Draft Report - Inquiry into the Efficient Costs and Tariffs of the Water Corporation, Aqwest and the Busselton Water Board

25 September 2012

Economic Regulation Authority
WESTERN AUSTRALIA

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Contents

List of Tables

List of Figures

1 EXECUTIVE SUMMARY

This report presents the Authority's draft recommendations on the appropriate level and structure of tariffs of the Water Corporation, Aqwest and Busselton Water over the three year period commencing 1 July 2013. It follows public consultation on an issues paper, which was published on 6 February 2011. A final report is due to be provided to the Treasurer by 2 November 2012.

The inquiry is being undertaken in response to a request by the Treasurer. It is the third water pricing inquiry that the Authority has undertaken with the first inquiry completed in 2005 and the second in 2009. The Authority does not set water prices but rather makes recommendations to the Government on what the prices should be.

Submissions on any matter raised in this draft report should be submitted by 4:00 pm (WST) on Monday, 22 October 2012, preferably in electronic form. Section 2.2 contains further information regarding the process for making a submission.

For most households in Western Australia, the aggregate water bill payable consists of a charge for water services and a charge for wastewater services. Charges for water services currently consist of an annual fixed charge (often referred to as a service charge) and variable charges that are applied to different volumes of water usage. The Authority has recommended that this charging structure be maintained. Charges for wastewater services are currently based on property Gross Rental Values (GRVs): The higher the GRV of a property, the higher will be the wastewater charges that apply. The Authority has recommended that this charging structure be abolished and that wastewater charges be levied as a single and equal fixed charge payable by all customers. The reasons for this recommendation are discussed later in this chapter.

If implemented, the tariff recommendations contained in this report will bring about a reduction in the aggregate payment that is made by most metropolitan households. The amount of reduction will depend on the volume of water that is consumed and the Gross Rental Value of the property in question. For a household serviced by the Water Corporation in the Perth metropolitan area with annual water consumption of 250 kilolitres, and an average property value, the aggregate water and wastewater bill payable will reduce by 10.5 per cent or $128 in 2013/14.

This reduction in the aggregate amount payable by metropolitan residential customers is a product of a small increase in the charges for water services that is for most customers offset by larger decrease in charges for wastewater services. For example:

- A household in the Perth metropolitan area with an annual water consumption of 250 kilolitres will face a 3.6 per cent ($20) *increase* in its 2013/14 water bill (relative to 2012/13).
- Assuming that same household had an average Gross Rental Value of approximately $17,000 per year then it would benefit from a 22.2 per cent ($148) *decrease* in its 2013/14 wastewater bill (relative to 2012/13).
- From 2013/14 onwards, price increases for water and wastewater services are driven predominantly by inflation and there are no price increases in excess of five per cent per annum.[1]

[1] The main reason why all prices increases beyond 2013/14 do not exactly match expected inflation (of 2.1 per cent) is that there are a number of minor transitional factors at play. These factors are explained throughout this report.

Similar price movements apply to the recommended tariffs for residential customers living in country areas. The average customer will face an increase in water payments and a decrease in wastewater payments.[2] Like the situation in the metropolitan area, the average decrease in wastewater payments more than offsets the increase in water payments in 2013/14 so that country customers will benefit from a decrease in their combined water and wastewater payments in the first year of the price review period. Beyond 2013/14 combined water and wastewater payments will increase at between 3 and 4 per cent per annum. Water price increases are more pronounced for country areas because country water tariffs are currently being transitioned to more cost-reflective levels. This transition commenced after the Authority's 2009 inquiry and is expected to be completed by 2016.

Under the Authority's recommendations, commercial customers in both the metropolitan and country areas will face higher water charges and lower wastewater charges. Metropolitan and country commercial customers will, in net terms, be better off in 2013/14.

Table 1.1 contains estimates of water and wastewater bills that would be payable by different types of Water Corporation customers over the review period. Figures for 2012/13 are included to provide a comparative measure of what customers are paying at present.

Table 1.1 Impacts of Draft Recommendations on Bills for Water Corporation's Customers - Annual Payments ($, nominal)

	Annual Payments			
	2012/13	2013/14	2014/15	2015/16
Household Water Bills (250kL)				
Perth	551	571	593	616
Country	519	533	559	587
Household Wastewater Bills (average)				
Perth	667	519	527	537
Country	674	586	599	611
Total Household Water and Wastewater Bills				
Perth	1,218	1,090	1,120	1,153
Country	1,193	1,120	1,159	1,198
Commercial Water Bills (40mm & 2ML)				
Perth	4,834	4,825	4,856	4,887
Country	8,739	9,070	9,261	9,455
Commercial Wastewater Bills (2 Fixtures and 1ML)				
Perth	3,182	2,458	2,509	2,562
Country	3,182	2,458	2,509	2,562
Total Commercial Water and Wastewater Bills				
Perth	8,016	7,282	7,365	7,450
Country	11,920	11,528	11,720	12,017

Source: Authority analysis.

[2] Specific water tariff outcomes for country customers will vary across the different classes of towns for which the Water Corporation applies different tariffs.

The annual dollar value and percentage changes in water and wastewater bills payable by Water Corporation customers under the Authority's recommendations is provided in Table 1.2.

Table 1.2 Impacts of Draft Recommendations on Bills for Water Corporation's Customers – Changes in Annual Payments ($, nominal)

	Change in Annual Payments					
	2013/14		2014/15		2015/16	
	$	%	$	%	$	%
Household Water Bills (250kL)						
Perth	20	*3.6*	22	*3.8*	23	*3.9*
Country	14	*2.8*	26	*4.8*	27	*4.9*
Household Wastewater Bills (average)						
Perth	-148	*-22.2*	8	*1.6*	10	*1.9*
Country	-88	*-13.0*	12	*2.1*	13	*2.1*
Total Household Water and Wastewater Bills						
Perth	-128	*-10.5*	30	*2.8*	32	*2.9*
Country	-73	*-6.2*	38	*3.4*	40	*3.4*
Commercial Water Bills (40mm & 2ML)						
Perth	-10	*-0.2*	31	*0.6*	32	*0.6*
Country	331	*3.8*	191	*2.1*	195	*2.1*
Commercial Wastewater Bills (2 Fixtures and 1ML)						
Perth	-724	*-22.8*	52	*2.1*	53	*2.1*
Country	-724	*-22.8*	52	*2.1*	53	*2.1*
Total Commercial Water and Wastewater Bills						
Perth	-734	*-9.2*	83	*1.1*	84	*1.1*
Country	-393	*-3.3*	242	*2.1*	247	*2.1*

Source: Authority analysis.

Residential customers with an average level of water consumption in Bunbury (serviced by Aqwest) and Busselton (serviced by Busselton Water) would face increases in their water bills of 11.4 per cent in 2013/14 ($36) and 8.0 per cent ($32) respectively. Annual percentage increases of similar magnitudes will apply in each of the remaining two years of the price review period.

Table 1.3 contains estimates of water bills that would be payable by different types of Aqwest and Busselton Water customers over the review period. Figures for 2012/13 are included to provide a comparative measure of what customers are paying at present.

Table 1.3 Impacts of Draft Recommendations on Bills for Customers of Aqwest and Busselton Water – Annual Payments ($, nominal)

	Annual Payments			
	2012/13	2013/14	2014/15	2015/16
Household Water Bills (250kL)				
Aqwest	317	353	394	438
Busselton Water	398	430	465	502
Commercial Water Bills (40mm & 2ML)				
Aqwest	3,451	3,844	4,282	4,796
Busselton Water	3,216	3,475	3,756	4,061

Source: Authority analysis.

The annual dollar value and percentage changes in water and wastewater bills payable by Aqwest and Busselton Water customers under the Authority's recommendations is provided in Table 1.4.

Table 1.4 Impacts of Draft Recommendations on Bills for Customers of Aqwest and Busselton Water – Changes in Annual Payments ($, nominal)

	Change in Annual Payments					
	2013/14		2014/15		2015/16	
	$	%	$	%	$	%
Household Water Bills (250kL)						
Aqwest	36	*11.4*	41	*11.6*	44	*11.2*
Busselton Water	32	*8.0*	35	*8.1*	37	*8.0*
Commercial Water Bills (40mm & 2ML)						
Aqwest	393	*11.4*	438	*11.4*	514	*12.0*
Busselton Water	259	*8.1*	281	*8.1*	305	*8.1*

Source: Authority analysis.

The downward pressure on combined water and wastewater bills for Water Corporation customers is the result of a number of factors but the two predominant drivers are a downward revision to the initial regulatory asset value of the Water Corporation and a decrease in the rate of return that is used to estimate the revenue requirements of the water service providers.

- *Regulatory asset value of the Water Corporation* – the Authority has made an adjustment to the Water Corporation's regulatory asset value to remove developer contributions that had previously been inadvertently included in the asset base. It is not appropriate for the Water Corporation to earn a return on assets that have been already paid for by developers and gifted to the Water Corporation. The Authority does not propose making a retrospective adjustment to the asset base. However, by lowering the asset base at 1 July 2013, the Authority's calculation of Water Corporation's revenue requirement is reduced by approximately $422 million over the three year price review period.

- *Rate of return* – the rates of return that the Authority has used in the generation of the revenue requirements of the water service providers are lower than those used in the 2009 inquiry and lower than those proposed by the water service providers for this inquiry. The Water Corporation proposed a real pre tax rate of return in the range of 5.28 per cent to 6.62 per cent. The Authority considers that an estimate of 4.03 per cent is appropriate. The impact of this change is to reduce Water Corporation's revenue requirement by approximately $1,442 million. Similarly, Aqwest and Busselton Water proposed a real pre tax rate of return of 6.30 per cent whereas the Authority considers an estimate of 4.60 per cent is appropriate.[3] The main reason for the relatively low rates of return that are applied in this inquiry is that the nominal risk free rate is currently at a low level: In 2009, the Authority estimated the nominal risk free rate at 5.52 per cent whereas in this inquiry, the Authority estimates that the nominal risk free rate is 2.45 per cent. The final rate of return figures that are used by the Authority will be updated to coincide with the release of the Final Report.

For the Water Corporation's water services these downward pressures are offset by increases in the costs of service provision associated with the need to fund new rainfall independent water source development options (such as the Southern Seawater Desalination Plant) due to Perth's drying climate. It is for this reason that as a stand-alone service, water prices for metropolitan customers increase, though modestly, under the Authority's recommendations.

However, these cost pressures are not as significant in the provision of wastewater services and hence there is a sizeable decrease in the cost of wastewater service provision. The Authority believes these cost savings should be passed on to consumers and hence has developed its recommended wastewater tariffs accordingly.

Water prices for Aqwest and Busselton Water customers increase more significantly than do Water Corporation prices. This is because there has been no downward revision to the initial regulatory asset values of Aqwest and Busselton Water and also because the efficient level of (operating and capital) costs for both businesses have recently been, and are expected to continue to be, relatively high. Despite the recommended increases, tariffs for Aqwest and Busselton Water in 2015/16 are lower than those for the Water Corporation because Aqwest and Busselton Water have lower per kilolitre costs of water supply than does the Water Corporation.[4]

As part of this inquiry, the Authority has also recommended a change in the way that the charges for wastewater services are levied. Specifically the Authority recommends that the GRV charging structure be replaced with a single and equal fixed charge payable by all customers.

The Authority has argued in its past two inquiries that GRV pricing is an inefficient method of recovering revenue. Specifically:

- there is little, if any, relationship between the price charged and the cost of the service;

[3] Note that the Authority considers that a real post tax rate of return should be used in deriving the revenue requirement, and has used 3.31 per cent for the Water Corporation and 3.87 per cent for Aqwest and Busselton Water. However, for comparative purposes, the real pre-tax rate of return is shown in the paragraph.

[4] Aqwest and Busselton Water source water exclusively from groundwater, which is typically a relatively inexpensive supply option.

- the Authority is not aware of reliable evidence to support the view that there is a strong correlation between property values and income[5]; and
- there are administrative costs associated with property value-based pricing. The Water Corporation estimates that the annual cost of maintaining its property value database and regularly recalculating tariffs is between $3 to $4 million.[6]

Under the GRV method for charging there is a large cross subsidy in that customers on properties with high GRV values subsidise (through the payment of higher wastewater charges) customers on low GRV properties. For this reason, a move away from GRV pricing will inevitably involve winners and losers.

Given the downward pressures on the costs of wastewater service provision, the Authority believes that this inquiry presents a good opportunity to shift away from GRV pricing. This is because the vast majority of wastewater customers will benefit from lower annual bill payments as a result of the downward revision to the Water Corporation asset base and the relatively low rate of return being used in revenue requirement calculations.

The Authority estimates that approximately 540,200 metropolitan households will benefit from lower wastewater bills under its recommendations and that 97,700 households will face higher charges as they are moved to a more cost-reflective tariff.

As part of its modelling of recommended tariffs, the Authority has implemented a transition period for customers facing an increase in wastewater payments. For the 97,700 households facing increased charges in 2013/14, the Authority has modelled tariffs such that these customers do not face an increase of more than $50 per year in wastewater charges. Under this arrangement, the vast majority of customers finish the transition to cost-reflective tariffs by the end of the three year price review period (2015/16). Of the households facing an increase, approximately 55,100, would face a $50 increase in 2013/14 and increases of up to $50 in future years, and approximately 42,600 would face a one-off increase in 2013/14 of a lower amount.

The Authority notes that its transition path proposal has been included to provide some indication about how the shift away from GRV based pricing can best be managed. The final decision about whether a transition arrangement is necessary (and if so how it would be implemented) is one that can be made by Government.

1.1 Specific Tariff Recommendations

1.1.1 Water Corporation Water Charges

The Water Corporation's residential water charges include an annual fixed charge that is the same for all customers and usage charges that apply to different levels of consumption.

[5] The available evidence on the relationship between income and property values in Western Australia is very limited. In fact, there appear to be few studies of this issue generally. A recent review of the correlation between income and home values undertaken for the Local Government Association of South Australia does not support the idea of a strong correlation. Indeed they find that the simple correlation is weak, both for Australia and Adelaide. South Australian Centre for Economic Studies. (2004). "The Correlation Between Income and Home Values: Literature Review and Investigation of Data." SA Local Government Association.

[6] Water Corporation, 2012, Personal communication (email), 25 May.

The Authority accepts the Water Corporation's proposal for continuing with the existing tariff structure for water services. The Authority recommends that usage charges should continue to be based on the long run marginal cost of water supply as doing so is an effective way to ensure cost-reflectivity in charges.[7] The Authority then calculates the fixed charge such that the Water Corporation is able to recover any residual revenue requirement.

The long run marginal cost of water supply has increased in recent years as the Water Corporation's estimate of the costs of sourcing water from desalination is higher than it has been in the past. The Water Corporation continues to face a drying climate in Perth and hence has the need to source supply from rainfall independent sources. Rainfall independent sources such as desalination tend to be more expensive to develop than traditional surface or groundwater sources. As a result, the Authority's recommended usage charges, which reflect the higher costs of desalination, are higher than charges that exist at present.

Offsetting this is a small decrease in the fixed charge from the existing charge of $188.10 to $181.75 in 2013/14. A comparison of the proposed fixed and usage charges and current usage charges is provided in Table 1.5.

Table 1.5 Recommended Water Charges for Water Corporation Metropolitan Residential Customers (nominal dollars)

Metro Residential Tariffs	Current Tariffs (2012/13)	Authority Recommended Tariffs (2013/14)	Authority Recommended Tariffs (2014/15)	Authority Recommended Tariffs (2015/16)	% Change (2012/13 to 2015/16)
Fixed Charge ($)	188.10	181.75	185.57	189.56	*0.73%*
1 to 150kL ($/kL)	1.34	1.39	1.44	1.49	*11.4%*
151 to 500kL ($/kL)	1.75	1.85	1.95	2.06	*18.2%*
Above 500kL ($/kL)	2.40	2.61	2.85	3.11	*29.6%*

Source: Authority analysis.

1.1.2 Water Corporation Wastewater Charges

The Authority recommends that the Water Corporation implements a single fixed residential wastewater charge to replace the existing charges that are calculated according to property values. For metropolitan customers, the recommended annual fixed charge is $519 (current charges vary between $309 and $877 per household per annum) in 2013/14 and rises by inflation over the following two years. Although most customers will experience a decrease in their wastewater charges, some customers will face an increase due to the change in the charging methodology. To ensure that such customers do not face a price shock, the Authority has suggested a transition methodology be adopted such that no customer faces a price increase for wastewater services of more than $50 per year.

1.1.3 Water Corporation Drainage Charges

Similar to the case for wastewater, the Authority recommends that the Water Corporation implements a single fixed residential drainage charge to replace the existing charges which are also calculated according to property values. For Perth customers, the

[7] The long run marginal cost is the cost of providing an additional unit of service over a long-term time horizon where physical infrastructure can be varied to meet demand.

Authority's recommended annual fixed charge is $66 in 2013/14 and rises by inflation over the following two years. For all metropolitan residential customers, the Authority's recommended charge is significantly lower than the existing minimum charge, which is $88.30 per year.

1.1.4 Aqwest

Aqwest provides water services to Bunbury and surrounding areas. The Authority has accepted Aqwest's proposed method of charging its customers with the exception that the Authority considers its usage charges should be capped at the Water Corporation's highest usage charge.

The Authority recommends that the 2013/14 water tariffs for Aqwest's residential customers include a fixed charge of $147.94 (up 11.4 per cent on the 2012/13 tariff). Table 1.4 sets out the recommended charges for Aqwest's residential customers.

Table 1.1 Aqwest's Residential Customers Water Charges (nominal)

Residential Tariffs	Current Tariffs (2012/13)	Authority Recommended Tariffs (2013/14)	Authority Recommended Tariffs (2014/15)	Authority Recommended Tariffs (2015/16)	% Change (2012/13 to 2015/16)
Fixed charge ($)	132.80	147.94	164.78	183.53	*38%*
1 to 150kL ($/kL)	0.55	0.61	0.68	0.76	*38%*
151 to 350kL ($/kL)	1.02	1.14	1.27	1.41	*38%*
351 to 500kL ($/kL)	1.46	1.63	1.81	2.02	*38%*
501 to 700kL ($/kL)	1.93	2.15	2.39	2.67	*38%*
701 to 1,000kL ($/kL)	2.31	2.57	2.87	3.11	*35%*
>1,000kL ($/kL)	2.41	2.68	2.99	3.11	*29%*

Source: Authority analysis.

1.1.5 Busselton Water

Busselton Water provides water services to Busselton and surrounding areas. The Authority has accepted Busselton Water's proposed method of charging its customers with the exception that the Authority considers its usage charges should be capped at the Water Corporation's highest usage charge.

The Authority recommends that the 2013/14 water tariffs for Busselton Water's residential customers include a fixed charge of $175.65 (up 8.1 per cent on the 2012/13 tariff). Table 1.5 sets out the recommended usage charges for Busselton Water's residential customers.

Table 1.2 Busselton Water's Residential Customers Water Charges (nominal)

Residential Tariffs	Current Tariffs (2012/13)	Authority Recommended Tariffs (2013/14)	Authority Recommended Tariffs (2014/15)	Authority Recommended Tariffs (2015/16)	% Change (2012/13 to 2015/16)
Fixed charge ($)	162.47	175.65	189.89	205.30	*23%*
1 to 150kL ($/kL)	0.81	0.88	0.95	1.03	*27%*
151 to 350kL ($/kL)	1.14	1.23	1.33	1.43	*25%*
351 to 500kL ($/kL)	1.28	1.39	1.50	1.62	*27%*
501 to 700kL ($/kL)	1.71	1.85	2.00	2.16	*26%*
701 to 1,000kL ($/kL)	2.39	2.58	2.79	3.02	*26%*
>1,000kL ($/kL)	2.45	2.65	2.86	3.10	27%

1.2 Derivation of the Recommended Tariffs

The major factor influencing the Authority's calculation of tariffs is the assessment of the amount of revenue that each of the water businesses requires over the period from 2013/14 to 2015/16 in order to cover its costs. The Authority has undertaken its assessment by reviewing the revenue requirement proposals submitted by the three water service providers. The Authority's recommended revenue requirement for each business reflects what the Authority considers an efficient water business would require.

1.2.1 Water Corporation

The Authority has calculated the Water Corporation's revenue requirement on the basis of its submitted assumptions at $7,978 million for the period from 2013/14 to 2015/16.

The Authority has assessed Water Corporation's proposal and recommends that the efficient level of revenue recovery for Water Corporation is $5,816 million for the period from 2013/14 to 2015/16. The difference between the amount that the Water Corporation has proposed and the amount considered efficient by the Authority is largely due to the following reasons:

- A lower rate of return than proposed by the Water Corporation. The Water Corporation proposed a real pre tax rate of return in the range of 5.28 per cent to 6.62 per cent. The Authority recommends that the appropriate rate of return for Water Corporation is 4.03 per cent, real pre tax. The impact of this recommendation is to reduce Water Corporation's revenue requirement by approximately $1,442 million compared to Water Corporation's proposal.
- An adjustment to the Water Corporation's asset value has been made to remove developer contributions from its regulatory asset base. It is not appropriate for the water business to earn a return on assets that have been already paid for by developers and gifted to the Water Corporation. By lowering the asset base at 1 July 2013, the Authority's calculation of Water Corporation's revenue requirement is reduced by approximately $422 million over the three year period.
- The Water Corporation's forecast operating expenditure for the future price path increases in real terms from $878.3 million in 2013/14 to $919.9 million in 2015/16 (an increase of about 11.5 per cent). The Authority recommends

that the efficient level of operating expenditure ranges from $809.2 million in 2013/14 to $823.2 million in 2015/16. The impact of this recommendation is to reduce Water Corporation's revenue requirement by $298 million compared to what the Water Corporation has proposed.

1.2.2 Aqwest

Aqwest proposed a total revenue requirement of $35.8 million for the period from 2013/14 to 2015/16. The Authority considers that a revenue requirement of $32.9 million is appropriate. The $2.9 million difference between the amount that Aqwest has proposed and the amount considered appropriate by the Authority is mainly caused by:

- *Changes in the rate of return* - Aqwest proposed a (real, pre-tax) rate of return of 6.3 per cent. The Authority recommends that a more appropriate rate of return for Aqwest (when measured on real, pre-tax basis) is 4.6 per cent. The reduction of revenue arising from the change to the rate of return accounts for around two thirds of the difference between that proposed by Aqwest and that considered appropriate by the Authority.
- *Changes in operating costs* - Aqwest proposed operating expenditure of $21.5 million over the 3 years of the review period. The Authority recommends that the efficient level of operating expenditure is $20.5 million over the same period. The impact of this recommendation accounts for around a third of the difference between the revenue requirement proposed by Aqwest and that considered appropriate by the Authority.

1.2.3 Busselton Water

Busselton Water proposed a total revenue requirement of $23.1 million for the period from 2013/14 to 2015/16. The Authority considers that a revenue requirement of $21.8 million is appropriate. The $1.3 million difference between the amount that Busselton Water has proposed and the amount considered appropriate by the Authority is mainly caused by:

- *Changes in the rate of return* - Busselton Water proposed a (real, pre-tax) rate of return of 6.3 per cent. The Authority recommends that a more appropriate rate of return for Busselton Water (when measures on real, pre-tax basis) is 4.6 per cent. The reduction of revenue arising from the change to the rate of return accounts for around four fifths of the difference between that proposed by Busselton Water and that considered appropriate by the Authority.
- *Changes in operating costs* - Busselton Water proposed operating expenditure of $15.6 million over the three years of the review period. The Authority recommends that the efficient level of operating expenditure is $14.8 million over the same period. The impact of this recommendation accounts for around one fifth of the difference between the revenue requirement proposed by Busselton Water and that considered appropriate by the Authority.

1.3 Impacts of the Authority's Recommendations

The following sections contain a series of high-level summaries of the average impacts of the Authority's tariff recommendations on a range of different customer groups.

1.3.1 Residential Customers in Perth

The Authority's proposed tariff recommendations will result in most households in the metropolitan area paying more for water services and less for wastewater services.

For water charges:

- A household in Perth with lower than average annual water consumption (150 kilolitres per year) will incur higher water charges of approximately $16 in 2013/14 compared to 2012/13 (a rise of 1.5 per cent, including inflation).
- A household in Perth with an average annual consumption (250 kilolitres per year[8]) will incur higher annual water charges of approximately $20 in 2013/14 compared to 2012/13 (an increase of 3.6 per cent, including inflation).
- A household in Perth with a higher than average annual water consumption (350 kilolitres per year) will incur higher water charges of approximately $34 in 2013/14 compared to 2012/13 (an increase of 4.7 per cent, including inflation).

For wastewater charges:

- A household with an average property value in the Perth metropolitan area will pay $148 less for wastewater services in 2013/14 relative to 2012/13 including inflation; an decrease of 22.2 per cent. After 2013/14, wastewater charges increase at the same rate as expected inflation such that in 2014/15 the average increase will be $8 and in 2015/16, the average increase will be $10.
- As indicated earlier in this chapter, the Authority calculates that under its recommendations: approximately 540,200 metropolitan households would pay less for wastewater services while 97,700 would pay more for wastewater services. Under the Authority's proposed transition path, a total of 55,100 households would pay the maximum increase of $50 per year.

For drainage charges:

- 43 per cent of households in Perth in 2012/13 are serviced by Water Corporation drainage infrastructure and hence pay drainage charges to the Water Corporation. All residential drainage customers will benefit from lower charges. The minimum annual saving will be approximately $22 per year.

Net impacts on Perth residential customers:

- A typical residential customer[9] in the Perth metropolitan area will pay $128 less for water and wastewater services combined[10] in 2013/14 relative to 2012/13 (including inflation). This is a decrease of 10.5 per cent. After

[8] According to the National Water Commission, average consumption per property was 264 kilolitres per year in 2010/11 (National Performance Report 2010-11). The Authority has used 250 kilolitres as an approximation of the average consumption level for the purposes of providing guidance on the impacts of its recommended tariffs.

[9] Consuming 250 kilolitres of water per year.

[10] Payments for drainage services are excluded from this calculation as not all residential customers pay drainage charges.

2013/14, water prices will increase with expected inflation such that the typical residential customer will pay $30 more for water services in 2014/15 (relative to 2013/14) and an additional $33 in 2015/16.

1.3.2 Commercial Customers in Perth

For water charges:

- Water payments would decrease by $4 (-0.5 per cent) for a typical small business between 2012/13 and 2013/14; $10 (-0.2 per cent) for a medium business; and remain unchanged for a larger commercial business.[11] Beyond 2013/14, annual payments would increase in accordance with expected inflation.

For wastewater charges:

- Wastewater payments would reduce by 22.8 per cent for all commercial customers in 2013/14 and then increase by the expected rate of inflation in the following two years.

1.3.3 Residential Customers in Country

- On average, residential customers in country areas would face an increase in their water bills of 13.0 per cent over the period from 2012/13 to 2015/16.[12]
- On average, residential customers in country areas will benefit from an 9.3 per cent decrease in their wastewater payments over the period from 2012/13 to 2015/16.

1.3.4 Commercial Customers in Country

- On average, country commercial water customers would face an increase of 8.2 per cent in their water bills over the period from 2012/13 to 2015/16.
- On average, country commercial wastewater customers would benefit from a 19.5 per cent decrease in their wastewater payments over the period 2012/13 to 2015/16.

1.3.5 Residential Customers in Bunbury

- Residential customers in Bunbury are serviced by Aqwest. All residential customers will face an average annual increase in their water bills of 11.4 per cent per year in each year of the review period.

1.3.6 Commercial Customers in Bunbury

- For commercial customers in Bunbury, the increase in water bills for an average customer is 11.4 per cent.

[11] A small business is defined here as one with a 20mm meter and 300 kilolitres per year of consumption. A medium business is defined as one with a 40mm meter and 2 megalitres per year of consumption. A large business is defined as one with a 150mm meter and 50 megalitres per year of consumption.

[12] Specific water tariff outcomes for country customers will vary across the different classes of towns for which the Water Corporation applies different tariffs.

1.3.7 Residential Customers in Busselton

- Residential customers in Busselton are serviced by Busselton Water. All residential customers will face an average annual increase in their water bills of 8.1 per cent per year in each year of the review period.

1.3.8 Commercial Customers in Busselton

- For commercial customers in Bunbury, the increase in water bills for an average customer is 8.1 per cent.

1.3.9 Impact on Government Finances

The terms of Reference requires the Authority to provide the impact on Government finances of its recommendations. Table 1.3 sets out the financial implications for the Government from the recommended tariffs for the Water Corporation.[13] In aggregate, the net payments to Government decrease from $131.9 million in 2012/13 to -$19.3 million in 2015/16. The fall is predominantly due to the Water Corporation having a lower profitability over the next price review period.

Table 1.3 Impacts of the Authority's Recommendations for the Water Corporation on Government Finances ($m, nominal)

	2011/12[1]	2012/13[2]	2013/14	2014/15	2015/16
Dividend Payments	396.6	356.7	198.9	218.6	230.7
Tax Equivalent Payments	222.7	203.6	132.8	135.9	147.9
Receipts from State Revenue Office[3]	-450.4	-428.3	-350.4	-374.5	-397.9
Net Payments to Government	168.9	131.9	-18.6	-20.0	-19.3

[1] *Actuals.*
[2] *Authority estimates.*
[3] *Received by the Water Corporation to pay for its Community Service Obligations.*
Sources: Authority analysis and Water Corporation Annual Report, 2012.

1.4 Other Matters

1.4.1 Charges for Recycled Water

As part of this inquiry, the Authority investigated the Water Corporation's approach to charging consumers for the use of recycled water. While the Authority does not provide any specific price recommendations, it does recommend that a number of pricing principles be adopted. These principles are:

- that the Water Corporation expand its use of neutral tendering mechanisms to ensure non-discriminatory access to wastewater allocations;

[13] Due to the relatively small size of Aqwest and Busselton Water, and the fact that they do not pay dividends to the State Government, the impacts on government finances from these two businesses are relatively modest and hence are not presented here but a full analysis is provided in chapters 4 and 5.

- that the Water Corporation permit customers to on-sell their water allocation where appropriate; and

- that the Water Corporation remove principles from its draft Recycled Water Pricing Policy that result in pre-determined outcomes for price discrimination between different customer groups and instead apply commercial negotiations.

1.4.2 Charges to Harvey Water

There is an increase in the recommended price that Water Corporation should charge Harvey Water, when compared to the Authority's recommended price path in its previous inquiry. This is shown in Table 1.7.

Table 1.4 Average Charge to Harvey Water (5yr Price Path, $m, nominal)

	Current	2013/14	2014/15	2015/16	2016/17
ERA Recommended Price Path, 2012	**1.962**	**2.212**	**2.473**	**2.743**	**3.024**
ERA Recommended Price Path, 2007	*1.962*	*2.004*	*2.089*	*2.223*	*2.416*

Source: Authority analysis.

The increase is primarily due to the inclusion of capital expenditure associated with dam safety conducted on the Drakesbrook dam as well as ongoing works on Wellington Dam. In addition, the safety expenditure associated with stage one of the remedial works on Logue Brook Dam has also been included in the Authority's calculation of charges.

The increase in charges arising from these factors has been partially offset by a decrease in the rate of return (from 5.63 per cent in 2007 to 4.03 per cent used in this inquiry[14]), and by the costs relating to the Stirling and Samson Brook dams no longer being borne by Harvey Water irrigators.

1.4.3 Improvements to Price Setting Framework

In this report, the Authority has recommended a number of ways to improve the price setting framework for the three water businesses. These include:

- encouraging the Government to set the revenue requirement and tariffs for the review period, and then leaving the water businesses to operate independently within this revenue requirement;

- having the water businesses take the revenue risk associated with getting their demand forecasts wrong;

- at the commencement of each review, resetting the level of expenditure for which the operating expenditure efficiency factor applies;[15] and

- subject to the introduction of a charter as is discussed below, increasing the length of the review period from the current three years to five years at the next review.

[14] In both instances, real pre-tax estimates of the weighted average cost of capital have been used.

[15] Note, currently this recommendation only applies to the Water Corporation as Aqwest and Busselton Water are not subject to an efficiency target.

In undertaking this review, the Authority has come to the conclusion that the current regulatory framework could be strengthened. One of the ways that this could be achieved is by not having customers pay for any significant capital expenditure that has not been subjected to a review by the Authority.

For example, if significant unexpected expenditure is required for a water treatment plant, and this expenditure was not envisaged at the time of the Authority's review, then under the Authority's proposal, this expenditure would be reviewed in the following price review and would only be passed on to consumers (that is, included in the revenue requirement) if the Authority was satisfied that the expenditure option undertaken was efficient. These additional incentive mechanisms would bring Water Corporation more into line with the type of incentive regime that applies to Western Power, to the benefit of consumers. Enhancing the role of the Authority in these ways would place the water businesses under greater scrutiny than applies at present.

These additional measures would also be in line with the Productivity Commission's recent recommendations that a more explicit 'charter' be established between water businesses and government. This charter would be established at the time of the periodic pricing review, on the advice of the Authority, and would apply for the duration of the review period (currently three years but preferably five years).

The Authority considers that the improvements to the price setting framework outlined above, and discussed in more detail in this report, would achieve net benefits for the community.

2 INTRODUCTION AND METHODOLOGY

The Treasurer of Western Australia gave written notice to the Economic Regulation Authority (**Authority**) on 10 January 2012 to undertake an inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water.

The inquiry has been referred to the Authority under section 32 of the *Economic Regulation Act 2003* (**Act**), which provides for the Treasurer to refer inquiries to the Authority on matters related to regulated or other industries.

In accordance with the Terms of Reference (available in Appendix A), the Authority is required to investigate and report on the efficient costs, and appropriate charges for the services of the Water Corporation, Aqwest and Busselton Water, including recommended tariff levels and charging structures for water, wastewater, irrigation and drainage services.

The Terms of Reference also require the Authority to make recommendations on the most appropriate level and structure of water storage charges to the South West Irrigation Co-operative (otherwise referred to as Harvey Water).

This is the third inquiry into water pricing that has been undertaken by the Authority. The first inquiry was completed in 2005 and the second completed in 2009.

In Western Australia the Government is responsible for setting water, wastewater and drainage tariffs. It is the Authority's role in undertaking these inquiries to provide independent recommendations on tariff levels and tariff structures. The Government considers the advice of the Authority before determining water tariffs. Water tariffs are announced as part of the annual Budget process.

2.1 Review Process

The recommendations of this inquiry will be informed by the following public consultation process:

- The Authority published an issues paper on the inquiry on 6 February 2012 and invited submissions from stakeholder groups, industry, government and the general community on the matters in the Terms of Reference. The due date for submissions was 12 March 2012.
- nine submissions were received in response to the issues paper, which are published on the Authority's web site.
- The Authority has consulted with its Consumer Consultative Committee (ERACCC), and will be consulting further with the ERACCC over the course of the inquiry.
- Following consideration of submissions, the Authority has developed this draft report. Public submissions on the draft report are invited by Monday 22 October 2012 (see section 2.2 below on how to make a submission).
- The final report for the inquiry is to be delivered to the Treasurer by 2 November 2012 and the Treasurer will, in accordance with the Act, have 28 days to table the report in Parliament.

In accordance with section 45 of the Act, the Authority will act through the Chairman and members in conducting this inquiry.

2.2 How to Make a Submission

Submissions on any matters raised in this draft report should be provided in both written and electronic form (where possible) and addressed to:

Inquiry into the Efficiency Costs and Tariffs of the Water Corporation, Aqwest and the Busselton Water Board
Economic Regulation Authority
PO Box 8469
Perth Business Centre
PERTH WA 6849

Email: publicsubmissions@erawa.com.au
Fax: (08) 9213 1999

Submissions must be received by 4:00 pm (WST) on Monday 22 October 2012.

Submissions made to the Authority will be treated as in the public domain and placed on the Authority's website unless confidentiality is claimed. The submission, or parts of the submission in relation to which confidentiality is claimed, should be clearly marked. Any claim of confidentiality will be dealt with in the same way as is provided for in section 55 of the Act.

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

Further information regarding this inquiry can be obtained from:

Bill Scanlan
Assistant Director, References and Research
Economic Regulation Authority
Ph: (08) 9213 1900

Media enquiries should be directed to:

Richard Taylor
Riley Mathewson Public Relations
Ph: (08) 9381 2144

2.3 Approach Taken by the Authority in Determining Tariffs

In developing "appropriate" tariffs for water, wastewater and drainage services the Authority considers both the appropriate level and the appropriate structure of tariffs as is required by the Terms of Reference.

The core principle adhered to by the Authority in calculating the level of water, wastewater and drainage tariffs is that prices should accurately reflect the efficient level of costs incurred by the water service providers in the provision of the relevant water services.

The Authority uses a "building block" approach to calculate an efficient level of costs of service provision for each of the service providers. Once an efficient level of costs has been identified, tariffs are set so that these costs can be recovered by the service providers over a period of time. This approach is described in more detail in the sections below.

2.3.1 Establish Initial Regulatory Asset Values

Initial regulatory asset values are set for each of the three service providers. An initial regulatory asset value represents an unrecovered amount of initial investment undertaken by a service provider.

Once determined, an initial regulatory asset value forms a basis from which some of a service provider's costs can be determined. Costs that are dependent on the setting of the initial regulatory asset value are a rate of return on assets, and a recovery of invested capital (depreciation).

2.3.2 Determine Efficient Costs of Service Provision

The efficient costs of service provision include both capital and operating expenditure. The Authority utilised the services of an engineering consulting firm to assist it with the identification of efficient levels of costs for each of the service providers.

If determined expenditure is lower than necessary then the water service providers run the risk of not being able to meet the levels of service that are required of them. Such an outcome would not be in the long-term interest of consumers. Consumers will be unjustifiably burdened by unreasonably high costs if determined expenditure is higher than necessary.

The process of identifying efficient costs involved liaison with the water service providers and detailed auditing by consulting engineers of demand and cost forecasting processes; as well as project planning and implementation processes. As a result of this detailed auditing process, the consulting engineers were able to provide the Authority with recommendations on efficient levels of capital and operating expenditure. The Authority has formed its recommendations based on this technical advice.

2.3.2.1 Operating Expenditure

As part of this inquiry, the Authority engaged Cardno, an engineering consulting company to undertake a detailed review of the operating expenditure proposals of the three water service providers and to determine if their proposed levels of expenditure are efficient.

In some instances an operating efficiency target may be adopted as a means to ensure that an organisation strives to achieve ongoing efficiencies.

Such an approach has been adopted for the Water Corporation. Since the first water pricing inquiry in 2005, the Authority has recommended that the Water Corporation's tariffs be set in accordance with the assumption that it achieves an ongoing efficiency in real base operating costs per connection of 2.0 per cent per year.

In addition to base operating expenditure, the Water Corporation incurs "level of service" operating expenditure. Level of service operating expenditure is loosely defined as expenditure undertaken to improve the Water Corporation's service standards above a base level that existed in 2005 (the time of the first water pricing inquiry). There is no

efficiency target applied to level of service operating expenditure and hence no incentive for the Water Corporation to achieve efficiencies because level of service costs are ultimately recovered through prices. In this inquiry, the Authority has adopted the approach of adding level of service expenditure incurred up to 2010/11 into the base operating expenditure category so that the expenditure is subject to the efficiency target.

No specific efficiency target is applied to the operating expenditure of Aqwest and Busselton Water but projected expenditure of these organisations is reviewed as part of the price determination process.

2.3.2.2 Capital Expenditure

Determining efficient levels of capital expenditure is a process that involves reviewing a sample of completed and planned capital projects and giving critical consideration to factors such as:

- the justification of need for the project;
- the extent that option analysis is undertaken prior to the making of a decision to proceed with project;
- technical aspects of the project and processes for procurement; and
- adequacy of information and documentation on the project as a means to ensure that costs are minimised throughout the design and build phases of the project.

Capital projects in the water industry are typically large and therefore expenditure is lumpy. In reviewing capital expenditure projections, the Authority is conscious of taking a long-term view when reviewing the capital expenditure projections of the water service providers.

2.3.3 Rate of Return

A rate of return represents the risk adjusted return that the water utilities should be able to earn on the investment that they have made. It is calculated for each service provider so that they can be compensated for the financing of assets as if they were funded from a portion of debt and equity, as would be the case in a competitive market. The rate of return is applied to the value of the assets that the service providers have invested in.

The rate of return is calculated as a weighted average of:[16]

- an expected return on equity; and
- the cost of debt.

In setting a rate of return, the objective is to ensure that the three water service providers are adequately compensated for their investments and hence can continue to operate effectively while at the same time ensuring that customers pay no more than is necessary to receive the required levels of service.

[16] The parameters are weighted according to an appropriate financing structure; this being the ratio of debt and equity finance in the total capital structure of a similar, well-run and efficient firm.

2.3.4 Total Revenue Requirement

Once the building blocks have been estimated, a total revenue requirement is determined for each service provider. This is an amount of revenue that the service provider is able to recover through tariffs.

The total revenue requirement is estimated by:

- commencing with the initial regulatory asset value and adjusting this each year by adding efficient capital expenditure in each year and deducting depreciation; and
- estimating the annual cost of service by applying the rate of return to the regulatory asset value and including depreciation and an efficient amount of operating expenditure, and an estimation of tax liabilities.

2.3.5 Determine Tariffs

The tariffs recommended by the Authority are calculated to recover the revenue requirements of the water service providers. This is done by taking the relevant revenue requirement and dividing it by the forecast level of demand.

Decisions surrounding the structure of tariffs are detailed below.

2.3.5.1 Water Tariffs

Water Corporation Residential Water Tariffs

The Water Corporation's current residential tariff structure includes three volumetric tiers and a fixed charge. The Authority and the Water Corporation support the continuation of the existing structure of tariffs.

The Authority has adopted the approach of using estimates of the long run marginal cost of the provision of water services to base the variable tariff tiers on. 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.

There is a degree of uncertainty surrounding the estimation of the long run marginal cost of water service provision because there is uncertainty surrounding long term rainfall patterns and hence infrastructure requirements as well as future levels of water demand. For this reason, three estimates of the Water Corporation's long run marginal cost have been derived: a central (or mean) estimate, a low estimate and a high estimate.[17]

The Water Corporation is able to earn a portion of its revenue requirement through its variable charges. The fixed charge is set at a level to recover the portion of the revenue requirement that cannot be recovered through the variable charges. In this sense, the fixed charge serves as a balancing item to ensure that the Water Corporation fully recovers its revenue requirement.

[17] The low estimate sits at the lower side of 90 per cent (two tailed) confidence interval around the mean. The high estimate sits on the upper side of a 90 per cent (two tailed) confidence interval around the mean. The Authority's recommended usage tariffs are derived such that they transition to equal the estimates of long run marginal cost by the end of the price review period (2015/16). This is done to minimise price increases in any one year.

Aqwest and Busselton Water Residential Water Tariffs

Aqwest and Busselton Water submitted to this inquiry a preference to continue with the current tariff structures for water services. The current residential tariff structures used by Aqwest and Busselton Water include six volumetric tiers and a fixed charge.

The Authority links the highest usage charge for Aqwest and Busselton Water to the highest usage charge of the Water Corporation because the Water Corporation's usage charge reflects an upper limit of the value of the water resource used by Aqwest and Busselton Water. Other residential usage charges for Aqwest and Busselton Water are increased in proportion to the average annual increase in their costs.

Water Corporation Commercial Water Tariffs

Existing commercial water tariffs include a fixed charge which is dependent upon the meter size that is used by the customer and a single usage or per kilolitre charge. There is no desire to move away from the existing tariff structure as it includes both a fixed and variable component and is cost-reflective in that the fixed charge that is levied increases with the size of the meter being used.

The approach adopted by the Authority to determine commercial tariff levels is to continue to link the Water Corporation's commercial tariffs and its residential tariffs. Specifically:

- the commercial usage charge is transitioned to equal the second tier usage charge for residential customers by 2015/16;
- the annual fixed charge for small-use commercial water customers (those using a 20mm meter) is set equal to the annual fixed charge for residential customers; and
- meter-based charges are increased according to the size of the meter used.

Aqwest and Busselton Water Commercial Water Tariffs

Similar to the approach taken for the Water Corporation's commercial tariffs, Aqwest and Busselton Water commercial tariffs are established by using residential charges as a benchmark. Specifically:

- the commercial usage charge for Aqwest customers is set equal to the second tier usage charge for Aqwest residential customers, and the same approach is adopted for Busselton Water customers;
- the annual fixed charge for Aqwest small-use commercial water customers (those using a 20mm meter) is set equal to the annual fixed charge for residential customers, and the same approach is adopted for Busselton Water customers; and
- in the case of both Aqwest and Busselton Water, meter-based charges are increased according to the size of the meter used.

2.3.5.2 Wastewater Tariffs

Residential Wastewater Tariffs

Residential wastewater tariffs are currently set as a fixed charge each year, based on the estimated Gross Rental Value (GRV) of the property. As relative property values change

over time the wastewater charges are adjusted to maintain the required amount of revenue for the wastewater service. In Perth, residential wastewater charges are set to recover the cost of the service by assuming that the cost share between residential and commercial customers is maintained at its existing level.

The Authority considers the use of GRV pricing to be an inefficient method of recovering revenue. Specifically:

- there is little relationship between the price charged and the cost of the service;
- the Authority is not aware of reliable evidence to support the view that there is a strong correlation between property values and income[18]; and
- there are administrative costs associated with property value-based pricing. The Water Corporation estimates that the annual cost of maintaining its property value database and regularly recalculating tariffs is between $3 to $4 million.[19]

In its 2012 submission to this inquiry the Water Corporation did not explicitly specify what method of charging it supported, only that it did not support GRV-based pricing. However, it made reference to the Authority's recommendation in previous inquiries. In 2009 the Authority's recommendation was for a fixed wastewater service charge.

