	D/V	40
Equity to total assets ratio ( per cent)	E/V	60
Nominal pre-tax cost of debt ( per cent)	$R_{fn} + DM$	6.97
Nominal post-tax cost of equity ( per cent)	$R_{fn} + \beta_e * MRP$	8.96
Expected inflation ( per cent)	$(1 + R_{fn}) / (1 + R_{fr}) - 1$	2.50
Nominal post-tax WACC ( per cent)		6.38
Nominal pre-tax WACC ( per cent)		9.10
<b>Real pre-tax WACC ( per cent)</b>		<b>6.44</b>

## APPENDIX 5: INDEPENDENT SOURCE DEVELOPMENT PROPOSALS

The Authority has become aware of independent proposals to supply potable water to the Corporation. This appendix provides the advice the Authority has received from the Corporation in relation to each proposal.

**United Utilities Australia** has proposed a scheme to meet the potable water needs of the Goldfields desalinating seawater in Esperance and transporting it via a pipeline to Kalgoorlie-Boulder. The scheme would potentially save 11 GL of water for Perth because Kalgoorlie-Boulder's current potable water supply would not need to be transported from Mundaring Weir via the Perth to Kalgoorlie pipeline.

The Corporation's view is as follows:

The Water Corporation has supported the investigation of this proposal in some detail. While the proposal has the potential to meet the growth in water demand in Kalgoorlie at a lower cost than the expansion of the Goldfields and Agricultural Water Supply (G&AWS), it is not a cost effective replacement the existing G&AWS capacity.

An alternative supply that replaced Kalgoorlie's existing water demand would provide source benefits in Perth and would save energy, chemical and some maintenance and replacement costs for the G&AWS. These savings are "avoidable costs". However, the investment that has been made in the existing pipelines, pump stations and storages are "sunk costs", and cannot be avoided if demand is met by an alternative source.

The Corporation is willing to purchase water based on the avoidable cost. Any higher price would result in an increase in the Community Service Obligation subsidy required to provide country water supplies. We understand that the avoidable costs are insufficient to make United Utilities proposal viable.

The Authority is currently investigating this proposal as part of a reference issued by government and will be releasing a draft report by 6 May 2005. Further information on this reference is available at [www.era.wa.gov.au](http://www.era.wa.gov.au).

**Agritech Smartwater**, has proposed a scheme to supply 45 GL of potable water to the Water Corporation at a cost of 60 cents per kL. The scheme is based on the desalination of water from Wellington Dam. Scour water from the dam would be piped 20 km to Brunswick Junction, where it would be treated using gravity-driven reverse osmosis to reduce its salt content from 1500ppm to 50ppm. It would then be transported a further 20 km to Harvey. Agritech Smartwater estimates that the head pressure in Wellington Dam is sufficient for the desalination process and the transportation of the water to Harvey.

The Corporation's view is as follows:

Wellington Dam is the most significant surface water source in the South West of the State. Utilisation of this resource is currently constrained by catchment salinisation. The Corporation's ability to access a larger share of this resource for the Integrated Water Supply Scheme (IWSS) will be closely linked to management of this issue.

The Corporation needs to review the detail underpinning Agritech's proposal to desalinate Wellington water and sell the water to the Corporation at an estimated price of 60c/ kL. There are questions regarding the volume of water available, the suitability of the proposed technology to provide a reliable and consistent output and the timing in obtaining the required regulatory approvals. The Corporation requested additional information from Agritech some time ago to allow consideration of these issues. No response has been received and until this occurs, the Corporation has not included this as a development option in the short-term.

The cost of transporting the water to Perth needs to be added to Agritech's cost of 60c/ kL. The total cost may make the proposal a potential source for development in the medium-term.

**Tenix Group** has proposed a scheme to transport water from the Fitzroy River to Perth by means of a 3,700 km canal. The canal would be covered and lined with a special membrane to prevent leaks and assist water flow, and would run parallel to the coast of Western Australia. It would cost an estimated \$2 billion and would transport 200 GL of water per annum. Tenix Group proposes to sell 120 GL per year to Water Corporation on a take-or-pay basis, at a cost of around \$1/ kL.

The Corporation's view is as follows:

The Corporation does not have details of Tenix's proposal and has not had the opportunity to make a detailed technical analysis or cost estimate for the canal.

Given the time required to construct the canal (3 years plus time to get the necessary approvals), the canal is not a substitute for the desalination plant or the Harvey Water trade. At best, the additional 120 GL in capacity may be able to replace the 45 GL that is currently planned to be supplied from the South West Yarragadee around 2009/10.

In this case, the additional 75 GL per annum capacity that the canal would provide over the South West Yarragadee would initially allow a reduction on the draw on existing sources. This capacity would then allow Perth to grow without developing additional sources for some time into the future (this time scale depends on climate, growth and consumption per person).

The alternative of developing the South West Yarragadee would result in a secure supply that would not require further augmentation until around 2020, depending on climate, growth and consumption per person. At that time, other lower cost sources should be available for development.

The price proposed by Tenix is \$1/ kL for a take-or-pay contract for 120 GL per annum, a commitment for the Corporation to pay a minimum of \$120m per annum.

The difference between this cost and the \$38m per annum for development of the South West Yarragadee would need to be recovered through an additional price increase.

Initially, the surplus capacity of 75 GL per annum could reduce groundwater use or increase storage in the dams to improve security. Where the additional capacity is used to reduce groundwater use, energy, chemical and treatment costs would reduce by broadly 10c/ kL. Water used to increase storage in the dams would not reduce operating costs.

