Final Report: Inquiry on Urban Water and Wastewater Pricing

4 November 2005

Economic Regulation Authority
WESTERN AUSTRALIA

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Key Conclusions

- **Prices for water services should be structured so that usage charges are set at levels to reflect the estimated cost of developing new water resources to meet water demand.**
- **Prices for wastewater services for residential customers should be gradually decoupled from property values and determined as an inclining tariff, thus increasing transparency, while retaining, in part, the principle of charging according to capacity to pay.**
- **Average water prices (expressed as a price per kilolitre of water delivered to all customers) for the Water Corporation should increase from $1.01 in 2005/06 to $1.07 in 2014/15 in real terms (an average rate of 0.7 per cent per year). By comparison, the Water Corporation has proposed to increase average prices to $1.17 in 2006/07 then to $1.20 in 2008/09 and then to maintain average prices at that level.**
- **Average wastewater prices (expressed as a price per connection) for the Water Corporation should decrease at an average rate of 0.8 per cent per year in real terms for the period 2006/07 to 2009/10 and then remain constant in real terms, compared to the Water Corporation's proposal that wastewater prices remain at current levels in real terms.**
- **Average water prices for AQWEST should decrease at an average rate of 1.4 per cent per year in real terms over the period 2005/06 to 2014/15, which is broadly consistent with AQWEST's proposal.**
- **Average water prices for Busselton Water should increase at an average rate of 0.7 per cent per year in real terms over the period 2005/06 to 2014/15, which is broadly consistent with Busselton Water's proposal.**
- **It is not necessary for the Water Corporation to recover the cost of the Perth Seawater Desalination Plant substantially through a one-off step increase in prices. Rather, the Authority is of the view that a "smoothed" price path over a 10-year period is likely to be more readily accepted by customers and provide for the recovery of costs in a normal way.**
- **On the basis of conservative assumptions about rainfall runoff (similar to the last eight years), reduced abstraction from the Gnangara Mound and a 1 in 50 year risk of a total sprinkler ban, either sprinkler restrictions can be relaxed to three days per week watering in 2006/07 or the proposed development of the South West Yarragadee aquifer could be deferred by three years.**
- **A cost-based system of price determination should be introduced for the Water Corporation, AQWEST and Busselton Water to transparently link tariffs to the costs incurred in operating these businesses.**

1.1 Introduction

This report provides the findings and recommendations of the first independent inquiry into water and wastewater pricing in Western Australia. The Economic Regulation Authority (Authority) has undertaken the inquiry at the request of the Treasurer, 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's decisions on the level and structure of urban water and wastewater prices and the system that the Government should apply to set prices for the Water Corporation (Corporation), AQWEST and Busselton Water.

This 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 on 22 July 2004 and a Draft Report that was published on 18 March 2005. Public forums were held in Perth, Bunbury and Busselton in May 2005 to discuss the Draft Report. The methodology that has been followed in this report is broadly consistent with the one presented in a Methodology Paper that was published on 15 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.

1.2 Methodology

The Authority recommends that a cost-based system be introduced for determining the prices of water and wastewater services. A cost-based system will permit each water business to recover the cost of constructing assets, to earn a commercial rate of return on the un-recovered cost of assets and to recover the efficient costs of operating and maintaining the assets.

The Authority believes that implementing a cost-based system of price determination that is rigorously and consistently applied at regular price reviews is both more appropriate and more practical than focusing on the level of prices at a particular point in time. For this reason, the Authority has, for this inquiry, provided recommendations for prices that largely preserve the current revenues of the water businesses, but establish the basis for increasing or decreasing prices over time in accordance with changes to costs incurred by the businesses, the level of investment in new assets and growth in demand for services.

The Authority has determined prices for each water business by determining the revenue required for each business and then determining a set of prices for water and wastewater services that will deliver this required revenue (given forecasts of demand) while also meeting other objectives such as promoting water efficiency in the use of water resources by the communities served by each business. The Authority has applied a building-block methodology in determining the revenue requirements for each of the three water businesses that are the subject of this inquiry.

The building block methodology involves determining a total revenue requirement from component costs, as follows.

Total Revenue	=	*Rate of Return × Asset Value*
	+	*Depreciation of Assets*
	+	*Forecast Efficient Operating and Maintenance Costs*

Identifying an appropriate level of revenue requires consideration of, among other things, the asset value, the rate of return on the asset value, the allowance for depreciation that is necessary to reflect the aging of assets and the efficient level of operating and maintenance expenditure.

An initial asset value has been established for each water business that is consistent with current forecasts of service prices and revenues. Assets should subsequently be re-valued by a "roll-forward" methodology, whereby the regulatory asset value is updated by adjusting for efficient new capital expenditure, depreciation, asset disposals and inflation.

Based on the information that is available, the Authority has determined initial asset values for the Corporation, AQWEST and Busselton Water of $10,599 million, $25.1 million and $14.7 million respectively (as at 30 June 2005). A real pre-tax rate of return of 5.63 per cent has been applied to the Corporation and a real pre-tax rate of return of 5.87 per cent has been applied to AQWEST and Busselton Water.

Each of the water businesses provided the Authority with forecasts of operating and capital costs for consideration in determining prices.

The Authority has incorporated the forecasts of capital costs by each water business into the price determinations. However, in the case of the Corporation, the Authority has done so on the basis of a different set of assumptions to those of the Corporation. The Authority considers that the Corporation's target security buffer (a 1 in 200 year risk of a total sprinkler ban, which is higher than for other Australian water utilities) may be imposing too great a cost on water customers through either the early development of new water sources or the continuation of existing water restrictions. For the purposes of this inquiry, the Authority has made the following assumptions: a security buffer based on a 1 in 50 year risk of a total sprinkler ban, the easing of water restrictions to three days per week in 2006-07 (on the basis of conservative assumptions about rainfall runoff and abstraction from the Gnangara Mound) and the timing of the South West Yarragadee development as envisaged by the Corporation. If the rainfall runoff continues at levels similar to the last eight years and water restrictions are not relaxed in 2006-07 then the abstraction of water from the South West Yarragadee aquifer could be deferred by three years.

Forecasts of operating costs have been amended to ensure that they incorporate productivity gains of at least 1.25 per cent per annum in real terms. This benchmark is set at half the rate of efficiency gains that the Authority considers should be achievable by the businesses after taking into account similar benchmarks for national and international water services businesses. The forecasts of operating expenditure of AQWEST and Busselton Water implied efficiency gains in excess of this benchmark (and hence no adjustments were made to the forecasts of costs). The forecasts provided by the Corporation implied efficiency gains of close to zero and, for the purpose of determining prices, the Authority has consequently revised the forecast of operating expenditure to reflect annual efficiency gains of 1.25 per cent.

Prices for water and wastewater services have been determined for a ten-year period, based on the revenue requirements determined for each business and forecasts of demand for services.

The reasons for determining prices for a ten-year period include:

- water businesses have less control over their sales than regulated businesses in other utility industries (such as gas transmission companies or electricity transmission companies) in that the level of water restrictions and the timing of when restrictions are eased or lifted are affected by year-to-year weather patterns and are generally matters for Government to decide rather than, necessarily, the water businesses themselves. For this reason, a method of pricing (such as price caps) that places all the demand or volume risk onto the water business may be inappropriate; and
- it may be unacceptable to expose consumers to large price variations from year to year (which might otherwise be needed to maintain the revenue requirement when restrictions are imposed).

In determining prices the Authority has applied a principle of establishing usage charges for water that reflect 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 or demand management programmes. Pricing to reflect long run marginal cost ensures that water users pay prices for water that reflect the long term cost of providing water services, and in particular the effects that current decisions for water consumption will have on the need for the water businesses to develop new water sources and their timing.

The recommended price paths for each water business are based on the assumption that the current relative average price difference between commercial and residential customers is maintained. This assumption was necessary because the water businesses do not have information systems that are suitable for cost-based regulation. The Authority recommends that the water businesses further develop their information systems to support the introduction of cost-based systems to better establish the revenue requirements for future periods.

It is recommended that the prices recommended in this report are updated periodically through reasonably frequent rolling reviews that take into account updated forecasts of costs and demand. The Authority considers that the first review of prices for all three of the water businesses should take place after four years, with revisions to the price path implemented from 1 July 2010. The Authority recommends that a revenue cap form of price control should be adopted for all of the water businesses so that in each review of prices, the target revenue for each business is adjusted for under-recovery or over-recovery of revenue in the previous period where this resulted from differences between realised demand and forecast demand.

The Authority's recommendations for prices for water and wastewater services of the Corporation and water services of AQWEST and Busselton Water are set out in detail in this report and are summarised below. In coming to its recommendations on prices, the Authority has considered the 54 submissions received during the course of the inquiry and the comments and presentations made at forums held in Perth, Bunbury and Busselton. This includes having taken into account the particular circumstances applying in the case of low-income and/or vulnerable consumers, families, pensioners and tenants. The approach adopted by the Authority in this inquiry establishes economically efficient prices and charges that are in the long-term interest of all Western Australian consumers. The Authority recognises that Government may wish to further consider the distributive and

adjustment effects of these prices and charges, including utilising concessions or Community Service Obligations to address these effects where necessary, although the Authority has already included measures to ameliorate distributional impacts.

1.3 Water Corporation

1.3.1 General Price Trends

Real price increases are necessary for customers of the Corporation, reflecting, amongst other things, the increasing costs of developing new water sources and wastewater treatment plants.

The Authority has determined that the cost forecasts produced by the Corporation justify an increase in the average price of water services, expressed as a price per kilolitre of water delivered to all customers, from $1.01/kL in 2005/06 to $1.07/kL to 2014/15, where the prices are expressed in "real" terms (i.e. in real dollar values of 2005/06). By comparison the increase in water prices proposed by the Corporation during the course of this inquiry were from $1.01/kl in 2005/06 to $1.17/kL in 2006/07 (to meet the costs of the Perth Seawater Desalination Plant), followed by an increase to $1.20/kL in 2008/09 and thereafter no change in real terms.

The Authority considers that it is not necessary for water prices to recover the cost of the Perth Seawater Desalination Plant substantially through a one-off step increase in prices. Rather, the Authority is of the view that a "smoothed" price path over a 10-year period is likely to be more readily accepted by customers and provides for the recovery of costs in a normal way.

The average price of wastewater services to all customers, expressed as a price per connection, is recommended to decrease in real terms from $433 in 2005/06 to $419 in 2009/10 and thereafter remain constant in real terms. By comparison the Corporation has proposed to hold wastewater prices constant in real terms.

1.3.2 Residential Water Services

The Authority recommends that the average price of supplying water to residential customers increase at an average rate of 0.7 per cent per year in real terms between 2005/06 and 2014/15.

The Authority also recommends that water prices be re-structured so that over a period of four years charges for water are aligned with estimates of the long run marginal cost of developing new water sources.

The Authority recommends that usage charges for residential water services be revised to reflect a range in estimates of the long run marginal cost of water of between $0.82/kL and $1.20/kL (in real dollar values of 2005) over a four year phase-in period. This results in the current five-block tariff structure being reduced to a two-block structure with usage up to 550kL/year being charged at $0.82/kL and usage over 550 kL/year at $1.20/kL by the end of the phase-in period. The service charge for water services is recommended to reduce to $103.80 per property by 2009/10 and then increase at 1.2 per cent per annum in real terms (Table 1.1).

Table 1.1 Proposed Tariff Structure for the Corporation's Metropolitan Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	152.30	140.18	128.05	115.93	103.81	110.24
Usage Charge ($/kL)						
0 – 150 kL	0.421	0.520	0.620	0.720	0.820	0.820
151 – 350 kL	0.682	0.716	0.751	0.785	0.820	0.820
351 – 550 kL	0.920	0.895	0.870	0.845	0.820	0.820
551 – 950 kL	1.213	1.210	1.207	1.203	1.200	1.200
Over 950kL	1.517	1.437	1.358	1.279	1.200	1.200

1.3.3 Residential Wastewater Services

The rates the Corporation currently charges for residential wastewater services are based on a property's gross rental value. All other States, except South Australia, no longer follow this practice.

The Authority recommends that the current charging structure be phased-out over four years and replaced by a simpler and more transparent system that retains in part the principle of "capacity to pay" (to the extent that this is represented by gross rental value).

The Authority's initial preference was to move to a uniform flat charge for residential wastewater services, but consultation indicated there were significant concerns over the price increases that would have resulted for households in lower-valued properties.

Therefore, the Authority recommends that a four-block inclining tariff be introduced for residential wastewater charges. Initially, households would be placed in the different blocks based on the current gross rental values of their properties. The Corporation would then move each household over a four-year period to the average charge for the particular block that each household is allocated to. New households, including those households that move, would pay the average charge. Under this approach, the gross rental value methodology would not be required after the initial placement of households to their respective blocks.

The proposed blocks and charges are shown in Table 1.2. The lowest two charges are set to minimise the annual average price increase to the 11 per cent of households in these blocks (the average increase is up to $6 per year). The highest charge is based on the current maximum charge for country residential wastewater customers ($612.40 per year).

Table 1.2 Proposed Tariff Structure for the Corporation's Metropolitan Residential Wastewater Service (Real Dollar Values of 2005/06)

Gross Rental Value	Percentage of House-holds	Current Average Charge	Proposed Charges				
2005/06		2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
$0 - $5,000	3%	252.74	255.45	258.19	260.96	263.76	263.76
$5,001 - $6,000	8%	298.90	303.75	308.67	313.67	318.76	318.76
$6,001 – $12,000	80%	444.75	442.54	441.16	440.61	440.87	440.87
Over $12,001	9%	767.41	723.38	683.12	646.24	612.40	612.40
Average charge		455.51	450.33	446.15	442.94	440.66	440.66

1.3.4 Commercial Water Services

As with water prices for residential customers, real price increases are necessary for the Corporation's commercial customers, reflecting the increasing costs of developing new water sources. The Authority recommends that the average price of supplying water to commercial customers increase at an average rate of 0.6 per cent per year in real terms over the period to 2014/15, which is the same rate of increase as for residential customers.

The Authority recommends that usage charges for commercial water services be revised to reflect an estimate of the long run marginal cost of water of $0.82/kL (in real dollar values of 2005/06) with a phase-in period of four years (Table 1.3). This results in the current three-block tariff structure being reduced to a single rate per kilolitre of water use.

The Authority recommends that the Corporation's current structure of service charges is maintained and these charges increase at an average rate of 1.2 per cent per year in real terms over the period to 2014/15.

Table 1.3 Proposed Tariff Structure for the Corporation's Metropolitan Commercial Water Services (in real dollar values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charges ($/property)						
20mm meter	461.90	467.49	473.15	478.87	484.67	514.72
25mm meter	721.70	730.43	739.27	748.22	757.28	804.22
30mm meter	1,039.30	1,051.88	1,064.61	1,077.49	1,090.53	1,158.14
40mm meter	1,848.00	1,870.36	1,893.00	1,915.91	1,939.10	2,059.31
50mm meter	2,887.00	2,921.94	2,957.30	2,993.09	3,029.31	3,217.11
80mm meter	7,390.00	7,479.44	7,569.95	7,661.57	7,754.29	8,235.00
100mm meter	11,548.00	11,687.76	11,829.20	11,972.36	12,117.26	12,868.45
150mm meter	25,982.00	26,296.44	26,614.68	26,936.78	27,262.77	28,952.89
200mm meter	46,190.00	46,749.00	47,314.77	47,887.38	48,466.92	51,471.55
250mm meter	72,172.00	73,045.44	73,929.45	74,824.16	75,729.70	80,424.44
300mm meter	103,928.00	105,185.76	106,458.74	107,747.12	09,051.10	115,811.56
350mm meter	141,457.00	143,168.94	144,901.60	146,655.23	148,430.08	157,631.78
Vacant Land	152.30	154.14	156.01	157.90	159.81	169.71
Usage Charge ($/kL)						
0 – 600 kL	0.726	0.750	0.773	0.797	0.820	0.820
601 – 1,100,000 kL	0.811	0.813	0.816	0.818	0.820	0.820
over 1,100,000 kL	0.790	0.798	0.805	0.813	0.820	0.820

1.3.5 Commercial Wastewater Services

The Authority recommends that usage charges for commercial wastewater services be revised to reflect an estimate of the long run marginal cost of wastewater disposal of $1.68/kL (in real dollar values of 2005 and with a 200kL free discharge per annum applying to each property) with a phase-in period of four years.

The Authority recommends that the Corporation's current structure of service charges be maintained and these charges are held constant in real terms (Table 1.4).

Table 1.4 Proposed Tariff Structure for the Corporation's Metropolitan Commercial Wastewater Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/fixture)						
First Fixture	516.00	516.00	516.00	516.00	516.00	516.00
Second Fixture	220.80	220.80	220.80	220.80	220.80	220.80
Third Fixture	294.90	294.90	294.90	294.90	294.90	294.90
Over 3 Fixtures (each)	320.70	320.70	320.70	320.70	320.70	320.70
Vacant Land	270.00	270.00	270.00	270.00	270.00	270.00
Usage Charge ($/kL)						
Over 200 kL	1.931	1.868	1.806	1.743	1.681	1.681

1.3.6 Impacts of Price Changes on Customers

1.3.6.1 Residential customers

The impacts on residential customers depend on the combined effects of the water and wastewater pricing recommendations. For clarity the impacts on households' water bills, wastewater bills and total bills are shown separately.

Households will face average increases in their water bills of between $3 per year and $10 per year, in real terms, depending on their level of water usage (Table 1.5). These bill variations are relatively constant over the four year period. By comparison, the Corporation has proposed average increases of between $9 per year and $32 per year over the four-year period, depending on the level of water usage. However, under the Corporation's proposal the increases occur entirely in 2006/07 (with annual increases of between $29 and $105) and 2008/09 (with annual increases of between $6 and $22).

Table 1.5 Projected Changes in Water Payments for Representative Metropolitan Residential Customers of the Corporation

Representative Residential Customer (Water Use Per Year)	Average Annual Change in Water Bill (Real Dollar Values of 2005/06)	
	2005/06 to 2009/10	2010/11 to 2014/15
150 kL	$3 per year	$1 per year
250 kL	$6 per year	$1 per year
350 kL	$10 per year	$1 per year
550 kL	$5 per year	$1 per year
750 kL	$4 per year	$1 per year

Table 1.6 shows the relatively small increase in wastewater payments associated with decoupling wastewater charges from property values for the 11 per cent of customers in the lowest gross rental value (GRV) categories. The largest increase is $24 per year for

customers with a GRV of between $6,001 and $7,000. The reductions to households in higher-valued properties are limited by the introduction of an inclining block tariff for wastewater charges.

Table 1.6 Projected Average Annual Changes in Wastewater Payments for Representative Metropolitan Residential Customers of the Corporation

Gross Rental Value (GRV)	Percentage of Customers in Each GRV Category	Average Annual Change in Wastewater Bills (2005/06 to 2009/10) (Real Dollar Values of 2005/06)
$0-$4000	0.3%	$6 per year
$4001-$5000	2.9%	$2 per year
$5001-$6000	8.0%	$5 per year
$6001-$7000	17.4%	$24 per year
$7001-$8000	17.6%	$11 per year
$8001-$9000	16.2%	-$2 per year
$9001-$10000	12.1%	-$14 per year
$10001-$11000	7.6%	-$23 per year
$11001-$12000	5.4%	-$32 per year
$12001-$13000	3.5%	-$41 per year
$13001-$14000	1.7%	-$6 per year
$14001-$15000	1.7%	-$14 per year
$15001-$16000	1.2%	-$23 per year
$16001-$17000	0.9%	-$32 per year
$17001-$18000	0.7%	-$38 per year
$18001-$19000	0.5%	-$46 per year
$19001-$20000	0.3%	-$55 per year
Over $20000	2.0%	-$96 per year

Table 1.7 shows the total payment variations that would occur on average each year between 2005/06 and 2009/10 depending on the household's property value and level of water usage. The payment variations differ significantly and range up to $34 per year.

Table 1.7 Projected Average Annual Changes in Total Water and Wastewater Bills for Metropolitan Residential Customers of the Corporation (2005/06 to 2009/10, Real Dollar Values of 2005/06)

		Water Usage Per Year				
Gross Rental Value	Percentage of Customers in Each GRV Category	150kL	250kL	350kL	550kL	750kL
$0-$4000	0.3%	$9	$12	$16	$11	$10
$4001-$5000	2.9%	$5	$9	$13	$7	$7
$5001-$6000	8.0%	$8	$11	$15	$10	$9
$6001-$7000	17.4%	$27	$30	$34	$29	$28
$7001-$8000	17.6%	$14	$18	$21	$16	$15
$8001-$9000	16.2%	$1	$5	$8	$3	$3
$9001-$10000	12.1%	-$11	-$7	-$4	-$9	-$9
$10001-$11000	7.6%	-$20	-$17	-$13	-$18	-$19
$11001-$12000	5.4%	-$29	-$25	-$22	-$27	-$28
$12001-$13000	3.5%	-$38	-$34	-$31	-$36	-$37
$13001-$14000	1.7%	-$3	$1	$4	-$1	-$2
$14001-$15000	1.7%	-$11	-$8	-$4	-$9	-$10
$15001-$16000	1.2%	-$20	-$17	-$13	-$18	-$19
$16001-$17000	0.9%	-$29	-$25	-$22	-$27	-$27
$17001-$18000	0.7%	-$36	-$32	-$28	-$34	-$34
$18001-$19000	0.5%	-$43	-$40	-$36	-$41	-$42
$19001-$20000	0.3%	-$52	-$48	-$45	-$50	-$51
Over $20000	2.0%	-$93	-$89	-$86	-$91	-$92

Under the current concession schemes, pensioners are partly shielded from the price variations that impact non-concession card holders (pensioners in lower-valued properties face price increases of between $4 and $20 per year). However, seniors and dual seniors (seniors with both State and Commonwealth concession cards) in lower-valued properties generally face higher price increases than shown in Table 1.7 (increases range between $8 and $40 per year).

Depending upon the level of water use, residential tenants are projected to incur increases in water charges of between $15 and $22 per year in real terms, for the period to 2009/10 and then no change to 2014/15. Tenants generally only pay usage charges for water and are therefore shielded from the variations to wastewater and water service charges until, and by the extent to which, the rental market passes on these charges in rents.

1.3.6.2 Commercial customers

Commercial customers who use moderate to high amounts of water will face reduced water and wastewater bills in real terms over the four years to 2009/10 as a result of the decline in the wastewater usage charge more than offsetting the increase in water

charges. Customers with small fixtures who use relatively low volumes of water will face price increases of 0.6 per cent per year.

Table 1.8 Projected Variations in Total Water and Wastewater Bills for Representative Commercial Customers of the Corporation (Real Dollar Values of 2005/06)

Representative Water User	Average Annual Change in Water and Wastewater Bill			
	2005/06 to 2009/10		2010/11 to 2014/15	
	(Real $/year)	(%/year)	(Real $/year)	(%/year)
20mm meter & 300 kL/year	6	0.6%	6	0.5%
40mm meter & 2 ML/year	-73	-1.0%	24	0.3%
100mm meter & 20 ML/year	-1,039	-1.6%	150	0.2%
150mm meter & 50 ML/year	-2,670	-1.7%	338	0.2%
200mm meter & 400 ML/year	-23,528	-2.1%	601	0.1%

1.3.7 Impacts of Price Changes on Government Finances

The Authority's recommended prices for water and wastewater services are expected to result in net payments to government over the ten-year period of $1,352 million (net payments to government are the total amount of dividend and taxation payments to the State Government less community service obligations payments to the Corporation). The Corporation's proposals result in higher net payments to government ($1,465 million over the ten-year period).

1.4 AQWEST and Busselton Water

1.4.1 General Price Trends

The Authority has determined that the cost forecasts produced by AQWEST justify a decrease in the average price of water services, expressed as a price per kilolitre of water delivered to all customers, from $1.08/kL in 2005/06 to $0.95/kL over the period to 2014/15 in real dollar values of 2005/06.

For Busselton Water, the Authority has determined that the average price of water services will need to rise from $0.96/kL to $1.03/kL over the period to 2014/15 in real dollars of 2005/06. The difference in the price variations between the two water boards is related to the relatively high growth rate in Busselton and to Busselton Water having a lower efficiency target than AQWEST.

1.4.2 Residential Water Services

The Authority recommends that usage charges for residential water services for consumption of up to 500 or 550 kilolitres per year be revised to reflect an estimate of the long run marginal cost of water of $0.56 per kilolitre (in real dollar values of 2005/06) and usage charges for higher quantities of water use priced at $1.20/kL, with a phase-in period of four years. As a result, the current multi-block tariff structures (with usage charges increasing in blocks from $0.39 per kilolitre to $2.47 per kilolitre) are reduced to a two-block structure.

For AQWEST the residential service charge is recommended to decrease from $90.00 per property in 2005/06 to $73.93 per property in 2009/10 (in real dollar values of 2005/06) and then remain constant in real terms. For Busselton Water the residential service charge is recommended to decrease from $105.25 per property in 2005/06 to $91.86 per property in 2009/10 (in real dollar values of 2005/06) and then remain constant in real terms.

Table 1.9 Proposed Tariff Structure for AQWEST's Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	90.00	85.98	81.97	77.95	73.93	73.93
Usage Charge ($/kL)						
0 – 150 kL	0.39	0.43	0.48	0.52	0.56	0.56
151 – 350 kL	0.69	0.66	0.63	0.59	0.56	0.56
351 – 500 kL	1.00	0.89	0.78	0.67	0.56	0.56
501 – 700 kL	1.31	1.28	1.26	1.23	1.20	1.20
701 – 1,000 kL	1.57	1.48	1.39	1.29	1.20	1.20
over 1000 kL	2.28	2.01	1.74	1.47	1.20	1.20

Table 1.10 Proposed Tariff Structure for Busselton Water's Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	105.25	101.90	98.55	95.21	91.86	91.86
Usage Charge ($/kL)						
0 to 150 kL	0.41	0.45	0.49	0.52	0.56	0.56
151 to 350 kL	0.59	0.58	0.58	0.57	0.56	0.56
351 to 550 kL	0.65	0.63	0.61	0.58	0.56	0.56
551 to 750 kL	0.78	0.89	0.99	1.10	1.20	1.20
751 to 1,150 kL	1.29	1.27	1.25	1.22	1.20	1.20
1,151 to 1,550 kL	1.84	1.68	1.52	1.36	1.20	1.20
1,551 to 1,950 kL	2.13	1.90	1.67	1.43	1.20	1.20
Over 1,950 kL	2.47	2.15	1.84	1.52	1.20	1.20

1.4.3 Commercial Water Services

The Authority recommends that usage charges for commercial water services for AQWEST and Busselton Water be revised to reflect an estimate of the long run marginal cost of water of $0.56 per kilolitre (in real dollar values of 2005/06) with a phase-in period of four years. This results in the current two-block price structure being reduced to a single rate regardless of the level of water use.

Both AQWEST and Busselton Water have recently implemented programmes to convert water service charges from a system based on the gross rental values to one based on meter sizes, similar to that used by the Corporation. This will be implemented between 2005/06 to 2009/10. The Authority recommends that these programmes be maintained and has determined a schedule of service charges in accordance with these programmes (Table 1.11).

Table 1.11 Proposed Tariff Structure for the Commercial Water Services of AQWEST and Busselton Water (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Proposed Charge (Phased-in by 2009/10 then held constant in real terms)	
		Busselton Water	AQWEST
Service Charges ($/property)			
20mm meter	Current charges are based on a hybrid of meter-based charge and industry-type charges	356.45	352.46
25mm meter		556.36	550.38
32mm meter		801.75	n/a
40mm meter		1,426.86	1,409.83
50mm meter		2,228.61	2,202.60
80mm meter		5,707.44	5,639.33
100mm meter		8,917.62	8,811.45
120mm meter		19,976.05	n/a
150mm meter		n/a	19,825.77
Usage Charge ($/kL)			
0 – 1000 kL		0.56	0.56
over 1000 kL		0.56	0.56

1.4.4 Impacts of Price Changes on Customers

While the Authority is recommending changes in price structures for water services provided by AQWEST and Busselton Water, average water prices and values of water bills for almost all water customers are projected to remain approximately constant in real terms or to decrease. While there are some exceptions to this, any increases projected for particular customer classes are relatively minor.

1.4.5 Impacts of Price Changes on Government Finances

The Authority's recommended prices for water and wastewater services are not projected to have any material impact on Government finances, taking into account the potential taxation payments, and with prices determined under the premise that AQWEST and Busselton Water continue to operate without making dividend payments to the Government and with internal financing of concessions for pensioners and seniors.

2 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 this inquiry is to inform the Government on the level and structure of water prices prior to its consideration of these matters for the 2006/07 financial year. The Treasurer has indicated that the inquiry will ensure "accountability and transparency" in the way water prices are set.[1]

The water businesses covered by the inquiry include the Water Corporation, AQWEST and Busselton Water, and the inquiry is limited to prices for water and wastewater services in the urban areas of the Perth region, Bunbury and Busselton. The inquiry does not include other water businesses, rural water prices or the pricing of drainage, trade waste, private groundwater extractions or developer's contributions. However, on 20 October 2005 the Treasurer requested the Authority to undertake an inquiry into the prices and pricing structures of the Corporation's country water and wastewater services (the final report for that inquiry is due by 30 April 2006). It should be noted that, because of the interrelated nature of urban and country tariffs, the outcomes of the country pricing inquiry may influence the recommendations of this urban pricing inquiry.

Currently, statutory authority to approve prices for water and wastewater services resides with the Minister Assisting the Minister for Water Resources. Prices are typically proposed and approved during the State Government's 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 and the Office of Water Strategy, the proposals are considered by both the Government's Expenditure Review Committee and Cabinet.

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" such as in the water industry. The Authority's role in respect of this inquiry is therefore advisory and it does not determine prices or pricing policy. Following receipt of this report, the Treasurer has 28 days to table the report in Parliament.

2.1 Terms of Reference

The Terms of Reference for the inquiry (Appendix 2) require the Authority to investigate and report on:

- the appropriate charging structures and recommended tariff levels for the Water Corporation's and the Bunbury and Busselton Water Boards' 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).

In conducting its investigation, the Authority must review:

[1] Treasurer's media statement, 16 June 2004.

- 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.

In addition, the Authority must give consideration to, but is not 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 responding to the above terms of reference, the Authority is also required by section 26 of the Authority Act 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.

2.2 Review Process

The following review process has informed the Authority's recommendations.

- On 22 July 2004, the Authority published an Issues Paper setting out the background to the inquiry and the issues to be considered and invited public comment. Thirty one 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 water businesses. 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 water businesses were asked to provide in their pricing submissions and the methodology that the Authority intended to use in analysing the information from water businesses.
- Draft pricing submissions were subsequently received from each water business on 26 November 2004 and final submissions were received on 24 December 2004, following an amendment to the timetable to allow water businesses more time to prepare their final submissions.
- The Draft Report and final pricing submissions from the water businesses were published on 18 March 2005 and an invitation made for public submissions. Twenty three submissions were received.
- Public forums were held in Perth (19 May 2005) and Bunbury and Busselton (23 May 2005) to discuss the Draft Report.
- The Economic Regulation Authority Consumer Consultative Committee was consulted on 23 June 2005.

In relation to the process in conducting the inquiry, the Authority notes the comments from the Office of Water Strategy:

> …the OWS would have favoured a public hearing to be undertaken prior to the release of the Draft Report. A public hearing has the advantage of providing a more formal rigor to the review of the service provider's pricing submissions. It allows the Authority to interact with invited agencies to question assumptions made in submissions for the public record. Public hearings prior to the release of Draft Reports are part of the inquiry process of well-regarded agencies such as IPART in NSW and the Productivity Commission. (Office of Water Strategy, Draft Report submission, p2)

On the question of formal public hearings, the Authority offers the following comments. With over six years of experience in conducting public consultation, the agencies that were brought together to form the Authority and the experience of the Authority itself has shown that public forums held after the release of a draft report – when interested parties have some guidance on the Authority's likely approach – are more focussed, more efficient and offer greater opportunity for interested parties to inform the Authority on matters of relevance. Public hearings prior to the release of a draft report add an

additional round of public consultation, and where the time frame for undertaking the inquiry is short are unlikely to represent a good use of the time available. Informal public forums encourage community wide participation in an open, transparent and generally welcoming discussion of the issues. Under its legislation the Authority has various options for formalising consultation, but considers that such formality, including public hearings, is best left to situations where it is evident that greater formality will provide clear benefits.

2.3 Background to the Inquiry

The impetus for this inquiry is 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 considered that greater transparency in water pricing was needed for Western Australia to conform with these COAG principles. These principles, in essence, seek that charges for water and wastewater services are based on efficient pricing, are transparent and send the correct economic signals to consumers on the cost of augmenting water supply systems.

A number of other recent projects have relevance for the 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.

2.3.1 National Water Initiative

In June 2004, the COAG water reform agreement of 1994 was "revisited" and revised. The outcome was the development of the National Water Initiative (NWI), signed by all States and Territories except Western Australia, which builds on earlier National Competition Policy (NCP) reforms and aims for adoption of best-practice approaches to water management. A National Water Commission has been formed to implement the Initiative.

While Western Australia is not a signatory to the National Water Initiative, the Initiative still establishes a direction and agenda for water reform in Australia that is of relevance to the current inquiry.

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.

2.3.2 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) Reforms. The purpose of the Productivity

Commission inquiry was to assist COAG in its 2005 review of NCP arrangements. In relation to water, the final report of the Productivity Commission inquiry (released on 14 April 2005) recommended:

> 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. Moreover, all parties should work towards the National Water Initiative being national in coverage through re-assessing the possibility of involvement by Western Australia and Tasmania.
>
> The CoAG water reform process should also give close attention to:
>
> - better integrating the rural and urban water reform agendas, including through facilitating water trading between rural and urban areas;
> - developing ways to better reflect the scarcity value of water and achieve more efficient and effective management of environmental externalities;
> - developing a set of best practice principles to help ensure that urban waste water recycling proposals are cost effective and environmentally sustainable; and
> - ensuring that monitoring arrangements post-NCP provide a discipline on all governments to progress agreed water reforms." (pXLV)

The Australian Government response to the final report is currently being progressed as part of the COAG review of NCP arrangements, which is due to be completed by the end of 2005.

2.3.3 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".[2] There are a number of overlaps between the inquiry into pricing of water and wastewater services 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 State Water Strategy sets 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.

[2] Water Taskforce (2003), *Securing our Water Future: A State Water Strategy for Western Australia*.

These targets are considered when examining the Water Corporation's cost structure and capital development program. They are also relevant to the question of how pricing can be used to manage demand.

3 Generic Principles for Water and Wastewater Pricing

The Terms of Reference and assessment framework requires that consideration be given to a range of issues that have generic application to each of the three water businesses. This chapter considers the generic principles for pricing of water and wastewater services while the analyses in the following sections apply these principles to each water business respectively.

The Authority makes a number of findings and recommendations in this chapter that guide the analysis of costs and prices for each of the three water businesses.

3.1 Pricing Integrated Utility Services

Optimal pricing of integrated utility services, such as those provided by the Corporation, AQWEST and the Busselton Water, poses some special challenges. As a fully corporatised entity, but subject to Ministerial direction, the Corporation, for example, is required to act in accordance with prudent commercial principles and endeavour to make a profit, consistent with maximising its long term value.[3]

Optimal pricing is a challenge because it typically involves balancing various objectives, recognising that the pursuit of any one may restrain or diminish the achievement of others. Indeed, optimal pricing implies that there is some overriding objective to be optimised. It could be argued, for example, that a suitable overriding objective might be to maximise the long term interests of consumers. Such an objective implies economic efficiency that can be achieved through the workings of a competitive market.

However, the services provided by utilities such as the Corporation often exhibit strong natural monopoly characteristics, which requires regulation or some other form of Government intervention to reconcile private commercial interests with those of the community more generally. In the case of the Corporation, the Government currently approves water and wastewater tariffs annually, offering the opportunity for aligning corporate objectives with those of the community more generally.

An integrated utility such as the Corporation typically provides a range of services, including water, wastewater, drainage and irrigation services. These services are provided to residential, commercial, industrial and horticultural customers located in metropolitan, rural and remote locations. The services generally involve treatment, transmission, storage and related network services, in addition to the sourcing, disinfection, purification and filtration of the water service.

At the broadest level, efficient prices lie between the avoidable cost of service provision at the lower end and stand-alone cost at the top. For a water business, the avoidable costs are those costs that would be avoided by not having a household connected to the network, while the stand-alone costs are the costs to the household of self supply.

Efficient pricing also requires that revenue derived from a service should be equal to or greater than expenditure directly associated with the provision of that service. Otherwise all of the utility's other customers would be better off if that service were not offered at all. At the other extreme, a service should not be priced above the point at which the net

[3] *Water Corporation Act 1995*, Section 30.

direct revenue from that service begins to decline, otherwise all of the utility's other customers would be better off if the price of that service were reduced.

The broad pricing parameters referred to above offer a wide range within which prices might be set. Optimal pricing seeks to determine prices within these broad parameters that provide a more efficient and indeed optimal outcome. To achieve such an outcome requires some specific cost information and market intelligence often not readily available. The importance of pricing, however, justifies developing systems to provide the information necessary to determine and guide efficient pricing.

Efficiency is enhanced through the application of pricing techniques that guide consumers in the choices they make that avoid waste, in terms of the private and public impacts of their individual and collective purchasing decisions.

Optimal pricing seeks to enhance impacts of individual and collective purchasing decisions that improve economic efficiency and diminish impacts that have the opposite effect. The impacts may be internal to the utility, such as improvements in the utilisation of existing infrastructure, particularly networks, transmission and storage facilities or external such as impacts on the environment. The impacts may be immediate or into the future, such as any impact on the long-run cost of source development. It is also important to be aware that any particular pricing strategy may have multiple impacts, some of which enhance economic efficiency and others that diminish it.

In essence, optimal pricing comes down to allocating joint fixed overheads across the various products and services provided by an integrated utility in a way that maximises impacts that enhance economic efficiency and minimises impacts that diminish it.

Optimal pricing in the circumstances of an integrated utility relies on good information disaggregated by the type of services offered, differentiating between the provision and costing of the resource, transmission, distribution and storage. Information disaggregating direct and avoidable costs of discrete services on regional and business lines is needed to identify and substantiate Consumer Service Obligations (CSOs) where Government considers services requiring CSOs should be provided. The application of optimal pricing also relies on the availability of basic market intelligence, particularly relating to the price sensitivity of consumers.

The information needed on costs includes direct, variable and avoidable costs of source development and treatment, operation, transmission, distribution and storage. Estimates of long run marginal cost are needed particularly in relation to source development.

While some of the required information is available for each water business, as discussed in the paper by the Allen Consulting Group issued in March 2005[4], there is a need for further enhancement of the information systems and techniques to guide the development of optimal pricing across the different product and service classifications involved. In the absence of such detailed cost information, the Authority has had to make an assumption about the allocation of costs, and the Authority has done this by assuming for each water business that the relativity between the average prices paid by residential and commercial customers is maintained at current levels.

[4] Allen Consulting Group, *Review of Asset Values, Costs and Cost Allocation of Western Australian Urban Water and Wastewater Service Providers*, March 2005, (available at: http://www.era.wa.gov.au/water/content/waterinquiry/docs/ACG_Report_on_General_Principles_and_Methodology.pdf)

Recommendation

1 Information systems be further developed including market intelligence to support the introduction of cost based systems to govern the revenue requirement of each water business for this and future periods.

3.2 Economic Characteristics of Water and Wastewater Services

Urban water supply and wastewater disposal services have a number of features that affect the manner in which water services may be efficiently provided to the community.

First, market-determined prices are currently unavailable for signalling the relative scarcity of water resources. Under "normal" market conditions, resources that are capable of being traded would attract a price that reflects the scarcity of the resource relative to demand. However, urban water supplies have historically been treated as "community resources" that are reserved for urban use and that are not traded in markets. As such, prices for water reflect the infrastructure and operational costs incurred in the provision of water services, but do not reflect the physical scarcity of water at particular locations to the extent that this might exist.

Second, water and wastewater services have characteristics of "natural monopolies", that is, significant infrastructure is required to store, treat and deliver water; and to collect, treat and transport wastewater. Much of this infrastructure may be provided at least cost if it is provided by a single business and without duplication of infrastructure. However, a consequence of this is that there is a lack of competition in service delivery, and a lack of competitive incentives for efficiency in provision of the services.

Third, the infrastructure used to transport water and wastewater may conceivably be utilised by multiple water producers and businesses providing wastewater treatment services. In such a case, as with other utility services such as electricity and gas distribution systems, there may be a role for government intervention to regulate the prices for access to, and use of, the infrastructure.

Fourth, provision of water and wastewater services is often characterised by environmental impacts – most of which are classed as "externalities". These are impacts that are not automatically factored into water supply, water consumption and wastewater disposal decisions because they are costs borne by society that are not reflected in costs incurred by the water businesses and the prices charged for the services. For example, the effect of extraction of groundwater on local ecosystems is a common external cost arising from the use of groundwater resources – a negative externality.[5] A justification for government intervention in the provision of services and the pricing of services is to ensure that external costs are taken into account in the prices that are charged for the services.

Finally, water and wastewater services are regarded as essential services, both in terms of ensuring ready and affordable access to these services and requiring the use of these

[5] Provision of water services may also result in positive externalities, such as where a water reservoir developed for water-supply purposes provides a recreational resource.

services for reasons of public health. There is a potential role for governments in ensuring the availability and affordability of services, and establishing the relevant standards for service provision.

Government intervention in the setting of prices for water and wastewater services may therefore be undertaken to achieve multiple policy objectives:

- delivering water and wastewater services at prices that reflect the cost of providing the services;
- enhancing the efficiency of service delivery in the absence of a competitive market through incentive-based pricing mechanisms that allow water providers to recover the costs of efficient service delivery and earn a commercial rate of return on capital;
- providing signals to water users of the relative scarcity of water supplies – which may arise due to infrastructure constraints or limited water supply – so that relative scarcity is taken into account in demand and consumption decisions;
- reflecting the net cost of environmental externalities, with the aim of either recovering costs associated with meeting environmental standards, or reducing consumption of water so as to avoid future environmental impacts and costs; and
- setting tariff structures to meet policy objectives relating to the use of water and wastewater services, the affordability of these services and standards of public health.

The pursuit of these objectives may involve trade-offs. The overall goal, however, is one of economic efficiency, including efficiency in achieving distributional and social policy objectives, to the extent that this is possible given administrative practicalities, requirements for revenue stability for the water businesses, customer acceptability and transparency.

3.3 Efficient Pricing for Water and Wastewater Services

Efficient prices for water and wastewater services will serve two main functions:

- they will generate revenue for the water provider to cover the efficient costs of providing the services; and
- they will send signals to consumers of the services of the costs of service provision in order that these costs are properly taken into account in usage decisions.

In determining prices, the first of these objectives is achieved by setting prices sufficient to recover a target revenue for a service provider. One approach that can be used to determine the value of this target revenue is termed the “building block” approach. This involves a bottom-up determination of a total revenue requirement from component costs: operating and maintenance costs, depreciation allowances and a rate of return or profit allowance. Given forecasts of demand for services, prices are then determined so that the forecast revenue achieved by charging of these prices is equal to the total revenue requirement.

Achieving the second of the above objectives is more complicated, involving the determination of price structures that ensure that consumers of water and wastewater services make efficient decisions on the consumption of these services, such as decisions

about the level of water usage and decisions about investments in water saving technologies or alternative sources of water such as rainwater tanks or recycling.

The approaches taken by the Authority in addressing these two objectives in determining price levels and structures are explained in the following sections of this chapter.

3.4 Price Paths and Periodic Reviews

3.4.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

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

3.4.2 Authority Assessment

A central aim in the determination of prices for services provided by natural monopolies is to encourage the efficient provision of services. In circumstances where prices for services are subject to economic regulation, prices and price structures are typically designed to provide incentives for the regulated businesses to seek efficiencies in the provision of services that ultimately benefit consumers.

The most common form of price control implemented in Australia for regulated utility services is the setting of price caps for a specified regulatory period. Price caps are established on the basis of forecasts of costs and demand for services. Incentives for a regulated business to seek cost reductions and to grow the market for services arises from the ability of the business to retain the additional profits that are earned if the business is able to out-perform the forecasts used to set prices, that is, the firm is able to reduce costs below forecasts or grow the market for services in excess of forecast demand. Other forms of price control include “revenue caps”, where the regulated utility is permitted to earn a certain amount of revenue over a period, and “rate of return” regulation, where the regulated entity is permitted to earn a particular rate of return on its investment.

The Authority has given consideration as to the appropriate regime of price determination that should be implemented for the water businesses in Western Australia.

In its Draft Report for this inquiry, the Authority proposed a price cap approach for the determination of an appropriate price path. IPART (NSW) and the Victorian Essential Services Commission currently use individual price caps to regulate water businesses. Individual price caps are also supported by the WA Department of Treasury and Finance (DTF):

> DTF supports the CPI-X individual price cap approach to price regulation as it is consistent with the pricing principles set out in the COAG water reform agreement and provides service providers with incentive for efficiency gains. Individual price caps also provide price certainty for the water business and are currently used by IPART to regulate water providers in NSW (DTF, Draft Report submission, p19).

Each of the three water businesses, however, has 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 water businesses, the incentives for efficiency in this context derive from efficiency targets and budgets agreed with Government (in the case of

Corporation) and from a view that the customers themselves are the shareholders (AQWEST and Busselton 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 (Corporation, Issues Paper submission, p34).

- 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 (AQWEST, Issues Paper submission, p6).

- 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. (Busselton, Issues Paper submission, p3).

The Authority accepts DTF’s view that individual price caps are consistent with COAG principles and provide price certainty for consumers. The Authority also accepts, however, that the water businesses, as public entities, are not in the same position as their private counterparts in facing profit incentives for the adoption of efficiency gains. On balance, the Authority considers that there is merit in setting efficiency targets to achieve the best possible outcome. Such a mechanism would include pricing that recovers the efficient cost of providing services.

In addition to public sector ownership of the water businesses, there are additional features of the water industry in Western Australia which will determine an appropriate approach to pricing, as follows.

- First, water businesses have less control over their sales than regulated businesses in other utility industries (such as gas transmission companies or electricity transmission companies) in that the level of water restrictions and the timing of when restrictions are eased or lifted are affected by year-to-year weather patterns and are generally matters for Government to decide rather than, necessarily, the water businesses themselves. For this reason, a method of pricing (such as price caps) that places all the demand or volume risk onto the water business may be inappropriate;

- Second, it may be unacceptable to expose consumers to large price variations from year to year (which might otherwise be needed to maintain the revenue requirement when restrictions are imposed).

- Third, given the changing climatic conditions and current supply constraints, consideration may need to be given for a price path to be designed in such a way as to provide water businesses with an incentive to increase the efficiency of service delivery rather than expanding demand.

The Authority’s view is that an appropriate way in which these matters may be taken into account is by setting individual price paths (for each service) as follows:

- The target revenue for each service provider is determined for a given period, using the building block approach and taking into account efficiency gains that are envisaged to be achievable by each business.
- Smoothed price paths are determined for an extended period into the future (say 10 years) based on the target revenue for each service provider and forecasts of demand for services. These prices are updated periodically through rolling reviews on a more frequent basis that take into account updated forecasts of costs and demand.
- Where a water business is faced with substantial demand uncertainty (such as where there is uncertainty over whether water restrictions will or will not apply), the form of price control applied in the determination of service prices should include sufficient flexibility to address under-recovery or over-recovery of revenue to the extent that this results from differences between realised demand and forecast demand.

A further issue in the regulation of prices is whether price caps should be strictly applied for each of the services provided by the water businesses, or whether the businesses should have a degree of flexibility in setting prices subject to a more general constraint such as a cap on the value of average revenue across a range of services or customer classes. The latter approach to regulating prices has become common in price regulation for gas and electricity distribution services in Australia over the past five years. To date, however, there has been no application of this approach in regulating prices for water and wastewater services.

AQWEST favours the more flexible approach to price regulation:

> If the ERA is to begin establishing prices for each and every service operated by AQWEST and other water service providers, AQWEST contends that this will be a very heavy-handed approach, and quite incompatible with any form of incentive based regulation and the "light-handed" approach which the ERA itself suggest is the best way of regulating prices. The rationale for this is allowing government to achieve its social and economic objectives on water pricing but these are not clearly enunciated, so it is not possible to accurately assess whether the heavy-handed approach proposed by the ERA is outweighed by the benefits of this approach from the perspective of achieving government objectives and nor is it made clear whether any other, less intrusive methods are also possible. Moreover, as AQWEST has argued elsewhere, it is not even clear that social and environmental goals should be within the ambit of determination by an economic regulator, as they would appear better addressed by the resource manager (in respect to environmental goals) and government (in respect to social goals). AQWEST suggests that, as discussed further in the section on the regulatory asset base, the regulator simply set a price cap for the weighed average of services provided by AQWEST, and allow this change via a CPI-X mechanism, with minimal oversight (AQWEST, Draft Report submission, p6).

The Authority has considered whether the determination of prices for water and wastewater services should make provision for the water businesses to have some flexibility in pricing subject to a constraint on the total amount of revenue forecast to be raised. In the context of setting prices for water services as opposed to other forms of utility services, the Authority takes the view that such a form of price control is inconsistent with other considerations in the determination of prices, including the desirability of setting usage charges at a level equal to the long run marginal cost of developing water supplies (refer to Section 3.6), which would not necessarily occur if pricing decisions were made by the water businesses themselves.

Recommendations

2 Prices for the urban water and wastewater water businesses should be established as price paths over a 10 year period based on current best forecasts of costs and demand, and these prices should be updated periodically through rolling reviews on a more frequent basis that take into account updated forecasts of costs and demand for services.

3 Where a water business is faced with substantial demand uncertainty a revenue cap form of price control should be adopted so that in each review of prices, the target revenue for the water business is adjusted for under-recovery or over-recovery of revenue in the previous period to the extent that this results from differences between realised demand and forecast demand.

3.5 Setting the Revenue Requirements

3.5.1 Terms of Reference

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.*

3.5.2 The Building-Block Method for Determining Revenue Requirements

One of the objectives in setting prices for water and wastewater services is to ensure the prices are set at levels that, when considered in conjunction with a forecast of demand for services, will generate a level of revenue sufficient to cover the efficient costs of providing the services, including an appropriate return on the value of the assets used by the business in providing services. The underlying principle in pursuing this objective is to set maximum prices for services that will permit the business providing those services to recover the cost incurred in constructing assets, to earn a commercial rate of return on the un-recovered cost of assets, and to recover the efficient costs of operating and maintaining the assets. That is, prices for water and wastewater services should bear a formal relationship to the costs of providing those services (and changes in those costs).

The Authority has applied the building-block methodology in determining the revenue requirements for each of the three water businesses that are the subject of this inquiry.

The building block methodology involves a determination of a total revenue requirement from component costs, as follows.

Total Revenue	=	*Rate of Return × Asset Value*
	+	*Depreciation of Assets*
	+	*Forecast Efficient Operating and Maintenance Costs*

Identifying an appropriate level of revenue requires consideration of, among other things, the asset value, the rate of return on the asset value, the allowance for depreciation that is

necessary to reflect the aging of assets and the efficient level of operating and maintenance expenditure.

Recommendations

4 A cost-based system of pricing should be introduced for the determination of prices for water and wastewater services. Prices should be established that will permit the business providing the services to recover the cost incurred in constructing assets, to earn a commercial rate of return on the un-recovered cost of assets, and to recover the efficient costs of operating and maintaining the assets.

5 A "building block" methodology should be applied to determine revenue requirements for each water business.

3.5.3 Asset Value

The asset value for a business is a measure of the un-recovered value of investment in the physical assets used to provide the relevant services. This value could be determined by consideration of the original costs of constructing the assets, subtracting any subsequent recovery of this investment in the revenues obtained from the use of the assets, and making any necessary adjustment for inflation to express the residual value in terms of current dollar values. However, for established businesses that have not previously been subject to rigorous, cost-based regulation of prices, there have generally not been the necessary accounts maintained to determine a value in this manner. This is the case with the Corporation, AQWEST and Busselton Water.

The first task in establishing asset values for each of these businesses has therefore been one of determining a notional cost (the initial asset value) associated with the existing assets of each water business for the purpose of reflecting this cost in the prices that the business is allowed to charge. Once the initial asset value has been established, the value can be "rolled forward" by:

- adding new capital expenditure at cost (or at a deemed efficient cost if there is some doubt as to the necessity, prudence or efficiency of capital expenditure); and
- subtracting depreciation (capital recovery) allowances explicitly provided for in the determination of prices.

Determination of an initial 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 an asset value for monopoly network assets at a particular point in time, but rather are typically interpreted as providing a feasible range.

- A lower limit for the asset valuation is that which is consistent with generating returns to the owner sufficient for the owner to have the incentive to continue to use the asset for the particular activity, which implies that the owner must receive a return at least as good as it would if the asset were used in its next best use. The asset value meeting this criterion is commonly referred to as "scrap value". Except for assets like freehold land, the value of network assets in alternative uses is typically very low.

- An upper limit that is typically posed is the value that is consistent with the price that would be charged by a hypothetical (efficient) new entrant. The rationale for this valuation derives from the observation that, in a perfectly contestable market, prices would reflect the cost structure of the efficient new entrant. Thus, it is argued that prices would contain monopoly rents if they were higher than would be earned in a contestable market, and so this should place a cap on the regulatory valuation. A depreciated optimised replacement cost (DORC) valuation – if implemented correctly – provides an estimate of the regulatory value for an existing asset that is consistent with the cost structure and prices of the hypothetical (efficient) new entrant that operates with a new asset.

While economic principles suggest that regulated assets should not be valued at less than scrap value or more than a (correctly-determined) DORC value, the appropriate value in any particular circumstance will depend on the impact on economic efficiency of the valuation. In general, it can be shown that price outcomes generated by a competitive market will be consistent with the valuation of assets at DORC.

There are, however, many examples of asset values for utility businesses being set at values lower than the estimates of DORC to reflect other concerns, the primary concern being a desire for the introduction of price regulation to not lead to a rise in prices from those previously prevailing. Thus, the asset values for the predominantly rural Victorian electricity distributors were determined at a discount to DORC to limit the magnitude of potential price increases experienced by end users of electricity.[6] A similar approach was adopted for the AlintaGas gas distribution networks in Western Australia,[7] and AGL Gas Networks in New South Wales.[8] These valuation methodologies are generally presented as a version of a deprival value, being an asset value that is implied by existing prices for, and revenues from, the relevant services.

The deprival value approach to setting an initial asset value has been given particular attention by the Authority for the reason that this approach (in one form or another) has been adopted in a number of instances where cost-based price regulation has first been implemented for government-owned utility businesses (including for the New South Wales urban water businesses, the predominantly rural Victorian electricity distributors, two of the three Victorian gas distributors, and the AlintaGas gas distribution business in Western Australia) [9].

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6 Office of the Regulator General, Victoria (October 1998), *Access Arrangements - Multinet Energy Pty Ltd & Multinet (Assets) Pty Ltd, Westar (Gas) Pty Ltd & Westar (Assets) Pty Ltd, Stratus (Gas) Pty Ltd & Stratus Networks (Assets) Pty Ltd Final Decision*, pp 51 – 70

7 Independent Gas Pipelines Access Regulator Western Australia (30 June 2000), *Final Decision: Access Arrangement Mid-West and South-West Gas Distribution Systems*, Part B pp 73 – 84.

8 Independent Pricing and Regulatory Tribunal of New South Wales (July 2000), *Final Decision Access Arrangement for AGL Gas Networks Limited Natural Gas System in New South Wales*, pp 71 – 88.

9 Deprival value is the amount that would need to be paid to an asset owner in compensation for being deprived of an asset. Optimised deprival value (ODV) is therefore viewed as the lesser of the replacement cost of an asset and the net present value of cash flows generated by use of that asset. If a person is deprived of an asset, they physically cannot build (and pay the cost of) an equivalent aged and depreciated asset, but rather must build a new asset. That is, the asset owner, when deprived of the asset, must bear the cost either of forgoing the future cash flows or building a new replacement asset. Therefore in application of the ODV methodology it is recognised that a person compensated for the cost of building a new asset would be better off than they were before when they owned an old and partially depreciated asset. The ODV valuation is therefore corrected to be a depreciated replacement cost.

A deprival value approach as described above has been proposed by the Corporation for the purposes of this inquiry. The Corporation has noted in a submission to the Authority that the Terms of Reference requires the Authority to value assets using the deprival valuation methodology unless another method is justified, and that this approach has been endorsed by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ).[10] The Corporation makes this submission in support of an argument for establishing a revenue requirement consistent with its current forecast of prices and revenues.

With AQWEST and Busselton Water, an issue for consideration in determination of an asset value using a deprival value methodology is that the prices and revenues for these businesses do not include any provision for a rate of return on investment. Rather, these businesses operate as not-for-profit businesses and with "profits" being, in effect, returned to customers through lower prices than would apply if the business was operated on a for-profit basis. Accordingly, if assets for these businesses were to be set on the basis of a benchmark financial structure of a for-profit business, then the forecast revenues should be increased by the value of a notional return on investment.

Taking into account relevant precedents in Australia for determining initial regulatory asset values for regulated utility business, the Authority has determined that the initial regulatory asset values for all of the three water businesses that are the subject of this inquiry should be determined using a deprival value methodology and as the values implied by, or consistent with, current forecasts of prices and revenues. Taking into account the circumstances and financial structures of AQWEST and Busselton Water, the Authority considers that it is appropriate to determine asset values for these businesses consistent with a forecast revenue stream that includes a notional return on investment. The manner in which this has been undertaken is described in sections 5 and 6 of this report. By these approaches, asset values have been established for all three water businesses at 30 June 2005.

The second task in determining asset values for each of the Corporation, AQWEST and Busselton Water is establishing the methodology for changing the asset values over time.

Economic principles also provide substantial guidance for the approach that should be taken to revaluing assets over time. That guidance is that that the method of revaluation, when combined with all other elements of the pricing framework, must provide the businesses with expectations of making a reasonable return on new investment and the return of that capital over time. That is, the revaluation method must be consistent with providing incentives for investment.

The overriding consideration in determining an appropriate methodology for the revaluation of assets is consistency of the revaluation methodology with provision of incentives for efficiency in investment and the costs of service provision. This is considered to be best achieved by a "roll-forward" methodology, whereby the regulatory asset value is updated by adjustment for efficient new capital expenditure, depreciation, asset disposals and inflation.

[10] On 27 February 1998, guidelines for pricing of water services were endorsed by the Agriculture and Resource Management Council of Australia and New Zealand. These guidelines indicate that assets should be valued by the deprival value methodology unless another method is justified in specific circumstances. (National Competition Council, June 1998, *Compendium of National Competition Policy Agreements* Second Edition, p 112.)

Recommendation

6 Initial asset values should be established for each of the water businesses as a value consistent with current forecasts of service prices and revenues.

For AQWEST and Busselton Water, the forecast revenue stream applied in determining the initial regulatory asset value should be adjusted to include a notional value of a return on an equity proportion of asset value.

Assets should subsequently be re-valued by a "roll-forward" methodology, whereby the regulatory asset value is updated by adjustment for efficient new capital expenditure, depreciation, asset disposals and inflation.

3.5.4 Rates of Return

A key element of the required revenue determined for each of the water businesses is the rate of return (or cost of capital) that investors – both the providers of debt and equity – would require in order to be compensated for the cost of the financial resources applied to investment in the assets used to provide services. 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)[11] for the each of the Corporation, AQWEST and Busselton Water.

In considering its approach to determining a value for the Rate of Return, the Authority has taken into account:

- the requirement under section 26(1) of the Authority Act that the Authority have regard to the needs of investors (by encouraging investment, and having regard to the legitimate business interest of investors and water businesses) 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 pricing principles of the 1994 CoAG water reform agreement (as set out in Appendix 2 to this report, which include the requirements under principles 4 and 5: "…a water business should not recover more than the ... cost of capital, the latter being calculated using a weighted average cost of capital." and "…a water business should recover, at least, … the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement ... Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome";
- the approach adopted by other utility regulators in Australia, including recent debates on the appropriate methodology for the estimation of the cost of capital;

[11] 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 approach adopted by the Authority and its predecessor agencies, O*ff*GAR and the Office of the Rail Access Regulator, in recent pricing determinations;[12] and
- comments by other respondents to the Issues Paper and the Draft Report in relation to the appropriate methodology for the estimation of the cost of capital.