The Authority continues to recommend a fixed wastewater charge based on the average annual cost of service. This approach would be more cost reflective than property based prices and would be relatively simple to implement and administer.

Commercial Wastewater Tariffs

Existing commercial wastewater charges include a fixed charge and a usage charge. The fixed charge is based on the number of major sewerage fixtures that a customer has. The usage charge is based on the estimated volume discharged to the sewerage system, which is calculated on the basis of water usage multiplied by a discharge factor.

The Authority considers that the existing tariff structure is cost-reflective and appropriate.

2.3.5.3 Drainage Tariffs

Residential Drainage Tariffs

Like wastewater charges, residential drainage tariffs are currently set as a fixed charge each year and the fixed charge is based on the estimated GRV of the property. As indicated above, the Authority considers GRV pricing to be an inefficient method of recovering revenue.

The Authority recommends that an annual fixed charge that is the same for all residential drainage customers is the most appropriate tariff structure for the collection of drainage revenue.

[18] The available evidence on the relationship between income and property values in Western Australia is very limited. In fact, there appear to be few studies of this issue generally. A recent review of the correlation between income and home values undertaken for the Local Government Association of South Australia does not support the idea of a strong correlation. Indeed they find that the simple correlation is weak, both for Australia and Adelaide. South Australian Centre for Economic Studies. (2004). "The Correlation Between Income and Home Values: Literature Review and Investigation of Data." SA Local Government Association.

[19] Water Corporation, 2012, Personal communication (email), 25 May.

Commercial Drainage Tariffs

Similar to the case for residential drainage tariffs, the Authority recommends the implementation of a fixed charge for commercial drainage tariffs (which are currently set on a GRV basis). The only difference between the case for residential and commercial customers is that commercial customers with very large properties are levied a higher fixed charge. The basis for the inclining fixed charge is that the larger the property, the larger is the creation of drainage water and hence the greater is the contribution to the need for drainage infrastructure.

2.4 Strengthening the Price Review Framework

Within this inquiry, the Authority has made a number of modifications to its approach to reviewing and developing its recommended tariffs. These modifications, along with a number of other recommended changes to the framework, would strengthen the existing regulatory framework so that the water service providers will operate with greater incentives to achieve efficiencies. It is expected that these changes will translate into beneficial outcomes for consumers.

2.4.1 The Revenue Recovery Period

In past inquiries, the Authority has determined the total cost of service for each service provider over a ten year forward period and then calculated tariffs such that the recovery of the total cost of service is achieved over this period.

This approach is in contrast to the Authority's general principle of having service providers recover the total costs incurred over a review period recovered over that same period. However, if such an approach had been adopted in the past for water prices, it would have created price shocks for customers due to the high costs of service that have been incurred in recent periods. These costs have been driven by investment in large-scale capital expenditure; predominantly the Kwinana and Southern Seawater desalination plants (in the case of the Water Corporation). Hence the decision was made to spread the recovery of these costs over ten years rather than three years so as to mitigate the price shocks.

No significant pricing pressures are apparent over the period of review covered by this inquiry (2013/14 to 2015/16). Accordingly, the Authority has adopted its preferred in principle approach of recommending tariffs such that the costs incurred over the three year price review period are recovered over that same period.

2.4.1.1 The Price Review Period

Going forward, the Authority has a preference to lengthen the price review period from the existing three years to five years subject to the implementation of a charter (as is discussed below). The Authority holds the view that moving from a three year to a five year period would bring a number of benefits to consumers, the water service providers, the Government. These benefits include:

- reduced administration costs for the water service providers, the Government and the Authority; and
- greater certainty for customers about the future direction of prices, provided that the price path is fixed.

If the Government chose to adopt the Authority's recommendation and lengthen the price review period then there would be a corresponding shift in the revenue recovery period from three years to five years. This would allow for greater flexibility in smoothing prices.

2.4.2 No Ex-Post Adjustment to Revenue Requirement

In determining the total revenue requirement in 2009 for the period 2010/11 to 2012/13, the Authority adopted the approach of making an adjustment to the total revenue requirements of the water service providers to account for an under recovery of revenue that had eventuated from the previous pricing period.[20]

An under recovery of revenue may eventuate in a situation where the volume of water actually sold over the price review period is lower than forecast volumes used at the time that tariffs were calculated. This may be due to a number of factors such as lower than expected demand for water. Under recovery may also eventuate in instances where the actual tariffs implemented by Government are lower than the cost-reflective tariffs recommended by the Authority.

By adjusting the total revenue requirement to allow for an under recovery of revenue the Authority was acting to insulate the water service providers from demand risk. Under such a framework, the revenue of the water service providers is not affected by any discrepancy between forecast volumes of water sold and actual volumes of water sold; and the onus of any discrepancy is borne by consumers in the form of higher or lower tariffs.

The decision to adopt this approach in the past was guided by the level of uncertainty regarding inflows, and water restriction policies (sprinkler bans) that existed at the time of the 2009 inquiry. Given the uncertainty surrounding Government policy on sprinkler bans, the Authority took the view that the water service providers should not be made to carry the risk that actual sales would be less than forecast sales.

While such an approach has been appropriate in the past, the Authority has reviewed the situation and formed the view that water restriction policies are now well-established and are unlikely to change in the near future. In such an environment, demand forecast risk is best managed by the water service providers (rather than consumers) as is the case in normal commercial practice.

Accordingly, the Authority considers that any under or over recovered revenue from past pricing periods should not be taken into account when estimating the revenue requirement for a future period. In other words, it is the Authority's intention that no adjustment for under recovery of revenue for the period 2013/14 to 2015/16 will be made in the next review.

Under this approach there is greater incentive for the water service providers to develop demand forecasts that are as accurate as possible.[21] This has the added benefit of ensuring that any costs based on demand forecasts are also accurate.

[20] Under such an approach, any under recovered revenue is added to the total revenue requirement. Similarly, any over recovery of revenue would be subtracted from the revenue requirement.

[21] Under an arrangement where the service providers bear the demand risk there is a disincentive to over-forecast as this will result in an under recovery of revenue. There is also a disincentive to under-forecast as demand forecasts are needed to underpin projections of capital and operating expenditure. Under-forecast demand figures would not be able to support the required levels of capital and operating expenditure.

Within this framework, the Authority is aware that the service providers are 'owed' an amount of under recovered revenue as a result of a past decision made by the Authority to smooth revenue over a ten-year period.[22] As such, existing under recovered revenue from previous pricing periods has been identified and factored into the revenue requirement (as a one- off adjustment) of each of the service providers. The Authority has calculated tariffs such that the under recovered revenue will be recovered by the service providers over a ten year period. The intention is that there will be no such adjustments like this in future Authority pricing recommendations.

2.4.3 Introducing a Charter

From time to time, some significant items of capital expenditure are incurred unexpectedly part-way through a review period. If such expenditure was not included in the forecasts of the water service providers at the preceding inquiry then, under the approach that has been adopted to date, there is a risk that consumers will end up paying for inefficient expenditure.

The Authority notes that in the context of water, it does not have regulatory powers and therefore cannot enforce any reduction in the regulatory asset base or prices. As such, the Authority recommends that the Government establish a formal arrangement by which the water service providers are obliged to not pass on the costs of any inefficient expenditure to consumers.

A formal arrangement such as this could be put in place through a 'charter' arrangement between the Government, the water service providers and the Authority, consistent with a recent recommendation made by the Productivity Commission.[23]

The Charter should be an open and transparent document that provides clear and unambiguous guidelines about what is expected of the water service providers, including the amount of revenue that they are able to earn. This charter should be established at the earliest opportunity; ideally soon after the current price inquiry is completed by the Authority. This timing would provide the water service providers the certainty about its revenue recovery for the period of the review.

The charter should include any rules that relate to the next price review, including rules about ex-post capital expenditure efficiency review, and that there will be no retrospective under or over revenue adjustment, as discussed earlier. It is important that these rules are set up front, at the start of the price review period. This will ensure that water service providers are clearly informed about what it will be held accountable for during the review period, and has the opportunity to manage its operations accordingly.

The main objective of such a charter should be to:

- establish the independence of the water service providers and the regulatory decision maker from government;
- clearly identify the different roles and responsibilities of each party; and

[22] The result of such a decision is to gradually increase tariffs over a ten year period so that by the end of the ten year period, the service providers have achieved full cost recovery. As a result, tariffs set for the early years of the ten year period are lower than fully cost reflective tariffs (offset later by tariffs that are higher than fully cost reflective tariffs).

[23] Productivity Commission, 2011, *Australia's Urban Water Sector, Productivity Commission Inquiry Report*, No. 55, August.

- establish mechanisms to ensure each party is accountable to its obligations as would be spelled out in the charter.

3 CHARGES FOR WATER CORPORATION CUSTOMERS

3.1 Overview

This chapter contains the outcomes of applying the building block approach, as described above, to the Water Corporation. It includes a discussion of the factors driving the tariffs and concludes with a discussion of the impacts of the Authority's recommended tariffs on Water Corporation customers, the Water Corporation and the State Government.

3.2 Water Corporation Proposal

In its submission to this inquiry, the Water Corporation proposed a total revenue requirement of $7,978 million to be recovered over the period of the price review (2013/14 to 2015/16). Incorporated in the Water Corporation's proposed revenue requirement were the following assumptions:

- a real pre tax rate of return in the range of 5.28 per cent to 6.62 per cent, with a proposed value of 6.0 per cent;
- a total level of capital expenditure of $2.7 billion (nominal) over the three year period 2013/14 to 2015/16; and
- a total level of 'business as usual' operating expenditure of $2.013 billion (nominal) for the three year period 2013/14 to 2015/16; in addition, $348 million (nominal) of operating expenditure to increase its level of service.

The Authority's approach to determining its own estimate of the Water Corporation's total revenue requirement is detailed below.

3.3 Establish the Initial Regulatory Asset Value

Once determined, the initial regulatory asset values form a basis from which some of a service provider's costs can be determined. Appropriate prices can then be set to recover these costs. The costs that are dependent on the setting of the initial regulatory asset value are a rate of return on assets to compensate the business for investing in the assets, and a recovery of invested capital (depreciation).

3.3.1.1 The 2005 Water Pricing Inquiry

An initial regulatory asset value for the Water Corporation was first established by the Authority as part of the 2005 inquiry. At the time, the Authority used a deprival value methodology to determine the initial regulatory asset value. The principle behind a deprival value methodology is to determine an initial regulatory asset value that delivers an expected net revenue stream to the service provider that is equal to the provider's (at the time) projected net revenue stream.

The adoption of a deprival value methodology[24] enabled the Authority to determine an initial regulatory asset value for the Water Corporation, which when utilised in regulatory modelling, did not cause significant changes to existing tariff levels.

Using the deprival value methodology, the Authority calculated the initial regulatory asset value of the Water Corporation at $10.6 billion (in 2005 dollars).

The initial regulatory asset value for the Water Corporation of $10.6 billion contrasted to the Water Corporation's own estimate made at the time of the Inquiry of $9.1 billion.[25] In the Authority's Final Report of the 2005 inquiry, it was noted that the difference between the two estimates was due in part to the treatment of developer contributions. The Authority's estimate of $10.6 billion included developer contributions in the initial regulatory asset value whereas the Water Corporation's estimate of $9.1 billion did not.[26]

3.3.1.2 The 2009 Water Pricing Inquiry

In a submission to the 2009 inquiry the Water Corporation stated that it had a preference for changing the treatment of developer contributions with one option being the exclusion of the contributions from its initial regulatory asset value.[27]

In the Final Report of the 2009 inquiry, the Authority stated that if it had excluded developer contributions from the initial regulatory asset value calculated in the 2005 review, then the derived value would have been $9.6 billion[28] rather than $10.6 billion. An alternative book value methodology was also developed by the Authority to provide context to the existing estimates. This approach delivered an initial asset value for the Water Corporation of $12.9 billion.

Given the range of initial asset values available, the Authority decided to retain its initial valuation of $10.6 billion.[29] The Authority has since reviewed the calculation of this number and has determined that the methodology adopted was flawed given the discovery of an error in the calculation of the range of possible asset values using different methodologies.

The Water Corporation did not comment on its initial regulatory asset value in its submission to this inquiry but a comment made by the Water Corporation during the 2009 inquiry has yet to be properly addressed, this being that the Water Corporation's initial regulatory asset value includes developer contributions. Issues surrounding the methodology used to calculate the Water Corporation's initial regulatory asset value also warrant consideration; this is done in the sections below.

3.3.1.3 Revisiting the Water Corporation's Initial Asset Value

Once an initial regulatory asset value has been established there is generally no good reason to move away from the established value. Changing an initial asset regulatory

[24] The Authority acknowledges that there are a number of different interpretations of the deprival value methodology. The Authority's interpretation of the deprival value methodology is detailed in Section 3.3.1.3.

[25] Water Corporation, 2005, *Submission to ERA Inquiry on Urban Water and Wastewater Pricing*.

[26] Economic Regulation Authority, 2005, *Final Report: Inquiry on Urban Water and Wastewater Pricing*, 4 November, p. 74.

[27] Water Corporation, 2007, *Submission to the Economic Regulation Authority's Inquiry into Tariffs of the Water Corporation, Aqwest and Busselton Water*, 12 September, p. 4.

[28] The Authority's Final Report actually stated a figure of $9.2 billion but this figure has been found to be erroneous. The figure should have been $9.6 billion.

[29] Economic Regulation Authority, 2009, *Inquiry into Tariffs of the Water Corporation, Aqwest and Busselton Water, Final Report*, 14 August, p. 74.

value can create unwanted regulatory risk and uncertainty. For this reason, a change in an initial regulatory asset value in a regulated market is generally not desirable. However, the Authority does not regulate water service providers but rather it provides advice to Government on relevant regulatory matters. In this context, there is scope for the Authority to recommend a change to an initial regulatory asset value provided that the case for change is robust and clearly in the public interest. The Authority believes that the case for a change to the initial regulatory asset value of the Water Corporation is robust, and in the public interest.

Developer Contributions

The existing initial regulatory asset value of the Water Corporation is incorrect because it includes a value for assets that have been gifted to the Water Corporation by developers (developer contributions).

The inclusion of developer contributions in the initial regulatory asset value of the Water Corporation has the effect of entitling the Water Corporation to earn a return on assets for which it has not had to fund. It is standard regulatory practice to limit a regulated entity to earning a rate of return only on assets that it has funded itself. In this way, regulation is designed to mimic conditions in an unregulated and competitive market where a firm can be expected to earn a return on its investments.[30]

The returns on developer contributed assets that are received by the Water Corporation are funded by tariff revenue paid by consumers of water and wastewater services in Western Australia. The ultimate outcome of the inclusion of developer contributions in the Water Corporation's initial regulatory asset value is that tariffs are higher than they should be.

Methodology of Calculation

The existing initial regulatory asset value of the Water Corporation has been calculated using the deprival value methodology. The deprival value methodology is based on the concept that the value of an initial asset base is equal to the forward-looking value that it can be expected to deliver to the owner of the asset. A deprival value methodology delivers an initial asset value that is equal to the net present value of the stream of future net revenues that can be expected to be derived from the existing asset base.

While effective in generating an initial regulatory asset value where previously there was none, the use of the deprival value methodology is problematic for two reasons:

The deprival value methodology suffers from problems of circularity. Forecasts of costs and revenues are used to calculate an initial regulatory asset value. This asset value is then used as the basis for determining appropriate projections of revenues and costs for the service provider. It inevitably follows that the projected revenues and costs are at least very similar (if not equal) to the original forecasts of revenues and costs that were used to determine the initial regulatory asset value.

The deprival value methodology is dependent on forecast data, which is inherently unreliable. This problem becomes especially apparent when it is considered that at the time of the 2005 calculation of the initial asset value, Water Corporation forecasts of revenues and costs were to a large extent unscrutinised by parties other than the Water

[30] A firm operating in a competitive market does not earn returns on investments that have been funded by other entities.

Corporation, or at least not scrutinised to the same level of detail and with the same level of sophistication as they are today.

Unlike the situation in 2005, the Authority now has sufficient data to calculate the Water Corporation's initial regulatory asset value using an historical cost methodology. Using this methodology, the initial regulatory asset value has been calculated by starting with the Corporation's 1995 book value of assets. Additional capital expenditure is then added in the year that it occurs and asset depreciation for that year is deducted. This process is repeated for each year up until 2005, so that an initial asset value can be calculated for 2005. Developer contributions can be excluded from such a calculation.

The historical cost methodology is not subject to the problems of circularity or reliance on forecasts that are inherent with the deprival value methodology and hence delivers a more accurate estimation of an initial regulatory asset value.

3.3.1.4 Conclusion on the Water Corporation's Initial Regulatory Asset Value

The existing regulatory asset value of the Water Corporation is problematic for two reasons. First, the initial regulatory asset value includes developer contributions. Second, the deprival value methodology that has been used as the basis for calculation suffers from methodological shortcomings.

The option of adopting an historical cost methodology that excludes developer contributions is the most technically correct approach to determining an initial regulatory asset value for the Water Corporation. This is because it is derived using a robust methodology and using the most up to date data available. The historical cost methodology delivers an initial regulatory asset value of $8.9 billion (when calculated over the period 1995 to 2005 and excluding developer contributions).

However, the Authority has chosen not to adopt this approach prior to receiving comment from interested parties in response to this Draft Report. The Authority is conscious that a change in the methodology used to calculate an initial regulatory asset value can be problematic due to the creation of regulatory risk.

Still, the case for the removal of developer contributions from the Water Corporation's initial regulatory asset value is robust and is a case that has been argued by the Water Corporation in previous reviews. The inclusion of developer contributions in the Water Corporation's existing regulatory asset value has the effect of placing an inappropriate financial burden on Western Australian consumers.

For this reason, the Authority has elected to revise the Water Corporation's initial regulatory asset value from the existing $10.6 billion to $9.6 billion. The value of $9.6 billion is the value which has been derived using the same methodology and data as used in the 2005 inquiry but excluding developer contributions.

The Authority is open to receiving comment from interest parties on any elements of its decision to revise the initial regulatory asset value of the Water Corporation.

3.4 Determine Efficient Costs of Service Provision

The efficient costs of service provision include both capital and operating expenditure. The Authority utilised the services of an engineering consulting firm (Cardno) to assist it with the identification of efficient levels of costs for the Water Corporation.

Identifying an efficient level of costs involves ensuring that a service provider incurs sufficient costs so as to be able to provide services to the required standard while also ensuring that costs are not excessive and unnecessary. An efficient and prudent level of expenditure is one that enables the Water Corporation to continue to meet service requirements while not unjustifiably burdening consumers.[31]

3.4.1 Demand Forecasts

To produce its demand forecasts, the Water Corporation generates forecasts of growth in customer numbers and forecasts of growth in per capita consumption. The two sets of forecasts are combined to produce an aggregate forecast of total water demand.

3.4.1.1 Forecast Growth in Customer Numbers

Water Corporation projections of growth in customer numbers for metropolitan and residential customers are detailed in Table 3.1.

Table 3.1 Projections of Growth in Water Corporation Customers 2012/13 to 2015/16 (%)

	2012/13	2013/14	2014/15	2015/16
Metropolitan Customers				
Water	2.0	2.1	2.2	2.3
Wastewater	2.2	2.3	2.3	2.4
Country Customers				
Water	1.6	1.7	1.7	1.8
Wastewater	2.3	2.3	2.4	2.5

Source: Water Corporation.

Forecasts of customer numbers are produced using information obtained from a variety of sources. These sources include:

- population projections provided by the Western Australian Planning Commission;
- structure plans prepared by the Western Australian Planning Commission;
- Australian Bureau of Statistics population data; and
- information obtained from local governments.

The Authority considers that the magnitude of the Water Corporation's forecasts of customer numbers is reasonable, though the process that sits behind the derivation of these forecasts is not explicitly clear. The Authority concurs with the findings of Cardno that the demand forecast process could be improved by better documentation.

[31] The forward estimates of capital and operating expenditure of the Water Corporation (and Aqwest and Busselton Water) that are contained in this report are inclusive of expected costs associated with the introduction of carbon pricing as part of the Commonwealth Government's Clean Energy Future Package. Costs put forward by the service providers have been reviewed and approved by the Authority's technical consultant, Cardno.

3.4.1.2 Forecasts of Per Capita Consumption

Forecast flows of water and wastewater are estimated on a per capita basis and then aggregated by multiplying the per connection data with projections of growth in connections.

Water

Per capita water consumption forecasts are contained in the Water Corporation's *Water Forever* document.[32] The document includes three water demand scenarios. The baseline scenario is a reduction in per capita demand from 145 kilolitres per person per year (the level of consumption at the time the document was produced) to 110 kilolitres per person per year by 2060. Forecasts of average per capita consumption for Western Australia as a whole over the 2012/13 to 2015/16 are depicted in Table 3.2.

Table 3.2 Projections of Per Capita Water Consumption 2012/13 to 2015/16 (kL)

	2012/13	2013/14	2014/15	2015/16
Water Consumption per Person per Year	140	139	138	137

Source: Water Corporation.

The forecast reduction in demand that is implicit in the baseline scenario is potentially achievable. For the near future, the required reductions in demand are relatively small but achieving consistent demand reductions over the longer term (to 2060) will be challenging.

The Authority has a number of concerns about the use of the *Water Forever* document as a basis for demand forecasts.

The document contains two alternative scenarios in which (i) per capita consumption falls to 90 kilolitres per year by 2060 and (ii) per capita consumption rises to 190 kilolitres per year by 2060. The inclusion of baseline scenarios and two alternative scenarios in forward projections provides for some sensitivity around the estimates. It is not clear why the low-demand projection is only marginally lower than the baseline scenario (20 kilolitres per person per year) whereas the high-demand scenario is significantly higher than the baseline scenario (80 kilolitres per person per year).

Water Forever forecasts were produced in 2009 without obvious means to be regularly updated. Already in 2012, the forecasts are three years old. It appears that the publication was primarily prepared as a document outlining a plan for the future rather than a detailed forecast document that can be used to underpin water supply planning and cost estimation.

The Authority is not aware of the Water Corporation undertaking any ex-post analysis of the accuracy of its forecasting process and outcomes.

On its review of the Water Corporation's water demand forecast process, Cardno formed the conclusion that there would be benefit in formally documenting the forecast process. In undertaking its own review of the forecasting process, the Authority has come to the same conclusion. The Authority is unclear about how the Water Corporation produces its demand forecasts and how these forecasts are ultimately used in the water supply planning process.

[32] Water Corporation, 2009, *Water Forever, Towards Climate Resilience*, October.

Despite the above concerns, the Authority has accepted the Water Corporation's demand forecasts for the purposes of this report while noting that ideally more work would be done by the Water Corporation to improve the process by which it derives its demand forecasts.

Wastewater

The process for forecasting wastewater flows is detailed in the Water Corporation's Wastewater Conveyance Planning Manual. The document sets out available and relevant sources of data for the wastewater forecasting process. The Water Corporation uses information on town planning schemes and zoning, urban growth data, census information and rainfall data to forecast wastewater flows.

Strategic forecasts of wastewater flows over areas that are already serviced are based on existing flows and census data which are increased using projected growth rates. Lot development data sourced from the Department of Planning, land developers and local governments are used to forecast flows in new development areas.

On review of the Water Corporation's wastewater flow forecasting process, Cardno concluded that the process is well-controlled and draws on appropriate sources of data. The Authority accepts this conclusion though notes that Cardno did point to a lack of high and low forecasts around central forecasts. Cardno concluded that sensitivity of wastewater flows to uncertainties in lot development rates should be included in future planning forecasts. The Authority concurs with this finding.

3.4.1.3 Conclusions on Demand Forecasts

The Authority has accepted the Water Corporation's demand forecasts for the purposes of this report. There is however a lack of clarity on the processes by which the demand forecasts are created, updated and tested. The Authority understands that the Water Corporation is in the process of updating and revising its forecasting processes and methodology and expects that the outcome will be greater clarity around the forecasting process.

3.4.2 Capital Expenditure

The Authority does not recommend an efficiency target on the Water Corporation's capital expenditure. Rather, in each pricing inquiry the Authority reviews what is proposed by the Water Corporation and provides recommendation on an efficient level of capital expenditure for the next pricing period.

The value of the Water Corporation's capital expenditure program in recent years has been between $800 million and $1 billion per annum. Capital expenditure identified as relating to 'supply and demand'[33] typically accounts for the bulk of expenditure (70 per cent of total expenditure over the past four years). Other drivers of capital expenditure relate to 'asset renewals' (19 per cent of total), 'quality and standards' (5 per cent of total), and 'enhanced services' (6 per cent of total).

With the exception of 2011/12, actual capital expenditure incurred by the Water Corporation has broadly matched the level determined by the Authority as appropriate. In 2011/12 actual capital expenditure incurred by the Water Corporation was significantly greater than the level recommended by the Authority as part of the 2009 inquiry (Table 3.3). This additional expenditure was approved by the Government for the purpose

[33] Refers to works required to address growth in demand from either the existing or an expanded customer base, or capacity expansions that are required to maintain the existing level of service.

of accommodating expenditure for a bring forward of Stage 2 of the Southern Seawater Desalination Plant;[34] as well as to accommodate rapid growth in regional Western Australia and an expansion to the infill sewerage program.

Table 3.3 Water Corporation Actual Capital Expenditure 2008/09 to 2012/13 Compared to Authority Projections as at 2009 ($m, nominal)

	2008/09	2009/10	2010/11	2011/12	2012/13
Capital expenditure determined by the Authority in 2009	1,002	1,160	867	695	823
Actual capital expenditure[1]	1,040	1,173	976	997	965
Difference	*39*	*13*	*109*	*302*	*143*

[1] *Data for 2011/12 is Budget data*
Source: Water Corporation 2012, Submission in Response to Issues Paper, March.

In its review of actual capital expenditure relative to budgeted expenditure, Cardno found that variations in actual expenditure outcomes (relative to budget projections) were the result of changes in the timing of certain projects as well as cost overruns and savings.

Cardno noted that many capital projects were developed using only one set of demand forecasts rather than a range of forecast scenarios as is considered preferable. For example, the Kwinana wastewater upgrade project was constructed on the basis of a projected increase in inflows of over 160 per cent in five years. This rate of growth is yet to materialise and according to Cardno, it is likely that the works will remain underutilised for 15 years. There is merit in the Water Corporation reviewing the methodology that it uses to forecast demand to determine the need for specific capital projects.

Cardno undertook a detailed review of 19 future Water Corporation projects and found that many were based on planning studies that were four to five years old. These planning studies included project scoping information that had been carried through the four to five year period without review. It was recommended that formal reviews of planned projects be continually undertaken with particular emphasis given to consideration of underlying assumptions of expected demand; as well the identification of a least cost solution and how this may change over time. Cardno also concluded that there is a need for demand projections to be better, and more formally, documented.

3.4.3 Capital Expenditure Forecasts

The Water Corporation's capital expenditure forecasts are developed in conjunction with the Government and are published in the State Budget. Forward projections of Water Corporation capital expenditure as contained in the State Budget are detailed in Table 3.4. These figures are used for this inquiry.

[34] There was an unexpected bring forward in the timing of the desalination plant due to low rainfall particularly in the year 2010. It is estimated that the bring forward accounted for approximately half of the difference of the observed difference in forecast capital expenditure versus actual capital expenditure. Water Corporation, 2012, personal communication and Premier of Western Australia, 2011, *Perth's New Major Water Supply Secured*, Media Statement, http://www.mediastatements.wa.gov.au/Pages/default.aspx?ItemId=142584&page=24.

Table 3.4 Water Corporation Capital Expenditure Forecasts 2013/14 to 2015/16 ($m, nominal)

	2013/14	2014/15	2015/16
State Budget 2012/13 (Provisional Revised)	948	712	735

Sources: Cardno and Water Corporation.

For the past four years, the budget granted by the State Government has been less than the Water Corporation's proposed budget. Competing objectives between the State Government and the Water Corporation work to constrain what the Water Corporation is able to spend and Cardno has found that this constraint tends to put pressure on expenditure that is required for environmental improvements or asset renewals.

In response to operating in a constrained environment, Cardno found that the Water Corporation has effectively and perhaps implicitly adopted a risk management approach whereby a higher risk of failure in meeting environmental obligations is accepted in exchange for a lower risk of failure in more public aspects of the business such as service standards, supply reliability and water quality.

Cardno also found that the tight constraints imposed by State Government Budget implications had the effect of fostering short design horizons (six to nine years) that focus on areas most in need (the worst performing areas of the business). Cardno concluded that under the current constrained framework for expenditure it is likely that opportunities to design optimal whole of life solutions that are based on long design horizons may be constrained.

It was also noted that capital constraints are one possible reason behind the historically low expenditure on asset renewals. Current levels of expenditure are not sustainable into the future given the ageing of the Water Corporation's asset base. On this matter Cardno recommended that:

- the Water Corporation ensures that all expenditure on asset renewals is captured under an asset renewals category so that accurate information on expenditure is available; and
- the Water Corporation further develops a long-term asset renewal plan to provide support for future renewals expenditure requirements.

The Authority supports these recommendations.

Table 3.5 contains the capital expenditure projections disaggregated into the Water Corporation's different business units. The large variations in some items of capital expenditure are the result of large lumpy investments in infrastructure such which is not uncommon in the water industry.

Table 3.5 Water Corporation Capital Expenditure Disaggregated Forecasts 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
Desalination	***215.3***	***30.4***	***0.9***	***0.0***
Metropolitan Water	*169.6*	*356.2*	*172.9*	*234.4*
Country Water	*279.0*	*280.2*	*126.0*	*169.9*
Total Water	***448.6***	***636.4***	***298.9***	***404.3***
Metropolitan Wastewater	*144.4*	*108.1*	*159.0*	*125.4*
Country Wastewater	*220.9*	*165.4*	*243.2*	*191.8*
Total Wastewater	***365.3***	***273.5***	***402.2***	***317.2***
Metropolitan Drainage	*6.0*	*6.2*	*4.5*	*6.7*
Country Drainage	*0.5*	*0.5*	*0.4*	*0.6*
Total Drainage	***6.5***	***6.7***	***4.9***	***7.3***
Irrigation	***3.3***	***0.9***	***4.9***	***6.3***
Total	**1,039**	**948**	**712**	**735**

* *Figures may not add due to rounding.*
Sources: Cardno and Water Corporation.

In its submission to this inquiry, the Water Corporation indicated that the approved (State Budget) level of capital expenditure is insufficient to fund the value of capital expenditure required meet its own internal Strategic Investment Business Case (SIBC) requirements.[35] The value of capital expenditure identified through its internal SIBC process as being required by the Water Corporation is detailed in Table 3.6 below.

Table 3.6 Water Corporation capital expenditure forecasts 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
State Budget 2012/13 (Provisional Revised)	1,039	948	712	735
SIBC Total Program	1,160	1311	941	756
Dollar Difference (SIBC less Budget Approved)	*+121*	*+363*	*+229*	*+21*

Sources: Cardno and Water Corporation.

Despite the difference between the two series of projections and the concerns raised by the Water Corporation in its submission to this inquiry, the Water Corporation submitted the approved (State Budget) figures to the Authority for use in the development of tariffs. Accordingly, the Authority has adopted the State Budget figures in its modelling of tariffs. Inclusive in the State Budget capital expenditure figures are costs associated with the carbon tax. For the Water Corporation, the additional costs to its capital expenditure program attributable to the carbon tax are between $6 million and $9 million per year.

[35] Water Corporation, 2012, *Submission in Response to the Issues Paper*, p. 23.

The Authority seeks further comment from Water Corporation on whether its SIBC capital expenditure forecasts should form the basis of the Authority's revenue requirement calculation. In particular, the Authority requires the Water Corporation to demonstrate whether higher capital expenditure is required to maintain service standards, and if so, for which categories of expenditure.

3.4.3.1 Water Corporation Capital Expenditure Forecast Process

The Water Corporation forecast process consists of a number of components including:

- a Strategic Investment Business Case analysis that enables the Water Corporation to effectively align capital investment with strategic priorities whilst adapting to State Government imposed budgetary constraints. The SIBC also enables the Water Corporation to observe the impacts of variations in funding;
- a risk-based approach to capital works programming; and
- an optioneering framework that enables the Water Corporation to consider non-capital, demand management and project deferral solutions.

Cardno found these processes to be effective in focussing the Water Corporation's project prioritisation approach, and enabling informed decision making on managing capital expenditure within the State Government Budget constraints that the Water Corporation operates in.

The implementation of the processes enables a sound justification for forecast projects. In summary, the Water Corporation effectively considers viable options to meet a project need; has a sound process for estimating costs; and has adopted the appropriate methodologies to identify least cost solutions to problems.

Based on the advice of Cardno, the Authority accepts the Water Corporation capital expenditure forecasts (as detailed in Table 3.4) as being efficient.

3.4.4 Operating Expenditure

For the purpose of regulatory analysis, the Water Corporation's total operating expenditure is disaggregated into a 'base' component and a 'level of service' component. The base component of operating expenditure is that expenditure which is incurred in the normal course of service provision assuming there is no change to service standards. The 'level of service' component of operating expenditure is operating expenditure that is incurred by the Water Corporation in meeting newly imposed standards or requirements.

The Water Corporation's forecast operating expenditure for the future price path increases from $878.3 million in 2013/14 to $919.9 million in 2015/16 (an increase of about 11.5 per cent). The majority of Water Corporation operating expenditure is defined as base operating expenditure. The first three rows of Table 3.7 detail the Water Corporation's projections for base, level of service and total operating expenditure.[36]

[36] The Water Corporation's projections of its level of service operating expenditure include an allowance made for the costs of the carbon tax. These costs equate to approximately $14.5 million per annum.

Table 3.7 Water Corporation Forecast Operating Expenditure, 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
Water Corporation Forecast Base Operating Expenditure	668.4	688.8	711.3	737.7
Water Corporation Forecast Level of Service Operating Expenditure	156.8	189.5	188.0	182.2
Water Corporation Forecast Total Operating Expenditure	***825.2***	***878.3***	***899.4***	***919.9***

Source: Water Corporation.

In prior inquiries the Authority has imposed a real per connection operating expenditure efficiency target of 2.0 per cent on base operating expenditure. The Water Corporation has met this target for its base operating expenditure in recent years. However, the Authority has observed that level-of-service operating expenditure has increased significantly since 2005, particularly when viewed in the context of the increases observed in base operating expenditure, Table 3.8.

Table 3.8 Water Corporation's Actual and Forecast Operating Expenditure Prior to Rebase ($m, nominal)

	2005/06	2006/07	2007/08	2008/09	2009/10
Base operating expenditure	416	415	453	481	525
Level of service operating expenditure	2	34	69	101	126

Source: Water Corporation.

As a general conclusion, Cardno found the Water Corporation's forecast expenditure to be efficient. However, Cardno did note there is an incentive for the Water Corporation to shift some of its base operating expenditure into level of service expenditure. This is because the Authority's efficiency target is applied to base operating expenditure and not level of service operating expenditure.[37] Rapid growth in actual level of service operating expenditure as evidenced in Table 3.8 lends some support to the conclusion drawn by Cardno. The incentive for the Water Corporation to shift its expenditure into the level of service category is a concern held by the Authority.

Additionally, Cardno noted that there was some confusion regarding the definition of level of service operating expenditure. Cardno proposed that the following categories of level of service operating expenditure be implemented going forward:

- *regulations* - costs (savings) related to the implementation of a new regulatory standard;
- *diseconomies* - marginal costs related to expanding service at a higher service standard (for example, climate proofing and security of supply);
- *spend to save initiatives* – schemes undertaken to save operating costs (for example, upgrades, automation, better data collection); and
- *capital expenditure deferral schemes* – schemes undertaken to defer capital expenditure (in cases where such schemes can be justified on a whole life cost basis).

[37] Cardno, 2012, *Review of Water Corporation's Capital and Operating Expenditure, Final Report*, p. iv.

Conversely, Cardno has recommended that the following categories of expenditure should be included in base operating expenditure:

- *growth* - including costs relating to growth, supply and demand balance, and meeting existing performance standards;
- *prices* - costs relating to increases in input prices; and
- *corporate objectives* - costs of initiatives for corporate objectives other than saving money.

The Authority also supports a more specific classification of operating expenditure as has been proposed by Cardno and will therefore apply this classification going forward.

3.4.5 Projections of Efficient Operating Expenditure

3.4.5.1 The Efficiency Target

Since the 2005 inquiry, the Authority has recommended that the Water Corporation's tariffs be set in accordance with the assumption that the Water Corporation achieves an ongoing efficiency in real base operating costs per connection of 2.0 per cent per year.

In reviewing the Water Corporation's operating expenditure, Cardno concluded that the 2.0 per cent annual efficiency target on base operating expenditure is an appropriate efficiency target to implement over the 2013/14 to 2015/16 period. Specifically, Cardno noted "we consider that a 2% annual efficiency target on base operating costs is achievable in the short term without a significant stretch by the Corporation, mainly due to the large impact of economies of scale while growth rates remain steady".[38]

In forming its view on an appropriate efficiency target for the Water Corporation, Cardno arrived at 2.0 per cent after identifying and summing various efficiency components. These are detailed in Table 3.9.

[38] Cardno, 2012, *Review of Water Corporation's Capital and Operating Expenditure, Final Report*, p. 59.

Table 3.9 Components of the Water Corporation Efficiency Target as Derived by Cardno

Type of Efficiency	Description	Estimate
Continuing Efficiency	Based on continuing efficiency achievable by a firm operating at the efficiency frontier.	0.25%
Efficiency Due to Specific Initiatives on Support Costs	Efficiencies achieved by investment in "corporate initiatives".	0.33%
Catch-Up Efficiency	The Water Corporation was assessed as already operating at an efficiency frontier hence no catch-up efficiency is possible.*	0.00%
Efficiency Due to Economies of Scale	Based on accepted advice from the Water Corporation.	0.98%
Contribution of Major Contracts to Efficiency	Alliance contracts are subject to similar efficiencies that support services are.	0.26%
Efficiency in Direct Costs	Efficiency to capture economies of scale in power costs.	0.17%
Total		**1.99%**
		(rounded to 2.0%)

** Catch up efficiency is an efficiency that can only be applied to companies that are considered to be less efficient than a frontier company.*
Source: Water Corporation.

The Authority accepts the Cardno recommendation that 2.0 per cent is an appropriate efficiency target to apply to base operating expenditure over the upcoming price review period. The efficiency target will be reviewed in the next pricing inquiry.

3.4.5.2 Base and Level of Service Expenditure

In its submission to this inquiry, the Water Corporation proposed that its operating expenditure be rebased to 2010/11. The Authority's interpretation of the Water Corporation proposal is to shift some elements of level of service expenditure into base operating expenditure.

Operating expenditure figures provided to the Authority by the Water Corporation include the Water Corporation's proposed rebase: the result being that level of service operating expenditure falls from $126.4 million in 2009/10 to $61.7 million in 2010/11. In the absence of a rebase, the Water Corporation has advised the Authority that total level of service operating expenditure in 2010/11 would have been $171.1 million.[39] With these figures it can be ascertained that the Water Corporation has proposed to shift $109.4 million of level of service expenditure into base expenditure.

The Authority accepts the in principle proposal for a rebase on the basis that:

- a rebase of expenditure means that the 2.0 per cent efficiency target will apply to the total level of operating expenditure (for 2010/11 at least); and
- going forward, the Authority can accurately determine what items should and should not be included in the level of service category.

[39] Water Corporation, 2012, personal communication by email, 11 September.

The Authority has however taken a different approach to the Water Corporation in determining the specifics of the rebase. Rather than shift some items of operating expenditure to the base operating expenditure, the Authority believes that a simpler and more effective approach is to shift all level of service expenditure into base expenditure at the end of each price review period.

The Authority does not believe that it is appropriate that expenditure items remain classified as level of service items for an indefinite period of time. In its view, the level of service classification should only be used as a short term classification to ensure that new level of service requirements are not subject to an efficiency target. This approach will ensure that level of service expenditure does not continually increase at the rapid rates that have been observed in the past.

The Authority's implementation of the rebase results in the shift of $171 million (as at 2010/11) from the level of service category of operating expenditure to the base category of operating expenditure. The operating expenditure figures used by the Authority in its development of tariffs are detailed in Table 3.10.

Table 3.10 Water Corporation Efficient Operating Expenditure as Determined by the Authority, 2010/11 to 2015/16 ($m, nominal)

	2010/11	2011/12	2012/13	2013/14	2014/15	2015/16
Efficient Base Operating Expenditure	501.4	684.2	696.1	708.2	720.5	733.0
Efficient Level of Service Operating Expenditure	174.7	20.3	91.6	123.9	121.1	114.2
Total Efficient Operating Expenditure	***672.5***	***704.5***	***787.8***	***832.2***	***841.6***	***847.2***

Source: Authority analysis.

3.4.6 Rate of Return

In its role of providing recommendations on tariffs for the Water Corporation the Authority is required to determine an allowable amount of revenue for each service provider. Part of this amount of revenue includes a return on the assets that the Water Corporation has invested in.

This section summarises the Authority's approach to the calculation of the weighted average cost of capital (**WACC**), which is equivalent to the rate of return. A detailed description of the methodology is provided in Appendix B. A rate of return is calculated for the Water Corporation so that it can be compensated for the financing of assets as if they were funded from a portion of debt and equity, as would be the case in a competitive market.

The rate of return consists of two components:

- an expected return on equity, which is estimated using the capital asset pricing model; and
- a cost of debt.

Once these two parameters are estimated they are weighted according to an appropriate financing structure; this being the ratio of debt and equity finance in the total capital

structure. The estimation of the rate of return should reflect prevailing market conditions; the level of risk faced by the service providers; the appropriate cost of debt; and the credit ratings of the service providers.

In setting a rate of return, the objective is to ensure that the Water Corporation is adequately compensated for its investments and hence can continue to operate effectively while at the same time ensuring that customers pay no more than is necessary to receive the required levels of service.

In determining the rate of return, the Authority has not based its analysis on the actual costs of capital faced by the Water Corporation but rather on the costs that would be incurred by a similar, well-managed, benchmark business.

Such an approach is typical of that taken by regulators across Australia and is adopted because it is the objective of regulators to determine an efficient level of costs to be recovered through tariffs. Determining an efficient level of costs requires that costs be estimated as those costs that a similar, well-managed, benchmark business would incur.

As is often the case with government-owned entities, the Water Corporation has a capital structure that differs to structures that are more typical of privately-owned utilities. The Water Corporation's gearing ratio is currently about 30 per cent. In contrast a similar private company would be expected to have a substantially higher gearing ratio. Gearing ratios of 60 per cent are observed in privately-owned water companies in the United Kingdom (refer Table 3.12).

The low gearing ratios observed in some government-owned entities may be the result of the fact that there is a general government objective of ensuring that its aggregate level of debt is kept at some level to maintain a desired credit rating. This objective can tend to override a desire held internally at an organisation level to optimise its capital structure.

In summary, it would not be appropriate to estimate rates of return using the actual capital structures of the Water Corporation because the actual capital structure of the Water Corporation does not match the capital structures of similar, well-managed and privately-owned companies.

Further, it would not be appropriate to estimate the rate of return using the State Government's AAA credit rating. The State Government is the owner of the Water Corporation but as an aggregated entity financed by taxpayers it faces a very different risk profile to the business risk profile that is faced by the Water Corporation.[40] By applying the credit rating that would be expected of a well-managed, benchmark company, the Authority is incorporating a more appropriate assumption about the credit rating that reflects the risks that are being faced by investors in such a company.[41]

3.4.6.1 The Adoption of a Pre-Tax or Post-Tax Approach

In the 2009 inquiry, the Authority applied real pre-tax rates of return (6.62 per cent for the Water Corporation, and 7.14 per cent for Aqwest and Busselton Water). Under the pre-tax approach, an allowance is included in the rate of return to compensate an organisation for taxation liabilities. The pre-tax rate of return provides sufficient revenue for an

[40] See ERA, 2012, *Draft Decision on Proposed Revisions to the Access Arrangement for the Western Power Network*, p. 175 for a fuller discussion on the risk profiles of State Government versus a regulated entity.

[41] As an aside, it is worth noting that were the Authority to use the actual capital structures incurred by the Water Corporation in estimating the rates of return, the resulting tariff recommendations would likely be lower than those recommended in this report.

organisation to provide a return to its equity investors, pay its debt financing costs, and meet its tax obligations.

Under a post-tax approach, the rate of return provides sufficient revenue for an organisation to provide a return to its equity investors and pay its debt financing costs. However, the taxation liability of a regulated entity is estimated as a separate component of the revenue requirement. The taxation liability is estimated based on a taxation liability that would be incurred by a similar, well-managed, privately owned business.

The matter of pre-tax versus post-tax rates of return was raised by the Authority in the issues paper for this inquiry in which the Authority noted that it was considering the application of a post-tax rate of return when determining revenue requirements for the Water Corporation, Aqwest and Busselton Water.

In response to the Issues Paper, the Water Corporation submitted that "introducing the added complexity of tax will not enhance the objective of setting the WACC within the appropriate range" and "that calculating the WACC on a post-tax basis will be time consuming and have a cost without a demonstrated benefit."[42] [43]

The Authority considers that the calculation of a post-tax rate of return does bring about benefits in terms of ensuring the revenue requirement better reflects the taxation costs incurred by an efficient service provider. It is for this reason that many Australian regulators have shifted toward post-tax modelling.[44] While the separate calculation of tax is time consuming, the Authority has already developed a method for doing so as part of its review of Western Power's access arrangement.