Assuming all of the 75 GL is used to reduce the groundwater draw, the initial cost would be \$112.5m per annum (\$120m minus \$7.5m in groundwater operating savings). This is an additional cost of \$74.5m per annum (\$112.5m minus \$38m) over the alternative of developing the South West Yarragadee.

To recover the additional \$74.5m per annum, an additional general price increase of 8.5 per cent would be required in all water, sewerage and drainage charges State-wide or 18.5 per cent on water charges alone. These increases have been calculated as an addition to the price after the proposed 13.5 per cent water price increase in 2006/07 for the desalination plant and a 2.1 per cent increase in 2008/09 for Harvey Water trade.

An 18.5 per cent increase in water prices would add around \$60 per annum to the average residential bill compared with the option of developing the South West Yarragadee.

The price increases calculated above are only to recover the \$120m take-or-pay cost for the water and exclude the recovery of any additional costs associated with water quality and integration of the canal supply into Perth's water supply system.

The Department of Agriculture, through the **Rural Towns Programme**, is implementing a range of projects to combat soil salinity in regional centres. Many of these projects involve some pumping to reduce the level of saline groundwater, followed by storage of the saline water in evaporation basins and in some cases desalination of some of the water. Where desalination is used, there is the potential for the supply of potable water to regional town centres.

The Corporation's view is as follows:

The development of rural desalination projects has the potential to provide a substitute supply for water that is currently provided from the IWSS sources. As with the Esperance to Kalgoorlie proposal described above, the Corporation is willing to purchase water based on the avoidable costs at each location.

The potential benefits of the rural desalination projects are primarily associated with the reduction in damage to buildings and roads due to the reduction in salinity resulting from a lowering of the groundwater level. Water production is an associated by-product.

The price the Water Corporation can afford to pay for the water produced is insufficient to meet the full costs of these projects. Alternative funding will be needed to make these schemes viable. Scheme operations will also need to be managed in a manner which ensures that drinking water quality is assured.

### **Catchment management**

The Corporation's view is as follows:

Catchment management represents a low cost source option aimed at increasing runoff to existing dams through enhanced surface water catchment management. The Corporation has estimated that it may be possible to make available an additional 40 GL of water via management of the metropolitan catchments. Realisation of these volumes of water is contingent upon demonstrating the feasibility (environmental, social and financial) of catchment thinning via a research trial proposed for the Wungong Dam catchment.

The Wungong catchment trial is expected to commence in 2005/06 (pending environmental approval), and is predicted to deliver up to 6 GL/yr of water to the IWSS. It is expected that the yield benefit will be realised gradually, with the full 6 GL/yr realised within approximately 5 years of commencing the trial. The Corporation will invest in comprehensive environmental monitoring and analysis as part of the Wungong catchment trial. The outcomes of this analysis will be used to guide the extension of the catchment management program into other public drinking water supply catchments.

### **Cloud Seeding**

The Corporation's view is as follows:

There is conflicting evidence within Australia and from overseas as to the effectiveness of cloud seeding in producing additional rainfall that results in economic additional water yields. The Corporation is seeking expert opinion as to the likelihood of meteorological conditions in the South West before considering significant investment in a field trial of the technology.

## APPENDIX 6: GLOSSARY AND ABBREVIATIONS

ACCC	Australian Competition and Consumer Commission
Authority	Economic Regulation Authority (Western Australia)
CAPM	Capital Asset Pricing Model
CCI	Chamber of Commerce and Industry (Western Australia)
COAG	Council of Australian Governments
CPI	Consumer Price Index
CSO	Community Services Obligation
DORC	Depreciated optimised replacement cost
DTF	Department of Treasury and Finance (Western Australia)
ESC	Essential Services Commission (Victoria).
EPA	Environmental Protection Authority (Western Australia)
GL	Gigalitre, which is 1000 megalitres or equivalent to 667 Olympic-size swimming pools
GPI	General Price Index, which is the annual per cent change in the Perth Consumer Price Index based on the preceding September year
GRV	Gross Rental Value, which is the gross annual rental that the property might reasonably be expected to realise if let on a tenancy from year to year.
ICRC	Independent Competition and Regulatory Commission (ACT)
IPART	Independent Pricing and Regulatory Tribunal of New South Wales
IWSS	Integrated Water Supply Scheme, which supplies water to Perth, Mandurah, Pinjarra and the Wheatbelt and Goldfields areas.
kL	Kilolitre, which is 1000 litres.
LRMC	Long run marginal cost, which is the forward looking cost of supplying an additional unit of water to meet increases in projected demand, through new source development and demand management programs.
ML	Megalitre, which is 1000 kilolitres
NCC	National Competition Council

NCP	National Competition Policy
NWI	National Water Initiative
OffGAR	Office of Gas Access Regulation, now part of the Economic Regulation Authority.
OfWAT	Office of Water Services (United Kingdom)
ORAR	Office of Rail Access Regulation, now part of the Economic Regulation Authority.
OWP	Office of Water Policy (Western Australia)
QCA	Queensland Competition Authority
RAV	Regulatory asset value, which is the value ascribed to the assets of a business for the purposes of determining a rate of return and a level of depreciation expenses that, along with operating expenses, can be reflected in the regulated revenue stream and prices.
SRMC	Short run marginal cost, which is the cost of providing an additional unit of service on the assumption that all physical infrastructure is fixed.
WACC	Weighted average cost of capital, which is the average cost of debt and equity capital, weighted by the proportion of debt and equity to reflect the financing of the assets.
WRC	Water and Rivers Commission (Western Australia)
WSAA	Water Services Association of Australia
WIRO	Water Industry Regulatory Order (Victoria)