Of the three water businesses that are the subject of this inquiry, only the Corporation has provided a submission to the Authority proposing a rate of return to be applied in determining prices. The rationale and methodologies used by the Corporation and the Authority in estimating the parameters of the CAPM are described in detail in Appendix 4, together with the Authority's determinations on appropriate rates of return for each of the three water businesses.

In determining rates of return, the Authority has applied standard assumptions of financial structure to the water businesses. Financial structure refers to the mix of equity and debt in the financing of each of the water businesses' assets, expressed as proportions of the total asset value. The Authority acknowledges that these standard assumptions (60 per cent debt and 40 per cent equity for the Corporation; and 40 per cent debt and 60 per cent equity for AQWEST and Busselton Water) do not reflect the actual financial structures of these businesses. In particular, the Authority acknowledges that AQWEST and Busselton Water carry no debt, but rather finance capital expenditures through a combination of developer contributions and asset replacement reserves. The Authority considers, however, that the financial arrangements and structures of each of the water businesses are a matter for determination by their respective management boards subject to constraints imposed by the State Government, and should not necessarily be considered in setting prices. In determining appropriate rates of return, the Authority has applied benchmark assumptions of financial structures that it considers may be adopted if the services were to be provided under commercial circumstances.

The Authority has adopted a pre-tax real approach in its calculation of the WACC. This approach conforms to the CoAG principles referred to above and to the practice of Australian utility regulators, particularly in relation to recent pricing determinations for water and wastewater services.[13] It has also been used in previous determinations on the cost of capital by the Authority, the Authority's predecessor agencies and the Corporation in its own estimation of the WACC.

Recommendation

7 Regulatory rates of return for each of the water businesses should be determined on the basis of benchmark assumptions of financial structure based on reasonable assumptions that would apply to a commercial provider of the same services.

[12] For example, Rail Access Regulator determination on urban and freight rail rates of return, July 2003; Authority draft decision on the Dampier to Bunbury Natural Gas Pipeline access arrangement, May 2005; Authority final decision on Goldfields Gas Pipeline access arrangement, May 2005; Authority final decision on AlintaGas Networks gas distribution access arrangement, July 2005.

[13] 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.*

3.5.5 Cost Forecasts

Applying the building block approach to the determination of revenue requirements for regulated businesses requires forecasts to be made of capital costs and operating costs (also referred to as operating and maintenance costs or non-capital costs).

Capital costs are the costs of purchasing and constructing new physical assets used to provide services. Once the need for a capital scheme has been identified there are numerous ways of predicting capital costs, with increasing accuracy during the project's development:

- costs based on similar schemes, taking into account inflation and any physical differences;
- in-house or external cost estimates based on historical data, vendor quotes or costing tools;
- unit cost databases, recording historical costs and attributes for later re-use;
- tender prices, based on a defined scope of work; and
- bills of quantities and firm quotes during the construction phase.

Capital costs are generally broken down into direct and indirect project costs in the development of overall scheme budgets. Direct costs include construction plant, labour and materials, and indirect costs include items like corporate overheads, internal staff input, external consultants, historical scheme costs, contingencies and any risk allowance.

Operating costs cover all expenditure related to the overall operation of the business and include water and wastewater treatment plant operation (power, chemicals, labour, materials), plant and equipment, administration, salaries, contracted services, overheads and depreciation.

Methods commonly used to forecast operating costs include:

- extrapolation of historical costs, and adjusting for increases such as inflation and decreases such as expected efficiencies;
- review and updating of historical costs allowing for new levels of service; and
- bottom-up predictions of costs based on current activities.

For the purposes of this inquiry, all three of the water businesses have submitted forecasts of costs to the Authority. The Authority has reviewed these forecasts to determine:

- whether the forecasts represent reasonable projections of costs that would be incurred by a prudent and efficient service provider in undertaking the activities to which the cost forecasts relate;
- whether any assumptions made by the water businesses as to efficiency gains that may be made over the period are appropriate; and
- whether the cost forecasts of the water businesses should be adjusted to incorporate any efficiency gains over and above those already contemplated.

In assessing forecasts of operating and capital expenditure for each of the water businesses, the Authority has reviewed the processes that drive operating and capital expenditure and has made comparisons with similar businesses throughout Australia and in the United Kingdom. The use of such comparisons involves forming judgements about

appropriate capital and operating efficiency targets. In applying this judgment, the Authority has recognised that the use of benchmarking is problematic: the number of suitable comparator businesses in Australia is small, and difficulties arise in determining whether differences in operating cost performance between businesses are due to different efficiencies, or could be explained by other factors (e.g., geography, demography, hydrology, climate, technology, social factors, etc).

Recommendation

8 Cost forecasts used in the determination of revenue requirements for each service provider should incorporate efficiency gains reasonably envisaged to be achievable over the period of the forecast.

3.6 Prices and Price Structures

3.6.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the current structure and level of urban water and wastewater prices;*

3.6.2 Authority Assessment

After establishing revenue requirements for each of the Corporation, AQWEST and Busselton Water, the second step in determination of prices is to determine prices and price structures for individual services.

A distinction can be made between the general levels of prices and price structures.

- The level of prices refers to the total amount that is payable by a consumer of water and wastewater services for each service, that is, the average price charged by the water businesses for services.
- The structures of prices refer to the mix of different charges that make up the total bill for each service. Prices for water services to most residential customers currently comprise a constant fixed charge and a scale of increasing volumetric (or "usage") charges, and for commercial customers a fixed charge based on either the size of the connection (Perth) or a property valuation (Bunbury and Busselton, although AQWEST and Busselton Water are transitioning to a charging structure based on the size of the connection) and a scale of increasing volumetric charges. Prices for wastewater services to residential customers currently comprise a fixed charge calculated according to the rateable value of the property, and for commercial customers a fixed charge calculated according to the number of fixtures and a volumetric charge.

As part of this inquiry, the Authority is required to give attention to both the levels of prices for water and wastewater services and the structure of prices.

In considering the overall level of prices, the Authority has given consideration to the need to ensure the overall financial viability of the water businesses so that the businesses can recover their costs of service provision, including returns on investment where appropriate.

In considering the structure of prices, the Authority has given attention to a number of factors:

- the desirability of having price structures for water services send clear economic signals to water users about the relative scarcity of water resources, and the costs of developing new resources and providing additional infrastructure to meet growing demand for water;
- the capacity to use water pricing as a tool for management of water demand either as a substitute for, or complement to, water restrictions;
- the extent to which, and the mechanisms by which, water prices should include a component to reflect the costs of management and protection of water resources and the value of environmental impacts that are not otherwise incurred as costs by the water businesses; and
- social objectives.

These matters are examined in more detail in the following sections.

3.7 Pricing to Reflect Scarcity of Water Resources

3.7.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *considerations of demand management;*

3.7.2 Water Scarcity and the Value of Water Resources

The concept of scarcity of water resources has both physical and economic aspects.

From a physical perspective, water is not scarce in the south west region of Western Australia, particularly now that technology is available to desalinate seawater relatively inexpensively. The National Land and Water Resources Audit in 2000 found that total groundwater and surface water use in the south west region is still below maximum sustainable yields (Table 3.1).[14,15] Surface water use was estimated to be at about 22 per cent of sustainable yield and groundwater at about 40 per cent of sustainable yield.

An economic perspective, however, involves a different concept of scarcity. Economic scarcity refers to the cost of developing new water sources. While water resources in the south west region of Western Australia may not be physically scarce relative to total demand, new sources of water are becoming increasingly expensive to develop. For example, as water demand in the Perth metropolitan region increases, new groundwater resources are being developed at an increasing distance from the locations at which water is used, requiring greater investment in infrastructure and greater operating costs of water transport. From an economic perspective, water resources are becoming scarcer in the sense that new sources are increasingly expensive to develop. It is notable, however, that improvements in the technology of seawater desalination and wastewater recycling

[14] National Land & Water Resources Audit (2000), Surface and Groundwater Management, Availability, Allocation and Efficiency of Use – State of Western Australia Water Resources Overview

[15] 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.

may affect this trend and provide additional water resources at a reducing cost, that is, reducing the scarcity of water.

Table 3.1 Water availability and use in Western Australia

	South west region (GL per year)	Whole State (GL per year)
SURFACE WATER		
Sustainable yield	1608	5210
Use (1996-97)		
Urban, industry, mining	185	206
Stock water	7	22
Irrigation	170	430
Total	**362**	**658**
GROUNDWATER		
Sustainable yield	1937	6304
Use (1996-97)		
Urban, industry, mining	470	839
Stock water	14	18
Irrigation	265	281
Total	**749**	**1138**
TOTAL WATER RESOURCE		
Sustainable yield	3545	11514
Use (1996-97)		
Urban, industry, mining	655	1045
Stock water	21	40
Irrigation	435	711
Total use	**1111**	**1796**

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

At present, urban consumers of water do not pay any charge for water itself. Prices paid for water reflect the costs incurred by the water businesses in collecting, treating and transporting water. The water businesses do not incur any costs in gaining access to the water resources, and hence there are no costs to be passed on to their customers. Entitlements of urban water businesses to use water resources are not attributed any value, and these entitlements do not appear as an asset on the financial balance sheets of the water businesses.

3.7.3 Significance of Trading Regimes for Water Resources

The situation where the entitlements to use water resources (and hence the water resources themselves) are not assigned any value results, in part, from the absence in Western Australia of an effective framework for the trading of entitlements to use water resources. For example, individual irrigators cannot readily trade their water entitlements with the Corporation, and so their entitlements to use water do not attract a value reflecting the value that Perth customers place on water. Similarly, the inability for AQWEST and Busselton Water to lease or trade their unused water entitlements to the

Corporation means that the prices charged to Bunbury and Busselton consumers do not reflect the "opportunity" value of that water to Metropolitan Perth (after allowing for transport costs).

During the course of the current inquiry, several submissions to the Authority have supported the establishment of a framework for water trading in Western Australia:

- Conservation Council of Western Australia

  The CCWA recommends that this opportunity is pursued as a matter of urgency, facilitated by the Government undertaking the structural reform needed to create an effective water market… (Draft Report submission, p3)

- Department of Treasury and Finance

  The concept of trading water to the Corporation for use in the Perth Integrated Water Supply Scheme (IWSS) is strongly supported. (Draft Report submission, p9)

- Professor Pannell, University of Western Australia

  The state urgently needs both water pricing reform in the rural sector, and an efficient system for trading between sectors to ensure that water does go to its highest value use. (Draft Report submission, p2)

A recent review of water supplies for irrigation has identified a number of problems in current institutional frameworks for water trading:[16]

- there remains a need for holders of water entitlements to demonstrate a legal right to access land from which groundwater may be abstracted and on which water is proposed to be used for any irrigation purpose (i.e. there is no separation of water and land titles);
- water entitlements are largely defined by areas and types of crops rather than as volumetric entitlements;
- for group irrigation schemes, water entitlements are held by irrigation cooperatives and corporations rather than individual water users;
- licences for water abstraction and use are granted for finite periods rather than in perpetuity (although in practice they are almost always renewed); and
- licences for water abstraction and use are issued on a "use it or lose it" basis, limiting potential for development of secondary (leasing) markets in water entitlements.

The facilitation of trade between bulk water users (irrigators, miners, industry and regional urban water providers) would require institutional changes. Furthermore, the benefit of increased trade would depend on the size of transaction costs, the cost of transporting water to Perth from regional areas in the south west and the cost of treating non-potable water. These observations were made in several submissions to the Authority:

- Department of Treasury and Finance

  While there are no legislative barriers to trade between service providers and individuals, there are currently considerable disincentives to the establishment of an effective water trading regime that should first be addressed. (Draft Report submission, p9)

- CSIRO

[16] State Water Strategy, Irrigation Review Steering Committee (July 2005), *Irrigation Review Final Report.*

> There may be limitations on the tradability of water between the rural and urban sectors because of quality implications. Only three dams in the south west currently contain water of sufficient quality for drinking – Samson, Logue Brook and Stirling. Wellington Dam water could be used in future if salinity and other water quality problems can be addressed, and recreational use is controlled (Draft Report submission, p13); and

- AQWEST

  > Potable urban water and non-potable irrigation water are not close substitutes. The two uses may compete at the margin for overall water supplies but, given that the Water and Rivers Commission allocates water licences rather than forcing parties to bid for it, the conjecture seems strained at best (Draft Report submission, p3).

The Corporation questions the legal right of AQWEST and Busselton to trade their unused allocations:

> While there are many opportunities to develop water trading in the south west, the Water Corporation supports the position that dormant (i.e. unused) allocations [held by AQWEST and Busselton Water] should not be available as a tradable commodity. These entitlements should instead be reallocated to other users and should not be made available as a windfall profit simply because of over-allocation by the water resource regulator (Corporation, Draft Report submission, p13).

In the presence of an effective water trading framework, the water entitlements of the urban water businesses would attract a value reflecting the costs of developing additional or alternative water sources and the value of entitlements to existing resources held by other water users, such as irrigation farmers. There could then be a sound basis for reflecting this value in water prices.

It is beyond the scope of the current inquiry to make recommendations in relation to the framework for water trading in Western Australia, which has recently been addressed by the State Water Strategy Irrigation Review.[17] The Authority has, however, given consideration to the structure of water prices that would reflect the economic scarcity of water as it is currently taken into account by water businesses, that is, as apparent from the additional infrastructure costs and operating costs that will be incurred in developing new sources of water to meet increasing demand.

3.7.4 Pricing of Water at Long Run Marginal Cost

The Authority has considered reflecting the relative scarcity of water resources through the concept of "long run marginal cost" (LRMC).

With increasing demand for water resources in urban areas of Western Australia, the providers of water services have to develop new sources of water. Each new source is typically of higher cost to develop (given current technologies).[18] As new, and more expensive, sources of water are developed, the average price of water supplies to urban areas needs to increase to reflect the greater cost incurred in supplying water. The faster that water demand increases, the greater the rate at which new water sources will have to be developed and the greater the rate at which water prices will increase. Conversely, a reduction in water use by existing customers will reduce the rate of growth in water demand, reducing the rate at which new water sources will have to be developed and reducing the rate at which water prices will increase.

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[17] State Water Strategy, Irrigation Review Steering Committee (July 2005), *Irrigation Review Final Report*.

[18] Development of new technologies for obtaining water, such as new and improved desalination technologies, may reduce the costs of developing new water sources.

The concept of LRMC has been developed as a measure of the effect that current consumption of water will have on the future cost of water supplies and prices for water. Reflecting this value in prices provides a signal to water users of the effect of their current water consumption on future water prices and allows this to be factored into current decisions about water use.

However, if current charges are set at levels reflecting anticipated future higher costs then revenue will exceed current total costs. If, in these circumstances, an overall revenue requirement is to be met, then other charges, including the fixed charge or charges for other services such as wastewater charges, would need to be reduced. The application of LRMC pricing therefore involves consideration of the charging of all services to achieve an overall optimal set of charges.

It is noted that in circumstances where LRMC pricing results in prices being established that are less than the average cost of service delivery, such as in the case of anticipated economies of scale or improvements in technology, the application of LRMC pricing would imply increasing some or all other charges in order for the overall revenue requirement to be maintained.

The concept of LRMC has the following elements.

- LRMC is a forward-looking cost measure. It signals to water users the present value of the costs that arise from a unit increase in per capita water demand at the current time as a result of the consequent need to bring forward the timing for development of new water sources and maintain the supply-demand balance.
- Because water supply is characterised by a series of lumpy capital investments and increases in operating costs, particular methods have been developed to estimate LRMC.[19]
- The LRMC of servicing an additional unit of demand is determined on a "least-cost" plan to manage the supply-demand balance, including demand management measures and new source development.
- Integral to the plan, and underpinning estimates of LRMC, is an assumed "security buffer". This is the degree of security that water supplies will be sufficient to meet water demand in any particular year, taking into account year to year variation and in rainfall and water supplies from the various surface water and groundwater sources that comprise the total supply system.
- The LRMC calculation excludes costs that would be financed by developer (headworks) charges, and is restricted to consideration of those costs that would be recovered through the prices for water services.
- Because the calculation of LRMC involves forecasts of demand and costs for some considerable time into the future, there are inherent uncertainties in the calculation. For this reason, different values of LRMC may be calculated under different scenarios of demand and cost forecasts, and judgement exercised as to the value that should be reflected in water prices.

Setting prices to reflect LRMC has a number of advantages.

[19] LRMC for the Corporation has been assessed using the "Turvey Method" while the "Average Incremental Cost Method" has been used for AQWEST and Busselton. See Appendix 5 for details of these methods.

First, it provides a means of providing appropriate economic signals to consumers about the consequences of their use of water on the need to develop new water sources and the future cost and price of water supplies.

Second, setting prices to reflect LRMC enables consumers to signal their demand preferences to water providers, which in turn assists the service provider in making efficient investment decisions to meet demand. For example, if water consumers are charged a price equal to LRMC and indicate a willingness to continue current patterns of water use and pay this price, then there is a clear signal sent to the provider of the service that consumers are willing to pay the cost of developing new water sources rather than reduce water use. There is also a clear signal sent to potential investors in alternative water sources, such as water recycling, as to the value that consumers are willing to pay for additional water supplies.

Third, pricing to reflect LRMC guides efficient investment by households in durable water-using goods (pools, gardens, reticulation, etc.) and water saving technologies (water-efficient appliances, low-flow tap fixtures, etc.). It is economically efficient for consumers to make investments to reduce (or not increase) water use if the cost per unit of water saved is less than the per-unit cost of developing new water sources (which is reflected in LRMC).

The Authority has examined the scale of potential water reductions (among Perth metropolitan residential users) that could be achieved by increasing usage prices. For illustrative purposes, the impact of setting prices for all households to a flat rate of $1.00 per kL has been examined. This scenario does not represent a pricing proposal. The modelling was undertaken to provide an indicative estimate of possible water savings from a notional increase in water price.

Based on available information about responsiveness to price, it is estimated that this pricing scenario could reduce demand by approximately 5 GL in years when water restrictions do not apply. This modelling takes into account that under the current five-block tariff arrangement applying to Water Corporation customers, setting usage price to $1.00 per kL would result in a price reduction for 14 per cent of households (who are currently paying either $1.20 or $1.50 per kL) and a price increase for the remaining 86 per cent of households. The total impact on demand is thus an aggregate of changes in demand by households in the five consumption blocks. Further details are provided in Appendix 6.

LRMC pricing is now well established in the water industry in some jurisdictions. In the United Kingdom, for example, the regulator that sets prices for water services (the Office of Water Services) 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 (e.g. education campaigns, rebates for water saving appliances and water-efficiency labelling of appliances) as well as the costs of any supply augmentation.

Victoria's Essential Services Commission (ESC) has embraced the concept of LRMC in its recent deliberations on water pricing. The Commission is guided by Victoria's 2003 Water Industry Regulatory Order (WIRO), which sets out a detailed framework of pricing principles for the Victorian 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.[20]

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. IPART's recent draft determination of water prices indicated that its preliminary analysis indicated that the LRMC of water supply in Sydney is likely to be in the range of $1.20 to $1.50, which provided a large part of the justification for price increases announced in its draft determination.[21]

A number of submissions made to the Authority during the current inquiry support the application of LRMC to water pricing in Western Australia. The Department of Treasury and Finance states that:

> It is also strongly agreed that long run marginal cost pricing is the most efficient way to price water, as such pricing would provide sufficient revenue to cover costs and clearly signal to consumers the full cost of additional supplies. In so doing, pricing at the long run marginal cost can also help ensure new sources are only developed when consumers decide, through necessary consumption at such prices, that the value of the additional water source exceeds the cost. (Department of Treasury and Finance, Draft Report submission, p3)

Professor Pannell notes that:

> If there is sufficient excess demand for water at a price that reflects the cost of supplying water from the [desalination] plant, then that indicates that the benefits from providing the plant would exceed the costs. Currently, because volumetric water prices are artificially low, we have little idea about whether the value of water to consumers is sufficient to justify the investment in the [desalination] plant, or any other infrastructure project. For this reason, I strongly agree with the recommendation that price reform should occur before investments in expensive infrastructure are committed. (Professor Pannell, Draft Report submission, p3)

The Corporation does not support setting the usage charge according to LRMC because it is concerned about the distributional consequences for vulnerable groups (particularly tenants) that would be associated with moving immediately to LRMC pricing (and resulting in an increase in usage charges, which are typically paid directly by tenants, and a reduction in the fixed charge, which is typically paid directly by the landlord). Nevertheless, the Corporation appears to consider that the concept of LRMC pricing has merit as one of a number of competing principles that could guide price setting over the longer term:

> An "ideal" water tariff for signalling the cost of supply may be a volumetric charge based on the Long Run Marginal Cost with a service charge to balance overall revenue requirements. (Corporation presentation, Perth Forum, 19 May 2005)

and

> The Corporation's previous tariff submissions to Government have been based on balancing our pricing objectives of:
>
> - providing appropriate price signals to customers;
> - prices that are easy for customers to understand;

[20] ESC (2004), "Approach to pricing", Workshop Discussion Paper.

[21] IPART (September 2005), "Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: Prices of Water Supply, Wastewater and Stormwater Services, Final Report", p 18.

- prices that are simple to administer;
- prices that are fair and equitable.

The combination of these objectives is aimed both at ensuring efficient use of our services and reducing the cost of billing, including the cost of customer contacts associated with explaining or defending the basis of charges.

As there is no single solution that meets all of these objectives, and due to the social impact of charges and the impact on the State budget, it is appropriate that Government determine the final balance." (Corporation, Pricing Submission, p35).

The submission from the Corporation highlights the potential need to consider both economic and social objectives in setting both the level of water prices and the relativity of fixed charges and usage charges. This issue has also been addressed in other submissions made to the Authority. For example, the WA Branch of the Australian Water Association proposes that a fixed charge be retained:

> It is pointed out, however, that the fixed charge is meant to be the cost of having the service available, and its level should not be manipulated to the point of making this relationship meaningless. All customers, regardless of circumstances, should pay for basic service availability. (Australian Water Association – WA Branch, Draft Report submission, p1)

Professor Pannell argues for the removal of the fixed component altogether:

> From an efficiency perspective, it would be far better to reduce the fixed charge to zero, and increase the variable charge accordingly to achieve the same revenue targets (e.g. perhaps to $1.15 per KL, reflecting the estimated marginal cost of water from the proposed [desalination] plant). Loss of efficiency from this change would occur only if additional low-volume consumers entered the market as a result of the lower fixed change. It is hard to see how this would happen to any great extent in the domestic water scheme. Almost all potential consumers are already connected to the system. For existing low-volume water users, they would receive some financial benefit from the setting fixed costs to zero, but would not change their status as low water consumers, so the efficiency of water allocation would not be altered. Overall, the proposal to retain a $35 fixed charge would not be economically efficient and would run counter to the goal of enhancing water conservation. (Professor Pannell, Draft Report submission, p1)

One of the general principles of economic efficiency in the setting of price structures is that charges should be set so that all customers pay at least the costs that are directly attributable to them from using the service (if they paid less they would have an incentive to take the service even though they place a value upon it that is lower than the cost to society of providing it). In the water sector, the directly attributable costs that the fixed charge should at least cover include the meter reading and billing costs for each customer. In addition, there are broader considerations relating to the costs of having services available as raised by the WA Branch of the Australian Water Association. While economic efficiency requires that prices should be set to recover at least directly attributable costs there is a need to be mindful of the effect of broader impacts of the recovery of joint costs.

A further issue with LRMC pricing is the potential financial effect on the water businesses. In a submission to the Authority, AQWEST has expressed concern that pricing at LRMC "may well bankrupt the utility", recognising that its LRMC is less than its average cost of service delivery and it may not recover sufficient revenue to meet the total costs of service provision. AQWEST's concern ignores, however, that while usage charges may be to reflect LRMC, both the usage charge and the fixed charge may be adjusted to ensure that the total revenue requirements of the water business are met.

A broader issue relating to efficient pricing for the businesses of AQWEST and Busselton Water is whether the LRMC cost calculation for each water utility should reflect overall water availability in the south west region or whether the calculation should just relate to the particular demand and supply conditions in the regions serviced by each utility. If the goal is one of efficient water allocation across all users in the south west, the LRMC price signal passed through to Bunbury and Busselton users should reflect the willingness to pay of Perth users for additional water, less the cost of transporting water from the Bunbury and Busselton region to Perth. Similarly, the LRMC price signal passed through to Perth users of water should reflect the willingness of other water users in the South West (such as irrigators) to pay for water resources that may be used to meet demand in the Perth metropolitan area.

Recommendation

9 Prices for water services should be structured so that usage charges are set at levels to reflect the estimated long-run marginal cost of developing new water resources to meet water demand. Other charges should be set at levels necessary to ensure that revenue requirements are met after taking into account revenues from usage charges.

3.8 Pricing for Short-Term Management of Water Demand

3.8.1 Terms of Reference

In relation to the pricing of urban water services, the Terms of Reference of the inquiry require the Authority to investigate and report on:

- *considerations of demand management;*

3.8.2 Authority Assessment

The previous section of this report considered the desirability of establishing price structures for water that reflect the scarcity of water resources. The Authority concluded that establishing price structures with usage charges set to reflect the value of LRMC is desirable because of the benefits of motivating water consumers and water businesses to make efficient decisions in respect of water demand and investment in development of new water sources.

There are various other tools available for managing water demand. These include water restrictions, seasonal pricing, rebates for water saving appliances, leakage control, water-efficiency labelling of appliances, education and urban planning. These measures aim to improve the efficiency of water use and to some extent reduce customers' discretionary use of water, as opposed to water for basic needs.

The Authority takes the view that reductions in water demand should not be viewed as a single, isolated objective, but rather should be considered alongside decisions to augment water supplies. It need not always be the case that reductions in demand for water are better from a community perspective than augmenting supply.

LRMC pricing of water has an important role in the long term management of supply and demand and promoting efficient consumption and investment decisions for maintaining a demand-supply balance. Other water demand programmes such as water-efficiency labelling of appliances, education and urban planning are entirely consistent with the potential efficiency benefits of LRMC pricing as they provide water consumers with information and options for managing water demand in response to water prices.

There are also, however, short-term demand and supply problems that must be dealt with by water businesses. The short term problems result from year-to-year fluctuations in rainfall and water supplies that may result in a need to reduce water demand for short periods.

To date, water businesses in Western Australia and elsewhere throughout Australia have relied on water restrictions for short-term demand management. In principle, an alternative approach to short-term demand management is to manipulate prices so as to increase prices in times of supply problems and thereby reduce demand.

The disadvantage of restrictions as a means of demand management is that all water consumers are compelled to reduce demand to the same extent, even though some consumers may value water much more highly than others. The alternative approach of raising prices to reduce water demand would allow consumers that value water highly to continue use, while demand reductions are made by consumers that value water less.

The Authority has undertaken modelling to estimate the costs imposed by two-day per week sprinkler restrictions on residential water users. Based on Corporation data, the restrictions in 2003-04 reduced consumption by 14 per cent (or 26 GL) relative to water use in 1999-2000 when no restrictions applied. The welfare loss associated with this reduced water availability is estimated to be $130 per household or $75 million across all of the Corporation's residential customers. The modelling indicates that, on average, households would be willing to pay up to $1.36 per kL to maintain access to water. Further details are provided in Appendix 6.

The pricing mechanism for short term management of demand is that of "seasonal" or "peak" pricing. The term seasonal pricing is used in this report.

Seasonal pricing would involve increasing prices in the dry seasons of the year and in times of drought and, possibly, lowering prices in the wet seasons or wetter years. For Western Australia, it could mean charging higher prices in summer to discourage discretionary outdoor uses such as watering gardens, particularly during or following a sequence of low-rainfall years that have resulted in a depletion of water supplies. Another approach would be to raise annual average prices above LRMC during drought years, but to make no distinction between seasons.

The economic-efficiency argument behind seasonal pricing is motivated by a water business's capital expenditure program which is highly influenced by requirements to maintain security buffers for water supplies and 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 demand.[22] Charging of higher prices at times of peak demand is common in the provision of electricity services (particularly for

[22] NERA (2000) "A review of Melbourne's Water Tariffs", a report for the Department of Natural Resources and Environment.

commercial electricity customers) but have not been widely adopted by urban water businesses.[23]

A submission received from Gardner argues for greater use of seasonal pricing on the grounds that pricing flexibility is needed to mimic the market and reflect scarcity.

> [The Corporation] should have the authority to charge a higher price in dry seasons so as to reduce water consumption to meet reduced availability targets and to recover adequate revenue from an expected reduction in consumption. The need for this pricing flexibility will be greater as water pricing moves to a lower fixed component and greater usage component, as the Authority recommends. (Gardner, Draft Report submission, p3)

The Corporation, however, downplays the potential role of seasonal pricing.

> 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. (Corporation, Issues Paper submission, p23.)

The Corporation's submission alludes to a major practical difficulty in implementing seasonal pricing, this being that current metering technology is unable to be used to read all meters simultaneously to coincide with the start and end of the peak period, and the cost of installing such technology ("intelligent meters") is currently unacceptably high.

Other submissions have noted that increasing pricing during the drier months of the year does not make sense when water supplies can be balanced between seasons through dam storage. Rather, high water consumption should attract higher prices in the winter months, when water is not needed for purposes such as watering gardens, than in the summer months, when gardens may need to be watered to keep them alive.[24]

A further consideration is the extent to which price increases actually lead to reductions in demand. The responsiveness of demand to price variation is referred to as the price elasticity of demand, which can be defined as the percentage change in quantity demanded in response to a one per cent change in price.

Little is known about the demand function for Perth households, but there are some estimates of the price elasticity of demand.

Previous studies of residential consumption in cities both here in Australia and overseas report a variety of elasticity estimates, ranging from -0.1 to -0.5, with the most common value being around -0.3.[25] NERA (2001) reports that non-domestic demand for water tends to be slightly more elastic than demand by domestic users.

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[23] Westernport Water in Victoria increases its usage charge in summer months as a means of mitigating tourist-driven peak demand.

[24] See submissions in response to the Issues Paper by Hine (p3) and the Conservation Council of WA (p11).

[25] Based on a review of 41 studies by NERA (2001), "A review of Melbourne's Water Tariffs", a report for the Department of Natural Resources and Environment.

In a study of Perth households, Thomas *et al* (1983)[26] reports an elasticity of -0.31 for outdoor water use, -0.04 for indoor use and -0.18 overall. Another Perth study, which utilised a contingent valuation approach, estimated an elasticity ranging between -0.1 and -0.43, with an overall value of -0.21.[27] At face value, these estimates indicate that demand is relatively inelastic (unresponsive) to price. For example, an elasticity of -0.2 implies that a 10 per cent increase in price would lead to a 2 per cent reduction in demand. However, several points should be considered in interpreting these elasticity estimates:

- Demand analyses have often been conducted in circumstances where water prices are low and where consumers have experienced relatively little movement in price over time compared to other factors affecting demand. Thus, the observed relationship between price and water usage is weak. A stronger relationship could be expected at higher price levels and in circumstances where water restrictions are not used to manage demand. Conversely, seasonal pricing is likely to have little impact on demand when there are water restrictions in place.
- Complex tariff structures can reduce the effectiveness of price as a demand signal, as the consumer may find it difficult to discern a relationship between consumption and cost.
- Demand elasticity is generally greater in the long run than the short run, reflecting the fact that it takes time for households to change their consumption habits. AQWEST submits that residential demand in Bunbury is quite responsive to price over longer timeframes:

  > Whilst the short run elasticity of demand is low, as many studies have found, very little academic study of the long run elasticity of demand (particularly in the WA context) has been done. However, AQWEST's experience is that, in the long-term, the elasticity of demand for discretionary use of water is quite high; people do, for example, plant less water intensive plants in their gardens in response to higher water prices. (AQWEST, Draft Report submission, p5)

- Household preferences for water, and price responsiveness, is likely to change over time due to increasing availability of water saving technology (at lower cost), changes in lifestyles (the trend to small block dwellings) and the regularity/severity of water restrictions.
- The demand for water for outdoor use is generally more responsive to prices than water for basic needs inside the house. However, this may vary between seasons: water use for gardens in the summer months may be less discretionary, and less responsive to price increases, than in winter months, when gardens do not need to be watered.

In summary, there are practical difficulties with seasonal pricing and uncertainty as to the magnitude of its effects on demand. Further, it is likely that the extent to which pricing can influence demand is lessened in the presence of water restrictions. For these reasons, the Authority is of the view that seasonal pricing is not, at present, a cost-effective tool for managing demand in Western Australia.

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[26] Thomas, J.F., Syme, G.J. and Gosselink, Y. (1983), "Household responses to changes in the price of water in Perth, Western Australia" in *Proceedings of the Hydrology and Water Resources Symposium*, 8-10 November, The Institution of Engineers Australia, National Conference Publication 83/13, pp57-61.

[27] Thomas, J.F. and Syme, G.J. (1988), "Estimating residential price elasticity of demand for water: a contingent valuation approach", *Water Resources Research*, 24(11), pp 1847-57.

Recommendation

10 Management of water demand to address short-tem shortfalls in water supply should continue to be undertaken through the application of water restrictions rather than through pricing mechanisms. However, the application of LRMC pricing and a security buffer should reduce the frequency of water restrictions to relatively rare events.

3.9 Pricing to Reflect Environmental Impacts

3.9.1 Terms of Reference

In relation to the pricing of urban water services, the Terms of Reference of the inquiry require the Authority to investigate and report on:

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

3.9.2 Background

The provision of water and wastewater services can potentially cause substantial environmental impacts through, for example, impacts of dams and reservoirs on catchments and aquatic environments, environmental impacts of groundwater abstraction on plant communities and wetlands, and impacts of wastewater disposal practices.

The provision of water services also entails management of catchment areas and groundwater areas for the purposes of protecting water quality.

There are two main classes of initiatives to control environmental impacts and to manage water resources.

Firstly, providers of water and wastewater services are required to undertake activities in accordance with standards and regulatory frameworks that apply generally to business activities throughout Western Australia. The water businesses would incur costs in complying with the relevant requirements, which would comprise part of the capital and operating costs of the businesses.

Secondly, the Department of Environment in Western Australia undertakes a wide range of activities for the protection of aquatic environments and water resources. Some of these activities are undertaken directly for the benefit of water users – for example, catchment management activities to maintain the quality of surface water. Users have a strong incentive to ensure that these activities are undertaken because they benefit directly. Other activities are principally undertaken for "public benefit" outcomes – such as the protection of environmental quality.

The Department of Environment is responsible for allocating access licences to defined volumes of water and use licences which impose obligations and conditions on use. The Department has four main roles:

- resource characterisation – which involves investigating the resources, their relationship to environmental factors and sensitivity to withdrawal;
- water allocation – managing the efficient and fair allocation of water to various uses while maintaining environmental values;
- protection and conservation of water quality; and
- waterways and catchment protection – protecting rivers and wetlands through land use planning, salinity management and floodplain management.

The predecessor agency to the Department of Environment (the Water and Rivers Commission) estimated that in 2002-03, its recurrent expenditure on resource management activities was approximately $46 million and it had a capital program of $2.5 million. The Commission's costs are funded almost entirely by the Western Australian Government, the exception being some joint State-Commonwealth initiatives which receive funding through programs such as the Natural Heritage Trust. No resource management costs are recovered from urban water users.

In 1994 the Council of Australian Governments (COAG) agreed to a package of water reform pricing principles which included the need to signal to users a share of the costs associated with managing the resource and any environmental impact costs caused through extractive use. This principle has recently been reiterated by the 2004 National Water Initiative, an inter-governmental agreement which updates and builds on the earlier COAG reforms. Although Western Australia is not a signatory to the agreement, the relevant provisions of the agreement provide guidance to current thinking in Australia on the recovery of resource management costs from water users. Sections 67 and 68 of the National Water Initiative relate to recovery of resource management costs:[28]

> 67. The States and Territories agree to bring into effect consistent approaches to pricing and attributing costs of water planning and management by 2006 involving:
>
> (i) The identification of all costs associated with water planning and management, including the costs of underpinning water markets such as the provision of registers, accounting and measurement frameworks and performance monitoring and benchmarking;
>
> (ii) The identification of the proportion of costs that can be attributed to water access entitlement holders consistent with the principles below;
>
> (a) charges exclude activities undertaken for the Government (such as policy development and Ministerial or Parliamentary services)
>
> (b) charges are linked as closely as possible to the costs of activities or products.
>
> 68. The States and Territories agree to report publicly on cost recovery for water planning and management as part of annual reporting requirements, including:
>
> (i) the total cost of water planning and management; and
>
> (ii) the proportion of the total cost of water planning and management attributed to water access entitlement holders and the basis upon which this proportion is determined.

[28] Intergovernmental Agreement on a National Water Initiative, between the Commonwealth of Australia and the Governments of New South Wales, Victoria, Queensland, South Australia, the Australian Capital Territory and the Northern Territory, 25 June 2004.

Some States have taken the step of introducing resource management charges for urban water users. For example, urban water customers in the Australian Capital Territory pay a Water Abstraction Charge of 25 cents per kilolitre which covers certain catchment management costs, a notional value of the environmental costs associated with the removal of water from the river system and the value of this water in alternative downstream irrigation uses (a measure of scarcity value). The New South Wales, Victorian and South Australian governments also recover some resource management costs from water users.

In Western Australia, the Government's 2003 State Water Strategy opted for a policy of continuing to fund resource management activities from consolidated revenue. However, it committed to investigating the applicability of implementing resource management charges in consultation with stakeholders, considering the possible timeframe, potential impacts and overall applicability of any possible implementation.[29]

In a submission to the Authority during the course of the current inquiry, the (then) Water and Rivers Commission provided the results of a preliminary investigation it had undertaken into its resource management expenditures and the degree to which these could be attributed to water users. Working off an annual cost base of $46 million, the Commission estimated that approximately $15 million of resource management costs are attributable to urban and rural water users. The cost share to rural users was not calculated, but the Commission submitted that this would be a small proportion of the $15 million.

The Water and Rivers Commission also outlined a proposal for the recovery of resource management costs through water charges. In the absence of reliable cost data at a regional level, the Commission suggested that a State-wide uniform tariff would be appropriate. For Corporation customers, the Commission proposed a volumetric tariff of 4.6 cents per kilolitre, which would be sufficient to recover the $15 million of costs – based on the 329 GL of water *supplied* by the Corporation in 2003. The Commission further proposed that the charge could be levied to the Corporation, which would pass through the costs to its customers. A three-year staged implementation is suggested, with the tariff initially being introduced at 30 per cent of the full tariff.

In a submission received from the CSIRO, support is given to implementation of a resource management charge. CSIRO's views are as follows:

> We agree with the recommendation that the cost of water resource management costs should be passed on to water users…Given that potential environmental impacts – and hence the need for management of water allocation decisions – are positively correlated with total water use, it would appear reasonable to charge on a volumetric basis.
>
> We agree that the use of externality charges to address issues that are not being dealt with through institutional arrangements is problematic, because of the uncertainty regarding the setting of such charges, and the likelihood that resource management can be better achieved through administrative arrangements that address property rights issues. (CSIRO, Draft Report submission, p17)

3.9.3 Authority Assessment

The standards of environmental performance required of the providers of water and wastewater services and the activities undertaken for the management of water resources

[29] Government of Western Australia, Water Task Force (February 2003), Securing Our Water Future: A State Water Strategy for Western Australia.

are determined by Government policies and initiatives that are outside of the sphere of price determinations.

To the extent that the water businesses incur costs in meeting standards of environmental performance, these costs will be reflected in the cost forecasts of the water businesses and thus recovered through prices. The recovery of resource management costs incurred by the Department of Environment is a further matter that is determined by Government policy, which to date has been that these costs be met from consolidated revenue rather than through charges imposed on water users.

The Authority is of the view that there is a strong case for a share of efficient resource management costs to be recovered from users, principally to improve the efficiencies of resource use by sending price signals to users about the management costs associated with their consumption.

However, as part of any policy to recover costs, effort should be made to examine whether the current level of resource management is in fact efficient – that is, is enough or too much management being undertaken. This is largely a question of what values the public places on the environmental outcomes of resource management relative to the costs of delivering the outcomes. A second efficiency consideration is whether or not the same level of outcomes can be achieved at lower levels of management cost – a measure of cost-effectiveness. Neither of these questions has been considered by the Authority, as both lie outside of the scope of the current inquiry.

Notwithstanding this, on the issue of efficient costs, a 2003 report by the Western Australian Auditor General into the management of State's water resources concluded that the then Water and Rivers Commission should be provided with a substantial increase in funding to meet its statutory obligations in an environment of growing water demand.[30] In its submission, the Commission supported this analysis and projects that to fully implement the principles contained in the National Water Initiative would require its annual budget to be increased by approximately $20 million. A submission received from the Environmental Protection Authority describes similar sentiments:

> In the face of the evidence of dimensions of the required resource management task and the documented performance it is hard not to conclude the water resource management performance has fallen below that required to ensure ongoing sustainable management of the State's water resources. From the environmental protection viewpoint, there is a danger of unacceptable impacts with both quantity and quality. (Environmental Protection Authority, Issues Paper submission, p6)

This would suggest that the estimated cost of resource management activities of $46 million may be too low.

While the Authority supports the case for attributable resource management costs to be passed through to users, the actual cost share to be recovered from users, and the allocation of these costs to different customer groups, needs to be established in a rigorous and transparent manner. At a minimum, the following matters should be considered:

- Whether or not the resource management activity is being undertaken to rectify the environmental impacts of past use patterns or inappropriate infrastructure (known as "legacy impacts"). If this is the case, these costs might be allocated to government because current users might be inappropriately burdened with the

[30] Auditor General for Western Australia (September 2003), Control, Compliance and Accountability Examination of Management of Water Resources in Western Australia.

"environmental debt" of past users. To the extent that current users are adding to or exacerbating previous damage – these resource management costs should be allocated to users.

- For those resource management activities that do not fit the "legacy" category, consideration must be given to the proportion that should be passed through to users.
- If the activity is being undertaken principally for the private benefit of water users – for example, improved potable water quality – this cost should be allocated to users.
- If the resource management activity does not fit the "private benefit" category, it follows that the activity must be focused on producing public good (environmental) outcomes. The allocation of these activity costs between users and government depends on the policy stance taken with respect to who (notionally) holds the rights to environmental quality:
  - If all rights to modify the environment have been allocated to water users, then government should pay for measures to address environmental impacts. For example, water businesses are not expected to maintain rivers and groundwater systems in a pristine state. Water extraction implies some modification of the natural environment. In the extreme case, if all rights to modification are allocated to utilities, the government would be required to pay for all remedial activities that seek to restore the environment to a desired condition.
  - At the other extreme, if all rights to the environment have been allocated to the public, then water utilities should pay for all resource management activities that seek to address the environmental impacts of water extraction. Currently water utilities must bear the cost of meeting their licence obligations. If the view is taken that all environmental rights reside with the public, the water businesses would also be obliged to pay for any impacts not covered by their licence obligations.
  - It is generally accepted that water utilities and other licence holders have some rights to modify the environment, but have a duty of care to maintain a minimum standard which may be set at some specified level at or above the licence requirements. If this view is taken, performance below the minimum standard implies that the user should pay for resource management. However, the public should pay for any environmental demands that exceed the minimum standard. Thus, there is scope for some resource management costs to be shared between government and users. This principle has been endorsed by the National Water Initiative, in which explicit cost-sharing rules have been devised for assigning the cost/risk of reductions in water allocation to users (due to increased demands for environmental flows).

Once the recoverable cost share has been established using these principles, decisions must be made about an appropriate allocation of costs to different user groups and the type of tariff structure to be used. While a uniform, State-wide resource management charge would be administratively simple to implement, the Authority recommends that this option be assessed further to determine whether it would lead to inefficient levels of cross-subsidisation between different regions and/or types of water users. For the purposes of this inquiry, the Authority has not incorporated a resource management charge into the costs and tariffs of the water businesses.

Recommendations

11 The costs of environmental impacts caused by provision of water and wastewater services is appropriately passed through to water users through the imposition of regulatory requirements and standards on the water businesses and the inclusion of the costs of meeting these requirements and standards in the cost forecasts for service provision.

12 Recovery from water users of the costs of the water-resource management activities of the Department of Environment is ultimately a matter for determination by the State Government. In the event that the Government determines that such costs should be recovered from water users, attention should be given to the efficiency and equity considerations of different mechanisms for recovery of these costs from water users in different regions of the State.

3.10 Pricing to Meet Social Objectives

3.10.1 Terms of Reference

In relation to the pricing of urban water services, the Terms of Reference of the inquiry require the Authority to investigate and report on:

- *the social impact of the recommendations;*

3.10.2 Background

A number of social objectives must be considered in 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".

Current government policies concerning water prices reflect a range of affordability and equity criteria and include:

- a uniform tariff policy, that results in prices for water and wastewater services being the same for all customers of the Corporation throughout the State (with the exception of charges for high levels of water use in non-metropolitan areas);
- various concessions on charges being available to pensioners and seniors, as classes of persons considered to be financially disadvantaged;[31]
- a price structure for water services provided to residential customers with a relatively low usage charge for the first 150 kL of water use, being regarded as essential or non-discretionary water use;

[31] 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.

- prices for wastewater services to residential customers determined on the basis of the rateable value of the serviced property as a proxy measure of the wealth and income of the customer and "capacity to pay".

3.10.3 Water for basic needs

The current approach to charging lower prices for a level of water use regarded as non-discretionary is probably only partly effective in achieving its desired social objective of providing affordable access to an essential requirement for water. Water businesses do not typically have information on the number of occupants in a household, which means that the level of usage below which the low price applies (currently 150 kL) is an arbitrary threshold – arbitrary because the single largest determinant of non-discretionary household water use is the number of occupants. Second, the low price on the first 150 kL of water use may make it necessary to charge a higher price for higher levels of water use, which is likely to penalise large families.

Some submissions have proposed a pricing structure that takes into account the number of persons in the household, e.g.:

> Pricing models that reflect the size of the household (number of occupants) and can therefore better assess discretionary use, and the ability of the household to respond to price signals would be more appropriate to ensure efficient pricing, increased water conservation, and lower social costs. (WACOSS, Draft Report submission, p24).

Another submission strongly rejected such a proposal:

> There have been adverse comments in the media about higher water prices affecting larger families. This is ridiculous. We do not provide subsidies based on family size for any other product consumed by large families (food, electricity, clothing, electrical equipment …) so why should water be any different. The view that water is "special" has proven a major impediment to responsible water management around the world. We should not make the same mistake. (Professor Pannell, Draft Report submission, p2)

A pricing structure that reflects household size would require additional administrative expenditure to identify the number of persons in each household (the Corporation estimates that the administrative changes of establishing and maintaining such a database would cost in the order of several million dollars for system development and around $1 million per year in operating costs).

WACOSS (p40) has proposed that consideration be given to a model whereby large-family households self-identify with the water business. This could then entitle them to an increased water allocation at a lower rate as recognition of their inability to reduce their essential water use. A similar model has been supported by IPART in its recent determination on water prices for Sydney Water Corporation.[32]

The Authority has given consideration to whether an initial amount of water should be made available to households at a relatively low price for reason of ensuring that water for basic needs is affordable for all households. The Authority is concerned, however, that this would be inconsistent with the principle of establishing usage charges for water at the value of LRMC. Even for households consuming relatively small qualities of water that may generally be regarded as for non-discretionary use, usage charges at levels of LRMC would provide signals as to the value of water that would play a role in driving household investment in water-efficient appliances and fittings. There are economic efficiency and

[32] IPART (September 2005), "Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority: Prices of Water Supply, Wastewater and Stormwater Services, Final Report", p7.

social reasons to not maintain a low price for an initial amount of water use by residential customers, or for any such allowance to be made dependent upon the number of people in households. The long-term interests of consumers would be better served by prices that reflect costs.

The Authority recognises that the vehicles for pursuing social objectives such as a low price for water for basic needs is ultimately a matter for determination by the Government, taking into account the policies that may be applied for achieving this objective. However, the Authority considers that such policies are best pursued as a community service obligation and financed by transparent payments from Government to the water businesses. The Authority has recommended prices that reflect economically efficient levels and structures as this is in the long-term interests of consumers.

The Authority understands concerns about the impact that a significant move away from the low price for the first 150 kL of water use by residential customers would have on tenants (who pay only the usage charge) and seniors (who only receive a discount on the fixed charge). For this reason, the Authority considers that any phasing-out of the low price would best occur gradually over time. The effect on tenants would be ameliorated to the extent that landlords passed on any reduction in the fixed charge, which competition in the rental market would likely deliver, particularly over the longer term. This is further addressed below in relation to the potential social impacts of changes in water prices.

3.10.4 Concessions

In 2004/05, the Corporation received a Community Service Obligation (CSO) payment of $288.2 million for the provision of concessions on water bills for “pensioner” and “senior” residential customers. AQWEST and Busselton Water also provide concessions, but do not receive any funding from the State Government for doing so and are not seeking funding.

The concessions are typically provided on the fixed service charge as well as on the usage charge up to a certain consumption level (although seniors in Perth and Busselton do not receive a discount on the usage charge).

The Authority takes the view that, as the provision of concessions does not affect the prices determined for water services, the maintenance or otherwise of these concessions is a matter of government policy that is outside of the scope of the current inquiry, as is the matter of whether the Government provides CSO payments to compensate the water businesses for revenue lost as a result of providing concessions.

Notwithstanding this, the Authority has considered whether it is more appropriate to provide a greater concession on the fixed charge to concession-card holders and to reduce the discount on the usage charge (while minimising the net impact on their bills). The principle behind such a change would be that concessions should be provided in a manner that minimises the impact on pricing signals provided through usage charges that are set at levels equal to LRMC. The Authority recognises that any change would need to take account of impacts on pensioners and seniors and has examined this issue further as part of the specific pricing proposals for each water business.

3.10.5 Charging according to capacity to pay

Prices for wastewater services to residential customers are currently determined on the basis of the rateable value (Gross Rental Value or GRV) of the serviced property as a proxy measure of the wealth and income of the customer and “capacity to pay”.

Some submissions made to the Authority have supported the continuance of GRV-based charging for wastewater services 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. For example, WACOSS:

> It is also important that progressive charges continue to be supported to ensure those in our community who have the greatest capacity to pay make an additional contribution to important services. (WACOSS, Draft Report submission, p43)

However, some submissions argued that the current approach is inequitable. For example:

> The present method of GRV charging is in place only because of the consideration that it provides a proxy of a customer's ability to pay for the service. However, as the investigations of the Joint Working Group convened by the previous Minister for Government Enterprises in 2002, found 25% of low income families live in above average GRV properties and 11% of high-income families live in below average GRV properties, so that GRV is not an ideal proxy for ability to pay. (Department of Treasury and Finance, Draft Report submission, p25).

On balance, the Authority is of the view that GRV-based charging is an imperfect way of achieving the objective of charging according to capacity to pay because a significant proportion of low-income households live in established, wealthy suburbs. Decoupling wastewater charges from property values has merit, principally because it makes pricing more cost reflective and transparent, but also because the inequity of the current system would be removed. With the exception of South Australia, other State Governments of Australia have abandoned the principle of charging according to capacity to pay as it applies to wastewater. Wastewater pricing is discussed in detail in Section 3.11.

3.10.6 Uniform Tariffs

The current uniform tariff policy results in prices for water and wastewater services being the same for all customers of the Corporation throughout the State (with the exception of charges for high levels of water use in non-metropolitan areas).

The Corporation has provided information on the basis for the uniform tariff policy:

> 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. (Corporation, Pricing Submission, p39)

The State Government makes a payment to the Corporation as compensation for the financial loss incurred in operating country schemes. This amounted to $185 million in 2004/05.

While the Terms of Reference do not specifically require the Authority to address the merits or otherwise of the uniform tariff policy, the Authority recognises that there are objectives other than economic objectives that the Government may wish to pursue which are of an equity, distributional or social character. In the case of the Uniform Tariff Policy the Government has pursued this by funding the shortfall from consolidated revenue through Community Service Obligation payments. Accordingly, the Authority has made its assessment and recommendations on prices for water and wastewater services on the premise that the uniform tariff policy will remain in place.

3.10.7 Social Impacts of Price Adjustments

As already described above, a fundamental principle that the Authority has sought to implement in its recommendations for the prices for water services is the setting of usage charges at levels reflecting the long run marginal cost of developing new water sources to meet increasing demand. The Authority is also recommending that prices for wastewater services be detached from the Gross Rental Values of serviced properties.

Under any set of pricing reforms, some groups of customers are likely to be adversely affected by increases in prices.

The Authority has considered three main options for ameliorating the impacts on these customers.

- Phasing-in the price reforms so that price increases in any one year are limited. This approach is currently being used by all three businesses to phase-in its reforms to commercial wastewater pricing.
- Providing direct assistance to customers that are experiencing difficulty in paying higher water bills, such as by offering targeted water saving packages which would enable households to reduce their water bills.
- Using education campaigns to demonstrate the water saving potential from adopting water efficient technology. The potential for such water savings has been raised in the CSIRO's submission, whereby the Corporation's water calculator is used to show the water savings that can be achieved by switching to water efficient technologies.
- A number of submissions offered suggestions for water saving packages. The Conservation Council of Western Australia (Issues Paper Submission, p6) suggested caps on water charges, low flow AAA rated shower heads and water flow constrictors. In relation to water saving subsidies, the CSIRO suggested:

  > Given the general increased incentive for adopting water saving devices the across the board subsidies that are currently applied could potentially be redirected to fund a targeted subsidy or retrofit program. (CSIRO, Draft Report submission, p9)

- CSIRO also makes the important point that:

  > even if the cost of installing these devices is greater than the LRMC of water, the efficiency losses associated with a retrofitting program, targeted at a small sector of the community, are likely to be less costly than the efficiency losses associated with the current pricing arrangements which distort all consumers' incentives for water saving. (CSIRO, Draft Report submission, p9)

- WACOSS suggested that in the event that usage charges rise then tenants, who have limited control over the water efficiency of their houses, could be assisted through the implementation of:

  > mandatory water efficient standards for rental properties, and the government implementing retrofitting for all Homeswest properties. (WACOSS, Draft Report submission, p30)

Water-saving packages have been used to ameliorate the impacts of pricing reforms in New South Wales and Victoria. For example, Yarra Valley Water in Victoria offers a package to large households (six or more people) who are experiencing difficulty paying their higher tariffs, involving a home visit by a water conservation plumber to identify water saving measures and, where necessary, the implementation of water saving measures,

such as installation of flow control valves, replacement of washers, cistern adjustment, leak detection and advice, and checking and adjustment of hot water systems.

In another example, Sydney Water Corporation offers free retro-fitting programs (e.g. showerheads, flow valves and regulators, cistern adjustment) to holders of health care cards, pensioners concession cards, veterans cards, households assessed by welfare agencies as being in financial hardship, as well as targeted high-consumption households (households of seven or more people using more than 100 kL per head).[33] Sydney Water Corporation estimates that the retro-fitting programme can result in savings of around 21kL per year for an average family.

Water and wastewater businesses in Australia commonly offer extended payment arrangements and in some cases payment assistance for customers experiencing difficulty in paying their bills:

- *Extended payment arrangements.* Water businesses in Australia, including the Corporation, commonly offer customers who are experiencing difficulty in paying their bills the option of arranging alternative payment schedules and deferring payments.
- *Emergency payment assistance.* Water businesses may direct customers facing severe financial hardship to relief agencies to apply for payment assistance from government funded schemes.
- *Payment and interest relief.* Water businesses may also, on a discretionary basis, provide their own financial assistance schemes or waive interest payments on outstanding accounts for customers demonstrating severe financial hardship.

The extent to which such hardship relief is available and effective reduces the need for additional measures during periods when reforms are being implemented.

In view of the options available to reduce the impacts of price changes on customers, the Authority considers that, in circumstances where changes in prices and price structures are clearly justified on efficiency grounds, consideration should be given to arrangements that reduce or ameliorate any short-term price impacts of these changes on particular groups of customers. In making recommendations on prices as part of this inquiry, the Authority has taken into account a transitional period for the implementation of changes in prices to limit the social impacts of changes in prices.

Recommendation

13 The impacts of changes in price structures on customers should be managed, to the extent considered appropriate, through the gradual phasing-in of new price structures over a number of years or billing periods. Any further assistance that the Government might consider should be provided in a way that minimises efficiency losses.

[33] Sydney Water Corporation (November 2004), Sydney Water Corporation Submission to the Independent Pricing and Regulatory Tribunal Review of Metropolitan Water Agency Prices, pp101-104.

3.11 Pricing of Wastewater Services

3.11.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the current structure and level of urban … wastewater prices;*

3.11.2 Background

Wastewater services involve the acceptance, transport and treatment of wastewater followed by the disposal of the end products of treatment.

Broadly, there are three different types of wastewater:

- Domestic wastewater – which is discharged by both residential and non-residential customers into sewer networks which transport it to treatment plants.
- 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. Trade waste may in some circumstances be discharged into sewer networks, and in other circumstances is required to be delivered by truck to treatment plants.
- Stormwater, which in some locations is discharged into the sewer network.

The provision of wastewater services is different in many commercial and economic respects to the provision of water services.

First, residential demand for wastewater services can be regarded as almost completely unresponsive to the level of prices charged for the services. Generally, households and commercial premises have no discretion as to whether or not to connect to sewerage services. As such, price levels and structures have limited impact on the demand for the services and hence have limited efficiency implications for the use of the services.

One possible exception to this is where wastewater charges are levied on a usage basis, such as by using a proxy measure of wastewater volumes such as winter water consumption of households.

A related matter is that wastewater treatments costs tend to be related to contaminant load of wastewater streams rather than, necessarily, the volume. As such, a reduction in volume of discharges without a reduction in contaminant load, such as reduction in grey water discharges from residential properties after implementation of household recycling schemes, does not necessarily result in a reduction of wastewater treatment costs.

Second, the nature of wastewater services provided to different classes of customers varies. While residential customers of wastewater services discharge waste streams of similar qualities, commercial users of wastewater services discharge waste streams of very different 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. There is therefore reason to apply different charges to different classes of customers according to the characteristics of waste streams and the costs that are incurred in treatment and disposal of these waste streams.

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.

Table 3.2 provides a summary of price regimes for wastewater services throughout Australia. With the exception of Victoria, most States levy 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. In Melbourne residents are levied a two-part price with the usage charge based on water consumption adjusted by a discharge factor (higher for units, lower for houses) and seasonal factor (lower in summer).

The fixed charges for residential properties in Western Australia and South Australia are levied on the basis of the Gross Rental Value of the serviced property. Under this system, the charges paid by individual customers do not necessarily reflect service delivery costs, with households in suburbs with high rental-value properties paying a disproportionately higher share of total costs. All other jurisdictions have adopted a uniform fixed charge that reflects the average "per property" cost of wastewater services. Where water consumption is used to estimate residential wastewater volumes, some companies (e.g. Melbourne retailers) use monthly seasonal factors and discharge factors differentiated by house type and quarterly water consumption. Hunter Water Corporation in NSW uses a simple discharge factor of 50 per cent for all residential customers in its usage-based wastewater charge. Another approach is to use winter water consumption as the basis, as water use in winter for regions that have rainfall concentrated in winter is predominantly in-house use and discharged to the sewer.

Table 3.2 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 and 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 four categories of users. Usage and quality charges apply to three 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 two.	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 (four 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.

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 3.2). 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 for non-residential customers also differs from State to State. Some States are using sophisticated methods to monitor discharge levels, while others use 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 200kL 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.

3.11.3 Assessment

3.11.3.1 Residential Wastewater Charges

In considering the charging structure for wastewater services to residential customers, the Authority has considered the following general approaches:

- charging according to capacity to pay, such as by basing charges on property values;
- a combination of a fixed charge and a usage charge, similar to the Victorian model; and
- a uniform flat charge.