As a means to improve the accuracy of its estimation of the revenue requirements of the service providers, the Authority has chosen to apply a post-tax modelling approach for this inquiry.

3.4.6.2 Estimating the Rate of Return

The Authority's approach to estimating the cost of debt and equity is detailed in the sections below.

The Return on Equity

In the Capital Asset Pricing Model, the expected return on equity is made up of a number of parameters. These are:

- R_f - *the nominal risk-free rate* - the rate of return that an investor receives from holding an asset with a fixed rate of return;
- β_e - *the equity beta* - a measure of how changes in the returns to a firm's stock are related to the changes in returns to the market as a whole; and

[42] Water Corporation, 2012, *Submission in Response to Issues Paper*, 14 March, p. 27.

[43] Aqwest and Busselton Water submitted that time constraints had prevented consideration of the implications of using a post-tax rate of return.

[44] IPART in New South Wales has recently shifted to post-tax modelling, see IPART, 2011, *The Incorporation of Company Tax in Pricing Determinations – Other Industries – Final Decision*. Other regulators who use a post-tax approach include the Australian Energy Regulator, the Essential Services Commission, the Queensland Competition Authority; and in the United Kingdom both Ofwat (the water regulatory) and Ofgem (the gas regulator) use post-tax approaches.

- $\left(R_m - R_f\right)$ - *the market risk premium* - the average return that investors demand for holding risky rather than non-risky assets. The market risk premium is calculated as the difference between the market return and the risk free rate.

The three components above are used to estimate the return on equity by using the formula below.

$$R_e = R_f + \beta_e\left(R_m - R_f\right)$$

The Nominal Risk Free Rate

The nominal risk free rate is the risk-adjusted rate of return that an investor expects. Yields on Australian Commonwealth Government Securities are widely used as a proxy for the risk free rate in Australia.

For the estimation of the nominal risk free rate the Authority has opted to use securities with a five-year term to maturity and has averaged the observed yields over a period of 20 trading days. The selection of the appropriate "term to maturity" (in this case five-years) and the "averaging period" (in this case 20 trading days) is discussed in detail below.

The Term to Maturity

In the 2009 inquiry into water pricing the Authority used yields on ten-year Commonwealth Government Securities to calculate the nominal risk free rate. For this inquiry, the approach taken by the Authority has shifted to using yields on five-year Commonwealth Government Securities.[45]

Adopting a term to maturity of five years achieves consistency between the terms used for the calculation of the risk free rate and for the debt risk premium. As is discussed later in this section the Authority has adopted a bond yield approach to calculating the debt risk premium. The bond yield approach involves taking a sample of corporate bonds on issue and calculating the debt risk premium paid by each bond. The average term to maturity of the bonds used in the Authority's sample is approximately five years.

The Averaging Period

The averaging period is the period used to calculate the average yield on the five-year Commonwealth Government Securities.

In its submission to this inquiry the Water Corporation submitted that a 20 day averaging period (as has been used in past inquiries) may bring unwanted volatility to the price setting process and that 'a longer-term average might be more appropriate for a government-owned utility'.[46] The Water Corporation did not provide any further specific comment on an appropriate length for the averaging period.

In addressing the issue raised by the Water Corporation it is important to be clear on what is meant by one method being 'more appropriate' than another. The ultimate objective in estimating a nominal risk free rate is to incorporate, in the calculation of a rate of return, a

[45] Since the Draft and Final Decisions on DBNGP's proposed Access Arrangement released in 2011, the Authority has adopted the term to maturity of five years for the estimate of the risk free rate. This shift was recently tested and upheld by the Australian Competition Tribunal. See, Australian Competition Tribunal, 2012, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26th July 2012, paragraph 137.

[46] Water Corporation, 2012, *Submission in Response to the Issues Paper*, p. 15.

risk free rate that is the best estimator of what the actual risk free rate will be over the three-year price review period commencing in 2013/14.

The Authority has encountered similar debate about the length of the averaging period in other regulatory determination processes that it has done. As part of its analysis on the Western Power Access Arrangement[47], the Authority tested the forecasting efficiency of a number of different averaging periods.

The Authority found that its default option of a 20 day trading period was a better predictor of actual yields than was a one year and five year averaging period. Forecasting periods of one day and five days were as accurate as a 20 day period but the Authority has opted to continue to use a 20 day averaging period for the calculation of the nominal risk free rate so that consistency is maintained with the approaches taken by other Australian regulators.

Conclusion

The Authority has used the average yield on five-year Commonwealth Government Securities (as reported by the Reserve Bank of Australia), calculated over a twenty-day trading period ending 31 July 2012, to estimate the nominal risk free rate. Using this methodology, the nominal risk free rate is 2.45 per cent. This will be updated at the time of the Final Report.

3.4.6.3 The Market Risk Premium

The market risk premium (MRP) is the average return that investors demand for holding risky, as opposed to non-risky assets. It is determined by the formula:

$$MRP = R_m - R_f$$

Where R_m is the and the market return and R_f is the risk-free rate (estimated above).

The market risk premium was set by the Authority at 6.0 per cent in both the 2005 and 2009 water pricing inquiries.

After undertaking its own internal reviews, the Authority has found no reason to deviate from its existing estimate of 6.0 per cent for the market risk premium.[48]

3.4.6.4 The Equity Beta

The equity beta is a measure of how changes in the returns to a firm's stock are related to the changes in returns to the market as a whole. It reflects business, and hence shareholder, exposure to non-diversifiable risk, which relates to that portion of the variance in the return on an asset that arises from market-wide economic factors that affect returns on all assets. This non-diversifiable risk cannot be avoided by holding the assets as part of a diversified portfolio of assets.

The Authority has selected an equity beta of 0.65 for the Water Corporation as was the case in the 2009 inquiry. In determining the equity beta, the Authority is aware that there is limited data on equity betas for the water industry as water businesses in Australia are

[47] Economic Regulation Authority, 2012, *Final Decision on Western Power Access Arrangement*, Final Report, 5 September 2012, p. 659.

[48] For a fuller discussion on the work done by the Authority on the market risk premium, see the Authority's *Final Decision on Western Power Access Arrangement*, Final Report, 5 September 2012.

generally owned by government. The Authority's decision to adopt an equity beta of 0.65 is guided by:

- analysis undertaken by The Allen Consulting Group whereby an equity beta range of 0.5 to 0.8 was established as feasible for gas distribution businesses (the Authority's estimate of 0.65 is the mid-point of this range);[49]
- the use by the Queensland Competition Authority of an equity beta of 0.65 it its final report on the Gladstone Area Water Board pricing practices;[50]
- analysis by the Australian Energy Regulator of WACC parameters for electricity network service providers indicating that equity betas for the industry ranged between 0.44 and 0.68;[51] and
- internal analysis undertaken by the Authority undertaken for the purposes of the Final Decision of Western Power's Access Arrangement.[52]

Under the equity beta assumption adopted by the Authority, each 100 basis point movement in the market risk premium will result in a 65 basis point movement in the calculated return on equity.

3.4.6.5 Conclusions on the Return on Equity

The return on equity is estimated at 6.35 per cent. The variables that make up the nominal return on equity are detailed in Table 3.11.

Table 3.11 Components of the Return on Equity

Variable	Authority Estimate
Risk Free Rate	2.45%
Market Risk Premium	6.00%
Equity Beta	0.65
Nominal Return on Equity	6.35%

Source: Authority analysis.

3.4.6.6 The Cost of Debt

The cost of debt is comprised of the risk free rate, a debt risk premium and a debt issuance cost.

[49] The Allen Consulting Group, 2007, *Empirical Evidence on Proxy Beta Values for Regulated Gas Distribution Activities*.

[50] Queensland Competition Authority, 2005, *Final Report – Gladstone Area Water Board: Investigation of Pricing Practices*.

[51] Australian Energy Regulator, 2009, *Review of the Weighted Average Costs of Capital (WACC) Parameters – Electricity Transmission and Distribution Network Service Providers*.

[52] For a fuller discussion on this estimation process, see the Authority's *Final Decision on Western Power Access Arrangement*, Final Report, 5 September 2012, p. 389.

3.4.6.7 The Debt Risk Premium

When a corporation has a need to finance by debt it must issue bonds or obtain bank finance. If the corporation chooses to issue bonds then its bonds must have a higher yield than that of Commonwealth Government Bonds. The difference in yield between corporate bonds and government bonds is the debt risk premium.

The Authority uses a bond yield approach to estimate the debt risk premium of a benchmark efficient business. The bond yield approach involves taking a sample of corporate bonds on issue and calculating the debt risk premium paid by each bond. The weighted average[53] debt risk premium is then calculated for all of the bonds in the sample and this average value is then taken as the debt risk premium.

The bond yield approach requires the Authority to determine an appropriate credit rating for each of the three water service providers. To determine an appropriate credit rating for the Water Corporation, the Authority assessed some key financial indicators using the Standard & Poor's framework for assessing credit ratings. The results of the analysis indicate that an appropriate credit rating should be within the A- band. The application of an A- credit rating for the Water Corporation is consistent with the approach taken by the Authority in the 2009 inquiry.

It follows that a sample of A- rated corporate bonds is used in the bond yield approach to estimate the debt risk premium for the Water.

The derived debt risk premium is 2.314 per cent.

3.4.6.8 Debt Issuance Costs

Debt issuance costs include underwriting fees, legal fees, company credit rating fees and other costs incurred in raising debt finance. Regulators across Australia, including the Authority, typically include an allowance of 12.5 basis points for debt issuance costs.

As was the approach taken in the 2009 water pricing inquiry, the Authority is of the view that an allowance for debt issuance costs of 12.5 basis points is appropriate to be included in the debt risk premium for the Water Corporation.

3.4.6.9 The Benchmark Financing Structure: Debt versus Equity

For regulated industries, the benchmark capital structure is considered to be the gearing level of an efficient utility business. The current practice of Australian regulators is to adopt a gearing level of 60:40 meaning that the proportion of debt to a firm's total capital value is 60 per cent; and the corresponding proportion of equity to total capital value is 40 per cent.

A gearing ratio of 60 per cent was used in the calculation of the Water Corporation's WACC in the 2009 inquiry. The Authority is of the view that it is appropriate to assume that the Water Corporation tends towards the "benchmark" gearing level observed from other water companies in the long run. To determine this benchmark level of gearing, the Authority considered the gearing ratios of publicly listed water companies in the United Kingdom.

Publicly listed companies must adhere to stringent financial reporting standards and it is for this reason that the Authority has chosen to observe only publicly listed companies in

[53] The average is weighted according to term to maturity and the amount on issue.

its estimation of an appropriate benchmark level of gearing. There are no publicly listed water companies in Australia and hence the Authority has considered the average gearing ratios of publicly listed water companies in the United Kingdom (Table 3.12). The Authority notes that these observed gearing levels are indicative and are used as a cross check as similar information is not available in Australia. These observed gearing ratios do not form the sole basis of the Authority's decision of an appropriate gearing of 60 per cent for the Water Corporation.

Table 3.12 Average Gearing Ratios of Publicly Listed Water Companies in the United Kingdom, 2005-2011 (%)

Company	Average Gearing Ratio (2005-2011)
Kelda Group	41.67
Severn Trent PLC	53.74
United Group PLC	53.22
YTL Power	61.09
Pennon Group PLC	60.20
Northumbrian Water Group	63.93

Source: Authority analysis.

As evident in Table 3.12, the gearing ratios for these companies is generally between 50 and 60 per cent; and there is a cluster of companies with an average gearing ratio of close to 60 per cent.

After reviewing existing gearing ratios of water businesses in the United Kingdom, the Authority has concluded that a gearing ratio of 60 per cent is appropriate for the Water Corporation as this ratio is observed as a "benchmark" gearing level.

3.4.6.10 Inflation Rate

The Authority has adopted an expected inflation rate of 2.10 per cent. The rate has been derived by calculating the difference between the nominal risk free rate and the real risk free rate.

The nominal risk free rate was estimated using yields on five-year Commonwealth Government Securities. The real risk free rate was estimated using yields on Treasury's indexed five-year Commonwealth Government Securities.[54]

3.4.6.11 Conclusions on the Rate of Return

Estimated real and nominal post-tax WACC estimates for the Water Corporation are:

- ***5.48 per cent*** for a nominal post-tax rate of return; and
- **3.31 per cent** for a real post-tax rate of return.[55]

[54] Economic Regulation Authority, 2012, *Final Decision on Western Power Access Arrangement.*

[55] As a point of reference, in 2009 the Authority adopted a real pre-tax rate of return of 6.62 per cent for the Water Corporation. Note that the 2009 estimate is not directly comparable to the 2012 estimates because of the shift from pre-tax to post-tax modelling.

3.5 Compensation for Previous Under Recovery

As discussed in Chapter 2, the Authority has decided to include any under-recovery of revenue over the past three years in its calculation of recommended tariffs as part of this review. However such under recovery is recovered by the Water Corporation over a period of ten years.

There are three reasons for under-recovery in revenue over the past review period (2010/11 to 2012/13):

- actual tariffs implemented by the Government were lower than the Authority's recommended tariffs from the 2009 inquiry;
- actual volumes of water sold were lower than those projected at the time of the 2009 inquiry; and
- the ten-year tariff path assumption used by the Authority in the 2009 inquiry which has resulted in an under-recovery of revenue in the early years of the ten-year period and an over-recovery of revenue in the later years of the ten-year period.

These are discussed below.

Lower than recommended tariffs

Table 3.13 shows a comparison between the Authority's recommended tariffs in 2012/13 and actual tariffs that have been set by the Government.[56]

[56] As part of the State Budget process, the Authority updated its calculations after the release of the 2009 Final Report therefore the figures quoted in this table are not the same as those in the Authority's 2009 Final Report.

Table 3.13 Actual Water Corporation Water Tariffs Compared to Authority Recommended Tariffs in 2009

	Authority Recommended Tariffs for 2012/13	Actual Implemented Tariffs for 2012/13
Residential Charges		
Residential Fixed Charges ($)	165.99	188.10
Residential Usage Charges		
1 to 150kL ($/kL)	1.52	1.34
151 to 500kL ($/kL)	1.99	1.75
Above 500kL ($kL)	2.34	2.40
Commercial Charges		
Commercial Fixed Charges, for meter sizes:		
20mm ($)	165.99	188.10
25mm ($)	259.36	293.90
40mm ($)	663.96	752.40
50mm ($)	1,037.43	1,175.60
80mm ($)	2,655.83	3,009.60
100mm ($)	4,149.73	4,702.50
150mm ($)	9,336.90	10,580.60
Commercial Usage Charge ($/kL)	1.99	2.04

Sources: Authority analysis and Water Corporation.

In aggregate, the actual tariffs that have been implemented by Government over the 2010/11 to 2012/13 period are lower than those recommended by the Authority in the 2009 inquiry. This has contributed to an under recovery of revenue by the Water Corporation over the current pricing period. The Authority estimates that the lower level of tariffs will result in the Water Corporation earning approximately four per cent less tariff revenue over the 2010/11 to 2012/13 period than the amount that the Authority projected at the time of the inquiry. Tariffs recommended as part of this inquiry have been calculated to compensate the Water Corporation for this under recovery of revenue.

Lower than projected volumes

The shortfall in revenue earned by the Water Corporation over the 2010/11 to 2012/13 period will be compounded by an over-projection (made in 2009) of water volume sold (Table 3.14). As a result of implemented tariffs being lower than cost recovery levels and lower water volumes sold, the Authority estimates that total actual tariff revenue for the three year period (2010/11 to 2012/13) will be almost eight per cent lower than projected by the Authority in 2009.

Table 3.14 Projections in 2009 versus Latest Estimates for Water Corporation Metropolitan Customers Averaged Over the Period 2010/11 to 2012/13 (real dollars of June 2012, where appropriate)

	Average Annual Estimates for the 2010/11 to 2012/13 Period as at 2009	Average Annual Estimates for the 2010/11 to 2012/13 Period as at This Inquiry
Residential		
Residential volume (ML)	189,058	178,471
Residential customer numbers (No.)	704,955	692,307
Consumption per residential customer (kL)	268	258
Residential tariff revenue (before discounts) ($m)	390	361
Commercial		
Commercial volume (ML)	48,465	44,145
Commercial customers numbers (No.)	61,807	47,687
Consumption per commercial customer (kL)	784	926
Commercial tariff revenue ($m)	101	93

Sources: Authority analysis and Water Corporation.

Ten-year tariff path assumption

In the 2009 inquiry, the Authority calculated the Water Corporation's tariffs by estimating the total cost of service for a ten-year period and then setting tariffs so that revenue earned for the period was equal to the total cost of service in net present value terms. The result of this approach was that there was a constant annual increase in recommended tariffs in each year of the ten-year period.

This approach has resulted in some under-recovery of revenue in the early years of the ten-year period, which in the normal course of events would be compensated for by an over-recovery of revenue in the later years of the ten-year period.

In determining tariffs for this inquiry, the Authority has taken this existing amount of under recovered revenue and enabled the Water Corporation to recover this amount as a fixed annual annuity over a period of ten years.

3.6 Determine the Total Revenue Requirement

In the 2009 inquiry, the Authority determined the Water Corporation's total revenue requirement by calculating the total cost of service for the period from 2008/09 to 2018/19 and then setting tariffs so that revenue earned for the 2008/09 to 2018/19 period is equal to the total cost of service in net present value terms. The result of this approach was that there was a constant annual increase in recommended tariffs in each year of the ten-year period.

As indicated in Chapter 2, the Authority has opted to shift to an approach whereby costs incurred over the three year price review period are recovered over the same three year period.

The Authority has calculated the Water Corporation's revenue requirement on the basis of its submitted assumptions at $7,978 million for the period from 2013/14 to 2015/16.

The Authority has assessed Water Corporation's proposal and recommends that the efficient level of revenue recovery for Water Corporation is $5,816 million for the period from 2013/14 to 2015/16. The difference between the amount that the Water Corporation has proposed and the amount considered efficient by the Authority is largely due to the following reasons:

- A lower rate of return than proposed by the Water Corporation. The Water Corporation proposed a real pre tax rate of return in the range of 5.28 per cent to 6.62 per cent. The Authority recommends that the appropriate rate of return for Water Corporation is 4.03 per cent, real pre tax. The impact of this recommendation is to reduce Water Corporation's revenue requirement by approximately $1,442 million compared to Water Corporation's proposal.
- An adjustment to the Water Corporation's asset value has been made to remove developer contributions from its regulatory asset base. It is not appropriate for the water business to earn a return on assets that have been already paid for by developers and gifted to the Water Corporation. By lowering the asset base at 1 July 2013, the Authority's calculation of Water Corporation's revenue requirement is reduced by approximately $422 million over the three year period.
- The Water Corporation's forecast operating expenditure for the future price path increases in real terms from $878.3 million in 2013/14 to $919.9 million in 2015/16 (an increase of about 11.5 per cent). The Authority recommends that the efficient level of operating expenditure ranges from $809.2 million in 2013/14 to $823.2 million in 2015/16. The impact of this recommendation is to reduce Water Corporation's revenue requirement by $298 million compared to what the Water Corporation has proposed.

This revenue requirement is attributed by the Authority to the Water Corporation's different business units to determine the recommended tariffs for each business unit.[57] The allocation of the revenue requirement across the Water Corporation's metropolitan business units is detailed in Table 3.15.

Table 3.15 Total Revenue Requirement Forecasts for Water Corporation Metropolitan Business Units, 2013/14 to 2015/16 ($m, nominal)

	Water	Wastewater	Drainage	Total
Total	1,724.6	1,438.4	106.7	3,269.7

Sources: Authority analysis and Water Corporation.

The allocation across the country business units is detailed in Table 3.16.

[57] In its submission to this Inquiry, the Water Corporation provided the Authority with its own allocation of the revenue requirement across different business units. The Authority has changed the total level of the revenue requirement from that proposed by the Water Corporation but has maintained the proportions by which the total revenue requirement is allocated across the business units.

Table 3.16 Total Revenue Requirement Forecasts for Water Corporation Country Business Units, 2013/14 to 2015/16 ($m, nominal)

	Water	Wastewater	Drainage and Irrigation	Total
Total	1,793.2	742.6	11.1	2,546.9

Sources: Authority analysis and Water Corporation.

3.7 Perth Metropolitan Water Tariffs

The overall level of tariffs is calculated for each business unit by dividing the total revenue requirement for each business unit by forecast demand. In this way, if actual demand over the price review period matches the Water Corporation's forecast levels of demand then the Water Corporation will recover the appropriate amount of revenue (assuming that the Authority's recommended tariffs are adopted).

The total nominal revenue requirement for the Water Corporation's metropolitan water business unit over the 2013/14 to 2015/16 period is $1,724.6 million. Tariffs are determined by dividing this total revenue requirement across total water demand in the metropolitan area.

The Water Corporation's residential water tariffs comprise a fixed charge and three variable charges which are estimated based on the long run marginal cost of water supply.

3.7.1 Estimate the Long Run Marginal Cost of Water Supply

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 services.

There are many different ways to calculate the long run marginal cost of water supply. The approach taken by Water Corporation is known as the perturbation approach (or Turvey approach). This approach adopts the following steps:

- forecast water availability from different sources over a long period;
- forecast unconstrained demand based on the current demand policies, over the same period of time;
- forecast optimal expenditure requirements to meet demand and supply balance;
- make a permanent increment or decrement to the forecast demand over the same period of time and determine cost;
- estimate the long run marginal cost as the present value, of the difference in costs derived from the two demand forecasts, divided by the present value of the difference in demand, expressed as follows:

$$LRMC = \frac{Present\ Value\ (Revised\ cost - Base\ cost)}{Present\ Value\ (Revised\ demand - Base\ demand)}$$

The long run marginal cost is a forward looking concept and as such, it requires forecasts of all inputs. Consequently, any estimate of long run marginal cost will be subject to a level of uncertainty. Where this uncertainty is quantifiable, a probabilistic estimate of the input variables is an appropriate safeguard.

3.7.1.1 The Water Corporation's Approach in Detail

The Water Corporation's long run marginal cost model is a Monte Carlo simulation model (explained below). The model calculates the cost of providing water services to meet long-term water demand in Perth (the model runs for a period of 100 years). The concept of the marginal cost (the cost of supplying an additional unit of water) is captured by estimating the costs of meeting a water demand profile that is higher than a base case demand profile. At a high level, the Water Corporation's long run marginal cost estimation methodology is as follows:

- consider a long term base case water demand forecast and an alternative comparator scenario in which water demand in each year is 7 per cent higher than the base case demand profile (details on why the figure of 7 per cent has been adopted are provided below);
- a Monte Carlo simulation is then run whereby a large number of different rainfall scenarios are assumed and for each rainfall scenario simulation, the costs of supplying water to meet demand in both the base case and alternative scenario are estimated. The costs of water supply are dependent upon the timing of different water supply projects, which in turn is dependent on the rainfall scenario that is being modelled and the Water Corporation's system constraints;
- on completion of the Monte Carlo simulation, a mean per kilolitre cost of water supply is derived in present value terms[58] for the base case scenario and the alternative scenario;
- the difference between the per kilolitre cost of supplying water under the base case scenario and the per kilolitre cost of supplying water under the alternative scenario is the long run marginal cost.

Model Inputs and Assumptions

Key inputs into the long run marginal cost model include the water demand profile, the alternative demand scenarios, water inflows and system losses and water source options. The assumptions surrounding each of these inputs are presented below.

Demand Profiles

The baseline demand profile used in the Water Corporation's long run marginal cost model reflects that included in the Water Corporation's *Water Forever* publication.[59] The Water Corporation's *Water Forever* projections are that per capita water consumption in Perth will fall from the existing level of 145 kilolitres per person to 125 kilolitres per person in 2030 and 110 kilolitres per person by 2060. Beyond 2060, per capita demand is held constant.

[58] Present values have been calculated using the Authority's estimates of nominal and real before tax rates of return for the Water Corporation, these figures are 6.22 per cent and 4.03 per cent respectively..

[59] Water Corporation, 2009, *Water Forever, Towards Climate Resilience*, October.

Because the demand profile is estimated on a per capita basis, it is also sensitive to assumptions about future population growth. The Water Corporation's forecasts of population growth are based on population projections provided by the Western Australian Planning Commission and the Australian Bureau of Statistics.

The alternative water demand scenario is modelled off the base case scenario with the only difference being that water demand in each year of the alternative scenario is 7 per cent higher than in the base case scenario. The figure of 7 per cent was adopted on the basis of Water Corporation analysis of a range of different comparator scenarios. The Water Corporation found that:

- Extreme estimates of the long run marginal cost are derived when the difference in demand between the base and the alternative scenario is too small.[60] Very low estimates of long run marginal cost are produced when the additional demand in the alternative scenario is inconsequential to the scenario. That is, the marginal increase in demand does not generate any difference in the timing of capital projects and simply results in the generation of additional marginal operating costs. Very high estimates of long run marginal cost are produced when a small marginal increase in demand causes a bring-forward in the timing of supply options (relative to the timing of supply options in the base case). In such a situation, large costs are incurred as a result of a small increment in demand.

- When the incremental difference in demand between the base and the alternative scenario is greater than 7 per cent, the model delivers unrealistically high estimates of the long run marginal cost as evidenced by a marked step change in the derived estimates. This step change is the result of a significant bring-forward in the timing of water supply options and a marked increase in the number of supply options that are required to be implemented to meet the additional demand.

As a result of this analysis, the Water Corporation concluded that a difference of 7 per cent between minimising the volatility of the range of long run marginal cost estimates and maintaining a realistic mean that is representative of a reasonable level of long-term investment.

Rainfall

Annual rainfall is modelled as a random variable that is generated based on:

- the average annual level of rainfall observed over the period 2001 to 2010; and

- a rainfall distribution pattern equivalent to the observed distribution of rainfall over the past 100 years.

In adopting these assumptions, the Water Corporation is basing its modelling on a continuation of the recent rainfall levels, which are very low by historical standards. The Authority does not object to such an approach but believes it is worth nothing that when viewed in the context of 100 years of rainfall data, the assumption taken by the Water Corporation on future rainfall levels is very conservative.

[60] Extreme outcomes are problematic as the range of estimates of long run marginal cost is used as a basis for the Water Corporation's variable charges.

Water Supply Options and Constraints

The water supply options that are modelled by the Water Corporation include a mix of groundwater schemes (including the expansion of some existing schemes) and desalination plants. Water supply options must also be considered in the context of integration constraints. A water supply option cannot simply be developed if there is insufficient infrastructure to allow the additional water to be integrated into the water supply network. The model determines the timing of the water supply options and integration options subject to the specific rainfall scenario being modelled and network constraints and other decisional triggers which the Water Corporation has incorporated into the model based on the advice of the its infrastructure planning branch.

Constraints incorporated into the model include:

- dams to be always operating within minimum and maximum operational levels;
- a limitation of conveying water from southern sources due to network infrastructure constraints; and
- production of climate independent sources of water to not exceed maximum production capabilities.

The key decisional triggers incorporated into the model is that a new water source option is triggered when metropolitan dam levels are below a certain volume, or useable level subject to the constraint that a new source is not triggered if one has already been triggered in the preceding two years.

The timing of specific new water sources is based on the dynamics of the water supply network. Within this framework, the timing of new sources is not set for each scenario but rather is dependent on the specific factors surrounding each scenario.

3.7.1.2 Conclusions on the Estimates of the Long Run Marginal Cost

The Authority considers that the modelling approach used by Water Corporation is appropriate and provides a reasonable estimate of the long run marginal cost of water supply.

The Authority has undertaken a high-level review of the key principles and key assumptions adopted by the Water Corporation in its estimation of the long run marginal cost of water supply. The Authority is satisfied that the Water Corporation's model (including the methodology and assumptions that underpin it) is appropriate. Estimates of the long run marginal cost of water supply derived from the model are used as the basis for the Water Corporation's variable charges.

The estimates in 2011/12 dollars are[61]:

- $1.90 – this is the central long run marginal cost estimate and is derived as the mean estimate for the Water Corporation's model (equivalent to $2.07 in 2015/16 dollars);

[61] Estimates are also presented in 2015/16 dollars in brackets as by 2015/16, the Authority's recommended usage tariffs are transitioned such that they equal the estimates of long run marginal cost in 2015/16 dollars. This can be seen in Table 3.17.

- $1.37 – is a low estimate of the long run marginal cost and is derived as the lower bound estimate using a 90 per cent (two-tailed) confidence interval around the mean (equivalent to $1.49 in 2015/16 dollars); and

- $2.86 - is a high estimate of the long run marginal cost and is derived as the upper bound estimate using a 90 per cent (two-tailed) confidence interval around the mean (equivalent to $3.11 in 2015/16 dollars).

The increase in the long run marginal cost of water (relative to estimates made at the time for the 2009 inquiry) is largely due to the need for the Water Corporation to invest in desalination capacity and the Water Corporation's estimates of these costs have increased.

3.7.2 Recommended Metropolitan Water Tariffs

Water Corporation Residential Water Tariffs

The Water Corporation's current residential tariff structure includes three volumetric tiers and a fixed charge. The Authority supports the Water Corporation's proposal to continue with the existing structure of tariffs.

Given the degree of uncertainty surrounding the estimation of the long run marginal cost of water service provision, as explained above, the Authority has adopted the three estimates of the Water Corporation's long run marginal cost: a central (or mean) estimate, a low estimate and a high estimate. The Authority has modelled the variable tariffs such that they transition to the Water Corporation's estimates of long run marginal cost by 2015/16. This is done to minimise price increases in any one year. The Authority's recommended tariffs are shown in Table 3.17. The estimates in the table are in nominal dollars hence there is a difference

The Water Corporation is able to earn a portion of its revenue requirement through its variable charges. The fixed charge is set at a level to recover the portion of the revenue requirement that cannot be recovered through the variable charges. In this sense, the fixed charge serves as a balancing item to ensure that the Water Corporation fully recovers its revenue requirement.

Water Corporation Commercial Water Tariffs

Existing commercial water tariffs include a fixed charge which is dependent upon the meter size that is used by the customer and a single usage or per kilolitre charge. There is no desire to move away from the existing tariff structure as it includes both a fixed and variable component and is cost-reflective in that the fixed charge that is levied increases with the size of the meter being used.

The specific approach adopted by the Authority in determining commercial tariffs is to model the Water Corporation's commercial tariffs on its residential tariffs. Specifically:

- the commercial usage charge is transitioned to equal the second tier usage charge for residential customers ($2.07 per kilolitre) in 2015/16;[62]

- the annual fixed charge for small-use commercial water customers (those using a 20mm meter) is set equal to the annual fixed charge for residential customers; and

[62] With the second tier usage charge for residential customers set equal to the nominal central (mean) estimate of the long run marginal cost of water supply of $2.07 per kilolitre in 2015/16.

- meter-based charges are increased according to the size of the meter used.

Table 3.17 provides the Authority's recommended tariffs for metropolitan water customers.

Table 3.17 Recommended Tariff Schedule for Water Corporation Metropolitan Residential and Commercial Customers (nominal dollars)

	Actual Implemented Tariffs 2012/13	Authority Recommended Tariffs 2013/14	Authority Recommended Tariffs 2014/15	Authority Recommended Tariffs 2015/16
Residential Charges				
Residential Fixed Charges ($)	188.10	181.75	185.57	189.47
Residential Usage Charges				
1 to 150kL ($/kL)	1.34	1.39	1.44	1.49
151 to 500kL ($/kL)	1.75	1.85	1.95	2.06
Above 500kL ($/kL)	2.40	2.61	2.85	3.11
Commercial Charges				
Commercial Fixed Charges, for meter sizes:				
20mm ($)	188.10	181.75	185.57	189.47
25mm ($)	293.90	283.98	289.95	296.04
40mm ($)	752.40	727.00	742.28	757.87
50mm ($)	1,175.60	1,135.94	1,159.80	1,184.18
80mm ($)	3,009.60	2,908.00	2,969.10	3,31.49
100mm ($)	4,702.50	4,543.74	4,639.22	4,739.70
150mm ($)	10,580.60	10,223.42	10,438.24	10,657.58
Commercial Usage Charge ($/kL)	2.04	2.05	2.06	2.07

Source: Authority analysis.

Appendix C contains detailed tables showing the impacts of the Authority's tariff recommendations on residential customers, pensioners and tenants.

3.8 Perth Metropolitan Wastewater Tariffs

The total nominal revenue requirement for the metropolitan wastewater business unit over the 2013/14 to 2015/16 period is $1,438.4 million. Tariffs are determined by dividing this total revenue requirement across the wastewater demand in the metropolitan area.

The Authority's main recommendation for wastewater tariffs is to move away from the property-value based approach to charging that is used presently.

3.8.1 Property Value Based Charging

Residential wastewater tariffs in Western Australia are currently set as a fixed charge each year, based on the estimated Gross Rental Value (GRV) of the property. Most other states have moved away from property-based charging.

As relative property values change over time the wastewater charges are adjusted to maintain the required amount of revenue for the wastewater service. In Perth, residential wastewater charges are set to recover the cost of the service by assuming that the cost share between residential and commercial customers is maintained at its existing level.

The Authority considers the use of GRV pricing to be an inefficient method of recovering revenue. Specifically:

- there is little relationship between the price charged and the cost of the service;
- the Authority is not aware of reliable evidence to support the view that there is a strong correlation between property values and income[63]; and
- there are administrative costs associated with property value-based pricing. The Water Corporation estimates that the annual cost of maintaining its property value database and regularly recalculating tariffs is between $3 to $4 million.[64]

In its 2012 submission to this inquiry the Water Corporation did not explicitly specify what method of charging it supported, only that it did not support GRV-based pricing. However, it made reference to the Authority's recommendation in previous inquiries. In 2009 the Authority's recommendation was for a fixed wastewater service charge.

The Authority continues to recommend a fixed wastewater charge based on the average annual cost of service. This approach would be more cost reflective than property based prices and would be relatively simple to implement and administer.

3.8.2 Recommended Metropolitan Wastewater Tariffs

The Authority recommends that residential wastewater charges be levied as a single and equal fixed charge payable by all customers. A shift away from GRV based charging will inevitably result in some winners and some losers. While the vast majority of customers will pay less for wastewater services under the Authority's recommendation, there will be some customers who will face higher wastewater charges.

As part of its modelling of recommended tariffs, the Authority has implemented a transition period for customers facing an increase in wastewater payments. For the 97,700 customers facing increased charges in 2013/14, the Authority has modelled tariffs such that these customers do not face an increase of more than $50 per year in wastewater charges. Under this arrangement, the majority of customers finish the transition to cost-reflective tariffs by the end of the three year price review period (2015/16).

[63] The available evidence on the relationship between income and property values in Western Australia is very limited. In fact, there appear to be few studies of this issue generally. A recent review of the correlation between income and home values undertaken for the Local Government Association of South Australia does not support the idea of a strong correlation. Indeed they find that the simple correlation is weak, both for Australia and Adelaide. South Australian Centre for Economic Studies. (2004). "The Correlation Between Income and Home Values: Literature Review and Investigation of Data." SA Local Government Association.

[64] Water Corporation, 2012, Personal communication (email), 25 May.

Existing commercial wastewater charges include a fixed charge and a usage charge. The fixed charge is based on the number of major sewerage fixtures that a customer has. The usage charge is based on the estimated volume discharged to the sewerage system, which is calculated on the basis of water usage multiplied by a discharge factor.

The Authority considers that the existing tariff structure for commercial customers is cost-reflective and appropriate.

The recommended metropolitan wastewater tariffs are shown in the following table.

Table 3.18 Water Corporation Metropolitan Wastewater Tariffs, 2013/14 to 2015/16 (nominal dollars)

	Actual Implemented Tariffs 2012/13	Authority Recommended Tariffs 2013/14	Authority Recommended Tariffs 2014/15	Authority Recommended Tariffs 2015/16
Residential Charges				
Residential Fixed Charge ($)	308.66* to over 1,000*	519.15	527.41	537.43
Commercial & Industrial Fixed Charges				
First Fixture ($)	728.40	562.63	574.45	586.52
Second Fixture ($)	311.80	240.84	245.90	251.07
Third Fixture ($)	416.40	321.63	328.39	335.29
Over 3 Fixtures (each) ($)	452.80	349.75	357.10	364.60
Strata Title ($)	452.80	349.75	357.10	364.60
First Fixture, Aged Homes ($)	195.70	151.16	154.34	151.58
Over 1 Fixture, Aged Homes ($)	86.10	66.50	67.90	69.33
Nursing Homes (per bed) ($)	131.80	101.80	103.94	106.13
Charitable & Exempt – All Fixtures ($)	195.70	151.16	154.34	157.58
Vacant Land ($)	248.87	192.23	196.27	200.40
Commercial & Industrial Usage Charge				
For consumption greater than 200kl ($/kL)	2.68	2.11	2.11	2.16

* *Current charges depend on GRV.*
Source: Authority analysis.

3.9 Perth Metropolitan Drainage Tariffs

The total nominal revenue requirement for the metropolitan drainage unit over the 2013/14 to 2015/16 period is $106.7 million. Tariffs are determined by dividing this total revenue requirement across the drainage customers in the metropolitan area.

As is the case for wastewater tariffs, the Authority's main recommendation for drainage tariffs is to move away from the property-value based approach used at present.

3.9.1 Property value based charging

Residential Drainage Tariffs

Like wastewater charges, residential drainage tariffs are currently set as a fixed charge each year and the fixed charge is based on the estimated GRV of the property. As indicated above, the Authority considers GRV pricing to be an inefficient method of recovering revenue.

The Authority recommends that an annual fixed charge that is the same for all residential drainage customers is the most appropriate tariff structure for the collection of drainage revenue.

Commercial Drainage Tariffs

Similar to the case for residential drainage tariffs, the Authority recommends the implementation of a fixed charge for commercial drainage tariffs (which are currently set on a GRV basis). The only difference between the case for residential and commercial customers is that commercial customers with very large properties are levied a higher fixed charge. The basis for the inclining fixed charge is that the larger the property, the larger is the creation of drainage water and hence the greater is the contribution to the need for drainage infrastructure.

3.9.2 Recommended Metropolitan Drainage Tariffs

The Authority's recommended metropolitan drainage tariffs are shown in Table 3.19. Recommended tariffs for residential customers are lower than the existing minimum charge for drainage. The decrease in tariffs is due to reductions in the initial regulatory asset value of the Water Corporation and the decrease in the rate of return.

While not apparent from the table, the Authority's recommended commercial drainage tariffs would also result in a decrease in annual drainage charges payable by most commercial customers.

Table 3.19 Water Corporation Metropolitan Drainage Tariffs, 2013/14 to 2015/16 (nominal dollars)

	Actual Implemented Tariffs 2012/13	Authority Recommended Tariffs 2013/14	Authority Recommended Tariffs 2014/15	Authority Recommended Tariffs 2015/16
Residential Fixed Charge	88.30 to over 1,000*	66.06	67.45	68.86
Commercial with land area less than 1,000 square metres	Minimum charge 88.30	66.06	67.45	68.86
Commercial with land area from 1,000 to 10,000 square metres	Minimum charge 88.30	330.29	337.23	344.32
Commercial with land area above 10,000 square metres	Minimum charge 88.30	660.58	674.46	688.64

** Current charges depend on GRV.*
Source: Authority analysis.

3.10 Country Water Tariffs

Tariffs for residential country customers of the Water Corporation differ between towns. There are five tariff classes that apply to towns in the south of the State (classes 1a to 5a) and five tariff classes that apply to towns in the north of the State (classes 1b to 5b).

For country residential customers of the Water Corporation, the Authority recommends a small reduction in the fixed charge in 2013/14.[65] Recommended usage charges for 2013/14 are broadly similar, though slightly higher, than existing charges (Table 3.20). Beyond 2013/14, the Authority's recommended tariffs increase only with inflation.

Recommended water price increases are more pronounced for country areas than metropolitan areas because country water tariffs are currently being transitioned to more cost-reflective levels. This transition commenced after the Authority's 2009 inquiry and is expected to be completed by 2016.

The Authority calculates that in net terms the increase in usage charges will offset the decrease in the fixed charges such that there will be a modest increase in the total amount payable for water services by country customers in each year of the review period.

Table 3.20 Recommended Water Corporation Country Residential Water Tariffs, 2013/14 to 2015/16 (nominal dollars)

	Actual Implemented Tariffs 2012/13	Authority Recommended Tariffs 2013/14	Authority Recommended Tariffs 2014/15	Authority Recommended Tariffs 2015/16
Residential Fixed Tariff				
Fixed Tariff	188.10	181.75	185.57	189.47
Residential Demand Tariffs				
Class 1a				
0-150kL	1.02	1.05	1.07	1.10
151-300kL	1.34	1.39	1.46	1.52
301-550kL	1.45	1.48	1.50	1.52
Above 550kL	1.71	1.88	2.08	2.29
Class 2a				
0-150kL	1.32	1.37	1.43	1.49
151-300kL	1.72	1.83	1.94	2.06
301-550kL	2.01	2.03	2.05	2.06
Above 550kL	2.36	2.59	2.84	3.11
Class 3a				
0-150kL	1.32	1.37	1.43	1.49
151-300kL	1.72	1.83	1.94	2.06

[65] This is because the country residential fixed charge is set in accordance with the metropolitan residential fixed charge (as part of the uniform tariff policy), which the Authority has recommended be decreased in 2013/14.

301-550kL	2.56	2.80	3.05	3.32
Above 550kL	3.27	3.56	3.87	4.22
Class 4a				
0-150kL	1.32	1.37	1.43	1.49
151-300kL	1.72	1.83	1.94	2.06
301-550kL	3.02	3.33	3.69	4.08
Above 550kL	4.55	4.89	5.29	5.73
Class 5a				
0-150kL	1.32	1.37	1.43	1.49
151-300kL	1.72	1.83	1.94	2.06
301-550kL	3.55	3.98	4.46	5.00
Above 550kL	6.26	6.72	7.23	7.77
Class 1b				
0-350kL	1.02	1.05	1.07	1.10
351-500kL	1.34	1.39	1.46	1.52
501-750kL	1.45	1.48	1.50	1.52
Above 950kL	1.71	1.88	2.08	2.29
Class 2b				
0-350kL	1.32	1.37	1.43	1.49
351-500kL	1.72	1.83	1.94	2.06
501-750kL	2.01	2.03	2.05	2.06
Above 750kL	2.36	2.59	2.84	3.11
Class 3b				
0-350kL	1.32	1.37	1.43	1.49
351-500kL	1.72	1.83	1.94	2.06
501-750kL	2.56	2.80	3.05	3.32
Above 750kL	3.27	3.56	3.87	4.22
Class 4b				
0-350kL	1.32	1.37	1.43	1.49
351-500kL	1.72	1.83	1.94	2.06
501-750kL	3.02	3.33	3.69	4.08
Above 750kL	4.52	4.89	5.29	5.73
Class 5b				
0-350kL	1.32	1.37	1.43	1.49
351-500kL	1.72	1.83	1.94	2.06
501-750kL	3.55	3.98	4.46	5.00
Above 750kL	6.26	6.72	7.23	7.77

Source: Authority analysis.

The Authority's recommended tariffs for country commercial customers are detailed in Appendix C. Like the case for residential tariffs, the Authority recommends commercial fixed tariffs be reduced in 2013/14.

3.11 Country Wastewater Tariffs

The recommended shift away from GRV based charging for residential customers will result in some customers being better off and others worse off. However, the majority of customers will benefit. As has been discussed in this report, customers facing higher tariffs can be transitioned gradually to the recommended tariff level such that they do not face a price shock.

Recommended fixed and variable charges for commercial customers in 2013/14 are lower than the tariffs that apply for 2012/13 (Table 3.21). Beyond 2013/14, the Authority's recommended tariffs for both residential and commercial customers increase only with inflation.

Table 3.21 Recommended Water Corporation Country Wastewater Tariffs 2013/14 to 2015/16 Period (nominal dollars)

	Actual Implemented Tariffs 2012/13	Recommended Tariffs 2013/14	Recommended Tariffs 2014/15	Recommended Tariffs 2015/16
Residential Fixed Tariff				
Average ($)	313.20 to 780.40*	586.46	598.78	611.36
Commercial Fixed Wastewater Tariffs				
First Fixture ($)	717.86	562.63	574.45	586.52
Second Fixture ($)	307.29	240.84	245.90	251.07
Third Fixture ($)	410.38	321.63	328.39	335.29
Over Three Fixtures ($)	446.25	349.75	357.10	364.60
Strata Title ($)	446.25	349.75	357.10	364.60
Charitable & Exempt – First Fixture ($)	192.87	151.16	154.34	157.58
Charitable & Exempt – Over One Fixture ($)	84.85	66.50	67.90	69.33
Vacant Land ($)	206.10 to 780.40	275.30	281.08	286.99
Caravan Parks ($)	278.00	217.88	222.46	227.13
Commercial Usage Tariff (>200kL)				
Commercial ($ per kL)	2.64	2.07	2.11	2.15

* *Actual charges are based on GRV.*
Source: Authority analysis.