The current approach to the setting of wastewater charges is supported by the Corporation, WACOSS and the Office of Water Policy. For example, the Corporation's position is:

> Replacing property value based charges would significantly affect many low income groups. Moving to a flat fee would see charges to customers with the lowest value properties increase by almost $200 per year. Any substantial change to the current tariff would require significant analysis and open consultation with the community. (Corporation, Draft Report submission, p9)

The Department of Treasury and Finance, on the other hand, prefers a simple flat charge:

> … the abolition of GRV based wastewater charges and replacement with a State-wide average fixed charge is supported on the grounds that it is the most economically efficient form of charging and all social efficiency concerns can be addressed through a substantial phasing in period.
>
> A standard charge or fixed charge is the most common form of sewerage charge in Australian water utilities. It is simple to administer and recognises that residential customers receive a standard service. A revenue neutral standard charge should be based on the average Statewide cost of the service per household. A Statewide wastewater charge is also consistent with the uniform pricing policy for residential water charges (up to

> 350kL) across the State. A flat charge will eliminate a lot of customer confusion relating to the calculation of GRV and dramatic changes in sewerage charges following revaluation periods. (Department of Treasury and Finance, Draft Report submission, p27)

Support for the introduction of a usage-based approach to residential wastewater charging was provided by B&T Bocking (p1, Draft Report submission), AQWEST (Draft Report submission, p9) and the Conservation Council of WA (Issues Paper submission, p11). AQWEST states:

> …wastewater pricing is a serious issue in WA, and the status quo is not acceptable, particularly given that WA has the highest charges in Australia, and still relies upon property value based charges, which have been abandoned elsewhere. If, subsequent to future legislative change, AQWEST is able to provide wastewater services, it hopes that a more sophisticated recognition of wastewater charging mechanisms is developed by the ERA, and detailed in its final report. For example, whilst it is difficult to meter wastewater in the same way as water is metered, it is possible to develop models which establish a relationship between water going into a household and the various uses of water in that household, and thus to determine an amount of wastewater produced. Industrial and commercial users of wastewater services (including AQWEST itself) are already billed in this manner. This may well form a more appropriate base for further consideration of appropriate pricing mechanisms. (AQWEST, Draft Report submission, p9)

The Conservation Council of WA has proposed a simpler measure of wastewater discharge: the number of toilets per residence. However, the information on number of toilets per residence is not readily available to water businesses, and in any event it would be an unsatisfactory proxy for discharge volumes because it does not reflect intensity of use. In addition, providing an incentive to simply reduce the number of toilets per residence would not achieve any social or economic objective.

The alternative approaches to charging for wastewater have been analysed by considering the implications for:

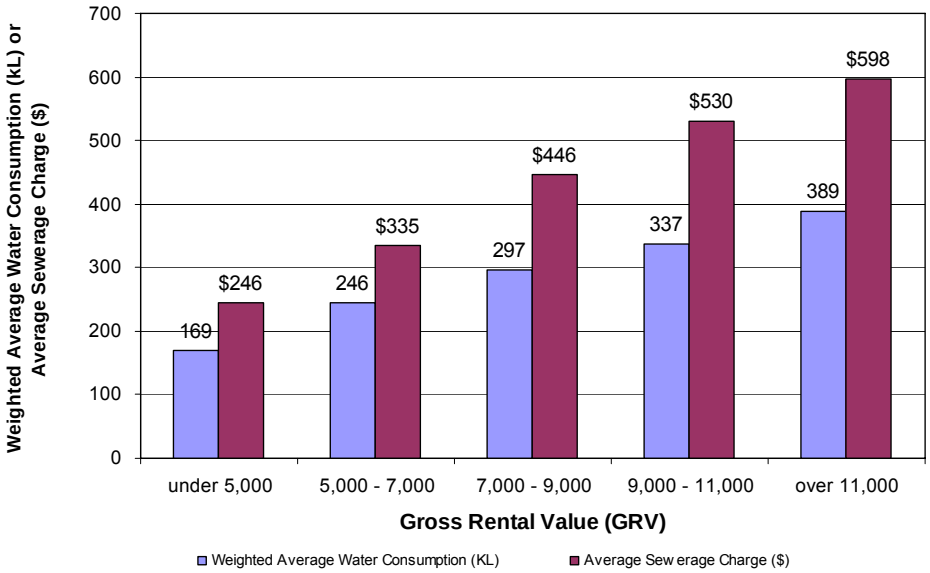
- cost-reflectivity;
- the effect on customer decision making;
- administration costs; and
- the social impacts associated with a transition to a new charging regime.

Cost-reflectivity

A key consideration is the extent to which wastewater prices reflect the costs of providing wastewater services.

Consideration of average levels of water use across suburbs with a range of average GRVs indicates that property GRV provides a proxy measure of water usage by households – households in higher value suburbs tend to use more water than households in lower value suburbs (Figure 3.1). Based on the presumption of this correlation, CSIRO have suggested that GRV-based charging may actually be similar to the usage-based approach applied in Melbourne. However, GRV is likely to be less well correlated with the volumes of wastewater discharge than with the total level of water use, since other variables determine the proportion of household water that is wastewater-related (the discharge factor). There is no evidence to suggest that households of higher-value properties have any greater discharge of wastewater than households of lower value properties. The higher average water consumption of higher-value properties may simply be a result of greater outdoor use of water for purposes such as swimming pools and garden watering.

Figure 3.1 Gross Rental Value versus Water Usage and Wastewater Charge



The Authority is of the view that the most cost reflective price structure for wastewater services would be to determine usage charges on the basis of estimated interior household water, based on a measurement of winter water usage. The correlation of winter water usage and wastewater discharge is likely to be particularly strong for the Perth metropolitan area (relative to other Australian cities) due to the predominance of winter rainfall. The use of winter water use as a proxy for wastewater discharge would, however, require that the Corporation align meter reading with the winter season.

A flat charge across all residential properties may also be more cost reflective than rates levied against GRV approach. There is no evidence to suggest that indoor water usage, which is the appropriate base for estimating wastewater discharge, differs significantly, on average, between households in properties of different value. However, a flat charge across all properties would not take account of differences in volumes of wastewater discharges between properties that may result from differences in the number, ages and lifestyles of occupants.

Effect on customer decision-making

A further consideration is the impact that the wastewater pricing approach has on customer decisions regarding wastewater options. As customers generally do not have any discretion as to whether or not to connect to wastewater services, customer decisions are limited to affecting the volume of wastewater streams.

Under a usage-charge approach based on estimates of indoor water consumption, households would be faced with only an indirect incentive to reduce wastewater discharge, through the direct incentive to reduce indoor water consumption, such as by investment in water-efficient fittings and appliances. Only a more sophisticated mechanism for estimating wastewater discharges would enable usage charges to be directly related to the volumes of discharge and hence motivate investments such as investment in household grey-water recycling schemes. Such sophisticated mechanisms for estimating wastewater discharges are unlikely to be practical.

3.11.3.2 Administration costs

The administration costs associated with each wastewater pricing approach also need to be taken into account.

The current GRV-based approach to pricing of wastewater services causes the Corporation to incur costs of $2.4 million per annum for property valuations. The GRV-based approach also causes the Corporation to incur significant costs in dealing with customer complaints about property valuations and charges.

A simple usage charge approach to wastewater pricing would also cause significant administrative costs to be incurred. The Corporation estimates that a simple usage charge approach (based on a discharge factor adjusted for bore ownership and dwelling type) would cost around $0.25 million in computer set-up costs, around $0.100 million for communication with customers and would take a minimum of 12 months to implement. In some cases, there may be additional meter reading costs, which the Corporation estimates at $2 million per year plus transaction costs for two additional meter readings. A usage charge approach may also cause significant costs to be incurred in dealing with customer complaints. Experience with usage-based wastewater charging in Victoria shows that complex formulas for estimating wastewater volumes (e.g. highly differentiated seasonal factors and discharge factors) can lead to customer complaints. The Essential Services Commission in Victoria favours simpler formulas on the basis that they are easier for customers to understand and are a good enough proxy for discharge to sewers.[34]

A flat charge for wastewater services would avoid the administrative costs associated with GRV or usage-based charging.

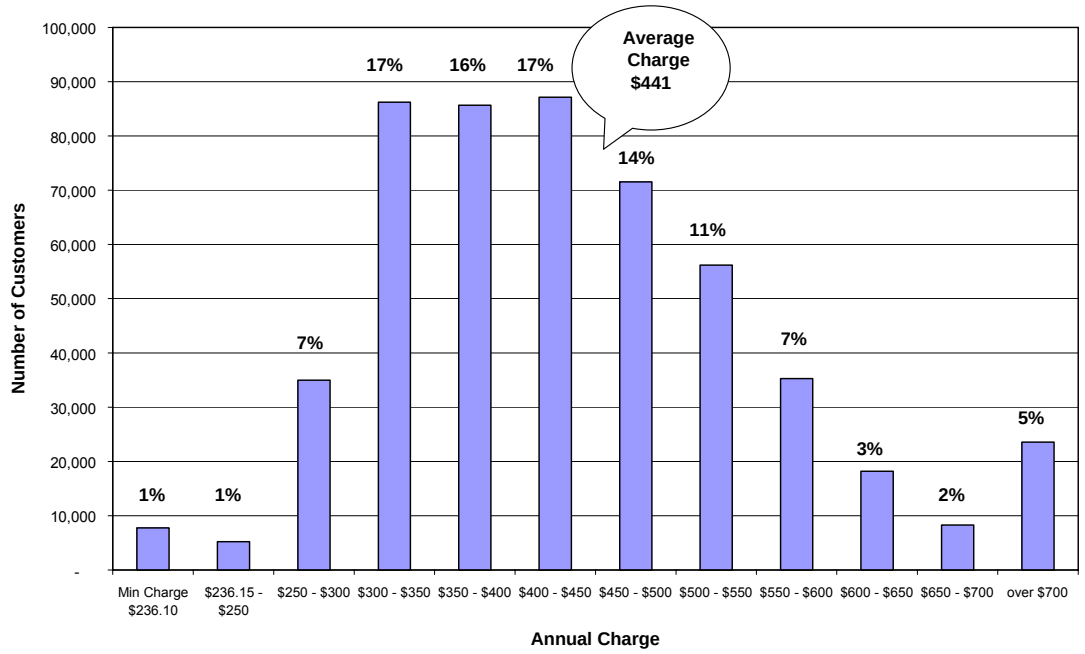
3.11.3.3 Social impacts

Of concern is the social impacts that would arise in moving away from GRV-based pricing to an alternative pricing approach.

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. The Authority estimates that with the current level of wastewater charges, the immediate conversion to a flat charge in 2006/07 would result in 9 per cent of customers facing an increase in their annual bill of between $142 and $200 (Figure 3.2). If the flat charge were phased-in over four years, the average increases per year would be between $35 and $50. A phase-in period of eight years would result in average increases per year of between $16 and $22.

[34] One Melbourne retailer, which receives around 20-30 calls per week in relation to its wastewater charging methodology and 20 customers per week seeking individual estimations of wastewater volumes, is considering moving to an alternative approach (either a fixed charge, or a constant discharge factor for all residential customers, as used by Hunter Water Corporation) in the next review period.

Figure 3.2 Distribution of Perth Household Wastewater Charges (2004-05)



The social impacts are sufficiently large to cause the Corporation, WACOSS and the Office of Water Policy to argue against replacing GRV-based prices with a flat charge. WACOSS argues for GRV-based 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-based charging is an imperfect way of achieving this outcome because a proportion of low-income households (25 per cent) live in established, wealthy suburbs. DTF also points out that tenants would be shielded from any price increase because they do not pay the wastewater bill directly and to some extent be shielded because they receive a 50 per cent discount on their wastewater bill.

It is unclear whether the usage charge approach would have lesser social impacts than the flat charge approach as this depends on the correlation between wastewater usage and GRV. It is possible that the flat charge and usage charge approaches would result in similar social impacts.

3.11.3.4 Conclusion

On balance, the Authority is of the view that decoupling wastewater charges from property values has merit, principally because charges based on property values are not cost reflective or transparent. The Authority recommends that the current charging structure be phased-out over a period of four years and replaced by a charging structure that provides for simpler and more transparent charging for wastewater services, but in part retains the principle of having charges based on capacity to pay (to the extent that capacity to pay is represented by property value).

The Authority recommends that a four-block inclining tariff be introduced for residential wastewater charges. Initially, households would be placed in the different blocks based on the current gross rental values of their properties. The Corporation would then move each household over a four-year period to the average charge for the particular block that each household is allocated to. New households, including those households that move,

would pay the average charge. Under this approach, the gross rental value methodology would not be required after the initial placement of households to their respective blocks.

The design of the proposed tariff structure is discussed in section 4.5.

Recommendation

14 Prices for wastewater services for residential customers should be gradually decoupled from property values and determined as an inclining tariff, thus increasing transparency, while retaining, in part, the principle of charging according to capacity to pay.

3.11.3.5 Commercial Wastewater Charges

The Corporation currently charges commercial customers for wastewater services using a fixed and volumetric charge. The Authority is of the view that this is appropriate in circumstances where volumes of wastewater discharged to sewerage systems can be measured or otherwise determined with reasonable accuracy. The efficiency of volumetric charging is further enhanced because customers have some ability to alter discharges of wastewater in response to prices (for example, to implement technologies that reduce wastewater discharges).

Recommendation

15 Prices for wastewater services for commercial customers should continue to be determined by a combination of fixed and volumetric charges. Volumetric charges should be set to reflect the estimated long run marginal cost of providing wastewater services. Fixed charges should be set at levels necessary to ensure that revenue requirements are met after taking into account revenues from volumetric charges.

4 Water Corporation

4.1 Background

The 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 the Department of Environment) 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 1995*.

The 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 approximately 2,000 people and operates 246 water treatment plants, 113 dams and reservoirs and 713 bores in 106 bore fields.[35]

The operational activities of the Corporation are currently subject to specific 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). 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.[36]

It is noted that on 7 October 2005 the Acting Premier, Eric Ripper MLA, announced the establishment of a new Department of Water by 1 December 2005, to provide advice on the status of water resources and the viability of new source development, as well as being responsible for allocating, licensing and monitoring functions.[37]

During the budget round each year, the 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 prices.

[35] Water Corporation Annual Report, 2004.

[36] Water Corporation Annual Report, 2004.

[37] Acting Premier's media statement, 7 October 2005

4.2 Service Standards

4.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services including:*
  - *any additional resources needed to meet the required standards of quality, reliability and safety;*
  - *how changes in standards and operating conditions faced by the service providers impact on its revenue requirements.*

4.2.2 Background

The provision of services by the Corporation is regulated under the *Water Services Licensing Act 1995*. This Act establishes a licensing scheme whereby the Corporation is granted an operating licence for provision of water supply services, sewerage services, irrigation services and drainage services.

The licence is granted subject to terms and conditions that establish standards and requirements for the provision of services in respect of:

- processes for dealing with customer complaints;
- a requirement to establish a customer charter;
- establishment of committees of consumers for the purpose of obtaining consumer opinions on the Corporation's prices and service standards;
- obligations to customers in respect of the availability and connection of services;
- reporting of customer complaints and incidents in the provision of services including non-compliance with water quality standards, overflows from wastewater infrastructure and interruption of water services;
- standards for the provision of services including standards for customer service, health-related aspects of water quality, water pressure and flow, interruptions to water services, overflows of sewerage systems, and design criteria and performance requirements for drainage schemes;
- reporting of compliance with standards for the provision of services;
- maintenance of an asset management system; and
- performance of operational audits, being audits of the effectiveness of measures taken by the Corporation to maintain quality and performance standards.

Compliance with the terms and conditions of its operating licence causes the Corporation to incur certain costs that in some cases may not necessarily be incurred in the absence of the specific licence requirements. These are costs legitimately incurred by the Corporation and prices for services should be set at a level sufficient to ensure that these costs are recovered.

The terms of reference for the current inquiry require the Authority to consider whether the Corporation requires any additional resources to meet the required standards of quality, reliability and safety; and how changes in standards and operating conditions affect the Corporation's revenue requirements.

The Authority has addressed this element of the inquiry by:

- consideration of whether the Corporation is providing services in accordance with its licence requirements;
- if the Corporation is not providing services in accordance with licence requirements, consideration of whether this is due to insufficient financial resources (i.e. revenues) to meet these requirements; and
- consideration of mechanisms by which the prices and revenues of the Corporation may be adjusted to meet any additional revenue requirements arising from changes in standards and operating conditions.

4.2.3 Compliance with Licence Requirements and Performance Standards

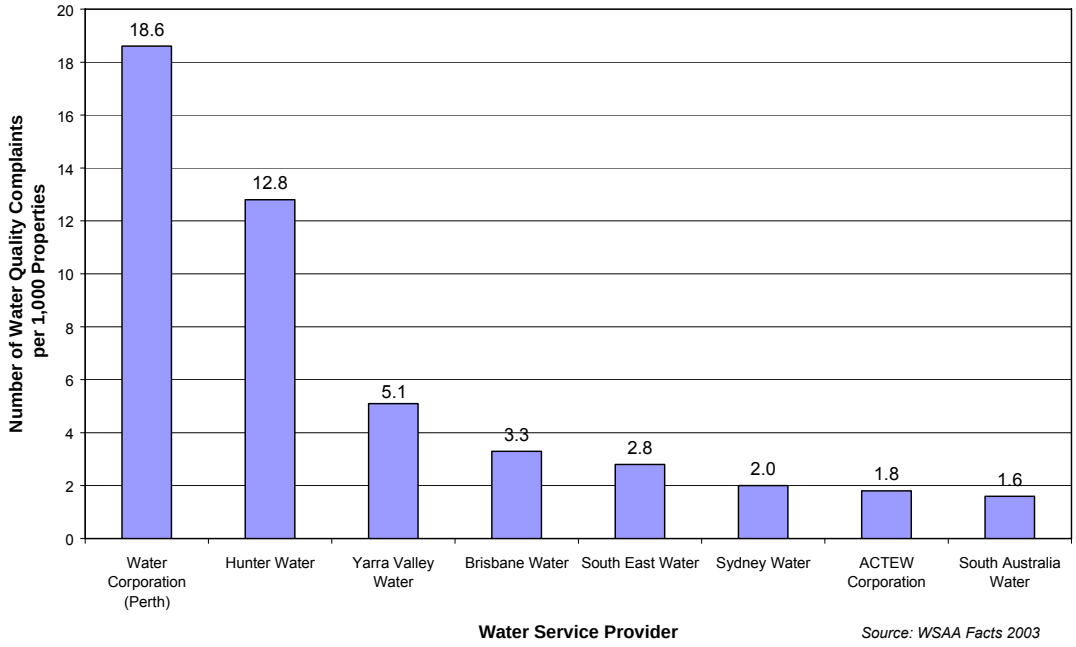
The Corporation has submitted to the Authority that it expects to continue to meet the standards that are specified in its operating licence and standards associated with health and environmental regulations. In support of this submission, the Corporation cited results of operational audits indicating that it met licence requirements across all auditable elements, and that its level of service provision in eight areas has exceeded relevant minimum requirements – customer complaints; drinking water quality; continuity, leaks and bursts; telephone answering; sewerage overflows on property and blockages; and services provided by agreement.[38]

The Corporation has also provided the Authority with results of market research on customer satisfaction with services and customers' perceptions of overall value in respect of parameters such as water quality, billing services and responses to emergency situations. The information provided by the Corporation indicates that customers have a high level of satisfaction with relevant parameters, with the exception in some cases of aesthetic water quality.

The Corporation indicates that its own market research shows that 35 per cent of residential customers are dissatisfied with the taste of their water. Information from the Water Services Association of Australia (WSAA) indicates that the number of customer complaints about water quality (per 1000 connections) well exceeds the national average (Figure 4.1).

[38] The Corporation also submits 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.

Figure 4.1 Comparison of Water Quality Complaints across Water Businesses



WACOSS submitted that there may be a case for higher standards for water taste:

> Given that 35% of residential customers were dissatisfied with the taste of their water, and the number of complaints about water quality in WA exceeds the national average it is surprising that, despite these high figures, there is no recommendation for service standards to improve (WACOSS, Draft Report submission, p16)

In response to the apparent dissatisfaction with water quality, the Corporation indicated to the Authority 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. (Corporation, Pricing Submission, p17)

The Authority notes 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. The lower levels of water treatment by the Corporation are made possible by the substantial reliance on groundwater resources, which require less treatment than surface water resources. However, as a consequence, properties of water taste may not be of the same standard as if more intensive water treatment was undertaken.

The Corporation has submitted to the Authority 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 has also pointed out that customer willingness to pay for improvements to aesthetic water quality is relatively low, citing a 2002 study that indicated 52 per cent of customers have a zero willingness to pay for taste improvements (when asked an "open-ended/unprompted" question about their willingness to pay), and 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.

The Authority has considered the results of the Corporation's operational audits and other reports on compliance with licence conditions and is satisfied that the Corporation is providing its services in accordance with standards and requirements imposed by the terms and conditions of its licence. While there are some aspects of service that give rise to customer dissatisfaction, such as aesthetic water quality, it is unclear whether the improvement of services in these respects, with concomitant increases in costs and prices, are desired by customers. The Authority considers that additional work, using more reliable valuation methods, should be carried out to assess customers' willingness to pay for improvements in service standards such as aesthetic water quality.

4.2.4 Additional Financial Resources Required to Comply with Licence Requirements and Performance Standards

After considering submissions and other information on standards and operating conditions, the Authority has formed the view that the Corporation is providing its services in accordance with standards and requirements imposed by the terms and conditions of its licence. The Authority does not consider that there is reason to consider that the Corporation requires additional financial resources – and hence higher prices and revenues – to meet these standards and requirements.

4.2.4.1 Changes in Standards and Operating Conditions

Submissions from the Corporation and other parties have indicated that there are a number of aspects of service delivery and operational performance for which the Corporation may be required to meet new or higher standards in the future. These include such aspects as:

- standards of aesthetic water quality;
- increases in billing frequency for water services and provision of more information on water bills;
- increased wastewater treatment (nutrient reduction) prior to ocean outfall;
- increased wastewater recycling, including development of supply systems for non-potable water;
- reduced odour surrounding wastewater treatment plants;
- improved management of urban stormwater prior to entering waterways;
- increased use of "green energy";
- improved availability and reliability of supply through various options (resulting in a lower incidence of water restrictions);
- stricter control on sustainable use of groundwater resources;

Any requirement for the Corporation to meet new or higher standards of operational performance in these respects will be likely to affect the costs incurred in the provision of services. The Authority considers that these costs should not be anticipated, but rather should be taken into account when and if the new or higher standards are imposed and forecasts made of the costs of meeting the standards. Under the scheme being recommended by the Authority for the determination of prices for water and wastewater services, any changes in cost forecasts arising from the imposition of new standards can be accommodated in target revenues and prices at the times of periodic price reviews.

Improved clarity in the information presented on the Corporation's water bills to customers could strengthen the pricing signal to customers. As noted by WACOSS:

> Customer bills are the most direct form of communication the Water Corporation has with its customers…Whilst there is a general awareness in the community of the need to conserve water, the ability of individual consumer to respond to price signals is limited by the lack of information about their individual consumption patterns. (WACOSS, Draft Report submission, p30)

A Corporation water usage bill shows the payment amount and due date on the front page, while further information on the calculation of the charge, average daily usage for the current reading period, and a comparison of property water use with the same period in the previous year is printed on the reverse page. Wastewater charges and the fixed charge for water are billed separately. Additional information which could improve customers' awareness of water usage prices and their own water consumption and efficiency includes:

- a table of usage charges for each tariff block;
- the customer's (household's) average usage in litres per day for the current and previous billing periods, split into tariff blocks; and
- a comparison of the customer's average daily consumption with other representative households (by number of people in the household and size of garden).

An example provided by WACOSS in its submission on the Draft Report is Yarra Valley Water in Victoria, which presents such information on the front page of its water bills.

Recommendations

16 The Authority is satisfied that the Corporation is providing its services in accordance with standards and requirements imposed by the terms and conditions of its licence. The Authority does not consider that the Corporation requires additional financial resources – and hence higher prices and revenues – to meet these standards and requirements.

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

18 The Authority considers that additional information on customer bills could improve customers' awareness of water prices and usage.

4.3 Balancing Water Supply and Demand

4.3.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *considerations of demand management;*
- *the cost of providing the services concerned, including … any additional resources needed to meet … such matters as the protection and development of future water sources.*

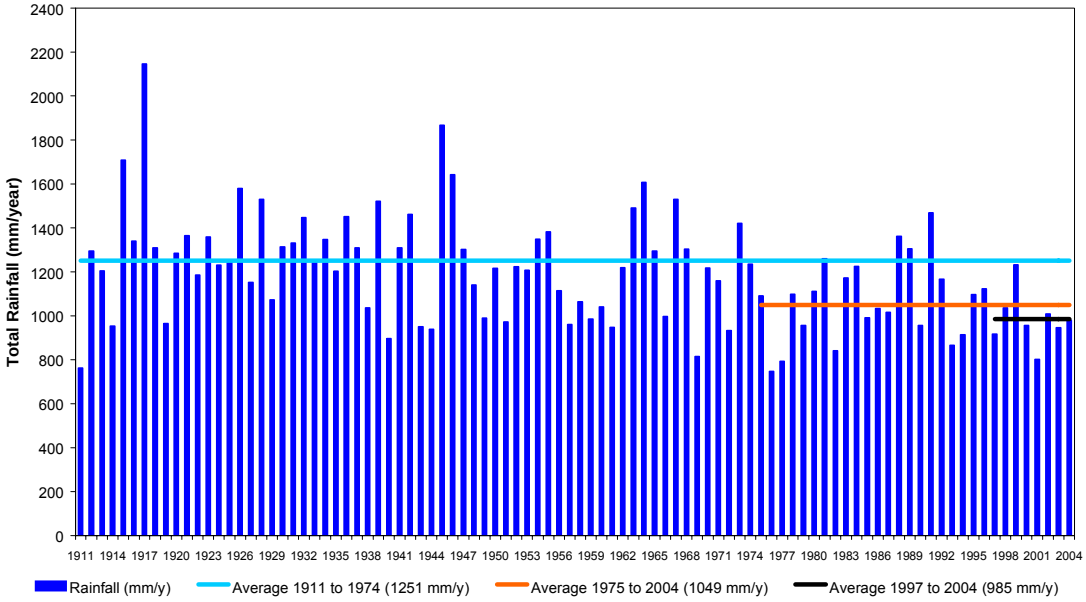
4.3.2 Background

Over the last 30 years, the South West of Western Australia has received relatively low levels of rainfall and low inflows to water storages (Figure 4.2 and Figure 4.3). In the period 1911 to 1974, average inflows were 338 gigalitres (GL) per year. However, in the 30-year period since 1975, average inflows have been only 161 GL per year – a reduction of 177 GL from the long-term average since records began. Over the last eight years, average inflows have been even less, amounting to just 115 GL per year, and corresponding to lower rainfall. The Authority notes that declines in rainfall result in disproportionately larger declines in storage inflows: while average rainfall for the past 8 years is 20 per cent lower than the average for 1911 to 1974, average inflows have been reduced by 66 per cent.

While it cannot be confirmed that climate change and the lower amounts of rainfall are the sole cause for this reduction in storage inflows (for example, inflows are also influenced by catchment vegetation density) there is a risk that the recent low levels of storage inflows will continue. 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.[39]

[39] Indian Ocean Climate Initiative No 2, June 2004.

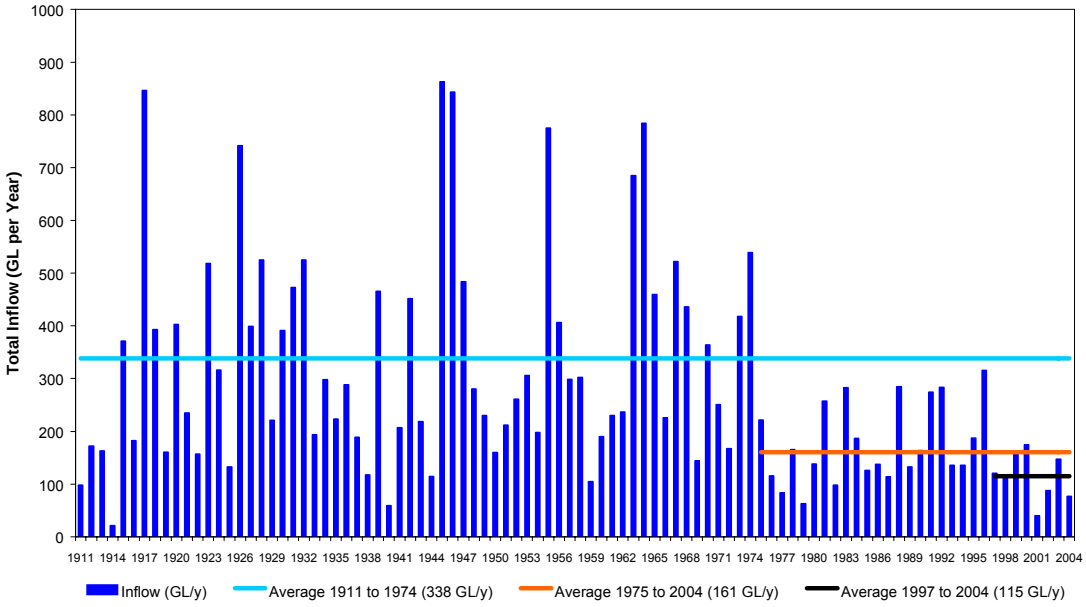
Figure 4.2 Declining Rainfall in South West Western Australia (Jarrahdale)[40]



Note: A year is taken as May to April (e.g. 2003 is May 2003 to April 2004)

Source: Water Corporation

Figure 4.3 Declining Streamflows into Perth Dams



Note: A year is taken as May to April (e.g. 2003 is May 2003 to April 2004)

Source: Water Corporation

[40] Jarrahdale is typical of the southwest Western Australian rainfall trends and is used by the Corporation to illustrate the decline in rainfall. A similar pattern occurs for other sites (eg, Perth, Dwellingup, Rottnest Island, Manjimup).

Around 240 GL of water is currently considered by the Corporation to be the sustainable supply of water available for annual urban consumption through its Integrated Water Supply System (IWSS). 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 annum, implying that the current level of water use exceeds sustainable supplies from existing sources by around 40 GL per annum.

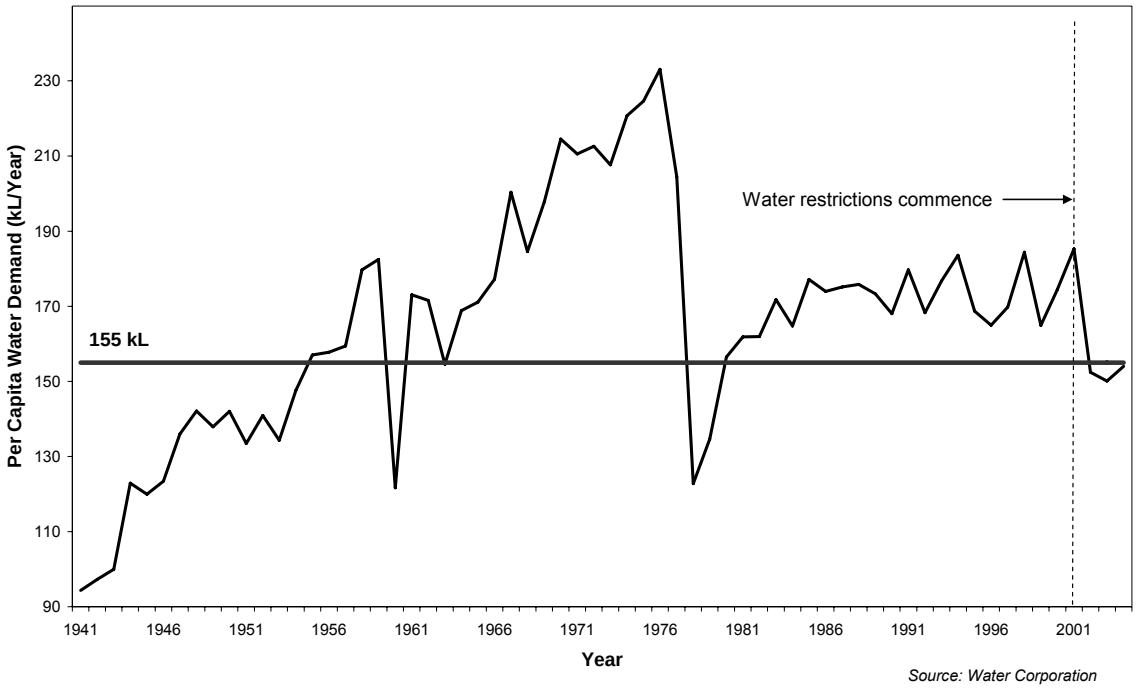
In recent years, water supply and demand has been brought into balance by water restrictions and by Ministerial approval to have the Corporation abstract 155 GL per annum from the Gnangara Mound.

The Corporation is continuing to implement both demand management and source-development initiatives to balance water demand and supply into the future. These initiatives are examined as follows.

4.3.3 Demand Management

The Corporation has implemented a demand management program to contribute to 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. Figure 4.4 shows the 155kL per year target in relation to historical per capita water demand.

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



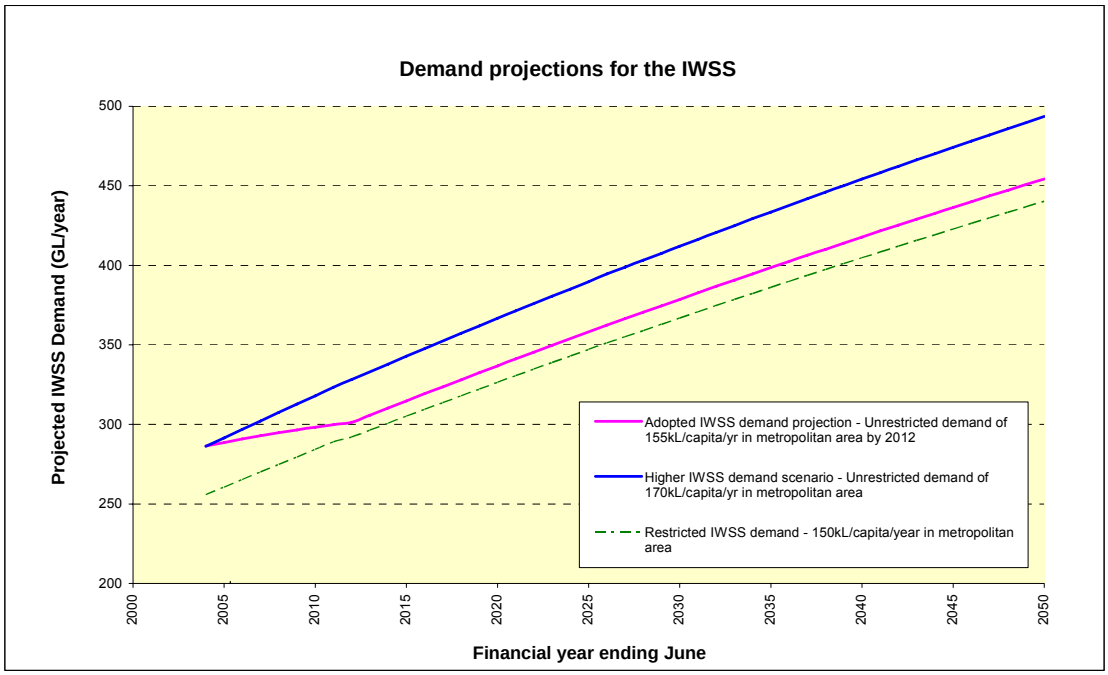
Source: Water Corporation

While current consumption is at about 155kL per person per year, 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. (Corporation, Pricing Submission, 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 4.5. Under the assumption of unconstrained per capita demand at 170 kL, the Corporation would need to meet a demand of about 480 GL per year by 2050. If unconstrained per capita demand can be held at 155 kL, total water requirements would be just over 450 GL per year by 2050.

Figure 4.5 Demand Projections for the Integrated Water Supply Scheme (IWSS)



The Corporation's demand management programme is based on the State Water Strategy target of achieving an annual per capita demand of 155kL by 2012. In this regard, the Authority's preference is for demand to be determined at the level that is consistent with efficient pricing (where prices include all costs, including costs of meeting environmental standards) and for demand management options to be used when they are less expensive than augmenting supply. Part of the justification for this view is the assessment that water in the South West is not in itself scarce, but rather that supplies of water are constrained by the infrastructure requirements for the utilisation of new water sources.

As discussed in Section 3.8 the Authority is of the view that, while new sources are being developed to address the supply-demand imbalance, water restrictions should remain as a tool for rationing available supplies. However, the Authority considers that demand restrictions should be reassessed once the security buffer for water supplies is restored and should be used for short-term rather than long-term demand management.

The Authority is also concerned that some elements of the Corporation's Waterwise initiative, especially the rebate schemes for water-efficient appliances and fittings, may not be the most cost-effective way of balancing supply and demand and that the Corporation may be over-reliant on extending the rebate scheme to achieve the 155kL per person target. 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 the cost of developing new sources of water.

Although a thorough review of the rebate scheme is beyond the terms of reference of this inquiry, the Authority has briefly considered the costs associated with the installation of rainwater tanks and bores relative to the cost of scheme water. It is estimated that water supplied from a bore or tank costs $1.09 or $2.91 per kL, respectively; assuming the upfront capital cost of installing these appliances is amortised at 6 per cent over a 20-year life.[41] While the cost of water from a bore is likely to be close to the LRMC of water (which, as explained in section 4.5, is likely to lie between $0.82 and $1.20 per kL), rainwater tanks are clearly not a cost-effective way of balancing supply and demand.

A close examination of the rebate elements of the Waterwise program would appear warranted. This view is shared by the CSIRO and WACOSS, and the Department of Treasury and Finance has indicated in its submission that a 'comprehensive' review will take place. CSIRO, WACOSS and the Department of Treasury and Finance have indicated that the following matters should be considered as part of the review.

- The sales of water-efficient appliances that are attributable to the scheme (as opposed to purchases that would have occurred in any case);
- The avoidable costs of potable water supply (as a comparative benchmark for the individual costs of the rebate on each appliance);
- The total cost of the water saved, which includes the additional private costs incurred in purchasing water-efficient appliances as well as the cost of the scheme to Government.
- Consumer preferences for taste and supply reliability (in comparison to scheme water).
- The broader impacts of bores and rainwater tanks on overall hydrological balance (and strategies for managing these impacts). For example, rainwater tanks reduce aquifer recharge under the urban area; and increased pumping from unlicensed backyard bores may not be sustainable in some cases without effective management.
- The uptake of rebates by low income families.

Overall, the Authority considers that efficient pricing of water services should be used to the extent practicable and that the setting of a per capita demand target should only be pursued to the extent that efficient pricing is unable to manage demand such as in short-

[41] The bore calculation is based on a cost of $2,500 and 200kL of water saving. The rainwater tank calculation is based on a cost of $2,000 and 60kL of water saving. Source: product suppliers (cost), Water Corporation (water saving).

term circumstances. In addition, provision of subsidies for investment in water-efficient appliances and fittings should only be used where they are a demonstrated cost-effective alternative to augmenting supply. In accordance with its recommendations for the use of pricing and water restrictions as mechanisms for management of demand (Recommendations 9 and 10 in sections 3.7 and 3.8), the Authority agrees with the Corporation that restrictions should be reassessed as soon as the security buffer is restored, but cautions against an over-reliance on the existing rebate program as a method of managing demand.

4.3.4 Source Development

The Corporation has a long-term plan for development of new water sources. In addition to the Corporation's plan, a number of proposals for development of water sources have recently been put forward by independent parties as submissions to the Authority during the course of the inquiry. The Authority has not examined these proposals in detail as it is not within the terms of reference of the inquiry. However, consideration is given to the Corporation's plan to the extent that it impacts on water charges.

Over the next 10 years the Corporation proposes to develop four new sources of water: desalination of seawater, 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 would be potable. Details of these projects, together with the approximate cost of water from each source, are as follows.

- *Desalination Plant (c.$1.16 per kL)* – the plant, currently under construction, will produce 45 GL of water per year.
- *Harvey Water Trade (c.$0.60 per kL)* – involves the purchase from Harvey Water of additional water made available from the piping of irrigation channels and the subsequent elimination of seepage and evaporation from existing open channel irrigation systems. Work undertaken to date has yielded water savings of 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 (c.$1.07 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 totals about 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.[42]

[42] 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).

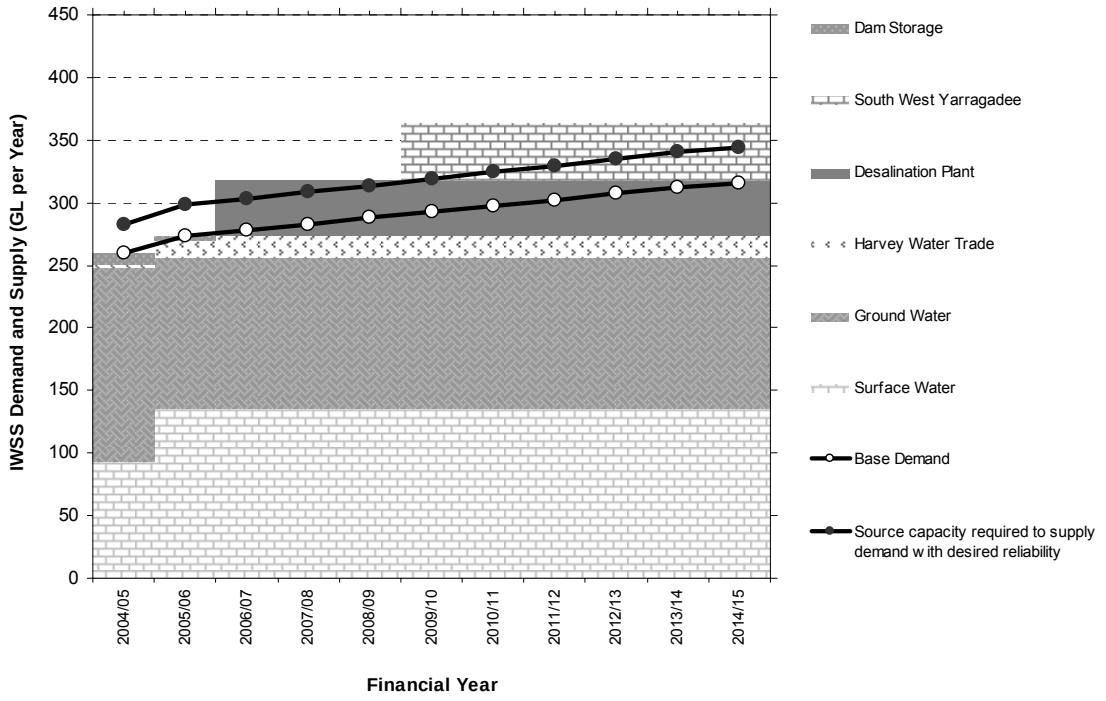
- *Water Recycling (c.$1.00 per kL)* – The Corporation has indicated that its Kwinana Water Reclamation Plant will treat 6 GL per year of wastewater for use by industry, at a cost of around $1 per kL (the majority of other recycled water schemes, which produce water of lower quality than will be produced by the Kwinana plant, cost less than $0.50 per kL.[43] Recycled water schemes for irrigation of parks and golf courses are also being progressed, which means 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 4.6. 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.

Figure 4.6 Supply and Demand Balance Under Corporation Assumptions

(1 in 200 year risk of total sprinkler ban, 8 year climate trend, 155kL per person, 120GL abstraction from Gnangara Mound)



[43] Corporation advice to Authority, 15 March 2005.

The Corporation has indicated 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. The Corporation 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 are not sufficiently developed to displace options that are currently proposed in the Corporation's source development plan.

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. The Corporation's assessment approach is outlined as follows.

> "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." (Corporation, 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: 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. (Corporaton, Issues Paper submission, p32)

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

However, the Authority is concerned that the objective of maintaining a capacity buffer to limit the risk of a total sprinkler ban to a 1 in 200 year event warrants further consideration, as does the objective of achieving the 155kL per person demand management target.

4.3.4.1 Security Buffer

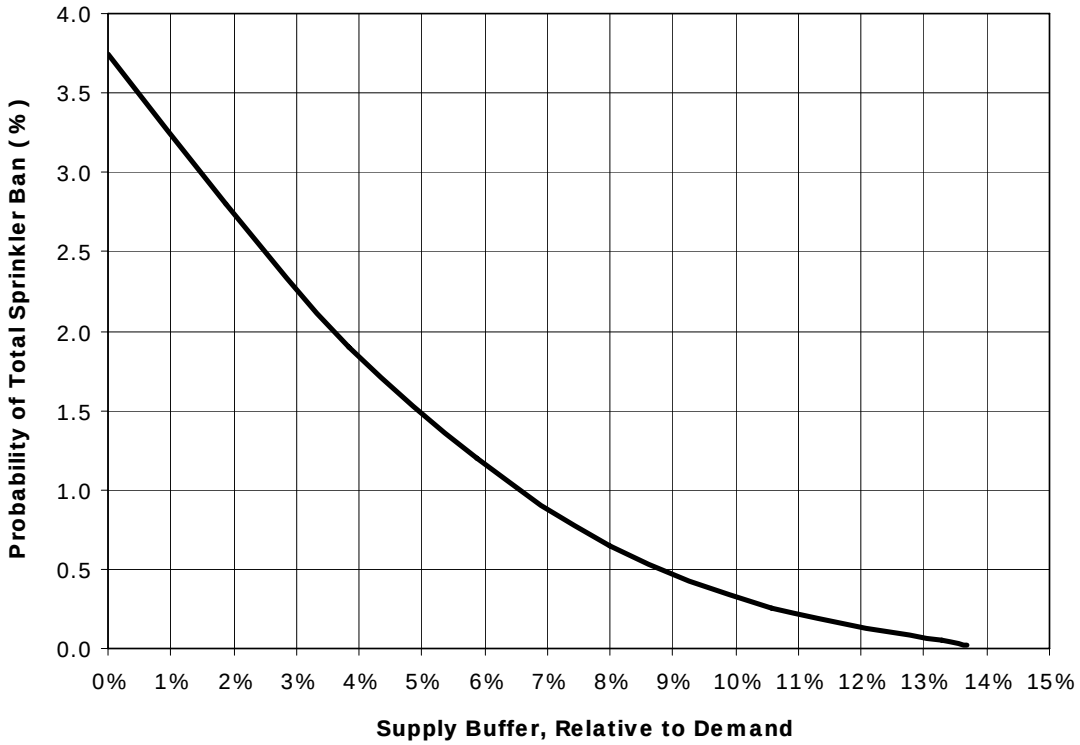
In other States, the security buffer underlying programs for development of new water sources is significantly less. For example, the ACT is currently reviewing its water supply options and security targets. Owing to the 2003 bushfires, drought and climate change forecasts, ACTEW is predicting that Canberra's 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.[44] A review of other Australian water utilities, which is cited in the ACTEW report, finds that currently there is consensus that the 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 (equivalent to 65 weeks in every 25 year period). This suggests that east coast water providers are maintaining a lower security buffer than the Corporation.

The selected security buffer needs to 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 4.7 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 per cent probability) corresponds to a zero margin.

Figure 4.7 Supply Buffer and Probability of Total Sprinkler Ban



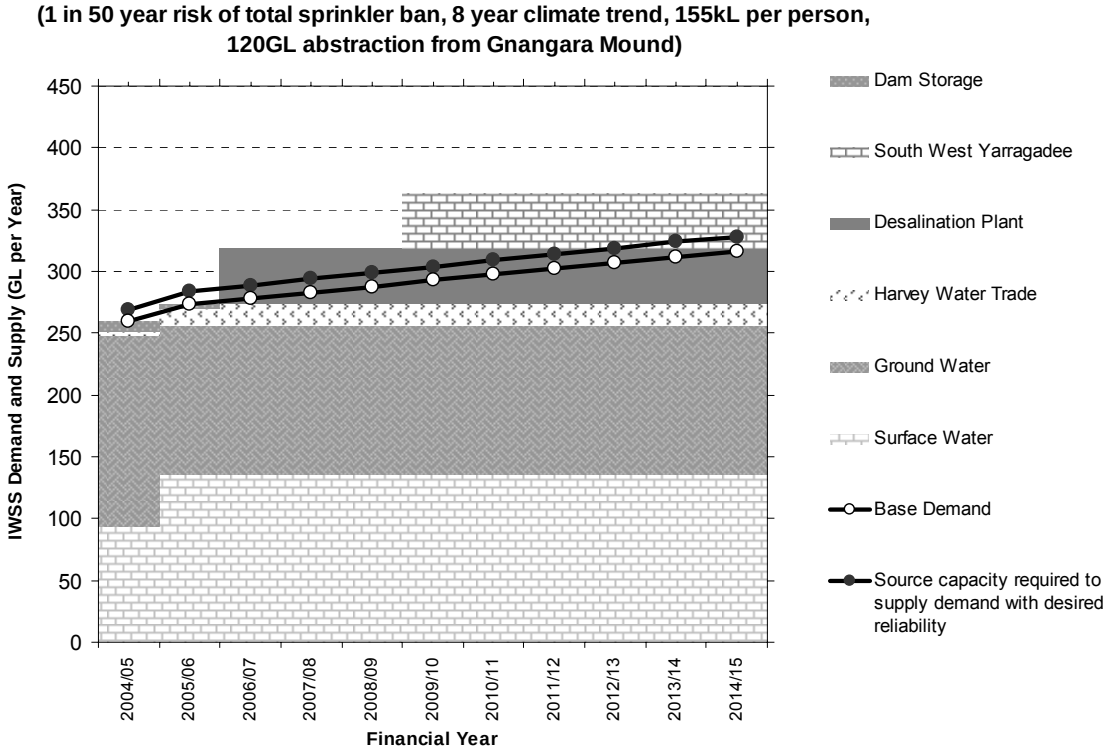
Source: Water Corporation

The proposal to maintain a relatively high security buffer influences the timing of bringing different source development options online. Figure 4.8 shows the projected supply and demand situation based on the assumptions of a 1 in 50 year security buffer. The figure illustrates that the acceptance of a lesser security buffer defers the need for a major new

[44] ACTEW Corporation Ltd (December 2004), *Future Water Options for the ACT Region in the 21st Century - An Assessment of the Need to Increase the ACT's Water Storage*

source by three years (from 2009/10 to 2012/13), which would present a saving of $43 million in net present value terms.

Figure 4.8 Supply and Demand Balance with a 1 in 50 Year Supply Buffer



The Authority has also considered the scenario where demand is unconstrained from 2006-07. Figure 4.9 shows the projected supply and demand situation based on the assumptions of a 1 in 50 year security buffer and unconstrained demand.

Figure 4.9 Supply and Demand Balance with Unconstrained Demand and a 1 in 50 year Supply Buffer

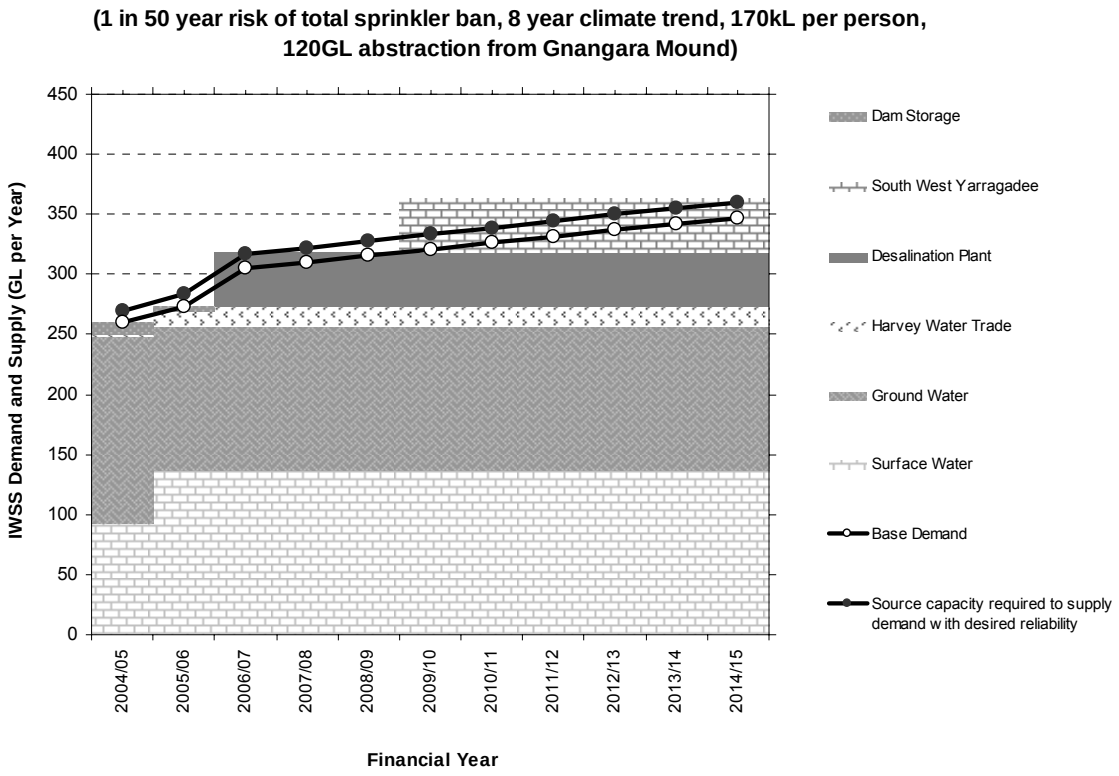
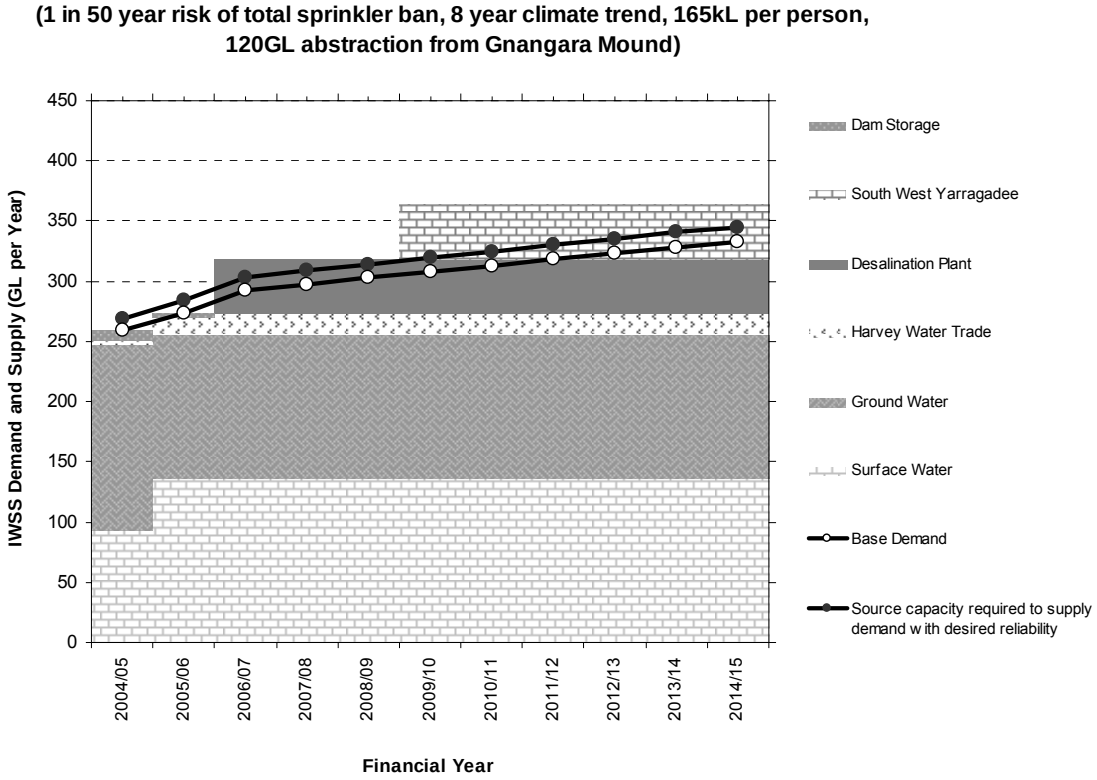


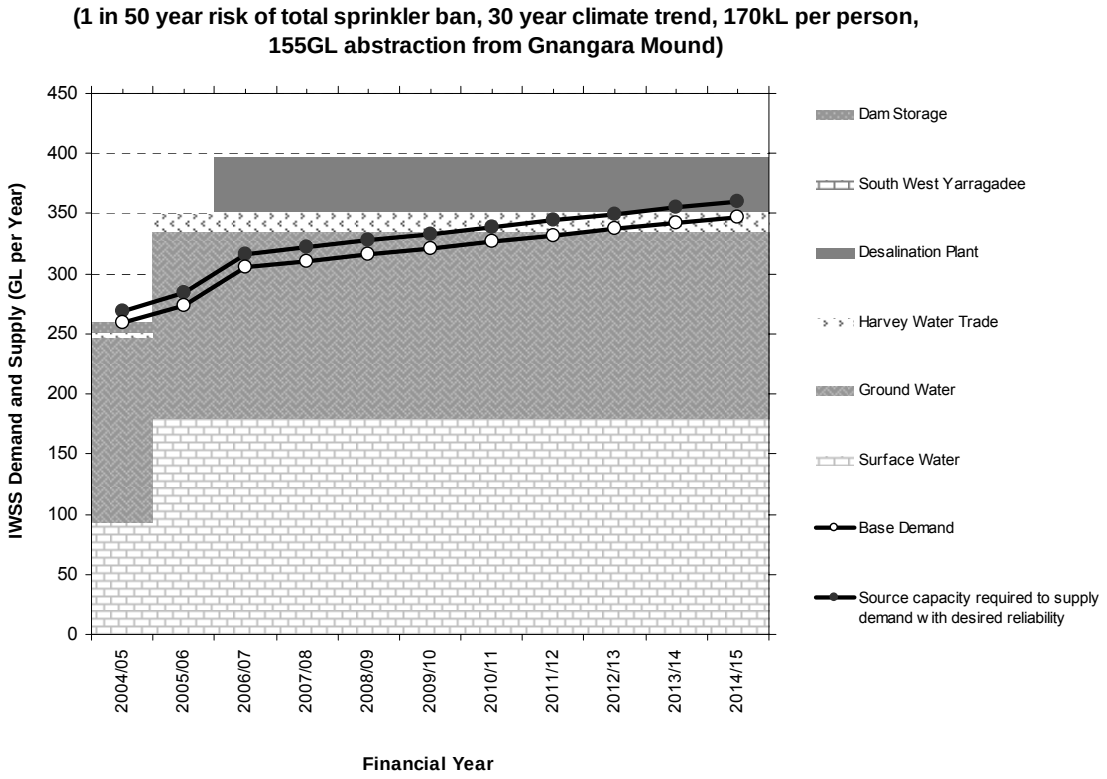
Figure 4.9 indicates that moving to unconstrained demand in 2006-07 could have the effect of not achieving the targeted 1 in 50 year supply reliability in the two years ahead of when water from South West Yarragadee would come online. The security buffer in those two years would drop to 1 in 27 year risks. The Authority considers that it would not be prudent to base the demand projections on an assumption that restrictions would be lifted from 2006/07. However, the Authority considers that it is reasonable to assume that demand restrictions will be able to be eased to 3-day per week sprinkler use from 2006/07 (which amounts to per capita demand of around 165 kL per person). This scenario is illustrated in Figure 4.10.

Figure 4.10 Supply and Demand Balance with 3 Days Per Week Watering and a Lesser Buffer



In the event that the rainfall and runoff levels return to levels of 30-year averages the South West Yarragadee source would not be necessary before 2015 (Figure 4.11).

Figure 4.11 Supply and Demand Balance with 30-Year Climate Trend



Overall, the Authority considers that the Corporation's target security buffer and probability

of severe water restrictions (total sprinkler ban) warrant further consideration and may impose a greater than necessary cost on water customers through either the continuation of existing water restrictions or the early development of new water sources.

For the purposes of this inquiry, the Authority has made the following assumptions: a security buffer based on a 1 in 50 year risk of a total sprinkler ban, the easing of water restrictions to three days per week in 2006-07 (on the basis of conservative assumptions about rainfall runoff and abstraction from the Gnangara Mound) and the timing of the South West Yarragadee development as envisaged by the Corporation. If the rainfall runoff continues at levels similar to the last eight years and water restrictions are not relaxed in 2006-07 then the abstraction of water from the South West Yarragadee aquifer could be deferred by three years.