3.12 Recycled Water Tariffs

In recommending appropriate tariffs for the Water Corporation, the Authority took the view that the Water Corporation's approach to pricing recycled water was an area that warranted attention. In this section, the Authority assesses the Water Corporation's draft

Recycled Water Pricing Policy (**RWPP**) against the pricing principles recommended by the Authority as part of its *Inquiry into Pricing of Recycled Water in Western Australia*[66] (**Recycled Water Inquiry**) and the guiding principles adopted by the National Water Commission.[67]

3.12.1 Water Recycling in Western Australia

In 2007, the Australian Government committed to a national target of recycling 30 per cent of wastewater by 2015.[68] The Western Australian Government subsequently committed to meeting a target of recycling 30 per cent of wastewater by 2030 as part of the *State Water Recycling Strategy* that was released in 2008.[69]

The Water Corporation recycled 7.5 per cent of wastewater in the Perth Peel region in 2010/11.[70] As evidenced from the following table, the percentage of wastewater recycled in Perth is lower than for most other capital cities. However, it should be noted that other cities do not have the groundwater resources available in Perth (groundwater is generally a relatively inexpensive source of potable water), and are more reliant on surface water supplies and alternatives to groundwater, including recycled water.

Table 3.22 Recycled water (percentage of effluent recycled)

Capital city	2008-09	2009-10	2010-11
Sydney	5	7	10
Melbourne	23	21	9
Brisbane	-	-	19
Perth	***6***	***6***	***7***
Adelaide	31	30	22
Canberra	14	14	12
Darwin	3	3	2

Source: National Water Commission, 2012, *National Performance Report 2010-11: Urban Water Utilities,* Canberra.

Recycling rates in non capital city areas of Western Australia are considerably higher at around 50 per cent in 2010/11.[71] This compares to a national recycling rate in non capital city areas of Australia of 21.7 per cent.[72] The rate of wastewater recycling in Western Australia as a whole was 12 per cent in 2009/10, compared to 16.8 per cent for Australia as a whole.[73]

[66] Economic Regulation Authority, 2009, *Inquiry into Pricing of Recycled Water in Western Australia.*

[67] Centre for International Economics, 2010, *Pricing Principles for Recycled Water and Stormwater Reuse*, Waterlines Report Series No. 31, Canberra.

[68] Marsden Jacobs Associates, 2012, *Progress against the national target of 30% of Australia's wastewater being recycled by 2015.*

[69] Government of Western Australia, 2008, *State Water Recycling Strategy – An Overview*.

[70] Water Corporation, 2011, *Annual Report 2011*.

[71] Water Corporation, 2011, *Annual Report 2011*.

[72] Marsden Jacobs Associates, 2012, *Progress against the national target of 30% of Australia's wastewater being recycled by 2015*, pp. 1 and 56.

[73] Marsden Jacobs Associates, 2012, *Progress against the national target of 30% of Australia's wastewater being recycled by 2015*, pp. 1 and 56.

The Water Corporation is currently conducting a trial of groundwater replenishment[74] using treated wastewater from the Beenyup Wastewater Treatment Plant. Groundwater replenishment commenced in November 2010. If approved, the groundwater replenishment project will supply between 25 and 35 gigalitres of potable water per year and increase recycled water use in Western Australia from 12 per cent to 30 per cent.[75]

The Water Corporation is currently involved in 76 water recycling schemes.[76] The most significant of these schemes are:

Kwinana wastewater reclamation plant, which accounted for 3.7 gigalitres of recycled wastewater in 2010/11[77];

In-plant re-use at the Water Corporation's metropolitan wastewater treatment plants, which accounted for 2.8 gigalitres of recycled wastewater in 2010/11;

In-plant re-use at the Water Corporation's Albany and Kwinana wastewater treatment plants, which accounted for 2.0 and 1.5 gigalitres of recycled wastewater respectively in 2010/11.[78]

3.12.2 Pricing principles for recycled water

The Authority released the final report on its Recycled Water Inquiry in February 2009. The Terms of Reference required the Authority to "undertake an inquiry into, and make recommendations on, pricing and other relevant factors affecting the adoption of recycled water and other alternative water supplies".

As part of the Recycled Water Inquiry, the Authority recommended that a set of pricing principles for the pricing of wastewater from wastewater treatment plants should be introduced.

In October 2010, the National Water Commission released a report on *Pricing Principles for Recycled Water and Stormwater Reuse*, prepared by the Centre for International Economics.[79] This report proposed a set of guiding principles for the pricing of recycled water and stormwater[80] to assist parties to the National Water Initiative.

[74] Groundwater replenishment recharges water supplies in underground aquifers with treated wastewater that has been further treated to drinking water standards.

[75] Marsden Jacobs Associates, 2012, *Progress against the national target of 30% of Australia's wastewater being recycled by 2015*, pp. 3.

[76] Water Corporation, 2011, *Annual Report 2011*.

[77] The Kwinana water reclamation plant accounted for around 39 per cent of recycled wastewater in the Perth-Peel region in 2010/11.

[78] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 26 July 2012.

[79] Centre for International Economics, 2010, *Pricing Principles for Recycled Water and Stormwater Reuse*, Waterlines Report Series No. 31, Canberra.

[80] Western Australia has separate sewage and stormwater systems, unlike some other jurisdictions that have a single wastewater system. In Western Australia, stormwater is generally dealt with locally by releasing it back into the environment whereby the stormwater seeps into the superficial aquifers, replenishing groundwater supplies.

The Water Corporation has subsequently prepared a draft RWPP[81], which outlines the Water Corporation's approach to determining the pricing for water recycling services provided from wastewater schemes.

3.12.2.1 The Authority's 2009 Pricing Principles

The Authority's main objective in developing a set of pricing principles for recycled water was to facilitate a competitive market for the supply of non-potable water. The Authority considered that this would be best achieved by ensuring that recycled water customers are able to gain access to wastewater on the same terms and conditions as the Water Corporation.

The Authority found that there were (and still are) barriers that prevent private operators from competing with the Water Corporation for the supply of recycled water services. In particular, the Authority found that potential private operators in the non-potable water market:

- do not have ready access to the wastewater collected from customers on the wastewater network because of the lack of a third party access regime; and
- are not able to offset the direct costs of their recycling projects against the avoided costs of wider wastewater services.

The Authority considered that, ideally, a customer who is interested in using recycled water should have the opportunity to either:

- buy recycled water from the owner of a wastewater treatment plant;
- buy the wastewater resource from the owner of the wastewater treatment plant in accordance with the pricing principles and recycle it themselves; or
- buy the wastewater resource from households and businesses and use a third party access regime to transport the wastewater through the wastewater network and recycle it themselves.

Reflecting these considerations, the Authority aimed to design a regulatory framework for the pricing of recycled water that promoted conditions in which:

- there is active investigation by a range of potential providers of recycled water into commercially viable recycling projects;
- there is robust competition between alternative providers, with equal access to the resources required for recycling;
- there are strong incentives for the Water Corporation to achieve least-cost provision of contestable wastewater activities;
- there are the minimum necessary obstacles to the implementation of new recycling projects;
- the resources for recycled water go to those who value them most; and
- the benefits of regulation outweigh its costs.
- The considerations resulted in the Authority recommending the following set of pricing principles for recycled water.

[81] The Authority has been provided a copy by the Water Corporation and understands that a public version is not yet available.

1) Wastewater from wastewater treatment plants should be priced to reflect the prices that would emerge under a competitive market. These prices would have three components:

   - **Direct Costs.** A charge associated with the costs of delivering the wastewater to the customer, including any incremental costs that might be incurred in treating the wastewater to be fit for purpose.
   - **(Minus) Avoidable Costs.** A negative adjustment in price to take into account any avoidable costs as a result of selling the wastewater resource. For example, the operating costs of discharging the wastewater to the environment would be part of the avoidable costs.

   The price of the wastewater resource should be non-negative. Thus, if avoidable costs are greater than direct costs, the price of the wastewater should be zero.

   - **(Plus) Scarcity Premium.** Additionally, if the amount of wastewater available to be recycled is less than the demand for the wastewater, then an additional premium would be added to the price to reflect its relative scarcity. The premium should be determined by a neutral tendering process.

   These guiding principles would complement, and may be superseded by, pricing principles that would be established under a third party access regime.

- The Authority also made a number of recommendations about the regulatory arrangements to complement the pricing principles. These included provisions for regulatory oversight (for example, periodic reviews of the pricing principles and their application, implementation of arbitration and dispute resolution mechanisms, and regulatory approval of avoidable costs).
- To facilitate the development of a competitive market for the sale of recycled water, the Authority recommended that a State-based third party access be introduced to allow third party access to the wastewater network for the purpose of providing recycled water.
- The Authority recommended that wastewater resources from wastewater treatment plants should be allocated through a neutral tender process[82] and that a trial of this mechanism be conducted involving stakeholders (for example, wastewater from the Beenyup wastewater treatment plant).

3.12.2.2 The National Water Commission's Pricing Principles

Subsequent to the Authority publishing its final report into its Recycled Water Inquiry, the National Water Commission released a report on *Pricing Principles for Recycled Water and Stormwater Reuse*.

In developing a set of pricing principles for recycled water, the National Water Commission was cognisant that pricing principles need to be sufficiently robust and inclusive to cater for, or span, the wide range of supply and demand circumstances in which recycled water and harvested stormwater are made available. The National Water Commission considered that the principles should provide additional guidance on how objectives of equity and efficiency can be achieved and also need to be pragmatic and feasible.

The National Water Commission developed nine pricing principles for recycled water and stormwater reuse, which have been adopted as part of the National Water Initiative.

[82] A neutral tendering process is one in which all interested parties are able to express their interest in a wastewater allocation and the merits of each application are assessed against criteria that do not unduly favour one party over another.

- Light handed and flexible regulation (including use of pricing principles) is preferable, as it is generally more cost-efficient than formal regulation. However, formal regulation (e.g. establishing maximum prices and revenue caps to address problems arising from market power) should be employed where it will improve economic efficiency.

- When allocating costs, a beneficiary pays approach — typically including direct user pay contributions — should be the starting point, with specific cost share across beneficiaries based on the scheme's drivers (and other characteristics of the recycled water/stormwater reuse scheme).

- Prices to contain a water usage (i.e. volumetric) charge.

- Regard to the price of substitutes (potable water and raw water) may be necessary when setting the upper bound of a price band.

- Pricing structures should be able to reflect differentiation in the quality or reliability of water supply.

- Where appropriate, pricing should reflect the role of recycled water as part of an integrated water resource planning (IWRP) system.

- Prices should recover efficient, full direct costs — with system-wide incremental costs (adjusted for avoided costs and externalities) as the lower limit, and the lesser of stand-alone costs and willingness to pay (WTP) as the upper limit. Any full cost recovery gap should be recovered with reference to all beneficiaries of the avoided costs and externalities. Subsidies and Community Service Obligation (CSO) payments should be reviewed periodically and, where appropriate, reduced over time.

- Prices should be transparent, understandable to users and published to assist efficient choices.

- Prices should be appropriate for adopting a strategy of 'gradualism' to allow consumer education and time for the community to adapt.

A summary comparison of the pricing principles developed by the Authority, the National Water Commission and the Water Corporation is set out in table 11.2.

Table 3.23 Comparison of Key Pricing Principles for Recycled Water

Issue	Authority's 2009 Principles	NWC's 2010 Principles	Water Corporation's Draft Recycled Water Pricing Policy
Regulatory regime	Light handed (e.g. pricing principles) preferred. Regulatory approval for avoidable costs. Light handed regulatory oversight for rates of return on third pipe schemes. Introduction of a State-based third party access regime for the wastewater network.	Light handed (e.g. pricing principles) preferred. Formal regulation (e.g. maximum prices and revenue caps) should be employed where it will improve economic efficiency.	Light handed (e.g. pricing principles) preferred.
Cost recovery	(It is inferred that) Prices should recover efficient, full direct costs.	Beneficiary pays approach as a starting point. Specific costs shared across beneficiaries based upon the scheme's drivers. Prices should recover efficient, full direct costs. Lower limit: system wide incremental costs (adjusted for avoided costs and externalities). Upper limit: the lesser of stand-alone costs and willingness to pay. Any full cost recovery gap should be recovered with reference to all beneficiaries of the avoided costs and externalities.	Prices for recycled water should be set within a price band: Lower limit: whole of system incremental cost.[83] Upper limit: willingness to pay (as defined by the lesser of stand-alone or by-pass price of the alternative[84]).

[83] The Water Corporation uses whole of system incremental cost as the lower price limit for recycled water reflecting that the customer that uses wastewater receives a portion of the benefit from the whole system and should make a contribution to the costs of that system.

[84] The by-pass price of the alternative is understood to refer to the price to a customer of a suitable substitute for wastewater.

Issue	Authority's 2009 Principles	NWC's 2010 Principles	Water Corporation's Draft Recycled Water Pricing Policy
Pricing structure	Prices = Direct Costs – Avoidable Costs + Scarcity Premium	Prices should contain a volumetric component.	The price structure should: • provide appropriate signals as to the cost of providing additional water; • ensure customers have sufficient control of the level of their bill; • ensure the appropriate relationship between the volumetric rates for potable and recycled water to avoid perverse incentives; and • ensure appropriate management of risk.
Price of substitutes	–	The upper bound of a price band needs to be set having regard for the price of substitutes.	Prices for recycled water should be set to broadly track the price of substitutes, but not locking in artificially low prices for an unnecessarily long time into the future.
Price differentiation (Demand side factors)	The price of water from recycling plants is a commercial matter between the service provider and its recycled water customers.	Pricing should allow for differentiation on quality, reliability et cetera.	Prices for community benefit reuse will be set at incremental cost. Other customers charged at some point between the lower and upper limit on the basis of commercial judgement.
Price differentiation (Supply side factors)	–	Pricing should allow for differentiation on quality, reliability et cetera.	Efficient prices may require different prices for different users, reflecting different qualities of recycled water and associated costs of supply – which may vary by user and/or location – and willingness to pay.
Water allocation	Wastewater (if scarce) should be allocated using a neutral tendering process.	(It is inferred that) Wastewater should be allocated according to willingness to pay.	–

The Authority considers that its recommended pricing principles are generally consistent with those recommended by the National Water Commission. Key similarities between the pricing principles of the Authority and those of the National Water Commission are:

- a preference for light-handed regulation (except for circumstances in which more formal regulation will result in improved economic efficiency); and
- support for prices for recycled water being set to recover efficient, full direct costs.

The National Water Commission has included a principle that the price for wastewater should include a volumetric component. Although not explicitly listed within the Authority's principles, this is a principle that the Authority supports as it sends a signal to customers about the cost of recycled water.

The National Water Commission has included a principle that pricing for recycled water should allow for differentiation on quality, reliability et cetera. Although not explicitly listed within the Authority's principles, this is a principle that the Authority also supports as it reflects the heterogeneous nature of different recycled water products.

The National Water Commission has included a principle stating that the upper bound of a price band needs to be set having regard for the price of substitutes. The Authority considers this principle to be logical as customers would generally be unwilling to purchase recycled water, which may be less reliable or treated to a lower standard than potable water, if the price of recycled water is equal to or more than the price of potable water.

3.12.2.3 Water Corporation's Recycled Water Pricing Policy

In this section, the pricing principles set out in the Water Corporation's draft RWPP are summarised and then assessed against the pricing principles recommended by the Authority.

The Water Corporation's pricing guidelines for recycled water are based on those outlined in the Water Services Association of Australia's Occasional Paper No. 12 "Pricing for Recycled Water" (February 2005). The Water Corporation's principles are:

> Prices for recycled water should be set within a price band, with (whole of system) incremental cost as the floor and willingness to pay (as defined by the lesser of stand-alone cost or by-pass price of the alternative) as the ceiling.
>
> Prices for community benefit reuse will be set at the incremental cost. Other customers will be charged on the basis of commercial judgement.
>
> Commercial judgements should determine whether prices are set at the lower end of the efficient price band (i.e. just covering system incremental costs) or towards the higher end (where recycled water users make an increasing contribution towards joint/common costs).
>
> Prices for recycled water should be set in a way that broadly tracks the price of substitutes, but not locking in artificially low prices for an unnecessarily long time into the future.
>
> Prices for recycled water should be set as part of any longer term pricing reform strategy encompassing the suite of products provided by the industry (rather than a short-term position based on the current charges for potable and other services).
>
> In the case of mandated targets, any subsidies provided to recycled water products at the expense of the broader customer base should be fully and transparently costed. Preferably, these subsidies should be paid from general revenue since they constitute a CSO.

> In some cases, efficient prices may require different prices for different users, reflecting different qualities of recycled water and associated costs of supply – which may vary by user and/or location – and willingness to pay. Failure to price differentially may result in viable recycling projects not proceeding.

The Water Corporation states in its draft RWPP that its guiding principles are based upon the National Water Initiative Pricing Principles agreed by the Natural Resource Management Ministerial Council (that is, the nine principles identified by the National Water Commission and set out above). These nine principles are included as an attachment to the draft RWPP.

The Authority considered that some investigation was warranted into the implementation by the Water Corporation of two aspects of its draft RWPP:

- the possibility of the Water Corporation attaining monopoly rents by withdrawing recycled water allocations from low value customers and reallocating this water to high value customers at a later date; and
- the extent of Water Corporation's price discrimination between public and private users[85] of recycled water.

Reallocation of recycled water from low to high value uses

The Water Corporation's draft RWPP indicates that prices for recycled water should be not be locked in at artificially low prices for an unnecessarily long time into the future. This principle would appear to allow for the Water Corporation to enter into a contract for the sale of wastewater in an environment of low demand and low prices for that resource and subsequently withdraw that allocation if demand and prices for that resource increase.

The Authority would be concerned if the Water Corporation were to exploit its position as a vertically integrated network owner and retailer. The Authority considers that the Water Corporation – as a network owner – should behave in a neutral manner. Reflecting this, the Authority made the following observation in its Recycled Water Inquiry report.

> The Authority does not consider that it is an appropriate role for the Water Corporation to anticipate the value that future users may place on wastewater, or to remove the rights of those allocated the resource in order to redirect the resource at a later date. Once a right has been allocated, it is for the holder of that right to make the decision to continue to hold that right, or to sell it to a purchaser willing to cover the costs and benefits associated with that right. There is a risk that other allocation mechanisms (such as intertemporal reassignment, or reservation for public supply, or negotiations with a small set of potential users) could underestimate – or overestimate – the benefits derived by different recycled water users. The Authority maintains the view that the value to users of a resource is best determined by the users themselves, and those values are best elicited by neutral market mechanisms.

The Authority would also be concerned if the Water Corporation's practices discouraged the entry of private providers of recycled water into the market. Potential private providers would be unwilling to enter the market if the Water Corporation charged artificially low prices for wastewater now in the expectation that it can reallocate and reprice that water at a later date.

[85] In this context, the Water Corporation differentiates between public and private users of recycled water by determining if the customer is driven by a profit motive and also by considering if the public has access to the site where the recycled water is being used. Public uses include public golf courses, water for public open space and sports ovals.

The Water Corporation provided the Authority with a copy of its standard recycled water supply agreement so the Authority could assess how the Water Corporation may be implementing its pricing principles. The standard agreement provides for (among other things):

- limitations on the term of the agreement (and the ability to renegotiate the contract should it expire);
- the ability of the Water Corporation to vary supply under the agreement in certain circumstances, including where the Water Corporation (acting reasonably) determines this is required or where the variation is by agreement of the parties;
- the recipient not being permitted to supply or sell wastewater to a third party without the Corporation's written consent;
- annual reviews of prices; and
- dispute resolution procedures.

The Water Corporation advises that it does not have a policy of withdrawing wastewater allocations from customers, including those that are paying prices at the low end of the price band. [86] In some circumstances, supplying wastewater to customers is an 'essential' part of the Water Corporation's wastewater disposal process.[87] These customers may have provided the Water Corporation with a mutually beneficial and low-cost wastewater disposal option over a long period of time. The Water Corporation chooses to recognise this by ensuring that these customers have a secure supply of wastewater. However, Water Corporation may balance this by choosing not to commit additional new water allocations that may become available in the future to existing 'low-value' customers, preferring instead to make these allocations available for more commercial contracts.

Furthermore, the Water Corporation advises that the supply of wastewater generally exceeds demand in most schemes and so it would be rare for the Water Corporation to have two competing customers and not be able to supply both (that is, reallocation away from a low value customer would rarely be warranted).

The Authority considers that customers should be able to on-sell their wastewater allocation, as this would facilitate the development of a secondary market in circumstances where demand for wastewater exceeds supply. The Water Corporation has indicated that its preference is not to allow customers to on-sell a water allocation, although they are willing to negotiate this ability for commercial schemes. The Water Corporation does not generally allow public users to on-sell wastewater as it is provided 'as-is, where-is' free of charge or at a nominal cost.[88] The Water Corporation does not want the recipient making a profit out of on-selling water they receive for free or at a nominal cost. The Authority considers that the ability to on-sell should be extended to public users, particularly as it does not accept that public users should be provided with wastewater free of charge (this matter is discussed in more detail in the next section).

[86] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 24 July 2012.

[87] The Authority has interpreted this to mean that other wastewater disposal options available to the Water Corporation would have the same or higher cost than supplying the wastewater to a customer.

[88] The Water Corporation notes that there are examples where it allows public users to on-sell at a price that is set to recoup costs only and not to make a profit.

The Water Corporation generally allocates wastewater on a 'first come, first serve' basis in schemes in which supply of wastewater exceeds demand. The Water Corporation occasionally actively markets wastewater, including 'door knocking' for potential customers.

In the limited circumstances in which it expects that demand for wastewater will exceed supply, the Water Corporation calls for expressions of interest from potential customers.[89] The Water Corporation advised that it called for expressions of interest in the Kwinana Industrial Area (for wastewater from the Kwinana Water Reclamation Plant) and in Karratha, and that it intends to do so in South Hedland.[90]

The Water Corporation indicates that it considers a number of criteria in allocating a scarce wastewater resource amongst commercial customers. These criteria may include:

- the customer whose demand profile bests matches the wastewater disposal needs of the Water Corporation (that is, a predictable and consistent pattern of demand will be preferred to an unpredictable and irregular pattern of demand);
- the expected scale and duration of the customer's demand (for example, a large scale project with a 30 year life will be preferred to a small start-up business);
- the price that the customer is willing to pay for a water allocation.[91]

The Water Corporation currently appears to be allocating wastewater in a neutral manner (having regard for the anticipated level of demand for wastewater within a scheme) and not improperly withdrawing wastewater allocations from low value customers. However, the Authority notes that while there are provisions in the standard agreements between the Water Corporation and its customers that allow the Water Corporation to vary and renegotiate allocations and therefore, this risk remains. The Authority will continue to monitor the Water Corporation's behaviour in allocating wastewater to customers.

The Authority considers that the Water Corporation should expand the use of neutral tendering mechanisms for future wastewater allocations (rather than assuming that supply of wastewater will exceed demand) and be permitting customers to on-sell their water allocation where appropriate.

Price discrimination between public and private users

The Water Corporation has a principle of setting prices for recycled water that is used for the benefit of the community at incremental cost and charging other customers on the basis of commercial judgement. The Authority understands that, in some cases, the Water Corporation charges public users a zero per kilolitre rate for the actual recycled water.[92]

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[89] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 24 and 26 July 2012.

[90] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 24 and 26 July 2012.

[91] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 24 July 2012.

[92] It needs to be clarified that this does result in public users paying an amount of zero in return for consumption of recycled water. The Water Corporation may incur additional infrastructure costs and cost for treatment of the recycled water. It is understood that these costs are allocated as follows.

- In circumstances where recycling the water is the least cost disposal option available to the Water Corporation (as is commonly the case in regional areas) the Water Corporation would pay for the costs of delivering the recycled water. In these circumstances, a public user may not pay any amount in return for the recycled water that it receives.

The Water Corporation's rationale for not charging public users for recycled water is that it is required by regulation to produce this water to a certain quality (irrespective of whether it is to be consumed by a customer or not) and so the community has already paid for the production of this water.[93] However, the Authority notes that this rationale could equally apply to private users given that this class of customers also pay taxes and water rates.

The Authority notes that the pricing principles of the National Water Commission explicitly provides for price differentiation or price discrimination. By way of explanation of this pricing principle, the National Water Commission states:

> Moreover, the use of differential pricing and or price discrimination may also be appropriate in this scenario. The different customer classes will most likely require different grades of recycled water. For example, industrial customers may place a lower quality premium on potable grade water for some purposes than residential customers with safety and aesthetic concerns would. On the other hand, the contribution that access to recycled water makes to overall reliability of supply may be more highly valued by industrial or agricultural customers than by 'outdoor' residential users. If a scheme can supply water of different grades or reliability at different costs, price differentiation is consistent with cost reflectivity and should be adopted. If different customers groups value water with the same characteristics differently, price discrimination to reflect differing willingness to pay may be appropriate so long as cross subsidisation is avoided and revenue recovery does not exceed full costs.[94]

The Authority accepts that price discrimination where different customer groups have a differing willingness to pay is appropriate. However, the Authority considers that the Water Corporation is making arbitrary judgements about the relative willingness of public and private users to pay for recycled water rather than requiring these customers to reveal their willingness to pay through a neutral tendering process.

The Authority accepts that if there is no scarcity in the wastewater resource (as is understood to be the case in the majority of wastewater recycling schemes in Western Australia), then the charge for the wastewater that is achieved through commercial negotiations may only be the incremental cost of supplying the wastewater, net of any avoided costs. That is, the current pricing practice of the Water Corporation for wastewater used for public purposes may not be affected. However, the Authority considers that a price arrived at through commercial negotiations is more appropriate than a pre-determined outcome based upon the characteristics of the customer group.

As part of its Recycled Water Inquiry, the Authority considered whether the price for wastewater, set efficiently, should be further adjusted to meet particular social objectives. The Authority identified several reasons why wastewater (if it is a scarce resource) should not be provided at subsidised prices for community use.

> First, it is important that all options for water supply or demand reduction are assessed on a level playing field. Setting an artificially low price for access to wastewater would favour this option relative to other approaches (for example, grey water recycling, or water sensitive urban design) that may be more cost effective.

- In circumstances where the cost of providing the recycled water is higher than that of other disposal methods the Water Corporation would charge the customer the net costs that it incurs. For example, if the Water Corporation were to incur costs of $5 million to dispose of the water via its least cost method and costs of $7 million to dispose of the water via recycling then the Water Corporation would charge the user of the recycled water $2 million.

[93] Personal communication between the Secretariat of the Economic Regulation Authority and the Water Corporation on 15 May 2012.

[94] Centre for International Economics, 2010, *Pricing Principles for Recycled Water and Stormwater Reuse*, Waterlines Report Series No. 31, Canberra, pp. 24.

> Second, pricing wastewater at less than what it costs to produce would encourage over-use of an artificially "cheap" water source.
>
> Further, communities derive a private benefit from the greening of public open spaces and should be prepared to pay an amount up to the value of that private benefit. If the private benefit derived is less than the cost, then a case would need to be made to fund this difference through a CSO. However, as these benefits are largely private, it would be difficult to justify that they should be funded by other tax payers rather than the local government authority.

Furthermore, the Authority considers that price discrimination between public and private users, as it currently is being practised by the Water Corporation, has the potential to contravene the principle of competitive neutrality in down-stream markets. Upholding the principle of competitive neutrality is an integral component of the Competition Principles Agreement agreed by the Council of Australian Governments in April 1995 as part of the National Competition Policy.[95] The Productivity Commission describes competitive neutrality as follows.

> Competitive neutrality policies aim to promote efficient competition between public and private businesses. Specifically, they seek to ensure that government businesses do not enjoy competitive advantages over their private sector competitors simply by virtue of their public sector ownership.[96]

By way of example, the Water Corporation's pricing policy could (theoretically) provide a public golf course with a significant competitive advantage over a private golf course by providing recycled water to the public course at the incremental cost, but charging a private golf course at the lower of standalone cost or the by-pass price of the alternative.

3.12.3 Conclusions

On review of the Water Corporation's approach to charging for recycled water, the Authority has not made specific tariff or pricing recommendations but does recommend the following principles be applied by the Water Corporation going forward:

- the Water Corporation to expand the use of neutral tendering mechanisms for future wastewater allocations;
- the Water Corporation to permit customers to on-sell their water allocation where appropriate;
- the Water Corporation to remove principles from its draft Recycled Water Pricing Policy that result in pre-determined outcomes for price discrimination between different customer groups and instead apply commercial negotiations; and
- the Water Corporation to finalise and publish its Recycled Water Pricing Policy.

3.13 Impacts on Residential and Commercial Customers

This section summarises the impacts of the tariff recommendations on Water Corporation customers.

[95] Government of Western Australia, 1996, *Policy Statement on Competitive Neutrality*.

[96] Productivity Commission, 2012, *About Competitive Neutrality*.

3.13.1 Residential Customers in Perth

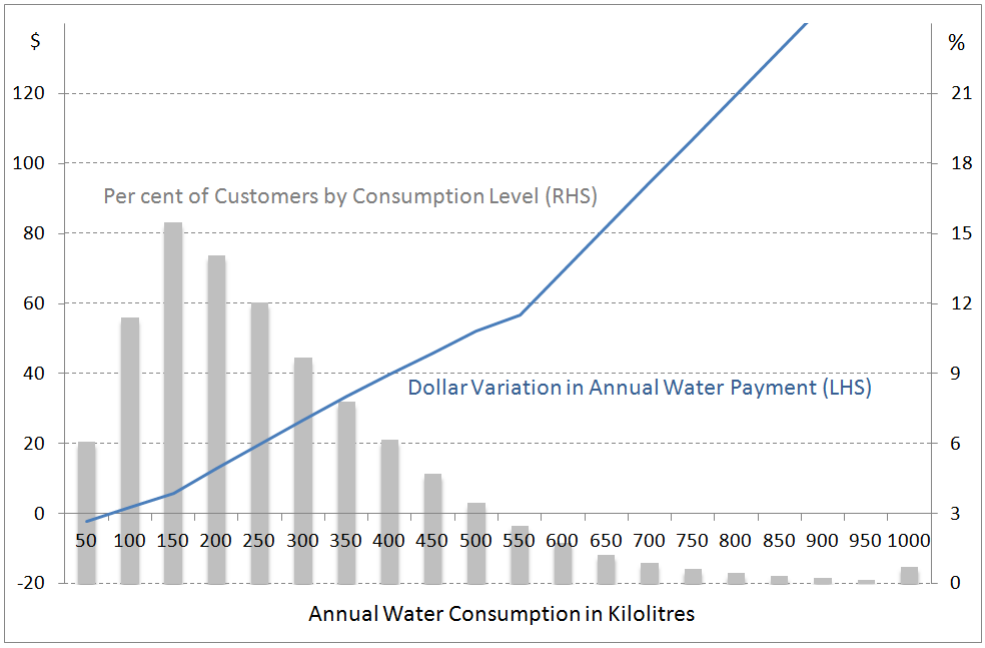
The Authority's proposed tariff recommendations will result in most households in Perth paying more for water services and less for wastewater services.

3.13.1.1 Water Charges

Water charges increase for most residential customers in the metropolitan area. Customers with very low water consumption (100 kilolitres or less) will pay less for their annual water services. For most customers, the small reduction in the fixed charge is more than offset by increases in usage charges. Commensurate with the increase in usage charges is the outcome whereby larger consumers of water face larger water payments.

- Customers with an annual consumption of 150 kilolitres per year will pay an additional $6 in 2013/14 and a total of an additional $29 over the period to 2015/16.
- Customers with an annual consumption of 250 kilolitres per year will pay an additional $20 in 2013/14 and a total of an additional $65 over the period to 2015/16.
- Customers with annual consumption of 350 kilolitres per year will pay an additional $34 in 2013/14 and a total of an additional $100 over the period to 2015/16.
- Customers with an annual consumption of 550 kilolitres per year will pay an additional $57 in 2013/14 and a total of an additional $144 over the period to 2015/16.
- Customers with an annual consumption of 1,000 kilolitres per year will pay an additional $169 in 2013/14 and a total of $473 over the period to 2015/16 (Figure 3.1).

Figure 3.1 Impacts of Recommended Water Tariffs on Residential Customers, 2013/14



3.13.1.2 Wastewater Charges

Under the GRV method for charging there is a large cross subsidy in that customers on properties with high GRV values subsidise (through the payment of higher wastewater charges) customers on low GRV properties. For this reason, a move away from GRV pricing will inevitably involve winners and losers.

The Authority estimates that approximately 540,200 metropolitan households will benefit from lower wastewater bills under its recommendations and that 97,700 households will face higher charges as they are moved to a more cost-reflective tariff.

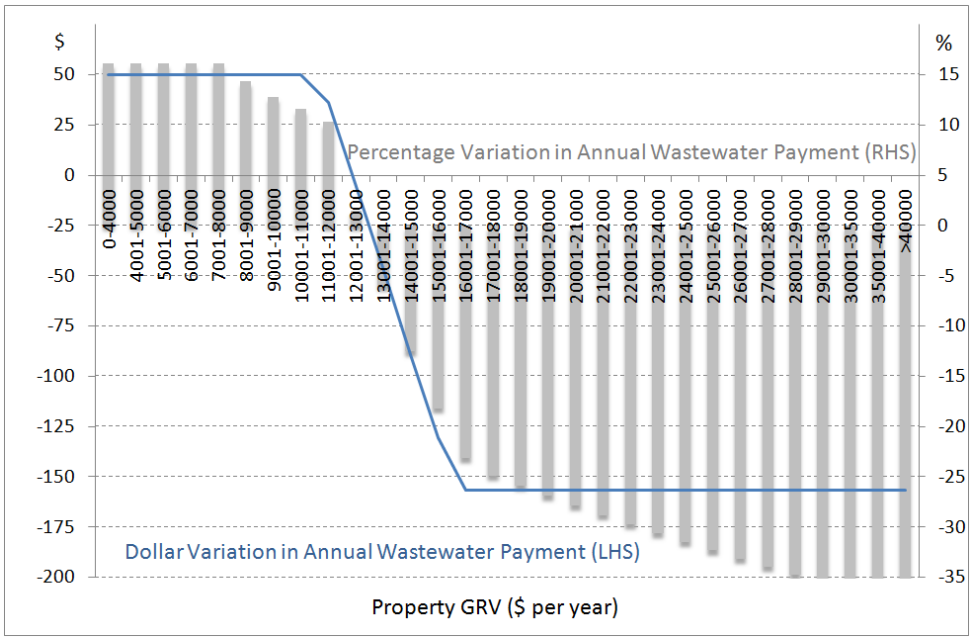
As part of its modelling of recommended tariffs, the Authority has implemented a transition period for customers facing an increase in wastewater payments. For the 97,700 households facing increased charges, the Authority has modelled tariffs such that these customers do not face an increase of more than $50 per year in wastewater charges. Under this arrangement, the vast majority of customers finish the transition to cost-reflective tariffs by the end of the three year price review period (2015/16). Of the households facing an increase, approximately 55,100, would face a $50 increase, and approximately 42,600 would face a one-off increase of a lower amount.

The Authority notes that its transition path proposal has been included to provide some context about how the shift away from GRV based pricing can best be managed. The final decision about whether a transition arrangement is necessary (and if so how it would be implemented) is one that can be made by Government.

The Authority estimates that a household with an average property value in the Perth metropolitan area will pay $148 less for wastewater services in 2013/14 relative to 2012/13 including inflation; an decrease of 22.1 per cent. After 2013/14, wastewater charges increase at the same rate as expected inflation such that in 2014/15 the average increase will be $8 and in 2015/16, the average increase will be $10.

For any customer on a property with a GRV in excess of $16,000 per year, the saving in 2013/14 will be greater than $150 (Figure 3.2).

Figure 3.2 Impacts of Recommended Wastewater Tariffs on Residential Customers, 2013/14



3.13.1.3 Net impacts on Perth residential customers:

On average, residential customers in the Perth metropolitan area will pay $128 less for water and wastewater services combined[97] in 2013/14 relative to 2012/13 (including inflation). This is a decrease of 10.5 per cent. After 2013/14, water prices will increase at the same rate as expected inflation. A typical residential customer will pay $30 more for water services in 2014/15 and an additional $33 in 2015/16.

3.13.2 Commercial Customers in Perth

For water charges:

- Water payments would decrease by $4 (-0.5 per cent) for a typical small business between 2012/13 and 2013/14; $10 (-0.2 per cent) for a medium business; and $1 (0.0 per cent) for a larger commercial business.[98] Beyond 2013/14, annual payments would increase in accordance with expected inflation.

For wastewater charges:

- Wastewater payments would reduce by 22.8 per cent for all commercial customers in 2013/14 and then increase by the expected rate of inflation in the following two years.

3.13.3 Residential Customers in Country

- On average, residential customers in country areas would face an increase in their water bills of 13.0 per cent over the period from 2012/13 to 2015/16.
- On average, residential customers in country areas will benefit from an 9.3 per cent decrease in their wastewater payments over the period from 2012/13 to 2015/16.

3.13.4 Commercial Customers in Country

- A typical country commercial water customer would face an increase of 8.2 per cent in its water bills over the period from 2012/13 to 2015/16.
- On average, country commercial wastewater customers would benefit from an 19.5 per cent decrease in their wastewater payments over the period 2012/13 to 2015/16.

3.14 Impacts on Water Corporation's Finances

As shown in Table 3.24, the Water Corporation's net profit decreases from an estimated $475.0 million in 2012/13 to $309.9 million in 2013/14. Other indicators remain broadly unchanged over the review period.

[97] Payments for drainage services are excluded from this calculation as not all residential customers pay drainage charges.

[98] A small business is defined here as one with a 20mm meter and 300 kilolitres per year of consumption. A medium business is defined as one with a 40mm meter and 2 megalitres per year of consumption. A large business is defined as one with a 150mm meter and 50 megalitres per year of consumption.

Table 3.24 Summary Financial Indicators for Water Corporation ($m, nominal)

	2011/12[1]	2012/13[2]	2013/14	2014/15	2015/16
Net Profit	527.2	475.0	309.9	317.1	345.6
Debt	4,630.1	4,975.0	5,394.2	5,581.8	5,780.6
Net Assets	9,341.0	9,143.5	9,254.5	9,353.0	9,467.3
Debt/Total Assets	31%	32%	34%	35%	35%
Net Cash from Operating Activities	782.0	859.3	696.3	737.9	766.6
Net Cash used in Investing Activities	-845.0	-821.7	-916.6	-706.8	-733.7

[1] *Actuals.*
[2] *Authority estimates.*
Sources: Authority analysis and Water Corporation Annual Report, 2012.

3.15 Impacts on Government Finances

Table 3.25 shows the impacts on government finances from applying the tariff recommendations to the Water Corporation. In aggregate, the net payments to Government decrease from an estimated $132.7 million in 2012/13 to -$14.8 million in 2015/16. The fall is predominantly due to the Water Corporation having a lower profitability over the next price review period.

Table 3.25 Impacts of the Authority's Recommendations for the Water Corporation on Government Finances ($m, nominal)

	2011/12	2012/13	2013/14	2014/15	2015/16
Dividend Payments	396.6	356.6	198.9	218.6	230.7
Tax Equivalent Payments	222.7	203.6	132.8	135.9	147.9
Receipts from State Revenue Office[1]	-450.4	-428.3	-350.4	-374.5	-397.9
Net Payments to Government	168.9	131.9	-18.6	-20.2	-19.3

[1] *Received by the Water Corporation to pay for its Community Service Obligations.*
Source: Authority analysis.

4 CHARGES FOR AQWEST CUSTOMERS

4.1 Background

Residential charges levied by Aqwest include an annual fixed charge and a volumetric charge that comprises six tariff tiers.

In the 2009 inquiry, the Authority recommended no structural change to the tariffs of Aqwest and that residential usage charges be increased on an annual basis in proportion to the average annual increase in costs, subject to a cap set so that Aqwest's highest usage tier did not exceed the highest usage tier in Perth.

In addition, the Authority recommended that:

- the annual fixed charge for residential customers be set equal to the annual fixed charge levied by the Water Corporation on residential customers in Perth;
- usage charges for Aqwest commercial water customers be set at the third tier usage charge for Aqwest residential customers;
- the annual fixed charge for Aqwest small-use commercial water customers[99] be set at the annual fixed charge for Aqwest residential customers; and
- meter-based fixed charges be set to increase with the square of the meter size.

Actual implemented tariffs for Aqwest are broadly similar to those recommended by the Authority in the 2009 inquiry (Table 4.1).

[99] Customers with a 20mm meter are defined as small-use commercial customers.

Table 4.1 Actual Aqwest Tariffs Compared to Authority Recommended Tariffs in 2009

	Recommended Tariffs for 2012/13	Actual Tariffs for 2012/13
Residential Charges		
Residential Fixed Charges ($)	129.20	132.80
Residential Usage Charges		
1 to 150kL ($/kL)	0.53	0.55
151 to 350kL ($/kL)	0.99	1.02
351 to 500kL ($/kL)	1.42	1.46
501 to 700kL ($/kL)	1.88	1.93
701 to 1000kL ($/kL)	2.25	2.31
Over 1000kL ($/kL)	2.34	2.41
Commercial Charges		
Commercial Fixed Charges, for meter sizes:		
20mm ($)	129.20	132.82
25mm ($)	201.87	207.53
40mm ($)	516.80	531.27
50mm ($)	807.50	830.12
80mm ($)	2,067.19	2,125.11
100mm ($)	3,229.99	3,320.47
150mm ($)	7,267.48	7,471.07
Commercial Usage Charge ($/kL)	1.42	1.43

Sources: Authority analysis and Aqwest.

4.2 The Authority's 2009 Approach to Tariff Determination

In the 2009 inquiry, the Authority determined tariffs by calculating Aqwest's total cost of service for the period from 2008/09 to 2018/19 and then setting tariffs so that revenue earned for the 2008/09 to 2018/19 period is equal to the total cost of service in net present value terms. The result of this approach was that there was a constant annual increase in recommended tariffs in each year of the ten-year period.

It is standard regulatory practice to allow a service provider to recover costs incurred in a regulatory period with revenue earned over that same regulatory period. However, in 2009 the Authority recommended tariffs such that costs would be recovered over a ten-year period. This approach was taken to avoid price shocks that would arise in the event of large-scale capital expenditure.

As indicated in Chapter 2, the Authority has opted to shift to an approach whereby costs incurred over the three year price review period are recovered over the same three year period.

On review of actual outcomes over the 2010/11 to 2012/13 period, it is apparent that Aqwest experienced a revenue shortfall (calculated as total tariff revenue less total cost of service) of approximately $1.063 million (Table 4.2).

Table 4.2 Actual Average Outcomes for the 2010/11 to 2012/13 Period Compared to Projections Made at the Time of the 2009 Inquiry

	Estimate as at 2009	Average for 2010/11 to 2012/13
Number of Residential Customers (No.)	15,897	15,688
Average Consumption per Residential Customer (kL)	257	254
Total Tariff Revenue ($m)	8.38	8.06
Total Cost of Service ($m)	9.11	9.13
Revenue Shortfall ($m)	*0.73*	*1.06*

Sources: Authority analysis and Aqwest.

There are three reasons for Aqwest's shortfall over the 2010/11 to 2012/13 period:

- the ten-year tariff path assumption used by the Authority which resulted in an under-recovery of revenue in the early years of the ten-year period and an over-recovery of revenue in the later years of the ten-year period;
- a small over forecast in customer numbers (as shown in Table 4.2); and
- a small over forecast in average consumption per customer (as shown in Table 4.2).

4.3 The Current Approach to Price Determination

The first step in the determination of tariffs as part of this inquiry is to derive the estimates of Aqwest's efficient costs over the 2013/14 to 2015/16 period. In determining Aqwest's efficient costs, the Authority has reviewed Aqwest's demand forecasts and the organisation's projections of capital and operating expenditure.[100]

4.3.1 Demand Forecasts

Aqwest's approach to demand forecasting is deemed to be appropriate. The organisation uses a hydraulic model with a 30 year planning horizon as the basis for its forecasts. The model is updated annually with new information on land development and population growth. The model was reviewed and approved by the global engineering firm MWH in 2011.

The two key factors that underpin Aqwest's demand forecasts are population growth and peak day demand. In terms of population growth, Aqwest has a good working relationship and an open dialogue with the City of Bunbury on land development activity in the region.

[100] Aqwest's efficient costs are calculated using an initial regulatory asset value of $30.4 million (in real dollar values of 2009) as was the case in the 2009 inquiry.

Aqwest also liaises with the Western Australian Planning Commission on upcoming subdivision activity within the region. These two relationships give Aqwest clarity over the likely extent and timing of development within its operating area.

Past trends show stability in peak day water demand in Bunbury. The stability is largely the result of water restrictions. Peak day demand is expected to remain stable in the future. Consequently, little demand driven work is proposed by Aqwest other than servicing new developments.

4.3.2 Capital Expenditure Forecasts

Aqwest proposes to spend a total of $19.3 million on capital expenditure items over the period 2012/13 to 2015/16. The magnitude of the proposed capital expenditure program is similar to that incurred over the 2008/09 to 2011/12 period. Table 4.3 contains a breakdown of Aqwest's forecasts for each year within the period.

Table 4.3 Aqwest Forecast Capital Expenditure, 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
Aqwest forecast capital expenditure	6.64	5.97	2.77	3.92

Sources: Aqwest and Cardno.

The most significant capital expenditure item is the Glen Iris treatment plant. The treatment plant will account for about $6 million over the period, almost one third of total expenditure. The project forms part of Aqwest's strategy to move its water abstraction operations inland as saline water is increasingly being encountered at the sites of existing coastal bores. Cardno has reviewed the project and existing levels of salinity in areas surrounding some of Aqwest's coastal bores and has concluded that the need for the project is justified. Other major capital expenditure items (including mains renewal, new service infrastructure and the construction of a business continuity centre) have been deemed as efficient and appropriate.