Recommendations

19 The Authority considers that the criteria of security buffers and probabilities of requirements for water restrictions that underlie plans for development of water resources may warrant further consideration.

20 The Corporation's current plan for development of new water sources may appropriately be incorporated in forecasts of costs applied in the setting of water prices if it is assumed that water restrictions are eased to three days per week in 2006/07. Alternatively, the proposed abstraction from the South West Yarragadee aquifer could be deferred by three years.

4.4 Revenue Requirement

4.4.1 Terms of Reference

The need to consider the revenue requirements of the Corporation arises from the following elements of the Terms of Reference for the inquiry.

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;*

4.4.2 Background

As already indicated in section 3 of this report, the Authority has assessed the Corporation's revenue requirements by using a 'building block' approach. This method is used to determine a value of revenue required for a predetermined period, based on an assessment of costs to be recovered over that period. Using a forecast of demand for services, price structures and levels are then formulated to recover this revenue.

Identifying an appropriate level of revenue requires consideration of, among other things, a value of existing assets, 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.

4.4.3 Initial Asset Value

4.4.3.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the regulatory asset value of each of the service providers;*

4.4.3.2 Determination of the Regulatory Asset Value

As set out in section 3 of this report, the Authority is recommending that initial asset values should be established for each of the water businesses at a value consistent with current forecasts of service prices and revenues.

4.4.3.3 Water Corporation Proposal

The Corporation has proposed that an initial asset value for its assets be determined as the value implied by current revenue forecasts. The Corporation thus proposes an initial asset value of $9,100 million in 2006/07.

4.4.3.4 Authority Assessment

The $9,100 million asset value proposed by the Corporation is a value indicated as preserving the "status quo" of the Corporation's forecast prices and revenues were the government to introduce cost-based regulation of prices, and given forecasts of operating and capital costs. The methodology applied by the Corporation in deriving its proposed asset value is consistent, in a general sense, with a deprival-value approach to asset valuation and with the methodology that the Authority has determined as appropriate for the determination of regulatory asset values for the service providers that are the subject of the current study.

The Authority has undertaken analysis to verify the Corporation's determination of the proposed asset value by constructing a set of regulatory accounts based on the Corporation's forecasts of operating and capital costs, and determining the asset value that results in the value of a building block determination of a revenue requirement to equate to the Corporation's forecast of actual revenue. This calculation gives an asset value of $10,599 million at 30 June 2005.

The differences in the asset values proposed by the Corporation and derived by the Authority reflect differences in the approaches taken to the modelling of prices and revenues. There are three principal differences, as follows

- A different treatment of developer contributions: in the Corporation's modelling, capital contributions from developers are excluded from consideration as capital expenditure while in the Authority's modelling, developer contributions are treated as both revenue in the year that they occur, and as capital expenditure that is added to the asset value of the business.
- A different treatment of revenues from sources other than provision of water and wastewater services: in the Corporation's modelling, "other" revenues are excluded from consideration while in the Authority's modelling, other revenues are included in the forecast of revenues derived from the capital assets of the Corporation.
- A change in the rate of return applied in the determination of revenue requirements: in the period since the Corporation submitted its pricing proposal to the Authority, there has been a decline in the expected risk-free cost of capital for the Australian economy (as measured by observed returns on government bonds) and consequently a reduction in the estimated cost of capital for the Corporation. All other things being equal, this results in the derivation of a higher implied asset value derived as a deprival value from the Corporations forecast of prices and revenues.

For the purposes of this inquiry, the Authority is of the view that the asset value that should be adopted for the Corporation should be that determined consistently with the model that is applied in the determination of prices. For this reason, the Authority takes the view that the appropriate asset value for the Corporation used for the determination of the revenue requirement should be $10,599 million at 30 June 2005. The Authority considers that this value is consistent, in principle, with the Corporation's proposal.

The adoption of the asset value proposed by the Corporation was proposed by the Authority in its Draft Report, and has subsequently been supported by the Department of Treasury and Finance:

> … the Draft Report proposes a "building block" approach to prices based on operating and maintenance costs, depreciation and a return on the regulatory asset value. As it notes, formal guidance for the regulatory valuation of assets of water service providers is provided by the Agriculture and Resource Management Council of Australia and New Zealand (ARMCANZ), which requires assets be valued by the deprival valuation methodology unless another method is justified. Under the endorsed approach, the Water Corporation's prices would increase by some 30%. (Department of Treasury and Finance, Draft Report submission, p13)
>
> …
>
> On the basis that the ERA has accepted the proposed regulatory value as being within the feasible range, and that the DORC determination of the initial asset value would result in a substantial increase in the Water Corporation's revenue requirement (potentially resulting in a regulatory price shock if cost-based regulation were introduced), the DTF accepts the

$9,100 million regulatory asset value proposed by the Water Corporation. (Department of Treasury and Finance, Draft Report submission, p17)

The calculation of the Corporation's initial regulatory asset value is summarised in Table 4.1.

Table 4.1 Derivation of Initial Regulatory Asset Value for the Corporation

	Value ($million, real dollar values at 30 June 2005)									
Projected Revenue	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Customer charges[45]	748	775	791	810	830	851	872	894	916	939
Capital contributions	33	37	33	32	32	32	33	34	34	35
Forecast revenue from other services	159	162	155	152	152	153	154	156	157	159
Community Service Obligation payments	331	337	350	353	359	359	359	359	359	360
Total projected revenue	1,271	1,310	1,328	1,348	1,373	1,395	1,419	1,442	1,467	1,493
Present value at real discount rate of 5.63% as at 30 June 2005					10,290					
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by Corporation)	386	398	418	429	448	455	462	469	477	484
Depreciation	597	624	635	651	670	682	690	702	711	719
Return on Assets	259	271	280	290	301	309	317	327	335	344
Total cost of service	1,242	1,293	1,332	1,370	1,419	1,446	1,470	1,498	1,523	1,547
Present value at real discount rate of 5.63% as at 30 June 2005					10,290					
Initial asset value equating present value of projected revenue with present value of cost of service (as at 30 June 2005)					10,599					

Recommendation

21 An initial regulatory asset value of $10,599 million at 30 June 2005 should be established for the Corporation's physical assets.

[45] Revenue generated from the Corporation's projected charges.

4.4.4 Operating Expenditure

4.4.4.1 Terms of Reference

In conducting its investigation, the Authority must review:

- the non capital cost forecasts of the service providers;

The Authority must give consideration to, but will not be limited to, the following matters:

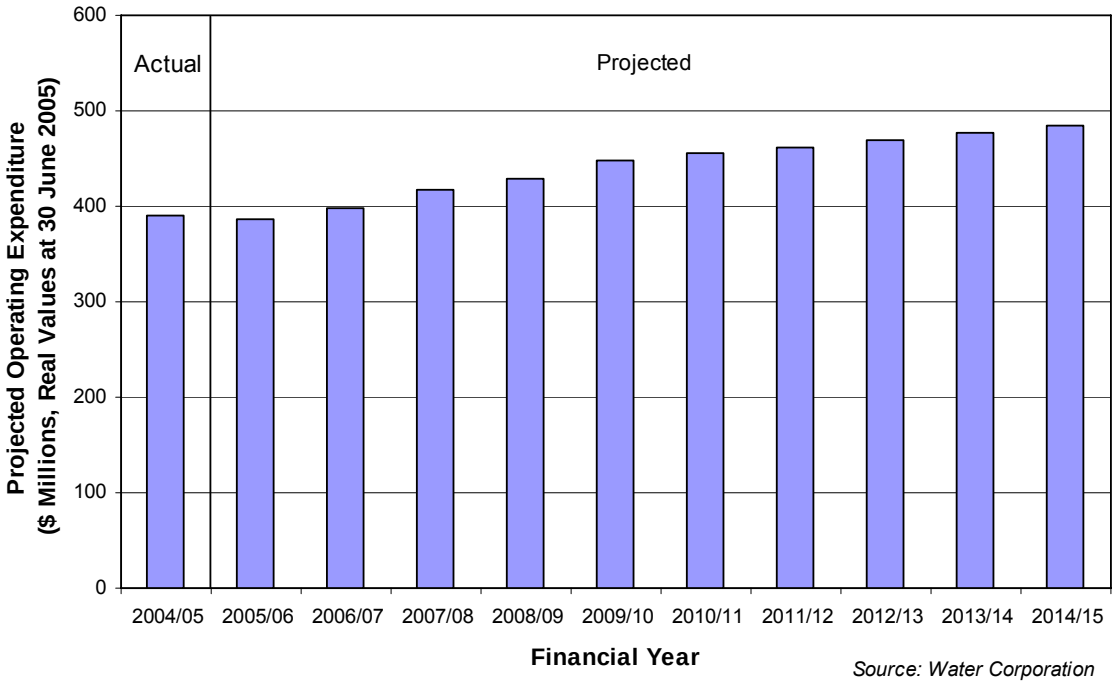
- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*

4.4.4.2 Water Corporation Proposal

The Corporation has provided the Authority with information on past and forecast operating expenditure, summarised below in Figure 4.12.

The cost information provided by the Corporation indicates that its operating costs (before depreciation) have risen in real terms over the last four years. Future operating costs are expected to continue to increase. The average annual increase in operating expenditure between 2004/05 and 2014/15 (in real values of 30 June 2005) is expected to be 2.2 per cent, which is slightly above the average annual increase of 2.1 per cent per year between 2000/01 and 2003/04.

Figure 4.12 Corporation's Historical and Projected Annual Operating Expenditure (Real Values of 30 June 2005)



Source: Water Corporation

The Corporation attributes a substantial proportion of cost increases to increases in the quantity of services delivered. The Corporation also claims that between the years 1997/98 and 2003/04, efficiency improved at rates of between -1.4 per cent and 4.3 per cent per annum (measured as the reduction in real operating cost per property, with a

negative value indicating a cost increase and a positive value indicating a cost reduction). The Corporation's target in the past has been to achieve annual efficiency gains in operating expenditures of 2.5 per cent.[46]

The Corporation's current strategy to achieve efficiency gains is reflected in its Process Improvement Programme, 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 that are intended to deliver cost savings and improve process integration. In broad categories, these include:

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

The Corporation estimates that these initiatives will deliver $51.5 million in cost savings over the next five years (2004/05 to 2008/09).

4.4.4.3 Authority Assessment

The Authority has assessed the Corporation's operating efficiency by benchmarking its operating costs and staff numbers against a number of other domestic and overseas water/wastewater providers. This benchmarking analysis provides some insight on the development of efficiency targets for the Corporation.

Australian Benchmarking

The Authority has used two performance benchmarks to compare the operating-cost efficiency of the Corporation with other Australian providers of water and wastewater services:

- population served per full time equivalent staff member; and
- operating expenditure per property served.

As human resources generally constitute around one half to two thirds of a utility business's total operating expenditure (excluding depreciation), it is informative to examine the staffing levels of different providers relative to the size of populations they serve. Table 4.2 indicates ratios of population to staff numbers for several Australian water businesses. The Corporation compares favourably to most of the providers, with a ratio of 1,055 persons per effective full time equivalent staff member (FTE). The apparently high efficiency of Melbourne Water (2,327 persons per FTE) is thought to be due to a number of factors, such as the high degree of use of gravity-fed water supplies and the relatively little amount of water treatment that is needed before delivery. Gold Coast Water also has a relatively high efficiency ratio (1,304 persons per FTE), although Gold Coast Water estimates its FTE numbers in a different way to the other providers which may distort the comparison.

[46] Corporation, Issues Paper submission, p21.

While population-to staff ratios give an initial insight to an organisation's operational efficiency, there are material variations between utilities in terms of the extent to which tasks are contracted-out, the relative size of their capital programs and the geographic distribution of the population base (customer density). These differences prevent a fully standardized comparison between utilities. A submission received from the Western Australian Branch of the Australian Water Association (AWA) draws attention to these limitations of benchmarking:

> To provide operations to customers in 250 separate water districts spread all over WA naturally requires higher staff to population ratios. (Australian Water Association – WA Branch, Draft Report submission, p2)

The Authority recognises these limitations and views the benchmarking results as only indicative of the Corporation's relative efficiency.

Table 4.2 Comparison of Staff Numbers (2003/04)

Organisation	Population served	Staff numbers (FTE)	Population served per FTE
Melbourne (total of Melbourne Water and water service providers)	3,497,000	1,503	2,327
Gold Coast Water	472,000	362	1,304
Sydney Consolidated	4,189,000	3,675	1,140
Hunter Water	496,000	428	1,159
Water Corporation	**1,453,000**	**1,377**	**1,055**
Brisbane Water	931,000	900	1,034

Source: various sources

The Authority undertook a second benchmarking analysis based on operating expenditure per property served (Table 4.3). Again, the Corporation's performance for the combined delivery of water and wastewater services ($159 per property) is not dissimilar to that of other major metropolitan water and wastewater providers. The Corporation stands equal to the average result for the four other utilities examined. Its operating expenditure per property served is within 10 per cent of the best performing utility — Sydney Water.

Table 4.3 Operating Expenditure Per Property Served (Metropolitan Services)

Organisation[a]	Water services	Wastewater services	Adjusted Weighted Average[b]
	$ per property	$ per property	$ per property
Sydney Water	216	194	148
SA Water Corporation	166	132	150
Hunter Water	154	154	154
Water Corporation	**156**	**162**	**159**
Gold Coast Water	179	197	179

[a] Expenditures based on the metropolitan operations of each provider.

[b] The operating expenditures of Sydney Water and Gold Coast Water are adjusted to eliminate the cost of bulk water purchases and filtration. This enables these utilities to be compared to the other water providers, which do not incur the cost of bulk water purchases. This adjustment explains why the weighted average cost ratio for Sydney Water is significantly lower than its individual cost ratios for water and wastewater provision.

Source: Various sources

International Benchmarking

Given the relatively small efficiency differences between domestic water providers, it is informative to examine how the Corporation compares to international best practice.

It is generally considered that UK efficiency levels are, at this point in time, ahead of those prevailing in Australia. For example, a recently released IPART report indicates that the best performing utilities in NSW are only equivalent, in an efficiency sense, to the average large utilities in Europe.[47] The disparity has been attributed to the effect in the UK of formal incentive-based price regulation, assisted in most cases by the discipline brought to bear on the privatised water businesses by capital markets. These factors have been working to raise business efficiency for around fifteen years or three price control periods.

The efficiency performance of major water/waste water utilities in England and Wales are closely spaced and nearly all rank highly on the efficiency scale adopted by the UK regulator, the Office of Water Services (Ofwat). All ten lie within fifteen per cent of the current benchmark for provision of sewerage services and eight of them lie within fifteen per cent of the benchmark for water services.[48]

The Authority has not attempted to identify the efficiency gap between the Corporation and the UK utilities. Such an assessment is technically difficult because of the different inputs and operating conditions associated with Australian providers relative to UK providers. Instead, the Authority has examined the rates of efficiency improvement being achieved and projected in the UK. The Authority has used this information to reach a view on efficiency gains that may be achievable by the Corporation, and appropriate efficiency targets to be reflected in prices for water and wastewater services.

Realised annual gains in operating-cost efficiency of the ten UK water and sewerage businesses have averaged around 1.9 per cent per annum during 1993 to 2003

[47] IPART, February 2005, Capex, Asset Management and Opex Review, Overview Report, February, p. 3.

[48] Ofwat 2004, Future Water and Sewerage Charges 2005-10, Final Determinations, pp 155, 156.

(expressed as percentage reductions in unit costs).[49] The gains have tended to diminish to about 1.75 per cent per annum since about 1999, possibly reflecting a reduction in opportunities for efficiency improvements. The 1.9 per cent per annum efficiency improvement achieved by the UK businesses in the period 1993 to about 2003 is an average performance figure. If the top five performers are removed from the sample (those operating within 5 per cent of an Ofwat performance benchmark), the average efficiency gain increases to 2.3 per cent per annum.

In past price reviews for the water and sewerage businesses, Ofwat made projections of achievable efficiency gains based on empirical estimations of actual efficiency gains (such as indicated above), comparisons between the businesses, and projections by the businesses themselves. In making these projections, the Ofwat has differentiated between efficiency gains possible for the comparatively less-well performing businesses by adopting existing best-practice technologies and practices ('catch-up' efficiency gains), and efficiency gains made possible by improvements in technology and business practice emerging during the future regulatory period ('continuing' efficiency gains). These efficiency projections are summarized in Table 4.4.

Table 4.4 Ofwat Operating Cost Efficiency Projections 2000 – 2005 and 2005–2010

	Water Services		Sewerage Services	
Regulatory Period	**2000–2005**	**2005–2010**	**2000–2005**	**2005–2010**
Catch-Up Efficiency Gains (per cent reduction in unit costs per annum)	1.8	1.8	2.9	1.3
Continuing Efficiency Gains (per cent reduction in unit costs per annum)	>1.4*	0.6	>1.4*	1.0
Total Efficiency Gain (per cent reduction in unit costs per annum)	>3.2	2.4	>4.3	2.3

* For the 2000 to 2005 regulatory period, assumptions as to continuing efficiency gains were not fully quantified.

Source: Ofwat (2004) [50]

The Authority considers that, in terms of operational efficiency, the Corporation may at present be positioned where most of its UK peers were around the start of their second price control period, that is, in the mid-1990s. This view is based on:

- consultation with the Corporation regarding its operations and working practices, including asset management methods and business systems for controlling costs;
- the efficiency gains made by the Corporation in recent years and the context in which its Process Improvement Programme initiatives have been formulated; and

[49] Stone and Webster, May 2004. Report for Ofwat – An Investigation into Operating Expenditure Productivity Trends, pp ii, iii. The quoted figures represent estimated operating productivity growth for the average water and sewerage company in England and Wales, and reflect reductions in operating costs per unit of water delivered and population served, taking into account changes in outputs, input prices, capital stocks and any other factors such as firm characteristics or drinking water quality that may influence operating costs.

[50] Ofwat 2004, Future Water and Sewerage Charges 2005-10, Final Determinations, p. 151.

- the gains made by UK companies, their higher degree of automation and remote monitoring and control, and the influence of capital market discipline on private sector utilities in the UK.

Conclusions

Taking the measured efficiency gains and efficiency targets of the UK water and sewerage businesses into account, the Authority is of the view that an annual efficiency gain in operating costs of about 2.5 per cent per annum (expressed as an annual reduction in unit costs of service provision and in real terms) should be possible for the Corporation over at least the next three to five years.

An assumption of possible efficiency gains in the order of 2.5 per cent per annum is similar to the average of projected efficiency gains for Victoria's four metropolitan water businesses (measured on a cost per connection basis) of 2.0 per cent per annum (0.8 per cent per annum for Melbourne Water, 4.4 per cent per annum for City West, 1.7 per cent per annum for South East and 1.3 per cent per annum for Yarra Valley).[51] The projections were derived from the Victorian businesses' own forecasts of operating expenditure (with bulk water costs removed and other minor cost adjustments) and customer growth over the period.

Consistent with regulatory precedent of Ofwat, IPART and the Victorian Essential Services Commission, the Authority considers that the efficiency gains anticipated as achievable for the regulatory period should be translated into efficiency targets that are reflected in forecasts of operating costs and hence in prices for services. There are two particular matters of relevance in deriving and applying efficiency targets from assumptions as to possible efficiency gains.

Firstly, the Authority considers that, consistent with an approach adopted by Ofwat,[52] the development of efficiency targets should incorporate both 'carrot' and 'stick' incentives. Under such an approach, part of assumed efficiency gains is reflected in forecasts of operating costs and prices (resulting in lower prices and benefits to service customers), and the benefits of the remainder of the efficiency gains (and any additional out performance of assumptions) should be able to be captured by the business as additional profit. The Authority considers that an even split of projected efficiency gains would be appropriate in the first instance.

Secondly, in applying an efficiency target for the Corporation, the Authority considers that efficiency gains already anticipated by the Corporation and incorporated in cost forecasts should be taken into account. Forecast efficiency gains in operating costs for the Corporation over the period 2005/06 to 2014/15, measured as changes in real operating expenditures per connection, are indicated in Table 4.5. Forecasts of operating expenditure and numbers of connections indicate average annual efficiency *losses* by the Corporation of 2.6 per cent.

Taking into account the desirability of a 'carrot and stick' approach to the imposition of efficiency targets, the Authority considers that for the purposes of determining service prices, the forecast operating costs of the Corporation should be adjusted to reflect an efficiency gain in real operating costs per connection of half of the value of 2.5 per cent per annum evident as possible from national and international comparisons of water businesses, i.e. an efficiency *gain* of 1.25 per cent per annum.

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[51] Essential Services Commission, June 2005, Water Price Review, Metropolitan and Regional Business's Water Plans 2005-06 to 2007-08: Final Decision, p 73.

[52] Ofwat 2004, Future Water and Sewerage Charges 2005-10, Final Determinations, pp 143, 144.

Table 4.5 Corporation Forecast Efficiency Improvements in Operating Expenditure Measured as Cost per Water and Sewerage Connection

Year	04/05	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Forecast Operating Costs* ($million real 2005/06)	390.8	396.3	419.7	452.9	477.8	513.0	535.3	558.6	583.0	608.4	634.9
Total Water and Sewerage Connections ('000)	1,720	1,765	1,803	1,844	1,884	1,927	1,970	2,015	2,060	2,106	2,154
Operating Cost per Water and Sewerage Connection ($'000 real 2005/06)	227	225	233	246	254	266	272	277	283	289	295
Per cent Change		-1.2%	3.7%	5.5%	3.2%	5.0%	2.1%	2.1%	2.1%	2.1%	2.1%
Average Per cent Change	2.6%										

* Net of depreciation and costs of new service items, and net of operating costs arising with the desalination plant and other new projects.

Recommendation

22 For the purpose of determining the revenue requirement of the Corporation, the Corporation's forecast of operating costs should be adjusted to reflect an efficiency gain in real operating costs per connection of 1.25 per cent per annum.

4.4.5 Capital Expenditure

4.4.5.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the … forecast capital expenditure program of the service providers;*

The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*
- *… the impact of any need to renew or increase relevant assets.*

Capital costs comprise costs of investment in new assets, including costs of asset purchases and construction. As well as costs of direct purchases of assets, capital costs may include indirect costs associated with capital programs such as corporate overheads, costs attributable to internal staff input and costs of external consultants. Forecasts of capital costs may include allowances for contingencies and risks.

Capital cost forecasts are based on capital investment programs which are driven by asset management planning, strategic development plans, corporate directives, external drivers and the supply-demand balance.

Capital efficiency improvements arise from better ways of managing capital projects from the planning and design stage through to the construction stage. Gains in capital efficiency allow more projects to be undertaken for a given capital expenditure budget or a reduction in total capital expenditure.

4.4.5.2 Water Corporation Proposal

Over the ten year period 2005/06 to 2014/15, the Corporation's capital expenditure program is projected to total $6,196 million, or an average $620 million per year, which is generally consistent with historical expenditure from 2002/03 to 2004/05, with the addition of "spikes" of expenditure for supply augmentation in 2005/06 and 2006/07 (the desalination plant) and 2010/11 and 2011/12 (the South West Yarragadee development).

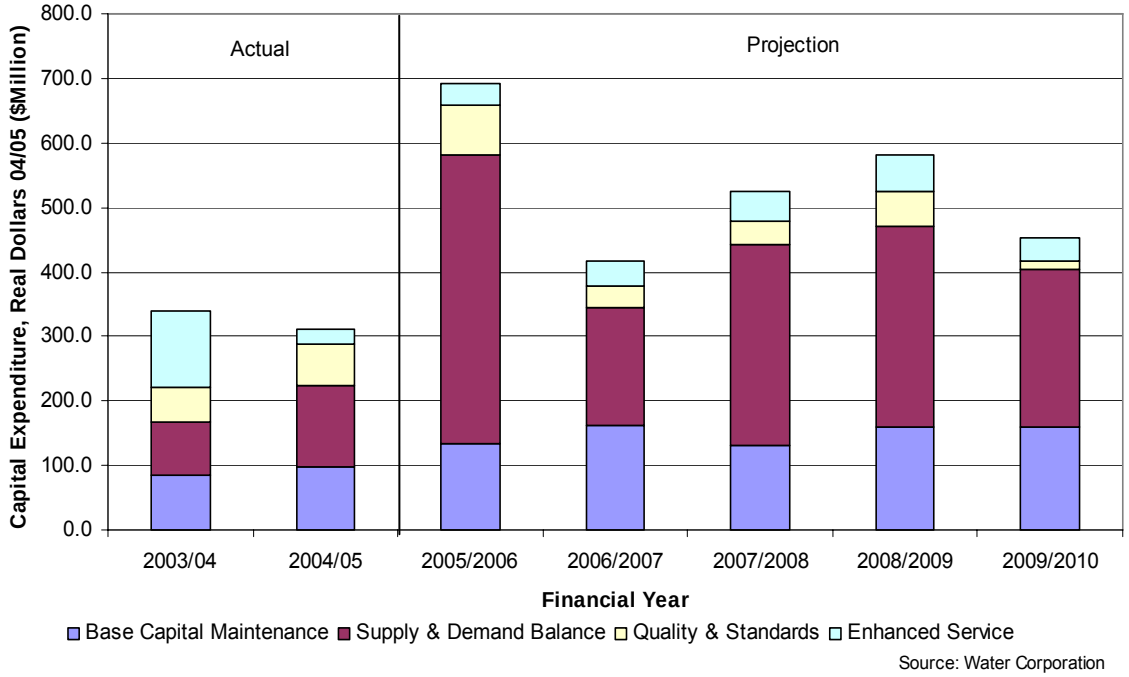
The Corporation has indicated that its capital works program needs to be framed within State Government budget constraints. Projects that are most urgent receive priority within this constraint. The Corporation identifies the following issues as being complicating factors in determining its Capital Investment 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.
- Limited capital funding from Government.
- Limited 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.
- The need to allow for climate change in long-term planning.

The Corporation uses four industry-standard capital drivers in developing its capital investment program, which are based on those used by Ofwat and IPART (Figure 4.13).

- Base capital maintenance – to maintain the current level of service to existing customers.
- Supply and demand balance – to meet capacity requirements and demand growth assuming the recent eight-year streamflow trend continues, and with consumption of 155 kL per person and groundwater extraction of 120 GL per annum.
- Quality and standards – to meet standards that have been externally imposed. The major projects are the Infill Sewerage Program and compliance with the Australian Drinking Water Guidelines.
- Enhanced service – to improve the level of service being provided to existing customers. The major projects are related to country water treatment.

Figure 4.13 Corporation Historical and Projected Total Capital Expenditure by Driver



Source: Water Corporation

4.4.5.3 Authority Assessment

Size of the capital program

In examining the efficiency of the Corporation's capital expenditure program, the Authority focused on whether the Corporation's projected *level* of expenditure is commensurate with the size of the business and the capital cost drivers. The Corporation's capital prioritisation process was examined as part of this review.

The Corporation has submitted to the Authority that there is no scope for operating under a lower capital budget, given the pressures it is under to meet growing water demand and address climate change:

> Within the current budget, the Corporation has been required to absorb a significant number of drought related projects. This pressure has required the Corporation to prioritise its expenditure and ensure that only the most critical projects are undertaken over the current period. Reducing this already constrained budget would only serve to delay critical projects and place service levels at severe risk……Although the Corporation is not seeking an increase in its budget, it would make clear the significant challenges already being faced under the current budget and proposes that this represents the absolute minimum required to meet ongoing service levels. (Corporation, Draft Report submission, p12)

The Authority has considered whether the size of the capital program is justified by the cost drivers. While there appear to be a number of elements of the program that may warrant further justification, using cost-benefit analysis as discussed below, the Authority has no reason at present to consider that the capital program includes unnecessary or unwarranted projects.

- Base capital maintenance. In 2003-04, the Corporation spent $85.6 million and in 2004/05, the Corporation spent $98 million (real dollar term as at 30/6/05) 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. A similar ratio of expenditure to asset values was achieved in both 2001/02 and 2002/03. The ratio of 0.5 is in line with the average annual renewal expenditure allocated by major water utilities in Australia[53]. Looking forward, the Corporation projects an increase on its historical levels of base capital expenditure. Between 2005/06 and 2009/10, average annual expenditure is projected to grow by 59 per cent relative to expenditure levels in the previous five year period, which will approximately double the Corporation's expenditure-asset ratio relative to the Australian average. The higher levels of projected expenditure are due to:
  - a back log of capital maintenance projects that were delayed due to funding constraints and drought-related impacts; and
  - a disproportionate number of larger maintenance and rehabilitation projects scheduled for the next five years.
- 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.
- Supply and Demand Balance. The majority of the Corporation's capital expenditure over the next five years is focused on addressing the supply/demand balance, both in terms of responding to the dry climate as well as population growth. 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. With reference to Section 0 above, the Authority considers:
  - that more investigation is warranted to establish whether this level of security is justified on cost-benefit grounds; and
  - that more should be done to consider whether water could be accessed more cheaply through trading and reallocation than through development of new sources. This may require additional investment in developing water trading frameworks for facilitating between-sector trades.
- Quality and Standards. The Authority views the Corporation's budgeted expenditure on maintaining quality and standards as appropriate.
- There may be value in the Government giving consideration to allowing the Corporation to have some flexibility in respect of standards for potable water in country areas. The Drinking Water Quality Program, which provides potable water to remote country communities, is currently costing approximately $110 million and could increase to around $390 million per annum over the next 10 to 15 years. There could be scope to make some cost savings by declaring some water supplies in regional areas as 'non-potable' and instead provide residents with alternative arrangements, such as rainwater tanks, for potable water supplies. 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

[53] Institution of Engineers Australia 2001, *Australian Infrastructure Report Card*.

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. The scope for such an alternative program is, however, unknown and if limited to only very small communities the cost savings may only be minor.

- Enhanced Service. Expenditure allocated to improving taste and odours, which are aesthetic characteristics as opposed to health-related quality attributes, should be reviewed. Investment for water treatment to improve taste and odour issues would increase treatment complexity and current operating costs substantially while having no effect on drinking water quality from a health point of view. A comprehensive customer willingness to pay study would assist in determining whether public benefits outweigh the costs of such additional treatment.

Project delivery efficiencies

A second element of the Authority's assessment was whether there is scope for the Corporation to improve the *cost-effectiveness* of project delivery.

A key factor influencing efficiencies in project delivery is the extent of private sector involvement. The Corporation involves private sector contractors in all stages of the capital delivery process, although to varying degrees.

- Planning – the planning stage encompasses the identification and generation of projects and typically accounts for around 1 to 2 per cent of total project capital costs. Historically, the Corporation has undertaken the majority of planning in-house. Looking forward, the Corporation has recently put out tenders for the outsourcing of planning and in one year's time, there is potential for 25 per cent of planning activities to be undertaken externally.
- Definition and design – the definition and design stage typically accounts for 10 to 15 per cent of total project capital work costs. The Corporation has run a large definition and design panel contract since 1996 and estimates that around 75 per cent of definition and design work is undertaken by external consultants.
- Project management – project management typically accounts for around 5 per cent of total project capital expenditure. The Corporation undertakes some 80 to 90 per cent of project management in-house, but is currently examining ways to outsource more work from this stage of the capital delivery process because of the increasing number of capital programs that are being delivered.
- Construction and delivery – the construction and project delivery stage accounts for around 80 per cent of total project capital costs and is typically worth in the order of $300 to $400 million per year. Construction and delivery work undertaken in-house usually amounts to only about 10 per cent of total capital expenditure. The remainder is undertaken by external contractors.

The Corporation is currently using a joint venture form of alliance for the design, construction and operation of the Perth desalinisation plant. Looking forward, it intends to consider employing alliances for projects above a threshold of around $30 to $50 million total construction cost. Development of the South West Yarragadee aquifer and the Alkimos wastewater scheme are two potential candidates for delivery through a private-public sector alliance. As outlined in the Corporation's submission, efficiencies are being achieved through these alliances:

> The Corporation has consistently sought to take advantage of opportunities with private partnering where they are available. The vast majority of the capital program, from the

> design phase through to commissioning, is delivered by the private sector. The Corporation considers private partnering to be a key component of achieving its capital efficiency target of $84 million, which has already been captured within the current capital budget. These efficiencies will be realised through a risk management approach to our capital program and via a number of innovative capital delivery strategies. (Corporation, Draft Report submission, p12)

The WA branch of the Australian Water Association (AWA) is of the view that alliance and partnership styles of contracting offer scope for efficiency gains, but a 'slowly-slowly' approach should be taken so as not to jeopardize the quality of project outcomes and risk losing in house expertise.

> [The Corporation] has been a pioneer in the Australian public sector in developing alliance and partnership styles of contracting and will no doubt continue down this path. It must however remain in control of its contracts and the quality of assets constructed……The Corporation has just entered a BOT [Build Own Transfer] style alliance contract for its desalination plant and it will be able to compare this with other water and wastewater plants that it continues to operate. It is worth noting that many BOO [Build Own Operate] and BOOT [Build Own Operate Transfer] contracts around the world have been awarded in developing countries to privatised water companies from developed countries, with mixed results. The Water Corporation, with top expertise in operation of traditional water and wastewater treatment processes, may gain nothing by following out-sourcing in this area, but would lose its own valuable expertise (WA AWA, Draft Report submission, p2).

While the Corporation is clearly embracing private sector involvement in its capital works program, the Authority is of the view that greater efficiencies could potentially be achieved through more active pursuit of alliances with the private sector, combined with a different approach to partnering. Alliances have increasingly been employed by UK water/wastewater providers over the past decade. The key features of alliances that have assisted UK firms to increase their efficiencies are:

- greater risk/reward incentives for the private sector than under traditional lump sum tendering;
- use of a performance specification that leaves open the specifics of project design and provides contractors with the flexibility to vary technical standards outside of the regulatory sphere; and
- involving the contractor in defining problems as well as assessing solution options.

The UK experience indicates that alliance arrangements result in overall project cost reductions in the order of 3-5 per cent per project. Since alliances are typically used on larger projects, this saving can be large in absolute terms and accumulate to significant sums over the medium term. In the UK the biggest gains have come from plant automation, introduction of new processes and technology and network rationalisation (primarily by combining sewage treatment plants).

Capital Efficiency Targets

In regard to the achievement of cost efficiencies in delivery of capital programmes, the Authority has given consideration to whether capital efficiency targets should be established for the Corporation's capital programme, and the forecasts of capital expenditures adjusted to reflect these efficiency targets.

At an in-principle level, the Authority is of the view that there is significant scope for efficiency gains in the Corporations capital programme. In terms of the capital delivery process, the Authority is of the view that the Corporation is currently positioned where UK water utilities were about five years ago. This view is based on the following considerations.

- The UK water and sewerage businesses have made substantial improvements in delivery of capital programmes during the past 12 years and the adoption of alliance arrangements with contracting businesses has been an important element in achieving these improvements – injecting expert thinking into the problem definition and solution generation stages (not just limited to design) and with strong performance incentives.
- Consultations with the Corporation on their capital program and out-sourcing policies, have revealed that while a start has been made on developing alliance relationships they are at a relatively early stage of using alliances – a situation mirrored by other Australian water/wastewater providers.

Despite indications of improvements in efficiency of capital programmes, however, there is a lack of information available to either measure historical trends in efficiency or to make projections of potential future efficiency gains. Some regulators have established efficiency targets for capital programmes and reflected these in price determinations, with projected efficiency gains in capital delivery of up to several per cent per annum.[54] However, the derivation of the efficiency projections and targets has not been substantiated and appears to have been based on highly subjective opinions rather than quantitative analysis.

Given the absence of quantitative information that could be used to make projections of potential gains in efficiency of capital programmes, the Authority does not consider it appropriate at the current time to establish and recommend the imposition of efficiency targets on the Corporation in respect of its forecast of capital expenditure.

Recommendation

23 The Authority considers that the Corporation's forecast capital costs are appropriate forecasts for consideration in determination of the revenue requirements of the Corporation.

4.4.6 Depreciation

4.4.6.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the depreciation … of the service providers;*

4.4.6.2 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:

[54] For example, Ofwat (2004), Future Water and Sewerage Charges 2005-10, Final Determinations; IPART (June 2005), Sydney Water Corporation, Hunter Water Corporation, Sydney Catchment Authority, Prices of Water Supply, Wastewater and Stormwater Services: Draft Report and Draft Determination.

> 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. (Corporation, Pricing Submission, p29)

4.4.6.3 Authority Assessment

The Corporation's determination of standard asset lives for water mains and sewers are within the typical range for engineering assets. The Authority considers the proposed lives to be appropriate for the purposes of determining depreciation allowances in the revenue requirement.

The 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.[55] 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.

Recommendation

24 The Corporation's assumptions of asset lives are considered appropriate for the purposes of determining depreciation allowances in the Corporation's revenue requirement.

4.4.7 Rate of Return

4.4.7.1 Terms of Reference

In conducting its investigation, the Authority must review:

- the appropriate rate of return on public sector assets, including appropriate payment of dividends to the Government of Western Australia;

A key element of the required revenue 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.

4.4.7.2 Water Corporation Proposal

The Corporation has proposed a real pre-tax WACC of **6.5 per cent**, derived by use of the Capital Asset Pricing Model (CAPM) to estimate an appropriate Weighted Average Cost of Capital (WACC). 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.

[55] Ofwat defines infrastructure assets, in broad terms, as underground assets, such as pipes. Non-infrastructure assets are above ground assets such as treatment works.

Assumptions applied by the Corporation in estimating the WACC are:

- 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;
- 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.

4.4.7.3 Authority Assessment

The Authority has also used the CAPM to estimate the WACC for the Corporation. This methodology is widely used and understood by industry, the finance community and other Australian utility regulators. The rationale and methodologies used by the Corporation and the Authority in estimating parameters of the WACC are described in detail in Appendix 4. This section summarises the main findings.

The Authority calculates a real pre-tax WACC for the Corporation of **5.63 per cent**.

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

- the requirement under section 26(1) of the Authority Act 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, O*ff*GAR and the Office of the Rail Access Regulator in recent pricing determinations;
- the approach used by the 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 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). These difference of view do not, however, have a material bearing on the estimated WACC and differences between the proposal of the Corporation and the Assessment by the Authority arise as a result of decreases in risk free interest rates (as evidenced by returns on Commonwealth Government bonds) during the period of the inquiry.

Recommendation

25 A rate of return of 5.63 per cent (pre-tax real) should be applied in determining the Corporation's revenue requirement.

4.4.8 Revenue Requirement

The Authority has determined a revenue requirement for the Corporation taking into account the conclusions of the Authority on the cost parameters, as set out above, of the revenue calculation. This revenue requirement equates to a present value (at a discount rate of 5.63 per cent (real pre-tax) of $6,240 million over the period from 2005/06 to 2014/15.

The derivation of this revenue requirement is summarised in Table 4.6.

Table 4.6 Corporation Revenue Requirement

	Value ($million, real dollar values at 30 June 2005)									
Asset Account	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Opening Asset Value	10,599	11,076	11,270	11,561	11,898	12,095	12,246	12,452	12,618	12,756
Capital Expenditure	735	465	570	626	498	460	524	493	473	487
Depreciation	259	271	280	290	301	309	317	327	335	344
Closing Asset Value	11,076	11,270	11,561	11,898	12,095	12,246	12,452	12,618	12,756	12,899
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by Authority)	396	401	405	409	413	417	421	425	429	433
Depreciation	259	271	280	290	301	309	317	327	335	344
Return on Assets	597	624	635	651	670	682	690	702	711	719
Gross Revenue Requirement	1,252	1,296	1,319	1,350	1,384	1,407	1,428	1,453	1,475	1,495
Capital contributions	-33	-37	-33	-32	-32	-32	-33	-34	-34	-35
Forecast revenue from other services	-159	-162	-155	-152	-152	-153	-154	-156	-157	-159
Community Service Obligation payments	-331	-337	-350	-353	-359	-359	-359	-359	-359	-360
Net revenue requirement for determination of water and wastewater charges	729	761	782	811	841	863	881	904	924	941

Table 4.7 shows that the Authority's recommendation of the net revenue requirement for the Corporation is the same in present value terms as achieved by the Authority's recommended tariffs and is less in present value terms than the revenue generated by the Corporation's proposed tariffs.

Table 4.7 Present Value of Revenue Generated With Corporation's and Authority's Proposed Charges

	Value ($million, real dollar values at 30 June 2005)									
	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Revenue generated from Corporation's proposed charges	748	813	831	860	880	900	920	941	962	984
Present value of the Corporation's revenue at real discount rate of 5.63% as at 30 June 2005					6,538					
Net revenue requirement	729	761	782	811	841	863	881	904	924	941
Revenue generated from Authority's proposed charges	748	775	791	810	830	851	872	894	916	939
Present value of the two revenue streams immediately above at real discount rate of 5.63% as at 30 June 2005					6,240					

Recommendation

26 Based on the parameters considered by the Authority, prices established for the Corporation's water, wastewater and other services should be consistent with a present value of forecast revenue over the period 2005/06 to 2014/15 of $6,240 million at a discount rate of 5.63 per cent (real, pre-tax).

4.5 Prices

4.5.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the current structure and level of urban water and wastewater prices.*
- *the most appropriate price path and period, including the requirement for periodic reviews of that price path.*

4.5.2 Water Corporation Proposal

The Corporation has proposed that the prices for water and wastewater services be increased in line with inflation with two variations: a 13.5% additional increase in water prices in 2006/07 for the additional cost associated with the Perth Seawater Desalination Plant and a 2.1% additional increase in water prices in 2008/09 to recover the costs of water trading with Harvey Water in that year.

4.5.3 Authority Assessment

As discussed in section 3.3, the Authority considers that it is appropriate to set individual price paths for each of the Corporation's services over a 10 year period. The Authority has determined smoothed price paths for each service, based on forecasts of demand for each service and revenue that is equal in present value terms to the revenue requirement determined for the Corporation.

In addition to the revenue requirement determined for the Corporation (described in the previous section of this report), the determination of a price path requires consideration of a number of further parameters and assumptions:

- forecasts of demand for services;
- the allocation of costs (and implicitly the revenue requirement) between the different services that the Corporation provides and between customers in metropolitan and non-metropolitan regions;
- the structure of prices for each service; and
- price paths by which prices will change over time to accommodate inflation.

These matters are addressed further below.

4.5.3.1 Demand Forecasts

Forecasts of demand for services affect both cost forecasts for service provision (and hence the revenue requirement of the Corporation) and the forecasts of the number of "units" of service provision which are used to determine unit prices for services.

For the purposes of determining price paths for services, the Authority has applied demand forecasts provided by the Corporation, with the exception of forecasts of water volumes for residential customers.

For water services, the Corporation has derived a forecast of volumetric demand for residential customers on the basis of forecasts of population growth and per capita water demand of 155 kL per annum. The Corporation's assumption of per capita demand is premised on average consumption being maintained at current levels that arise in the presence of restrictions on the use of garden sprinklers in the Perth metropolitan area. The Corporation has assumed that consumption will be maintained at this level by either the continuation of current restrictions, or education campaigns and rebates for household expenditures on water-saving initiatives. The Authority is of the view that this forecast may be underestimated if water restrictions are relaxed, and for the purposes of deriving prices the Authority has assumed that restrictions will be relaxed to three days per week watering in 2006/07 resulting in increases in residential water demand by 7 per cent in the Perth metropolitan area and 3.5 per cent in non-metropolitan areas, in addition to demand increases caused by population growth. (The impact of assuming restrictions will be relaxed to three days per week in 20006/07 (to165 kL per person per year usage) on the Corporation's source development schedule is discussed in section 4.3.4.1.)

4.5.3.2 Cost Allocations across Services and Regions

The price charged to a customer (and hence the revenue obtained from the customer) implies recovery from that customer of a particular proportion of the costs of service delivery.

Within a regulatory framework, the proportion of total costs to be recovered from a customer or class of customers may be determined explicitly, such as through a fully distributed cost model, or implicitly, where prices are set such that forecast revenue in total is expected to be equal to forecast costs. Within this regulatory framework the regulated business is relatively free to set prices according to other commercial constraints. In the latter case the business may be constrained in setting prices to a requirement to ensure that prices meet the broad efficiency requirements of being above the avoidable cost of service provision and less than stand-alone costs of service provision.

The Corporation does not currently determine prices for services on the basis of an explicit allocation of costs. The Corporation does have a process for allocating costs to individual service schemes, but this is undertaken for accounting and performance-monitoring purposes rather than for the determination of prices.

While the Corporation does not determine prices on the basis of an allocation of costs, the amount of costs recovered from particular services and particular classes of customers is implied by the prices determined and hence the revenue earned from each service and class of customer. When these implied cost allocations are considered together with the Corporation's allocations of operating costs to services and schemes, two observations can be made.

Firstly, customers in several country water and wastewater schemes are currently cross-subsidised by customers of other schemes. That is, the customers in the cross-subsidised schemes pay less, on average, than the avoidable costs incurred in the provision of services (i.e. the operating costs directly attributable to the provision of these services):

- For water services, customers in 188 of the 281 water schemes that are in operation currently pay prices that are, on average, less than the avoidable costs of service provision. The cross subsidised schemes are, however, relatively small in size. The number of connections in schemes that are being cross subsidised totals around 36,000, thus accounting for less than five per cent of the Corporation's 810,000 connections and just over seven per cent of total water delivered.
- For wastewater services, 26 of the 105 wastewater schemes operated by the Corporation are presently being cross-subsidised. As is the case regarding cross subsidisation of water services, the schemes that are cross-subsidised are generally small in size – while around one quarter of schemes are cross-subsidised, these schemes account for less than one per cent of the Corporation's total wastewater connections.

The implicit cross-subsidisation of some water and wastewater schemes arises principally from the uniform tariff policies underlying the Corporations determination of water and wastewater prices.

Secondly, it is evident that returns to the Corporation in excess of operating costs and depreciation (i.e. returns on investment) are gained predominantly through the provision of wastewater services.

The Authority has considered whether prices for water and wastewater services should be determined in such a manner as to reduce the extent of cross-subsidies, and to "shift" revenue collection from wastewater services to water services (i.e. establish a relative reduction in wastewater charges and increase in water charges).

The extent of cross-subsidisation in provision of water and wastewater services is small in dollar terms and in terms of the number of customers implicitly being subsidised. Taking this into account, the Authority does not consider that there is an imperative for reasons of economic efficiency to address this issue in the context of the allocation of costs between the Perth metropolitan and country regions. That is, the Authority considers that prices of water and wastewater services for the Perth metropolitan area should be determined on a premise of the shares of revenues generated from metropolitan and country areas remaining relatively unchanged from that currently occurring.

The Authority does, however, consider that there should be a progressive shift of revenue generation from wastewater services to water services so that both of these service types contribute to returns in the Corporation's asset investments.

The Authority has therefore applied the following principles in establishing prices for water and wastewater services for the Perth metropolitan area:

- a uniform tariff policy will continue to apply for water and wastewater services across all regions of Western Australia, resulting in a generation of revenue (and recovery of costs) of service provision from metropolitan and non-metropolitan areas in proportions to number of customers and demand for services in each; and
- prices paths for water and wastewater services are established such that there is progressively an increase in prices for water services relative to wastewater services.

4.5.3.3 Price Paths

A 'price path' refers to a projected change in prices over time. The most common component of a price path in a system of regulated prices is the escalation of prices with a measure of economy-wide inflation or a proportion of inflation. Price paths may also be determined to take into account, for example, step changes in costs such as with major new investments and expected long term trends in costs such as may arise through efficiency and productivity gains.

The Corporation has proposed a price path involving full escalation of prices with inflation and with step changes in prices of water services to accommodate the costs incurred by the Corporation through major investments in development of water sources – in particular investment in the desalination project and procurement of water from Harvey Water.

The Authority acknowledges that the investment in development of new water resources will require a real increase in water prices. The Authority does not, however, accept that it is either necessary or desirable to have step changes in water prices to reflect these costs. Rather, the Authority is of the view that with the establishment of a price path over a 10 year period, a "smoothed" price path with real increases in prices spread over the entire period is likely to be more readily accepted by customers of services and still adequately provide for the recovery of costs.

4.5.3.4 Price Structures

In section 3 of this report, there were a number of principles established for the structure of prices for water and wastewater, summarised as follows.

- Water usage charges should be adjusted over time to reflect the estimated LRMC of increasing water supplies to the Perth metropolitan area.
- The charges for residential water services should be adjusted to enable the Corporation to recover its revenue target.
- The service charge for residential wastewater services should be decoupled from property values and determined as an inclining tariff.
- The usage charge for commercial wastewater services should be adjusted over time to reflect the estimated LRMC of increasing wastewater services to the Perth metropolitan area.
- The service charges for commercial wastewater services should be levied in accordance with the current structure and adjusted to enable the Corporation to recover its revenue target.

The Authority has determined prices and price structures for water and wastewater services according to these general principles and with a transition period of four years (2006/07 to 2009/10) over which the new price structure would be introduced for water services.

Additional views taken by the Authority's in its determination of prices are set out as follows.

Metropolitan Residential Water Tariffs

- The Corporation has submitted that the LRMC of supply of water to the Perth metropolitan area is in the range $0.41 to $1.20/kL depending upon assumptions as to the availability of water from current and proposed sources. The lower bound of this range of estimates is premised on increases in inflows to water storages to a level consistent with 30 year averages. On the available information the Authority is disinclined to recommend this lower bound in a price structure for water for reason that it does not have adequate regard to the possibility of a drying climate in Western Australia. The Authority considers that a reasonable range of estimates of LRMC is $0.82 per kL to $1.20/kL, based on different assumptions of source development plans and with the lower figure taking into account the possibility of additional water being procured from the Harvey Irrigation Scheme and an additional amount of abstraction from the South West Yarragadee.
- Taking these estimates of LRMC into account, the Authority considers that a two-block inclining price structure should be applied to water services for residential customers in the Perth metropolitan area. The price structure recommended by the Authority (in real dollar values of 2005/06) and to be gradually implemented over a four year period as discussed is as shown in Table 4.8.

Table 4.8 Proposed Tariff Structure for the Corporation's Metropolitan Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	152.30	140.18	128.05	115.93	103.80	110.24
Usage Charge ($/kL)						
0 – 150 kL	0.421	0.520	0.620	0.720	0.820	0.820
151 – 350 kL	0.682	0.716	0.751	0.785	0.820	0.820
351 – 550 kL	0.920	0.895	0.870	0.845	0.820	0.820
551 – 950 kL	1.213	1.210	1.207	1.203	1.200	1.200
Over 950kL	1.517	1.437	1.358	1.279	1.200	1.200

- The tariff step change between the tariff blocks occurs at a level of water use of 551kL, which the Corporation has indicated to be the average water usage of a six-member household (in the absence of water restrictions).
- The service charge for residential water services would initially be set at $140.18 in 2006/07 and then gradually reduced to $103.80 per property in 2009/10. Thereafter, the service charge increases at 1.2 per cent per year in real terms (the same rate of increase is also applied to the Corporation's commercial water service charges over the period 2010/11 to 2014/15).
- The charges for water services have been determined on the basis of a premise that the current rates of concessions for pensioners and seniors will be retained.
- Prices for water services to residential customers have been determined in such a manner that the relativity between average prices charged to residential and commercial customers is maintained at the same value as in 2005/06.

Metropolitan Residential Wastewater Tariffs

- The Authority recommends that a four-block inclining tariff be introduced for residential wastewater charges. Initially, households would be placed in the different blocks based on the current gross rental values of their properties. The Corporation would then move each household over a four-year period to the average charge for the particular block that each household is allocated to. New households, including those households that move, would pay the average charge. Under this approach, the gross rental value methodology would not be required after the initial placement of households to their respective blocks.
- The proposed blocks and charges are shown in Table 4.9. The lowest two charges are set to minimise the annual average price increase to the 11 per cent of households in these blocks (the average increase is up to $6 per year). The highest charge phased-in by 2009/10 is based on the current maximum charge for country residential wastewater customers ($612.40 per year).
- The notional average charge for residential wastewater services has been reduced from $455.51 per residential property in 2006/07 to $440.66 in 2009/10 (in real dollar values of 2005/06) and then held constant in real terms.

- Prices for wastewater services to residential customers have been determined in such a manner that the relativity between average prices charged to residential and commercial customers is maintained at the same value as in 2005/06.
- The detailed list of proposed wastewater charges by each $1,000 GRV bracket is provided in Schedule 1.

Table 4.9 Proposed Tariff Structure for the Corporation's Metropolitan Residential Wastewater Service (Real Dollar Values of 2005/06)

Gross Rental Value	Percentage of House-holds	Current Charge	Proposed Charges				
2005/06		2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
$0 - $5,000	3%	252.74	255.45	258.19	260.96	263.76	263.76
$5,001 - $6,000	8%	298.90	303.75	308.67	313.67	318.76	318.76
$6,001 – $12,000	80%	444.75	442.54	441.16	440.61	440.87	440.87
Over $12,001	9%	767.41	723.38	683.12	646.24	612.40	612.40
Average charge		455.51	450.33	446.15	442.94	440.66	440.66

Metropolitan Commercial Water Tariffs

- A single-block price structure has been applied for water use by metropolitan commercial customers, with the price corresponding to the lower estimate of the LRMC of providing water to the metropolitan area. An inclining block tariff structure is considered less relevant for non-residential customers for the reason that usage is typically less discretionary than for residential customers.
- Service charges for metropolitan commercial water customers have been set in 2006/07 at the current structure and levels and allowed to vary at the same rate as the service charge for residential water services (1.2 per cent per year) to meet the revenue requirement of the Corporation.
- The proposed water tariff structure for metropolitan commercial tariffs is shown in Table 4.10.

Table 4.10 Proposed Tariff Structure for the Corporation's Metropolitan Commercial Water Services (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charges ($/property)						
20mm meter	461.90	467.49	473.15	478.87	484.67	514.72
25mm meter	721.70	730.43	739.27	748.22	757.28	804.22
30mm meter	1,039.30	1,051.88	1,064.61	1,077.49	1,090.53	1,158.14
40mm meter	1,848.00	1,870.36	1,893.00	1,915.91	1,939.10	2,059.31
50mm meter	2,887.00	2,921.94	2,957.30	2,993.09	3,029.31	3,217.11
80mm meter	7,390.00	7,479.44	7,569.95	7,661.57	7,754.29	8,235.00
100mm meter	11,548.00	11,687.76	11,829.20	11,972.36	12,117.26	12,868.45
150mm meter	25,982.00	26,296.44	26,614.68	26,936.78	27,262.77	28,952.89
200mm meter	46,190.00	46,749.00	47,314.77	47,887.38	48,466.92	51,471.55
250mm meter	72,172.00	73,045.44	73,929.45	74,824.16	75,729.70	80,424.44
300mm meter	103,928.00	105,185.76	106,458.74	107,747.12	109,051.10	115,811.56
350mm meter	141,457.00	143,168.94	144,901.60	146,655.23	148,430.08	157,631.78
Vacant Land	152.30	154.14	156.01	157.90	159.81	169.71
Usage Charge ($/kL)						
0 – 600	0.726	0.750	0.773	0.797	0.820	0.820
601 – 1,100,000	0.811	0.813	0.816	0.818	0.820	0.820
over 1,100,000	0.790	0.798	0.805	0.813	0.820	0.820

Metropolitan Commercial Wastewater Tariffs

- The current price for wastewater services for commercial properties is $1.93/kL (with a 200kL free discharge per annum applying to each property). The Authority

has reduced this value to $1.681/kL in 2009/10 to align it with the Corporation's estimate of LRMC for wastewater services.

- Wastewater tariffs have been held constant in real terms at the current structure and levels.

Table 4.11 Proposed Tariff Structure for the Corporation's Metropolitan Commercial Wastewater Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/fixture)						
First Fixture	516.00	516.00	516.00	516.00	516.00	516.00
Second Fixture	220.80	220.80	220.80	220.80	220.80	220.80
Third Fixture	294.90	294.90	294.90	294.90	294.90	294.90
Over 3 Fixtures (each)	320.70	320.70	320.70	320.70	320.70	320.70
Vacant Land	270.00	270.00	270.00	270.00	270.00	270.00
Usage Charge ($/kL)						
Over 200 kL	1.931	1.868	1.806	1.743	1.681	1.681

Non Metropolitan Tariffs and Tariffs for Services other than Water and Wastewater

It is not within the inquiry's terms of reference for the Authority to consider the prices charged for services in non-metropolitan regions and for services other than water and wastewater services (i.e. irrigation and drainage services). Nevertheless, for the purposes of ensuring that the Corporation is able to recover its required revenue from provision of all services, it is necessary for the Authority to make assumptions about the prices that may apply to these services, and hence the total amount of revenue that may be generated by the Corporation after prices have been established for the metropolitan water and wastewater services.

The assumptions made by the Authority are as follows:

- for water services for non-metropolitan residential customers, the service and usage charges (up to 350kL) have been set to the same structure and level as applied to metropolitan customers, in accordance with the uniform tariff policy. Water usage charges above 350kL have been maintained at current levels pending consideration of these charges as part of the Inquiry on Country Water and Wastewater Pricing (information about this inquiry is available at www.era.wa.gov.au);
- wastewater charges for non-metropolitan residential customers have been set using the same charges as for metropolitan residential customers;

- water service charges for non-metropolitan commercial customers have been set in 2006/07 at the current structure and levels and allowed to vary at the same rate as the service charge for metropolitan commercial and residential water services to meet the revenue requirement of the Corporation;
- wastewater service and usage charges for non-metropolitan commercial customers have been set at the same structure and level as applied to metropolitan customers; and
- for other services (drainage and irrigation services) charges have been maintained equal to current charges in real terms.

It should be noted that, because of the interrelated nature of urban and country tariffs, the outcomes of the country pricing inquiry may influence the recommendations of this urban pricing inquiry.

The prices determined by the Authority for the period 2005/06 to 2014/15 are indicated in Schedule 1 of this report. The Authority has specified the prices in real dollar values as at 30 June 2006 on the basis that the values for the years 2006/07 onwards would be escalated annually for inflation. For illustrative purposes, Schedule 1 also indicates prices in nominal terms with an assumed annual inflation rate of 2.72 per cent.

Recommendation

27 The Authority recommends prices for water and wastewater services provided by the Corporation in the Perth metropolitan area as set out in Schedule 1 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

4.6 Impacts of Price Changes on Customers

4.6.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the social impact of the recommendations.*

4.6.2 Assessment of Impacts on Customers

The Authority has assessed the impacts of the recommended price structures and levels on residential and commercial customers of water and wastewater services. This has included consideration of:

- general trends in prices for water and wastewater services;
- impacts of price changes on average prices paid and the total water bills of residential customers, including those groups of customers eligible for price concessions (pensioners and seniors) and residential tenants that typically pay only the usage charge for water services; and
- impacts of price changes on average prices paid by commercial customers, and the total water and wastewater bills of these customers.

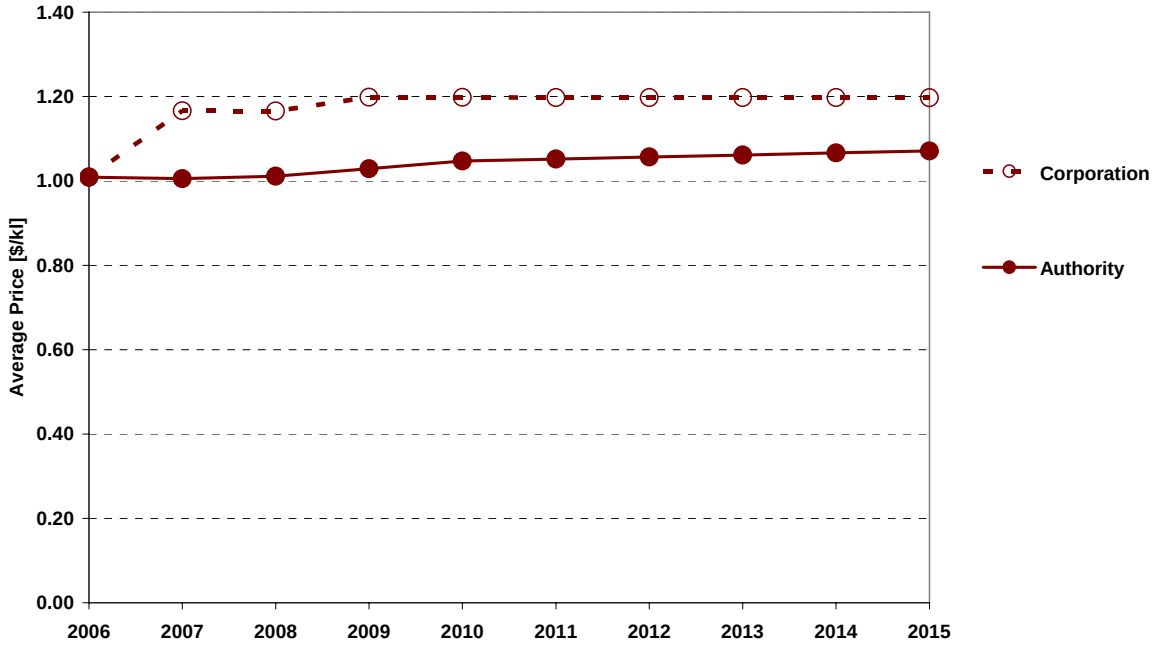
4.6.2.1 General Price Trends

Real price increases are necessary for customers of the Corporation, reflecting, amongst other things, the increasing costs of developing new water sources and developing new wastewater treatment plants.

The Authority has determined that the cost forecasts produced by the Corporation justify an increase in the average price of water services, expressed as a price per kilolitre of water delivered to all customers, from $1.01/kL in 2005/06 to $1.07/kL to 2014/15, where the prices are expressed in "real" terms (i.e. in real dollar values of 2005/06). By comparison the increase in water prices proposed by the Corporation during the course of this inquiry were from $1.01/kl in 2005/06 to $1.17/kL in 2006/07, followed by an increase to $1.20/kL in 2008/09 and thereafter no change in real terms (Table 4.14).

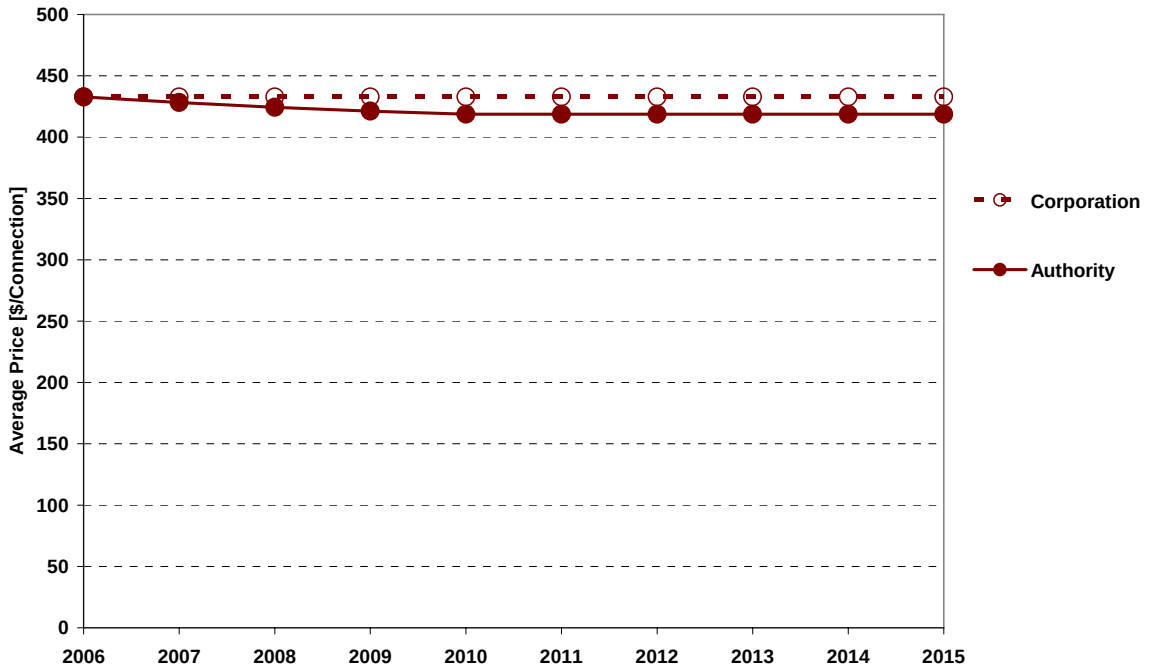
The general price trends reflect increases in costs incurred by the Corporation in service provision and not the price structures being recommended by the Authority.

Figure 4.14 Average Real Per-Kilolitre Price of Metropolitan Water Services



The average price of wastewater services, expressed as a price per connection, is recommended to decrease in real terms from $433 in 2005/06 to $419 in 2009/10 and thereafter remain constant in real terms (Figure 4.15). By comparison the Corporation's proposal is to hold wastewater prices constant in real terms.

Figure 4.15 Average Real Per-Connection Price of Residential Metropolitan Wastewater Services

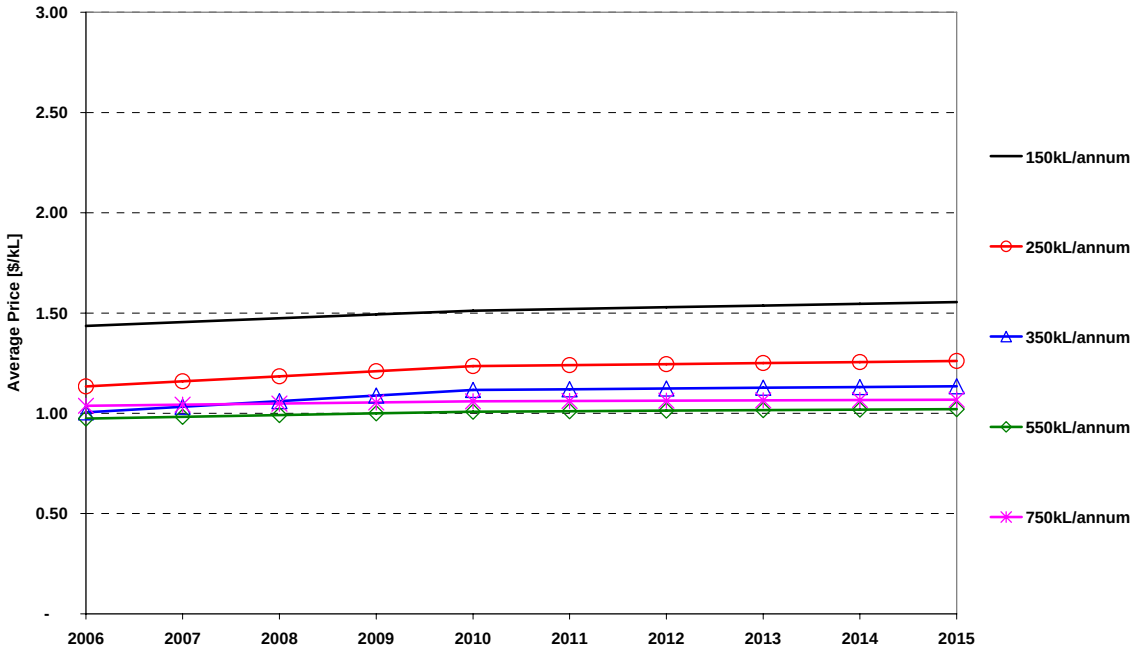


4.6.2.2 Residential Customers

Average per-kilolitre water prices are projected to increase in real terms for all residential customers over the period 2005/06 to 2014/15, although the extent of increases varies depending upon the level of water use (Figure 4.16). The greatest increases in average per-kilolitre water prices occur for customers with low levels of water consumption, particularly those customers with annual water consumption of less than 350 kL with an average annual real increase in price between 0.9 and 1.4 per cent, compared with between 0.3and 0.5 per cent for customers with annual water consumption of 550 to 750 kL.

The greater relative increase for customers with low annual water consumption results from increases in the usage charge for annual water usage of 0 to 150 kL and 151 to 350 kL ($0.42/kL and $0.69/kL in 2005/06, respectively, to $0.82/kL in 2009/10 and beyond), while usage charges for higher levels of water use actually decrease in real terms ($0.92/kL for annual water usage of 351 to 550 kL decreasing to $0.82/kL, $1.213/kL for annual water usage of 551 to 950 kL decreasing to $0.82/kL, and $1.517/kL for annual water usage of >950 kL decreasing to $1.20/kL).

Figure 4.16 Average Real Unit Price of Water to Residential Customers



Households will face average increases in their water payments of between $3 per year and $10 per year, in real terms, depending on the level of water usage by the household (Table 4.12). These water bill variations are relatively constant over the four year period. By comparison, the Corporation has proposed average increases of between $9 per year and $32 per year over the four year period, depending on the level of water usage. However, under the Corporation's proposal the increases occur entirely in 2006/07 (with annual increases of between $29 and $105 depending on the level of water usage) and 2008/09 (with annual increases of between $6 and $22)[56].

Table 4.12 Projected Changes in Water Payments for Representative Metropolitan Residential Customers of the Corporation

Representative Residential Customer (Water Use Per Year)	Average Annual Change in Water Bill (Real Dollar Values of 2005/06)	
	2005/06 to 2009/10	2010/11 to 2014/15
150 kL	$3 per year	$1 per year
250 kL	$6 per year	$1 per year
350 kL	$10 per year	$1 per year
550 kL	$5 per year	$1 per year
750 kL	$4 per year	$1 per year

Table 4.13 shows the relatively small increase in wastewater payments associated with decoupling wastewater charges from property-values for the 11 per cent of customers in the lowest GRV categories. The largest increase is $24 per year for customers with a

[56] The Corporation's proposed tariff increase in 2006/07 results in a $29 increase for customers using 150kL/year, $38 for customers using 250kL/year, $47 for customers using 350kL/year, $72 for customers using 550kL/year and $105 for customers using 750kL/year.

GRV of between $6,001 and $7,000. The reductions to households in higher-valued properties are limited by the introduction of an inclining block tariff for wastewater charges.

Table 4.13 Projected Average Annual Changes in Wastewater Payments for Representative Metropolitan Residential Customers of the Corporation

Gross Rental Value (GRV)	Percentage of Customers in Each GRV Category	Average Annual Change in Wastewater Bills (2005/06 to 2009/10) (Real Dollar Values of 2005/06)
$0-$4000	0.3%	$6 per year
$4001-$5000	2.9%	$2 per year
$5001-$6000	8.0%	$5 per year
$6001-$7000	17.4%	$24 per year
$7001-$8000	17.6%	$11 per year
$8001-$9000	16.2%	-$2 per year
$9001-$10000	12.1%	-$14 per year
$10001-$11000	7.6%	-$23 per year
$11001-$12000	5.4%	-$32 per year
$12001-$13000	3.5%	-$41 per year
$13001-$14000	1.7%	-$6 per year
$14001-$15000	1.7%	-$14 per year
$15001-$16000	1.2%	-$23 per year
$16001-$17000	0.9%	-$32 per year
$17001-$18000	0.7%	-$38 per year
$18001-$19000	0.5%	-$46 per year
$19001-$20000	0.3%	-$55 per year
Over $20000	2.0%	-$96 per year

Table 4.14 shows the total payment variations that would occur on average each year between 2005/06 and 2009/10 depending on the household's property value and level of water usage. The payment variations differ significantly and amount up to $34 per year.

Table 4.14 Projected Average Annual Changes in Total Water and Wastewater Bills for Metropolitan Residential Customers of the Corporation (2005/06 to 2009/10, Real Dollar Values of 2005/06)

		Water Usage Per Year				
Gross Rental Value (GRV)	Percentage of Customers in Each GRV Category	150kL	250kL	350kL	550kL	750kL
$0-$4000	0.3%	9	12	16	11	10
$4001-$5000	2.9%	5	9	13	7	7
$5001-$6000	8.0%	8	11	15	10	9
$6001-$7000	17.4%	27	30	34	29	28
$7001-$8000	17.6%	14	18	21	16	15
$8001-$9000	16.2%	1	5	8	3	3
$9001-$10000	12.1%	-11	-7	-4	-9	-9
$10001-$11000	7.6%	-20	-17	-13	-18	-19
$11001-$12000	5.4%	-29	-25	-22	-27	-28
$12001-$13000	3.5%	-38	-34	-31	-36	-37
$13001-$14000	1.7%	-3	1	4	-1	-2
$14001-$15000	1.7%	-11	-8	-4	-9	-10
$15001-$16000	1.2%	-20	-17	-13	-18	-19
$16001-$17000	0.9%	-29	-25	-22	-27	-27
$17001-$18000	0.7%	-36	-32	-28	-34	-34
$18001-$19000	0.5%	-43	-40	-36	-41	-42
$19001-$20000	0.3%	-52	-48	-45	-50	-51
Over $20000	2.0%	-93	-89	-86	-91	-92

Under the current concession schemes, pensioners and seniors are partly shielded from the price variations that impact non-concession card holders (pensioners in lower-valued properties face price increases of between $4 and $20 per year). However, seniors and dual seniors (seniors with both State and Commonwealth concession cards) in lower-valued properties generally face higher price increases than shown in Table 4.14 (increases range between $8 and $40 per year).

The impacts on concession card holders are shown in the following tables (Table 4.15 to Table 4.17).

Table 4.15 Projected Average Annual Changes in Total Water and Wastewater Bills for Metropolitan Residential Pensioner Customers of the Corporation (2005/06 to 2009/10, Real Dollar Values of 2005/06)

	Water Usage Per Year				
Gross Rental Value	150kL	250kL	350kL	550kL	750kL
$0-$4000	4	8	11	6	5
$4001-$5000	3	6	10	5	4
$5001-$6000	4	8	11	6	5
$6001-$7000	13	17	20	15	15
$7001-$8000	7	11	14	9	8
$8001-$9000	1	4	8	3	2
$9001-$10000	-5	-2	2	-3	-4
$10001-$11000	-10	-7	-3	-8	-9
$11001-$12000	-14	-11	-7	-13	-13
$12001-$13000	-19	-15	-12	-17	-18
$13001-$14000	-1	2	6	0	-0
$14001-$15000	-6	-2	2	-4	-4
$15001-$16000	-10	-7	-3	-8	-9
$16001-$17000	-14	-11	-7	-12	-13
$17001-$18000	-18	-14	-11	-16	-16
$18001-$19000	-22	-18	-15	-20	-20
$19001-$20000	-26	-22	-19	-24	-25
Over $20000	-46	-43	-39	-44	-45

Table 4.16 Projected Average Annual Changes in Total Water and Wastewater Bills for Metropolitan Residential Senior Customers of the Corporation (2005/06 to 2009/10, Real Dollar Values of 2005/06)

	Water Usage Per Year				
Gross Rental Value	150kL	250kL	350kL	550kL	750kL
$0-$4000	10	14	17	12	11
$4001-$5000	8	11	15	10	9
$5001-$6000	10	13	17	12	11
$6001-$7000	24	27	31	26	25
$7001-$8000	14	18	21	16	16
$8001-$9000	5	8	12	7	6
$9001-$10000	-4	-1	3	-2	-3
$10001-$11000	-12	-8	-5	-10	-10
$11001-$12000	-18	-15	-11	-16	-17
$12001-$13000	-25	-21	-18	-23	-23
$13001-$14000	1	5	8	3	3
$14001-$15000	-5	-1	2	-3	-3
$15001-$16000	-12	-8	-5	-10	-10
$16001-$17000	-18	-14	-11	-16	-17
$17001-$18000	-23	-19	-16	-21	-22
$18001-$19000	-29	-25	-22	-27	-28
$19001-$20000	-35	-32	-28	-33	-34
Over $20000	-66	-62	-59	-64	-65

Table 4.17 Projected Average Annual Changes in Total Water and Wastewater Bills for Metropolitan Residential Dual Senior Customers of the Corporation (2005/06 to 2009/10, Real Dollar Values of 2005/06)

	Water Usage Per Year				
Gross Rental Value	150kL	250kL	350kL	550kL	750kL
$0-$4000	15	18	21	16	16
$4001-$5000	11	15	18	13	13
$5001-$6000	14	17	21	16	15
$6001-$7000	33	36	40	35	34
$7001-$8000	20	24	27	22	21
$8001-$9000	7	11	14	9	8
$9001-$10000	-5	-1	2	-3	-3
$10001-$11000	-14	-11	-7	-12	-13
$11001-$12000	-23	-20	-16	-21	-22
$12001-$13000	-32	-28	-25	-30	-31
$13001-$14000	3	6	10	5	4
$14001-$15000	-5	-2	2	-3	-4
$15001-$16000	-14	-11	-8	-13	-13
$16001-$17000	-23	-19	-16	-21	-21
$17001-$18000	-30	-26	-23	-28	-28
$18001-$19000	-37	-34	-30	-35	-36
$19001-$20000	-46	-42	-39	-44	-45
Over $20000	-87	-83	-80	-85	-86

Notwithstanding that the Authority considers that the maintenance or otherwise of concessions is a matter of government policy that is outside of the scope of the current inquiry, the Authority has considered the option of providing a greater concession on the fixed charge to seniors and dual seniors to further ameliorate the impacts of the proposed wastewater reform:

- If the current concession to dual seniors (a 50 per cent reduction on fixed charges) were increased to 60 per cent, their total water and wastewater payments would reduce by $59 per year in 2006/07 at a cost of $3.8 million (in present value terms over nine years).
- If the current concession to seniors (a 25 per cent reduction on fixed charges) were increased to 35 per cent, their total water and wastewater payments would also reduce by $59 per year in 2006/07 at a cost of $5.5 million (in present value terms over nine years).

Immediate impacts on tenants of the projected prices for water and wastewater services may arise due to changes in the water usage charges which are generally passed through to tenants under typical lease agreements for residential properties. Depending upon the level of water use, residential tenants are projected to incur increases in water charges of between $15 and $22 per year in real terms, for the period to 2009/10 and then no change (Table 4.18). Tenants generally only pay usage charges for water and are therefore

shielded from the variations to wastewater and water service charges until, and the extent to which, the rental market transmits these charges into rents.

As discussed in section 3, the Authority takes the view that, as the provision of concessions does not affect the prices determined for water services, the maintenance or otherwise of these concessions is a matter of government policy that is outside of the scope of the current inquiry, as is the matter of whether the Government provides CSO payments to compensate the water businesses for revenue lost as a result of providing concessions.

Table 4.18 Projected Changes in Water Payments for Representative Metropolitan Residential Tenant Customers of the Corporation

Representative Residential Customer (Water Use Per Year)	Average Annual Change in Water Bill (Real Dollar Values of 2005/06)	
	2005/06 to 2009/10	2010/11 to 2014/15
150 kL	$15 per year	$0 per year
250 kL	$18 per year	$0 per year
350 kL	$22 per year	$0 per year
550 kL	$17 per year	$0 per year
750 kL	$16 per year	$0 per year

4.6.2.3 Commercial Customers

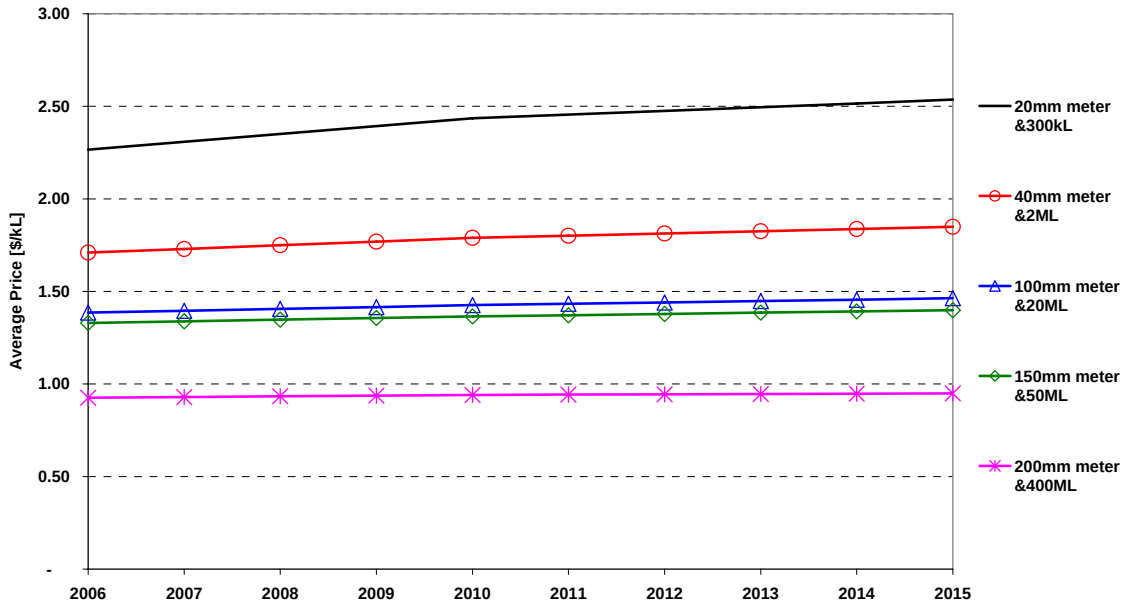
Water Services

The change in price structure and levels for water services to commercial customers comprises:

- a relatively minor change to water usage charges (from three rates of between $0.73 and $0.81/kL to a single rate of $0.82/kL); and
- maintenance of the same structure of service charges (related to meter size) but a projected increase in the service charges of 1.2 per cent per annum in real terms.

The effect of the changes in prices on commercial water users is greatest for users with relatively low levels of water use and for which the service charge comprises a greater proportion of the total water bill. Figure 4.17 below shows the variation in average real unit prices for water for a range of representative water users and indicates higher increases in average prices (and correspondingly the total value of water bills) for representative water users with relatively small to moderate usage of water.

Figure 4.17 Average Real Unit Price of Water to Metropolitan Commercial Customers



These increases in the average real unit prices of water correspond to dollar values in water bills for the set of representative water users as indicated in Table 4.19.

Table 4.19 Projected Variations in Water Bills for Representative Commercial Customers of the Corporation

Representative Water User	Average Annual Change in Water Bill			
	2005/06 to 2009/10		2010/11 to 2014/15	
	Real $/year	%/year	Real $/year	%/year
20mm meter & 300 kL/year	13	1.8%	6	0.8%
40mm meter & 2 ML/year	40	1.2%	24	0.7%
100mm meter & 20 ML/year	200	0.7%	150	0.5%
150mm meter & 50 ML/year	445	0.7%	338	0.5%
200mm meter & 400 ML/year	1,482	0.4%	601	0.2%

Wastewater Services

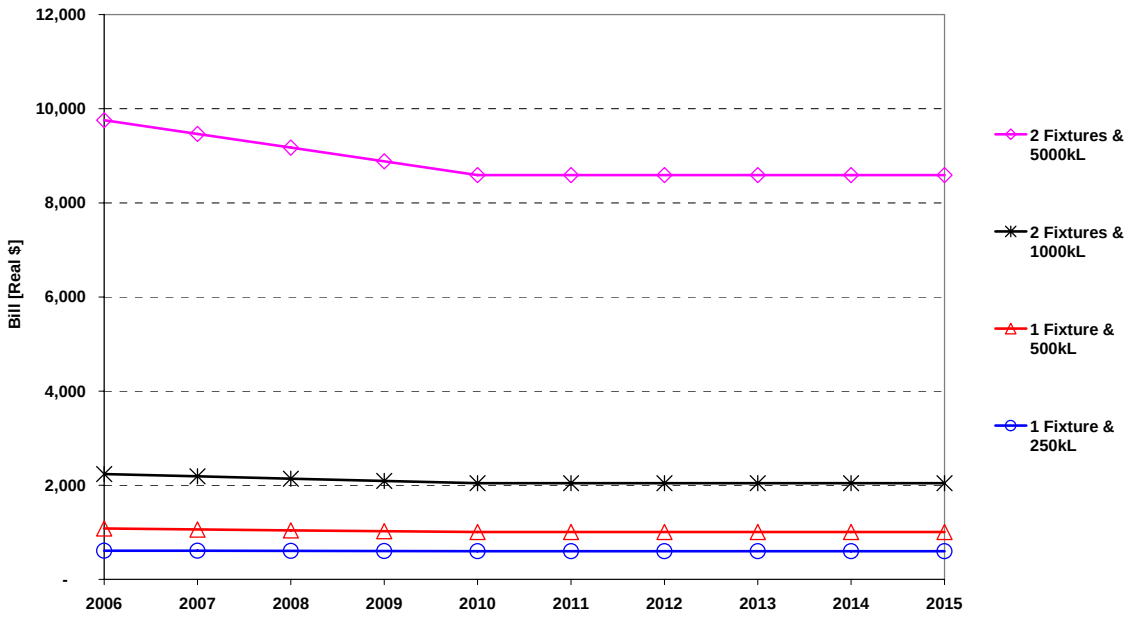
The change in price structure and levels for wastewater services to commercial customers comprises:

- a relative minor change to water usage charges (from $1.931/kL to $1.681/kL for discharge volumes in excess of 200 kL per year); and
- maintenance of the same structure of service charges (related to the number of fixtures) which are held constant in real terms.

As with the projected prices for water services, the effect of the changes in prices of wastewater services on commercial users of these services is greatest for users with relatively low levels of wastewater discharge and for which the service charge comprises a greater proportion of the total bill for wastewater services.

Figure 4.18 below shows the value of bills for wastewater services for a range of representative customers and indicates decreases in average prices for most customers. Customers with high volumes of wastewater discharge benefit the most from the reduction in the wastewater usage charge.

Figure 4.18 Total Wastewater Bill to Representative Commercial Customers



Impact on total water and wastewater bills

Overall, commercial customers who use moderate to high amounts of water will face a reduction in their total water and wastewater bills in real terms over the four year period to 2009/10 as a result of the decline in the wastewater usage charge more than offsetting the increase in water charges. Customers with small fixtures who use relatively low volumes of water will face greater price increases in real terms (up to 0.6 per cent per year).

Table 4.20 Projected Variations in Total Water and Wastewater Bills for Representative Commercial Customers of the Corporation (Real Dollar Values of 2005/06)

Representative Water User	Average Annual Change in Water and Wastewater Bill			
	2005/06 to 2009/10		2010/11 to 2014/15	
	Real $/year	%/year	Real $/year	%/year
20mm meter & 300 kL/year	6	0.6%	6	0.5%
40mm meter & 2 ML/year	-73	-1.0%	24	0.3%
100mm meter & 20 ML/year	-1,039	-1.6%	150	0.2%
150mm meter & 50 ML/year	-2,670	-1.7%	338	0.2%
200mm meter & 400 ML/year	-23,528	-2.1%	601	0.1%

4.7 Impacts of Price Changes on the Water Corporation and Government

4.7.1 Impact on Borrowing, Capital and Dividend Requirements

4.7.1.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the effect of any pricing recommendations on the level of government funding (through Community Service Obligation payments);*
- *the impact of pricing policies on borrowing, capital and dividend requirements…*

4.7.1.2 Assessment

Table 4.21 shows the implications of the tariff recommendations for net payments to government, which are the total amount of dividend and taxation payments to the State Government less community service obligations payments to the Corporation. The Authority's recommended prices for water and wastewater services are expected to result in net payments to government over the ten-year period of $1,352 million, which compares to net payments under the Corporation's proposals of $1,465 million over the ten-year period.

Table 4.21 Present Value of Net Payments to Government (2005/06 to 2014/15)

	Present Value of Projected Payment ($ Million)	
	Authority	Corporation
Dividends	2,648	2,648
Tax equivalent payments	1,335	1,335
Community Service Obligation payments	-2,631	-2,518
Net payments to government	**1,352**	**1,465**

Under the Authority's tariff recommendations, the present value of the increase in the Corporation's net equity over the ten year period is estimated to be $1,609 million. By comparison, the increase in net equity under the Corporation's tariff proposals is $2,118 million.

4.7.2 Impact on General Price Inflation

4.7.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

the effect on and of general price inflation over the medium term;

4.7.2.2 Assessment

The water and wastewater prices determined by the Authority are projected to increase in real terms over the period 2005/06 to 2014/15 at an average annual rate of 0.7 per cent and -0.4 per cent respectively. As water and wastewater expenditure represents less than 1 per cent of the basket of goods and services that comprises the consumer price index, the overall impact of the prices determined for the Corporation would not be expected to have a significant impact on the rate of general price inflation.

4.8 Future Price Reviews

In section 3 of this report, the Authority considered the appropriate forms of price paths for the water businesses. As set out in this section, the Authority recommends that where a water business is faced with substantial demand uncertainty, a revenue-cap form of price control should be adopted so that in each review of prices, the target revenue for the water business is adjusted for under-recovery or over-recovery of revenue in the previous period to the extent that this results from differences between realised demand and forecast demand (Recommendation 3).

The Authority also assumes in this report that water restrictions will be eased to three days per week watering in 2006/07 (section 1.2). In any event, the Corporation is exposed to substantial variability in supplies from its various water sources depending upon year-to-year variation in rainfall. The potential for water restrictions to be applied or relaxed depending upon available water supplies creates substantial demand uncertainty for the Corporation, and consequently uncertainty in revenues obtained from usage charges for water services.

In addition, the Corporation would be subject to some revenue variability as a result of the recommendations on residential wastewater tariffs, which will largely depend on growth and on the rate of property sales (as households purchasing a new property would be charged the average charge rather than the charge that was originally linked to the property value).

Taking these factors into account the Authority recommends that reviews of prices for the Corporation should apply a pseudo revenue-cap form of revenue and price control that corrects revenue targets and prices for over-recovery or under-recovery of revenue in the previous pricing period, to the extent that this over-recovery or under-recovery arises from differences between realised demand and forecast demand for water by customers affected by water restrictions. The precise formulation of the price and revenue control can be a matter addressed at the time of price reviews, but should comply with the following principles.

- At the time of a price review, the target revenue for the ensuing pricing period should be adjusted by an amount equal to:
  - the notional value of over-recovery or under-recovery of revenue by the Corporation that results from the average per-customer water demand for each block of usage charges for water services in the previous pricing period being different to the forecast used for the purposes of setting prices;
  - the notional value of the costs avoided as a result of realised average per-customer water demand being less than the forecast used for the purposes of setting prices, or the additional costs incurred as a result of realised average per-customer water demand being greater than the forecast used for the purposes of setting prices, in each case being based on the avoidable (or

incremental) cost to the Corporation of supplying an additional unit of water; and

- the notional value of over-recovery or under-recovery of revenue by the Corporation that results from the reform to residential wastewater pricing resulting in different revenue per block than has been assumed for the purposes of setting prices.

- The values of revenues and costs carried forward to the next pricing period should be adjusted to reflect the time-value of money and inflation.

5 AQWEST

5.1 Background

Bunbury Water Board, trading as AQWEST, is a statutory authority established under the *Water Boards Act 1904*. The Bunbury Water Board was established in 1905 and was operated in association with the Bunbury local government authority until 1997 when it was re-formed as a separate entity. AQWEST is governed by a Board of Directors appointed by the Minister for the Environment and acting under powers created by the *Water Boards Act 1904*, and the business is financially administered under the *Financial Administration and Audit Act 1985*.

AQWEST provides a potable water service to the Bunbury-Wellington region, including water sourcing, treatment, distribution and retailing operations. Water is sourced from the Yarragadee aquifer through 13 production bores and supplied to about 14,000 connections through 332 kilometres of water mains. About 72 per cent of water produced is supplied to residential customers and the remaining 28 per cent supplied to non-residential customers.[57] The business has an employee workforce of around 30 full-time-equivalent staff.[58] AQWEST does not provide wastewater services, which in AQWEST's region of operation are provided by the Water Corporation.

The operational activities of AQWEST are subject to specific regulation by four government agencies:

- Economic Regulation Authority – established on 1 January 2004, the Authority oversees AQWEST's operating licence which sets out the conditions under which AQWEST operates (a copy of the operating licence is available at www.era.wa.gov.au). The Authority also monitors AQWEST's performance and reporting processes in accordance with licence requirements.
- Department of Environment – issues and administers AQWEST's groundwater extraction licence, dealing with issues surrounding management of water resources.
- Environmental Protection Authority – assesses the environmental impacts of significant projects.
- Department of Health – regulates drinking water quality.

5.2 Service Standards

5.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services including:*
  - *any additional resources needed to meet the required standards of quality, reliability and safety;*

[57] AQWEST correspondence.

[58] AQWEST (2003), *Annual Report 2002-03*.

- *how changes in standards and operating conditions faced by the service providers impact on its revenue requirements.*

5.2.2 Background

The provision of services by AQWEST is regulated under the *Water Services Licensing Act 1995*. This Act establishes a licensing scheme whereby AQWEST is granted an operating licence for provision of water supply services, sewerage services, irrigation services and drainage services. AQWEST holds a licence under the Act to provide water services within a defined area within, and in the vicinity of, the city of Bunbury.

The licence is granted subject to terms and conditions that establish standards and requirements for the provision of services in respect of:

- processes for dealing with customer complaints;
- a requirement to establish a customer charter;
- establishment of processes for consultation with customers in respect of AQWEST's operations and delivery of services;
- obligations to customers in respect of the availability and connection of services;
- obligations to provide reports to the Authority in respect of customer complaints and incidents in the provision of services including non-compliance with water quality standards and interruption of water services;
- obligations to provide the Authority with information required for performance monitoring purposes; and
- requirements in respect of the provision of services including requirements for emergency response and standards for health-related aspects of water quality, water pressure and flow, continuity of services and obligations to maintain water supplies in periods of drought.

Compliance with the terms and conditions of its operating licence causes AQWEST to incur certain costs that in some cases may not necessarily be incurred in the absence of the specific licence requirements. These are costs legitimately incurred by AQWEST and prices for services should be set at a level sufficient to ensure that these costs are recovered.

The terms of reference for this inquiry require the Authority to consider whether AQWEST requires any additional resources to meet the required standards of quality, reliability and safety; and how changes in standards and operating conditions affect AQWEST's revenue requirements.

The Authority has addressed this element of the inquiry by:

- consideration of whether AQWEST is providing services in accordance with its licence requirements;
- if AQWEST is not providing services in accordance with licence requirements, consideration of whether this is due to insufficient financial resources (i.e. revenues) to meet these requirements; and
- consideration of mechanisms by which the prices and revenues of AQWEST may be adjusted to meet any additional revenue requirements arising from changes in standards and operating conditions.

5.2.3 Compliance with Licence Requirements and Performance Standards

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.

Notwithstanding strict compliance with licence conditions, 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. (AQWEST, Pricing Submission, p8)

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. (AQWEST, Issues Paper submission, p8)

AQWEST receives approximately 9.8 complaints per 1,000 connections and believes that an appropriate target is 4 complaints per 1,000 connections. 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.

5.2.4 Additional Financial Resources Required to Comply with Licence Requirements and Performance Standards

In response to customer complaints over water quality, AQWEST has indicated that it intends to adopt more stringent targets for iron and manganese concentrations in water supplies (AQWEST Pricing Submission, p8). 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. (AQWEST, Pricing Submission, p8)

For the purposes of this inquiry, the Authority has not sought to have amendments made to cost forecasts to include provision for the works contemplated for the improvement of water quality. The Authority envisages that the costs of these works can be incorporated into revenue requirements and reflected in prices at a time of a review of prices and when AQWEST is able to provide details of the necessary works and forecasts of costs.

5.2.5 Changes in Standards and Operating Conditions

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[59] 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 has increased from approximately 4 to 12 during this time.)

Further, the Department of Health notes that:

[59] Advice to the Authority, 3 March 2005.

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 or precursors associated with the formation of trihalomethanes and associated disinfection by products).

Any requirement for AQWEST to meet new or higher standards of operational performance in respect of water quality will be likely to affect the costs incurred in the provision of services. The Authority considers that these costs should not be anticipated, but rather should be taken into account when and if the new or higher standards are imposed and forecasts made of the costs of meeting the standards. Under the scheme being recommended by the Authority for the determination of prices, any changes in cost forecasts arising from the imposition of new standards can be accommodated in target revenues and prices at the times of periodic price reviews.

5.3 Balancing Supply and Demand

5.3.1 Terms of Reference

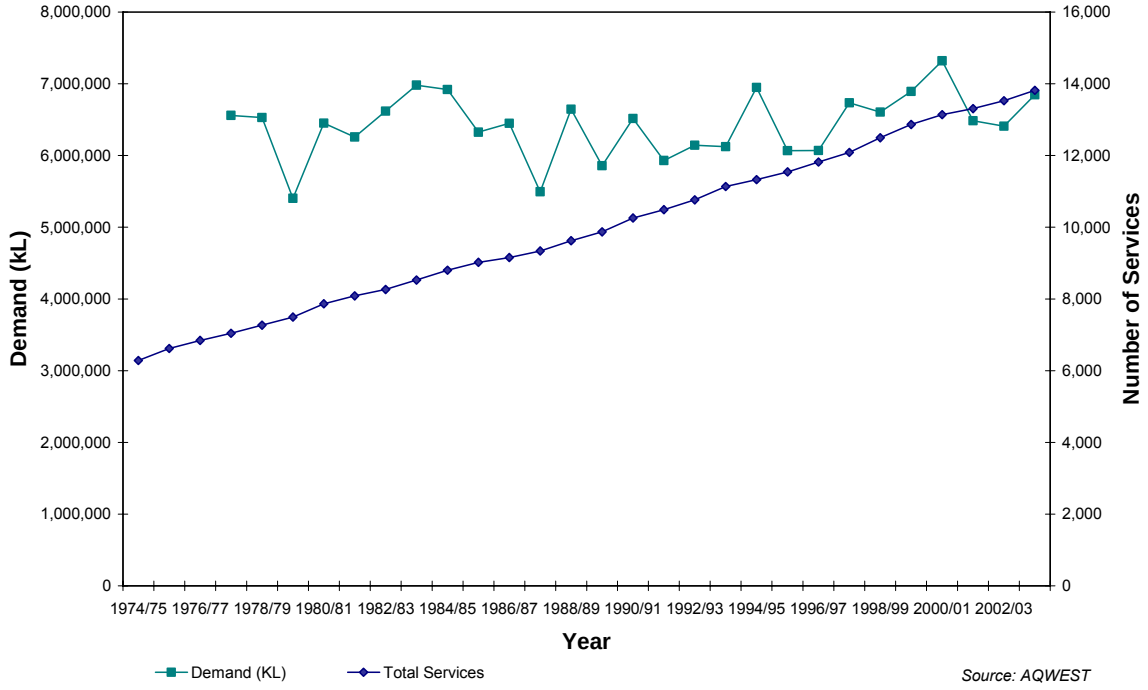
The Authority must give consideration to, but will not be limited to, the following matters:

- *considerations of demand management;*
- *the cost of providing the services concerned, including … any additional resources needed to meet … such matters as the protection and development of future water sources.*

5.3.2 Demand Management

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 (around 155 kL per person), despite the fact that Perth customers face more severe water restrictions (AQWEST customers are encouraged but not required to restrict their sprinkler use). In its submission, AQWEST indicates that the total demand for water within its service area has remained relatively steady despite growth in the number of services at an average rate of 2.7 per cent per annum (Figure 5.1). AQWEST attributes the decline in demand per customer to the introduction of a user-pays system of pricing for water services, inclining block tariffs, demand management programs, water conservation, increasing housing density and the aging of the population (AQWEST Pricing Submission, p11).

Figure 5.1 AQWEST Demand Versus Service Growth



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; and
- Public relations program (AQWEST, Pricing Submission, p15)

AQWEST submits that its most effective strategy for demand management has been to change the pricing structure to penalise excessive usage. AQWEST's current pricing structure includes charges for water usage that increase progressively from $0.37 per kL for usage up to 150 kL per annum to $2.12 per kL for usage above 1,000 kL per annum. AQWEST asserts that this stepped tariff structure has allowed it to defer $9 million in capital expenditure over the past decade and resulted in tariffs that are 10 to 15 per cent lower than they would otherwise have been. 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 (AQWEST, Draft Report submission, p8).

AQWEST has also implemented a program to decouple service charges for industrial and commercial customers from a system of determining charges on the basis of gross rental values of properties, and implement a new pricing structure based on the size of the water meters used in providing services, similar to the pricing structure used by the Water Corporation (AQWEST, 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. In doing so, 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 incorporate 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.

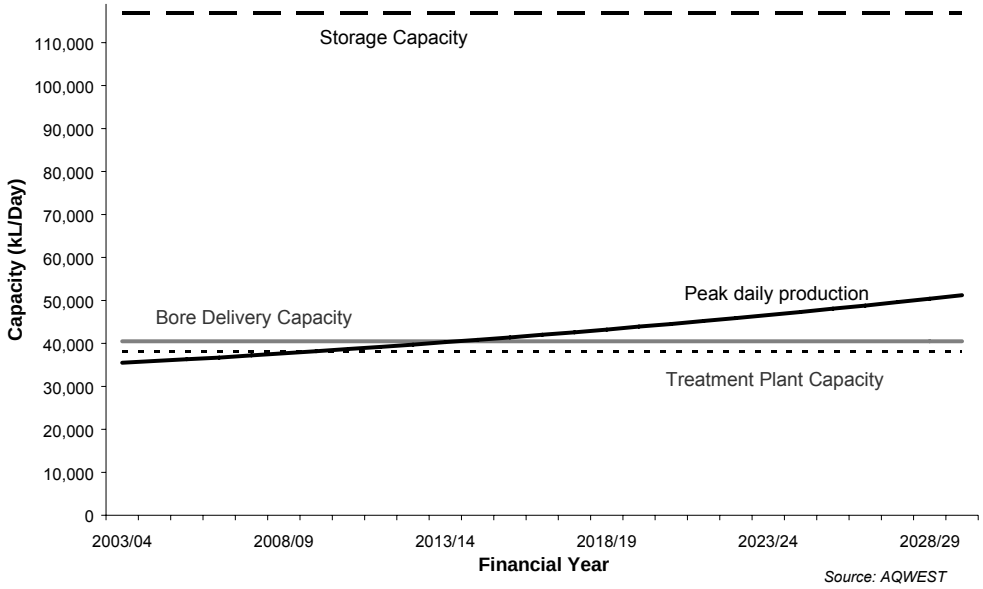
5.3.3 Source Development Plan

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).

AQWEST expects that its groundwater supplies are sufficient to meet average demand for potable water until 2045 and maximum demand until 2030. AQWEST does not consider that there is any need for further source development, although increasing water supplies may require further investment in treatment facilities in 2007 and 2010.

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. 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. AQWEST's capital expenditure program includes significant investment to increase treatment plant capacity by 2010 (see section 5.4.5.2). Bore delivery capacity will be sufficient for production requirements until around 2014/15.

The Authority considers AQWEST's supply system to be a reasonable balance 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 on water use.

Recommendation

28 AQWEST's current plan for capital works to increase water supplies provides for a timing of development that is necessary and appropriate. The forecast cost of implementing these plans may appropriately be incorporated in forecasts of costs applied in the setting of water prices.

5.4 Revenue Requirement

5.4.1 Terms of Reference

The requirement to consider the revenue requirements of AQWEST arises from the following elements of the Terms of Reference for the inquiry.

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;*

5.4.2 Background

As indicated in section 3 of this report, the Authority has assessed AQWEST's revenue requirements by using a 'building block' approach. This method is used to determine a value of revenue required for a predetermined period, based on an assessment of costs to

be recovered over that period. Using a forecast of demand for services, price structures and levels are then formulated to recover this revenue.

Identifying an appropriate level of revenue requires consideration of, among other things, a value of existing assets, 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.

5.4.3 Initial Asset Value

5.4.3.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the regulatory asset value of each of the service providers;*

5.4.3.2 Determination of the Initial Asset Value

As set out in section 3 of this report, the Authority is recommending that initial asset values should be established for each of the water businesses at a value consistent with a deprival-value methodology and current forecasts of prices and revenues.

5.4.3.3 AQWEST Proposal

AQWEST was not asked to provide a proposal for the initial asset value and accordingly did not propose any value prior to the Authority's Draft Report. Subsequent to the Authority's Draft Report, AQWEST has indicated that in determining an asset value, the Authority should give attention to the book value of AQWEST's assets of approximately $45 million (as at June 2004), and a value of $36.5 million that would be implied by average prices per customer of a group of suggested comparable water businesses.

5.4.3.4 Authority Assessment

For the reasons as set out in section 3 of this report, the Authority considers that an initial asset value for AQWEST should be established by a deprival-value approach and consistent with the current forecasts of revenue and costs for the business. The Authority has adopted this approach for reasons that:

- this approach preserves the values of prices and revenue forecasts that are currently forecast by the business itself, and therefore will not result in any need for changes to the financial structure or management of the business for at least the period of the initial pricing recommendations;
- assuming that the value of the business as represented in statutory accounts has been properly determined, this approach to the valuation of assets for pricing purposes will not affect the value of the business or its assets as represented in these accounts; and
- the valuation is consistent with establishing a rigorous scheme for the determination of prices for water services that will result in prices changing over time to reflect the costs incurred by the business through investments in new and replacement assets, providing assurance to the business that it will be able to charge prices for services that are sufficient for it to recover its costs.

In its Draft Report, the Authority determined that the actual and forecast revenues from customer charges for the period 2003/04 to 2008/09 implied an asset value for pricing purposes of $16.1 million in 2003/04, taking into account capital expenditures and depreciation in the intervening period.

The Authority acknowledges that this asset value is substantially less than the book value of AQWEST's assets. The Authority does not, however, regard this as necessarily a matter of concern in establishing an asset value for price setting purposes. Both book values and regulatory asset values of assets are notional asset values, maintained for different purposes and determined using different accounting methodologies. Establishing a regulatory asset value of lower value than the book value of AQWEST's statutory accounts does not necessarily imply a devaluation of assets for statutory accounting purposes.

The Authority also acknowledges that, in determining an asset value by a deprival-value methodology, a range of factors may be taken into account in establishing appropriate benchmarks of prices and revenues that can be used to back-calculate the implied asset value.

In its Draft Report, the Authority considered the implications of a range of different asset values and revenue streams for the financial sustainability of the AQWEST business, concluding that a regulatory asset value may be determined at a lower value than implied by current forecasts of revenue (with corresponding lower future prices and revenue) without necessarily compromising the financial viability of the business.

Taking AQWEST's submission into account, the Authority maintains the view that AQWEST's current forecasts of prices and revenues comprise an appropriate benchmark for determining an initial asset value.

Notwithstanding this, the Authority has given further consideration to the financial structure of AQWEST and implications for establishing a regulatory asset value on the basis of forecasts of prices and revenue. AQWEST operates as a not-for-profit business, financing capital expenditures by accumulating cash reserves. The Authority considers that it is appropriate in establishing a regulatory asset value to start with a presumption that the business is operating as a typical for-profit business, and to make an adjustment to the benchmark revenue projection of AQWEST to account for a margin of profit (i.e. a return on equity).

The additional value of a profit (or return on equity) component of revenue is appropriately calculated as the difference between the cost of equity finance and cost of debt finance for that portion of Busselton Water's asset value that is assumed to be equity financed. That is, the additional profit component of revenue is calculated by multiplying the difference between the costs of equity and debt finance determined for AQWEST (3.93 per cent in real pre-tax terms, see Appendix 4) by the proportion of asset value that is assumed to be equity financed (60 per cent) in the benchmark capital structure of the business being assumed for pricing purposes.

The Authority has also determined an initial asset value for AQWEST on the basis of the total revenues generated by the business, including customer service charges for water services, developer charges and revenues from provision of services other than the water services that are the subject of the current inquiry.

Applying the above methodology and assumptions, the Authority has calculated an initial regulatory asset value for AQWEST of $25.1 million in real dollar values at 30 June 2005. This calculation is summarised in Table 5.1.

Table 5.1 Derivation of Initial Regulatory Asset Value for AQWEST

	Value ($million, real dollar values at 30 June 2005)									
Projected Revenue	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Customer charges[60]	5.6	5.6	5.5	5.4	5.4	5.3	5.3	5.3	5.2	5.2
Capital contributions	0.7	0.5	0.5	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Forecast revenue from other services	0.4	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Addition for return on equity	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.1	1.1	1.2
Total projected revenue	7.3	7.1	7.0	7.0	7.0	7.0	7.0	7.0	7.0	7.0
Present value at real discount rate of 5.87% as at 30 June 2005					52.1					
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by AQWEST)	3.9	3.9	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Depreciation	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1
Return on Assets	1.5	1.7	2.0	2.1	2.2	2.5	2.6	2.7	2.8	2.9
Total cost of service	6.0	6.4	6.8	6.8	7.0	7.3	7.5	7.7	7.8	8.0
Present value at real discount rate of 5.87% as at 30 June 2005					52.1					
Initial asset value equating present value of projected revenue with present value of cost of service (as at 30 June 2005)					25.1					

Recommendation

29 An initial regulatory asset value of $25.1 million in real dollar values at 30 June 2005 should be established for AQWEST's physical assets.

5.4.4 Operating Expenditure

5.4.4.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the non capital forecasts of the service providers;*

[60] Revenue generated from AQWEST's projected charges.

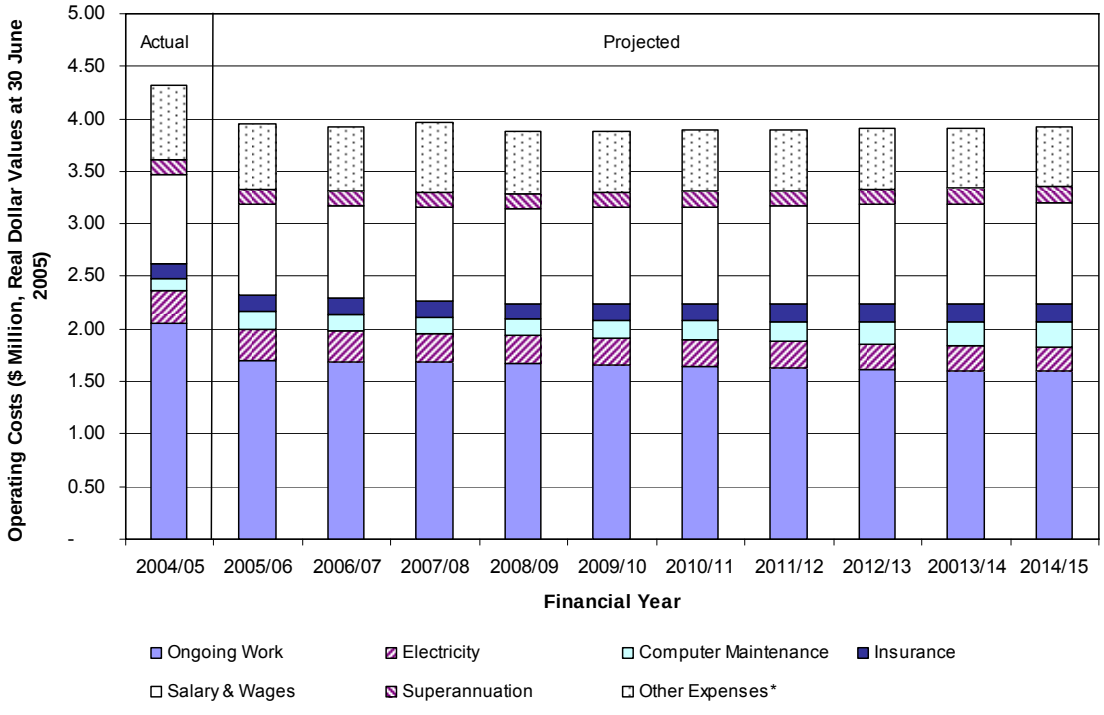
The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*

5.4.4.2 AQWEST Proposal

AQWEST has an annual operating and maintenance expenditure of approximately $4 million per annum in real dollar values at 30 June 2005 (Figure 5.3).

Figure 5.3 AQWEST Projected Operating and Maintenance Expenditure (Real Dollar Values at 30 June 2005)



Source: AQWEST

* Note: "Other Expenses" includes rent, legal expenses, interest paid, bad debt, other service expenses and all other expenses.

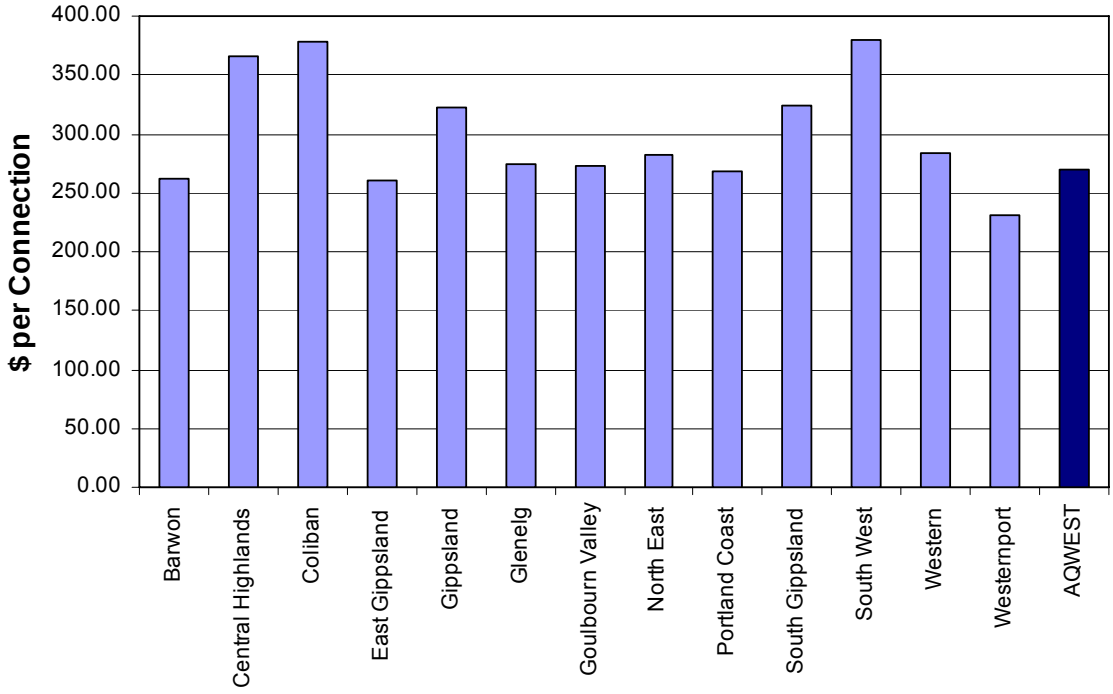
5.4.4.3 Authority Assessment

The Authority has assessed AQWEST's operating efficiency by consideration of trends in operating expenditure and by benchmarking operating costs against a number of other domestic water service providers.

Operating costs per unit of water delivered are forecast to decrease in real terms from $0.76/kL in 2005/06 to $0.70/kL in 2014/15, a total reduction of 6.8 per cent. Operating costs per connection are also forecast to decrease in real terms, from $269/connection in 2005/06 to $240/connection in 2014/15, a decrease of 11 per cent.

AQWEST's forecast operating cost per connection of $269 in 2005/06 is less than the average value for the Victorian regional water businesses of $300/connection (Figure 5.4), although comparisons are made difficult by the Victorian businesses being providers of both water and sewerage services while AQWEST is a provider of water services only.

Figure 5.4 Operating Expenditure – AQWEST and Comparable Businesses



Source: AQWEST Forecast Data; Essential Services Commission of Victoria, March 2005, Water Price Review: Metropolitan and Regional Businesses' Water Plans, Draft Decision 2005/06 to 2007/08, Volume II (All values expressed in real dollar values at 30 June 2005; Figures for the Victorian water businesses are expressed per total of water and sewerage connections and are as proposed by the water businesses where provided, or otherwise as per the Draft Decision of the ESC.)

The Authority has considered prospects for improvements in technical efficiency in delivery of water services as part of the consideration of forecasts of operating expenditure for the Corporation (section 4.4 of this report). From an analysis of efficiency gains achieved and forecast for water businesses elsewhere in Australia and in the United Kingdom, the Authority considers that the Western Australian water businesses should be able to achieve efficiency gains in operating expenditures in the order of 2.5 per cent per annum on a unit cost basis, and that a target of 1.25 per cent should be incorporated into forecasts of operating costs.

For AQWEST, cost forecasts indicate efficiency gains in operating costs over the period 2005/06 to 2014/15 at average rates (in real terms) of 2.8 per cent per annum on a cost per connection basis. As this rate of efficiency improvement exceeds the Authority's target rate of efficiency gain of 1.25 per cent per annum, the Authority considers that AQWEST's forecasts of operating expenditure provide an appropriate basis for determination of service prices.

5.4.5 Capital Expenditure

5.4.5.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the … forecast capital expenditure program of the service providers;*

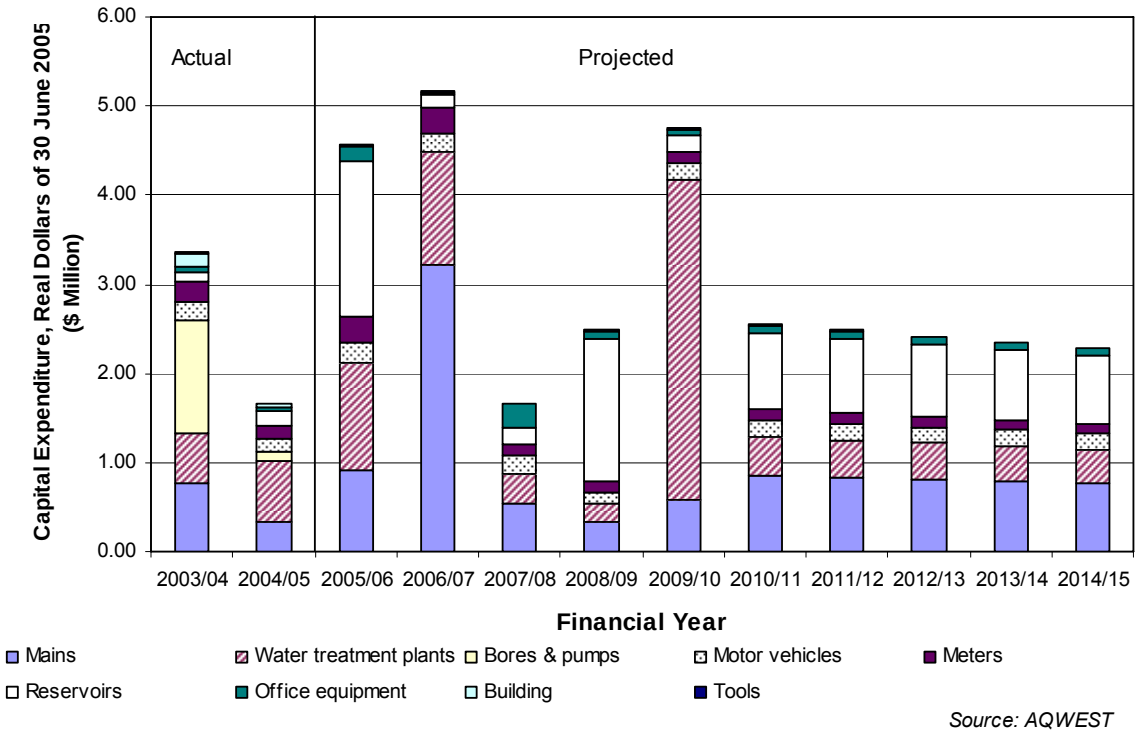
The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*
- *… the impact of any need to renew or increase relevant assets.*

5.4.5.2 AQWEST Proposal

AQWEST's forecast capital program for the period 2005/06 to 2014/15 involves expenditure of approximately $35.2 million or just over $3.5 million per year (Figure 5.5).

Figure 5.5 AQWEST's Capital Expenditure Program (Real Dollars at 30 June 2005)



Source: AQWEST

The most significant item of expenditure is capital works on water mains ($10.95 million, with a significant expenditure of $3.39 million in 2007). The remainder of the capital program includes water treatment plants ($9.8 million with a significant expenditure of $4.1 million in 2010), motor vehicles ($2.21 million), meters ($1.74 million) and storage reservoirs ($9.13 million with significant expenditure of approximately $1.8 million in 2006 and 2009).

The large amount of expenditure on water mains forecast for 2007 is in large part for 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.

5.4.5.3 Authority Assessment

The Authority considers the level of capital expenditure being incurred by AQWEST to be appropriate. The Authority is, however, aware of some deficiencies in AQWEST's capital planning process.

The capital program presented in AQWEST's proposal was developed using an asset management process, which was audited by KPMG in January 2005. While the asset management process is considered to be reasonably sound, the audit 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.[61]

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 are used in the capital planning process. This review is yet to be finalised, but it is expected improvements will be made to the capital planning process.