In conclusion, Aqwest's capital expenditure forecasts, and the processes that sit behind the identification of need, options and cost estimation are deemed to be appropriate. The Authority accepts the Aqwest capital expenditure forecast as contained in Table 4.3.

4.3.3 Operating Expenditure Forecasts

Aqwest's forecast operating expenditure for the future price path rises from $6.2 million in 2011/12 to $7.5 million in 2015/16 (an increase of about 21.0 per cent, inclusive of inflation). Forecast expenditure for each year is detailed in the first row of Table 4.4 below.

As a general conclusion, Cardno has found the forecast expenditure to be efficient and appropriate. In past pricing inquiries the Authority has made the decision not to subject Aqwest to an efficiency target. Cardno has confirmed that such an approach is appropriate for this inquiry. Cardno noted that Aqwest's budgeting process is sound and appropriate, and that Aqwest is already a low cost water service provider.

Aqwest's forecasts of operating expenditure include an allowance made for expected costs incurred due to the carbon tax, which in 2012/13 is expected to cost Aqwest $78,000.

While no efficiency target is imposed on Aqwest there is a need for some minor adjustment to Aqwest's forecast operating expenditure. The following adjustments are based on the advice of Cardno:

Aqwest has made allowances for corporatisation costs in its forecast operating expenditure. The Authority holds the view that should Aqwest be corporatised then it will be because of a decision made by the State Government in its capacity as owner of Aqwest and that presumably such a decision would be made because it were in Aqwest's interests. There is no reason that Aqwest customers should be required to bear the costs incurred as a result of such a decision.[101] Corporatisation costs have been removed from Aqwest's forecast (see row two of Table 4.4).

Aqwest has incorrectly included a two minor capital expenditure items (in 2013/14) in its operating expenditure forecasts. These costs have been removed from the forecasts (see row three of Table 4.4).

Aqwest has understated its postage expenses and therefore these expenses need to be added onto the existing forecasts (see row four of Table 4.4).

The total efficient level of operating expenditure for Aqwest is detailed in the final row of Table 4.4.

Table 4.4 Aqwest Forecast Operating Expenditure, 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
Aqwest forecast operating expenditure	6.17	6.94	7.04	7.50
Less corporatisation costs	*0.15*	*0.15*	*0.00*	*0.00*
Less business development manager staff costs	*0.00*	*0.30*	*0.31*	*0.32*
Less misallocated capital expenditure	*0.04*	*0.00*	*0.00*	*0.00*
Plus Increased postage allowance	*0.03*	*0.03*	*0.03*	*0.03*
Total efficient forecast operating expenditure*	**6.01**	**6.50**	**6.76**	**7.21**

** Figures may not add exactly due to rounding.*
Sources: Aqwest and Cardno.

4.3.4 Rate of Return

The Authority's methodology for determining the rate of return for Aqwest is the same as that used for the Water Corporation. This methodology is detailed in Chapter 3. There is one difference in the application of this methodology and this difference applies to the estimation of the debt risk premium.

To estimate the debt risk premium for the Water Corporation the Authority used a sample of A- rated corporate bonds in its bond yield approach. The Authority considers that Aqwest is likely to face higher debt costs than the Water Corporation because it faces higher bankruptcy risks and limited access to different sources of finance. The Authority has therefore adopted a credit rating of BBB/BBB+ for its analysis of the rate of return for Aqwest. The derived debt premium for Aqwest of 3.276 per cent is higher than that estimated for the Water Corporation (2.314 per cent).

[101] Furthermore, it is not certain that a decision to corporatise Aqwest will be made and therefore even if it were argued that Aqwest customers should be required to bear the associated costs it would not be appropriate that Aqwest customers be asked, in the upcoming pricing period, to bear the costs of a course of action that may not eventuate.

It follows that the real post-tax rate of return determined for Aqwest of 3.87 per cent is higher than that estimated for the Water Corporation (3.31 per cent).

4.3.5 Determining the Total Cost of Service

In a post-tax scenario (as is being adopted by the Authority), Aqwest's total cost of service for the 2013/14 to 2015/16 period when calculated using Aqwest's proposed inputs is estimated at $31.944 million.

As discussed in Chapter 2, the Authority has opted to alter its price-determination methodology such that a three-year approach is used. Within this framework, the Authority has ensured that Aqwest is able to recoup its existing under-recovered revenue. This is achieved by increasing Aqwest's costs for each of the next ten years by an annuity that is sufficient to recover the previous under-recovery. The value of the annuity that would ensure Aqwest is able to recover its existing under recovered revenue is $0.246 million per year (in real dollars of 2012).

Table 4.5 contains the Authority's cost estimates for Aqwest under the revised approach that has been adopted by the Authority. The addition of the annuity adds almost $1 million to Aqwest's revenue requirement over the next three years (this amount is greater than the sum of the annual annuity payments because of the impact of taxation).

Table 4.5 Aqwest's Costs over the 2013/14 to 2015/16 Period Under Revised Approach to Tariff Determination ($m, real 2012)

	Total, 2013/14 to 2015/16
Operating Costs	19.22
Depreciation	4.44
Return on Assets (real pre-tax)	5.95
Other Revenue	-2.62
Annuity for Deferred Revenue	0.74
Net Taxation Payments	1.68
Total Net Cost	**29.41**

Source: Authority analysis.

The total cost of service of $29.41 million is used by the Authority to calculate its recommended tariff levels.

4.4 Recommended Tariffs

The following table shows the current tariffs for Aqwest and the tariffs that the Authority recommends be transitioned to by 2015/16. The Authority recommends that Aqwest charges increase at a constant rate to achieve cost recovery but that the highest usage charge be capped at the highest usage charge recommended for Water Corporation metropolitan customers ($3.11 per kL). The adoption of this cap will result in a reduction in the number of usage charges for residential customers from six to five by 2015/16.

Table 4.6 Recommended Tariff Schedule for Aqwest Residential and Commercial Customers (nominal dollars)

	Actual Tariffs 2012/13	Recommended Tariffs 2013/14	Recommended Tariffs 2014/15	Recommended Tariffs 2015/16
Residential Charges				
Residential Fixed Charge ($)	132.80	147.94	164.78	183.53
Residential Usage Charges				
1 to 150kL ($/kL)	0.55	0.61	0.68L	0.76
151 to 350kL ($/kL)	1.02	1.14	1.27	1.41
351 to 500kL ($/kL)	1.46	1.63	1.81	2.02
501 to 700kL ($/kL)	1.93	2.15	2.39	2.67
701 to 1000kL ($/kL)	2.31	2.57	2.87	3.11
Over 1000 ($/kL)kL	2.41	2.68	2.99	3.11
Commercial Charges				
Commercial Fixed Charges (by meter size)				
20mm ($)	132.82	147.94	164.78	183.53
25mm ($)	207.53	231.15	257.47	286.77
40mm ($)	531.27	591.75	659.11	734.14
50mm ($)	830.12	924.62	1,029.86	1,147.09
80mm ($)	2,125.11	2,367.02	2,636.45	2,936.55
100mm ($)	3,320.47	3,698.47	4,119.45	4,588.36
150mm ($)	7,471.07	8,321.55	9,268.77	10,323.81
Commercial Usage Charge ($/kL)	1.46	1.63	1.81	2.02

Source: Authority analysis.

4.5 Impacts on Residential and Commercial Customers

The following table shows the impacts of the tariff recommendations on Aqwest customers. The tariff increases would result in an average annual increase in payments of 11.4 per cent over the review period.

Table 4.7 Impacts of Recommendations on Average Annual Payments for Aqwest Customers (nominal dollars)

	Annual Payment 2012/13	Annual Payment 2015/16	Annual Percentage Variation (2012/13 to 2015/16)	Annual Average Dollar Variation (2012/13 to 2015/16)	Total Dollar Variation (2012/13 to 2015/16)
Typical Household Water Bill (250kL per year)	$317	$438	11.4%	$40.39	$121
Typical Commercial Water Bill (2,000kL per year, 40mm meter)	$3,451	$4,769	11.4%	$439.27	$1,318

Source: Authority Analysis.

4.6 Impacts on Aqwest

As shown in Table 4.8, Aqwest's net profit varies from $0.70 million in 2013/14 to $1.53 million in 2015/16. Aqwest's net assets increase over the price period, and its gearing is kept at or below three per cent.

Table 4.8 Summary Financial Indicators for Aqwest (nominal dollars)

	2012/13[1]	2013/14	2014/15	2015/16
Net Profit ($m)	0.35	0.70	1.10	1.53
Debt ($m)	1.31	3.57	3.43	3.29
Net Assets ($m)	98.29	98.98	100.09	101.61
Debt/Total Assets (%)	1.13	3.00	2.86	2.71
Net Cash from Operating Activities ($m)	3.02	3.62	4.26	4.80
Net Cash used in Investing Activities ($m)	-6.59	-5.88	-2.72	-3.83

[1] *Authority estimates.*
Source: Authority analysis.

4.7 Impacts on Government Finances

Table 4.9 shows the impacts on government finances from applying the tariff recommendations to Aqwest. Aqwest does not make any dividend payments. However, it does make tax equivalent payments to the State Government and receives a small payment from the State Revenue Office for providing rebates to seniors. Net payments to Government increase from an estimated $137,300 in 2012/13 to $460,100 on average for the price review period.

Table 4.9 Summary of Impacts on Government Finances (nominal dollars)

	Estimated Annual Payments for 2012/13	Annual Equivalent Payments for the Period 2013/14 to 2015/16
Dividend Payments ($)	0	0
Tax Equivalent Payments ($)	149,100	475,400
Receipts from State Revenue Office[1] ($)	-11,700	-15,200
Net Payments to Government ($)	137,300	460,100

[1] *Received by Aqwest to pay for its Community Service Obligations.*
Source: Authority analysis.

5 CHARGES FOR BUSSELTON WATER CUSTOMERS

5.1 Background

Residential charges levied by Busselton Water include an annual fixed charge and a volumetric charge that comprises six tariff tiers.

In the 2009 inquiry, the Authority recommended no structural change to the tariffs of Busselton Water and that residential usage charges be increased on an annual basis in proportion to the average annual increase in costs, subject to a cap set so that Busselton Water's highest usage tier did not exceed the highest usage tier in Perth.

In addition, the Authority recommended that:

- the annual fixed charge for residential customers be set equal to the annual fixed charge levied by the Water Corporation on residential customers in Perth;
- usage charges for Busselton Water commercial water customers be set at the third tier usage charge for Busselton Water residential customers;
- the annual fixed charge for Busselton Water small-use commercial water customers[102] be set at the annual fixed charge for Busselton Water residential customers; and
- meter-based fixed charges be set to increase with the square of the meter size.

Actual implemented tariffs for Busselton Water are broadly similar to those recommended by the Authority in the 2009 inquiry (Table 5.1).

[102] Customers with a 20mm meter are defined as small-use commercial customers.

Table 5.1 Actual Busselton Water Tariffs Compared to Authority Recommended Tariffs in 2009

	Recommended Tariffs for 2012/13	Actual Tariffs for 2012/13
Residential Charges		
Residential Fixed Charges ($)	162.47	156.97
Residential Usage Charges		
1 to 150kL ($/kL)	0.81	0.78
151 to 350kL ($/kL)	1.14	1.09
351 to 500kL ($/kL)	1.28	1.20
501 to 700kL ($/kL)	1.71	1.44
701 to 1000kL ($/kL)	2.39	2.34
Over 1000kL ($/kL)	2.45	2.34
Commercial Charges		
Commercial Fixed Charges, for meter sizes:		
20mm ($)	162.47	156.97
25mm ($)	253.87	245.27
40mm ($)	649.90	627.90
50mm ($)	1,015.46	981.09
80mm ($)	2,599.58	2,511.59
100mm ($)	4,061.85	3,924.36
150mm ($)	9,139.16	8,829.81
Commercial Usage Charge ($/kL)	1.28	1.20

Sources: Authority analysis and Busselton Water.

5.2 The Authority's 2009 Approach to Tariff Determination

In the 2009 inquiry, the Authority determined tariffs by calculating Busselton Water's total cost of service for the period from 2008/09 to 2018/19 and then setting tariffs so that revenue earned for the 2008/09 to 2018/19 period was equal to the total cost of service in net present value terms. The result of this approach was that there was a constant annual increase in recommended tariffs in each year of the ten-year period.

It is standard regulatory practice to allow a service provider to recover costs incurred in a regulatory period with revenue earned over that same regulatory period. However, in 2009 the Authority recommended tariffs such that costs would be recovered over a ten-year period. This approach was taken to avoid price shocks that would arise in the event of large-scale capital expenditure. In this inquiry, the Authority has opted to shift to an approach whereby costs incurred over the three year price review period are recovered over the same three year period.

On review of actual outcomes over the 2010/11 to 2012/13 period, it is apparent that Busselton Water experienced a revenue shortfall (calculated as total tariff revenue less total cost of service) of approximately 12 per cent, or $0.809 million (Table 5.2).

Table 5.2 Actual Outcomes for the 2010/11 to 2012/13 Period Compared to Projections Made at the Time of the 2009 Inquiry

	Estimate as at 2009	Current Estimate
Number of Residential Customers (No.)	9,959	10,386
Average Consumption per Residential Customer (kL)	291	277
Total Tariff Revenue ($m)	5.89	5.84
Total Cost of Service ($m)	6.43	6.65
Revenue Shortfall ($m)	*0.54*	*0.81*

Sources: Authority analysis and Busselton Water.

The main reason for Busselton Water's shortfall over the 2008/09 to 2012/13 period is the ten-year tariff path assumption used by the Authority. This assumption results in an under-recovery of revenue in the early years of the ten-year period and an over-recovery of revenue in the later years of the ten-year period.

5.3 The Current Approach to Price Determination

The first step in the determination of tariffs as part of this inquiry is to derive the estimates of Busselton Water's efficient costs over the 2013/14 to 2015/16 period. In determining Busselton Water's efficient costs, the Authority has reviewed Busselton Water's demand forecasts and its projections of capital and operating expenditure.[103]

5.3.1 Demand Forecasts

Busselton Water's ten year development plan was completed in March 2011 and covers the provision of infrastructure over the period from 2011 to 2021. The plan utilises a hydraulic model with a 10 year planning horizon as basis for its forecasts, and identifies the infrastructure required to meet increased demand due to population growth and an increase in other users.[104] Since its release in 2011, the plan has not been updated to account from the latest information on development, but Busselton Water has indicated it will be updated annually in the future.

Cardno generally found Busselton Water's forecasting process to be sound, but has noted the plan assumes a growth in peak day demand, in spite of the fact that actual peak demand has declined since 2007. Busselton Water's demand forecasting would be improved through the use of actual historical data, resulting in more efficient timing of infrastructure works. As explained later in this chapter, the use of an outdated assumption of growth in peak day demand has resulted in Busselton Water projecting the need for an increase in supply capacity that cannot reasonably be justified.

[103] Busselton Water's efficient costs are calculated using an initial regulatory asset value of $20.5 million (in real dollar values of 2009) as was the case in the 2009 inquiry.

[104] For example, the increase in users arising from Busselton Water's agreement with the Water Corporation to provide bulk water to the Dunsborough service area.

5.3.2 Capital Expenditure Forecasts

Busselton Water proposes to spend a total of $13.9 million on capital expenditure items over the 2012/13 to 2015/16 period. The magnitude of the proposed capital expenditure program is, on average, slightly lower than that of the preceding four years, due to the impact of significant investment in new infrastructure that was incurred in 2011/12. Capital expenditure in 2011/12 was over three times larger than the average of the prior three years.[105]

Cardno has reviewed Busselton Water's planning process and generally found it to provide a sound basis for infrastructure planning, but has provided a number of recommendations for its improvement. These recommendations focus on improving the processes and analytical methodologies informing the justification of capital expenditure.

In its review, Cardno noted that, while Busselton Water's forecast capital expenditure is generally efficient, the proposed works related to expanding supply capacity were not justified given they were based on an assumption of growth in peak day demand which is not supported by historical data. Cardno further commented that the need for and timing of the expansion were not sufficiently examined by Busselton Water, and nor were alternatives such as demand management.[106] In light of this finding, the Authority does not consider the capital expenditure relating to expanding supply capacity to be efficient.

In conclusion, Busselton Water's capital expenditure forecasts, and the processes that sit behind the identification of need, options and cost estimation are deemed to be appropriate, with the exception of the proposed expansion of supply capacity. The Authority has adopted the adjusted capital expenditure forecasts as contained in Table 5.3.

Table 5.3 Busselton Water Forecast Capital Expenditure, 2012/13 to 2015/16 ($m, nominal)

	2012/13	2013/14	2014/15	2015/16
Busselton Water forecast capital expenditure	3.76	5.01	3.05	1.99
Less expenditure relating to supply augmentation	*1.82*	*0.00*	*0.00*	*0.00*
Total efficient forecast capital expenditure	**1.94**	**$5.01**	**3.05**	**1.99**

Sources: Busselton Water and Cardno.

5.3.3 Operating Expenditure Forecasts

Busselton Water's forecast operating expenditure for the future price path rises from $4.6 million in 2011/12 to $5.4 million in 2015/16 (an increase of 19.0 per cent, inclusive of inflation). Forecast expenditure for each year is detailed in the first row of Table 5.4 below.

As a general conclusion, Cardno has found the forecast expenditure to be efficient and appropriate. In past pricing inquiries the Authority has made the decision not to subject Busselton Water to an efficiency target. Cardno has confirmed that such an approach is appropriate for this inquiry. Cardno noted that Busselton Water's budgeting process is sound and appropriate, and that Busselton Water is already a low cost water service provider.

[105] Cardno notes that, due to the relatively small size of Busselton Water's capital programme, year-on-year expenditure can be quite variable where large investments are involved. The capital program in 2011/12 included the construction of bulk water supply to Dunsborough as per Busselton Water's agreement with the Water Corporation, the introduction of chlorination, and works relating to increasing supply capacity.

[106] Cardno, 2012, *Review of Busselton Water's Capital and Operating Expenditure, Final Report*, pp. 41-44.

While no efficiency target is imposed on Busselton Water there is a need for some minor adjustment to Busselton Water's forecast operating expenditure. The following adjustments have been made based on the advice of Cardno:

Busselton Water has escalated its real treatment plant operating costs by about 7 per cent which is well above the three per cent escalation rate that is applied to most expenditure items. Treatment plant operating costs in excess of a 3 per cent rate of escalation have been removed from the forecasts (row two of Table 5.4).

Busselton Water has made allowances for operating costs of future water treatment plants. The Authority holds the view, informed by Cardno, that no additional treatment capacity is required. These costs have been removed from the forecasts (row three of Table 5.4).

Busselton Water's forecast operating expenditure does not include an allowance for impacts arising from the carbon tax. The Authority has accepted a recommendation from Cardno to add an amount of approximately $20,000 per annum to be added to existing operating forecasts (row four of 5.4).

In 2011/12, Busselton Water employed a public relations officer following the introduction of its chlorination program. The organisation has not budgeted on maintaining this staff member for 2012/13. On review of the situation and the community concerns about chlorination, Cardno has recommended that public relations costs will continue to need to be incurred in 2012/13. The Authority has accepted this recommendation and included an additional allowance of $30,000 for 2012/13 (row five of Table 5.4).

The total efficient level of operating expenditure for Busselton Water is detailed in the final row of Table 5.4.

Table 5.4 Busselton Water Forecast Operating Expenditure, 2012/13 to 2015/16 ($m, nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Busselton Water forecast operating expenditure	4.58	4.87	5.27	5.43
Less treatment plant costs in excess of 3% cap	*0.00*	*0.12*	*0.17*	*0.18*
Less future treatment plant costs	*0.00*	*0.04*	*0.15*	*0.19*
Plus carbon price impacts	*0.02*	*0.02*	*0.02*	*0.02*
Plus ongoing public relations costs	*0.03*	*0.00*	*0.00*	*0.00*
Total efficient forecast operating expenditure*	**4.63**	**4.74**	**4.97**	**5.08**

** Figures may not add exactly due to rounding.*
Sources: Busselton Water and Cardno.

5.3.4 Rate of Return

The Authority's methodology for determining the rate of return for Busselton Water is the same as that used for the Water Corporation (and Aqwest). This methodology is detailed in Chapter 3. There is one difference in the application of this methodology and this difference applies to the estimation of the debt risk premium.

To estimate the debt risk premium for the Water Corporation the Authority used a sample of A- rated corporate bonds in its bond yield approach. The Authority considers that Busselton Water is likely to face higher debt costs than the Water Corporation because it faces higher

bankruptcy risks and limited access to different sources of finance. The Authority has therefore adopted a credit rating of BBB/BBB+ for its analysis of the rate of return for Busselton Water. The derived debt premium for Busselton Water of 3.276 per cent is higher than that estimated for the Water Corporation (2.314 per cent).

It follows that the real post-tax rate of return determined for Busselton Water of 3.87 per cent is higher than that estimated for the Water Corporation (3.31 per cent).

5.3.5 Determining the Total Cost of Service

In a post-tax scenario (as is being adopted by the Authority), Busselton Water's total cost of service for the 2013/14 to 2015/16 period when calculated using Busselton Water's proposed inputs is estimated at $19.724 million.

If the Authority were to adopt the same methodology to price determination as used in the 2009 inquiry then the average annual revenue that Busselton Water would be expected to receive over the 2013/14 to 2015/16 period is at $6.830 million.[107]

As discussed in Chapter 2, the Authority has opted to alter its price-determination methodology such that a three-year approach is used. Within this framework, the Authority has ensured that Busselton Water is able to recoup its existing under-recovered revenue. This is achieved by increasing Busselton Water's costs for each of the next ten years by an annuity that is sufficient to recover the previous under-recovery. The value of the annuity that would ensure Busselton Water is able to recover its existing under recovered revenue is $0.074 million per year (in real dollars of 2012).

Table 5.5 contains the Authority's cost estimates for Busselton Water under the revised approach that has been adopted by the Authority. The addition of the annuity adds almost $0.3 million to Busselton Water's revenue requirement over the next three years (this amount is greater than the sum of the annual annuity payments because of the impact of taxation).

Table 5.5 Busselton Water's Costs over the 2013/14 to 2015/16 Period Under Revised Approach to Tariff Determination ($m, real dollars of 2012)

	Total, 2013/14 to 2015/16
Operating Costs	13.46
Depreciation	3.44
Return on Assets (real pre-tax)	4.64
Other Revenue	-2.31
Annuity for Deferred Revenue	0.22
Net Taxation Payments	1.31
Total Net Cost	**20.76**

Source: Authority analysis.

[107] In this instance, average annual net revenue is calculated such that revenues and costs are balanced in net present value terms over the 2008/09 to 2018/19 period and that annual percentage increases in tariffs over the next ten years are held constant.

The total cost of service of $20.76 million is used by the Authority to calculate its recommended tariff levels.

5.4 Recommended Tariffs

The following table shows the current tariffs for Busselton Water and the tariffs that the Authority recommends be transitioned to by 2015/16. The Authority recommends that Busselton Water charges increase at a constant rate to achieve cost recovery. As is the case with Aqwest, the Authority has adopted a policy of capping Busselton Water's highest usage charge to that of the Water Corporation ($3.11 per kilolitre). However, this cap is not reached over the review period. Instead the highest usage charge required by Busselton Water is $3.10 per kilolitre (Table 5.6).

Table 5.6 Recommended Tariff Schedule for Busselton Water Residential and Commercial Customers (nominal dollars)

	Actual Tariffs 2012/13	Recommended Tariffs 2013/14	Recommended Tariffs 2014/15	Recommended Tariffs 2015/16
Residential Charges				
Residential Fixed Charges ($)	162.47	175.65	189.89	205.30
Residential Usage Charges				
1 to 150kL ($/kL)	0.81	0.88	0.95	1.03
151 to 350kL ($/kL)	1.14	1.23	1.33	1.43
351 to 500kL ($/kL)	1.28	1.39	1.50	1.62
501 to 700kL ($/kL)	1.71	1.85	2.00	2.16
701 to 1000kL ($/kL)	2.39	2.58	2.79	3.02
Over 1000kL ($/kL)	2.45	2.65	2.86	3.10
Commercial Charges				
Commercial Fixed Charges, for meter sizes:				
20mm ($)	162.47	175.65	189.89	205.30
25mm ($)	253.87	274.45	296.71	320.78
40mm ($)	649.90	702.59	759.58	821.19
50mm ($)	1,015.46	1,097.80	1,186.84	1,283.11
80mm ($)	2,599.58	2,810.37	3,038.31	3,284.75
100mm ($)	4,061.85	4,391.20	4,747.36	5,132.42
150mm v	9,139.16	9,880.19	10,681.57	11,547.95
Commercial Usage Charge ($/kL)	1.28	1.39	1.50	1.62

Source: Authority analysis.

5.5 Impacts on Residential and Commercial Customers

The following table shows the impacts of the tariff recommendations on Busselton Water customers. The tariff increases would result in an average annual increase in payments of 8.1 per cent over the review period.

Table 5.7 Impacts of Recommendations on Average Annual Payments for Busselton Water Customers (nominal dollars)

	Annual Payment 2012/13	Annual Payment 2015/16	Annual Percentage Variation (2012/13 to 2015/16)	Annual Average Dollar Variation (2012/13 to 2015/16)	Total Dollar Variation (2012/13 to 2015/16)
Typical Household Water Bill (250kL per year)	$398	$502	8.1%	$34.94	$104
Typical Commercial Water Bill (2,000kL per year, 40mm meter)	$3,216	$4,061	8.1%	$281.72	$845

Source: Authority analysis.

5.6 Impacts on Busselton Water

As shown in Table 5.8, Busselton Water's net profit varies from $1.54 million in 2013/14 to $2.15 million in 2015/16. Busselton Water's net assets increase over the price period.

Table 5.8 Summary Financial Indicators for Busselton Water (nominal dollars)

	2012/13[1]	2013/14	2014/15	2015/16
Net Profit ($m)	1.13	1.54	1.78	2.15
Debt ($m)	0.00	0.00	0.00	0.00
Net Assets ($m)	85.66	87.20	88.98	91.14
Debt/Total Assets (%)	0.00	0.00	0.00	0.00
Net Cash from Operating Activities ($m)	2.70	3.17	3.58	4.04
Net Cash used in Investing Activities ($m)	-1.89	-4.97	-2.86	-1.96

[1] *Authority estimates.*
Source: Authority analysis.

5.7 Impacts on Government Finances

Table 5.9 shows the impacts on government finances from applying the tariff recommendations to Busselton Water. Busselton Water does not make any dividend payments to the Government. However, it does make tax equivalent payments to the State Government and receives a small payment from the State Revenue Office for providing rebates to seniors. Net payments to Government increase from an estimated $465,800 in 2012/13 to $760,600 on average for the regulatory period.

Table 5.9 Summary of Impacts on Government Finances (nominal dollars)

	Estimated Annual Payments for 2012/13	Annual Equivalent Payments for the Period 2013/14 to 2015/16
Dividend Payments ($)	0	0
Tax Equivalent Payments ($)	484,000	792,500
Receipts from State Revenue Office[1] ($)	-18,200	-21,800
Net Payments to Government ($)	465,800	760,600

[1] *Received by Busselton Water to pay for its Community Service Obligations*
Source: Authority analysis.

6 CHARGES TO HARVEY WATER

6.1 Background

In October 1996, the Water Corporation transferred its South West irrigation distribution business to the South West Irrigation Management Co-operative (now trading as Harvey Water) and entered into a ten-year water storage and supply agreement with the irrigation water supplier.

The agreement, known as the Bulk Water Supply Agreement (**Agreement**), initially ran until 2006 but has since been extended indefinitely on the consent of both the Water Corporation and Harvey Water. Under the terms of the Agreement, the Water Corporation owns and operates the dams that store the water that is supplied to Harvey Water. The Water Corporation does not charge for the water itself (as Harvey Water has for many years held the access entitlements to the water under the *Rights in Water and Irrigation Act 1914*) but only the costs associated with storing the water, including dam safety costs.

The intent of the Agreement between the Corporation and Harvey Water was to establish a price that reflects an amount irrigators would pay were they, rather than the Corporation, to own the dams.[108] Actual water storage charges levied on Harvey Water have historically been below the costs of service provision. This shortfall has been due to dam safety costs being underestimated at the time of the Agreement. In response to this shortfall, the Government makes Community Service Obligation (**CSO**) payments to the Water Corporation to cover the difference between the Water Corporation's water storage costs and the revenue raised from the storage charges.

In total, the Water Corporation owns and operates seven dams in the South West that are used by Harvey Water. These dams are Waroona, Drakesbrook, Logue Brook, Harvey, Wokalup and Wellington, and Burekup Weir. [109,110]

Water that is provided to Harvey Water is passed on to the Harvey Water shareholders via Harvey Water's own network of channels and pipes.[111] These shareholders include dairy and beef farmers, as well as vineyard owners and fruit and vegetable growers, who use the water to irrigate agricultural land. A number of the dams are also used for recreational purposes.

The region irrigated by the Harvey Water co-operative is shown below.

[108] A 1996 Cabinet Submission on the matter states that under the Agreement, the bulk water price was to be based on "irrigation farmers paying on the same basis that they would pay if they owned the assets."

[109] In addition to these seven dams, Stirling Dam and Samson Brook Dam have traditionally been included in the Agreement but in 2012, it was agreed that the Water Corporation would take ownership of the water in these dams in exchange for the water in Logue Brook Dam, which is no longer potable and hence of more use to Harvey Water rather than the Water Corporation.

[110] While water from Harvey Dam is used by Harvey Water Irrigators, the Authority has not included the dam safety costs relating to this dam in its calculation of charges, as the Water Corporation agreed in the 1996 Agreement that Harvey Water would not be impacted by the capital or operating costs associated with Harvey Dam.

[111] Harvey Water operates as a co-operative that is jointly owned by 683 shareholders or irrigators. The irrigators have access to the water contained in the dams by way of the shares that they hold in the co-operative.

Figure 6.1 Harvey Water Owned and Managed Dams and Weirs

Source: Harvey Water.

The Authority last reviewed the level and structure of water charges levied on Harvey Water in 2007. As part of the 2007 inquiry, the Authority calculated an appropriate level of charges and recommended that these charges be implemented over a ten year phase-in period so as to smooth adjustment costs. The Authority concluded that the structure of charges was a commercial issue to be determined by the Water Corporation and Harvey Water and thus did not provide guidance on this matter.[112]

6.1.1 Determining the Level of Charges

The Authority has developed a financial model for the purpose of calculating cost-reflective charges to Harvey Water.[113] The model estimates the total costs associated with providing a dam storage service from each of the seven dams, and so calculates the revenue required by the Water Corporation to provide these services to Harvey Water. The revenue that is required by the Water Corporation includes depreciation; a return on the assets; and operating costs.[114]

Dam safety expenditure represents over 80 per cent of the total cost to be recovered from irrigators, with the remainder consisting largely of non-safety related expenditure. Day to day operating expenditure accounts for less than one per cent of the total costs of service provision.

The methodology adopted in the Authority's modelling of tariffs is as follows:

[112] Economic Regulation Authority (2007) *Inquiry on Harvey Water Bulk Pricing Revised Final Report*.

[113] The model currently operates on a real pre-tax basis. The Authority intends to revise the model to operate on a nominal post-tax basis between the release of this Draft Report and the Final Report, to be consistent with the Authority's current approach to the modelling of Water Corporation, Aqwest and Busselton Water tariffs. Preliminary investigation undertaken by the Authority indicates that a shift to nominal post-tax modelling would have only a minor impact on its recommended charges.

[114] The approach taken by the Authority is known as 'upper bound pricing', setting charges at a level where the Water Corporation recovers an amount that is not more than the total of the depreciation of the assets, the operational expenses associated with the assets, and an appropriate commercial return on the assets.

- the starting point is the regulatory asset value of each dam, initially determined in 1996, and then rolled forward each year by adding appropriate and efficient capital expenditure in each year and deducting depreciation;
- the annual cost of providing the storage service from each dam is calculated by summing the return on assets (the rate of return multiplied by the regulatory asset value), depreciation and operating costs;[115]
- the cost of service is projected over an eighty year period and costs are smoothed over the period;[116]
- the annual cost of service for each dam is then, where appropriate, reduced by the assumed recreational value to account for the fact that recreational users also reap benefits from the existence of the dams;[117] and
- the remaining cost is allocated to Harvey Water upon which the costs are passed on to the Harvey Water irrigation and non-irrigation customers. [118]

6.1.2 Recovery of Expenditure

In determining the appropriate level of charges, the Authority has taken into account the actual and projected dam safety costs incurred by the Water Corporation over an eighty-year period commencing in 1995/96 (the year that the South West Irrigation Management Co-operative was established).

Charges are then calculated such that this expenditure is recovered by the Water Corporation over the same eighty-year period.

In the 2007 inquiry, the Authority determined that charges in place at the time were significantly below cost-reflective charges.[119] To avoid a rapid increase in charges, the Authority recommended that charges be transitioned to cost-reflective levels over a ten-year period (2007/08 to 2016/17). The Authority also recommended that the Government provide a CSO payment to the Water Corporation to account for the shortfall in revenue caused by actual charges being below cost-reflective charges.

The Authority's recommendations were implemented following the release of the 2007 inquiry.

As part of this inquiry, the Authority has elected to continue with the same phase in approach such that recommended charges will continue to gradually increase until 2016/17, at which time they will be cost-reflective. Accordingly, charges will remain constant in real terms (at a cost-reflective level) for each year beyond 2016/17.

[115] Details of the assumptions applied in calculating the Water Corporation's revenue requirement are provided in Appendix [x].

[116] The Authority estimates costs over an eighty year period because dam safety expenditure is typically long-term expenditure and will generate benefits over a long period of time. A period of eighty years matches the period over which dam safety expenditure is depreciated.

[117] Six of the seven dams that are used by Harvey Water are open to recreational use. Recreational users derive some value from the dams and therefore it is appropriate that some of the costs of maintaining and operating the dams are passed on to recreational users. In reality, the State Government pays this portion of costs that are allocated to recreational users with a community service obligation payment to the Water Corporation. More discussion on this matter is provided in Section 1.5.1.

[118] Non-irrigation usage represents less than one per cent of the total volume of all dams. Harvey Water's operating and surface water licenses allow it to sell water to non-irrigation customers. However, as an irrigators' collective, such customers are incidental to Harvey Water's core business.

[119] Economic Regulation Authority, *op.cit.* The report found that charges to Harvey Water would need to more than triple from their 2005/06 levels to reach cost reflectivity.

6.2 The Dam Safety Programme

Dam safety costs account for the majority of the dam-related expenditure during the period covered by the model.

Dam safety requirements were first reviewed in detail by the Water Corporation shortly after it was established in 1995. In the absence of state-based regulations on dam safety, the Water Corporation adopted the assessment framework set by the Australian National Committee on Large Dams (ANCOLD).

The adoption of the ANCOLD guidelines is reflected in the fact that the Agreement held between the Water Corporation and Harvey Water makes reference to a requirement for safety upgrades consistent with the requirements of ANCOLD guidelines. The Agreement allows for the charges to irrigators to be increased as a consequence of any future dam safety upgrades.

On conclusion of the Water Corporation dam safety review, six South West dams had been identified as being in need of a further high priority review.[120] These six dams were Wellington, Drakesbrook, Logue Brook, Waroona, Samson Brook and Stirling. As mentioned earlier in the report, ownership of the water in the Samson Brook and Stirling Dams has recently been transferred to the Water Corporation. As these two dams no longer provide services to Harvey Water, the costs incurred in maintaining them are not relevant to the determination of charges.

The Water Corporation continued the review process and by 2001 had produced detailed business cases for a series of safety upgrades. Harvey Water has advised the Authority that the Water Corporation did not consult with Harvey Water as part of this process.

In determining appropriate water storage charges, the Authority considers that only the minimum capital expenditure necessary to reduce the risk of dam failure below the ANCOLD Limit of Tolerability should be passed on to Harvey Water. The Limit of Tolerability is determined based on the following criteria:

- no single individual should face a risk greater than 1 in 10,000 of death from dam failure in anyone year (called the individual risk criterion);
- the expected (risk weighted) number of fatalities in any one year must not exceed 1 in 1,000 for an established dam (called the societal risk criterion); and
- the Limit of Tolerability for multiple fatalities is capped for any number of deaths above 100 (1 in 100,000 for existing dams).

In its 2007 inquiry, the Authority found that when viewed in the context of how other safety expenditure is allocated, the application of the ANCOLD guidelines can lead to a substantially greater amount spent on dam safety than on other areas where safety can be improved.[121]

The Authority went on to recommend that the Government introduce a mechanism that transparently prioritises expenditure on dam safety against expenditure on reducing other

[120] These six dams were Wellington, Drakesbrook, Logue Brook, Waroona, Samson and Stirling. As mentioned earlier in the report, ownership of the water in the Samson and Stirling Dams has recently been transferred to the Water Corporation. Neither dam is used to provide services to Harvey Water and hence the costs incurred in maintaining these two dams are not relevant to the determination of charges for Harvey Water.

[121] Economic Regulation Authority (2007) *Inquiry on Harvey Water Bulk Pricing Revised Final Report,* pp. 40-43.

risks facing Government and community. Such a mechanism would require all safety-related expenditure to be justified using a common measure. This recommendation still holds.

6.3 Review of Dam Safety Expenditure

6.3.1 Dam Safety Projects

It is estimated that over the period 1997/98 to 2019/20 total Water Corporation expenditure on safety improvements will be approximately $106 million. Around $79 million of this amount relates to works that were completed by 2012/13.

Of the seven dams used by Harvey Water, four have been subject to remedial works relevant to this inquiry. The specific remedial works included in the dam safety programme are detailed in Table 6.1.

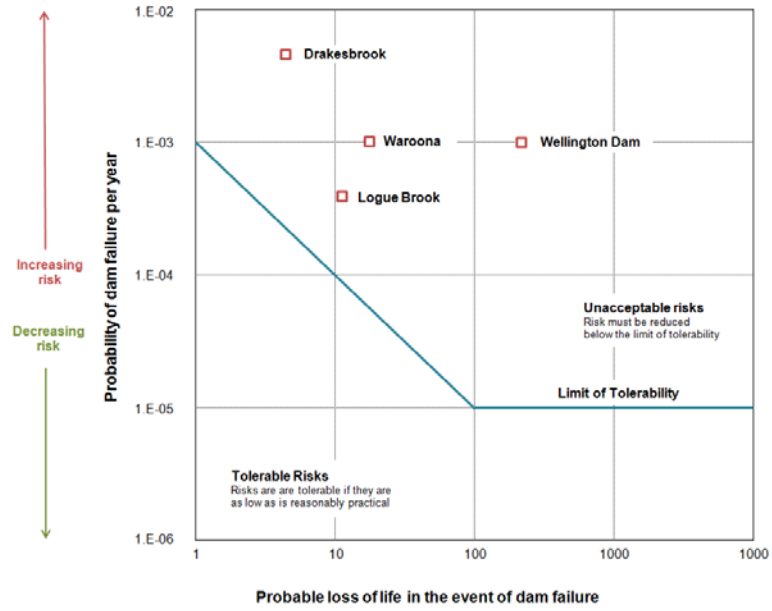
Table 6.1 Water Corporation Remedial Works on South West Dams

Dam	Works	Cost ($m)	Timing
Waroona Dam	Strengthening of dam wall, measures to control seepage, replacement of intake tower with a submerged emergency control valve, construction of a new two-way road across the dam crest. (Further works originally planned as a stage two have been deferred.)	$12.5m	1998 - 2007
Drakesbrook Dam	The excavation and rebuilding of the top three metres of the dam, raising the dam by one metre, the construction of a new main spillway, and upgrade of instrumentation.	$19.5m	2003 - 2011
Wellington Dam	The installation of post tensioned anchors through the dam along with other minor works on instrumentation and decommissioning of the high level outlet.	$48.5m	2003 - 2013
Logue Brook Stages 1, 2 & 3	The construction of a new spillway, the extension of a chimney filter, work on the outlet conduit, the replacement of the intake tower with a submerged valve, an upgrade of dam instrumentation, the installation of guardrails and the construction of a chimney filter and downstream berm on the saddle dam. (Stage one to be completed by 2015/16.)	$25.4m	2003 – 2020

Sources: Water Corporation (provided by email, Friday 13 July, 2012) and Cardno.

Figure 2 illustrates the risk of failure to which each of these four dams was subject in 1997/98. The distance of each dam from the Limit of Tolerability line is a measure of the seriousness of the dam risks prior to any remedial works. Alongside each dam in Table 5 is a note on the action needed to be taken by the Water Corporation to lower the risk of failure below the Limit of Tolerability.

Figure 6.2 Risk of Dam Failure Prior to Remedial Works (as at 1997/98)



Sources: Water Corporation and Marsden Jacob Associates.

In 2007, Marsden Jacob Associates (**MJA**) was engaged by the Authority to review the Water Corporation's dam safety programme. MJA analysis confirmed that, once complete, the Water Corporation's planned risk mitigation actions would reduce the risk of failure for each dam below the Limit of Tolerability.

At the time, MJA considered the works undertaken by the Water Corporation that were sufficient to reduce risk to this level were limited to the remedial works on the Drakesbrook and Wellington dams, Stage One of the remedial works on Waroona Dam, and the lowering of the Mean Operating Level[122] of Logue Brook Dam by 1.5 metres.

In 2011 the risk profile of the Logue Brook Dam was reassessed, taking into account information that had become available subsequent to the original review. The 2011 review found that, in spite of the reduction of the Mean Operating Level, the risk of loss of life due to dam failure remained above the Limit of Tolerability.

6.3.2 Consultant Findings

As part of this inquiry, the Authority engaged Cardno to examine the efficiency of the Water Corporation's historical and planned expenditure on the south west dams. As part of this process, Cardno reviewed expenditure on Wellington Dam, Drakesbrook Dam and Logue Brook Dam review.

Cardno concluded that:

- the remedial works on Wellington Dam were performed to a high standard and at an appropriate cost;
- the Drakesbrook Dam works were more costly than necessary as a result of inadequacies in the project delivery strategy; and

[122] That is, the average level of water contained in the dam, expressed in terms of the height of the water.

- stage one of the Logue Brook Dam remedial works, as budgeted, would result in the necessary risk reduction.

6.3.3 Authority Assessment

The Authority's conclusions as to the appropriateness of the Water Corporation dam safety expenditure have been formed after taking into account Cardno's findings and the findings from the Authority's own 2007 review. These conclusions are:

- stage one remedial works on Waroona Dam were efficient and necessary to lower the risk of failure;[123]
- Water Corporation expenditure on Drakesbrook Dam was necessary to lower the risk of failure but has not been efficient due to 'the poor performance of the design consultant';[124]
- Water Corporation expenditure on Wellington Dam is efficient and once completed in 2012/13 will bring the risk of failure below the Limit of Tolerability; and
- the stage one Logue Brook Dam works due to be completed in 2015/16 are necessary to reduce the risk of failure and should proceed as planned, but any further expenditure is unnecessary.

Given the above conclusions, the Authority has undertaken its modelling on the following basis:

- all Water Corporation expenditure associated with stage one of remedial works on Waroona Dam is passed on to customers;
- all Water Corporation expenditure on Wellington Dam is passed on to customers;
- the Water Corporation is to recover the original budgeted expenditure of $17.9 million for remedial works to the Drakesbrook Dam, rather than the actual expenditure of $19.6 million;[125] and
- expenditure associated with stage one of remedial works on Logue Brook Dam, being $17.6 million, is passed on to customers.

Of the Water Corporation's total planned dam safety capital expenditure of $106.0 million, the Authority has determined that $96.5 million is efficient and necessary and therefore should be passed on to customers.

6.4 Allocation of Costs

Harvey Water irrigators are not the only users of the South West dams, and hence it is appropriate to allocate the identified efficient water storage costs across all parties that benefit from the dams. These beneficiaries include:

[123] Simply because stage one expenditure is sufficient on its own to lower the risk of failure below the Limit of Tolerability.

[124] Cardno/Atkins, 2012, *Review of Water Corporation's Capital and Operating Expenditure*, p. 88.

[125] Customers should not bear the additional costs arising from the Water Corporation's engagement of an unsatisfactory consultant.

- Private beneficiaries - these beneficiaries make a payment to the Corporation for their private use of water. In the case of the South West irrigation dams, the private beneficiaries include Harvey Water irrigators and other purchasers of water including a small number of mine sites and households in the region, referred to as 'non-irrigation customers'.

- Public beneficiaries - these beneficiaries include recreational users of dams.

The allocation process recognises that Harvey Water irrigators are not the only parties that benefit from the dams. Consequently, the Authority has determined methods to allocate portions of water storage costs to recreational users, and to Harvey Water's non-irrigation customers.

6.4.1 Recreational Benefits

Six of the seven dams that are used by Harvey Water are open to recreational use.[126] For these six dams, it is inappropriate for Harvey Water irrigators to bear the entirety of the dam safety costs, since the benefits of dam safety expenditure is shared between the irrigators and the recreational users. To address this, the Authority has estimated the value of the benefits enjoyed by recreational users of the dams.

The most relevant study for estimating the value of the benefits enjoyed by recreational users is the Lucas study of 1991.[127] The study contained a detailed analysis of the recreational value of Logue Brook Dam and concluded that recreational benefits accounted for approximately 20 per cent of the total benefits created by the dam. Consistent with the approach taken in 2007, the Authority has allocated 20 per cent of the costs associated with the six dams that are open to recreational use to recreational users. These costs are not borne by Harvey Water.