AQWEST's asset management plan indicates the majority of assets are relatively new with only 15 per cent – or $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. Therefore, in general, the risk of unidentified high value capital expenditure related to asset replacement in the period to 2008/09 is considered to be low. This is not to say that the risks associated with some major renewal projects are negligible – a point highlighted by AQWEST's submission:

> ….the ERA notes that only one third of AQWEST's assets have less than 20 per cent of their economic life remaining, and concludes thus that the risk of unidentified high value capital expenditure related to asset replacement in the period 2008-09 is therefore considered to be low. However, in making this assessment, the ERA has ignored *which* third of AQWEST's assets fall into this category. In fact, some of the assets in this category are the mains which run through the centre of the Bunbury CBD, which were built 100 years ago and may require replacement in the next few years. Planning for this, the first time it has occurred, has been occurring for a number of years but AQWEST considers the risks associated with this major exercise to be anything but small. (AQWEST, Draft Report submission, p10)

The Authority acknowledges the views expressed by AQWEST but also notes that AQWEST has indicated that it is planning for replacement of mains and hence such expenditure is expected. Taking this into account, the Authority maintains the view that there are relatively low risks of requirements for capital expenditure arising in respect of unexpected projects.

With respect to efficient delivery of capital projects, only minor cost savings via changes to the project delivery process are thought to be achievable. This is due to the relatively small size of the capital program by industry standards – an average of about $3.0 million per annum in real terms – and the fact that the program is generally made up of predominantly small projects. For these reasons, the Authority considers that additional capital efficiency targets should not be imposed on AQWEST at the current time.

[61] KPMG (January 2005), "AQWEST-Bunbury Water Board: Operational Audit and Asset Management Review. Risk Assurance Services Report", p24.

5.4.6 Depreciation

5.4.6.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the depreciation … of the service providers;*

5.4.6.2 AQWEST Proposal

AQWEST has described the determination of a depreciation allowance in terms of an amount of charges included in prices that is determined for the purposes of financing asset replacement.

5.4.6.3 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. The Authority therefore accepts the proposed asset lives (and corresponding depreciation of assets by a straight line methodology over these asset lives) for the purposes of determining a revenue requirement for AQWEST.

The Authority has correspondingly determined depreciation allowances on the assumption of an average remaining life of 40 years for existing assets and an average life for new assets of 65 years.

5.4.7 Rate of Return

5.4.7.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the appropriate rate of return on public sector assets, including appropriate payment of dividends to the Government of Western Australia;*

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.

5.4.7.2 AQWEST Proposal

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 required to, provide an estimate of the rate of return that might be relevant to its business. AQWEST did not, however, provide an estimate of the rate of return that might be relevant to its business.

In a submission to the Authority made subsequent to the Authority's Draft Decision, AQWEST submitted that if the Authority is to estimate a weighted average cost of capital (WACC) for AQWEST using the capital asset pricing model, then consideration should be

given to evidence for the values of model parameters (particularly gearing levels and beta values) for private water utility businesses in the UK.

5.4.7.3 Authority Assessment

The Authority has used the CAPM to estimate the WACC for AQWEST. This methodology is widely used and understood by industry, the finance community and other Australian utility regulators. The rationale and methodologies used by the Authority in estimating parameters of the WACC are described in detail in Appendix 4. This section summarises the main findings.

The Authority calculates a real pre-tax WACC for AQWEST of 5.87 per cent, comprising a real pre-tax cost of equity of 7.44 per cent and a real cost of debt of 3.51 per cent.

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

- the requirement under section 26(1) of the Authority Act 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 pricing principles of the 1994 CoAG water reform agreement (as set out in Appendix 2, which include the requirements under principles 4 and 5: "…a water business should not recover more than the ... cost of capital, the latter being calculated using a weighted average cost of capital." and "…a water business should recover, at least, … the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement ... Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome";
- 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, O*ff*GAR and the Office of the Rail Access Regulator in recent pricing determinations;
- the approach used by the Water Corporation in its estimation of its WACC; and
- comments by other respondents to the Issues Paper in relation to the appropriate methodology for the estimation of the cost of capital.

The Authority considers that the rate of return for AQWEST and Busselton Water should be considered similarly to that for the 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 non-diversifiable risk. AQWEST and Busselton Water are both relatively small businesses that, for reason of business size, would be unlikely to be able to raise debt finance as easily as a substantially larger business such as the Corporation. For this reason, the Authority considers that the rate of return for AQWEST and Busselton Water should be determined on the basis of a benchmark financial structure that assumes a lower proportion of debt and higher proportion of equity finance than assumed for the Corporation. Taking into account that there is a lack of relevant private-sector businesses to be able to observe an appropriate benchmark from capital markets, the Authority considers that a benchmark assumption of financial structure of 40 per cent debt and 60 per cent equity finance is appropriate (as compared with 60 per cent debt and 40 per cent equity finance assumed for the Corporation). 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).

AQWEST contends that the assumptions made about a hypothetical "commercial structure" for AQWEST are inappropriate. In particular, AQWEST contends that the assumption of gearing (40 per cent debt to total assets) is not supported by observations of gearing in comparable businesses. Gearing levels for a large number of Victorian water businesses are presented as evidence for this.

The Authority considers that the assumption of 40 per cent gearing for AQWEST and Busselton Water is an appropriate benchmark to apply for the purposes of setting service prices.

The levels of gearing of the Victorian water businesses is not considered to be informative in making an assumption about the level of gearing that would be appropriate for AQWEST and Busselton Water in a commercial setting. The Victorian water businesses have similar histories to AQWEST and Busselton Water, including operation as not-for-profit businesses with constraints on abilities to utilise debt finance. As such, the observed levels of gearing are not considered to be informative.

Recommendation

30 A rate of return of 5.87 per cent (real, pre-tax) should be applied in determining AQWEST's revenue requirement

5.4.8 Revenue Requirement

The Authority has determined a revenue requirement for AQWEST using a cost-of-service calculation and taking into account the conclusions of the Authority on the cost parameters of the revenue calculation, as set out above.

In determining a total revenue requirement for the prices of water services, the Authority has determined a revenue requirement for the business as a whole, including a return on equity, and then deducted forecasts of capital contributions, forecasts of revenue from other services and an allowance for profit (i.e. return on equity). The allowance for a return on equity has been calculated as:

- the difference between the estimated cost of equity and cost of debt

  multiplied by

- the proportion of assets assumed to have been equity financed, under the benchmark capital structure assumed for pricing purposes.

This revenue requirement equates to a present value (at a discount rate of 5.87 per cent, real, pre-tax) of $39.8 million. The derivation of this revenue requirement is summarised in Table 5.2.

Table 5.2 AQWEST Revenue Requirement, 2005/06 to 2014/15

	Value ($million, real dollar values at 30 June 2005)									
Asset Account	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Opening Asset Value	25.1	29.7	34.6	36.0	38.1	42.4	44.4	46.3	48.1	49.8
Capital Expenditure	5.3	5.6	2.1	2.9	5.2	3.0	2.9	2.8	2.7	2.7
Depreciation	-0.6	-0.7	-0.8	-0.8	-0.9	-1.0	-1.0	-1.0	-1.1	-1.1
Closing Asset Value	29.7	34.6	36.0	38.1	42.4	44.4	46.3	48.1	49.8	51.3
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by Authority)	3.9	3.9	4.0	3.9	3.9	3.9	3.9	3.9	3.9	3.9
Depreciation	0.6	0.7	0.8	0.8	0.9	1.0	1.0	1.0	1.1	1.1
Return on Assets	1.5	1.7	2.0	2.1	2.2	2.5	2.6	2.7	2.8	2.9
Gross Revenue Requirement	6.0	6.4	6.8	6.8	7.0	7.3	7.5	7.7	7.8	8.0
Capital contributions	-0.7	-0.5	-0.5	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4	-0.4
Forecast revenue from other services	-0.4	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Addition for return on equity	-0.6	-0.7	-0.8	-0.8	-0.9	-1.0	-1.0	-1.1	-1.1	-1.2
Net revenue requirement for determination of water service charges	4.3	4.9	5.2	5.2	5.4	5.6	5.8	5.9	6.0	6.2

Table 5.3 demonstrates that the net revenue requirement for AQWEST is the same in present value terms as the revenue generated by AQWEST's proposed charges and the revenue generated from the Authority's proposed charges.

Table 5.3 Present Value of Revenue Generated with AQWEST's and Authority's Proposed Charges

	Value ($million, real dollar values at 30 June 2005)									
	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Revenue generated from AQWEST's proposed charges	5.5	5.5	5.5	5.4	5.4	5.4	5.3	5.2	5.2	5.1
Present value of AQWEST's revenue at real discount rate of 5.63% as at 30 June 2005					39.8					
Net revenue requirement	4.3	4.9	5.2	5.2	5.4	5.6	5.8	5.9	6.0	6.2
Revenue generated from Authority's proposed charges	5.5	5.4	5.4	5.3	5.2	5.3	5.3	5.4	5.5	5.5
Present value of the two revenue streams immediately above at real discount rate of 5.63% as at 30 June 2005					39.8					

Recommendation

31 Prices established for the AQWEST's water services should be consistent with a present value of forecast revenue for AQWEST over the period 2005/06 to 2014/15 of $39.8 million at a discount rate of 5.87 per cent (real, pre-tax)

5.5 Price Path

5.5.1 Terms of Reference

The Authority must give consideration to, but will not be limited to the following matters:

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

5.5.2 AQWEST Proposal

AQWEST has provided the Authority with a projection of water service charges for the period 2005/06 to 2014/15. The principal characteristics of the charges proposed by AQWEST are as follows.

Residential Charges

The residential service charge is set at $90.00 for 2005/06 and projected to decrease to $73.93 by 2014/15 (in real dollar values at 30 June 2005).

Usage charges comprise a five-block structure with values that are projected to decline as shown in Table 5.4:

Table 5.4 AQWEST's Current and Projected Residential Charges (in real dollar values of 2005/06)

	Current Charge (2005/06)	Projected Charge (2014/15)
Service Charge ($/property)	90.00	84.30
Usage Charges ($/kL)		
0 to 150	0.39	0.31
151 to 350	0.69	0.54
351 to 500	1.00	0.78
501 to 700	1.31	1.03
701 to 1000	1.57	1.23
Over 1000	2.28	1.79

Non-Residential Charges

In 2005/06, AQWEST commenced a transition from determination of service charges for non-residential customers on the basis of gross rental value of properties to charges based on meter size. This transition is expected to be completed by 2009/10, at which time all service charges are projected to be levied on the basis of meter size. Table 5.5 shows AQWEST's current and projected charges for non-residential customers.

Table 5.5 AQWEST's Current and Proposed Commercial Water Charges (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Proposed Charge (Phased-in by 2009/10)
Service Charges ($/property)		
20mm meter	Current charges are based on a hybrid of meter-based charge and industry-type charges	333.00
25mm meter		520.00
40mm meter		1,332.00
50mm meter		2,081.00
80mm meter		5,328.00
100mm meter		8,325.00
150mm meter		18,731.25
Usage Charge ($/kL)		
0 – 1000 kL	0.72	0.72
over 1000 kL	1.05	1.05

5.5.3 Authority Assessment

As discussed in section 3.4, the Authority considers that it would be appropriate to set individual price paths for each of AQWEST's services over a 10 year period. The Authority has determined smoothed price paths for each service, based on forecasts of demand for each service and revenue that is equal in present value terms to the revenue requirement for AQWEST as set out in section 5.4 above.

In addition to the forecast of revenue for AQWEST, the determination of a price path requires consideration of a number of further parameters and assumptions:

- forecasts of demand for services;
- the allocation of costs (and implicitly the revenue requirement) between the different customer classes (residential and non-residential) to which AQWEST provides services;
- the structure of prices; and
- price paths by which prices will change over time to accommodate inflation.

These matters are addressed further below.

5.5.3.1 Demand Forecasts

Forecasts of demand for services affect both cost forecasts for service provision (and hence the revenue requirement of AQWEST) and the forecasts of the number of "units" of service provision which are used to determine unit prices for services.

For the purposes of determining price paths for services, the Authority has applied demand forecasts provided by AQWEST.

5.5.3.2 Cost Allocations across Customer Classes

Within a framework of cost-based regulation of prices, the price charged to a customer (and hence the revenue obtained from the customer) implies recovery from that customer of a particular proportion of the costs of service delivery.

The proportion of total costs to be recovered from a customer or class of customers may be determined explicitly, such as through a fully distributed cost model, or implicitly, where prices are set such that forecast revenue in total is expected to be equal to forecast costs but within this constraint the regulated business is relatively free to set prices according to other commercial constraints. In the latter case the business may be constrained in setting prices to a requirement to ensure that prices meet the broad efficiency requirements of being above the avoidable cost of service provision and less than stand-alone costs of service provision.

AQWEST does not currently determine prices for different customer classes on the basis of an explicit allocation of costs. The amount of costs recovered from different classes of customers is, however, implied by the prices determined and hence the revenue earned from each class of customer.

In a broad sense, AQWEST has four customer groups: residential, commercial, industrial and "other" (comprising schools, hospitals and vacant land).

Revenue receipts are skewed towards non-residential customers. Residential customers account for 71 per cent of water use but 59 per cent of revenue, while non-residential customers account for 29 per cent of water use but 41 per cent of revenue (Table 5.6).

Despite the variations in charges and tariff structures, all customer groups appear to be paying more than the avoidable costs associated with the provision of water supply services. For the purposes of the current inquiry, the Authority has determined prices that maintain approximately the same allocation of costs and revenue across residential and non-residential customers.

Table 5.6 Share of Revenue and Water Usage by Customer Class

Revenue Component	Revenue Received ($)	Share of Total Sales Revenue (%)	Share of Total Water Deliveries*
RESIDENTIAL			
Residential connection charges	1,069,491	17.3	
Residential fixed charges	2,559,327	41.4	
Total residential	**3,628,818**	**58.7**	**71.2**
NON-RESIDENTIAL			
Commercial			
Commercial standard charges	1,307,448	21.2	
Commercial excess charges	201,976	3.3	
Total commercial	**1,509,424**	**24.4**	
Industrial			
Industrial standard rate charges	344,929	5.6	
Industrial excess water charges	117,749	1.9	
Total industrial	**462,678**	**7.5**	
Other			
Other fixed charges	319,600	5.2	
Other variable charges	258,815	4.2	
Total other customers	**578,415**	**9.4**	
Total Non-Residential	**2,550,517**	**41.3**	**28.8**
Total All Customers	**6,179,335**	**100.0**	**100.0**

* Based on forecast 2005/06 water use.

Source: AQWEST

5.5.3.3 Price Structures

In section 3 of this report, there were a number of principles established for the structure of prices for water and wastewater, summarised as follows.

- Water usage charges should be set at a level reflecting the estimated LRMC of increasing water supplies.
- The service charges for water services should be adjusted to enable AQWEST to recover its revenue target after taking into account revenue gained from the usage charges.

In establishing usage charges for water, the Authority has considered estimates of the LRMC of developing new water supplies for Bunbury.

In its initial submission AQWEST has submitted estimates of LRMC as follows, indicating that the LRMC differs between customer groups.[62]

[62] AQWEST, Pricing Submission, p34.

- Residential customers: $0.69 to $0.94/kL
- Non-residential customers: $0.60 to $0.81/kL
- All customers: $0.66 to $0.91/kL

AQWEST indicates that these estimates were derived as an average total cost of providing water services either in total or to customers in each class.

In its submission to the Authority subsequent to the Authority's Draft Report, AQWEST provided further calculations of LRMC, calculated by the average incremental cost approach, with values of LRMC of 55.4 to 92.5 cents per kilolitre.

The Authority has undertaken further analysis of LRMC of water supplies by the methodology described in section 3.7 and Appendix 5 of this report, and taking into account additional information obtained from AQWEST, to derive an estimate of LRMC for AQWEST of $0.56/kL.

The Authority has recognised that a change from the existing usage charges of AQWEST of between $0.382/kL and $2.235/kL to a flat charge of $0.56/kL reflecting LRMC is a very substantial change in charges for higher levels of water use by residential customers, and that this could result in significant changes in water demand which may be difficult for AQWEST to forecast and accommodate in the short term. For this reason, the Authority considers that a higher price should be maintained for high levels of water use for at least an initial pricing period. The Authority recommends that usage charges for AQWEST's residential customers be established at $0.56/kL for water use of 0 to 500 kL/annum and $1.20/kL for water use in excess of 500kL/annum (in real dollar values of 2005/06), with a transition from existing usage charges to the new charges over four years to 20019/10. For non-residential customers, the Authority recommends the implementation of a flat usage charge of $0.56/kL for all levels of water use, again with a transition from current charges over the period to 2009/10.

The Authority has determined service charges at levels sufficient to enable AQWEST to recover its revenue target after taking into account revenue gained from the usage charges, while at the same time:

- maintaining an approximately constant allocation of costs and revenue between residential and non-residential customers; and
- maintaining AQWEST's transition from GRV based charges to service charges based on meter size for non-residential customers.

Residential and non-residential service charges have been determined according to these principles and with a transition period of four years (2006/07 to 2009/10) for introduction of the new price structure for water services.

The proposed tariff structures for residential and non-residential customers, respectively, are shown in the following tables (Table 5.7 and Table 5.8).

Table 5.7 Proposed Tariff Structure for AQWEST's Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	90.00	85.98	81.97	77.95	73.93	73.93
Usage Charge ($/kL)						
0 – 150 kL	0.39	0.43	0.48	0.52	0.56	0.56
151 – 350 kL	0.69	0.66	0.63	0.59	0.56	0.56
351 – 500 kL	1.00	0.89	0.78	0.67	0.56	0.56
501 – 700 kL	1.31	1.28	1.26	1.23	1.20	1.20
701 – 1,000 kL	1.57	1.48	1.39	1.29	1.20	1.20
over 1000 kL	2.28	2.01	1.74	1.47	1.20	1.20

Table 5.8 Proposed Tariff Structure for AQWEST's Non-residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Proposed Charge (Phased-in by 2009/10 then held constant in real terms)
Service Charges ($/property)		
20mm meter	Current charges are based on a hybrid of meter-based charge and industry-type charges	352.46
25mm meter		550.38
40mm meter		1,409.83
50mm meter		2,202.60
80mm meter		5,639.33
100mm meter		8,811.45
150mm meter		19,825.77
Usage Charge ($/kL)		
0 – 1000 kL		0.56
over 1000 kL		0.56

The prices determined by the Authority for the period 2005/06 to 2014/15 are indicated in Schedule 2 of this report. The Authority has specified the prices in real dollar values of 2005/06 on the basis that the values for the years 2006/07 onwards would be escalated annually for inflation. For illustrative purposes, Schedule 2 also indicates prices in nominal terms with an assumed annual inflation rate of 2.74 per cent.

Recommendation

32 The Authority recommends prices for water services provided by the AQWEST as set out in Schedule 2 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

5.6 Impacts of Price Changes on Customers

5.6.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the social impact of the recommendations.*

5.6.2 Assessment of Impacts on Customers

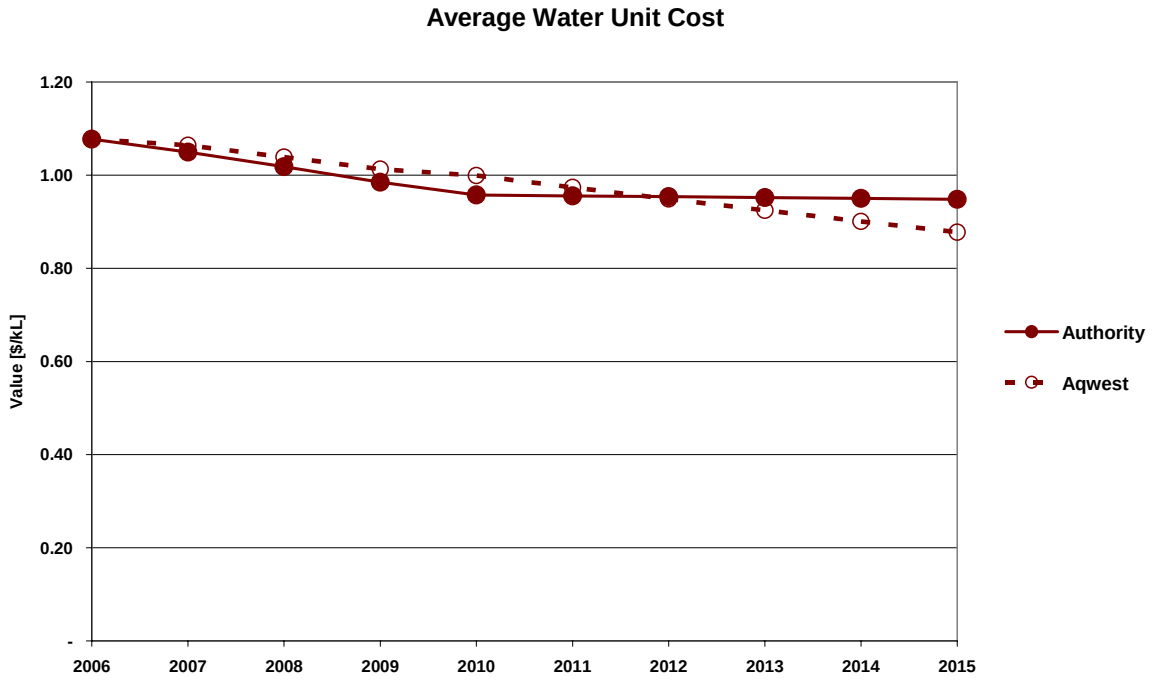
The Authority has determined the impacts of the recommended price structures and levels on residential and non-residential customers of water services. This has included consideration of:

- general trends in prices for water services;
- impacts of price changes on average prices paid and the total water bills of residential customers, including those groups of customers eligible for price concessions (pensioners and seniors) and residential tenants that typically pay only the usage charge for water services; and
- impacts of price changes on average prices paid by commercial customers, and the total water and wastewater bills of these customers.

5.6.3 General Price Trends

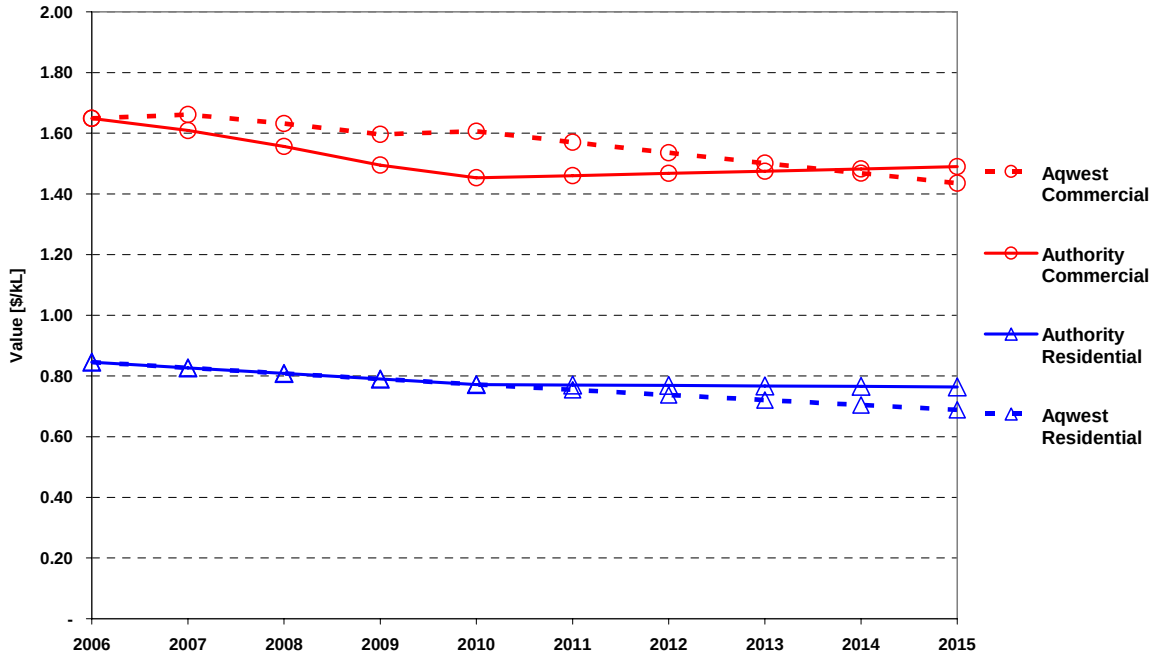
The average price of water services, expressed as a price per kilolitre of water delivered to all customers, is projected to decline in real terms over the period 2005/06 to 2008/09 from $1.08/kL to $0.96/kL (in real dollar values of 2005/06), and then remain approximately constant in real terms (Figure 5.6). By comparison, AQWEST is proposing a steady decline from $1.08/kL to $0.88/kL.

Figure 5.6 Average Real Price of AQWEST's Water Services



As explained above, the Authority has assumed that the price increase is shared equally between commercial and residential customers. This assumption results in the Authority's recommendations for tariffs for commercial water services initially decreasing at a greater rate than has been proposed by AQWEST and the Authority's recommendations for tariffs for residential water services decreasing at a lesser rate (Figure 5.7).

Figure 5.7 Average Real Price of AQWEST's Residential and Commercial Water Services



5.6.3.1 Residential Customers

Table 5.9 indicates that all customers except tenants using relatively low amounts of water are projected to receive reductions in their water bills. Under the existing concession schemes applied by AQWEST, the customers eligible for concessions (pensioners and seniors) would experience approximately the same changes in the value of water bills as customers that are not eligible for concessions. The impact on tenants results from the higher usage charge for low volumes of water use.

Table 5.9 Projected Variations in Water Bills for Representative Residential Customers of AQWEST (2005/06 to 2009/10)

Representative Residential Customer (Water Use per Year)	Average Annual Change in Water Bill (2005/06 to 2009/10) (Real Dollar Values of 2005/06)				
	Non-concession	Pensioners	Seniors	Dual Seniors	Tenants
150 kL	2	1	0	1	6
250 kL	-1	-0	-3	-2	3
350 kL	-4	-2	-6	-5	-0
550 kL	-22	-20	-24	-23	-18
750 kL	-31	-29	-33	-32	-27

The relative size of water bills for representative customers of AQWEST and the trends in the water bills are shown in the following figures (Figure 5.8 to Figure 5.11).

Figure 5.8 AQWEST Water Bill for Water Consumption of 150kL

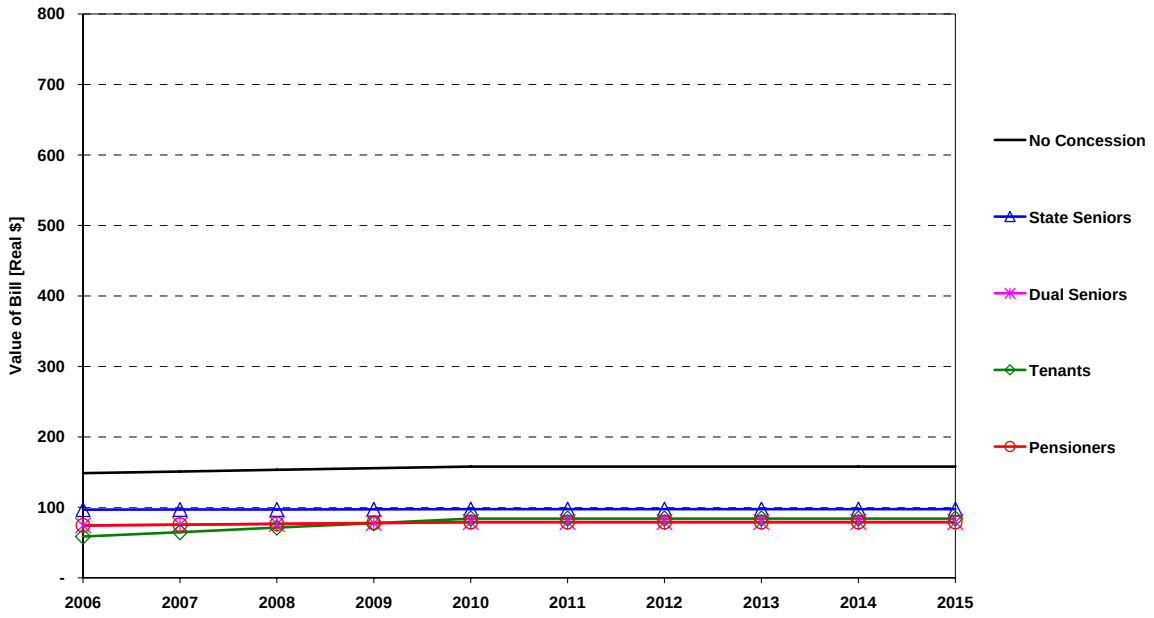


Figure 5.9 AQWEST Water Bill for Water Consumption of 350kL

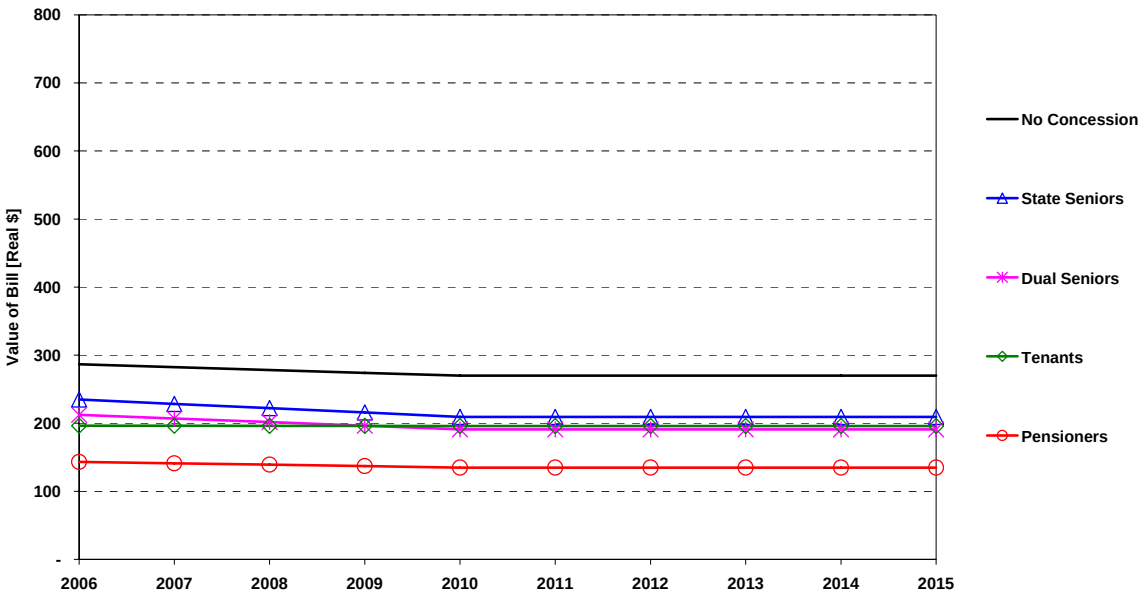


Figure 5.10 AQWEST Water Bill for Water Consumption of 550kL

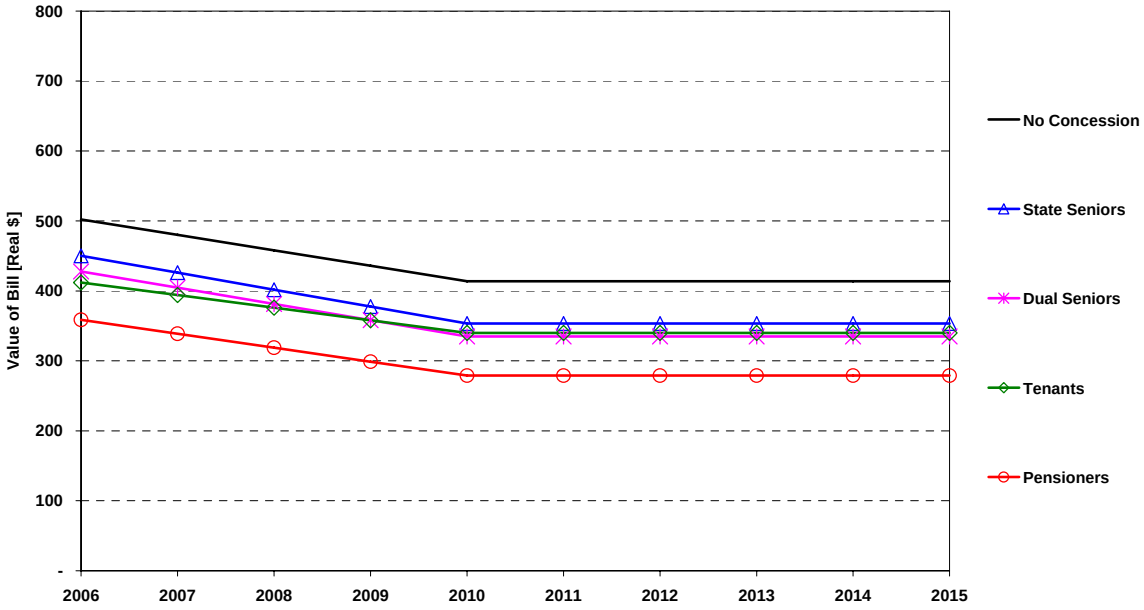
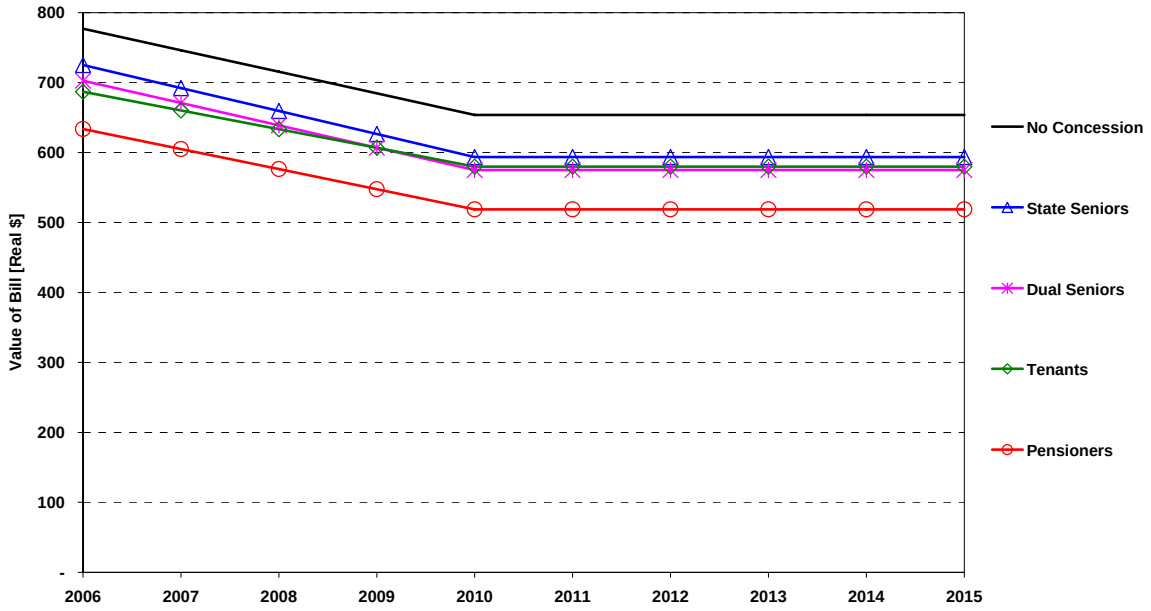


Figure 5.11 AQWEST Water Bill for Water Consumption of 750kL



5.6.3.2 Non-Residential Customers

Water costs for commercial customers of AQWEST are projected to decrease for most commercial customers (in real dollars of 2005/06) (Table 5.10). The variation in the impact on different customers is a result of the transition to meter-based charging.

Table 5.10 Projected Variations in Water Bills for Representative Commercial Customers of AQWEST

Representative Water User	Average Annual Change in Water Bill (2005/06 to 2009/10)	
	(Real $/year)	(%/year)
20mm meter and 300 kL/year	-90	-11.9%
25mm meter and 800 kL/year	-70	-5.9%
40mm meter and 2 ML/year	-27	-1.0%
50mm meter and 5 ML/year	-233	-4.2%
80mm meter and 10 ML/year	-149	-1.3%
100mm meter and 20 ML/year	-731	-3.3%
150mm meter and 50ML/year	-2,173	-4.1%

5.7 Impacts of Price Changes on AQWEST and Government

5.7.1 Impact on borrowing, capital and dividend requirements

5.7.1.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the impact of pricing policies on borrowing, capital and dividend requirements…*

5.7.1.2 Assessment

AQWEST currently operates as a not-for-profit business and makes no dividend payments to the State Government. Capital investment is financed by a combination of developer contributions and the accumulation and maintenance of cash reserves from customer revenues, and there is no funding of investment by either funding from the State Government or by debt.

The Authority has determined revenue requirements and water service prices for AQWEST consistent with the current capital financing arrangements and the absence of any requirements to make dividend payments. As such, there is not expected to be any impact of the prices determined by the Authority on borrowing or capital requirements. In particular, the prices determined by the Authority are consistent with AQWEST continuing to finance capital expenditures from cash reserves and from developer contributions. Consistent with this, any future requirement for AQWEST to make dividend payments to the Government would require an increase in service prices (by approximately 17 per cent) from those determined by the Authority and/or a change in sources of funds for capital investment.

5.7.2 Impact on the level of government funding

5.7.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the effect of any pricing recommendations on the level of government funding (through Community Service Obligation payments);*

5.7.2.2 Assessment

AQWEST currently offers price concessions to customers in categories of ‘pensioners’, ‘seniors’ and ‘dual seniors’. These concessions are determined as follows.

- pensioners receive a discount of 50 per cent of the service charge and 50 per cent of the price for the first 350 kL of water use;
- seniors receive a discount of 25 per cent of the service charge and 50 per cent of the price for the first 150 kL of water use; and
- dual seniors receive a discount of 50 per cent of the service charge and 50 per cent of the price for the first 150 kL of water use.

As the concessions for these customers are determined as a proportion of water prices, rather than as an absolute value, the value of concessions offered by AQWEST will vary with price levels and demand for water services of these customers. Based on forecasts of demand for services provided by AQWEST and the prices of water services as determined by the Authority, the value of concessions provided by AQWEST is projected to increase from approximately $338,000 to $411,000 in real terms over the period 2005/06 to 2014/15.

The concessions provided by AQWEST are not currently financed by the Government as a community service obligation, but rather are internally financed by AQWEST. As such, while the value of concessions is projected to increase over the period to 2014/15, there will not be a corresponding cost to the Government unless there is a change in the mechanism for financing the concessions.

In accordance with the current arrangement for financing of concessions, the Authority has taken into account the internal financing of concessions by AQWEST in the determination of prices. If the Government were to finance concessions through CSO payments, the cost of the CSO payments to Government would be as indicated above, and there would need to be a downward adjustment of the revenue requirement and prices of AQWEST, reflecting the removal of the need to internally finance concessions.

5.7.3 Impact on general price inflation

5.7.3.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the effect on and of general price inflation over the medium term;*

5.7.3.2 Assessment

The prices determined by the Authority for AQWEST are projected to decrease in real terms over the period 2005/06 to 2014/15 at an average annual rate of 1.4 per cent. This corresponds to an increase in nominal terms over the period at an average annual rate of 1.3 per cent, which is less than the expected rate of inflation for this period. As such, the prices determined for AQWEST would have a general downward impact on the rate of general price inflation.

5.8 Future Price Reviews

In section 3 of this report, the Authority considered the appropriate forms of price paths for the water businesses. As set out in that section, the Authority recommends that where a service provider is faced with substantial demand uncertainty, a revenue-cap form of price control should be adopted so that in each review of prices, the target revenue for the water business is adjusted for under-recovery or over-recovery of revenue in the previous period to the extent that this results from differences between realised demand and forecast demand (Recommendation 3).

For AQWEST, the substantial changes in some levels of usage charges for water services create some uncertainty in demand for these services

Also for AQWEST there is some uncertainty in forecasts of revenues from developer charges and capital contributions, which are netted off from the total revenue requirement

to determine the net level of total revenue to be recovered from charges for water services.

Taking these factors into account the Authority recommends that reviews of prices for AQWEST should apply a pseudo revenue-cap form of revenue and price control that corrects revenue targets and prices for over-recovery or under-recovery of revenue in the previous pricing period, to the extent that this over-recovery or under-recovery arises from differences between realised demand and forecast demand for water by customers and for differences between forecast and realised revenues from capital contributions and developer charges. The precise formulation of the price and revenue control can be a matter addressed at the time of price reviews, but should comply with the following principles.

- At the time of a price review, the target revenue for the ensuing pricing period should be adjusted by an amount equal to:
  - the notional value of over-recovery or under-recovery of revenue by AQWEST that results from the average per-customer water demand for each block of usage charges for water services in the previous pricing period being different to the forecast used for the purposes of setting prices;
  - the notional value of the costs avoided as a result of realised average per-customer water demand being less than the forecast used for the purposes of setting prices, or the additional costs incurred as a result of realised average per-customer water demand being greater than the forecast used for the purposes of setting prices, in each case being based on the avoidable (or incremental) cost to AQWEST of supplying an additional unit of water; and
  - the difference between actual and forecast revenues from developer charges and capital contributions.
- The values of revenues and costs carried forward to the next pricing period should be adjusted to reflect the time-value of money and inflation.

6 Busselton Water

6.1 Background

Busselton Water Board, trading as Busselton Water, is a statutory authority established under the *Water Boards Act 1904*. The Busselton Water Board was established in 1906. Busselton Water is governed by a Board of Directors appointed by the Minister for the Environment and acting under powers created by the *Water Boards Act 1904*, and the business is financially administered under the *Financial Administration and Audit Act 1985*.

Busselton Water provides a potable water service to the town of Busselton and to surrounding areas, including water sourcing, treatment, distribution and retailing operations. Water is sourced from the Yarragadee aquifer through 8 production bores and supplied to about 8,700 connections through 232 kilometres of water mains. About 82 per cent of water produced is supplied to residential customers and the remaining 18 per cent supplied to non-residential customers.[63] The business has an employee workforce of around 23 full-time-equivalent staff.[64] Busselton Water does not provide wastewater services, which in Busselton Water's region of operation are provided by the Water Corporation.

The operational activities of Busselton Water are subject to specific regulation by four government agencies:

- Authority – established on 1 January 2004, the Authority oversees Busselton Water's operating licence which sets out the conditions under which the Busselton Water operates (a copy of the operating licence is available at www.era.wa.gov.au). The Authority also monitors Busselton Water's performance and reporting processes in accordance with licence requirements.
- Department of Environment – issues and administers Busselton Water's groundwater extraction licence, dealing with issues surrounding management of water resources.
- Environmental Protection Authority – assesses the environmental impacts of significant projects.
- Department of Health – regulates drinking water quality.[65]

6.2 Service Standards

6.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services including:*
- *any additional resources needed to meet the required standards of quality, reliability and safety…;*

[63] Busselton Water correspondence.

[64] Busselton Water (2003), *Annual Report 2002-03*.

[65] Busselton Water Annual Report, 2004.

- *how changes in standards and operating conditions faced by the service providers impact on its revenue requirements.*

6.2.2 Background

The provision of services by Busselton Water is regulated under the *Water Services Licensing Act 1995*. This Act establishes a licensing scheme whereby the Corporation is granted an operating licence for provision of water supply services, sewerage services, irrigation services and drainage services. Busselton Water holds a licence under the Act to provide water services within a defined area within, and in the vicinity of, the town of Busselton.

The licence is granted subject to terms and conditions that establish standards and requirements for the provision of services in respect of:

- processes for dealing with customer complaints;
- a requirement to establish a customer charter;
- establishment of processes for consultation with customers in respect of Busselton Water's operations and delivery of services;
- obligations to customers in respect of the availability and connection of services;
- obligations to provide reports to the Authority in respect of customer complaints and incidents in the provision of services including non-compliance with water quality standards and interruption of water services;
- obligations to provide the Authority with information required for performance monitoring purposes; and
- requirements in respect of the provision of services including requirements for emergency response and standards for health-related aspects of water quality, water pressure and flow, continuity of services and obligations to maintain water supplies in periods of drought.

Compliance with the terms and conditions of its operating licence causes Busselton Water to incur certain costs that in some cases may not necessarily be incurred in the absence of the specific licence requirements. These are costs legitimately incurred by Busselton Water and prices for services should be set at a level sufficient to ensure that these costs are recovered.

The terms of reference for the current inquiry require the Authority to consider whether Busselton Water requires any additional resources to meet the required standards of quality, reliability and safety; and how changes in standards and operating conditions affect Busselton Water's revenue requirements.

The Authority has addressed this element of the inquiry by:

- consideration of whether Busselton Water is providing services in accordance with its licence requirements;
- if Busselton Water is not providing services in accordance with licence requirements, consideration of whether this is due to insufficient financial resources (i.e. revenues) to meet these requirements; and

- consideration of mechanisms by which the prices and revenues of Busselton Water may be adjusted to meet any additional revenue requirements arising from changes in standards and operating conditions.

6.2.3 Compliance with Licence Requirements and Performance Standards

Busselton Water has in almost all cases complied with its operating licence standards over the past five years.

The most recent Office of Water Policy customer satisfaction survey 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).

6.2.4 Additional Financial Resources Required to Comply with Licence Requirements and Performance Standards

Busselton Water does not currently plan to undertake capital investment programs or undertake additional operating activities for the purposes of achieving compliance with licence requirements or otherwise improving performance standards. For the purposes of this inquiry, the Authority has not sought to have amendments made to cost forecasts to include provision for the works contemplated for the improvement of performance standards or water quality. The Authority envisages that the costs of these works can be incorporated into revenue requirements and reflected in prices at a time of a review of prices when and if Busselton Water plans such works and provides forecasts of costs.

6.2.5 Changes in Standards and Conditions

The Department of Health has noted in correspondence with the Authority[66] 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 has 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 (e.g. the control or removal or precursors associated with the formation of trihalomethanes and associated disinfection by products).

Any requirement for Busselton Water to meet new or higher standards of operational performance in respect of water quality will be likely to affect the costs incurred in the provision of services. The Authority considers that these costs should not be anticipated,

[66] Advice to the Authority, 3 March 2005.

but rather should be taken into account when and if the new of higher standards are imposed and forecasts made of the costs of meeting the standards. Under the scheme being recommended by the Authority for the determination of prices for water and wastewater services, any changes in cost forecasts arising from the imposition of new standards can be accommodated in target revenues and prices at the times of periodic price reviews.

6.3 Balancing Supply and Demand

6.3.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *considerations of demand management;*
- *the cost of providing the services concerned, including … any additional resources needed to meet … such matters as the protection and development of future water sources.*

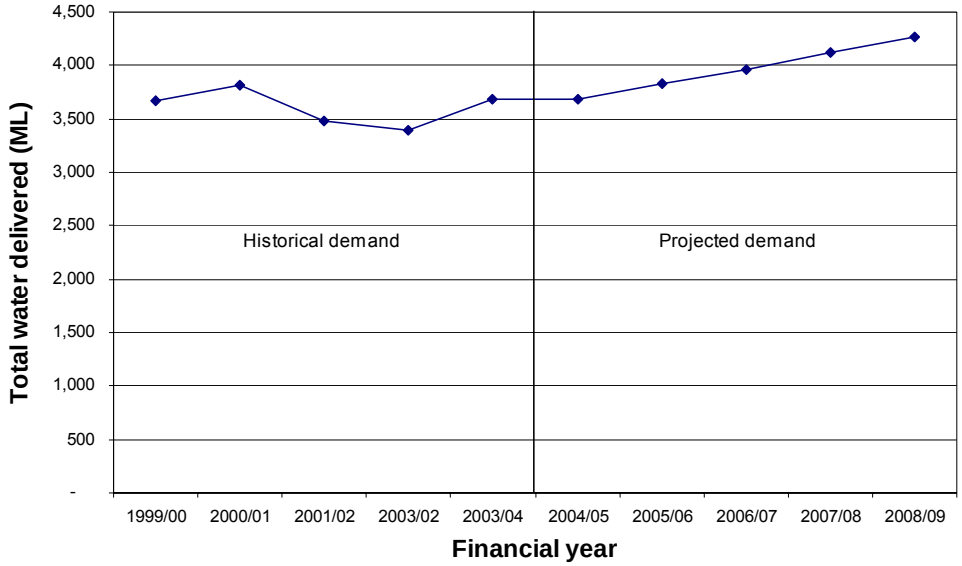
6.3.2 Demand Management

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. (Busselton Water, Pricing Submission, p3)

Figure 6.1 Busselton Water Historical and Projected Total Water Delivered



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, equating to annual per capital consumption of 184 kL. 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).

The Authority is of the view that Busselton Water's assumption that demand per connection will remain at 386 kL per connected property for the forecast period may cause the forecasts of water demand to be unreasonably high. 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.

According to Busselton Water:

> At the micro level, [Busselton Water] 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 [Busselton Water] would undertake in any event but come at no cost. (Busselton Water, Pricing Submission, p4)

The Authority considers that it is likely that demand per connection will continue to reduce as the Water Corporation continues implementing its Waterwise initiatives.

The Authority does not consider that it is either necessary or desirable that Busselton Water implement any further demand management initiatives, as the water resources used by Busselton Water are in relatively plentiful supply. Busselton Water itself recognises this in taking a position against imposing stringent restrictions on use of garden sprinklers:

> 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. (Busselton Water, Issues Paper submission, p2)

Busselton Water is, however, taking action for management of water 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. (Busselton Water, Issues Paper submission, p5)

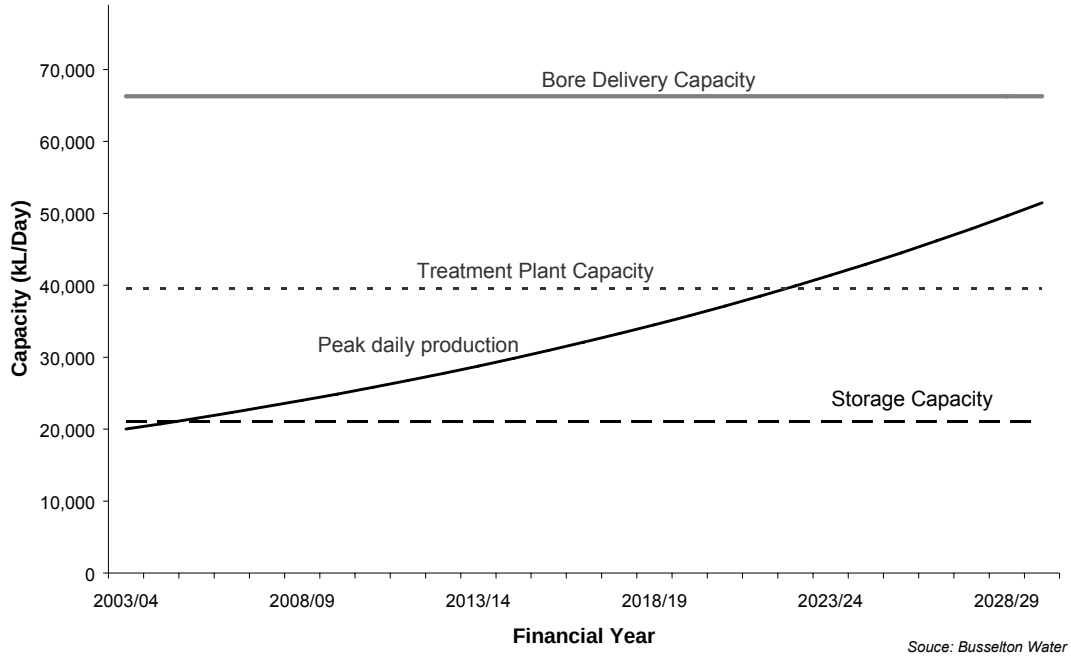
6.3.3 Source Development Plan

Busselton Water has approval to extract up to 17 GL of groundwater 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's future needs until 2046 (assuming growth in water demand continues at 3.7 per cent per annum).

Figure 6.2 shows Busselton Water's long-range forecast for the future levels of peak daily production along with its current capacity constraints.

Figure 6.2 Busselton Water Long Range Peak Daily Production Forecasts Alongside Current Capacity Constraints



Busselton Water expects that its groundwater supplies are sufficient to meet average demand for potable water until 2036 and there is no current need for further source allocations. The Authority considers 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 supply constraint for Busselton Water is a potential lack of storage capacity. Treated water storage is currently about 12 hours under peak daily flows. Typically, water businesses would maintain at least two to three days of treated water storage as a minimum to allow time to fix system problems. However, Busselton Water deliberately maintains a low level of storage of treated water so as to distribute water quickly following treatment to avoid bacteriological problems as the water is not chlorinated. Busselton Water has indicated that minimal storage facilities are required as Busselton Water relies on ultraviolet light, not chlorination, for disinfection. Bacteriological problems within the storage and distribution network can be controlled with only short durations between supply, treatment and final use.

Busselton Water has included $1.4 million in its five-year capital program to provide for greater storage capacity. Busselton Water considers that, with the exception of additional storage planned to be constructed in 2005/06 to meet expected increases in peak daily demand, 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 updates [its] Risk Management Plan to identify vulnerable areas and plan infrastructure to minimise the risk of loss of supply to these areas.

Taking into account Busselton Water's plans to increase storage capacity in 2005/06, the Authority considers Busselton Water's supply system has sufficient bore and treatment plant capacity and storage to minimise the risk of system failure.

Recommendation

33 Busselton Water's current plan for capital works to increase water storage provides for a timing of development that is necessary and appropriate. The forecast cost of implementing this plan may appropriately be incorporated in forecasts of costs applied in the setting of water prices.

6.4 Revenue Requirement

6.4.1 Background

The requirement to consider the revenue requirements of Busselton arises from the following elements of the Terms of Reference for the inquiry.

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;*

6.4.2 Background

As indicated in section 3 of this report, the Authority has assessed Busselton Water's revenue requirements by using a 'building block' approach. This method is used to determine a value of revenue required for a predetermined period, based on an assessment of costs to be recovered over that period. Using a forecast of demand for services, price structures and levels are then formulated to recover this revenue.

Identifying an appropriate level of revenue requires consideration of, among other things, a value of existing assets, 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.

6.4.3 Initial Asset Value

6.4.3.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the regulatory asset value of each of the service providers;*

6.4.3.2 Determination of the Initial Asset Value

As set out in section 3 of this report, the Authority is recommending that initial asset values should be established for each of the water businesses at a value consistent with a deprival value methodology and current forecasts of prices and revenues. It is also recommended that in any future price re-determination, the asset value is updated by a roll-forward calculation whereby the value of new capital investment is added to the asset value and the value of depreciation subtracted.

By applying these methodologies to the determination of the initial asset value and subsequent revaluations, the revenues and value of the Busselton Water business are preserved for an initial period of price determination, but thereafter a rigorous mechanism is established whereby the prices of services and revenues to the business change in accordance with changes in the levels of costs actually incurred by the business and the level of demand for services.

6.4.3.3 Busselton Water Proposal

Busselton Water was not asked to provide a proposal for the initial asset value and accordingly did not propose any value prior to the Authority's Draft Report. Subsequent to the Authority's Draft Report, Busselton Water has submitted that the initial 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).

6.4.3.4 Authority Assessment

For the reasons as set out in Chapter 3 of this report, the Authority considers that an initial regulatory asset value for Busselton Water should be established by a deprival-value approach and consistent with the current forecasts of revenue and costs for the business.

In its Draft Report, the Authority determined that the actual and forecast revenues from customer charges for the period 2003/04 to 2008/09 implied a regulatory asset value of $4.5 million in 2003/04, corresponding to a value of $3.9 million at the commencement of 2006/07 taking into account capital expenditures and depreciation in the intervening period.

Subsequent to the Draft Report, the Authority has given further consideration to the financial structure of Busselton Water and implications for establishing a regulatory asset value on the basis of forecasts of prices and revenue.

The Authority considers that in determining service prices for Busselton Water, attention should first be given to establishing the revenue requirement of a business under a benchmark financial structure. In this way, the opportunity exists to set in place a pricing scheme that may continue to be applied to price determination independent of changes in the actual financial structure of Busselton Water.

Busselton Water operates as a not-for-profit business, financing capital expenditures by developer contributions and accumulated cash reserves. The Authority considers that it is appropriate in establishing a regulatory asset value to start with a presumption of a benchmark financial structure for the business as a typical for-profit business that is financing capital investment by a combination of equity and debt instruments, in a ratio of 60 per cent equity and 40 per cent debt. In determining an initial asset value for Busselton Water by a deprival value methodology, an allowance for profit (i.e. a return on investment) is therefore added to Busselton Water's revenue projection.

The additional value of a profit (or return on equity) component of revenue is appropriately calculated as the difference between the cost of equity finance and cost of debt finance for that portion of Busselton Water's asset value that is assumed to be equity financed. That is, the additional profit component of revenue is calculated by multiplying the difference between the costs of equity and debt finance determined for Busselton Water (3.93 per cent in real pre-tax terms, see Appendix 4) by the proportion of asset value that is assumed to be equity financed (60 per cent) in the benchmark capital structure of the business being assumed for pricing purposes.

Taking an allowance for profit into account in this manner, the Authority has calculated an initial regulatory asset value for Busselton Water of $14.7 million at 30 June 2005. This calculation is summarised in Table 6.1.

Table 6.1 Derivation of Initial Regulatory Asset Value for Busselton Water

	Value ($million, Real Dollar Values at 30 June 2005)									
Projected Revenue	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Customer charges[67]	2.9	3.1	3.2	3.3	3.5	3.6	3.7	3.8	3.9	4.0
Capital contributions	2.1	0.9	0.9	0.9	1.0	1.9	1.8	0.7	0.8	0.7
Forecast revenue from other services	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Addition for return on equity	0.3	0.4	0.4	0.5	0.5	0.6	0.6	0.7	0.7	0.7
Total projected revenue	5.6	4.6	4.8	5.0	5.2	6.3	6.4	5.5	5.6	5.7
Present value at real discount rate of 5.87% as at 30 June 2005					40.2					
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by Busselton Water)	3.2	3.3	3.4	3.6	3.6	3.7	3.9	3.9	4.0	4.1
Depreciation	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.7
Return on Assets	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7
Total cost of service	4.4	4.8	4.9	5.2	5.4	5.7	5.9	6.2	6.4	6.5
Present value at real discount rate of 5.87% as at 30 June 2005					40.2					
Initial asset value equating present value of projected revenue with present value of cost of service (as at 30 June 2005)					14.7					

Recommendation

34 An initial regulatory asset value of $14.7 million at 30 June 2005 should be established for Busselton Water's physical assets.

6.4.4 Operating Expenditure

6.4.4.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the non capital forecasts of the service providers;*

The Authority must give consideration to, but will not be limited to, the following matters:

- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*

[67] Revenue generated from AQWEST's projected charges.

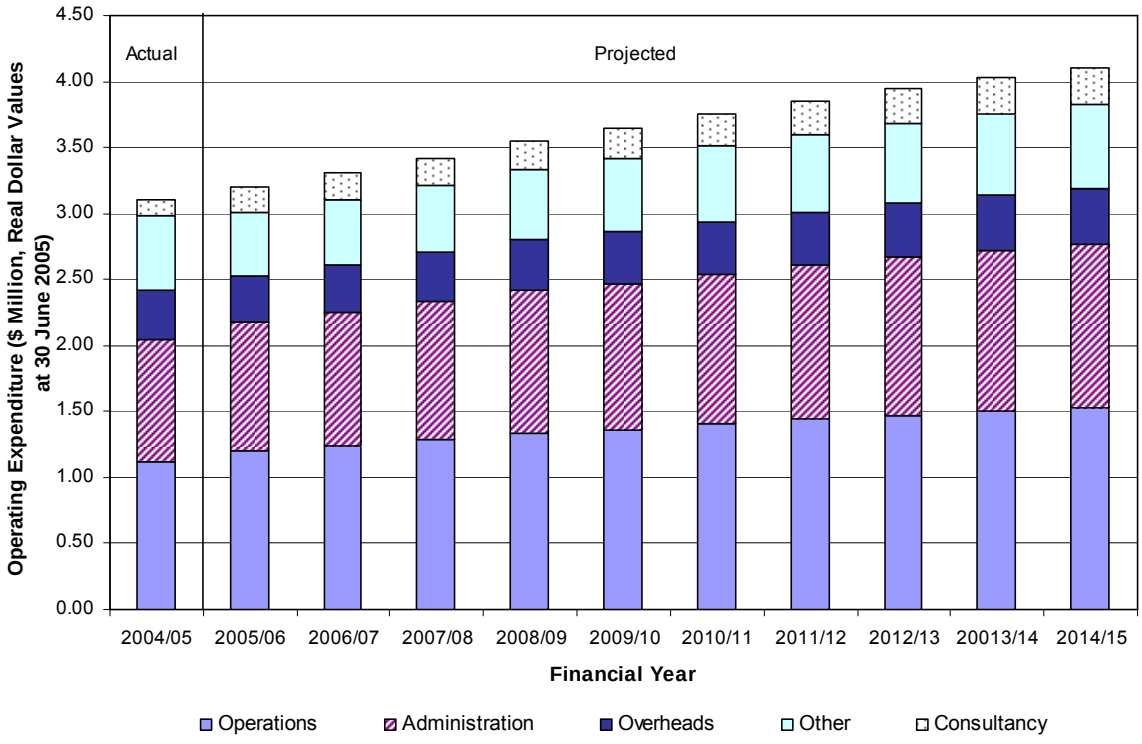
6.4.4.2 Busselton Water Proposal

In 2004-05, Busselton Water's budget for operating and maintenance, excluding depreciation, was approximately $3.1 million. Costs are forecast to grow to $4.1 million (in real terms) by 2014/15. This represents an average annual increase of 3.6 per cent in real terms.

As shown in Figure 6.3, the proportional breakdown of costs in each year of the period 2005/06 to 2014/15 remains approximately constant as:

- Operations – 38 per cent
- Administration – 30 per cent
- Overheads – 11 per cent
- Consultancy – 6 per cent
- Other – 5 per cent

Figure 6.3 Busselton Water Annual Operating Expenditure (Real Values)



Source: Busselton Water

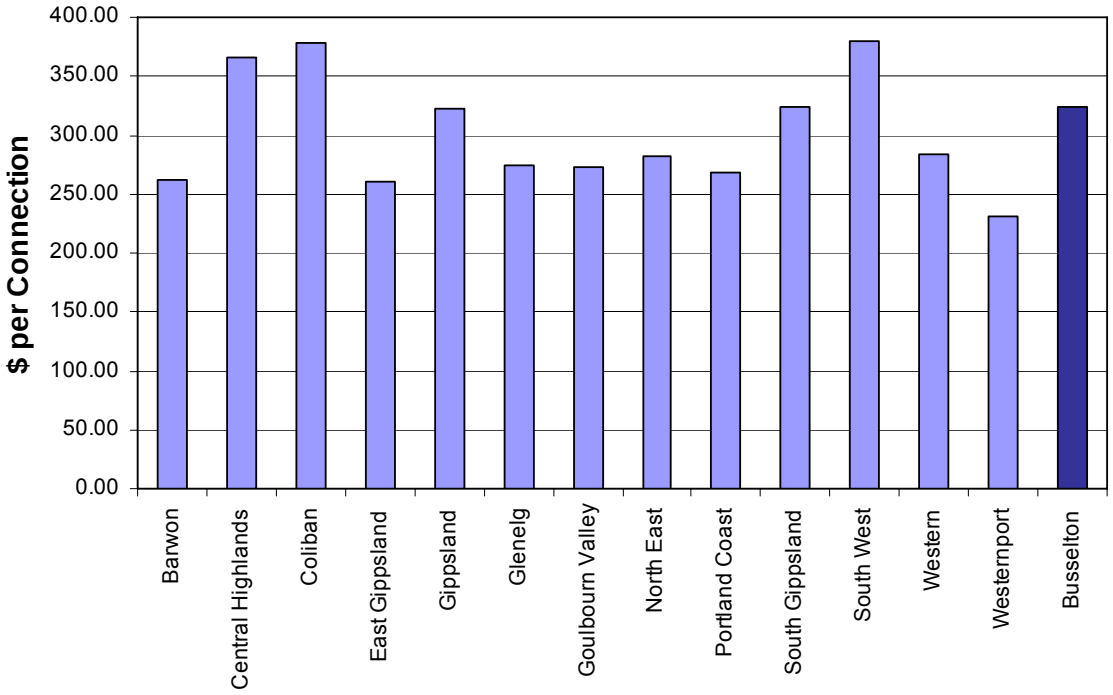
6.4.4.3 Authority Assessment

The Authority has assessed the Busselton Water's operating efficiency by consideration of trends in operating expenditure and by benchmarking operating costs against a number of other domestic water businesses.

Operating costs per unit of water delivered are forecast to decrease in real terms from $1.04 per kL in 2005/06 to $1.02 per kL in 2014/15, a total decrease of 1.8 per cent. Operating costs per connection are also forecast to decrease, from $324 in 2005/06 to $283 in 2014/15, a total decrease of 13 per cent.

Busselton Water's forecast operating cost per connection of $324 in 2005/06 exceeds the average value for the Victorian regional water businesses of $300/connection (Figure 6.4), although comparisons are made difficult by the Victorian businesses being providers of both water and sewerage services while Busselton Water is a provider of water services only.

Figure 6.4 Operating Expenditure Per Service Connection for Comparable Water Businesses



Source: Busselton Water Forecast Data; Essential Services Commission of Victoria, March 2005, Water Price Review: Metropolitan and Regional Businesses' Water Plans, Draft Decision 2005/06 to 2007/08, Volume II

Note: All values expressed in dollar values at 30 June 2005; Figures for the Victorian water businesses are expressed per total of water and sewerage connections and are as proposed by the water businesses where provided, or otherwise as per the Draft Decision of the ESC.)

The Authority has considered prospects for improvements in technical efficiency in delivery of water services as part of the consideration of forecasts of operating expenditure for the Corporation (section 4 of this report). From an analysis of efficiency gains achieved and forecast for water businesses elsewhere in Australia and in the United Kingdom, the Authority considers that the Western Australian water businesses should be able to achieve efficiency gains in operating expenditures in the order of 2.5 per cent per annum on a unit cost basis, and that a target of 1.25 per cent should be incorporated into forecasts of operating costs.

For Busselton Water, cost forecasts indicate efficiency gains in operating costs over the period 2005/06 to 2014/15 at an average rate (in real terms) of 1.5 per cent per annum on a cost per connection basis. As this rate of efficiency improvement exceeds the Authority's target rate of efficiency gain of 1.25 per cent per annum, the Authority

considers that Busselton Water's forecasts of operating expenditure provide an appropriate basis for determination of service prices.

6.4.5 Capital Expenditure

6.4.5.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the … forecast capital expenditure program of the service providers;*

The Authority must give consideration to, but will not be limited to, the following matters:

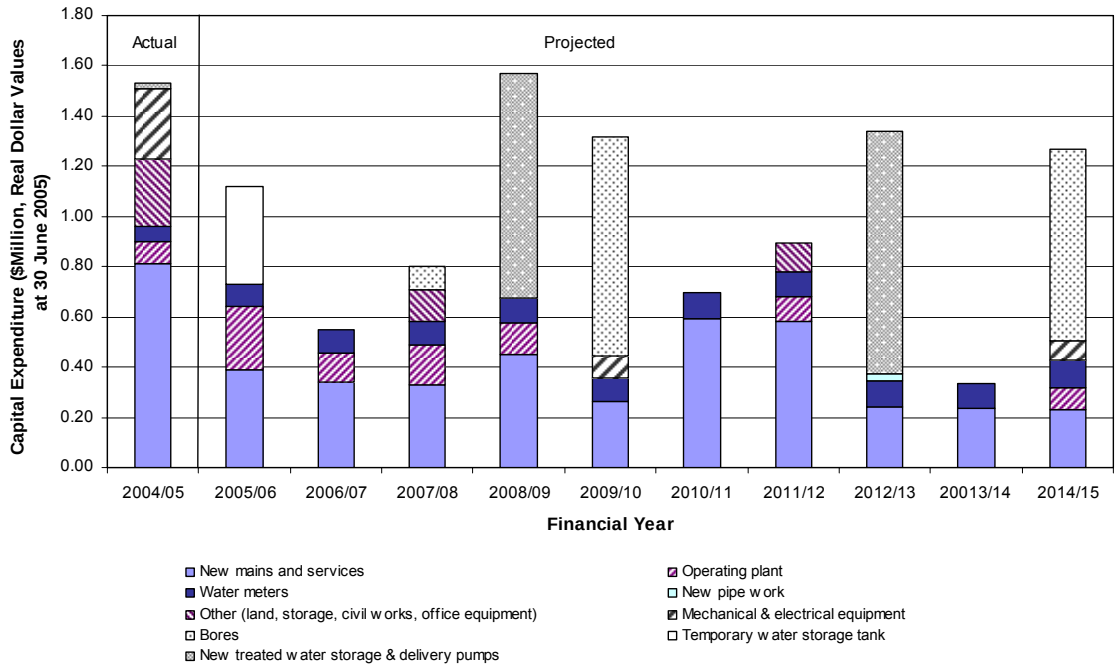
- *the cost of providing the services concerned, including… a target for improvement in the efficiency in the supply of services;*
- *… the impact of any need to renew or increase relevant assets.*

6.4.5.2 Busselton Water Proposal

Busselton Water's capital program for the period 2005/06 to 2014/15 amounts to $9.89 million (in real dollar values at 30 June 2005), varying between $0.34 million and $1.57 million per year (Figure 6.5).

The most significant item of capital expenditure is new mains and services, which accounts for $3.65 million over the period. Other major items include temporary and permanent water storages ($2.25 million), new bores ($1.73 million), water meters ($1.0 million) and operating plant ($0.84 million).

Figure 6.5 Busselton Water Forecast Capital Expenditure (Real Values)



Source: Busselton Water

6.4.5.3 Authority Assessment

As discussed above, Busselton Water presently operates a system capable of sourcing, treating and distributing water in far greater quantities than projected requirements out to 2008/09. The key operational constraint for the organisation is the lack of storage capacity and the capital works program is directed in the short term towards providing greater storage capacity.

The Authority considers the level of capital expenditure being incurred by Busselton Water to be appropriate. The Authority is, however, aware of some deficiencies in Busselton Water's asset management and capital planning processes, which became evident in a recent operational audit and report on the effectiveness of its asset management system required under the *Water Services Licensing Act 1995*.

Busselton Water commissioned a consultant (KPMG) to review the adequacy and effectiveness of its asset management system in place for the planning, construction, operation and maintenance of assets. This consultancy report was provided to the Authority in the context of the periodic review of the Busselton Water Board Water Supply Services Operating Licence.

Overall, the audit of the asset management system found that the processes in place in relation to the planning, construction, operation and maintenance of Busselton Water's assets were inadequate in a number of areas including:

- asset planning;
- asset creation/acquisition;
- asset system analysis;
- risk analysis and contingency planning;

- financial planning;
- capital expenditure planning; and
- review.

The review made a number of recommendations, including:

- review of the maintenance costs and remaining economic life of assets against replacement costs, to assist in identifying optimum asset replacement times (based on actual/predicted costs, functionality and efficiency opportunities);
- a capital expenditure proposal form to be used for all capital works proposals and, for major (or high-risk) capital works projects, a comprehensive project evaluation report or business case study to be undertaken and provided to the Board as part of the capital works proposal submission process;
- post-completion/evaluation reviews for all capital works projects, including an analysis of actual project costs against the project budget and an evaluation of the achievement of asset objectives;
- the need to clearly define and document the process for carrying out failure mode analysis, and analysis should determine whether a capital works project proposal is required to rectify increasing asset failures and maintenance costs; and
- the development of contingency plans.

The Authority anticipates Busselton Water will improve its capital expenditure need and identification processes in line with the findings and recommendations of the asset management audit. This will assist in ensuring the forecast capital expenditure program of Busselton Water remains sound.

However, given the size of the capital program is typically less than $1.5 million per annum, only minor savings via changes to the project delivery process are thought to be achievable. Moreover, if forecasts of capital expenditure are ultimately found to be in excess of actual required expenditure, the effect on service prices is only short term as if a rigorous cost-based scheme of pricing were to be introduced, it is only actual rather than forecast capital expenditures that affect prices going forward. For these reasons, the Authority considers that additional capital efficiency targets should not be imposed on Busselton Water at the current time.

6.4.6 Depreciation

6.4.6.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the depreciation … of the service providers;*

6.4.6.2 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.

6.4.6.3 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. The Authority therefore accepts the proposed asset lives (and corresponding depreciation of assets by a straight line methodology over these asset lives) for the purposes of determining a revenue requirement for Busselton Water.

The Authority has correspondingly determined depreciation allowances on the assumption of an average remaining life of 40 years for existing assets and an average life for new assets of 65 years.

6.4.7 Rate of Return

6.4.7.1 Terms of Reference

In conducting its investigation, the Authority must review:

- *the appropriate rate of return on public sector assets, including appropriate payment of dividends to the Government of Western Australia;*

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.

6.4.7.2 Busselton Water Proposal

Although Busselton Water 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 Busselton Water in terms of the opportunity cost of capital that may be invested in system expansions. Busselton Water was invited, but not required, to provide an estimate of the rate of return that might be relevant to its business. Busselton Water did not, however, provide an estimate of an estimate of the rate of return that might be relevant to its business.

6.4.7.3 Authority Assessment

The Authority has used the CAPM to estimate the Weighted Average Cost of Capital (WACC) for Busselton Water. This methodology is widely used and understood by industry, the finance community and other Australian utility regulators. The rationale and methodologies used by the Authority in estimating parameters of the WACC are described in detail in Appendix 4. This section summarises the main findings.

The Authority calculates a real pre-tax WACC for Busselton Water of 5.87 per cent, comprising a real pre-tax cost of equity of 7.4 per cent and a real cost of debt of 3.5 per cent.

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

- the requirement under section 26(1) of the Authority Act 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 pricing principles of the 1994 CoAG water reform agreement (as set out in Appendix 2 to this report, which include the requirements under principles 4 and 5: "…a water business should not recover more than the ... cost of capital, the latter being calculated using a weighted average cost of capital." and "…a water business should recover, at least, … the interest cost on debt, dividends (if any) and make provision for future asset refurbishment/replacement ... Dividends should be set at a level that reflects commercial realities and stimulates a competitive market outcome";
- 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, O*ff*GAR and the Office of the Rail Access Regulator in recent pricing determinations;
- 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.

The Authority considers that the rate of return for AQWEST and Busselton Water should be considered similarly to that for the 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 non-diversifiable 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 Corporation – is 60 per cent. However, for the regional water providers (Busselton Water and AQWEST) such a level of gearing may not be appropriate given the relatively small sizes of the businesses. For this reason, the Authority considers that it is appropriate to assume a lower level of gearing of 40 per cent.

Recommendation

35 A rate of return of 5.87 per cent (real, pre-tax) should be applied in determining Busselton Water's revenue requirement.

6.4.8 Revenue Requirement

The Authority has determined a revenue requirement for Busselton Water using a cost-of-service calculation and taking into account the conclusions of the Authority on the cost parameters of the revenue calculation, as set out above.

In determining a total revenue requirement for the prices of water services, the Authority has determined a revenue requirement for the business as a whole, including a return on equity, and then deducted forecasts of capital contributions, forecasts of revenue from other services and an allowance for profit (i.e. return on equity). The allowance for return on equity has been calculated as the difference between the estimated cost of equity and cost on debt, multiplied by the proportion of assets assumed to have been equity financed under the benchmark capital structure assumed for pricing purposes.

This revenue requirement equates to a present value (at a discount rate of 5.87 per cent, real, pre-tax) of $25.1 million). The derivation of Busselton Water's revenue requirement is summarised in Table 6.2 (and Table 6.3 demonstrates that the net revenue requirement for Busselton Water is the same in present value terms as the revenue generated by Busselton Water's proposed charges and the revenue generated from the Authority's proposed charges).

It is able to be observed from the determination of the revenue requirement for Busselton Water that the net revenue requirement for the determination of water service prices ($25.1 million in present value terms) is actually less than Busselton Water's forecast operating expenditure ($26.9 million in present value terms). It is thus evident that the costs of providing water services are being substantially met by Busselton Water's revenue from other sources, which principally comprise capital contributions from developers and interest earnings on reserves.

It has been beyond the scope of this current inquiry to consider the magnitude of developer charges and the Authority has determined prices for water services on the basis of Busselton Water's total revenue requirements and the expected revenues from developer charges as forecast by Busselton Water. However, the circumstances of water customers paying less than the operating costs of service provision indicates that revenues from developer charges may be in excess of the levels necessary to meet the costs of capital expenditures associated with new land development and these revenues may actually be subsidising delivery of water services to existing customers. The Authority recommends that the values of developer charges levied by Busselton Water be subject to scrutiny to determine that they are set at appropriate levels.

Table 6.2 Busselton Water Revenue Requirement

	Value ($million, real dollar values at 30 June 2005)									
Asset Account	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Opening Asset Value	14.7	17.6	18.5	19.7	21.7	23.5	25.5	27.7	29.1	29.6
Capital Expenditure	3.3	1.4	1.7	2.4	2.3	2.6	2.7	2.1	1.1	2.0
Depreciation	-0.4	-0.4	-0.4	-0.5	-0.5	-0.5	-0.6	-0.6	-0.6	-0.7
Closing Asset Value	17.6	18.5	19.7	21.7	23.5	25.5	27.7	29.1	29.6	30.9
Cost of Service	**05/06**	**06/07**	**07/08**	**08/09**	**09/10**	**10/11**	**11/12**	**12/13**	**13/14**	**14/15**
Operating expenditure (proposed by Authority)	3.2	3.3	3.4	3.6	3.6	3.7	3.9	3.9	4.0	4.1
Depreciation	0.9	1.0	1.1	1.2	1.3	1.4	1.5	1.6	1.7	1.7
Return on Assets	0.4	0.4	0.4	0.5	0.5	0.5	0.6	0.6	0.6	0.7
Gross Revenue Requirement	4.4	4.8	4.9	5.2	5.4	5.7	5.9	6.2	6.4	6.5
Capital contributions	-2.1	-0.9	-0.9	-0.9	-1.0	-1.9	-1.8	-0.7	-0.8	-0.7
Forecast revenue from other services	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3	-0.3
Addition for return on equity	-0.3	-0.4	-0.4	-0.5	-0.5	-0.6	-0.6	-0.7	-0.7	-0.7
Net revenue requirement for determination of water service charges	1.7	3.2	3.3	3.5	3.6	3.0	3.2	4.5	4.6	4.8

Table 6.3 Present Value of Revenue Generated With Busselton Water's and Authority's Proposed Charges

	Value ($million, real dollar values at 30 June 2005)									
	05/06	06/07	07/08	08/09	09/10	10/11	11/12	12/13	13/14	14/15
Revenue generated from Busselton Water's proposed charges	2.9	3.1	3.2	3.3	3.5	3.6	3.7	3.8	3.9	4.0
Present value of Busselton Water's revenue at real discount rate of 5.63% as at 30 June 2005					25.3					
Net revenue requirement	1.7	3.2	3.3	3.5	3.6	3.0	3.2	4.5	4.6	4.8
Revenue generated from Authority's proposed charges	2.9	3.0	3.2	3.3	3.4	3.6	3.7	3.8	3.9	4.0
Present value of the two revenue streams immediately above at real discount rate of 5.63% as at 30 June 2005					25.3					

Recommendations

36 Prices established for Busselton Water's water services should be consistent with a present value of forecast revenue for Busselton over the period 2005/06 to 2014/15 of $25.3 million at a discount rate of 5.87 per cent (real, pre-tax).

37 The values of developer charges levied by Busselton Water should be subject to scrutiny to determine that they are set at appropriate levels to meet the capital costs associated with new land development.

6.5 Price Path

6.5.1 Terms of Reference

The Authority must give consideration to, but will not be limited to the following matters:

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

6.5.2 Busselton Water Proposal

Busselton Water has provided the Authority with a projection of water service charges for the period 2005/06 to 2014/15. The principal characteristics of the charges proposed by Busselton Water are as follows.

Residential Charges

The residential service charge is set at $105.25 for 2005/06 and projected to decrease to $100.80 by 2014/15 (in real dollar values at 30 June 2005).

Usage charges comprise an eight-block structure with values that are projected to decline as shown in Table 6.4.

Table 6.4 Busselton Water's Current and Proposed Residential Charges (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Projected Charge (2014/15)
Service Charge ($/property)	105.25	100.80
Usage Charges ($/kL)		
0 to 150 kL	0.41	0.39
151 to 350 kL	0.59	0.53
351 to 550 kL	0.65	0.58
551 to 750 kL	0.78	0.75
751 to 1,150 kL	1.29	1.22
1,151 to 1,550 kL	1.84	1.72
1,551 to 1,950 kL	2.13	2.02
Over 1,950 kL	2.47	2.33

Non-residential Charges

In 2005/06, Busselton Water commenced a transition from determination of service charges for non-residential customers on the basis of gross rental value of properties to charges based on meter size. This transition is expected to be completed by 2009/10, at which time all service charges are projected to be levied on the basis of meter size. Table 6.5 shows Busselton Water's current and proposed charges for non-residential customers.

Table 6.5 Busselton Water's Proposed Tariff Structure for Non-residential Customers (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Projected Charge (Phased-in by 2009/10)
Service Charges ($/property)		
20mm meter	Current charges are based on a hybrid of meter-based charge and industry-type charges	302.42
25mm meter		472.03
32mm meter		680.22
40mm meter		1,210.58
50mm meter		1,890.80
80mm meter		4,842.31
120mm meter		7,565.89
150mm meter		16,948.09
Usage Charge ($/kL)		
0 – 1000 kL	0.71	0.71
over 1000 kL	1.07	1.04

6.5.3 Authority Assessment

As discussed in section 3.4, the Authority considers that it would be appropriate to set individual price paths for each of Busselton Water's services over a 10 year period. The Authority has determined smoothed price paths for each service, based on forecasts of demand for each service and revenue that is equal in present value terms to the revenue requirement for Busselton as set out in section 6.4.

In addition to the forecast of revenue for Busselton Water, the determination of a price path requires consideration of a number of further parameters and assumptions:

- forecasts of demand for services;
- the allocation of costs (and implicitly the revenue requirement) between the different customer classes (residential and non-residential) to which Busselton Water provides services;
- the structure of prices; and
- price paths by which prices will change over time to accommodate inflation.

These matters are addressed further below.

6.5.3.1 Demand Forecasts

Forecasts of demand for services affect both cost forecasts for service provision (and hence the revenue requirement of Busselton Water) and the forecasts of the number of "units" of service provision which are used to determine unit prices for services.

For the purposes of determining price paths for services, the Authority has applied demand forecasts provided by Busselton Water.

6.5.3.2 Cost Allocations across Customer Classes

Within a framework of cost-based regulation of prices, the price charged to a customer (and hence the revenue obtained from the customer) implies recovery from that customer of a particular proportion of the costs of service delivery.

The proportion of total costs to be recovered from a customer or class of customers may be determined explicitly, such as through a fully distributed cost model, or implicitly, where prices are set such that forecast revenue in total is expected to be equal to forecast costs but within this constraint the regulated business is relatively free to set prices according to other commercial constraints. In the latter case the business may be constrained in setting prices to a requirement to ensure that prices meet the broad efficiency requirements of being above the avoidable cost of service provision and less than stand-alone costs of service provision.

Busselton Water does not currently determine prices for different customer classes on the basis of an explicit allocation of costs. The amount of costs recovered from different classes of customers is, however, implied by the prices determined and hence the revenue earned from each class of customer.

In a broad sense, Busselton Water has four customer groups: residential, commercial, industrial and "other" (comprising schools, hospitals and vacant land).

Revenue receipts are skewed towards non-residential customers. In 2003/04, residential customers accounted for 85 per cent of water use but 67 per cent of revenue, while non-residential customers account for 15 per cent of water use but 33 per cent of revenue (Table 6.6).

Despite the variations in charges and tariff structures, all customer groups appear to be paying more than the avoidable costs associated with the provision of water supply services. For the purposes of the current inquiry, the Authority has determined prices that maintain approximately the same allocation of costs and revenue across residential and non-residential customers.

Table 6.6 Water Sales Revenue (2003/04)

Customer Class	Share of Sales Revenue %	Share of Total Connections %	Share of Total Consumption %
Residential	67.3	87.2	84.6
Non Residential	32.7	12.8	15.4

Source: Busselton Water

6.5.3.3 Price Structures

In section 3 of this report, there were a number of principles established for the structure of prices for water and wastewater, summarised as follows.

- Water usage charges should be set at a level reflecting the estimated LRMC of increasing water supplies.
- The service charges for water services should be adjusted to enable Busselton Water to recover its revenue target after taking into account revenue gained from the usage charges.

In establishing usage charges for water, the Authority has considered estimates of the LRMC of developing new water supplies for Busselton.

The Authority has undertaken analysis of LRMC of water supplies by the methodology described in section 3.7 and Appendix 5 of this report to derive an estimate of LRMC for Busselton Water of between $0.52 and $0.66/kL, depending upon assumptions of future costs. These values are similar to the LRMC of water supplies estimated for AQWEST of $0.56/kL, and the Authority has applied this same figure for the purposes of setting water prices for Busselton Water.

The Authority has recognised that a change from the existing usage charges of Busselton of between $0.41/kL and $2.47/kL to a flat charge of $0.56/kL reflecting LRMC is a very substantial change in charges for higher levels of water use by residential customers, and that this could result in significant changes in water demand which may be difficult for Busselton Water to forecast and accommodate in the short term. For this reason, the Authority considers that a higher price should be maintained for high levels of water use for at least an initial pricing period. The Authority recommends that usage charges for Busselton Water's residential customers be established at $0.56/kL for water use of 0 to 500 kL/year and $1.20/kL for water use in excess of 500kL/year (in real dollar values at 30 June 2005), with a transition from existing usage charges to the new charges over the four years to 2009/10.

For non-residential customers, the Authority recommends the implementation of a flat usage charge of $0.56/kL for all levels of water use, again with a transition from current charges over the period to 2009/10.

The Authority has determined service charges for customers at levels sufficient to enable Busselton Water to recover its revenue target after taking into account revenue gained from the usage charges, while at the same time:

- maintaining an approximately constant allocation of costs and revenue between residential and non-residential customers; and
- maintaining Busselton Water's transition from GRV based charges to service charges based on meter size for non-residential customers.

Residential and non-residential service charges have been determined according to these principles and with a transition period of four years (2006/07 to 2009/10) for introduction of the new price structure for water services.

The proposed tariff structures for residential and non-residential customers, respectively, are shown in the following tables (Table 6.7 and Table 6.8).

Table 6.7 Proposed Tariff Structure for Busselton Water's Residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge	Proposed Charges				
	2005/06	2006/07	2007/08	2008/09	2009/10	2014/15
Service Charge ($/property)	105.25	101.90	98.55	95.21	91.86	91.86
Usage Charge ($/kL)						
0 to 150 kL	0.41	0.45	0.49	0.52	0.56	0.56
151 to 350 kL	0.59	0.58	0.58	0.57	0.56	0.56
351 to 550 kL	0.65	0.63	0.61	0.58	0.56	0.56
551 to 750 kL	0.78	0.89	0.99	1.10	1.20	1.20
751 to 1,150 kL	1.29	1.27	1.25	1.22	1.20	1.20
1,151 to 1,550 kL	1.84	1.68	1.52	1.36	1.20	1.20
1,551 to 1,950 kL	2.13	1.90	1.67	1.43	1.20	1.20
Over 1,950 kL	2.47	2.15	1.84	1.52	1.20	1.20

Table 6.8 Proposed Tariff Structure for Busselton Water's Non-residential Water Service (in Real Dollar Values of 2005/06)

	Current Charge (2005/06)	Proposed Charge (Phased-in by 2009/10 then held constant in real terms)
Service Charges ($/property)		
20mm meter	Current charges are based on a hybrid of meter-based charge and industry-type charges	356.45
25mm meter		556.36
32mm meter		801.75
40mm meter		1,426.86
50mm meter		2,228.61
80mm meter		5,707.44
120mm meter		8,917.62
150mm meter		19,976.05
Usage Charge ($/kL)		
0 – 1000 kL	0.71	0.56
over 1000 kL	1.07	0.56

The prices determined by the Authority for the period 2005/06 to 2014/15 are indicated in Schedule 3 of this report. The Authority has specified the prices in real dollar values of 2005/06 on the basis that the values for the years 2006/07 onwards would be escalated annually for inflation. For illustrative purposes, Schedule 1 also indicates prices in nominal terms with an assumed annual inflation rate of 2.74 per cent.

Recommendation

38 The Authority recommends prices for water services provided by Busselton Water as set out in Schedule 3 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

6.6 Impacts of Price Changes on Customers

6.6.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the social impact of the recommendations.*

6.6.2 Assessment of Impacts on Customers

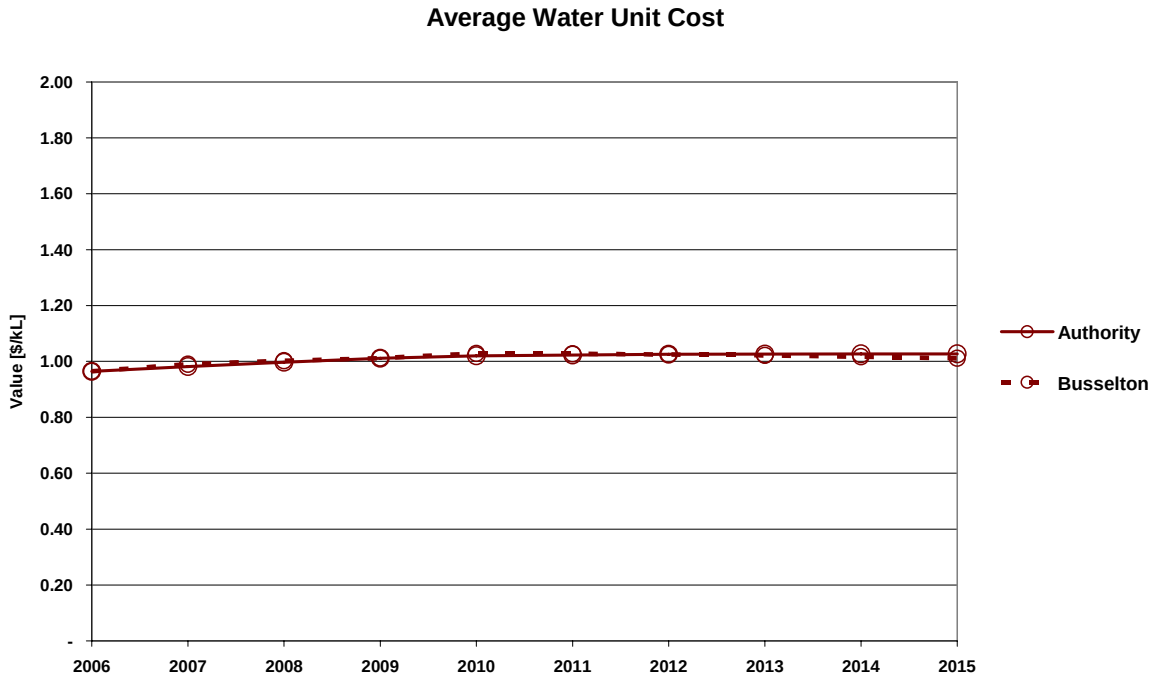
The Authority has determined the impacts of the recommended price structures and levels on residential and non-residential customers of water services. This has included consideration of:

- general trends in prices for water services;
- impacts of price changes on average prices paid and the total water bills of residential customers, including those groups of customers eligible for price concessions (pensioners and seniors) and residential tenants that typically pay only the usage charge for water services; and
- impacts of price changes on average prices paid by commercial customers, and the total water and wastewater bills of these customers.

6.6.3 General Price Trends

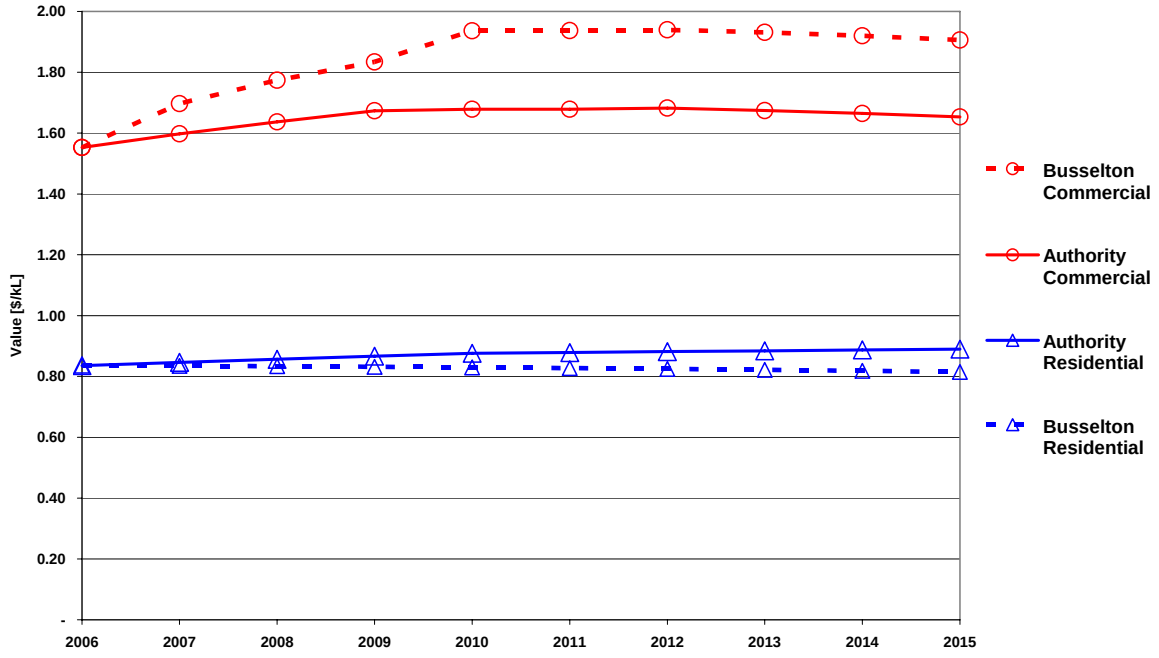
The prices determined by the Authority for water services generally increase in real terms over the period 2005/06 to 2014/15 in a similar manner to those proposed by Busselton Water. The average price of water services, expressed as a price per kilolitre of water delivered to all customers, is projected to increase over the period 2005/06 to 2009/10 from $0.96/kL to $1.02/kL (in real dollar values of 2005/06) and then increase slightly to $1.03/kL in 2014/15 (Figure 6.6). By comparison, Busselton Water's average price is $1.01/kL in 2014/15.

Figure 6.6 Average Real Price of Water Services for Busselton Water



As explained in section 6.5.3.3, the Authority has assumed that the price increase is shared equally between commercial and residential customers. This assumption results in the Authority's recommendations for tariffs for commercial water services increasing at a lesser rate than has been proposed by Busselton Water and the Authority's recommendations for tariffs for residential water services increasing at a greater rate (Figure 6.7).

Figure 6.7 Average Real Price of Residential and Commercial Water Services for Busselton Water



6.6.3.1 Residential Customers

Table 6.9 indicates that the significant increases in water bills are limited to customers who use relatively high amounts of water. Under the existing concession schemes applied by Busselton Water, the customers eligible for concessions (pensioners and seniors) would experience approximately the same changes in the value of water bills as customers that are not eligible for concessions. Immediate impacts on tenants of the projected prices for water services are slightly higher than for other customers.

Table 6.9 Projected Variations in Water Bills for Representative Residential Customers of Busselton Water (2005/06 to 2009/10)

Representative Residential Customer (Water User per Year):	Average Annual Change in Water Bill (2005/06 to 2009/10) (Real Dollar Values of 2005/06)				
	Non-concession	Pensioners	Seniors	Dual Seniors	Tenants
150 kL	2	1	3	1	6
250 kL	2	1	2	1	5
350 kL	1	0	2	0	4
550 kL	-4	-4	-3	-4	-0
750 kL	17	17	18	17	21

The relative size of water bills for representative customers of Busselton Water and the trends in the water bills are shown in the following figures (Figure 6.8 to Figure 6.11).

Figure 6.8 Busselton Water Bill for Water Consumption of 150kL

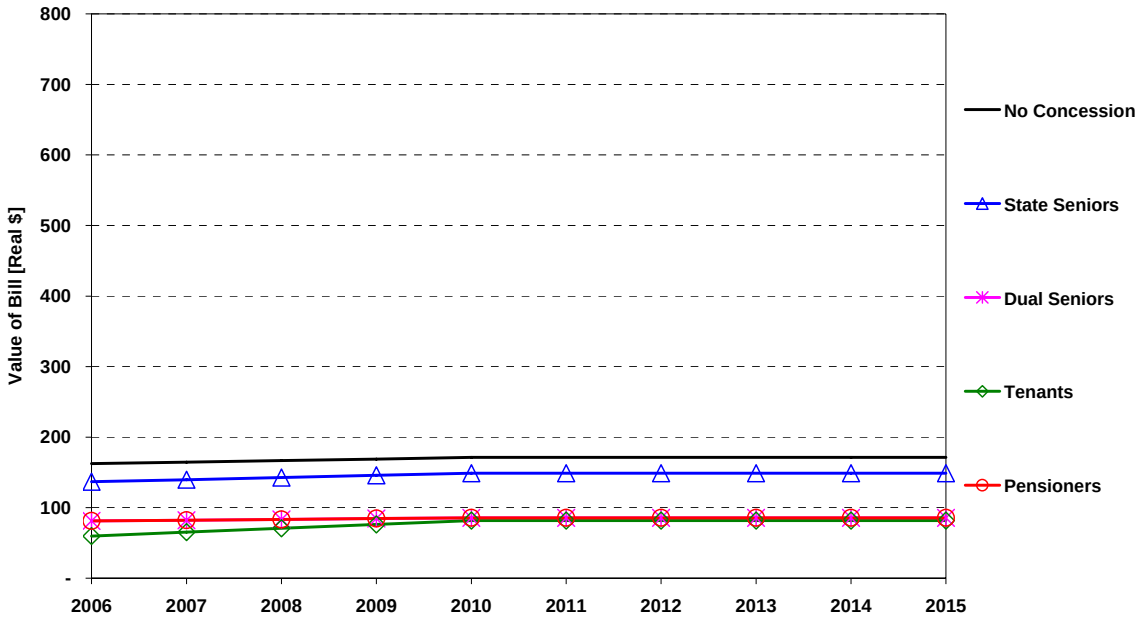


Figure 6.9 Busselton Water Bill for Water Consumption of 350kL

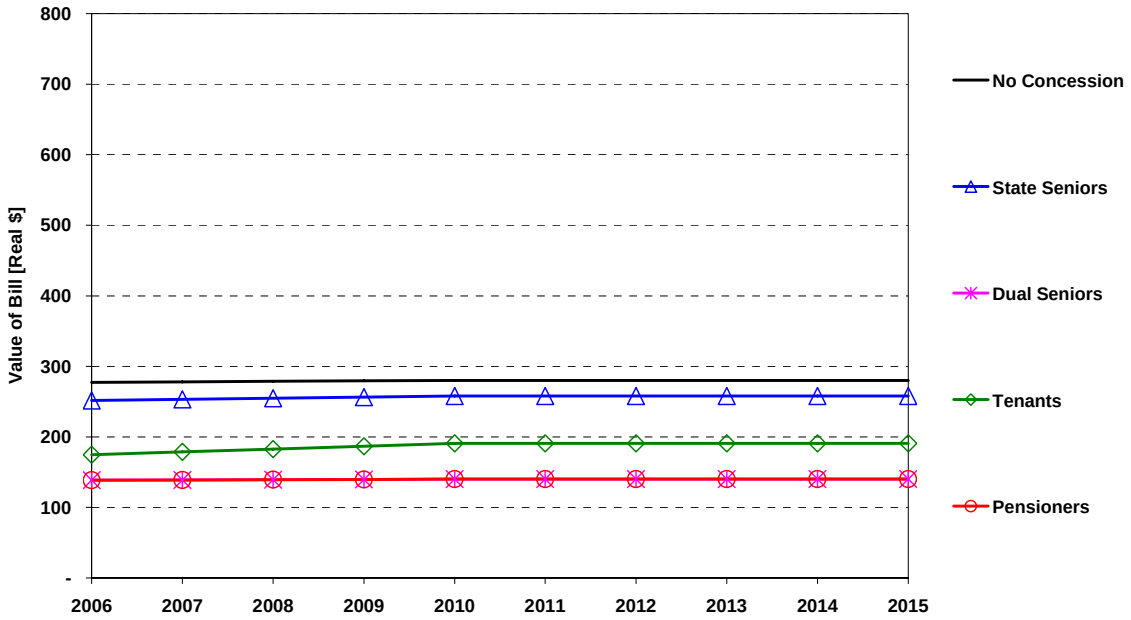


Figure 6.10 Busselton Water Bill for Water Consumption of 550kL

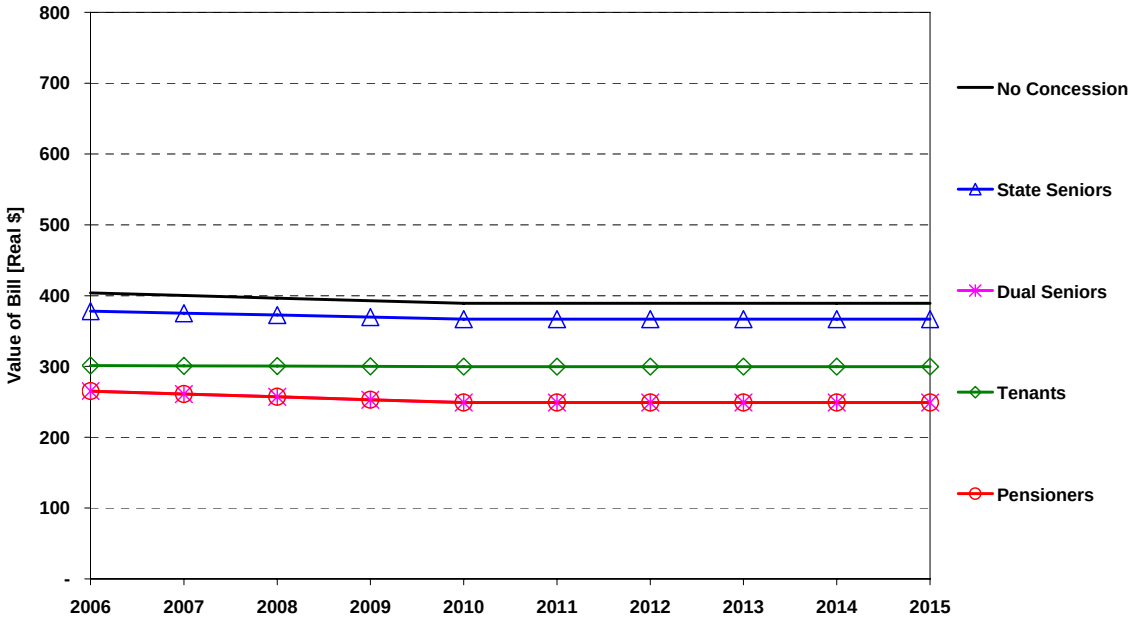
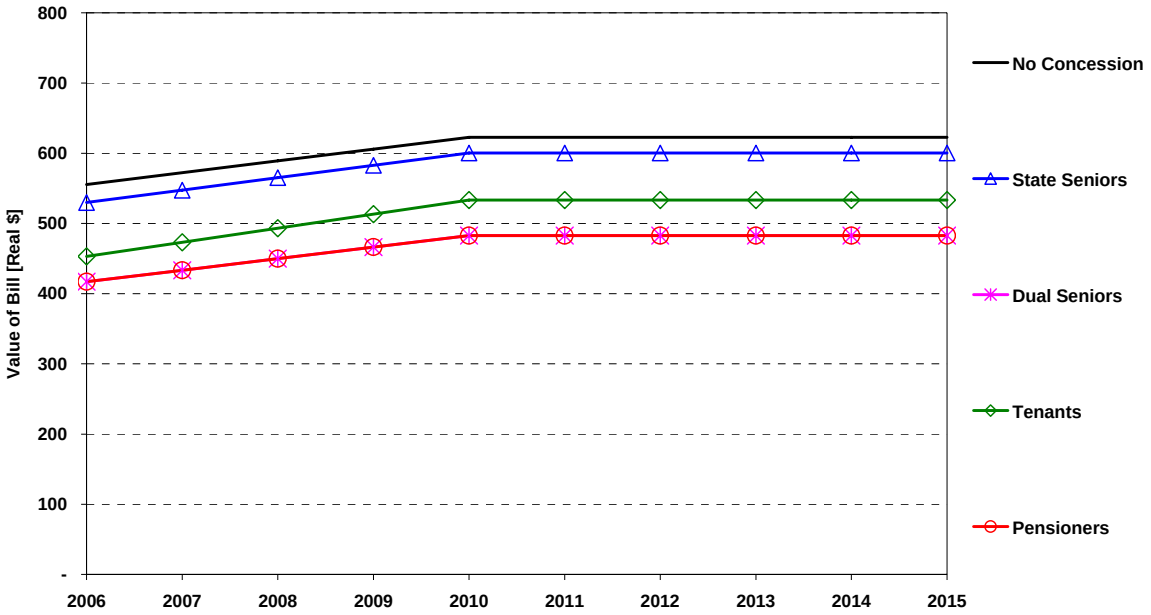


Figure 6.11 Busselton Water Bill for Water Consumption of 750kL



6.6.3.2 Non-Residential Customers

Water costs for commercial customers of Busselton Water are projected to increase for low water users and decrease for high water users (in real dollars values of 2005/06) (Table 5.10). Commercial customers with high water use benefit from the reduction in the water usage charge.

Table 6.10 Projected Variations in Water Bills for Representative Commercial Customers of Busselton Water (real dollar values of 2005/06)

Representative Water User	Average Annual Change in Water Bill (2005/06 to 2009/10)	
	(Real $/year)	(%/year)
20mm meter & 300 kL/year	17	3.9%
25mm meter & 800 kL/year	38	4.5%
40mm meter & 2 ML/year	78	3.5%
50mm meter & 5 ML/year	-137	-2.5%
80mm meter & 10 ML/year	-75	-0.6%
100mm meter & 20 ML/year	-685	-3.1%
150mm meter & 50ML/year	-2,237	-4.2%

6.7 Impacts of Price Changes on Busselton Water and Government

6.7.1 Impact on borrowing, capital and dividend requirements

6.7.1.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the impact of pricing policies on borrowing, capital and dividend requirements…*

6.7.1.2 Assessment

Busselton Water currently operates as a not-for-profit business and makes no dividend payments to the State Government. Capital investment is financed by a combination of developer contributions and the accumulation and maintenance of cash reserves from customer revenues, and there is no funding of investment by either funding from the State Government or by debt.

The Authority has determined revenue requirements and water-service prices for Busselton Water consistent with the current capital financing arrangements and the absence of any requirements to make dividend payments. As such, there is not expected to be any impact of the prices determined by the Authority on borrowing or capital requirements. In particular, the prices determined by the Authority are consistent with Busselton Water continuing to finance capital expenditures from cash reserves and from developer contributions. Consistent with this, any future requirement for Busselton Water to make dividend payments to the Government would require an increase in service prices (by approximately 15 per cent) from those determined by the Authority and/or a change in sources of funds for capital investment.

6.7.2 Impact on the level of government funding

6.7.2.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the effect of any pricing recommendations on the level of government funding (through Community Service Obligation payments);*

6.7.2.2 Assessment

Busselton Water currently offers price concessions to customers in categories of 'pensioners', 'seniors' and 'dual seniors'. These concessions are determined as follows.

- pensioners receive a discount of 50 per cent of the service charge and 50 per cent of the price for the first 350 kL of water use;
- seniors receive a discount of 25 per cent of the service charge; and
- dual seniors receive a discount of 50 per cent of the service charge and 50 per cent of the price for the first 350 kL of water use.

As the concessions for these customers are determined as a proportion of water prices, rather than as an absolute value, the value of concessions offered by Busselton Water will

vary with price levels and demand for water services of these customers. Based on forecasts of demand for services provided by Busselton Water and the prices of water services as determined by the Authority, the value of concessions provided by Busselton Water is projected to increase from approximately $151,000 to $200,000 in real terms over the period 2005/06 to 2014/15.

The concessions provided by Busselton Water are not currently financed by the Government as a community service obligation, but rather are internally financed by Busselton Water. As such, while the value of concessions is projected to increase over the period to 2014/15, there will not be a corresponding cost to the Government unless there is a change in the mechanism for financing the concessions.

In accordance with the current arrangement for financing of concessions, the Authority has taken into account the internal financing of concessions by Busselton Water in the determination of prices. If the Government were to finance concessions through CSO payments, the cost of the CSO payments to Government would be as indicated above, and there would need to be a downward adjustment of the revenue requirement and prices of Busselton Water, reflecting the removal of the need to internally finance concessions.

6.7.3 Impact on general price inflation

6.7.3.1 Terms of Reference

The Authority must give consideration to, but will not be limited to, the following matters:

- *the effect on and of general price inflation over the medium term;*

6.7.3.2 Assessment

The prices determined by the Authority for Busselton Water are projected to increase in real terms over the period 2005/06 to 2014/15 at an average annual rate of 0.7 per cent. This corresponds to an increase in nominal terms over the period at an average annual rate of 3.4 per cent, which is marginally greater than the expected rate of inflation for this period. As such, the prices determined for Busselton Water would have a slight upward impact on the rate of general price inflation.

6.8 Future Price Reviews

In section 3 of this report, the Authority considered the appropriate forms of price paths for the water businesses. As set out in this section, the Authority recommends that where a water business is faced with substantial demand uncertainty, a revenue-cap form of price control should be adopted so that in each review of prices, the target revenue for the water business is adjusted for under-recovery or over-recovery of revenue in the previous period to the extent that this results from differences between realised demand and forecast demand (Recommendation 3).

For Busselton Water, the substantial changes in some levels of usage charges for water services create some uncertainty in demand for these services

Also for Busselton Water there is some uncertainty in forecasts of revenues from developer charges and capital contributions, which are netted off from the total revenue

requirement to determine the net level of total revenue to be recovered from charges for water services.

Taking these factors into account the Authority recommends that reviews of prices for Busselton Water should apply a pseudo revenue-cap form of revenue and price control that corrects revenue targets and prices for over-recovery or under-recovery of revenue in the previous pricing period, to the extent that this over-recovery or under-recovery arises from differences between realised demand and forecast demand for water by customers and for differences between forecast and realised revenues from capital contributions and developer charges. The precise formulation of the price and revenue control can be a matter addressed at the time of price reviews, but should comply with the following principles.

- At the time of a price review, the target revenue for the ensuing pricing period should be adjusted by an amount equal to:
  a) the notional value of over-recovery or under-recovery of revenue by Busselton Water that results from the average per-customer water demand for each block of usage charges for water services in the previous pricing period being different to the forecast used for the purposes of setting prices;
  b) the notional value of the costs avoided as a result of realised average per-customer water demand being less than the forecast used for the purposes of setting prices, or the additional costs incurred as a result of realised average per-customer water demand being greater than the forecast used for the purposes of setting prices, in each case being based on the avoidable (or incremental) cost to Busselton Water of supplying an additional unit of water; and
  c) the difference between actual and forecast revenues from developer charges and capital contributions.
- The values of revenues and costs carried forward to the next pricing period should be adjusted to reflect the time-value of money and inflation.

Appendix 1: Summary of Recommendations

1 Information systems be further developed including market intelligence to support the introduction of cost based systems to govern the revenue requirement of each water business for this and future periods.

2 Prices for the urban water and wastewater water businesses should be established as price paths over a 10 year period based on current best forecasts of costs and demand, and these prices should be updated periodically through rolling reviews on a more frequent basis that take into account updated forecasts of costs and demand for services.

3 Where a water business is faced with substantial demand uncertainty a revenue cap form of price control should be adopted so that in each review of prices, the target revenue for the water business is adjusted for under-recovery or over-recovery of revenue in the previous period to the extent that this results from differences between realised demand and forecast demand.

4 A cost-based system of pricing should be introduced for the determination of prices for water and wastewater services. Prices should be established that will permit the business providing the services to recover the cost incurred in constructing assets, to earn a commercial rate of return on the un-recovered cost of assets, and to recover the efficient costs of operating and maintaining the assets.

5 A “building block” methodology should be applied to determine revenue requirements for each water business.

6 Initial asset values should be established for each of the water businesses as a value consistent with current forecasts of service prices and revenues. For AQWEST and Busselton Water, the forecast revenue stream applied in determining the initial regulatory asset value should be adjusted to include a notional value of a return on an equity proportion of asset value. Assets should subsequently be re-valued by a “roll-forward” methodology, whereby the regulatory asset value is updated by adjustment for efficient new capital expenditure, depreciation, asset disposals and inflation.

7 Regulatory rates of return for each of the water businesses should be determined on the basis of benchmark assumptions of financial structure based on reasonable assumptions that would apply to a commercial provider of the same services.

8 Cost forecasts used in the determination of revenue requirements for each service provider should incorporate efficiency gains reasonably envisaged to be achievable over the period of the forecast.

9 Prices for water services should be structured so that usage charges are set at levels to reflect the estimated long-run marginal cost of developing new water resources to meet water demand. Other charges should be set at levels necessary to ensure that revenue requirements are met after taking into account revenues from usage charges.

10 Management of water demand to address short-tem shortfalls in water supply should continue to be undertaken through the application of water restrictions rather than through pricing mechanisms. However, the application of LRMC pricing and a security buffer should reduce the frequency of water restrictions to relatively rare events.

11 The costs of environmental impacts caused by provision of water and wastewater services is appropriately passed through to water users through the imposition of regulatory requirements and standards on the water businesses and the inclusion of

the costs of meeting these requirements and standards in the cost forecasts for service provision.

12 Recovery from water users of the costs of the water-resource management activities of the Department of Environment is ultimately a matter for determination by the State Government. In the event that the Government determines that such costs should be recovered from water users, attention should be given to the efficiency and equity considerations of different mechanisms for recovery of these costs from water users in different regions of the State.

13 The impacts of changes in price structures on customers should be managed, to the extent considered appropriate, through the gradual phasing-in of new price structures over a number of years or billing periods. Any further assistance that the Government might consider should be provided in a way that minimises efficiency losses.

14 Prices for wastewater services for residential customers should be gradually decoupled from property values and determined as an inclining tariff, thus increasing transparency, while retaining, in part, the principle of charging according to capacity to pay.

15 Prices for wastewater services for commercial customers should continue to be determined by a combination of fixed and volumetric charges. Volumetric charges should be set to reflect the estimated long run marginal cost of providing wastewater services. Fixed charges should be set at levels necessary to ensure that revenue requirements are met after taking into account revenues from volumetric charges.

16 The Authority is satisfied that the Corporation is providing its services in accordance with standards and requirements imposed by the terms and conditions of its licence. The Authority does not consider that the Corporation requires additional financial resources – and hence higher prices and revenues – to meet these standards and requirements.

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

18 The Authority considers that additional information on customer bills could improve customers' awareness of water prices and usage.

19 The Authority considers that the criteria of security buffers and probabilities of requirements for water restrictions that underlie plans for development of water resources may warrant further consideration.

20 The Corporation's current plan for development of new water sources may appropriately be incorporated in forecasts of costs applied in the setting of water prices if it is assumed that water restrictions are eased to three days per week in 2006/07. Alternatively, the proposed abstraction from the South West Yarragadee aquifer could be deferred by three years.

21 An initial regulatory asset value of $10,599 million at 30 June 2005 should be established for the Corporation's physical assets.

22 For the purpose of determining the revenue requirement of the Corporation, the Corporation's forecast of operating costs should be adjusted to reflect an efficiency gain in real operating costs per connection of 1.25 per cent per annum.

23 The Authority considers that the Corporation's forecast capital costs are appropriate forecasts for consideration in determination of the revenue requirements of the Corporation.

24 The Corporation's assumptions of asset lives are considered appropriate for the purposes of determining depreciation allowances in the Corporation's revenue requirement.

25 A rate of return of 5.63 per cent (pre-tax real) should be applied in determining the Corporation's revenue requirement.

26 Based on the parameters considered by the Authority, prices established for the Corporation's water, wastewater and other services should be consistent with a present value of forecast revenue over the period 2005/06 to 2014/15 of $6,240 million at a discount rate of 5.63 per cent (real, pre-tax).

27 The Authority recommends prices for water and wastewater services provided by the Corporation in the Perth metropolitan area as set out in Schedule 1 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

28 AQWEST's current plan for capital works to increase water supplies provides for a timing of development that is necessary and appropriate. The forecast cost of implementing these plans may appropriately be incorporated in forecasts of costs applied in the setting of water prices.

29 An initial regulatory asset value of $25.1 million in real dollar values at 30 June 2005 should be established for AQWEST's physical assets.

30 A rate of return of 5.87 per cent (real, pre-tax) should be applied in determining AQWEST's revenue requirement

31 Prices established for the AQWEST's water services should be consistent with a present value of forecast revenue for AQWEST over the period 2005/06 to 2014/15 of $39.8 million at a discount rate of 5.87 per cent (real, pre-tax)

32 The Authority recommends prices for water services provided by the AQWEST as set out in Schedule 2 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

33 Busselton Water's current plan for capital works to increase water storage provides for a timing of development that is necessary and appropriate. The forecast cost of implementing this plan may appropriately be incorporated in forecasts of costs applied in the setting of water prices.

34 An initial regulatory asset value of $14.7 million at 30 June 2005 should be established for Busselton Water's physical assets.

35 A rate of return of 5.87 per cent (real, pre-tax) should be applied in determining Busselton Water's revenue requirement.

36 Prices established for Busselton Water's water services should be consistent with a present value of forecast revenue for Busselton over the period 2005/06 to 2014/15 of $25.3 million at a discount rate of 5.87 per cent (real, pre-tax).

37 The values of developer charges levied by Busselton Water should be subject to scrutiny to determine that they are set at appropriate levels to meet the capital costs associated with new land development.

38 The Authority recommends prices for water services provided by Busselton Water as set out in Schedule 3 of this report, subject to escalation for inflation and review prior to the 2010/11 year.

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.

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

Submissions received in response to Issues Paper

AQWEST
Australian Hotels Association (Western Australia)
Barnes, I.
Bowyer, R.
Brooker, C. A.
Busselton Water Board
Byl, P. and L.
Chamber of Commerce and Industry (CCI)*
Conservation Council of WA Inc*
CSIRO*
Department of Treasury and Finance (DTF)*
Elliot, L.*
Environmental Protection Authority*
Fleming, D.
Gilbert, K.
Gregoriadis, S.
Hine, P.
Joel, S.
Major, D.
Metcalfe, E.
Office of Water Policy
Perth Water Users
Property Council of Australia*
Scott, C.
Shire of Mundaring*
Small Business Development Corporation
Toby, S.
WACOSS*
Water and Rivers Commission*
Water Corporation

* Time extensions given

Submissions received in response to Draft Report

AQWEST
Bird, A.
Bocking, B. and T.
Busselton Water
Chamber of Minerals and Energy
Conservation Council of WA Inc
CSIRO
Department of Environment
Department of Treasury and Finance
Environmental Protection Authority
Gardner, A.
Gilbert, K.
Office of Water Strategy
Pannell, D.

Perth Water Users
Thomas, J.
United Utilities Australia
Verany, C.
Waugh, S.
WA Australian Water Association
WACOSS
WA Farmers Federation
Water and Rivers Commission
Water Corporation
Wood, A.

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 *Economic Regulation 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:

$$WACC = R_e \frac{E}{V} \frac{1 - T_c}{\left(1 - T_c\left(1 - \gamma\right)\right)} + R_d \frac{D}{V}\left(1 - T_c\right)$$

where T_c is the corporate tax rate and γ 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.[68] 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 component to reflect the risk premium that investors would require over the risk free rate:

$$R_e = R_f + \beta_e\left(R_m - R_f\right)$$

[68] Other models include Arbitrage Pricing Theory, the Fama-French Model and the Dividend Growth Model.

where R_e is the required rate of return on equity, R_f is the risk-free rate, β_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.[69] 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.[70]

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.