6.4.2 Harvey Water Irrigators and Non-Irrigation Customers

Harvey Water's operating and surface water licences allow it to sell water to non-irrigation customers. Harvey Water incurs a higher charge for non-irrigation water use, reflecting a Government decision to maintain pricing consistency across the Water Corporation's customers. The Water Corporation charges an amount to Harvey Water that incorporates water storage costs as well as a premium resulting from the Government decision, and Harvey Water recovers the charge, along with the costs of distributing the water, from its non-irrigation customers.

In the approach taken by the Authority, the model allocates a portion of the total water storage and dam safety costs to the non-irrigation customers on the basis of the volume of water they consume.

The total cost allocated to Harvey Water can then be calculated as the Corporation's total cost of providing storage and dam safety, less the costs that are allocated to recreational users and to non-irrigation customers.

[126] Burekup Weir is currently not open to recreational use. For Wellington Dam, recreational use on the water itself is prohibited though areas surrounding the Dam are open to the public. The Department of Water is currently reviewing arrangements at Wellington Dam with a view toward reopening the Dam to public use. See Department of Water (2012) *Statewide Policy 13 – Recreation within public drinking water source areas on Crown land* (Draft).

[127] Lucas, S., 1991, *An Estimation of the Recreation Activities Occurring at Waroona and Logue Brook Reservoirs*, Water Authority of Western Australia.

6.5 Level of Charges

6.5.1 Charges

The historical and current charges paid by Harvey Water to the Water Corporation are provided in Table 3. Over the five year period, the charges have increased from approximately $0.93 million to $1.93 million, bringing them more closely into line with the cost of dam safety compliance.

Table 6.2 Historical Water Storage and Dam Safety Charges 2008/09 to 2012/13 ($m, nominal)

	2007/08	2008/09	2009/10	2010/11	2011/12	2012/13
Charge to Harvey Water	0.93	1.13	1.33	1.53	1.76	1.96

Source: Water Corporation.

The increase in charges over time reflects the fact that the original Agreement between the Water Corporation and Harvey Water did not contemplate the significantly higher expenditure on dam safety that would be required to meet the ANCOLD guidelines. The cost of improvement to the dams was estimated to be around $17 million in 1996 at the time the agreement was negotiated. By the time of the Authority's 2007 inquiry these costs had increased to around $151 million.

6.5.2 Transition to Cost-reflective Charges

The immediate introduction of cost-reflective charges would result in an increase upon the current charges payable by Harvey Water of around 42 per cent. Given the significant increase in charges, the Authority recommends that tariffs be phased in over an appropriate period.

The Water Corporation is already in the process of phasing in the price increases recommended by the Authority in 2007. These existing prices increases are being phased in over a ten-year period. Under this arrangement, full cost reflectivity was to be achieved by 2017/18. A State Government CSO payment is provided to the Water Corporation for the under recovery of costs incurred during the phase-in period. At the time of writing this report (2012), the Water Corporation was half-way through the ten-year phase in period.

Accordingly, the Authority considers that any remaining price increase calculated as part of this inquiry should be phased in over the next five years such that (as would have been the case anyway) the charges will not reach a level of full cost reflectivity until 2017/18. This phase in of charges will allow annual price increases to be limited to around 10 to 13 per cent in each year of the phase in period, inclusive of inflation.

As is the current practice, any shortfall between the cost-reflective price and the price paid by irrigators during this period should be funded by a CSO.

The Authority's recommended charges to Harvey Water are detailed in Table 6.3. For the purposes of comparison, Table 6.3 includes the existing price path as recommended by the Authority in 2007.

Table 6.3 Average Charge to Harvey Water (5yr Price Path, $m, nominal)

	Current	2013/14	2014/15	2015/16	2016/17
ERA Recommended Price Path, 2012	**1.962**	**2.212**	**2.473**	**2.743**	**3.024**
ERA Recommended Price Path, 2007	*1.962*	*2.004*	*2.089*	*2.223*	*2.416*

Source: Authority analysis.

The total charges determined in this inquiry are higher than the charges of the existing price path that were determined in the Authority's 2007 inquiry into Harvey Water. There are two main reasons for the increase in charges.

Firstly, in 2007 the Authority recommended the Government should establish a mechanism to prioritise safety expenditures within the community as a whole, ensuring that funds were allocated to projects where they might be best used to lower the risk of loss of life. The Authority considered that under such a framework only the costs incurred in relation to Wellington Dam and Stage One of the Waroona Dam remedial works were necessary and appropriate to recover from customers.[128]

The Authority considered that, were the Government to consider the wider portfolio of risks facing the community on a whole-of-government basis, any further safety expenditure might be deferred to allow funds to be allocated to projects mitigating risk of loss of life elsewhere in the community. However, the Government elected to prioritise the risk of loss of life associated with dam safety, resulting in remedial works being conducted on Stirling, Drakesbrook and Samson Brook dams as well as on Wellington Dam. Consequently, the expenditure on these dams has been included in Authority's calculation of charges.

Secondly, at the time of the Authority's 2007 report, the risk of failure for Logue Brook Dam was understood to be below the Limit of Tolerability. However, as discussed earlier, the risk profile of the dam was subsequently reassessed and found to be above the Limit of Tolerability. As a result, the safety expenditure associated with stage one of the remedial works on Logue Brook Dam has also been included in the Authority's calculation of charges.

The increase in charges arising from these factors has been partially offset by a decrease in the weighted average cost of capital (from a rate of 5.63 per cent in 2007 compared to 4.03 per cent used in this inquiry[129]), and by the costs relating to the Stirling and Samson Brook dams no longer being borne by Harvey Water irrigators.

[128] These are the charges shown in the 2007 recommended price path in Table 4, being the charges that would apply under an "Option 2" scenario as referred to in the Authority's 2007 inquiry. Option 2 represents the price path currently used by Water Corporation, and allows only for the recovery of the costs associated with Wellington Dam and Stage One of the Waroona Dam remedial works. See the Authority's *Final Report on Harvey Water Bulk Water Pricing* for more discussion.

[129] In both instances, real pre-tax estimates of the weighted average cost of capital have been used.

6.5.3 Recommendations

The Authority recommends that the storage charges to Harvey Water should be phased in over a period of five years. To achieve cost reflectivity, the total annual charge by the Water Corporation to Harvey Water would increase from $1.96 million in 2012/13 to $3.02 million in 2016/17.

If the Authority's recommendations are implemented, the Government will be required to pay a CSO to the Water Corporation of $2.55 million in 2013/14.This CSO will provide the Water Corporation with an appropriate amount to offset:

- the undercharging to Harvey Water resulting from the use of a phase-in period; and
- the value of benefits of recreational use of the dams by the public which is not paid for by Harvey Water.

By 2017/18, Harvey Water charges will reach cost reflectivity and there will be no need for the phase-in part of the CSO. By this time the CSO will only need to provide the Water Corporation with the costs that are attributed to public recreational use: it is estimated that these costs will amount to $1.01 million (in nominal dollars) in 2017/18.

6.6 Structure of Charges

To date, the Water Corporation has charged Harvey Water a fixed amount in each year to cover the costs of dam safety. In its submission to this inquiry, Harvey Water noted its objection to the fixed charge approach that has been adopted by the Water Corporation:

> As the bulk water charges are fixed, the effective cost per megalitre increases substantially as the allocation decreases. Water allocations have recently been in the order of 35%-45% of full entitlements, implying impacts two to three times greater than forecast in the ERA's original [2007] modelling. The lower allocations imply that water is not only less affordable to use, but also less affordable to own, as irrigators must pay the fixed fees regardless of usage.

The Authority concurs with the statement put forward by Harvey Water that per megalitre costs of water rise in a scenario where charges are fixed and water allocations are falling. But the charges levied on Harvey Water are designed to recoup fixed (dam safety) costs and therefore it is appropriate that these costs be recovered from Harvey Water with a fixed charge, as is the current practice.

In coming to this conclusion, the Authority notes that the charges levied on Harvey Water are not intended to be water usage charges as it is Harvey Water that owns the water in the south west dams. Instead, the charges levied on Harvey Water are charges designed to recoup the costs of the provision of the appropriate infrastructure, this being the south-west dams.

APPENDICES

7 Appendix A Terms of Reference

INQUIRY INTO THE EFFICIENT COSTS AND TARIFFS OF THE WATER CORPORATION, AQWEST AND BUSSELTON WATER

TERMS OF REFERENCE

I, CHARLES CHRISTIAN PORTER, Treasurer and pursuant to section 32(1) of the Economic Regulation Authority Act 2003 request that the Economic Regulation Authority (ERA) undertake an inquiry into the efficient costs and tariffs of the Water Corporation, Aqwest and Busselton Water Board for the next three year period.

Whilst conducting its inquiry, the ERA is to investigate and report on the efficient costs, and appropriate charges for the services of the Water Corporation, Aqwest and the Busselton Water Board. The ERA should consider, but not limit its investigation to, recommended tariff levels and charging structures for water, wastewater and drainage services.

The ERA is also to make recommendations on the most appropriate level and structure of water storage charges to the South West Irrigation Management Co-operative (Harvey Water).

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

- the efficient operating and capital costs of providing services, with a focus on:
  - cost effectiveness in the supply of services;
  - appropriate service standards and the resources required to meet them;
  - resources necessary to meet the required service standards; and
  - resources necessary to meet security of supply service standards for water;
- the method used to determine the revenue requirements of each service provider;
- the value of the service providers' assets, and the appropriate rate of return on those assets;
- the impact of the recommendations on each service provider's net financial position and financial performance;
- the impact of the imposition of the Clean Energy Future Package (carbon pricing) by the Commonwealth Government;
- the impact of the recommendations on the Government's financial targets, in particular, Public Sector Net Debt, dividends, tax equivalent payments and the level of Government funding (particularly through Community Service Obligation Payments); and
- the social impact of the recommendations.

In developing its recommendations, the ERA is to have regard to the following policies:

- the pricing principles of the 1994 Council of Australian Governments water reform agreement and the National Water Initiative;
- uniform pricing; and

- the pricing mechanisms available to the Water Corporation, Aqwest and the Busselton Water Board under relevant legislation.

The ERA will release an issues paper as soon as possible after receiving the terms of reference. The paper is to facilitate public consultation on the basis of invitations for written submissions from industry, government and all other stakeholders groups, including the general community.

A draft report is to be made available for further public consultation on the basis of invitations for written submissions. A final report is to be completed by no later than the close of business 2 November 2012. To accommodate the timing necessary to meet the normal information requirements of the 2013/14 Budget Process, no extension of time is possible beyond this date.

HON C. CHRISTIAN PORTER MLA
TREASURER; ATTORNEY GENERAL

8 Appendix B Rate of Return Methodology

1. 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, which is estimated using the Capital Asset Pricing Model (**CAPM**), R_d is the cost of debt. E is the share of equity and D is the share of debt such that the total asset value of the firm: $V = E + D$.

2. The WACC is an estimate of the post-tax return on assets. Calculating the WACC consists of:

- determining the (post tax) rate of return on equity R_e;
- determining the Cost of Debt R_d;
- determining the financing structure (D/V and E/V); and
- other WACC parameters that directly affect the above parameters.

3. The above WACC formula is widely known as the post-tax (Vanilla) WACC formula because the formula, in its simplest form, requires all potential costs and benefits to be reflected in the cash flows. It is generally argued that the above Vanilla WACC formula is the most appropriate because all the adjustments for taxes, imputation credits and the like occur in the net cash flows. Doing so has the advantage of being able to clearly identify when these taxes are paid. In addition, the Vanilla WACC formula bears a closer resemblance to market rates that investors can observe in comparison with other WACC formulas, which will be discussed below.

4. While all regulators of utility industries in Australia use the CAPM to estimate the cost of equity, there is no clear precedent on the form of the WACC to be used (i.e. pre-tax or post-tax, real or nominal). The following section is devoted to the discussion of the different WACC formulas that have been adopted by Australian regulators.

8.1 The WACC formula

5. There are many different WACC formula that could be used to estimate the cost of capital for a firm. The most commonly used formula for the WACC, and their appropriate definitions of the cash flows given the WACC formula, are presented below.[130]

6. It is assumed that X_O represents net operating cash flows (i.e. the net cash flows that are to be distributed to debt holders; the government through taxation; and equity holders). X_O is also known as the earnings before interest and tax (**EBIT**). Then, we have:

[130] Officer, R. (1994), "The Cost of Capital of a Company under an Imputation Tax System", *Accounting and Finance,* Vol. 34, No. 1, pp.1-17.

- is distributed to debt holders;
- X_G is the net cash flow that is distributed to the government; and
- X_E is the net cash flow that is distributed to equity holders.

7. Table 8.1 below provides a summary of the different WACC formulas associated with the definitions of the cash flows.

Table 8.1 The WACC formula and the definitions of the cash flows

Parameter	WACC Formulae	Definition of the Cash flows
Before Tax Cost of Capital	$\frac{R_e}{\left(1-T\left(1-\gamma\right)\right)}\frac{E}{V}+R_d\frac{D}{V}$	$X_O=X_D+X_G+X_E$
After Tax Cost of Capital I	$\frac{R_e\left(1-T\right)}{\left(1-T\left(1-\gamma\right)\right)}\frac{E}{V}+R_d\frac{D}{V}\left(1-T\right)$	$X_O\left(1-T\right)$
After Tax Cost of Capital II	$R_e\frac{E}{V}+R_d\left(1-T\left(1-\gamma\right)\right)\frac{D}{V}$	$X_O\left(1-T\left(1-\gamma\right)\right)$
After Tax Cost of Capital III	$R_e\frac{E}{V}+R_d\frac{D}{V}\left(1-T\right)$	$X_O\left(1-T\right)-\gamma T\left(X_O-X_D\right)$
After Tax Cost of Capital IV ("Vanilla" WACC)	$R_e\frac{E}{V}+R_d\frac{D}{V}$	$X_O-T\left(X_O-X_D\right)\left(1-\gamma\right)$

8.2 Pre-tax versus post-tax approaches

8. In the current inquiry released in 2009, the Authority used a real pre-tax WACC approach in its recommendations because this method:

- avoided the need to forecast inflation ex ante in setting the overall price path;
- simplified financial modelling; and
- allowed consistency across regulated utilities in Western Australia.

9. Increasingly other regulators are moving to a post-tax WACC, recognising that the use of a pre-tax WACC tends to over-compensate service providers for their tax liabilities. The Authority considers that this over compensation does not result in economically efficient pricing.

10. The Authority observes that a number of Australian and foreign regulators adopt a post-tax modelling approach.

- The Queensland Competition Authority and New Zealand Commerce Commission currently adopt nominal post-tax modelling.
- The Australian Competition and Consumer Commission (**ACCC**) and the Australian Energy Regulator (AER) use a post-tax nominal form of the WACC.
- The Essential Services Commission of Victoria (**ESC**) has used a post-tax real form of the WACC.

- The Office of Gas and Electricity Markets (UK) and Office of Water and the Water Services Regulatory Authority (UK) currently adopt real post-tax modelling.

11. With the recent decision by the Independent Pricing and Regulatory Tribunal of New South Wales (**IPART**) to move to a real post-tax WACC, the only remaining regulators using a pre-tax approach are the Independent Competition and Regulatory Commission (**ICRC**), and the Essential Services Commission of South Australia (**ESCOSA**). The Authority notes that there is a legislative requirement for ESCOSA to use a pre-tax WACC when determining prices for SA Water.

12. The Authority considers that the use of an explicit post-tax approach allows a regulated entity's effective tax liabilities to be estimated more precisely – overcoming shortcomings with the pre-tax approach. The post-tax approach recognises that:

- pre-tax WACC regulatory method (implicit) 'earnings before tax' tend to differ from actual post-tax method 'earnings before tax', reflecting differences in the respective depreciation schedules, as well as in the tax base itself;
- tax rebates and offsets may need to be incorporated; and
- accumulated tax losses and any expected changes in tax treatment can affect the timing of tax liabilities.

13. The alternate method of estimating a pre-tax WACC at effective tax rates is impractical as no publicly available reasonable estimates of benchmark effective taxation rates exist. These would need to be modelled, requiring the same work as modelling taxation liability directly, but would be less transparent in application.

14. In the Final Decision on Western Power's Network Proposed Access Arrangement released in August 2012, the Authority adopted the overall real post-tax revenue framework. The Authority is of the view that where an overall real post-tax revenue framework is adopted, nominal modelling of the post-tax building block should be implemented (refer Table 8.2). This is because it is not possible to accurately estimate tax liabilities in a real account. In this case, the resulting nominal post-tax estimates of the tax liabilities then may be deflated to real terms using the estimate of future inflation, and incorporated into the real revenue model. This real post-tax model can overcome many of the problems associated with the real pre-tax approach.

15. However, there is no clear precedent for the choice between a real or nominal post tax modelling approach to the overall revenue requirement (refer Table 8.2). There are advantages and disadvantages associated with each approach, and the issues are complex. The key issues include:

- the treatment of depreciation in the regulatory accounts;
- alignment of treatment in the regulatory accounts and the tax accounts; and
- how to deal with differences between expected and actual inflation.

16. The Authority's view is that there are advantages with remaining with a real revenue modelling framework – which utilises the real post-tax WACC to calculate the rate of return. These advantages relate principally to the ability to:

- incorporate a post tax approach, which addresses a major shortcoming of the previous approach; and
- retain actual inflation outcomes in the setting of the maximum revenue.

Table 8.2 Tax treatment in other jurisdictions

Regulator	Form of WACC	Nominal or real tax liability	Accumulated tax losses	Tax rate	Depreciation allowance	Gearing
AER[a]	Nominal post-tax	Nominal	Yes	Statutory	Tax	Benchmark
IPART[b]	Real post-tax (water)	Nominal	Yes	Statutory	Tax	Benchmark
ESC[c]	Real post-tax	Nominal	Yes	Statutory	Tax	Benchmark
ERA (existing)[d]	Real pre-tax	Real	No	Statutory	Regulatory	Benchmark
QCA[e]	Nominal post-tax	Nominal	No	Statutory	Tax	Benchmark
ESCOSA[f]	Real pre-tax	Real	No	Statutory	Regulatory	Benchmark
NZ Commerce Commission[g]	Nominal post-tax	Nominal	Yes, but limited	Statutory	Tax	Benchmark
UK Ofgem[h]	Real post-tax	Nominal		Statutory	Tax	Benchmark for low geared. Actual for high geared
UK Ofwat[i]	Real post-tax	Nominal		Statutory	Tax	Benchmark for low geared. Actual for high geared

Notes: All regulators allow for dividend imputation

a) Australian Energy Regulator 2010, Amendment : Electricity transmission network service providers Post-tax revenue model handbook, www.aer.gov.au
b) IPART 2011, The incorporation of company tax in pricing determinations: Other industries – Final Decision, www.ipart.nsw.gove.au.
c) Essential Services Commission 2009, Melbourne Metropolitan Water Price Review 2008-09–Final Decision, www.esc.vic.gov.au.
d) Economic Regulation Authority 2012, Revised Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, www.erawa.com.au.
e) Queensland Competition Authority 2010, Gladstone Area Water Board 2010 Investigation of Pricing Practices; Dalrymple Bay Coal Terminal 2010 Draft Access Undertaking, www.qca.com.au.
f) ESCOSA 2009, Metropolitan and Regional Water and Wastewater Pricing Process, www.escosa.com.au.
g) Airport Services Input Methodologies Determination December 2010; Commerce Act (Transpower) Input Methodologies Determination 2010; Input Methodologies (Electricity Distribution and Gas Pipeline Services) Reasons Paper December 2010.
h) Electricity distribution final price control review: final proposals, 2004
i) Setting price limits for 2010-15: framework and approach, 2009

Source*: Authority analysis (but drawing extensively on IPART 2011,* The Incorporation of Company Tax in Pricing Determinations*, www.ipart.nsw.gov.au, p. 10)*

8.3 Overall Rate of Return for the Water Corporation, Aqwest and Busselton

17. In the inquiry, released in 2009, the target revenue was currently determined in real dollar-value terms for the Water Corporation and the Water Boards. As such, a real pre-tax WACC was applied on the asset base of the businesses to derive the return on asset (**ROA**), one component of the target revenue. The WACC value was set by reference to a range of WACC parameters determined by the Authority using the capital asset pricing model (**CAPM**) for the cost of equity and market observations of the risk free rates and the costs of debt. The WACC input parameters were mainly based on the so-called 'benchmark' efficient private service provider, which is consistent with the current Australian regulatory practice. Calculating the WACC based on a benchmark efficient private service provider provides greater incentives for the Water Corporation and the Water Boards to pursue efficient funding arrangements. The real pre-tax WACC was set at 6.62 per cent for Water Corporation and 7.14 for Water Boards in the Authority's final report.

18. The values of WACC input parameters in the final report of the previous inquiry for the Water Corporation and the Water Boards are summarised as follows:

Table 8.3 The WACC input parameters for the Water Corporation and the Water Boards as at November 2009

Parameter	Water Corporation[131]	Water Boards[132]
Nominal risk free rate of return (%)	5.52	5.52
Inflation rate (%)	2.38	2.38
Real risk free rate (%)	3.07	3.07
Equity beta	0.65	0.65
Market risk premium (%)	6.0	6.0
Debt to total value (%)	60	40
Debt Risk Premium (%)	2.60	2.80
Debt Issuance Cost (%)	0.125	0.125
Effective tax rate (%)	30	30
Value of imputation credits (gamma, %)	65	65
Nominal pre-tax WACC (%)	9.16	9.69
Real pre-tax WACC (%)	**6.62**	**7.14**

[131] The Economic Regulation Authority, 2009, Final Report on Inquiry into Tariffs of the Water Corporation, Aqwest and Busselton Water, 14 August 2009, Table 22.12, page 227

[132] The Economic Regulation Authority, 2009, Final Report on Inquiry into Tariffs of the Water Corporation, Aqwest and Busselton Water, 14 August 2009, Table 22.12, page 227

19. The Authority did not receive any public submissions with regards to the estimates of the cost of capital (or the required rate of return) for the Water Corporation and the Water Boards. In addition, the Water Corporation also did not raise any significant issues on the issue in its submission in response to the Authority's Issues Paper.

20. The following sections are devoted to the analyses for each of the WACC input parameters on which the rate of return is estimated for the Water Corporation and the Water Boards for the purpose of this inquiry. Each of the WACC input parameters are discussed in turn below.

8.4 Nominal Risk Free Rate of Return

21. The risk free rate is the rate of return an investor receives from holding an asset with guaranteed payments (i.e. no risk of default). The CAPM theory does not provide guidance on the appropriate proxy for the risk free rate. The Australian Commonwealth Government Securities (**CGS**) are widely used as a proxy for the risk free rate in Australia. In addition, current practice of the Australian regulators is to average the observed yields on the CGS for a period of 20 trading days as close as feasible before the day the decision is made.

8.4.1 Term of the risk-free rate

22. In the final determination of the current inquiry released in 2009, the Authority adopted a 10-year term for a nominal risk free rate. The estimate of the nominal risk-free rate for the 20-trading day period as at 31 July 2009 was 5.52 per cent in that determination.

23. However, in its recent decisions on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline (**DBNGP**), released in 2011; and on Western Power Network, released in September 2012, the Authority was of the view that there should be consistency between the terms of the risk free rate and the debt risk premium. In these decisions, the Authority concluded that there are strong grounds for matching the assumption of a term to maturity with the regulatory period, which is generally 5 years. A term of the risk free rate that matches the length of the regulatory period of 5 years better reflects the financing strategies of regulated businesses in Australia. The Authority is of the view that the use of the term of 5 years to match the regulatory period will result in correct compensation consistent with the "NPV=0" rule.[133]

24. As a result, in these decisions, the Authority considered the nominal risk free rate of return should be estimated using observed yields from the 5-year CGS reported by the Reserve Bank of Australia (**RBA**). This conclusion was discussed in detail in both the Draft Decision released in March 2011[134] and Final Decision released in October 2011.[135]

25. The Authority considers that it is appropriate that the 5-year term to maturity for a nominal risk free rate is adopted in this inquiry.

[133] Economic Regulation Authority, 2011, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, October 2011, pp. 125-9.

[134] Economic Regulation Authority, 2011, Draft Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, March 2011, pp. 182-7.

[135] Economic Regulation Authority, 2011, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, October 2011, pp. 125-9.

8.4.2 The appropriate averaging period

26. The Water Corporation submitted that the Authority may consider the impact of setting the WACC for the following three years based on the average values of the risk-free rate and the debt risk premium for a recent 20 trading day period. The Water Corporation acknowledges that this averaging period is a standard practice. However, the Corporation was of the view that a longer-term average may be more appropriate for a government-owned utility.[136]

27. The Authority is aware that an issue of central importance is accurately forecasting the risk free rate into the future for the duration of the three-year inquiry period. This is because the risk free rate is an input into the cost of equity and cost of debt. As such, the estimate of the risk free rate will have a significant impact on the estimates of the WACC for the Water Corporation, Aqwest and Busselton.

28. Like other Australian economic regulators, the Authority currently adopts an averaging period of 20 trading days. The Australian Energy Regulator (**AER**) adopted the averaging period of 40 trading days in its recent final decision released on 30 April 2012.[137] In contrast, United Kingdom regulators adopt a longer-term averaging period of 5 to 10 years. Regulatory periods in both jurisdictions (Australia and the UK) typically span for a period of five years. As a result, the question is that which method of the averaging periods among the three above predicts more accurately the "behaviour" of the risk free rate into the future when a regulatory period of 5-years is applied.

8.4.2.1 An Introduction

29. The daily observed yields on Commonwealth Government Securities (CGS) for both 5-year and 10-year terms have significantly decreased since 2011. It is argued that lower observed yields on the CGS confirm the "flight to quality" from equities into bonds in Australia. Daily observed yields on the CGS have been used as a proxy for the nominal risk free rate of return in regulatory decisions by Australian regulators. In turn, the risk free rate is used in the estimate of the cost of capital for an access arrangement. As the daily observed yields on CGS have decreased since 2011, so too has the cost of capital (including the cost of equity and the cost of debt).

30. In response to a decreased yield on CGS, regulated businesses have requested regulators (including the Authority), to re-consider the effect of setting the WACC for the next five years based on the average values of the risk-free rate and the debt risk premium for a recent 20 trading day period. Regulated businesses are of the view that a longer-term average for the risk free rate may be more appropriate.

[136] Water Corporation, 2012, Submission in Response to the Issues Paper, 14 March 2012, page 15.

[137] The Australian Energy Regulator, 2012, Final Decision on *Powerlink Transmission Determination 2012-13 to 2016-17,* 30 April 2012.

31. Like other Australian economic regulators, the Authority currently adopts an averaging period of 20 trading days in the month prior to the month in which the decision is made. The AER adopted an averaging period of 40 trading days in its recent final decision released on 30 April 2012[138] while the United Kingdom regulators adopt a longer-term averaging period of 5 to ten years. Regulatory periods in both jurisdictions (Australia and the UK) typically span for a period of five years.

32. An issue of central importance for the Authority is achieving a reasonable forecast of the risk free rate into the future for the five year duration of the regulatory period. This is because the risk free rate is both an input into the cost of equity as well as debt. As such, the estimate of the risk free rate will have a significant effect on the estimates of the WACC for the Water Corporation, Aqwest and Busselton Water. Therefore, the Authority seeks to establish which averaging period most accurately predicts the average risk free rate when the regulatory period of five years is applied.

8.4.2.2 The Design of the Test: An Averaging Period versus A Regulatory Period

33. The Diebold-Mariano (**DM**) test compares the errors of two forecasting methods to determine if one method is statistically more efficient than the other method. The DM test compares the 'losses' of the two forecasts to determine the forecast that is statistically better than the other forecast. Under the DM test, a greater loss tends to indicate that a less efficient forecast method is in use. This relationship is illustrated by the following formula:

$$\varepsilon^1_{t+h|t} = y_{t+h} - y^1_{t+h|t}$$
$$\varepsilon^2_{t+h|t} = y_{t+h} - y^2_{t+h|t} \quad (1)$$

34. In the context of the averaging period, $\varepsilon^1_{t+h|t}$ are the differences (or the errors) between the 10-year CGS average bond yields for the regulatory period, y_{t+h} and the 10-year CGS average bond yields for the averaging period of twenty days, $y^1_{t+h|t}$

35. For example, if today is 9 July 2012 and an average of bond yields over the last twenty days (including today) is 3.5 per cent, this would be used as the forecast $y^1_{t+h|t}$ for the bond yield average for the next five years. Five years since that day, on 10 July 2017, the average of the observed yields for the regulatory period of five years is derived. If it is assumed that this figure was calculated to be 3 per cent, then the difference or error, $\varepsilon^1_{t+h|t}$ between y_{t+h} and $y^1_{t+h|t}$ would be -0.5 per cent. The forecast was over-estimated by 0.5 per cent.

[138] The Australian Energy Regulator, 2012, Final Decision on *Powerlink Transmission Determination 2012-13 to 2016-17,* 30 April 2012.

36. Errors using other forecast methods (i.e. using different averaging periods) to create $y^2_{t+h|t}$ such as one day, five days, one year and five years are represented by $\varepsilon^2_{t+h|t}$. As some errors will be negative and some will be positive, a loss function that squares the errors is used.

$$L(\varepsilon^i_{t+h|t}) = [\varepsilon^i_{t+h|t}]^2, \; i = 1,2 \tag{2}$$

37. The average difference in losses is calculated using:

$$\bar{d} = \frac{1}{T}\sum_{i=1}^{T}\left[L(\varepsilon^1_{t+h|t}) - L(\varepsilon^2_{t+h|t})\right] \tag{3}$$

38. If $\bar{d}$ is positive, the loss from the twenty day average is greater than that for other averaging methods and thus indicates that it is a less efficient forecast method than the method it is being compared to. However, if $\bar{d}$ is negative, it indicates that the other forecast method's loss is greater, suggesting the twenty day average is more efficient.

39. To determine whether the result is statistically significant, $\bar{d}$ is converted to the DM test statistic so it can be compared to t-distributed critical values with (t-1) degrees of freedom, where t is the number of observed forecast errors in the sample. The details of the conversion are omitted here.139

40. The following hypothesis is tested:

$$H_0 : E[L(\varepsilon^1_{t+h|t})] = E[L(\varepsilon^2_{t+h|t})] \tag{4}$$

$$H_1 : E[L(\varepsilon^1_{t+h|t})] \neq E[L(\varepsilon^2_{t+h|t})] \tag{5}$$

41. The null hypothesis (4) is that the twenty day average forecasting efficiency is equal to that of the method it is being compared to. The alternative hypothesis is that the forecasting efficiency is not equal.

42. A t-distributed critical value of 1.96 is used if the number of observations exceeds 120 and a five percent chance of incorrectly rejecting the null hypothesis is tolerated. A DM statistic greater than 1.96 in this situation leads to a rejection of the null hypothesis.

$$|DM| > 1.96 \tag{6}$$

43. Attention can then be turned to whether the DM statistic is negative or positive for an indication of which series has the highest forecasting efficiency.

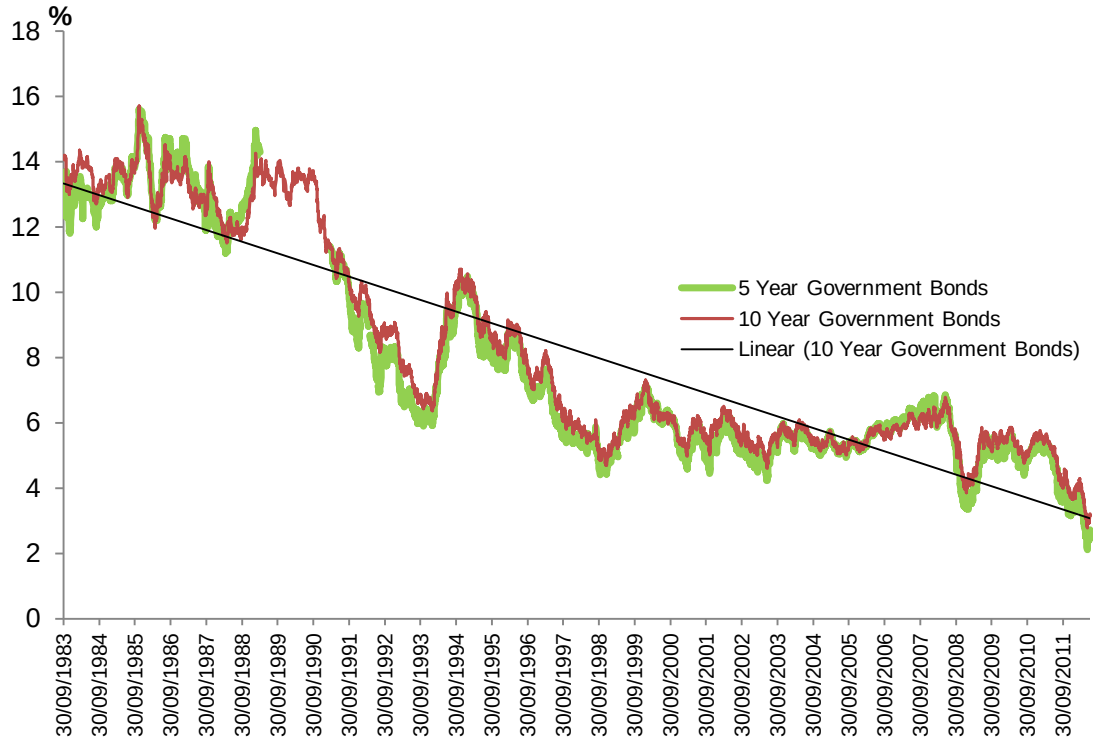
139 See Enders. W, 2004, *Applied Econometric Time Series,* John Wiley and Sons, New Jersey USA, p.86.

8.4.2.3 Data

44. Ten year Commonwealth Government Bond yield data from Bloomberg was used to carry out the tests on the different averaging periods. This series was used because the five year bond yields contained 492 missing observations, compared with only seventeen missing observations in the ten year CGS yields series. The observations cover the period from 30 September 1983 to 4 July 2012 with 7,322 daily observations of bond yields.[140]

45. Based on its own analysis the Authority is of the view that the ten year series is an excellent predictor of movements in the five year series (as opposed to the level) because the two series are both co-integrated and are also very highly correlated. This means that the two series of ten year and five year CGS bond yields are closely tied to one another and virtually always move in the same direction as presented in Figure 8.1. The correlation coefficient between the two series was calculated to be 0.99. Co-integration tests are discussed below.

Figure 8.1 Observed Yields on 10-year CGS versus 5-year CGS, September 1983 to July 2012, Per cent



Source: Bloomberg.

46. Engel-Granger co-integration tests were carried out using a two-step process where a regression is run first to acquire a series of errors e_t and then, secondly, the errors are tested for stationarity using the Augmented Dickey Fuller (ADF) test. The following regression, Equation 7, was run to obtain standard errors.

[140] Bloomberg tickers are GACGB10 Index and GACGB5 Index for 10-year and 5-year CGS bonds respectively. These two series are the mid-yield to maturity, which is implied by the mid-point of the bid-ask prices. The sample size represents 7,322 mid-yield to maturity observations.

$$5\text{Y Yield}_t = \alpha + \beta \times (10\text{Y Yield}_t) + \varepsilon_t \quad (7)$$

47. Taking the expected value[141] of this equation, and assuming the five year bond yield moves one for one with the ten year bond yield on average, Equation 8:

$$5\text{Y Yield}_t = \alpha + \beta \times (10\text{Y Yield}_t) \quad (8)$$

Where α is the difference between the two over the long run, which is often interpreted as the liquidity premium, and β equals one indicating that both five year and ten year yields move one for one. On average, the error ε_t is expected to be zero and as such, they are cancelled out.

48. Regression (7) was run over the period 30 September 1983 to 4 July 2012 with the results outlined in Table 8.4. On average, the difference between the five year yields and ten year yields is around 36 basis points as indicated by the result for α. The result for β is also very close to one.

Table 8.4 5-Year CGS Bonds versus 10-Year CGS Bonds

Regression: 5 Year Bond Yield on 10 Year Bond Yield			
Parameter	**Result**	**Standard Error**	**p value**
α	-0.367397	0.011286	< 0.0001
β	1.014398	0.001339	< 0.0001
Number of observations	6828	(492 missing)	
R-Square	0.9882		

Source: Authority analysis.

49. This indicates that the two series move close to one for one. Both results are highly significant, that is statistically not likely to be zero, as indicated by the p value, which shows the probability of this is virtually zero.

50. The implication of this finding is that the five year CGS yields can be forecast by the ten year CGS yields by deducting 36 basis points from the forecasts of ten year CGS yields as implied by Equation (8).

51. The ADF test revolves around the concept of the 'random walk' shown in equation (9) below.

$$Y_t = Y_{t-1} + \varepsilon_t \quad (9)$$

52. In the context of today, this can be interpreted as 'today's t value is yesterday's (t-1) value plus a random error that we can only observe once today's value is known'. This can also be interpreted as 'tomorrow's t value is today's (t-1) value plus a random error that we can only observe once tomorrow's value is known' and so on. All past random errors are included in all future values of Yt. This means that the Yt series follows a path of random shocks and will not necessarily revert to any long run value. And as a result, it is more difficult or frequently impossible to predict.

[141] Probability weighted average.

53. Equation (9) can also be augmented to include a trend. This modification means that although the series has a trend in a particular direction; it randomly deviates from this path with each past deviation being reflected in all future values. The random walk is a 'non-stationary' process. A non-stationary process, among other things, has a mean and variance that is not constant through time.

54. A major implication of a process that follows a random walk process is that the best predictor of Y_t is Y_{t-1}. This is demonstrated using the expected value of equation (9) on average:

$$Y_t = Y_{t-1} \tag{10}$$

55. This is because, on average, the errors ε_t are a random process that is expected to average out to zero. By using Y_{t-1} as a predictor of Y_t, the errors are minimised through avoiding a situation where Y_t was predicted to increase and when it actually decreased and vice versa.

56. A stylised way of explaining the ADF test is testing to see if ρ in equation (11) below equals one, that is has a unit root and becomes the random walk in equation (9).[142]

$$Y_t = \rho Y_{t-1} + \varepsilon_t \tag{11}$$

57. ADF tests were carried out on the five year and ten year CGS yields data to determine whether they contained a unit root and thus followed a random walk. The outcomes are presented in Table 8.5.

Table 8.5 ADF Tests

Augmented Dickey Fuller Tests: Null Hypothesis - Series has unit root			
	5 Year Yields	**10 Year Yields**	**Regression (7) Errors**
test-statistic	-2.1356	-2.331	-5.0201
		Critical Values	
1 per cent	-3.96	-3.96	-2.58
5 per cent	-3.41	-3.41	-1.95
10 per cent	-3.12	-3.12	-1.62
Outcome	Non-Stationary	Non-Stationary	Stationary

58. The ADF is very sensitive to the specification of the test. For example, if the series contains a trend, the test must be specified with trend. Figure 8.1 strongly suggests a declining trend in each series and so the test was conducted 'with trend'. Both series did not reject the hypothesis of containing a unit root as indicated by the absolute value of their test statistics -2.1356 and -2.331 being lower than all absolute value of the critical values below. This indicates that they follow a random walk, albeit with trend.

[142] In actuality, the equation is rewritten with parameter δ which equals $(\rho - 1)$. This parameters is tested to see if it is statically different from zero. A value of zero implies ρ equal to one and thus a (10) becomes (9), that is, a non-stationary random walk.

59. Two or more non-stationary processes such as the five year and the ten year yields can be considered co-integrated if a linear combination of the two (such as addition or subtraction from each other) is stationary. For example, equation (7) can be rearranged as:

$$5\text{Y Yield}_t - \beta \times (10\text{Y Yield}_t) = \alpha + \varepsilon_t \quad (12)$$

60. The difference between the two series is α and ε_t. There is no need to test α as a constant is stationary. An ADF test need only be carried out on ε_t. The results are shown in Table 8.5 above.

61. The absolute value of the test statistic (5.0201) is greater than all absolute critical values. This means that the hypothesis of a unit root is rejected and the series is stationary. This indicates that the two series are 'tied' together in the sense that the difference between them is stationary. However, it is noted that it will not wander in a random erratic sense but tend to revert back to a long term mean.

62. The finding that the two series are highly correlated and co-integrated indicates that the ten year yields are a good proxy for movements in the five year yields. This means that the ten year CGS yields can be used to test the forecasting efficiency of the five year CGS yields.

Figure 8.2 20 trading day averaging period

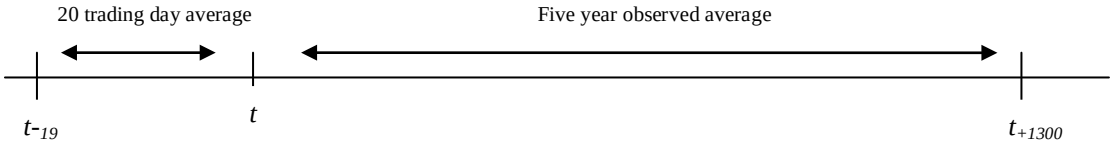
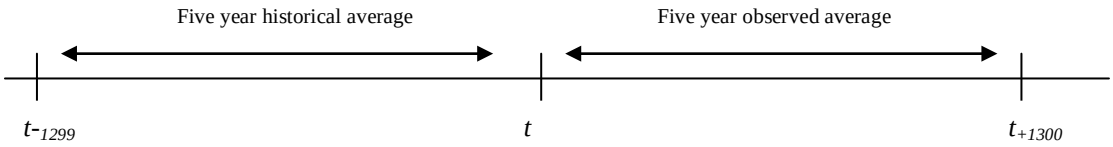


Figure 8.3 Five year averaging period



63. A number of different averaging periods were used as a test against the twenty day period including one day, five days, one year and five years. One year is assumed to be 260 trading days, which implies that five years is 1,300 days. For the twenty day average, if time t is now, nineteen trading days prior to and including t forms the twenty trading days. This is the forecast at time t for the five year average as presented in Figure 8.2 above. The actual five year average itself can only be observed five years (or 1,300 trading days) after t. Similarly, for the five year average forecast if time t is now 1,299 trading days prior to and including t makes the 1,300 trading days (see Figure 8.3).

8.4.2.4 Results

64. The twenty day averaging period was tested against the one day, five day, one year and five year averages using the DM statistic in equation (6) to test the hypothesis in equation (4). The DM statistic was computed using R open source statistical software and reported in Table 8.4.

Table 8.4 Forecasting Efficiency: 20 Trading Days Period versus Other Averaging Periods of 1 Day; 5 Days; 1 Year; and 5 Years

Other Averaging Period Forecasts	test - statistic
1 Day	1.2907
5 Day	1.3069
1 Year	-5.8112
5 Year	-1.9357

65. Only results greater than 1.96 are statistically significant with 95 per cent confidence. Negative values indicate that the twenty day average is the superior forecast method, where as positive results indicate the opposite.

66. The results indicate that the one day and five day forecast efficiency are not statistically different from twenty days. However, the one year period test statistic is highly significant, with the negative number indicating that twenty days has superior forecasting efficiency over one year. The five year forecast efficiency is not statistically different from the twenty day forecast with 95 per cent confidence. However, it is significant with 90 per cent confidence[143] and again the negative statistic indicates that the twenty day averaging period has superior forecasting efficiency to five years.

8.4.3 Conclusion

67. The ten year Australian Government bond yield was found to be a good predictor of movements in the corresponding five year CGS yields. Due to a large number of missing observations in the five year data, the ten year CGS yields were used to test the forecast efficiency of different averaging periods, being twenty trading days; one day; five days; one year; and five years. Augmented Dickey Fuller tests indicate that the 10-year bond yield series follows a random walk. The implication is that the latest value is the best predictor of future values. In addition, it is noted that both bond yield series also exhibit a strong downward trend, which indicates that future values will tend to be overestimated by past values. The problem is compounded when observations from further back into the past are used to forecast values further into the future. This lends further weight to the ADF test's implication that the latest value of the bond yields is the best predictor of future yields, despite the tendency of this to overestimate future yields.

[143] A t-distribution critical value at 10 per cent significance and greater than 120 degrees of freedom is 1.658, the absolute value of -1.9357 being greater thus rejecting the hypothesis of equal forecasting efficiency.

68. The DM test was used to formally test the forecasting efficiency of different averaging periods. The results suggested that, statistically, there is no difference in forecasting efficiency between twenty, five or one day averaging period forecasts. Twenty day based forecasts were significantly superior to one year based forecasts with 95 per cent statistical confidence. They were also superior to five year based forecasts, but with only 90 per cent statistical confidence. The tests again confirm that the most recent value of Australian Government bond yields is the most efficient predictor of the future yields, being the twenty trading day average period.

8.4.4 Draft Determination

69. In conclusion, the Authority is of the view that it is appropriate that the 5-year term to maturity for a nominal risk free rate is adopted in this inquiry. In addition, the averaging period of 20-trading day period is appropriate to be adopted in the estimate of the risk free rate for this inquiry.

70. The Authority considers the estimated nominal risk free rate of return should be 2.45 per cent using yields from the 5-year Commonwealth Government bonds reported by the RBA, as at 31 July 2012.

8.5 Market Risk Premium

8.5.1 Introduction

71. The market risk premium (**MRP**) is the average return of the market above the risk free rate. In other words, it is the premium that investors demand for investing in a market portfolio relative to the risk-free rate.

$$MRP = R_m - R_f$$

where R_f is the risk-free rate.