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 (β_e);
- the benchmark financing structure (D/V and E/V);

[69] Economic Regulation Authority (25 February 2005), "Determination of the preferred methodology for calculating the weighted average cost of capital for covered electricity networks".

[70] The Fisher equation describes the relationship between the real interest rate (R), the nominal interest rate (r) and the inflation rate (i), as follows: $R = (1+r)/(1+i) - 1$.

- the benchmark debt margin (*DM*); and
- the value of the imputation credits (γ).

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. For the Draft Report, the Authority used Water Corporation's estimate of the nominal risk free rate of 5.84 per cent. For its final recommendation, the Authority has used a nominal risk free rate of **5.23 per cent** and a real risk free rate of **2.42 per cent**, based on financial information available on 30 September 2005.

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.[71]

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[72] and IPART's acceptance of a market risk premium between 5 and 6 per cent.[73]

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[71] The Allen Consulting Group (January 2005), "Electricity Networks Access Code 2004: Advance Determination of a WACC Methodology", report to the Economic Regulation Authority, p23.

[72] As referred to in a commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation.

[73] For example, IPART (May 2003), and other IPART price determinations in electricity distribution (June 2004) and gas distribution (July 2000).

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 and Finance.

Equity Beta

The equity beta (β_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.

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.[74] The mid-point value of 0.78 has been adopted by the Water Corporation for the purpose of its calculation of WACC.

[74] IPART (May 2003).

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.

For its final recommendation, the Authority has adopted an equity beta value of **0.80**, which is close to the Water Corporation's proposed value of 0.78, and 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.[75]. Recent pricing determinations by IPART and ICRC for water and wastewater services also employed benchmark gearing ratios of 60 per cent.[76]

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.

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

[75] 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).

[76] IPART (May 2003); ICRC (March 2004).

at BBB+.[77] 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.[78]

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.[79]

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.[80] On the basis of a debt margin in February 2004 of 1.10 per cent, and the Corporation's 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.[81] 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.

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[77] See Allen Consulting Group (January 2005), ibid, p43.

[78] The Allen Consulting Group (January 2005), ibid, p44.

[79] The Allen Consulting Group (January 2005), ibid, p45.

[80] Essential Services Commission (18 March 2004), "Economic regulation of the Victorian water sector – estimating a return on and of capital investments", Workshop Discussion Paper.

[81] See IPART (August 2002), "Weighted Average Cost of Capital: Discussion Paper", p8.

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.[82]

The Authority has used 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 predecessor agencies, proposal by Water Corporation and recent regulatory decisions in the water industry.[83]

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.[84]

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.[85] 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.[86]

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 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 **5.63 per cent** for Water Corporation's regulated asset value, based on financial information available on 31 August 2005. This is lower than the Corporation's proposal in its pricing submission of 6.54 per cent.

The difference between the Water Corporation's estimate and the Authority's estimate is due to:

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82 Commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation; and IPART (May 2003).

83 IPART (May 2003); ICRC (March 2004).

84 Hathaway, N. and R. R. Officer (1999), *The Value of Imputation Tax Credits,* Unpublished manuscript, Graduate School of Management, University of Melbourne.

85 As cited in a commercial-in-confidence report by Macquarie Bank Limited, commissioned by the Water Corporation.

86 IPART (May 2003), ibid.

- a reduction in the nominal risk free rate over the year, from around 5.8 per cent at the time of the Water Corporation's submission in January 2005, to 5.23 per cent at the end of September 2005;
- a reduction in the real risk free rate over the year, from around 3.26 per cent at the time of the Draft Report in March 2005, to 2.42 per cent at the end of August 2005;
- 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).

Table A3.1 Recommendation on WACC for Water Corporation

CAPM Parameter	Water Corporation Proposal (January 2005)	Authority Draft Recommendation (18 March 2005)	Authority Final Recommendation (4 Nov 2005)*
Nominal Risk Free Rate	5.84%	5.84%	5.23%
Real Risk Free Rate	3.26%	3.26%	2.42%
Inflation Rate	2.50%	2.50%	2.74%
Debt Proportion	60.0%	60.0%	60.0%
Equity Proportion	40.0%	40.0%	40.0%
Cost of Debt; Debt Risk Premium	1.000%	1.000%	1.000%
Cost of Debt; Debt Issuing Cost	0.100%	0.125%	0.125%
Cost of Debt; Risk Margin	1.100%	1.125%	1.125%
Australian Market Risk Premium	6.00%	6.00%	6.00%
Debt Beta	0.18	0.19	0.19
Equity Beta	0.78	0.78	0.80
Asset Beta	0.42	0.42	0.43
Corporate Tax Rate	30.0%	30.0%	30.0%
Franking Credit	45.0%	50.0%	50.0%
Nominal Cost of Debt	6.94%	6.97%	6.36%
Real Cost of Debt	4.33%	4.36%	3.51%
Nominal Pre-Tax Cost of Equity	12.60%	12.38%	11.80%
Real Pre-Tax Cost of Equity	9.85%	9.64%	8.81%
Nominal After-Tax Cost of Equity	10.52%	10.52%	10.03%
Real After Tax Cost of Equity	7.83%	7.83%	7.09%
Nominal Pre-Tax WACC	9.20%	9.13%	8.53%

Real Pre-Tax WACC	**6.54%**	**6.47%**	**5.63%**
Nominal After-Tax WACC	6.44%	6.39%	5.97%
Real After Tax WACC	3.85%	3.80%	3.14%

* Based on financial information available on 30 September 2005.

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 give 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 0.60 at 40 per cent gearing is equivalent to an equity beta of 0.80 for the Water Corporation at 60 per cent gearing.

Authority 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 **5.87 per cent** for AQWEST and Busselton Water.

Table A3.2 Recommendation on WACC for AQWEST and Busselton Water

CAPM Parameter	Authority Draft Recommendation (18 March 2005)	Authority Final Recommendation (4 Nov 2005)*
Nominal Risk Free Rate	5.84%	5.23%
Real Risk Free Rate	3.26%	2.42%
Inflation Rate	2.50%	2.74%
Debt Proportion	40.0%	40.0%
Equity Proportion	60.0%	60.0%
Cost of Debt; Debt Risk Premium	1.000%	1.000%
Cost of Debt; Debt Issuing Cost	0.125%	0.125%
Cost of Debt; Risk Margin	1.125%	1.125%
Australian Market Risk Premium	6.00%	6.00%
Debt Beta	0.19	0.19
Equity Beta	0.78	0.60
Asset Beta	0.54	0.44
Corporate Tax Rate	30.0%	30.0%
Franking Credit	50.0%	50.0%
Nominal Cost of Debt	6.97%	6.36%
Real Cost of Debt	4.36%	3.51%
Nominal Pre-Tax Cost of Equity	12.38%	10.39%
Real Pre-Tax Cost of Equity	9.64%	7.44%
Nominal After-Tax Cost of Equity	10.52%	8.83%
Real After-Tax Cost of Equity	7.83%	5.92%
Nominal Pre-Tax WACC	10.21%	8.77%
Real Pre-Tax WACC	**7.53%**	**5.87%**
Nominal After-Tax WACC	7.15%	6.14%
Real After-Tax WACC	4.54%	3.31%

* Based on financial information available on 30 September 2005.

Appendix 5: Estimation of Long-Run Marginal Cost

Short-run marginal costs

Definition and relevance to pricing of services

The short-run marginal cost is the cost of providing an additional unit of service – the marginal unit – on the assumption that all physical infrastructure is fixed.

A unit price for water at, or in excess of, short run marginal cost would ensure that when an additional unit of water is provided to a customer that the service provider receives additional revenue to equal to or greater than the additional costs incurred in providing the additional unit of water. Estimates of short-run marginal costs can be used to constitute a floor for water rates, that is, volumetric rates should be greater than short-run marginal costs. Such an approach to pricing of water services is recommended by the California Urban Water Conservation Council among others.

Estimating short-run marginal costs

In the context of the current study, the short-run marginal cost for water supply services is considered as the cost of delivering an additional unit of water (in this case one kilolitre) given existing infrastructure constraints. For wastewater services, the short-run marginal cost is considered as the cost of collecting, treating and disposing of an additional kilolitre of wastewater given existing infrastructure constraints.

Estimating short-run marginal costs requires identification of the true variable operating costs that are immediately and directly affected by the quantities of water delivered or wastewater treated. In the case of water delivery, the variable costs of importance are pumping and treatment costs or, more specifically, the electricity and chemical costs incurred in water treatment and transportation of water from its source to its final destination. Both these costs vary directly with the quantity of water delivered. Similarly, the short-run marginal cost of wastewater treatment involves an assessment of pumping and treatment costs and how these costs vary with changes in quantities of wastewater treated and disposed of.

Once the true variable (or avoidable) costs of water production (or wastewater disposal) are isolated, the process of estimating the short-run marginal cost is relatively straightforward and can be done using the following equation:

$$SRMC = \frac{Variable\ costs_{\ t}}{Quantity\ of\ service\ produced_t}$$

Long-run marginal costs

Definition and relevance to pricing of services

The long-run marginal cost is the cost of providing an additional unit of service over a long-term time horizon where capital or physical infrastructure can be varied to meet changes in the supply and demand balance. A long-term perspective takes into account the cost of long-term investments in assets used to provide water and wastewater services. Customer habits and demand are largely influenced by long-term considerations and investment programs are typically framed with the long term in mind and capital

projects frequently involve the construction of long-life infrastructure which requires long lead up times in terms of planning, design and construction.

Long-run marginal cost is considered by many analysts and regulators to embody an efficient price signal, and therefore they argue that, to the extent possible, volumetric rates or tariffs should reflect long-run marginal costs. The arguments as to why volumetric water charges should reflect long-run marginal costs can be broadly summarised as follows.

- When based on long-run marginal costs, prices faced by customers reflect the forward-looking cost of providing the service – including the need to augment supply systems to meet future demand. As such, decisions made by customers on whether to increase or decrease consumption will reflect their willingness to finance the future costs that will be incurred as a result of their consumption behaviour.
- Long-run marginal cost pricing enables water supply companies to recover all costs associated with the delivery of water including costs related to long-term supply issues – if water suppliers do not recover costs through the setting of appropriate tariffs they run the risk of exposing themselves to financial difficulties at some point in the future.
- Setting prices based on long-run marginal costs prevents water service providers from generating monopoly profits. If prices are set equal to long-run marginal costs, it follows that average revenue per unit sold is equated with average efficient costs thus resulting in the utility earning a “normal” profit consistent with the opportunity cost of the investments made in the business.

Of these arguments for setting prices equal to long run marginal costs, it is only these first that has some economic justification. Water consumption patterns of water consumers typically reflect long term decisions such as decisions by households on such matters as use of swimming pools, garden design and plumbing fittings; and decisions by commercial and industrial water users on production processes. The setting of prices equal to long-run marginal costs has the effect of causing the consumer to factor in the long-term costs of water services in these long-term decisions on water use.

The last two of the above arguments for setting prices at long-run marginal cost have limited support from economic principles. The ability of a provider of water services, and the scope for the service provider to earn monopoly profits, depends upon the total of charges paid by customers, which may include a range of fixed and quantitative charges, rather than the price paid by customers for the “last unit” of a service purchased. Indeed, charging for all units of a service at a unit price of long-run marginal cost may result in the service provider earning excessive profits as the prices would be based on costs that may be incurred by the service provider at some future time, rather than costs currently incurred.

Estimating long-run marginal cost

There are two general approaches that can be used to estimate long-run marginal costs:

- the average incremental cost approach – based on the incremental cost of a system augmentation; and
- the Turvey approach – based on the costs incurred in an acceleration of growth in demand or the costs avoided by a deceleration in demand.

The two approaches have common elements within them, and in a broad sense each approach should yield comparable outcomes. Both approaches are sensitive to cost and quantity estimations and the application of each method requires estimates to be made of:

- future demand;
- future costs (both capital and operating); and
- inflation rates and discount rates.

The average incremental cost approach

The average incremental cost approach considers the level at which future increments of output must be sold to ensure recovery of incremental cost, given forecast changes in demand and hence supply. Specifically, the approach involves:

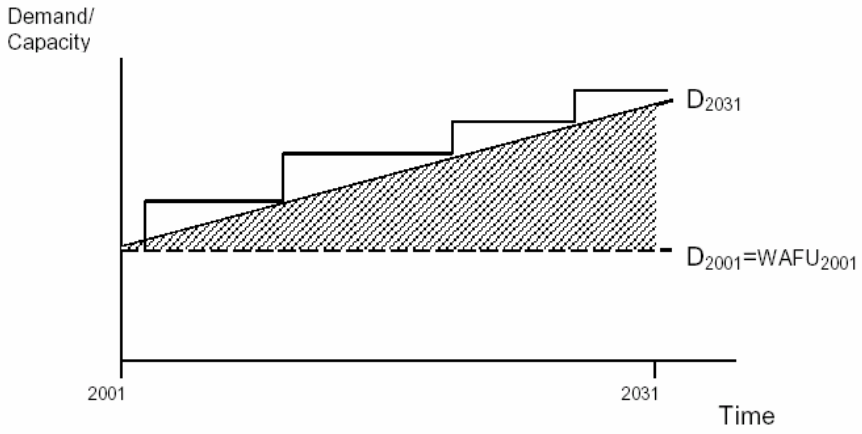
- consideration of the resource position over a suitably long-term period;
- forecasting demand over the same period;
- optimising various strategies available to generate the least-cost solution to addressing supply/demand imbalances; and
- estimating long-run marginal costs as the present value of the expected extra costs of the optimal strategy divided by the present value of the changes in the supply/demand balance in terms of additional volumes of water supplied through additional supply schemes.

In short, the approach involves estimation of long-run marginal costs by using the following equation:

$$LRMC = \frac{PV\ (extra\ capital\ and\ operating\ costs\ of\ optimal\ strategy)}{PV\ (additional\ volumes\ of\ water\ supplied)}$$

A graphical illustration of the average incremental approach is provided in Figure A5.1 The figure illustrates the situation whereby the optimal long term strategy of the water supplier comprises increases in supply capacity such that supply keeps up with forecast demand (forecast for water demand in 2031 is illustrated by D_{2031}). Given existing capacity or water available for use ($WAFU_{2001}$) this implies a future supply deficit, equivalent to the shaded area. The supply/demand balance is maintained through four successive investment projects (depicted by the stepped line representing changes in capacity). Using the average incremental approach, the long-run marginal cost would be estimated as the present value of the costs of the investments required to close the supply deficit divided by the present value of the additional water supplied (depicted by the shaded area).

Figure A5.1 The Average Incremental Cost Approach



Source: OFWAT 2001, The Role of Long Run Marginal Costs in the Provision and Regulation of Water Services, Report C, p. 39.

The incremental cost approach requires an explicit understanding of the relationship between future costs and growth in water supply. In order to generate cost estimates that reflect the influence of changes in the volume of output, it is necessary to distinguish and disregard those costs that are unrelated to supply augmentation.

Similarly, the demand forecast used in the analysis has a significant impact on estimates of long-run marginal costs. As such, when using such an approach, the demand forecast has to accurately reflect expectations about the future path of total demand.

The Turvey approach

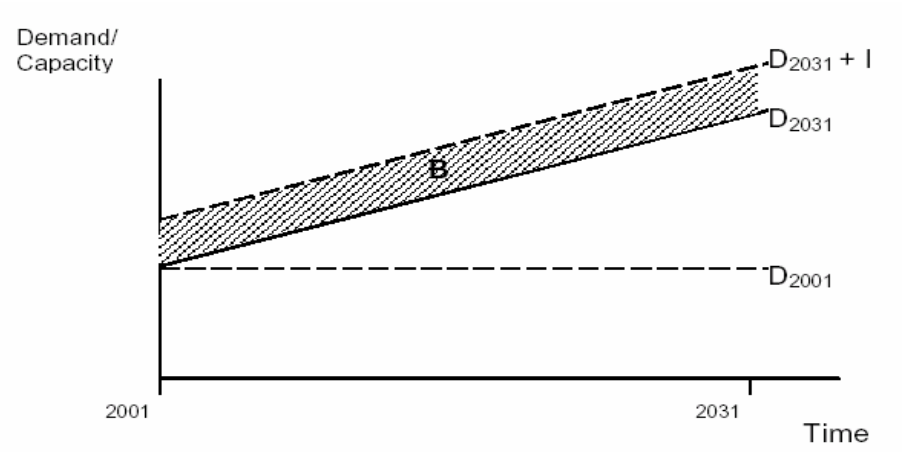
The Turvey approach was initially developed to estimate the savings associated with a slowing of system expansion through reductions in demand for water as a result of the implementation of conservation programs. The approach can also be applied in an opposite manner to address the costs associated with a bringing forward of system expansion to meet increases in demand.

The approach involves:

- consideration of the resource position over a suitably long-term period;
- forecasting demand over the same period;
- optimising the various strategies available to generate the least cost solution to avoid supply/demand imbalances; and
- estimating long-run marginal costs by considering the change in the present value of costs over the planning period resulting from a permanent increment or decrement in forecast demand at a given date and then dividing this by the present value of the increment/decrement.

A graphical illustration of the average incremental approach is provided in Figure A5.2 Suppose D_{2031} represents a company's central demand forecast. The approach considers the impact of a marginal change in demand, represented by alternative forecast (D_{2031} + I). In this case, long-run marginal costs are calculated as the change in the present value of schemes required to maintain the supply/demand balance, divided by the present value of the "marginal change" in expected demand (represented by the shaded area B).

Figure A5.2 The Turvey Approach



Source: OFWAT 2001, The Role of Long Run Marginal Costs in the Provision and Regulation of Water Services, Report C, p. 41.

A simplified example of the process undertaken in estimating long-run marginal costs using the Turvey approach is provided in Box A5.1. In this example, an increase in demand has resulted in a capital expansion program being brought forward by one year; the costs of which divided by the initial augmentation of demand provide a basis for estimating the long-run marginal cost. In a more realistic situation, estimating long-run marginal costs using the Turvey approach would involve an assessment of the costs involved in changing the timing of a number of projects.

Box A5.1 Simplified Example of the Turvey Approach

Given a central demand forecast, a water supplier plans to construct a treatment facility in four years at a cost of $17 million in order to maintain the supply/demand balance. An alternative "unconstrained" forecast of demand of around 1,000 kL per day higher than the central forecast in each year would result in a need to bring forward construction of the treatment facility to year 3 instead of year 4.

Using a discount rate of four per cent, the $17 million spent three years from today has a present value of $15.1 million ($17/(1+0.04)^3$). If the project is instead to be undertaken in year 4, the present value of it would be $14.5 million ($17/(1+0.04)^4$). Under the Turvey approach, the cost numerator is the difference in the present value of capital expenditure brought about from bringing the investment forward; $0.58 million. Dividing the change in cost by the present value of the change in annual demand required to bring the capital project forward (365,000 kL/annum, over a period of, say, 25 years) yields a marginal capital cost estimate of $0.10 per kL. This estimate is then added to a SRMC estimate to yield a LRMC estimate.

Source: Based on the California Urban Water Conservation Council 1997, Designing, Evaluating, and Implementing Conservation Rate Structures, p. C-10.

Appendix 6: Responsiveness to Price Changes

Introduction

In developing pricing recommendations for this inquiry, the Authority undertook demand modelling to examine the potential water savings that could be achieved from increasing usage prices. For illustrative purposes, the impact of setting prices for all households to a flat rate of $1.00 per kL was examined. This scenario does not represent a pricing proposal. The modelling was undertaken solely to provide an indicative estimate of possible water savings from a notional increase in water price.

The introduction of a $1.00 per kL usage charge would result in increased volumetric prices for most households and a reduced fixed service charge. Assuming users make usage decisions based on the marginal price of water rather than average prices (the total water bill divided by kL of water used), it is expected there would be a net reduction in usage in response to the higher marginal price. The size of this reduction depends on the price elasticity of household demand for water, the severity of water restrictions at the time of introducing the tariff change and the timeframe over which the demand response is measured. A greater response to price would be expected in years when consumption is unrestricted – and long term response may exceed the short term response.

The demand analysis also examined the cost of water restrictions to households, when introduced under the current administered prices, and the cost of restrictions under an operational water market.

This appendix outlines the Authority's methodology and results. The modelling is based on residential demand by Water Corporation customers.

A household demand function for water

Examining the possible water savings from a rebalancing of Perth's tariff structure requires an estimate regarding the long-run elasticity of demand across all households for water use. Price elasticity of demand (E) is a measure of the responsiveness of water demand to changes in price. It is defined as the per cent change quantity (Q) in response to a 1 per cent change in price (P):

$$E = (\%\Delta Q)/(\%\Delta P)$$

Econometric studies of household demand for water have commonly found elasticities to lie in the range of minus 0.1 to minus 0.5. This indicates that demand is relatively inelastic (unresponsive) to price — indices greater (more negative) than -1 are considered to be elastic.

Given this range, the Authority has adopted an estimate for demand elasticity of -0.3. Given this elasticity estimate, and observations of unconstrained demand for water at a given volumetric (marginal) price, a linear demand function of the following form: $Q = b_o - b_1P$ can be 'backed out'. For a linear function, elasticity is $E = -b_1P/Q$. Thus, knowing values for E, P and Q it is possible to derive an aggregate household demand function, which is drawn conceptually in Figure A1 below.

The annotations are defined as follows:

P_{WA} = weighted average marginal price under the existing five-block tariff ($0.92 per kL), where the weighting factor is the level of water consumption in each volumetric block as a proportion of total unconstrained consumption;

P_{LRMC} = price equivalent to long run marginal cost (a flat rate of $1.00 per kL was used for indicative purposes in this modelling exercise);

P_R = implicit 'market' price of water under two-day per week restrictions;

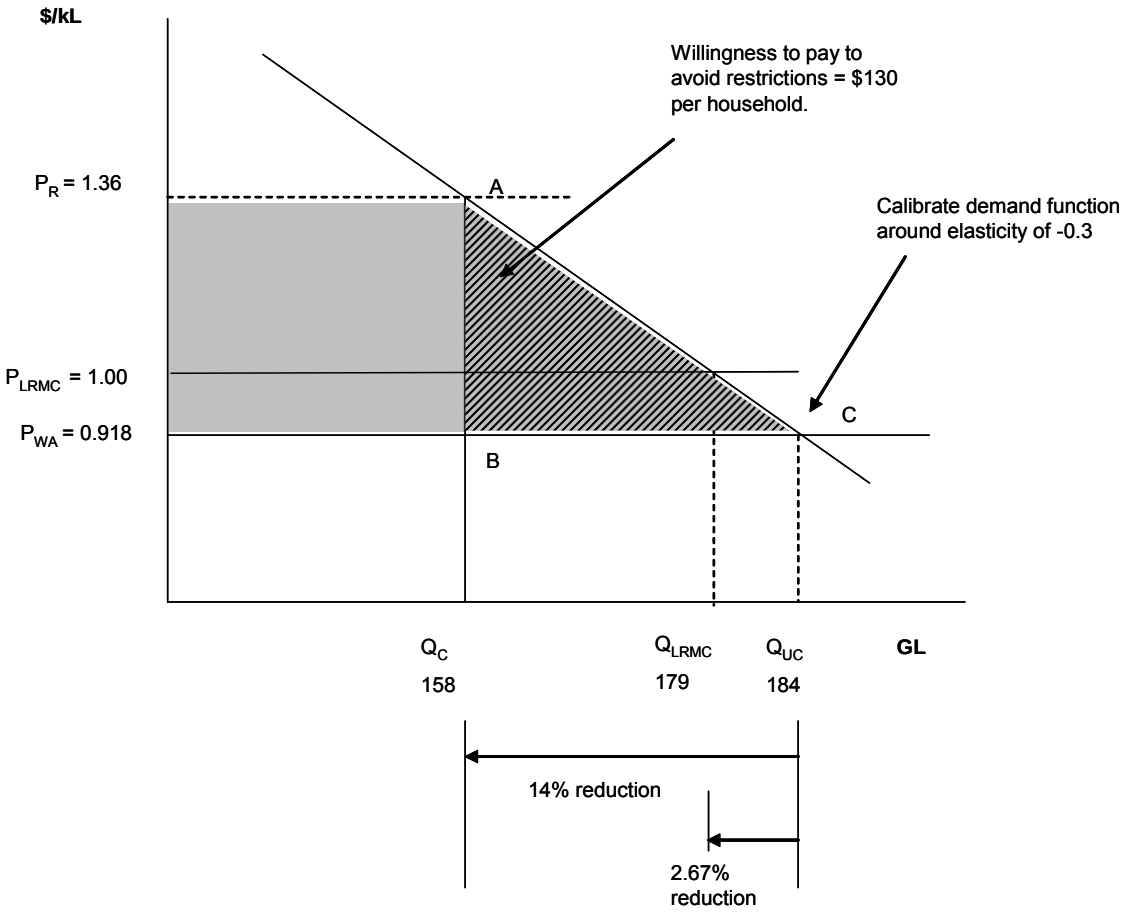
Q_{UC} = unconstrained total household consumption;

Q_{LRMC} = consumption level corresponding to prices set at LRMC;

Q_C = constrained level of total household consumption, corresponding to two-day per week restrictions.

The relevant price-quantity pair for deriving the demand function is the total amount of water consumed by households (Q_{UC}) in the absence of water restrictions (ie. unconstrained consumption), given a weighted averaged price specified by the current block tariff.

Figure A6.1 Aggregate household demand function



Source: The Allen Consulting Group

Household consumption levels (Q_C and Q_{UC})

Table A1 shows the proportion of households within each consumption block and the amount of water consumed by each household grouping under unconstrained supply conditions and in years when two-day per week water restrictions apply. The data are based on observed consumption in 1999-2000, a year when water restrictions did not apply (when average consumption was 319 kL per household) and 2003-04 when two-day per week sprinkler restrictions applied, resulting in average consumption falling to 273kL per household.[87] Total consumption for each of these years is calculated based on a total residential customer base of 576,836 households (includes single and multiple dwellings).

The data indicate that two-day per week sprinkler restrictions impose a 14 per cent reduction in unconstrained consumption, as calculated by (184GL – 158GL)/184, where 184GL is the level of unconstrained consumption (Q_{UC}) and 158GL is the level of constrained consumption (Q_C).

Table A6.1 Household Consumption Profile — with and without water restrictions

	Per cent of households		Total consumption (GL)	
Consumption block (kL/hhold)	Constrained	Unconstrained	Constrained	Unconstrained
0-150	29%	23%	15.6	12.8
151-350	44%	42%	60.6	58.2
351-550	19%	21%	48.3	52.0
551-950	7%	12%	28.0	48.6
951+	1%	2%	5.2	12.6
Total	100%	100%	158	184

Source: Water Corporation, pers. comm., 2005

The weighted average marginal price – existing tariffs (P_{WA})

Under current arrangements, households pay a marginal price based on their level of consumption – according to an inclining five-block tariff. To estimate an aggregate demand function it is therefore necessary to calculate a weighted average of the marginal price (P_{WA}) faced by households. This is given as:

$$\bar{P}_{WA} = \sum_{B=1}^{5} (P_{B^*} \frac{Q_B}{Q_{UC}})$$

where P_B is the price applying to consumption block B, Q_B is the total consumption of households within block B (calculated as average household consumption within block B multiplied by the number of households in block B) and Q_{UC} is the total *unconstrained* consumption across all households, given by:

[87] Includes single and multi-dwelling residences. The 1999-2000 consumption data is normalized to adjust for growth in the customer base (with the adjustment factor being 2003-04 customer base divided by the 1999-2000 customer base).

$$Q_{UC} = \sum_{B=1}^{5} Q_B$$

The consumption data contained in Table A1 is used to calculate the weighting factor Q_B/Q_{UC}. Using the Water Corporation's current price schedule for each consumption block (Table A2), P_{WA} is calculated to be \$0.918 per kL, which is the price that applies to aggregate household consumption.

The weighted marginal price is not too dissimilar to the price used for indicative purposes in this modelling exercise to represent long run marginal cost (a flat rate of \$1.00 per kL). This is because high volume consumers currently pay significantly more than LRMC and their consumption accounts for a significant proportion of total water use. For example, the consumption profiles show that 14 per cent of households are currently paying above LRMC (Table A1) and their consumption accounts for one third of total residential water use (Table A2). A further 21 per cent of households are paying just below weighted average marginal price (\$0.91 per kL) and their consumption accounts for 28 per cent of total residential use.

Table A6.2 Weighted average marginal price calculation

Consumption block (kL/hhold)	Consumption as per cent of total unconstrained use (184 GL)	Current prices ($/kL)	Weighted price ($/kL) (PWA)
0-150	6.93%	0.416	0.029
151-350	31.60%	0.674	0.213
351-550	28.23%	0.91	0.257
551-950	26.41%	1.20	0.317
951+	6.84%	1.50	0.103
	100%		0.918

Key results

Demand response to increasing price to LRMC

Figure A1 illustrates that setting price to a flat rate of \$1.00 per kL, which represents an 8.9 per cent increase on the current weighted average marginal price of \$0.918 per kL, would reduce unconstrained consumption by 2.7 per cent or 4.9 GL.

This quantity reduction is calculated as follows:

-0.3 * 8.9% = 2.67% reduction in Q_{UC}

and 2.67% * 184 GL = 4.9 GL water saving.

In years when restrictions apply, the demand response is estimated to be significantly less or possibly nil. In our static model of demand, depicted by Figure A1, there would be no water savings from raising price to \$1.00 per kL when consumption is constrained to Q_C by two-day per week sprinkler restrictions. This is because, in aggregate, households would be willing to pay a *market price* of up to \$1.36 per kL for an additional unit of water

above Q_C — if a functioning water market existed[88]. The higher price reflects the increased scarcity of the resource.

It is acknowledged that a static demand function for water is an abstraction from reality. Over time there may indeed be a demand response to increasing water prices, even under constrained supply, if higher prices cause household preferences to change. The demand function may shift downward or the slope (elasticity) of the demand function may change. Dynamic modelling is required to estimate consumption responses over a longer timeframe.

Cost of water restrictions

Based on information from the Water Corporation, two-day per week water restrictions have the effect of reducing unconstrained consumption by 14 per cent, or 21 GL per year. Figure A1 shows that marginal price for water would have to increase to $1.36 per kL to achieve the same level of reductions.

The consumer welfare loss imposed by two-day per week restrictions is denoted by the cross hatched triangle ABC. This area is equivalent to $130 per household, or $75 million across all households – assuming the current administered prices are maintained.

If a water market existed and prices were determined by market forces, price would increase following the imposition of water restrictions, reflecting the increased scarcity of water. It is estimated that under a market, the imposition of supply constraint Q_C would result in a welfare loss to consumers equal to the shaded areas in Figure A1 — that is, the area defined by P_RACP_{WA}. This area represents an aggregate welfare loss of $145 million across all households or $251 per household. The loss to consumers is higher under the market scenario because households would be required to pay the market price for water rather than the lower, administered price. However, this observation is somewhat academic because if there was an operational market for water, water restrictions would not be required in the first place. Price, instead, would be the mechanism for bringing supply into balance with demand over the long term.

Sensitivity analyses around the elasticity assumption

As discussed above, there is some uncertainty about the demand elasticity for residential water. Previous studies of residential consumption in cities both here in Australia and overseas report a variety of elasticity estimates, ranging from -0.1 to -0.5, with the most common value being around -0.3[89]. In a study of Perth households, Thomas et al (1983) reports an elasticity of -0.31 for outdoor water use, -0.04 for indoor use and -0.18 overall[90]. Another Perth study, which utilised a contingent valuation approach, estimated an elasticity ranging between -0.1 and -0.43, with an overall value of -0.21[91].

Given the uncertainty about elasticity, it is informative to examine how sensitive our results are to different elasticity values. For elasticities ranging from -0.1 to -0.5:

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88 The estimate of $1.36 per kL is given by [((0.14/0.3)+1)*$0.918], where the percentage reduction in consumption due to water restrictions is 14 per cent.

89 Based on a review of 41 studies by National Economic Research Associates (NERA) — "A review of Melbournes's Water Tariffs". A report for the Department of Natural Resources and Environment, 2001.

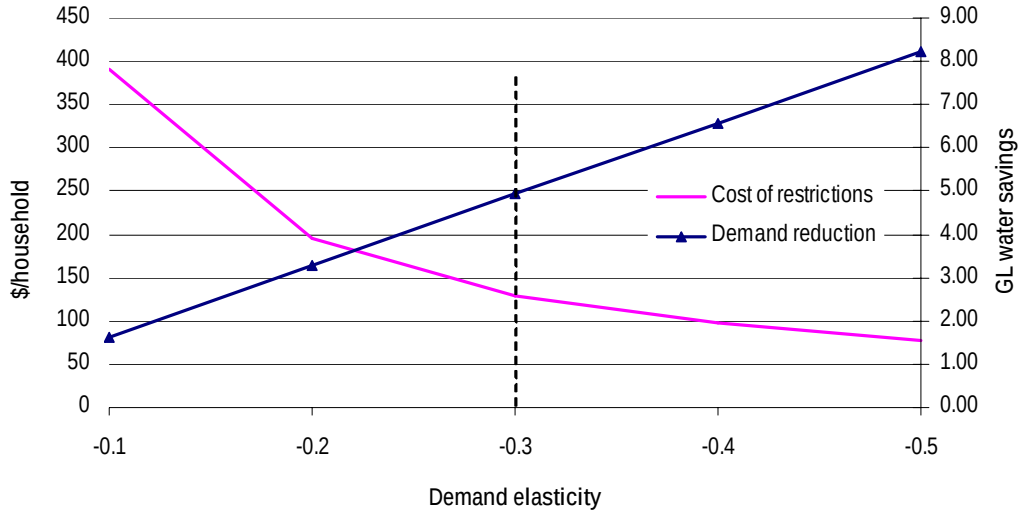
90 Thomas, Syme and Goselink (1983), cited in the NERA report.

91 Thomas J.F. and Syme G.J. (1988) Estimating the price elasticity of demand for water: A contingent valuation approach. Water Resource Research, 24(11), 1847-57.

- water savings from introducing a flat rate volumetric price of $1.00 per kL range from 1.64 GL (under the assumption of a low elasticity of -0.1) to 8.21 GL under the high elasticity assumption (-0.5); and
- the cost of water restrictions under the current regime of administered prices is highest under the inelastic demand assumption of -0.1 ($391 per household) and reduces to $78 per household under an elasticity value of -0.5 (due to households being more willing to substitute water using activities for other activities).

Figure A2 provides a graphical illustration of the water savings and cost of restrictions under the different elasticity assumptions.

Figure A6.2 Sensitivity of results to elasticity assumption



Source: The Allen Consulting Group

Appendix 7: 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 percentage 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 1,000 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 1,000 kilolitres
NCC	National Competition Council
NCP	National Competition Policy
NWI	National Water Initiative
O*ff*GAR	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)

Schedule 1: Recommended Price Paths for Water and Wastewater Services – Water Corporation

Table S1.1 Recommended Water Corporation Metropolitan Residential and Commercial Water Charges (Real Dollar Values of 2005/06)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges ($)										
Residential										
All customers	152.30	140.18	128.05	115.93	103.80	105.06	106.33	107.62	108.92	110.24
Commercial										
20mm meter	461.90	467.49	473.15	478.87	484.67	490.53	496.47	502.48	508.56	514.72
25mm meter	721.70	730.43	739.27	748.22	757.28	766.44	775.72	785.10	794.61	804.22
30mm meter	1,039.30	1,051.88	1,064.61	1,077.49	1,090.53	1,103.73	1,117.09	1,130.61	1,144.29	1,158.14
40mm meter	1,848.00	1,870.36	1,893.00	1,915.91	1,939.10	1,962.56	1,986.32	2,010.35	2,034.68	2,059.31
50mm meter	2,887.00	2,921.94	2,957.30	2,993.09	3,029.31	3,065.98	3,103.08	3,140.63	3,178.64	3,217.11
80mm meter	7,390.00	7,479.44	7,569.95	7,661.57	7,754.29	7,848.13	7,943.11	8,039.24	8,136.53	8,235.00
100mm meter	11,548.00	11,687.76	11,829.20	11,972.36	12,117.26	12,263.90	12,412.32	12,562.54	12,714.57	12,868.45
150mm meter	25,982.00	26,296.44	26,614.68	26,936.78	27,262.77	27,592.71	27,926.65	28,264.62	28,606.69	28,952.89
200mm meter	46,190.00	46,749.00	47,314.77	47,887.38	48,466.92	49,053.48	49,647.13	50,247.97	50,856.08	51,471.55
250mm meter	72,172.00	73,045.44	73,929.45	74,824.16	75,729.70	76,646.19	77,573.78	78,512.59	79,462.77	80,424.44
300mm meter	103,928.00	105,185.76	106,458.74	107,747.12	109,051.10	110,370.86	111,706.59	113,058.48	114,426.74	115,811.56
350mm meter	141,457.00	143,168.94	144,901.60	146,655.23	148,430.08	150,226.41	152,044.48	153,884.55	155,746.90	157,631.78
Vacant land	152.30	154.14	156.01	157.90	159.81	161.74	163.70	165.68	167.69	169.71
Demand Charges ($/kL)										
Residential										
0 – 150 kL	0.421	0.520	0.620	0.720	0.820	0.820	0.820	0.820	0.820	0.820
151 – 350 kL	0.682	0.716	0.751	0.785	0.820	0.820	0.820	0.820	0.820	0.820
351 – 550 kL	0.920	0.895	0.870	0.845	0.820	0.820	0.820	0.820	0.820	0.820
551 – 950 kL	1.213	1.210	1.207	1.203	1.200	1.200	1.200	1.200	1.200	1.200
over 950 kL	1.517	1.437	1.358	1.279	1.200	1.200	1.200	1.200	1.200	1.200
Commercial										
0 – 600 kL	0.726	0.750	0.773	0.797	0.820	0.820	0.820	0.820	0.820	0.820
601 – 1,100,000 kL	0.811	0.813	0.816	0.818	0.820	0.820	0.820	0.820	0.820	0.820
over 1,100,000 kL	0.790	0.798	0.805	0.813	0.820	0.820	0.820	0.820	0.820	0.820

Table S1.2 Recommended Water Corporation Metropolitan Residential and Commercial Water Charges (Forecast Nominal Dollar Values at End of Year; Assumed Annual Inflation Rate of 2.72%)

Year ending 30 June	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges ($)										
Residential										
All customers	152.30	144.02	135.18	125.73	115.67	120.29	125.08	130.07	135.25	140.65
Commercial										
20mm meter	461.90	480.32	499.47	519.38	540.09	561.62	584.01	607.30	631.51	656.69
25mm meter	721.70	750.47	780.40	811.51	843.87	877.51	912.50	948.88	986.71	1,026.05
30mm meter	1,039.30	1,080.74	1,123.83	1,168.63	1,215.23	1,263.68	1,314.06	1,366.45	1,420.94	1,477.59
40mm meter	1,848.00	1,921.68	1,998.30	2,077.97	2,160.82	2,246.97	2,336.56	2,429.72	2,526.59	2,627.33
50mm meter	2,887.00	3,002.11	3,121.80	3,246.27	3,375.70	3,510.29	3,650.24	3,795.78	3,947.12	4,104.49
80mm meter	7,390.00	7,684.64	7,991.03	8,309.63	8,640.94	8,985.46	9,343.71	9,716.25	10,103.64	10,506.47
100mm meter	11,548.00	12,008.42	12,487.20	12,985.07	13,502.79	14,041.15	14,600.97	15,183.12	15,788.47	16,417.96
150mm meter	25,982.00	27,017.91	28,095.12	29,215.28	30,380.10	31,591.37	32,850.92	34,160.70	35,522.70	36,939.00
200mm meter	46,190.00	48,031.61	49,946.64	51,938.03	54,008.81	56,162.16	58,401.36	60,729.84	63,151.16	65,669.01
250mm meter	72,172.00	75,049.52	78,041.76	81,153.31	84,388.92	87,753.53	91,252.29	94,890.54	98,673.85	102,608.01
300mm meter	103,928.00	108,071.64	112,380.49	116,861.13	121,520.41	126,365.47	131,403.70	136,642.80	142,090.79	147,755.99
350mm meter	141,457.00	147,096.93	152,961.73	159,060.36	165,402.14	171,996.77	178,854.33	185,985.30	193,400.59	201,111.52
Vacant land	152.30	158.37	164.69	171.25	178.08	185.18	192.56	200.24	208.23	216.53
Demand Charges ($/kL)										
Residential										
0 – 150 kL	0.421	0.535	0.655	0.781	0.914	0.939	0.965	0.991	1.018	1.046
151 – 350 kL	0.682	0.736	0.793	0.852	0.914	0.939	0.965	0.991	1.018	1.046
351 – 550 kL	0.920	0.920	0.918	0.916	0.914	0.939	0.965	0.991	1.018	1.046
551 – 950 kL	1.213	1.243	1.274	1.305	1.337	1.374	1.412	1.450	1.490	1.531
over 950 kL	1.517	1.477	1.434	1.387	1.337	1.374	1.412	1.450	1.490	1.531
Commercial										
0 – 600 kL	0.421	0.535	0.655	0.781	0.914	0.939	0.965	0.991	1.018	1.046
601 – 1,100,000 kL	0.682	0.736	0.793	0.852	0.914	0.939	0.965	0.991	1.018	1.046
over 1,100,000 kL	0.920	0.920	0.918	0.916	0.914	0.939	0.965	0.991	1.018	1.046

Table S1.3 Recommended Water Corporation Metropolitan Residential Wastewater Charges (Real Dollar Values of 2005/06)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges ($)	241.30	246.73	252.28	257.96	263.76	263.76	263.76	263.76	263.76	263.76
0-4000	253.80	256.25	258.73	261.23	263.76	263.76	263.76	263.76	263.76	263.76
4001-5000	298.90	303.75	308.67	313.67	318.76	318.76	318.76	318.76	318.76	318.76
5001-6000	346.00	367.61	390.57	414.96	440.87	440.87	440.87	440.87	440.87	440.87
6001-7000	396.25	406.96	417.97	429.27	440.87	440.87	440.87	440.87	440.87	440.87
7001-8000	447.75	446.02	444.30	442.58	440.87	440.87	440.87	440.87	440.87	440.87
8001-9000	495.30	481.09	467.29	453.89	440.87	440.87	440.87	440.87	440.87	440.87
9001-10000	534.00	509.02	485.21	462.51	440.87	440.87	440.87	440.87	440.87	440.87
10001-11000	568.60	533.56	500.68	469.82	440.87	440.87	440.87	440.87	440.87	440.87
11001-12000	603.95	558.25	516.01	476.96	440.87	440.87	440.87	440.87	440.87	440.87
12001-13000	636.05	630.05	624.11	618.23	612.40	612.40	612.40	612.40	612.40	612.40
13001-14000	668.45	653.97	639.81	625.95	612.40	612.40	612.40	612.40	612.40	612.40
14001-15000	705.85	681.23	657.46	634.53	612.40	612.40	612.40	612.40	612.40	612.40
15001-16000	739.00	705.08	672.73	641.85	612.40	612.40	612.40	612.40	612.40	612.40
16001-17000	766.20	724.46	684.99	647.68	612.40	612.40	612.40	612.40	612.40	612.40
17001-18000	797.75	746.72	698.96	654.25	612.40	612.40	612.40	612.40	612.40	612.40
18001-19000	831.55	770.33	713.61	661.07	612.40	612.40	612.40	612.40	612.40	612.40
19001-20000	995.45	881.60	780.77	691.48	612.40	612.40	612.40	612.40	612.40	612.40
> 20000	455.51	450.33	446.15	442.94	440.66	440.66	440.66	440.66	440.66	440.66
Average charge (for new customers and customers who move house)	241.30	246.73	252.28	257.96	263.76	263.76	263.76	263.76	263.76	263.76

Table S1.4 Recommended Water Corporation Metropolitan Residential Wastewater Charges (Forecast Nominal Dollar Values at End of Year; Assumed Annual Inflation Rate of 2.72%)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
0-4000	241.30	253.50	266.31	279.78	293.92	301.98	310.27	318.78	327.53	336.51
4001-5000	253.80	263.28	273.12	283.33	293.92	301.98	310.27	318.78	327.53	336.51
5001-6000	298.90	312.08	325.84	340.21	355.21	364.95	374.97	385.25	395.82	406.68
6001-7000	346.00	377.69	412.29	450.06	491.28	504.76	518.61	532.84	547.46	562.48
7001-8000	396.25	418.13	441.21	465.58	491.28	504.76	518.61	532.84	547.46	562.48
8001-9000	447.75	458.26	469.01	480.02	491.28	504.76	518.61	532.84	547.46	562.48
9001-10000	495.30	494.29	493.29	492.28	491.28	504.76	518.61	532.84	547.46	562.48
10001-11000	534.00	522.98	512.20	501.63	491.28	504.76	518.61	532.84	547.46	562.48
11001-12000	568.60	548.20	528.53	509.57	491.28	504.76	518.61	532.84	547.46	562.48
12001-13000	603.95	573.57	544.71	517.31	491.28	504.76	518.61	532.84	547.46	562.48
13001-14000	636.05	647.34	658.83	670.52	682.42	701.14	720.38	740.14	760.45	781.31
14001-15000	668.45	671.92	675.40	678.90	682.42	701.14	720.38	740.14	760.45	781.31
15001-16000	705.85	699.92	694.04	688.20	682.42	701.14	720.38	740.14	760.45	781.31
16001-17000	739.00	724.43	710.15	696.14	682.42	701.14	720.38	740.14	760.45	781.31
17001-18000	766.20	744.34	723.10	702.46	682.42	701.14	720.38	740.14	760.45	781.31
18001-19000	797.75	767.21	737.83	709.59	682.42	701.14	720.38	740.14	760.45	781.31
19001-20000	831.55	791.46	753.30	716.99	682.42	701.14	720.38	740.14	760.45	781.31
> 20000	995.45	905.79	824.20	749.97	682.42	701.14	720.38	740.14	760.45	781.31
Average charge (for new customers and customers who move house)	455.51	462.69	470.97	480.41	491.04	504.52	518.36	532.58	547.19	562.20

Table S1.5 Recommended Water Corporation Metropolitan Commercial Wastewater Charges (Real Dollar Values of 2005/06)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Commercial										
First Fixture	516.00	516.00	516.00	516.00	516.00	516.00	516.00	516.00	516.00	516.00
Second Fixture	220.80	220.80	220.80	220.80	220.80	220.80	220.80	220.80	220.80	220.80
Third Fixture	294.90	294.90	294.90	294.90	294.90	294.90	294.90	294.90	294.90	294.90
Over 3 Fixtures (each)	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70
Vacant land	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70	320.70
First Fixture, Aged Homes	270.00	270.00	270.00	270.00	270.00	270.00	270.00	270.00	270.00	270.00
Over 1 Fixture, Aged Homes	142.90	142.90	142.90	142.90	142.90	142.90	142.90	142.90	142.90	142.90
First Fixture, Exempt & Charitable	62.85	62.85	62.85	62.85	62.85	62.85	62.85	62.85	62.85	62.85
Demand Charges ($/kL)										
Commercial										
>200kL	1.931	1.868	1.806	1.743	1.681	1.681	1.681	1.681	1.681	1.681

Table S1.6 Recommended Water Corporation Metropolitan Commercial Wastewater Charges (Forecast Nominal Dollar Values at End of Year; Assumed Annual Inflation Rate of 2.72%)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Commercial										
First Fixture	516.00	530.16	544.70	559.65	575.00	590.78	606.99	623.64	640.75	658.33
Second Fixture	220.80	226.86	233.08	239.48	246.05	252.80	259.73	266.86	274.18	281.70
Third Fixture	294.90	302.99	311.30	319.84	328.62	337.64	346.90	356.42	366.20	376.24
Over 3 Fixtures (each)	320.70	329.50	338.54	347.83	357.37	367.17	377.25	387.60	398.23	409.16
Vacant land	320.70	329.50	338.54	347.83	357.37	367.17	377.25	387.60	398.23	409.16
First Fixture, Aged Homes	270.00	277.41	285.02	292.84	300.87	309.13	317.61	326.32	335.28	344.47
Over 1 Fixture, Aged Homes	142.90	146.82	150.85	154.99	159.24	163.61	168.10	172.71	177.45	182.32
First Fixture, Exempt & Charitable	62.85	64.57	66.35	68.17	70.04	71.96	73.93	75.96	78.04	80.19
Demand Charges ($/kL)										
Commercial										
>200kL	1.931	1.920	1.906	1.891	1.873	1.924	1.977	2.031	2.087	2.144

Schedule 2: Recommended Price Paths for Water Services – AQWEST

Table S2.1 Recommended AQWEST Water Charges (Real Dollar Values of 2005/06)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Residential										
All customers	90.00	85.98	81.97	77.95	73.93	73.93	73.93	73.93	73.93	73.93
Non-Residential Industry Charges										
Industrial	607.61	443.54	287.80	140.06	-	-	-	-	-	-
Rural	163.07	119.04	77.24	37.59	-	-	-	-	-	-
Commercial	1,227.11	895.76	581.22	282.85	-	-	-	-	-	-
Vacant Land	186.43	152.13	120.57	91.59	80.77	78.61	76.51	74.47	72.48	70.54
Public Facility	1,172.14	855.63	555.19	270.18	-	-	-	-	-	-
Non Rateable	266.40	194.46	126.18	61.41	-	-	-	-	-	-
Meter Charges										
20mm meter	66.60	126.54	201.80	278.39	352.46	352.46	352.46	352.46	352.46	352.46
25mm meter	104.00	197.60	315.12	434.72	550.38	550.38	550.38	550.38	550.38	550.38
40mm meter	266.40	506.16	807.19	1,113.55	1,409.83	1,409.83	1,409.83	1,409.83	1,409.83	1,409.83
50mm meter	416.20	790.78	1,261.09	1,739.72	2,202.60	2,202.60	2,202.60	2,202.60	2,202.60	2,202.60
80mm meter	1,065.60	2,024.64	3,228.77	4,454.21	5,639.33	5,639.33	5,639.33	5,639.33	5,639.33	5,639.33
100mm meter	1,665.00	3,163.50	5,044.95	6,959.70	8,811.45	8,811.45	8,811.45	8,811.45	8,811.45	8,811.45
150mm meter	3,746.25	7,117.88	11,351.14	15,659.33	19,825.77	19,825.77	19,825.77	19,825.77	19,825.77	19,825.77
Demand Charges ($/kL)										
Residential										
0 – 150kL	0.39	0.43	0.48	0.52	0.56	0.56	0.56	0.56	0.56	0.56
151 – 350kL	0.69	0.66	0.63	0.59	0.56	0.56	0.56	0.56	0.56	0.56
351 – 500kL	1.00	0.89	0.78	0.67	0.56	0.56	0.56	0.56	0.56	0.56
501 – 700kL	1.31	1.28	1.26	1.23	1.20	1.20	1.20	1.20	1.20	1.20
701 – 1000kL	1.57	1.48	1.39	1.29	1.20	1.20	1.20	1.20	1.20	1.20
Over 1000kL	2.28	2.01	1.74	1.47	1.20	1.20	1.20	1.20	1.20	1.20
Non-Residential										
0 – 1000kL	0.72	0.68	0.64	0.60	0.56	0.56	0.56	0.56	0.56	0.56
Over 1000kL	1.05	0.93	0.81	0.68	0.56	0.56	0.56	0.56	0.56	0.56
Chargeable volume	50%	65%	75%	85%	100%	100%	100%	100%	100%	100%

Table S2.2 Recommended AQWEST Water Charges (Forecast Nominal Dollar Values at End of Year; Assumed Annual Inflation Rate of 2.72%)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Residential										
All customers	90.00	88.34	86.52	84.54	82.38	84.64	86.97	89.35	91.80	94.32
Non-Residential Industry Charges										
Industrial	607.61	455.71	303.81	151.90	-	-	-	-	-	-
Rural	163.07	122.30	81.54	40.77	-	-	-	-	-	-
Commercial	1,227.11	920.33	613.55	306.78	-	-	-	-	-	-
Vacant Land	186.43	156.30	127.28	99.34	90.00	90.00	90.00	90.00	90.00	90.00
Public Facility	1,172.14	879.10	586.07	293.03	-	-	-	-	-	-
Non Rateable	266.40	199.80	133.20	66.60	-	-	-	-	-	-
Meter Charges										
20mm meter	66.60	130.01	213.02	301.94	392.76	403.54	414.61	425.98	437.67	449.68
25mm meter	104.00	203.02	332.65	471.49	613.32	630.15	647.43	665.20	683.45	702.20
40mm meter	266.40	520.05	852.09	1,207.74	1,571.04	1,614.14	1,658.43	1,703.93	1,750.68	1,798.71
50mm meter	416.20	812.48	1,331.23	1,886.87	2,454.45	2,521.79	2,590.98	2,662.07	2,735.10	2,810.14
80mm meter	1,065.60	2,080.19	3,408.37	4,830.98	6,284.15	6,456.56	6,633.71	6,815.71	7,002.70	7,194.83
100mm meter	1,665.00	3,250.29	5,325.57	7,548.40	9,818.99	10,088.38	10,365.17	10,649.54	10,941.73	11,241.92
150mm meter	3,746.25	7,313.16	11,982.54	16,983.90	22,092.72	22,698.85	23,321.62	23,961.47	24,618.88	25,294.33
Demand Charges ($/kL)										
Residential										
0 – 150kL	0.39	0.44	0.50	0.56	0.62	0.64	0.66	0.68	0.70	0.71
151 – 350kL	0.69	0.68	0.66	0.64	0.62	0.64	0.66	0.68	0.70	0.71
351 – 500kL	1.00	0.91	0.82	0.73	0.62	0.64	0.66	0.68	0.70	0.71
501 – 700kL	1.31	1.32	1.32	1.33	1.34	1.37	1.41	1.45	1.49	1.53
701 – 1000kL	1.57	1.52	1.46	1.40	1.34	1.37	1.41	1.45	1.49	1.53
Over 1000kL	2.28	2.07	1.84	1.59	1.34	1.37	1.41	1.45	1.49	1.53
Non-Residential										
0 – 1000kL	0.72	0.70	0.68	0.65	0.62	0.64	0.66	0.68	0.70	0.71
Over 1000kL	1.05	0.95	0.85	0.74	0.62	0.64	0.66	0.68	0.70	0.71
Chargeable volume	50%	65%	75%	85%	100%	100%	100%	100%	100%	100%

Schedule 3: Recommended Price Paths for Water Services – Busselton Water

Table S3.1 Recommended Busselton Water Charges (Real Dollar Values of 2005/06)

Year ending 30 June –	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Residential										
All customers	105.25	101.90	98.55	95.21	91.86	91.86	91.86	91.86	91.86	91.86
Non-Residential Industry Charges										
Industrial	385.52	281.42	182.60	88.86	-	-	-	-	-	-
Vacant Land	105.25	104.73	104.20	103.68	103.20	102.71	102.22	101.77	101.27	100.80
Public Facility	105.25	104.73	104.20	103.68	103.20	102.71	102.22	101.77	101.27	100.80
Meter Charges										
20mm meter	67.40	114.58	193.44	283.08	356.45	356.45	356.45	356.45	356.45	356.45
25mm meter	105.20	178.84	301.92	441.84	556.36	556.36	556.36	556.36	556.36	556.36
32mm meter	151.60	257.72	435.09	636.72	801.75	801.75	801.75	801.75	801.75	801.75
40mm meter	269.80	458.66	774.33	1,133.16	1,426.86	1,426.86	1,426.86	1,426.86	1,426.86	1,426.86
50mm meter	421.40	716.38	1,209.42	1,769.88	2,228.61	2,228.61	2,228.61	2,228.61	2,228.61	2,228.61
80mm meter	1,079.20	1,834.64	3,097.30	4,532.64	5,707.44	5,707.44	5,707.44	5,707.44	5,707.44	5,707.44
100mm meter	1,686.20	2,866.54	4,839.39	7,082.04	8,917.62	8,917.62	8,917.62	8,917.62	8,917.62	8,917.62
150mm meter	3,777.20	6,421.24	10,840.56	15,864.24	19,976.05	19,976.05	19,976.05	19,976.05	19,976.05	19,976.05
Demand Charges ($/kL)										
Residential										
0 – 150kL	0.41	0.45	0.49	0.52	0.56	0.56	0.56	0.56	0.56	0.56
151 – 350kL	0.59	0.58	0.58	0.57	0.56	0.56	0.56	0.56	0.56	0.56
351 – 500kL	0.65	0.63	0.61	0.58	0.56	0.56	0.56	0.56	0.56	0.56
501 – 700kL	0.78	0.89	0.99	1.10	1.20	1.20	1.20	1.20	1.20	1.20
701 – 1000kL	1.29	1.27	1.25	1.22	1.20	1.20	1.20	1.20	1.20	1.20
Over 1000kL	1.84	1.68	1.52	1.36	1.20	1.20	1.20	1.20	1.20	1.20
Non-Residential										
0 – 1000kL	0.71	0.67	0.64	0.60	0.56	0.56	0.56	0.56	0.56	0.56
Over 1000kL	1.07	0.94	0.82	0.69	0.56	0.56	0.56	0.56	0.56	0.56
Chargeable volume	50%	65%	75%	85%	100%	100%	100%	100%	100%	100%

Table S3.2 Recommended Busselton Water Charges (Forecast Nominal Dollar Values at End of Year; Assumed Annual Inflation Rate of 2.72%)

Year ending 30 June-	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015
Service Charges										
Residential										
All customers	105.25	104.70	104.04	103.26	102.36	105.17	108.06	111.02	114.07	117.20
Non-Residential Industry Charges										
Industrial	385.52	289.14	192.76	96.38	-	-	-	-	-	-
Vacant Land	105.25	107.60	110.00	112.45	115.00	117.60	120.25	123.00	125.75	128.60
Public Facility	105.25	107.60	110.00	112.45	115.00	117.60	120.25	123.00	125.75	128.60
Meter Charges										
20mm meter	67.40	117.72	204.20	307.02	397.21	408.11	419.30	430.81	442.63	454.77
25mm meter	105.20	183.75	318.72	479.21	619.98	636.99	654.46	672.42	690.87	709.82
32mm meter	151.60	264.79	459.29	690.58	893.42	917.94	943.12	969.00	995.58	1,022.90
40mm meter	269.80	471.24	817.40	1,229.01	1,590.01	1,633.64	1,678.46	1,724.51	1,771.82	1,820.43
50mm meter	421.40	736.03	1,276.69	1,919.59	2,483.44	2,551.57	2,621.58	2,693.51	2,767.40	2,843.33
80mm meter	1,079.20	1,884.98	3,269.59	4,916.04	6,360.05	6,534.55	6,713.83	6,898.03	7,087.29	7,281.73
100mm meter	1,686.20	2,945.19	5,108.58	7,681.09	9,937.29	10,209.93	10,490.05	10,777.86	11,073.56	11,377.37
150mm meter	3,777.20	6,597.41	11,443.57	17,206.15	22,260.19	22,870.92	23,498.41	24,143.11	24,805.50	25,486.07
Demand Charges ($/kL)										
Residential										
0 – 150kL	0.41	0.46	0.51	0.57	0.62	0.64	0.66	0.68	0.70	0.71
151 – 350kL	0.59	0.60	0.61	0.62	0.62	0.64	0.66	0.68	0.70	0.71
351 – 500kL	0.65	0.64	0.64	0.63	0.62	0.64	0.66	0.68	0.70	0.71
501 – 700kL	0.78	0.91	1.05	1.19	1.34	1.37	1.41	1.45	1.49	1.53
701 – 1000kL	1.29	1.30	1.31	1.33	1.34	1.37	1.41	1.45	1.49	1.53
Over 1000kL	1.84	1.73	1.60	1.48	1.34	1.37	1.41	1.45	1.49	1.53
Non-Residential										
0 – 1000kL	0.71	0.69	0.67	0.65	0.62	0.64	0.66	0.68	0.70	0.71
Over 1000kL	1.07	0.97	0.86	0.75	0.62	0.64	0.66	0.68	0.70	0.71
Chargeable volume	50%	65%	75%	85%	100%	100%	100%	100%	100%	100%