72. There are several ways to estimate the equity risk premium, though there is no general agreement as to the best approach. The three approaches usually used are as follows.

- The first approach is the historical equity risk premium approach, which is a well-established method based on the assumption that the realised equity risk premium observed over a long period of time is a good indicator of the expected equity risk premium. This approach requires compiling historical data to find the average rate of return of a country's market portfolio and the average rate of return for the risk-free rate in that country.
- The second approach for estimating the equity risk premium is the dividend discount model based approach or implied risk premium approach, which is implemented using the Gordon growth model (also known as the constant-growth dividend discount model). For developed markets, corporate earnings often meet, at least approximately, the model assumption of a long-run trend growth rate. As a result, the expected return on the market is the sum of the dividend yield and the growth rate in dividends. The equity risk premium is therefore the difference between the expected return on the equity market and the risk-free rate.
- The third approach is the direct approach or survey approach. A panel of finance experts is asked for their estimates the mean response is taken.

73. The Authority considered that cash flow based measures of the MRP (such as the Dividend Growth Model (DGM) or Gordan growth model) are subject to a number of limitations:

- They provide highly variable forward looking estimates of the MRP.
- They are sensitive to small changes in assumptions.
- There is a relative lack of data sources of these estimates.

74. The disadvantages of using the DGM or any similar model or approach that involves many different assumptions in relations to the inputs into the model to estimating the cost of equity was discussed at length by the Authority in its previous regulatory decision. The Authority is of the view that DGM and similar models or approaches are not suitable for the purpose of estimating the cost of equity for Australian regulated businesses.[144]

75. In addition, in its most recently released decision on the *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, released on the 26th July 2012, the Australian Competition Tribunal was of the view that[145]

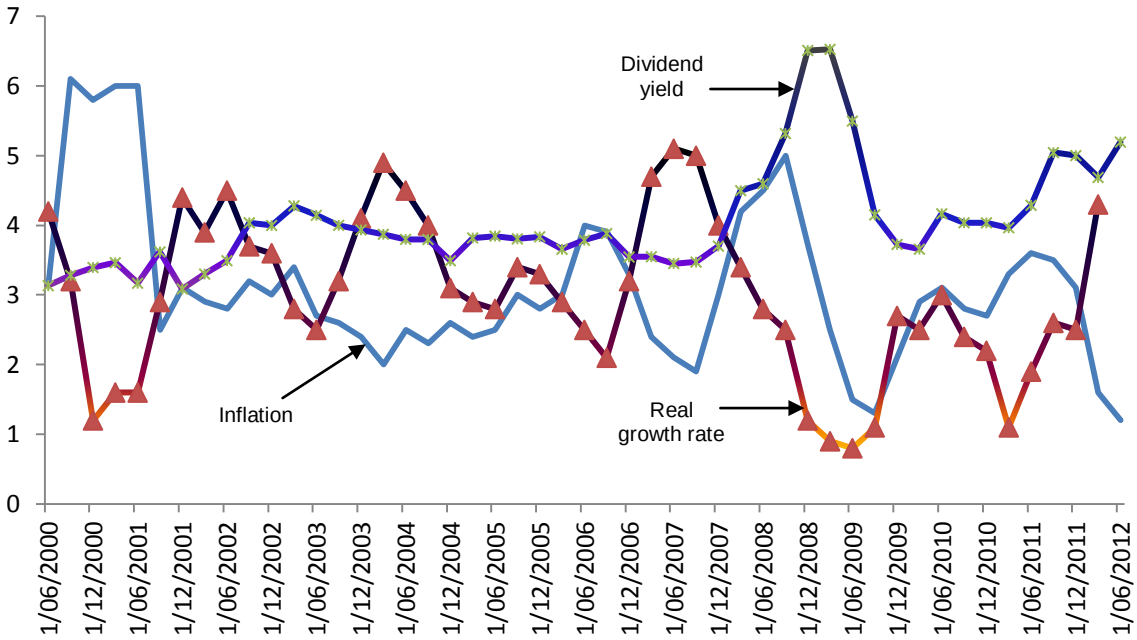
> "... It is, however, necessary to note that the selection of the brokers, the quality of their reports, the analyses of the so-called comparable infrastructure firms, the quality of their dividend yield forecasts and capital gain forecasts, and the compatibility of their recent capital raisings are all not fully argued or justified or, if those things were assessed by SFG, it is not transparent how that was done. Such matters would, or may, require very careful analysis on a case-by-case basis before a fair independent assessment acceptable to a regulator could be provided and such analysis would be necessary to satisfy rule 87(1).

76. As an updated analysis, the Authority has recently conducted its own analysis of the behaviour of the three components, being (i) dividend yield; (ii) real rate of growth; and (iii) inflation, which are the key component used in any dividend growth model, for the period from June 2000 to June 2012. The Authority retains its view that each of these components is itself an estimate and as a result is subject to a high degree of uncertainty.

[144] Economic Regulation Authority, 2010, *Draft Decision on WA Gas Networks Revision Proposal for the Access Arrangement for the Mid-West and South-West Gas Distribution Systems,* August 2010, pp 100-2.

[145] Australian Competition Tribunal, 2012, *Application by DBNGP (WA) Transmission Pty Ltd (No 3) [2012] ACompT 14*, 26th July 2012, paragraph 102.

Figure 8.4 Quarterly Dividend Yield, Inflation and GDP Growth, June 2000 – June 2012, Per cent



Source: Bloomberg.

77. The Authority is also aware that the AER also noted that there are inherent problems in any DGM[146] such as:

- reliance on contentious assumptions, such as (i) markets are perfectly priced at all times; and (ii) forecast dividend distributions accurately reflect market expectations;
- forecasts are highly variable such as (i) small, plausible changes to inputs and assumptions produce large changes in MRP estimates; and (ii) even if consistent inputs are used, implausibly large changes in MRP are estimated across short periods of time.

78. As a result, among these three, the current approach of Australian regulators' is to adopt the first approach, using historical data on equity premiums, and the survey approach, together with observations on the Australian financial market to provide the estimate of the MRP.

8.5.2 Considerations of the Authority

79. Consistent with its previous regulatory decisions, the Authority is of the view that it is appropriate to consider a wide range of the evidence for the forward-looking long-term estimates of the MRP, including:

- an estimate of the historical equity risk premium for the period for 1883 – 2011 by Associate Professor Handley in April 2012.[147] In this analysis, the 10-year CGS have been used;

[146] The Australian Energy Regulator (March 2010), Final Decision, Access Arrangement Proposal on ACT, Queanbeyan and Palerang Gas Distribution Network, page 61

- the Authority's estimate of the historical equity risk premium for the period for 1963 – 2011 using the 5-year CGS for consistency with the term of the risk free rate;
- surveys of market risk practice; and
- the Authority's approach and other Australian regulators' current practice.

80. The Authority will follow the same approach to determine the appropriate estimate of the MRP for this inquiry.

The Method of Using Historical Data on Equity Risk Premium

81. The market risk premium is the required return, over and above the risk free rate, on a fully diversified portfolio of assets. It is the current practice of regulators across Australia to estimate the MRP using historical data on equity premia, together with other approaches as mentioned above.

82. Australian regulators have consistently applied a MRP of 6 per cent in their decisions, except for the AER's decisions after its review of WACC parameters released in May 2009. It is noted that a MRP of 6 per cent was first adopted in Australia by the ACCC[148] and the Victorian Office of the Regulator General. A MRP range of 4.5-7.5 per cent was derived on the basis of consultant work prepared by Professor Davies at the University of Melbourne, where the upper bound of this range was based on historical estimates and the lower bound was based on cash flow measures.[149] As such, the mid-point of that range (6 per cent) was adopted. Subsequently, Australian regulators have consistently applied a MRP of 6.0 per cent, which is estimated using historical data on equity premia.

83. In its previous regulatory decisions, with regard to the estimates of the MRP using historical equity risk premium, the Authority relied on the studies by Associate Professor Handley at the University of Melbourne prepared for the AER. In these studies, Handley used the observed yields on 10-year Commonwealth Government bonds as the proxy for the nominal risk free rate.

84. The above Handley's study is now updated to include the year 2011. For both periods from 1883 – 2011 and 1958 – 2011 (the period of a relatively good data quality), with the assumed imputation credit of 35 cents (i.e. gamma of 0.35), the estimate of the MRP for both periods is 6.1 per cent. Handley also confirms that these two tests are statistically significant at the 5 per cent level of confidence.[150]

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147 Handley, 2012, "An estimate of the historical equity risk premium for the period for 1883 – 2011", A report for the Australian Energy Regulator, April 2012.

148 ACCC, Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Principal Transmission System – Access arrangement by Transmission Pipelines Australia Pty Ltd and Transmission Pipelines Australia (Assets) Pty Ltd for the Western Transmission System – Access arrangement by Victorian Energy Networks Corporation for the Principal Transmission System, Final Decision, 6 October 1998.

149 ORG, Access arrangements – Multinet Energy Pty Ltd and Multinet (Assets) Pty Ltd – Westar (Gas) Pty Ltd and Westar (Assets) Pty Ltd – Stratus (Gas) Pty Ltd and Stratus Networks (Assets) Pty Ltd , Final decision, October 1998.

150 Handley, 2012, "An estimate of the historical equity risk premium for the period for 1883 – 2011", A report for the Australian Energy Regulator, April 2012, page 8.

85. Handley's study in 2012 also confirms that when the assumed value of imputation credit of zero (i.e. gamma of zero), then the MRP for the periods from 1883 – 2011 and from 1958 – 2011 are 6 per cent and 5.8 per cent respectively.

86. With regard to the shorter periods such as 1980 – 2011; and 1988 – 2011, the estimates of the MRP in these two periods are all lower than 6 per cent. For example, with the assumed imputation credit of 0.35, the estimates of the MRP are 5.7 per cent and 4.9 per cent respectively. When the assumed imputation credit of zero, the MRPs are 5.2 per cent and 4.3 per cent, respectively.[151]

87. As previously discussed, the Authority has adopted the 5-year term to maturity for the risk free rate. As such, for consistency purpose, the Authority considers that it is more appropriate to adopt a 5-year term to maturity for the estimates of the MRP using historical equity risk premia.

88. The Authority is aware that the observed yields on 5-year Commonwealth Government bonds have become available since July 1968. This was also confirmed by Handley in his report to the AER in 2008.[152]

89. The Authority has constructed a data set of 40 years, from 1968 to 2011, inclusive.

90. An equity market index was used as a proxy for the market return. This data is obtained from Bloomberg.[153] The series was based on the All Ordinaries Accumulation Index, a value weighted index made up of the largest 500 companies as measured by the market caps that are listed on the Australian Stock Exchange. This index captures a market return comprising dividends and capital gains. For consistency, the yearly index value is the arithmetic average of the daily closing index values during the corresponding December.

91. The estimate of Commonwealth Government bond yields (or the risk free rate) is the yields on 5-year term Treasury Bonds. The risk free proxy series from 1968 to 2011 were collected from the Reserve Bank of Australia website.

92. The MRPs were calculated as the difference between the historical market return and the opening Treasury bond yield. This means that:

$$MRP_t = E_t - Y_{t-1}$$

where:

- MRP_t is the market risk premium for year t;
- E_t is the nominal equity return for year t; and
- Y_{t-1} is the 5-year Commonwealth Government bond yield for year $(t-1)$.

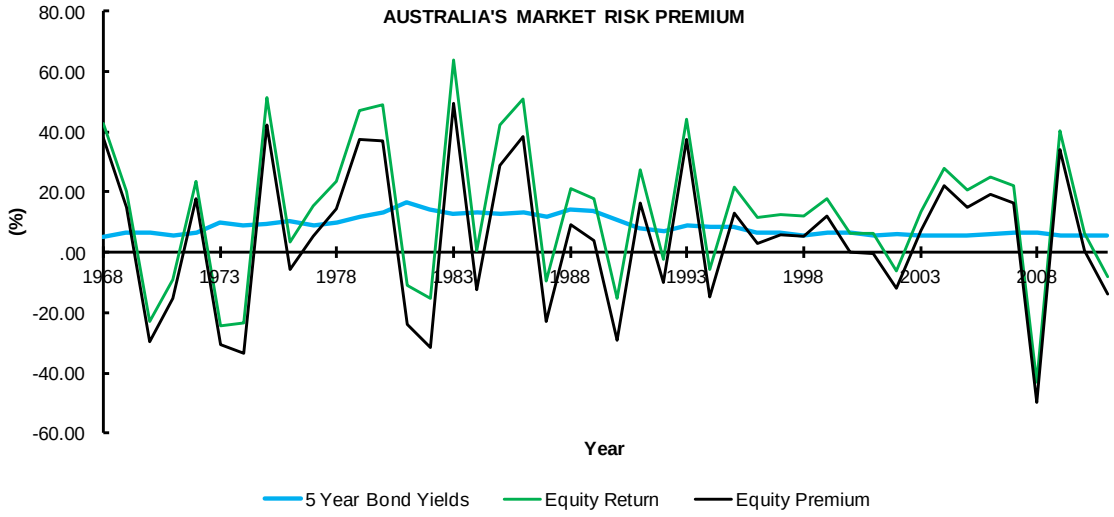
93. Figure 8.4 below presents the estimates of Australia's MRP for the period from 1968 to 2011.

[151] Handley, 2012, "An estimate of the historical equity risk premium for the period for 1883 – 2011", A report for the Australian Energy Regulator, April 2012, Tables 1 and 2, pp 5 - 6.

[152] Handley, 2008, "A Note on the Historical Equity Risk Premium", A report for the Australian Energy Regulator, 17 October 2008, page 4.

[153] The ticker of *ASA30 Index* and the field of *PX_LAST* were used to obtain the data.

Figure 8.5 Australia's Market Risk Premium, 1968 – 2011, Per cent



Sources: RBA, Bloomberg, and Economic Regulation Authority's analysis.

94. Table 8.7 below presents the estimates of Australia's MRP for the period from 1968 to 2011 over different periods.

Table 8.5 Estimates of Australian Market Risk Premium, 1968 - 2011

Period	No. of years	MRP Per cent	MRP [including imputation credit][154] Per cent
1968 - 2011	44	4.7	5.2
1980 - 2011	32	4.8	5.6
1988 - 2011	24	3.8	5.0

Source: Authority analysis.

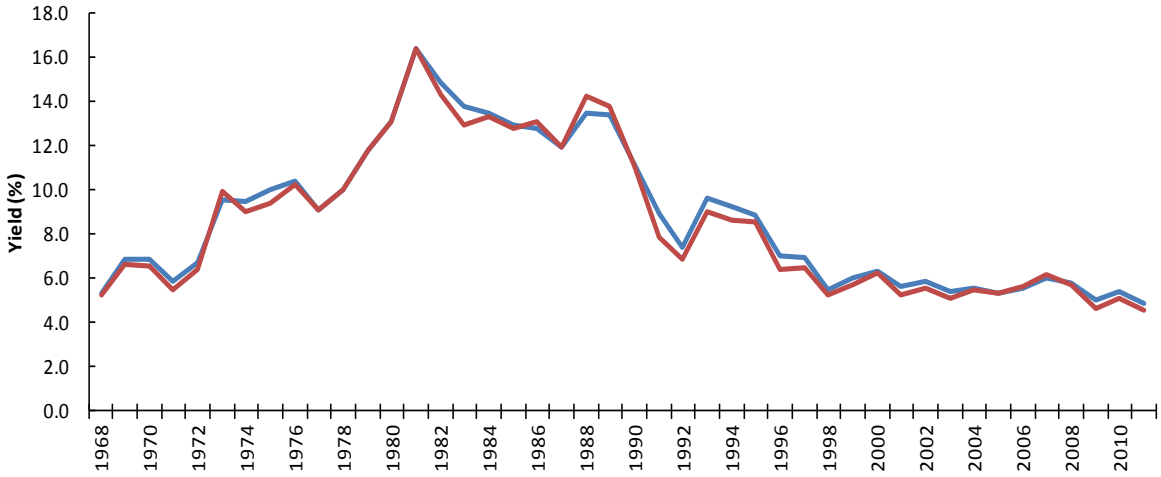
95. From the above analysis, given the high level of imprecision due to the nature of the estimates of the MRP using historical equity risk premium, the Authority is of the view that the estimate of the MRP, using 5-year nominal risk free rate of return, is 6 per cent.

96. In summary, based on Handley's study in April 2012, as discussed in paragraphs 83 to 86, which adopted 10-year term risk free rate; and the Authority's study, which adopted the 5-year term risk free rate, the estimates of the MRP using historical data on equity risk premium are approximately 6 per cent or lower.

[154] Assumed values of imputation credit were obtained from AER, the Weighted Average Cost of Capital Review, Final Decision, May 2009, Table 7.2, page 209.

97. Figure 8.5 below presents that observed yields for 10-year and 5-year Commonwealth government bonds have consistently moved together for the entire period from 1968 (when the historical data on observed yields for 5-year bonds first became available).

Figure 8.6 10-year term and 5-year term risk free rate, 1968 – 2012, Per cent



Source: RBA and Bloomberg.

98. Table 8.8 presents that while observed yields on 10-year bonds have generally been higher compared with 5-year bonds for the entire period, the difference between the two is approximately 25 basis points, which can be accommodated for the conservative decisions by Australian economic regulators of adopting 6 per cent as the MRP from historical data on equity risk premium across different periods.

Table 8.7 10-year and 5-year risk free rate, 1968 - 2012

Period	Average	Max	Min	Standard Deviation
5 year yields				
1968 - 2011	8.55	16.40	4.54	3.34
1980 - 2011	8.64	16.40	4.54	3.72
1988 - 2011	7.02	14.20	4.54	2.67
10 year yields				
1968 - 2011	8.76	16.40	4.88	3.25
1980 - 2011	8.86	16.40	4.88	3.62
1988 - 2011	7.26	13.50	4.88	2.54
10 year yields minus 5 year yields				
1968 - 2011	0.21	-0.70	1.07	0.33
1980 - 2011	0.22	1.07	-0.70	0.35
1988 - 2011	0.24	1.07	-0.70	0.36

Source: Authority analysis.

99. In conclusion, the Authority is of the view that 6 per cent is the best estimate of the MRP using historical data on equity risk premium regardless of the 10-year term or 5-year term of the risk free rate is adopted.

The Survey Method

100. The Authority also observes that 6 per cent is the market risk premium value most commonly used by Australian market practitioners. Surveys of market risk practice show that 47 per cent of market practitioners apply a MRP of 6 per cent, while 69 per cent apply a value of 6 per cent or less. Only 31 per cent of market practitioners apply values of MRP more than 6 per cent.[155] However, the Authority is cautious about relying on this evidence alone as these surveys preceded the global financial crisis in 2008.

101. Surveys in 2009[156] and 2010[157] show that the average MRP adopted by market practitioners was approximately 6 per cent. These findings are similar to the market surveys prior to the Global Financial Crisis.[158]

102. In addition, evidence from broker reports indicates that the current market practice is to adopt an MRP of approximately 6 per cent. In addition, a recent report from AMP Capital Investors indicates that its forward-looking MRP is lower than 6 per cent.[159]

103. Anthony Asher conducted a survey of MRP estimates by a number of Australian actuaries in February 2011. There were 58 respondents. Most of the respondents were associated with Investment and Wealth Management, Insurance, Superannuation and Banking. The study reported that, on average, respondents had about 15 years of experience as actuaries. The survey found that the average MRP expected over the next 12 months was 4.7 per cent, while the average expected over the next ten years was 4.9 per cent. The author noted that the standard deviation of the former estimate is 2.5 per cent, and of the latter 2.0 per cent. In these estimates, franking credits were taken into account.[160]

[155] G. Truong, G. Partington and M. Peat, 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p. 155.

[156] Fernandez and Del Campo, Market Risk Premium used by Professors in 2008: A Survey with 1400 Answers, IESE Business School Working Paper, WP-796, May 2009, page 7.

[157] Fernandez and Del Campo, Market Risk Premium Used in 2010 by Analysts and Companies: A Survey with 2400 Answers, IESE Business School, 21 May 2010, page 4.

[158] For example, see Truong, Partington and Peat (2008), 'Cost of capital estimation and capital budgeting practices in Australia', *Australian Journal of Management*, Vol. 33, No. 1, June 2008, p.155. KPMG (2005), *Cost of Capital – Market Practice in relation to Imputation Credits.* Capital Research (2006), *Telstra's WACC for network ULLS and the ULLS and SSS businesses – Review of reports by Professor Bowman,* Associate Professor Neville Hathaway.

[159] Oliver, Shane, 2011, *Why are Australian shares lagging? Will it continue?* AMP Capital Investors, January 2011, page 2.

[160] Asher, A. (2011), "Equity Risk Premium Survey: Results and Comments", *Actuary Australia,* 161, July 2011, pp. 13-15.

104. In a recently released article, "*Market Risk Premium Used in 56 Countries in 2011: A Survey with 6,014 Answers*" by Pablo Fernandez, Javier Aguirreamalloa and Luis Corre from IESE Business School, University of Navarra, the authors provided an analysis of the results of an international survey on the MRP in March and April 2011. Of the 3,998 survey responses that provided an estimate of the MRP, 40 were from Australia and offered an estimate of the MRP for the Australian equity market. The average of these 40 estimates of the Australian MRP was 5.8 per cent. Of the 40 responses received for Australia, 15 were from academics, 21 from analysts and 4 from managers of companies. The average of the estimates of the MRP received from academics was 6.2 per cent, from analysts 5.4 per cent and from managers 6.5 per cent. It is noted that, while the overall average for Australia was 5.8 per cent, the median was significantly lower, at 5.2 per cent.[161]

Current Practice by Australian Regulators

105. The Authority has consistently adopted the point estimate of the MRP of 6 per cent in its regulatory decisions.[162] For the current access arrangement for Western Power, the Authority was of the view that the MRP of 6 per cent was appropriate.[163]

106. The AER had reverted from its 2009 WACC Review, released in May 2009, which adopted an estimate of a MRP of 6.5 per cent, to the adoption of a MRP of 6 per cent since 2011 in its Draft Decision on Envestra's access arrangement proposal for the South Australian gas network, released in February 2011.[164] In its final decision, released in June 2011, the AER also adopted the estimate of the MRP of 6.0 per cent.[165] The AER also adopted the MRP of 6 per cent in its most recent decisions released on 30th April 2012, including the Draft Decision on Roma to Brisbane Pipeline (Queensland Gas Transmission);[166] and the Final Decision on Aurora (Tasmanian Electricity Distribution).[167] However, the AER adopted the MRP of 6.5 per cent in the Final Decision on Powerlink (Queensland Electricity Transmission) access arrangements.[168]

[161] The Australian Competition and Consumer Commission, 2011, *Network,* Issue 41, September 2011, page 11.

[162] For example, see The Economic Regulation Authority, 2011, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natural Gas Pipeline, 31 October 2011, page 137.

[163] The Economic Regulation Authority, 2012, Final Decision on Proposed Revisions to the Access Arrangement for Western Power's Network.

[164] Australian Energy Regulator, February 2011, Draft Decision, Envestra Ltd. – Access Arrangement proposal for the SA gas network, pages 83-92.

[165] Australian Energy Regulator, June 2011, Final Decision, Envestra Ltd. – Access Arrangement proposal for the SA gas network, page 59.

[166] Australian Energy Regulator, April 2012, APT Petroleum Pipeline Pty. Ltd. Access Arrangement Draft Decision, Roma to Brisbane Pipeline, 2012-13 to 2016-17, pages 27-29.

[167] Australian Energy Regulator, April 2012, Final Distribution Determination Aurora Energy Pty Ltd, 2012-13 to 2016-17, pages 29-31.

[168] Australian Energy Regulator, April 2012, Final Decision, Powerlink Transmission Determination, page 33.

107. IPART has used a market risk premium range of 5.5 per cent to 6.5 per cent in its recent determinations, such as for metropolitan and outer metropolitan bus services in December 2009, the CityRail determination, and recent determinations on prices charged by Sydney Catchment Authority and Hunter Water. IPART argues that deriving the MRP from a long-term historical time series remains appropriate. IPART also considers that relying on a long-term historical time series adequately takes into account any impact on excess returns of recent market events, such as the global financial crisis.

108. The Queensland Competition Authority has also used 6.0 per cent for the MRP in the draft determination for Queensland Rail in December 2009. QCA argued that it did not lower the MRP when the market conditions at the time led some stakeholders to seek a reduction – therefore increasing the MRP now would be inconsistent with its past practice that sets the MRP at a level to encourage investment over the medium term, and not in response to short-term market fluctuations.

Recent Developments in the Australian Financial Market

109. The Authority is aware of current developments in the financial markets both in Australia and overseas. However, the Authority is of the view that the investors' expectations of the long-run forward-looking MRP is unlikely to change frequently in response to any developments in the financial markets in the short term.

110. It is noted that, one of the approaches the Authority has adopted to estimate the MRP is to use a historical return on equity premia. In that analysis, the Authority has considered a much longer period in which the MRP is derived, ranging from 20 years to 40 years. In addition, also in the same analysis, the term to maturity of a risk-free rate of 5-year is adopted.

Should the MRP be adjusted to reflect a decrease of the observed yields on Australian Government Bonds?

The 2012 Study by McKenzie and Partington

111. Professors McKenzie and Partington noted that the observed yields on government securities are currently relatively low. The authors considered the arguments that these low yields are a consequence of a "flight to quality" (that is, to low default instruments), in which investors are particularly attracted to government securities with low default risk. They also argued that these low yields are partly due to the actions of monetary authorities in response to the global financial crisis. In considering the Australian situation, McKenzie and Partington observed that the actions of the RBA are mostly felt at the short end of the yield curve because the RBA targets short-term interest rates (the cash rate) to achieve its monetary policy.[169]

112. McKenzie and Partington observe that the implication of the argument to increase the MRP is that there is a negative correlation between the MRP and the yield on government securities. They note there is empirical evidence of a negative correlation between the nominal government yield and future nominal excess returns in the market, particularly for the government bill yield.

[169] McKenzie and Partington, 2012, *Supplementary Report on the Equity Market Risk Premium,* Report to the AER, 22 February 2012, p. 9.

However, it is not clear whether this relationship is due to variations in required returns or predictable shocks to realised returns in an inefficient market. If the latter, the relationship would contain no information about the required MRP.

113. McKenzie and Partington considered that such adjustments would likely be an endless source of debate about the threshold movement in yields that should trigger a revision in the MRP and how large each revision should be.

114. As a consequence, McKenzie and Partington recommended that if there is to be a switch from an unconditional MRP to an MRP conditioned on government security yields, then there needs to be a strong and clear case to do so and a clear and reliable basis for determining the magnitude of the effect. They concluded that the conditions to adjust the MRP due to a variation of the observed yields from the government securities are not met and, thus, recommended retaining the unconditional MRP of 6 per cent.[170]

115. The Authority agrees with the expert views of McKenzie and Partington and has decided that the estimate of the MRP should not be conditional on variations on observed yields from the CGS.

The 2012 Study by the Authority: Granger Causality Test

116. The Authority conducted a Granger causality test to test the proposition that the changes in the nominal risk free rate causes changes in the MRP.

117. The Granger causality test assumes that changes in variable X causes changes in variable Y based purely on precedence within a time series. If there is a relationship between changes in X and Y, and X precedes Y then X causes Y based on the assumption that the future cannot predict the past.

118. Two equations are developed to test the existence of causality between the risk-free rate and the MRP.

$$\text{Yield Change}_t = \sum_{i=1}^{n} \alpha_i \text{ERP}_{t-i} + \sum_{i=1}^{n} \beta_i \ \text{Yield Change}_{t-j} + \varepsilon_{1t} \quad (1)$$

$$\text{ERP}_t = \sum_{i=1}^{n} \lambda_i \text{Return}_{t-i} + \sum_{i=1}^{n} \delta_i \text{Yield Change}_{t-j} + \varepsilon_{2t} \quad (2)$$

119. In the context of bond yields (Yield Change) and equity return premiums[171] (ERP) equations (1) and (2) are regressed to determine whether (in aggregate) the coefficients on the lagged values of the respective variables are statistically different from zero. That is, the following hypotheses are tested:

$$H_0 : \alpha_1 + \alpha_2 + ... + \alpha_n = 0 \quad (3)$$

[170] McKenzie and Partington, 2012, *Supplementary Report on the Equity Market Risk Premium,* Report to the AER, 22 February 2012, p. 11.

[171] The equity return premium is the difference between the observed daily return and observed daily bond yield change, as opposed to the market risk premium which is the difference between the equity return and the bond yield over a longer time horizon.

$$H_0 : \delta_1 + \delta_2 + ... + \delta_n = 0 \quad (4)$$

120. An assumption is made on the number of lagged values of each variable to include in the regression. For example, if the data is daily and it is expected that returns will only be significantly affected by changes in bond yields for the previous day, then the lag will be one. However, if it is expected that the ERP will be significantly affected by changes in yield on each day over the past business week, then the lag will be designed to include all five days of the week.

- If the null hypothesis (3) is rejected, that is alpha is statistically different from zero, changes in the ERP Granger cause changes in Yield.
- If the null hypothesis (4) is rejected, that is delta is statistically different from zero, changes in Yield Granger cause the ERP.
- Rejecting both null hypotheses is evidence of feedback or bilateral Granger causality, that is both variables Granger cause each other.
- Failure to reject both null hypotheses suggests that the variables are independent.

121. To test for Granger causality between bond yields and equity market returns in Australia, the daily (trading day) yields on 10-year Australian Government Bonds and daily closing prices for the All Ordinaries Index were sourced from Bloomberg. It is noted that the daily closing prices were adjusted for changes on days for all normal and abnormal cash dividend types except omitted, discontinued, deferred or cancelled and so do not incorporate the effect of dividend drop offs.

122. Changes in the yield (Yield Change) were constructed by taking the natural log of the daily yield, b_t, divided by the previous day's yield b_{t-1}. This means that $Yield\ Change_t = \ln(b_t / b_{t-1})$. Similarly, the equity market returns (returns) are constructed as $\mathrm{Re}turn_t = \ln(P_t / P_{t-1})$.

123. The daily equity return premium is defined as the difference between the equity market return and the bond yield return, which is defined as below.

$$ERP_t = \ln\left(\frac{P_t}{P_{t-1}}\right) - \ln\left(\frac{b_t}{b_{t-1}}\right)$$

124. Table 8.9 below presents the summary of data used in this study for the period from 1983 to 2012.

Table 8.6 Granger Causality Test, MRP versus Risk Free Rate, Oct 1983 – February 2012

Variable	Ticker	Numbers of observations
10-year CGS yields	GACGB10	7,215
All Ordinaries Accumulation Index	ASA30	7,215

Source: Bloomberg.

125. Regression equations as presented in equations (1) and (2) using the Granger causality test function of the MSBVAR package in R. The lag was set at one day to test if changes in bond yields Granger cause changes in the equity return premium the next day and vice versa.

126. Table 8.10 below presents the findings of the augmented Dickey Fuller Unit Root Tests (No Drift or Trend). Both series exhibit a t-statistic greater than two. As such, the test rejects the null hypothesis of a unit root at the five percent level of significance. This implies that the series are stationary and are suitable to conduct the Granger causality Test.

Table 8.7 Augmented Dickey Fuller Unit Root Tests

Series	T-Stats
Yield Change	-39.3792
Equity Risk Premium	-42.3983

Source: Authority analysis.

127. The null hypotheses (3) and (4) are rejected even at the one percent level of significance. These results suggest that there is feedback or bilateral causality between changes in yield and the equity return premium.

Table 8.8 Granger Causality Test Results

Coefficient	F-Stats	P-Value
$\sum_{i=1}^{n} \alpha_i$	112.5331	0.0000
$\sum_{i=1}^{n} \beta_i$	14.0874	0.0002

Source: Authority analysis.

128. On the above analysis, the Authority is of the view that the Granger causality test suggests that there is feedback between changes in bond yields and equity return premium in Australia. Intuitively, one would assume that this would be the case as significant movements in the return from one asset vis-à-vis a given value the other would change the relative attractiveness of each asset and at times cause investors to move funds between them.

129. In conclusion, the Authority considers that there is no evidence to support the view that the decreased yields on the CGS bonds have caused for an increase in the estimate of the MRP.

Draft Determination

130. Based on the above analyses, the Authority is of the view that a MRP of 6 per cent is appropriate. This is consistent with the view from other Australian regulators, including the AER, IPART and QCA, that this is the best estimate of a forward-looking long-term MRP.

Equity Beta

Introduction

131. The systematic risk (beta) of a firm is the measure of how the changes in the returns to the firm's stock are related to the changes in returns to the market as a whole. Systematic risks are those risks that cannot be costlessly eliminated through portfolio diversification, such as unexpected changes in real aggregate income, inflation and long-term real interest rates.

132. 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 risk free rate plus a component to reflect the risk premium that investors would require over the risk free rate:

$$R_e = R_f + \beta_e\left(R_m - R_f\right)$$

where R_e is the required rate of return on equity, R_f is the risk-free rate, β_e is the equity beta that describes how a particular portfolio i will follow the market and is defined as $\beta_e = \mathrm{cov}\left(r_i, r_M\right)/\mathrm{var}\left(r_M\right)$; and $\left(R_m - R_f\right)$ is the market risk premium.

133. The above equation reveals that the equity beta of a particular asset will scale the MRP up (when its value is greater than one) or down (when its value is lower than one) to reflect the risk premium, which is over and above the risk-free rate, that equity holders would require to hold that particular risky asset in the investor's well-diversified portfolio.

Considerations of the Authority

134. The Authority notes that statistical estimates of beta values for Australian energy network businesses in the period since 2002 point to a value of equity beta at a gearing of 60 per cent debt to assets to be in the range of 0.45 to 0.7. Higher estimates of up to about 1.0 are produced by some estimation methods from the longer period of data for Australian businesses or data for United States businesses.

135. In the Final Decision for the second access arrangement for Western Power, released in December 2009, the Authority adopted a range for the estimate of equity beta of 0.5 to 0.8. The Authority was of the view that this range was consistent with the analysis presented by the AER in its 2009 WACC Review, based on Henry's empirical study, which suggests an equity beta of between 0.41 and 0.68.

136. The Authority has conducted its own analysis with regard to the estimates of the equity beta. The Authority has used the same approach as adopted by Henry in his study, using an updated data set until October 2011.

137. The Authority's analysis, using the extended dataset to October 2011, can be summarised as below:

- the estimates of the equity beta using monthly data range from 0.0675 to 0.9688, with a mean of 0.4569 and median of 0.4253; and
- the estimates of the equity beta using weekly data range from 0.2168 to 1.3378, with a mean of 0.5204 and median of 0.4261.

138. The Authority considers that any empirical study estimating equity beta experiences a high level of imprecision. As such, the Authority is of the view that it is appropriate to take a conservative approach with regard to the estimates of equity beta. In the Final Decision on Western Power Network's second access arrangement, the Authority adopted the equity beta of 0.65.

Draft Determination

139. The Authority is of the view that an equity beta of 0.65 is reasonable for the purpose of this draft determination.

Benchmark Financing Structure: Debt versus Equity

140. Gearing is the relative proportion of debt to total capital value, and is used to weight the cost of debt and equity when calculating WACC. The relative proportions of debt, equity, and other securities that a firm has outstanding constitute its capital structure. The capital structure choices across industries are different. The same conclusion can be reached for the capital structure for companies within industries. For regulated industries, the benchmark capital structure is considered to be the gearing level of a benchmark efficient utility business. Current practice by Australian regulators for a gearing level for a benchmark firm is to adopt the ratio of 60:40 for regulated businesses in electricity and gas industry.

141. The benchmark gearing ratio is considered to be the capital structure of a benchmark efficient utility business. The Authority assumes that the regulated business tends towards the benchmark gearing level in the long-run. As the optimal level of gearing is not directly observable, the 60:40 gearing level is derived from the average of actual gearing levels from a group of comparable firms.[172] The actual proportion of debt and equity for each business is dynamic and depends on a number of business-specific factors.

142. The Authority has estimated the actual gearing level, defined as the ratio between total debt and total asset, using publicly available information from the financial statements of the relevant entities. This exercise covers the estimates of the actual gearing level for:

- Water Corporation;
- Other Australian water businesses;
- UK's public water companies; and
- UK's private water companies.

143. Table 8.12 below presents the summary of the findings. The average gearing level for Water Corporation over the last 7 years is approximately 20 per cent whereas the gearing level for other Australian water businesses is between 20 per cent and 45 per cent. UK's water businesses have higher gearing levels compared with Water Corporation and other Australian water businesses, being approximately 60 and 70 per cent for publicly listed water companies and private water companies respectively.

[172] Australian Energy Regulator, May 2009, Final Decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters

Table 8.9 Gearing Ratios: the Water Corporation versus other Australian and UK Water Businesses, 2005 – 2011, per cent

Average Gearing Ratios for Water Corporation compared to water providers in Australia and the United Kingdom over 2005 - 2011 (%)			
Water Corporation	***19.89***		
Australia		**United Kingdom**	
SA Water	20.03	***Private companies***	
Sydney Water	35.26	Anglian Water	68.67
Hunter Water	20.21	Southern Water	71.51
Melbourne Water	35.87	Thames Water	71.25
South East Water	29.76	***Publicly Listed Companies***	
City West Water	34.33	Kelda Group	41.67
Yarra Valley Water	44.71	Severn Trent PLC	53.74
Sun Water	24.46	United Utilities Group PLC	53.22
Unity Water	45.64	YTL Power	61.09
Allconex Water	26.82	Pennon Group PLC	60.20
Queensland Urban Utilties	38.55	Northumbrian Water Group	63.93

Source: Authority analysis.

144. Publicly listed companies must adhere to stringent financial reporting standards and it is for this reason that the Authority has chosen to observe only publicly listed companies in its estimation of an appropriate benchmark level of gearing. There are no publicly listed water companies in Australia and hence the Authority has considered the average gearing ratios of publicly listed water companies in the United Kingdom. The Authority notes that these observed gearing levels are indicative and are used as a cross check as similar information is not available in Australia. These observed gearing ratios do not form the sole basis of the Authority's decision of an appropriate gearing of 60 per cent for the Water Corporation.

145. The Authority considers that the current gearing level of Water Corporation is lower than its peers in other Australian States. Its current gearing level is also significantly lower than water businesses in the UK. The Authority is of the view that it is appropriate to assume that Water Corporation tends towards the "benchmark" gearing level observed from other water companies in the long run.

146. Based on levels of gearing for Water Corporation and water businesses in the UK, the Authority is of the view that the gearing level of 60:40, a benchmark gearing for Australian regulated utilities, is appropriate for the purpose of this inquiry.

Credit Rating

147. The current approach to estimating the required rate of return or the WACC for regulated businesses in gas and electricity industry is to adopt the benchmark framework, which is widely used by other Australian regulators. In this benchmark approach, the benchmark credit rating of BBB+ is used. The WACC parameters, such as the equity beta, gearing level, debt risk premium and others, are derived in such a way as to make additional provision in the utilities' cost of capital, to ensure regulatory certainty and to allow for regulatory errors.

148. Australian regulators have tended to use a target credit rating of BBB+ for the benchmark rate of return for their regulated energy businesses. However, due to a limited number of credit ratings of BBB+ for Australian energy firms in the Australian financial market, regulators tend to combine the credit rating of BBB/BBB+ as the benchmark credit rating.

149. The Authority had used the credit rating of BBB band including BBB-/BBB/BBB+ in its Final Decisions on Western Australia Gas Networks Access Arrangement released in February 2011 and on the Dampier to Bunbury Natural Gas Pipeline released in October 2011. In its most recent final decision on proposed revisions to the Access Arrangement for the Western Power Network, released in August 2012, the Authority was of the view that the appropriate credit rating is BBB/BBB+.

150. The Authority has recently conducted the determination of the credit rating for Water Corporation using Standard & Poor's framework for assessing the credit rating for a particular entity, as presented in Table 8.13 below.[173]

Table 8.10 Standard and Poor's Matrix of Business Risk and Financial Risk

Business Risk Profile	*Financial Risk Profile*					
	Minimal	**Modest**	**Intermediate**	**Significant**	**Aggressive**	**Highly Leveraged**
Excellent	AAA	AA	A	A-	BBB	-
Strong	AA	A	A-	BBB	BB	BB-
Satisfactory	A-	BBB+	BBB	BB+	BB-	B+
Fair	-	BBB-	BB+	BB	BB-	B
Weak	-	-	BB	BB-	B+	B-
Vulnerable	-	-	-	B+	B	CCC+

Source: Standard and Poor's, 2009.

151. The business risk and financial risk for the Water Corporation over the last 10 years, from 2001 to 2010, can be summarised in Table 8.14 below.

Table 8.11 Water Corporation's Business Risk and Financial Risk, 2001 - 2010

METRIC/YEAR	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Cash flow (Funds from operations/ Debt)(%)	53%	53%	48%	51%	61%	49%	45%	38%	25%	29%
Debt leverage (Total debt/Capital) (%)	11%	11%	12%	13%	13%	17%	21%	25%	38%	34%
Debt/EBITDA (x)	1.28	1.28	1.39	1.35	1.18	1.50	1.70	1.95	2.99	2.53
RATING										
Cash flow (Funds from operations/ Debt)(%)	MOD	MOD	MOD	MOD	MIN	MOD	MOD	INT	AGR	AGR
Debt leverage (Total debt/Capital) (%)	MIN	MIN	MIN	MIN	MIN	MIN	MIN	MOD	MOD	MOD
Debt/EBITDA (x)	MIN	MIN	MIN	MIN	MIN	MOD	MOD	MOD	INT	INT

Note: MIN for Minimal; MOD for Moderate; INT for Intermediate; and AGR for Aggressive.

[173] Standard and Poor's, 2009, Global Credit Portal, RatingsDirect, Criteria Methodology: *Business Risk/Financial Risk Matrix Expanded*.

Source: Economic Regulation Authority's Analysis

152. The above financial indicators indicate that the appropriate credit rating for Water Corporation, on average, should lie with the A rated credit rating.

153. The Authority obtained the most recent credit ratings for all Australian rated utilities as summarised from Bloomberg. The Authority is of the view that including all companies in the same industry is appropriate for the determination of the benchmark credit rating.

154. The Authority is informed by the updated analysis that A- is the median credit rating for the sample of close comparators, sourced from Bloomberg as presented in Table 8.15 below.

Table 8.12 Standard & Poor's Credit Rating for Australian Energy Companies, August 2012

Issuer	Latest Rating	Effective Date	Rating Type
Ergon Energy Corporation	AA	20/02/2009	Long Term Local Currency Issuer
ElectraNet	AA-	30/11/2011	Instrument
Energy Partnership (Gas) Pty Ltd	AA-	30/11/2011	Instrument
Envestra Ltd	AA-	30/11/2011	Instrument
Citipower	A-	9/11/2010	Instrument
ETSA Utilities	A-	28/02/2009	Instrument
Powercor Australia	A-	24/06/2009	Instrument
Rowville Transmission Facility Pty Ltd	A-	28/02/2012	Long Term Senior Secured Debt Rating
SPI PowerNet Pty Ltd	A-	31/03/2008	Long Term Local Currency Issuer
Country Energy (now Origin)	BBB+	31/03/2011	Long Term Local Currency Issuer
United Energy	BBB	3/04/2012	Instrument
AGL Energy Ltd	BBB	24/02/2012	Long Term Local Currency Issuer
DUET	BBB-	3/06/2003	Long Term Local Currency Issuer

Source: Bloomberg.

155. Table 8.15 shows that, out of the sample of 13 companies classified as Australian energy companies, there are five with a credit rating of A-, which are shaded in the above table. The median credit rating for the entire sample lies within the companies with an A- credit rating, including Citipower, ETSA Utilities, Powercor Australia, Rowville Transmission Facility, and SPI PowerNet. As such, the Authority is informed by this updated analysis that A- is the median credit rating for the sample of close comparators, as presented in Table 8.15.

156. The Authority is aware that some of the above credit ratings are for instruments of the entities, not for the entities as a whole. It is also aware that credit wrapping (enhancement) or insurance may have been used to improve the credit rating of the businesses. However, the Authority considers that achieving a better credit rating using credit wrap and/or insurance will incur a cost that is not publicly available to quantify. Among five companies with a credit rating of A-, two companies Citipower and Powercor both have the same credit rating of A- for their entities and their financial instruments. As such, a credit rating of A- is applied for both the entities level and the instruments level. The Authority is of the view that it is more appropriate to base its decision of a benchmark credit rating on the entities' credit rating.

157. In its WACC Review in 2009, the AER was of the view that, the size of the sample of businesses and the likelihood that a robust estimate can be obtained must be taken into account.[174] In addition, the AER also considered that including both subsidiaries and their parents introduces an issue of double counting. Given the number of mergers and acquisitions that have taken place since the AER's credit rating analysis, the Authority is of the view that it is appropriate to exclude parents of subsidiaries in the sample and only include the subsidiaries themselves. This is in order to keep the sample as large as possible whilst avoiding double counting.[175] The AER found it was unlikely for the majority of the subsidiaries in the sample to have been rated in such a way that their financial positions were ignored.[176]

158. Using all of S&P's available industry reports for Australian electricity network service providers from 2008 to 2011 inclusive, the Authority considers that it is appropriate to conclude that a median credit rating of A- is observed from the sample of 12 Australian electricity network service providers (Table 8.13Table 8.16 Table 8.13).[177] It must be noted that Ausgrid and Essential Energy were not included in the calculation because S&P credit ratings were not available for them.

174 Australian Energy Regulator, May 2009, Final Decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, p. 109.

175 Australian Energy Regulator, May 2009, Final Decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, p. 379.

176 Australian Energy Regulator, May 2009, Final Decision, Electricity transmission and distribution network service providers, Review of the weighted average cost of capital (WACC) parameters, p. 368.

177 See Standard and Poor's, 2011, *Industry Report Card: Australian Utilities Are On A Firm Footing, But Confronting Regulatory Reviews*, 21 November 2011, pp. 9-12; Standard and Poor's, 2010, *Industry Report Card: Refinancing And Balance Sheet Management Remain Top Of The Agenda For Australian Utilities*, 5 May 2010, pp. 7-10; Standard and Poor's, 2009, *Industry Report Card: For Australian Utilities, The Challenge Remains To Manage Refinancing And Balance Sheets*, 7 May 2009, pp. 7-10; and Standard and Poor's, 2008, *Industry Report Card: Australian Utilities' Credit Prospects Dimmed By Looming Shadow Of M&A, Climate, And Regulatory Risks*, 9 May 2008, pp. 8-20.

Table 8.16 Table 8.13 S&P Credit Rating, 2008 – 2011

Electricity Network Service Providers Standard and Poor's Issuer Rating					
Company/Year	**2008**	**2009**	**2010**	**2011**	**Entity's Median Credit Rating**
Ergon Energy Corp Ltd	AA+	AA	AA	AA	**AA**
CitiPower I Pty Ltd	A-	A-	A-	NA	**A-**
Powercor	A-	A-	A-	A-	**A-**
ETSA Utilities Finance	A-	A-	A-	A-	**A-**
SPI Australia Assets Pty Ltd	A-	A-	A-	A-	**A-**
Jemena Ltd	A-	NA	A-	A-	**A-**
United Energy Distribution Pty	BBB	BBB	BBB	BBB	**BBB**
ElectraNet Pty Ltd	BBB+	BBB+	BBB	BBB	**BBB/BBB+**
Ausgrid	NA	NA	NA	NA	**NA**
Essential Energy	NA	NA	NA	NA	**NA**
Integral Energy (Origin now)	BBB+	BBB+	BBB+	BBB+	**BBB+**
Sample Median	**A-**	**A-**	**A-**	**A-**	**A-**

Source: S&P and Authority analysis.

159. On balance, the Authority considers that the credit rating of A- (A minus) is appropriate for the Water Corporation. Given the two Water Boards may face higher debt cost, higher bankruptcy risk, limited access to different source of finance, the Authority considers they require lower credit rating in order to maintain access to the capital markets. As such, the Authority is of the view that the credit rating of BBB/BBB+ is appropriate for the two Water Boards for the purpose of this inquiry.

8.6 The Cost of Debt (R_d)

160. In its regulatory decisions, the Authority is of the view that the Authority's Bond-yield approach to estimating a debt risk premium should be used to estimate the debt risk premium. As such, the Authority uses the same method to estimate the debt risk premium for the Water Corporation, Aqwest and Busselton in this inquiry.

161. In its reasons in ATCO's application, the Australian Competition Tribunal (**ACT**) found no error in the Authority's decision to depart from the Bloomberg Fair Value Curve as a basis for estimating the debt risk premium. The Tribunal also determined that there was no incorrect exercise of discretion or unreasonableness in the development of the bond-yield approach to estimate the debt risk premium. The Tribunal accepted that this approach was a valid one.

8.6.1 Estimating Debt Risk Premium: The Bond-yield approach

162. The Authority is of the view that the bond-yield approach is appropriate for estimating the debt risk premium for the Water Corporation, Aqwest and Busselton in this inquiry.

163. The Authority has used this approach in its Final Decisions on Western Australia Gas Networks Access Arrangement released in February 2011 and on the Dampier to Bunbury Natural Gas Pipeline released in October 2011. The Authority recommends to use the same approach for this inquiry.

164. Table 8.16 below summarises a benchmark sample of Australian corporate bonds with the S&P credit rating of A- as at 31 July 2012.

Table 8.14 A Benchmark Sample of Australian Corporate Bonds with Credit Rating of A- (A Minus) as at 31 July 2012.

Number	Issuer	Ticker	Coupon (%)	Redemption
1	AUST & NZ BANKING GROUP	EG919776 Corp	7.75	18/10/2017
2	POWERCOR AUSTRALIA LLC	EJ138911 Corp	5.75	27/04/2017
3	COCA-COLA AMATIL LTD	EI963715 Corp	4.88	1/02/2017
4	COCA-COLA AMATIL LTD	EI814473 Corp	5.95	27/09/2021
5	COCA-COLA AMATIL LTD	EJ271436 Corp	5.06	11/07/2022
6	COMMONWEALTH PROP FUND	EI598880 Corp	7.25	11/03/2016
7	COMMONWEALTH PROP FUND	EI060572 Corp	5.25	11/12/2016
8	MERCEDES-BENZ AUSTRALIA	EI894424 Corp	5.25	12/12/2014
9	MERCEDES-BENZ AUSTRALIA	EJ049426 Corp	5.50	9/03/2015
10	MERCEDES-BENZ AUSTRALIA	EJ177530 Corp	4.50	18/05/2015
11	ETSA UTILITIES FINANCE	EI619051 Corp	6.75	29/09/2016
12	ETSA UTILITIES FINANCE	EJ048937 Corp	6.25	7/09/2017
13	GPT RE LTD	EI963443 Corp	6.75	24/01/2019
14	AUSTRALIA PACIFIC AIRPOR	EI363004 Corp	6.50	25/08/2014
15	AUSTRALIA PACIFIC AIRPOR	EF188672 Corp	6.00	14/12/2015
16	NATIONAL AUSTRALIA BANK	EG566188 Corp	7.25	21/12/2017
17	STOCKLAND TRUST MANAGEME	EI083701 Corp	8.50	18/02/2015
18	STOCKLAND TRUST MANAGEME	EI494819 Corp	7.50	1/07/2016
19	STOCKLAND TRUST MANAGEME	EI475100 Corp	8.25	25/11/2020
20	SPI ELECTRICITY & GAS	EI193940 Corp	7.50	25/09/2017
21	SPI ELECTRICITY & GAS	EI626314 Corp	7.50	1/04/2021
22	SPI ELECTRICITY & GAS	EJ251235 Corp	5.75	28/06/2022
23	SPI ELECTRICITY & GAS	EJ251460 Corp	5.75	28/06/2022
24	SPI AUSTRALIA ASSETS PTY	EI340883 Corp	7.00	12/08/2015
25	SPI AUSTRALIA ASSETS PTY	EJ021352 Corp	6.25	21/02/2017
26	TRANSURBAN FINANCE CO PT	EI697455 Corp	6.75	8/06/2016
27	VOLKSWAGEN FIN SERV AUST	EI880238 Corp	5.25	21/11/2014
28	VOLKSWAGEN FIN SERV AUST	EI546029 Corp	7.00	28/01/2015
29	VOLKSWAGEN FIN SERV AUST	EI740609 Corp	6.25	14/07/2015
30	VOLKSWAGEN FIN SERV AUST	EJ251230 Corp	5.00	27/06/2017
31	WESFARMERS LTD	EH964875 Corp	8.25	11/09/2014
32	WESFARMERS LTD	EI861425 Corp	6.00	4/11/2016
33	WESFARMERS LTD	EJ102129 Corp	6.25	28/03/2019
34	WOOLWORTHS LIMITED	EI602412 Corp	6.75	22/03/2016
35	WOOLWORTHS LIMITED	EJ094929 Corp	6.00	21/03/2019
36	WESTPAC BANKING CORP	EH345905 Corp	10.00	9/05/2018

Source: Authority analysis.

165. As presented in paragraph 26, the Authority considers that the estimated 5-year nominal risk-free rate of return should be 2.45 per cent, for the period until 31 July 2012. This nominal risk free rate is estimated for a 5-year CGS. The same principle is applied to estimate the risk free rate for Australian corporate bonds with more (or less) than 5-year term to maturity. The risk free rate for 5-year CGS must be adjusted to reflect the fact that bonds in the benchmark sample have longer (or shorter) than-5-year term to maturity.

166. For example, row 20 from Table 8.17 below shows that the nominal risk free rate for the SPI Electricity and Gas bond with 5.15 years to maturity is 2.483 per cent for the 20 day trading period to 31 July 2012. By comparison, the nominal risk free rate for this company, which has been used to estimate the debt risk premium for this bond in the benchmark sample, is higher than the risk-free rate for a 5-year CGS of 2.450 per cent. This is consistent with the finance principle of risk and return trade-off: for longer investments with higher risks, then higher returns are required.

Table 8.15 Observed Yields, Adjusted Nominal Risk Free Rate, the Debt Risk Premium for A- Australian Corporate Bond as at 31 July 2012.

Number	Issuer	Term to maturity as at 31 July 2012	Observed yields (%)	Adjusted Risk free rate (%)	Debt Risk Premium (%)
1	AUST & NZ BANKING GROUP	5.22	4.334	2.491	1.843
2	POWERCOR AUSTRALIA LLC	4.74	5.001	2.425	2.576
3	COCA-COLA AMATIL LTD	4.50	3.957	2.399	1.558
4	COCA-COLA AMATIL LTD	9.16	4.372	2.820	1.552
5	COCA-COLA AMATIL LTD	9.95	4.439	2.886	1.553
6	COMMONWEALTH PROP FUND	3.61	4.854	2.373	2.481
7	COMMONWEALTH PROP FUND	4.36	4.141	2.394	1.747
8	MERCEDES-BENZ AUSTRALIA	2.37	3.953	2.411	1.543
9	MERCEDES-BENZ AUSTRALIA	2.61	4.034	2.356	1.678
10	MERCEDES-BENZ AUSTRALIA	2.80	4.027	2.330	1.697
11	ETSA UTILITIES FINANCE	4.16	4.641	2.388	2.252
12	ETSA UTILITIES FINANCE	5.10	4.906	2.477	2.429
13	GPT RE LTD	6.48	5.575	2.591	2.983
14	AUSTRALIA PACIFIC AIRPOR	2.07	4.795	2.444	2.351
15	AUSTRALIA PACIFIC AIRPOR	3.37	4.899	2.366	2.532
16	NATIONAL AUSTRALIA BANK	5.39	4.635	2.511	2.124
17	STOCKLAND TRUST MANAGEME	2.55	4.996	2.370	2.626
18	STOCKLAND TRUST MANAGEME	3.92	5.320	2.381	2.939
19	STOCKLAND TRUST MANAGEME	8.32	5.937	2.748	3.189
20	SPI ELECTRICITY & GAS	5.15	4.981	2.483	2.498
21	SPI ELECTRICITY & GAS	8.67	5.405	2.778	2.626
22	SPI ELECTRICITY & GAS	9.91	5.650	2.883	2.767
23	SPI ELECTRICITY & GAS	9.91	5.703	2.883	2.820
24	SPI AUSTRALIA ASSETS PTY	3.03	4.655	2.347	2.308
25	SPI AUSTRALIA ASSETS PTY	4.56	4.884	2.400	2.484
26	TRANSURBAN FINANCE CO PT	3.86	5.234	2.380	2.855
27	VOLKSWAGEN FIN SERV AUST	2.31	4.204	2.425	1.779
28	VOLKSWAGEN FIN SERV AUST	2.49	4.502	2.383	2.119
29	VOLKSWAGEN FIN SERV AUST	2.96	4.551	2.342	2.209
30	VOLKSWAGEN FIN SERV AUST	4.91	4.723	2.451	2.272
31	WESFARMERS LTD	2.11	4.306	2.443	1.863
32	WESFARMERS LTD	4.26	4.688	2.391	2.296
33	WESFARMERS LTD	6.66	5.160	2.604	2.557
34	WOOLWORTHS LIMITED	3.64	4.234	2.374	1.860
35	WOOLWORTHS LIMITED	6.64	4.832	2.602	2.230
36	WESTPAC BANKING CORP	5.78	4.476	2.543	1.933

Source: Authority analysis.

167. In the original Bond-yield approach prior to the release of the ACT decision in May 2012, the following four weighted average methods were considered:

- a simple average;
- a term-to-maturity weighted average approach;
- an amount-issued weighted average approach; and
- a median approach.

168. The Authority has reconsidered the proper application of the bond yield approach in deciding on the debt risk premium pursuant to orders 1(e) and 2(b) of the Tribunal's Reasons in ATCO's application. In doing so, the Authority has had regard to the Tribunal's criticisms of the simple averaging process adopted in the final decision. The Authority has re-made its decision in this respect as ordered by the Tribunal.

169. In its reasons in ATCO's application, the Tribunal found no error in the Authority's decision to depart from the Bloomberg Fair Value Curve as a basis for estimating the debt risk premium. The Tribunal also determined that there was no incorrect exercise of discretion or unreasonableness in the development of the bond-yield approach to estimate the debt risk premium. The Tribunal accepted that this approach was a valid one.

170. The Tribunal noted that it might have expected some more detailed discussion of the Authority's decision to favour the term to maturity weighted average and some more detailed discussion of the 'amount issued' weighted average. The Authority discusses these approaches further in this decision below. It is noted that the Tribunal did not determine error on the part of the Authority in this respect.

171. The Tribunal did find error in relation to the Authority's decision to adopt a simple average across all of the scenarios in Table 8.16 of the Final Decision of the WAGN's Access Arrangement. The Tribunal was of the view that adopting this approach would lead to double and quadruple counting of certain of the sample bonds, which was undesirable, and with no reason being given as to why some bonds should be given more weight than others. The Tribunal therefore determined error and directed the Authority to re-make its decision by, amongst the other matters addressed in this decision, reconsidering the adoption of the simple averaging approach.

172. The Tribunal accepted the Authority's "term to maturity" weighted average to determining the debt risk premium. As such, the Authority has maintained this approach in this draft report.

173. In addition, the Tribunal has requested more detailed discussions of the "amount-issued" weighted average. Given that both these characteristics might be regarded as important in the market, the Authority has come to the view that there is merit to assign weight to bonds with large issuance in comparison with other bonds in the benchmark sample. However, the Authority is of the view that more work needs to be undertaken to better reflect both characteristics in a joint weighting system to determining the debt risk premium, as recommended by the Tribunal. In the absence of further evidence and for the purpose of this decision, consistent with the Tribunal's observations, the Authority considers it is appropriate to apply a higher weight to bonds with larger issuance and longer terms to maturity.

174. As a consequence, the Authority considers that it is appropriate to use the *multiplicative rule* to account for this compounding effect.

Table 8.16 The estimate of the Debt Risk Premium using a joint-weighted averaging approach as at 31 July 2012, Per cent

No.	Bond	Amount ($ million)	Weight (Issuance)	Maturity	Years to Maturity as at 31 July 2012 (Years)	Weight (Term)	Combined Weight	Bond's Own DRP (%)	Contributed DRP (%)
1	AUST & NZ BANKING GROUP	290.00	0.032	18/10/2017	5.217	0.029	0.036	1.84	0.066
2	POWERCOR AUSTRALIA LLC	200.00	0.022	27/04/2017	4.742	0.027	0.022	2.58	0.057
3	COCA-COLA AMATIL LTD	250.00	0.028	1/02/2017	4.503	0.025	0.026	1.56	0.041
4	COCA-COLA AMATIL LTD	30.00	0.003	27/09/2021	9.158	0.052	0.006	1.55	0.010
5	COCA-COLA AMATIL LTD	30.00	0.003	11/07/2022	9.947	0.056	0.007	1.55	0.011
6	COMMONWEALTH PROP FUND	200.00	0.022	11/03/2016	3.614	0.020	0.017	2.48	0.042
7	COMMONWEALTH PROP FUND	200.00	0.022	11/12/2016	4.364	0.025	0.021	1.75	0.036
8	MERCEDES-BENZ AUSTRALIA	100.00	0.011	12/12/2014	2.367	0.013	0.006	1.54	0.009
9	MERCEDES-BENZ AUSTRALIA	100.00	0.011	9/03/2015	2.608	0.015	0.006	1.68	0.010
10	MERCEDES-BENZ AUSTRALIA	175.00	0.019	18/05/2015	2.800	0.016	0.012	1.70	0.020
11	ETSA UTILITIES FINANCE	250.00	0.028	29/09/2016	4.164	0.023	0.024	2.25	0.055
12	ETSA UTILITIES FINANCE	200.00	0.022	7/09/2017	5.103	0.029	0.024	2.43	0.058
13	GPT RE LTD	250.00	0.028	24/01/2019	6.483	0.037	0.038	2.98	0.114
14	AUSTRALIA PACIFIC AIRPOR	100.00	0.011	25/08/2014	2.069	0.012	0.005	2.35	0.011
15	AUSTRALIA PACIFIC AIRPOR	100.00	0.011	14/12/2015	3.372	0.019	0.008	2.53	0.020
16	NATIONAL AUSTRALIA BANK	300.00	0.033	21/12/2017	5.392	0.030	0.038	2.12	0.081
17	STOCKLAND TRUST MANAGEME	300.00	0.033	18/02/2015	2.550	0.014	0.018	2.63	0.047
18	STOCKLAND TRUST MANAGEME	150.00	0.017	1/07/2016	3.919	0.022	0.014	2.94	0.041
19	STOCKLAND TRUST MANAGEME	160.00	0.018	25/11/2020	8.319	0.047	0.031	3.19	0.100
20	SPI ELECTRICITY & GAS	300.00	0.033	25/09/2017	5.153	0.029	0.036	2.50	0.091
21	SPI ELECTRICITY & GAS	250.00	0.028	1/04/2021	8.669	0.049	0.051	2.63	0.134
22	SPI ELECTRICITY & GAS	175.00	0.019	28/06/2022	9.911	0.056	0.041	2.77	0.113
23	SPI ELECTRICITY & GAS	30.00	0.003	28/06/2022	9.911	0.056	0.007	2.82	0.020
24	SPI AUSTRALIA ASSETS PTY	500.00	0.055	12/08/2015	3.033	0.017	0.036	2.31	0.082
25	SPI AUSTRALIA ASSETS PTY	400.00	0.044	21/02/2017	4.558	0.026	0.043	2.48	0.107
26	TRANSURBAN FINANCE CO PT	200.00	0.022	8/06/2016	3.856	0.022	0.018	2.85	0.052
27	VOLKSWAGEN FIN SERV AUST	175.00	0.019	21/11/2014	2.308	0.013	0.010	1.78	0.017
28	VOLKSWAGEN FIN SERV AUST	300.00	0.033	28/01/2015	2.494	0.014	0.018	2.12	0.037
29	VOLKSWAGEN FIN SERV AUST	150.00	0.017	14/07/2015	2.956	0.017	0.010	2.21	0.023
30	VOLKSWAGEN FIN SERV AUST	150.00	0.017	27/06/2017	4.908	0.028	0.017	2.27	0.039
31	WESFARMERS LTD	400.00	0.044	11/09/2014	2.114	0.012	0.020	1.86	0.037
32	WESFARMERS LTD	500.00	0.055	4/11/2016	4.261	0.024	0.050	2.30	0.115
33	WESFARMERS LTD	500.00	0.055	28/03/2019	6.661	0.038	0.078	2.56	0.200
34	WOOLWORTHS LIMITED	500.00	0.055	22/03/2016	3.644	0.021	0.043	1.86	0.080
35	WOOLWORTHS LIMITED	500.00	0.055	21/03/2019	6.642	0.037	0.078	2.23	0.174
36	WESTPAC BANKING CORP	625.00	0.069	9/05/2018	5.775	0.033	0.085	1.93	0.164
TOTAL		**9,040.00**	**1.000**		**177.547**	**1.000**	**1.000**		**2.314**

Source: Authority analysis.

175. A combined weight, which takes into account both characteristics of the bonds including their terms to maturity and the issuance, is calculated as follows:

- First, the product of term to maturity and the issuance, to be called “the contribution”, is calculated for each bond in the sample.
- Second, the sum of these all contributions is derived, to be called “the total”.
- Third, the weight assigned to each bond is simply the ratio between its own contribution and the sample’s total, to be called “the combined weight”.

- Fourth, the combined weight for each bond is multiplied by its associated debt risk premium to derive the debt risk premium for each bond, to be called "the bond's debt risk premium", contributed to the sample.
- Fifth, the sum of the bond's debt risk premiums is the estimate of the debt risk premium for the sample when two characteristics of bonds are considered: (i) the term to maturity; and (ii) the issuance.

176. For the Water Corporation, the estimate of the debt risk premium associated with their relevant credit rating of A- is 2.314 per cent.

177. In a similar manner, for the Water Boards, the estimate of the debt risk premium associated with their relevant credit rating of BBB/BBB+ is 3.178 per cent.

Draft Determination

178. The Authority is of the view that the bond-yield approach should be used to estimate the debt risk premium for the purpose of this inquiry.

179. For the 20-day trading period until 31 July 2012, the Authority is of the view that a debt risk premiums of 2.314 per cent and 3.178 per cent are reasonable and appropriate for the Water Corporation and the two Water Boards respectively. The estimate of the debt risk premium will be reviewed for the final determination to ensure that it reflects the prevailing conditions in the markets for funds at that time.

8.6.2 Debt Issuance Costs

180. Debt raising costs may include underwriting fees, legal fees, company credit rating fees and any other costs incurred in raising debt finance. In practice, regulators across Australia have typically included an allowance of 12.5 basis points for these costs in the cost of debt, as an increment to the debt margin.

181. The current allowance for debt raising costs of 12.5 basis points is based upon a benchmark analysis conducted by the Allen Consulting Group (**ACG**) in 2004.[178] ACG undertook a study for the ACCC in 2004 on appropriate debt and equity raising costs to be included in costs recognised for the purposes of determining regulated revenues and prices. This study determined debt raising costs based on long-term bond issues, consistent with the assumptions applied in determining the costs of debt for a benchmark regulated entity. Debt raising costs were based on costs associated with Australian international bond issues and for Australian medium term notes sold jointly in Australia and overseas. Estimates of these costs were equivalent to 8 to 10.4 basis points per annum when expressed as an increment to the debt margin.[179] However, for regulatory certainty, Australian regulators have adopted a debt raising cost of 12.5 basis points.

[178] Allen Consulting Group, December 2004, Debt and equity raising transaction costs: Final report to ACCC.
[179] Allen Consulting Group, December 2004, Debt and Equity raising transaction costs: Final report to ACCC.

182. The Authority's decision is not only based on the ACG 2004 study, which provided the debt raising cost of 12.5 basis points, but also on the evidence recently provided to the AER by Associate Professor Handley from the University of Melbourne in April 2010.[180] In this study, Handley considered that the available estimate of the debt raising cost is below 12.5 basis points which has been adopted by Australian economic regulators. The Authority is also of the view that an allowance of 12.5 basis points provides regulatory certainty, given that this amount has been widely used in the past by Australian regulators.

Draft Determination

183. The Authority is of the view that an allowance for debt raising costs of 12.5 basis points is appropriate to be included in the debt risk premium to calculate the total cost of debt for the Water Corporation, Aqwest and Busselton.

Inflation Rate

184. The current practice adopted by the Authority, and other regulators, to determining the expected inflation rate is to calculate a geometric mean of inflation forecasts by the RBA for the next two years and the mid-point estimate of the RBA's long-term inflation forecasts of 2.5 per cent for the remaining three years.

185. Using the same method with regard to the estimate of the nominal risk free rate (linear extrapolation from 5-year CGS's observed yields) and expected inflation using the above geometric means of the RBA's inflation forecasts, the Authority notes the real risk free rate derived from Fisher's equation is negative. The Authority notes that this could possibly be due to a significantly different expected inflation between the economy as the whole (as the RBA's forecasts) and the sector (in this case the 5-year CGS bonds). The Authority considers that the market's expectations of inflation over the period are the most relevant to investors pricing of debt, provided that the market is producing signals that could be considered efficient.

186. As such, to overcome this negative estimate of the real risk free rate, the Authority adopts a direct approach of calculating expected inflation using the difference[181] between Treasury Bonds and Indexed Bonds to imply the market's expectation of inflation. Linear interpolations of the five-year yields were used based on the Reserve Bank of Australia's data to arrive at a twenty day average of Treasury Bond annualised yields and Indexed Bond annualised yields.[182] To ensure the yield data used in the calculation was reasonable, an assessment of liquidity conditions was undertaken. The Authority notes that liquidity had been good by historical standards in both markets based on correspondence with the Australian Office of Financial Management.[183] It is noted that the Authority had adopted this approach in its previous regulatory decisions.

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180 Handley, J., April 2010, *A Note on the Completion Method*, Report prepared for the Australian Energy Regulator

181 Based on the formal Fisher equation

182 The twenty trading days to 15 June 2012 for Treasury Bond TB120, TB135 and Treasury Indexed Bond TI405 and TI406 were sourced from the Reserve Bank of Australia's F16 statistical table. These bonds straddle the date of 15 June 2017.

183 Email and Telephone Correspondence with the Australian Office of Financial Management , 24 and 25 July 2012

187. Using the above methodology, the Authority has calculated the forecast inflation rate using Fisher's equation from the nominal and real risk free rates of return for the draft determination to be 2.10 per cent.

Draft Determination

188. The Authority is of the view that the expected inflation should be calculated based on a 5-year term.

189. The expected inflation of 2.10 per cent is adopted in this draft determination. This figure will need to be updated in the final determination.

Corporate Tax Rate

190. The Authority considers that a corporate tax rate of 30 per cent is appropriate for the purpose of this inquiry.

Value of Imputation Credits

Introduction

191. A full imputation tax system for companies has been adopted in Australia since 1 July 1987. While Australia and New Zealand have full imputation tax systems (which are discussed below) many other countries have a partial imputation system, where only partial credit is given for the company tax.

192. Under the tax system of dividend imputation, a franking credit is received by Australian resident shareholders, when determining their personal income taxation liabilities, for corporate taxation paid at the company level. In a dividend imputation tax system, the proportion of company tax that can be fully rebated (credited) against personal tax liabilities is best viewed as personal income tax collected at the company level. With the full imputation tax system in Australia, the company tax (corporate income tax) is effectively eliminated if all the franking values are used as credits against personal income tax liabilities.

193. It is widely accepted that the approach adopted by regulators across Australia to define the value of imputation credits, known as "Gamma", is in accordance with the Monkhouse definition.[184] There are two components of Gamma:

- the distribution rate (F): the rate at which franking credits that are created by the firm are distributed to shareholders, attached to dividends; and
- theta (θ): the value to investors of a franking credit at the time they receive it.

194. As a result, the actual value of franking credits, represented in the WACC by the parameter 'gamma', depends on the proportion of the franking credits that are created by the firm and that are distributed, and the value that the investor attaches to the credit, which depends on the investor's tax circumstances (that is, their marginal tax rate). As these will differ across investors, the value of franking credits may be between nil and full value (i.e. a gamma value between zero and one). 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.

[184] P. Monkhouse, 'Adapting the APV Valuation Methodology and the Beta Gearing Formula to the Dividend Imputation Tax System', *Accounting and Finance*, 37, vol. 1, 1997, pp. 69-88.

Payout Ratio (F)

195. The Authority is aware of the recent decision by the Australian Competition Tribunal with regard to the payout ratio. The Authority considers that the range of the payout ratio of 70 per cent to 100 per cent is appropriate given the information currently available to the Authority.

196. The Authority considers that an estimate of the payout ratio of 70 per cent is appropriate based on the empirical evidence currently available. This estimate is consistent with the Tribunal's decision with regard to the value of the payout ratio.[185] The Authority is of the view that existing evidence still supports the use of a range of 70 per cent and 100 per cent for payout ratio. However, for regulatory certainty, the Authority considers that there is no new evidence at this time that would cause the Authority to depart from the findings of the Tribunal in respect of gamma.

197. In conclusion, the Authority's decision is to adopt the payout ratio of 70 per cent in this draft determination.

Theta (θ)

198. The dividend drop-off study is the only approach used by the Tribunal to determine the value of theta. The Tribunal considered that redemption rate studies should only be used as a check on the reasonableness of the market value of imputation credits as estimated from dividend drop-off studies. On this basis, the Authority may consider further evidence on the estimate of theta using redemption rate studies in the future when this sort of study has been refined on economically justifiable grounds (such as a consideration of any time value loss between when imputation credits are distributed and when they are redeemed, which is currently not taken into account in redemption rate studies).

199. The Authority maintains its position in its previous regulatory decision[186] that dividend drop-off studies are affected by estimation issues, including multicollinearity and heteroscedasticity. As such, estimates of theta using dividend drop-off studies are inherently imprecise. As a result, the Authority is of the view that a range of evidence should be considered where available.

Gamma (γ)

200. Based on an estimate of the payout ratio of imputation credits of 70 per cent, together with an estimate of theta of 0.35, the Authority concludes that a reasonable value of gamma, for the purpose of the Authority's draft decision on Western Power's proposed Access Arrangement, is 0.25 (or 25 per cent). The estimate of gamma of 0.25 is consistent with the Tribunal's decision on gamma.[187]

[185] Australian Competition Tribunal, Application by Energex Limited (Distribution Ratio (Gamma)) (No 3) [2010] ACompT 9 (24 December 2010), paragraph 4

[186] For example, see Economic Regulation Authority, 2011, Final Decision on Proposed Revisions to the Access Arrangement for the Dampier to Bunbury Natuarl Gas Pipeline, 31 October 2011, page 140.

[187] Australian Competition Tribunal, Application by Energex Limited (Gamma) (No 5) [2011] ACompT 9 (12 May 2011), paragraph 42

Draft Determination

201. The Authority adopts the estimate of gamma of 0.25 to derive the cost of capital for this purpose of this draft determination.

8.6.3 Conclusion on Rate of Return

202. Based upon the above assessments of each of the WACC parameters, the point estimates that the Authority considers may reasonably be applied to parameters of the WACC in estimating the rate of return for Water Corporation and Water Boards, which will be adopted in the estimate of the retail margin using the Return on asset approach, as follows:

Table 8.17 A Determination of a Rate of Return as at 31 July 2012

Parameter	Water Corporation	Water Boards
Nominal Risk Free Rate $\left(R_f\right)$	2.45%	2.45%
Expected Inflation Rate π_e	2.10%	2.10%
Debt Proportion $\left(D\right)$	60%	60%
Equity Proportion $\left(E\right)$	40%	40%
Debt Risk Premium	2.314%	3.276%
Australian Market Risk Premium (MRP)	6%	6%
Equity Beta $\left(\beta_e\right)$	0.65	0.65
Corporate Tax Rate $\left(T_c\right)$	30%	30%
Franking Credit $\left(\gamma\right)$	25%	25%
Nominal Pre Tax Cost of Equity $\left(R_e^{n,\text{pre-tax}}\right)$	8.20%	8.20%
Real Pre Tax Cost of Equity $\left(R_e^{r,\text{pre-tax}}\right)$	5.97%	5.97%
Nominal After Tax Cost of Equity $\left(R_e^{n,\text{post-tax}}\right)$	6.35%	6.35%
Real After Tax Cost of Equity $\left(R_e^{r,\text{post-tax}}\right)$	4.17%	4.17%

Table 8.18 Authority's estimates of the WACC as at 31 July 2012

WACC	Water Corporation	Water Boards
Nominal Pre Tax WACC $\left(WACC_n^{\text{pre-tax}}\right)$	6.22%	6.79%
Real Pre Tax WACC $\left(WACC_r^{\text{pre-tax}}\right)$	4.03%	4.60%
Nominal After Tax WACC $\left(WACC_n^{\text{post-tax}}\right)$	5.48%	6.06%
Real After Tax WACC $\left(WACC_r^{\text{post-tax}}\right)$	3.31%	3.87%

9 Appendix C Impacts on Water Corporation Customers

Table 9.1 Impacts on Water Corporation Metropolitan Residential Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	252.92	250.65	257.01	263.53
100kL/annum	317.73	319.56	328.45	337.60
150kL/annum	382.55	388.46	399.88	411.66
200kL/annum	466.91	479.76	496.41	513.72
250kL/annum	551.26	571.06	592.94	615.78
300kL/annum	635.62	662.36	689.47	717.84
350kL/annum	719.97	753.66	786.00	819.90
400kL/annum	805.12	844.96	882.53	921.96
450kL/annum	890.28	936.25	979.06	1,024.02
500kL/annum	975.43	1,027.55	1,075.58	1,126.08
550kL/annum	1,087.71	1,144.40	1,186.75	1,231.84
600kL/annum	1,203.08	1,272.36	1,326.27	1,383.95
650kL/annum	1,318.44	1,400.32	1,465.78	1,536.06
700kL/annum	1,433.80	1,528.28	1,605.29	1,688.17
750kL/annum	1,549.16	1,656.24	1,744.80	1,840.28
Water Payment Annual Variation ($)				
50kL/annum		-2	6	7
100kL/annum		2	9	9
150kL/annum		6	11	12
200kL/annum		13	17	17
250kL/annum		20	22	23
300kL/annum		27	27	28
350kL/annum		34	32	34
400kL/annum		40	38	39
450kL/annum		46	43	45
500kL/annum		52	48	50
550kL/annum		57	42	45
600kL/annum		69	54	58
650kL/annum		82	65	70
700kL/annum		94	77	83
750kL/annum		107	89	95

Water Payment Annual Variation (%)			
50kL/annum	-0.9%	2.5%	2.5%
100kL/annum	0.6%	2.8%	2.8%
150kL/annum	1.5%	2.9%	2.9%
200kL/annum	2.8%	3.5%	3.5%
250kL/annum	3.6%	3.8%	3.9%
300kL/annum	4.2%	4.1%	4.1%
350kL/annum	4.7%	4.3%	4.3%
400kL/annum	4.9%	4.4%	4.5%
450kL/annum	5.2%	4.6%	4.6%
500kL/annum	5.3%	4.7%	4.7%
550kL/annum	5.2%	3.7%	3.8%
600kL/annum	5.8%	4.2%	4.3%
650kL/annum	6.2%	4.7%	4.8%
700kL/annum	6.6%	5.0%	5.2%
750kL/annum	6.9%	5.3%	5.5%

Source: Authority analysis.

Table 9.2 Impacts on Water Corporation Metropolitan Pensioners; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	105	102	102	103
100kL/annum	132	130	131	132
150kL/annum	159	158	159	161
200kL/annum	229	232	236	240
250kL/annum	299	306	313	320
300kL/annum	291	307	316	325
350kL/annum	361	382	393	406
400kL/annum	433	457	471	486
450kL/annum	504	531	548	566
500kL/annum	574	605	625	645
550kL/annum	667	700	713	728
600kL/annum	763	804	825	847
650kL/annum	859	908	936	965
700kL/annum	955	1,012	1,047	1,084
750kL/annum	1,051	1,117	1,158	1,203
Water Payment Annual Variation ($)				
50kL/annum		-3	0	0
100kL/annum		-2	1	1
150kL/annum		-1	1	1
200kL/annum		3	4	4
250kL/annum		8	7	7
300kL/annum		16	9	10
350kL/annum		20	12	12
400kL/annum		24	15	15
450kL/annum		27	17	18
500kL/annum		31	20	20
550kL/annum		33	13	14
600kL/annum		41	20	22
650kL/annum		49	27	30
700kL/annum		57	35	37
750kL/annum		66	41	44
Water Payment Annual Variation (%)				
50kL/annum		-0.7%	0.5%	0.6%
100kL/annum		0.2%	0.9%	0.9%

150kL/annum	-2.9%	0.4%	0.4%
200kL/annum	-1.5%	0.7%	0.7%
250kL/annum	-0.5%	0.8%	0.8%
300kL/annum	1.5%	1.7%	1.7%
350kL/annum	2.5%	2.1%	2.2%
400kL/annum	5.5%	3.0%	3.0%
450kL/annum	5.6%	3.1%	3.1%
500kL/annum	5.5%	3.2%	3.2%
550kL/annum	5.4%	3.2%	3.2%
600kL/annum	5.4%	3.3%	3.3%
650kL/annum	4.9%	1.9%	2.0%
700kL/annum	5.4%	2.5%	2.7%
750kL/annum	5.7%	3.0%	3.2%

Source: Authority analysis.

Table 9.3 Impacts on Water Corporation Metropolitan Tenants; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	54	56	57	58
100kL/annum	108	112	114	116
150kL/annum	161	168	171	173
200kL/annum	231	242	248	253
250kL/annum	301	317	324	332
300kL/annum	372	391	401	412
350kL/annum	443	466	479	493
400kL/annum	514	541	557	573
450kL/annum	584	615	633	652
500kL/annum	655	689	710	732
550kL/annum	748	784	799	815
600kL/annum	844	888	910	933
650kL/annum	940	992	1,021	1,052
700kL/annum	1,036	1,096	1,132	1,170
750kL/annum	1,132	1,201	1,243	1,289
Water Payment Annual Variation ($)				
50kL/annum		2	1	1
100kL/annum		4	2	2
150kL/annum		7	3	3
200kL/annum		11	5	5
250kL/annum		15	8	8
300kL/annum		19	11	11
350kL/annum		24	13	14
400kL/annum		27	16	16
450kL/annum		31	18	19
500kL/annum		34	21	22
550kL/annum		36	15	16
600kL/annum		44	22	23
650kL/annum		52	29	31
700kL/annum		61	36	38
750kL/annum		69	43	46
Water Payment Annual Variation (%)				
50kL/annum		4.1%	1.5%	1.5%
100kL/annum		4.1%	1.5%	1.5%

150kL/annum	4.1%	1.5%	1.5%
200kL/annum	4.7%	2.2%	2.2%
250kL/annum	5.0%	2.5%	2.5%
300kL/annum	5.2%	2.7%	2.7%
350kL/annum	5.3%	2.8%	2.8%
400kL/annum	5.3%	2.9%	2.9%
450kL/annum	5.2%	3.0%	3.0%
500kL/annum	5.2%	3.1%	3.1%
550kL/annum	4.8%	1.9%	2.0%
600kL/annum	5.2%	2.4%	2.6%
650kL/annum	5.6%	2.9%	3.0%
700kL/annum	5.9%	3.3%	3.4%
750kL/annum	6.1%	3.6%	3.7%

Source: Authority analysis.

Table 9.4 Average Impacts on Water Corporation Country Residential Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	206	199	201	203
100kL/annum	256	251	254	258
150kL/annum	306	303	308	313
200kL/annum	369	368	377	385
250kL/annum	431	434	445	457
300kL/annum	493	499	514	529
350kL/annum	571	591	623	659
400kL/annum	651	686	736	792
450kL/annum	732	781	847	922
500kL/annum	811	874	956	1,050
550kL/annum	897	975	1,075	1,191
600kL/annum	999	1,099	1,225	1,373
650kL/annum	1,101	1,222	1,375	1,556
700kL/annum	1,200	1,342	1,520	1,730
750kL/annum	1,300	1,463	1,665	1,905
Water Payment Annual Variation ($)				
50kL/annum		-7	2	2
100kL/annum		-5	3	3
150kL/annum		-4	5	5
200kL/annum		-0	8	9
250kL/annum		3	12	12
300kL/annum		6	15	16
350kL/annum		20	32	36
400kL/annum		35	49	56
450kL/annum		49	66	76
500kL/annum		63	82	95
550kL/annum		78	100	116
600kL/annum		100	126	148
650kL/annum		122	153	180
700kL/annum		142	178	210
750kL/annum		163	202	240
Water Payment Annual Variation (%)				
50kL/annum		-3.3%	0.8%	0.8%
100kL/annum		-2.0%	1.3%	1.3%

150kL/annum	-1.2%	1.6%	1.7%
200kL/annum	-0.1%	2.2%	2.3%
250kL/annum	0.6%	2.7%	2.7%
300kL/annum	1.2%	3.0%	3.0%
350kL/annum	3.6%	5.4%	5.8%
400kL/annum	5.4%	7.2%	7.7%
450kL/annum	6.7%	8.4%	9.0%
500kL/annum	7.7%	9.4%	9.9%
550kL/annum	8.7%	10.2%	10.8%
600kL/annum	10.0%	11.5%	12.1%
650kL/annum	11.1%	12.5%	13.1%
700kL/annum	11.8%	13.2%	13.8%
750kL/annum	12.5%	13.8%	14.4%

Source: Authority analysis.

Table 9.5 Average Impacts on Water Corporation Country Pensioners; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	124	123	126	130
100kL/annum	154	154	160	165
150kL/annum	184	186	193	200
200kL/annum	222	227	236	247
250kL/annum	260	267	280	293
300kL/annum	297	307	322	339
350kL/annum	344	363	391	423
400kL/annum	392	422	462	508
450kL/annum	441	480	532	591
500kL/annum	536	594	668	755
550kL/annum	640	719	818	935
600kL/annum	763	871	1,007	1,169
650kL/annum	885	1,023	1,195	1,403
700kL/annum	1,005	1,171	1,377	1,627
750kL/annum	1,125	1,319	1,559	1,851
Water Payment Annual Variation ($)				
50kL/annum		-2	4	4
100kL/annum		0	5	6
150kL/annum		2	7	7
200kL/annum		4	10	10
250kL/annum		7	13	14
300kL/annum		10	16	17
350kL/annum		20	28	31
400kL/annum		30	40	46
450kL/annum		39	51	60
500kL/annum		58	74	87
550kL/annum		79	99	117
600kL/annum		109	136	162
650kL/annum		138	172	208
700kL/annum		166	206	250
750kL/annum		194	240	292
Water Payment Annual Variation (%)				
50kL/annum		-1.3%	2.9%	3.0%
100kL/annum		0.0%	3.4%	3.5%

150kL/annum	0.9%	3.8%	3.8%
200kL/annum	2.0%	4.4%	4.4%
250kL/annum	2.8%	4.8%	4.9%
300kL/annum	3.3%	5.2%	5.2%
350kL/annum	5.8%	7.7%	8.0%
400kL/annum	7.6%	9.4%	9.9%
450kL/annum	9.0%	10.7%	11.2%
500kL/annum	10.9%	12.4%	13.0%
550kL/annum	12.4%	13.8%	14.3%
600kL/annum	14.2%	15.6%	16.1%
650kL/annum	15.6%	16.8%	17.4%
700kL/annum	16.5%	17.6%	18.1%
750kL/annum	17.2%	18.2%	18.7%

Source: Authority analysis.

Table 9.6 Average Impacts on Water Corporation Country Tenants; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	60	64	67	70
100kL/annum	210	225	240	256
150kL/annum	404	458	520	594
200kL/annum	890	1,058	1,261	1,509
250kL/annum	1,416	1,709	2,069	2,510
Water Payment Annual Variation ($)				
50kL/annum		2	2	2
100kL/annum		10	10	11
150kL/annum		45	53	62
200kL/annum		149	182	221
250kL/annum		264	324	397
Water Payment Annual Variation (%)				
50kL/annum		3.3%	3.3%	3.3%
100kL/annum		4.6%	4.7%	4.7%
150kL/annum		11.1%	11.5%	11.9%
200kL/annum		16.8%	17.2%	17.6%
250kL/annum		18.6%	18.9%	19.2%

Source: Authority analysis.

Table 9.7 Impacts on Water Corporation Metropolitan Residential Customers; Wastewater Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Wastewater Payment by GRV ($)				
0-4,000	308.65	358.65	408.65	458.65
4001-5,000	308.65	358.65	408.65	458.65
5001-6,000	308.65	358.65	408.65	458.65
6001-7,000	308.65	358.65	408.65	458.65
7001-8,000	308.65	358.65	408.65	458.65
8001-9,000	348.03	398.03	448.03	498.03
9001-10,000	388.98	438.98	488.98	537.44
10001-11,000	429.92	479.92	527.50	537.44
11001-12,000	470.86	519.44	527.50	537.44
12001-13,000	511.80	519.44	527.50	537.44
13001-14,000	552.75	519.44	527.50	537.44
14001-15,000	593.69	519.44	527.50	537.44
15001-16,000	634.63	519.44	527.50	537.44
16001-17,000	675.57	519.44	527.50	537.44
17001-18,000	691.34	519.44	527.50	537.44
18001-19,000	700.84	519.44	527.50	537.44
19001-20,000	710.33	519.44	527.50	537.44
20001-21,000	719.83	519.44	527.50	537.44
21001-22,000	729.32	519.44	527.50	537.44
22001-23,000	738.82	519.44	527.50	537.44
23001-24,000	748.32	519.44	527.50	537.44
24001-25,000	757.81	519.44	527.50	537.44
25001-26,000	767.31	519.44	527.50	537.44
26001-27,000	776.80	519.44	527.50	537.44
27001-28,000	786.30	519.44	527.50	537.44
28001-29,000	795.79	519.44	527.50	537.44
29001-30,000	805.29	519.44	527.50	537.44
30001-35,000	833.77	519.44	527.50	537.44
35001-40,000	881.25	519.44	527.50	537.44
>40,000	928.73	519.44	527.50	537.44
Wastewater Payment Annual Variation by GRV ($)				
0-4,000		50.00	50.00	50.00
4001-5,000		50.00	50.00	50.00
5001-6,000		50.00	50.00	50.00

6001-7,000	50.00	50.00	50.00
7001-8,000	50.00	50.00	50.00
8001-9,000	50.00	50.00	50.00
9001-10,000	50.00	50.00	48.47
10001-11,000	50.00	47.58	9.94
11001-12,000	48.58	8.07	9.94
12001-13,000	7.63	8.07	9.94
13001-14,000	- 33.31	8.07	9.94
14001-15,000	- 74.25	8.07	9.94
15001-16,000	- 115.19	8.07	9.94
16001-17,000	- 156.14	8.07	9.94
17001-18,000	- 171.91	8.07	9.94
18001-19,000	- 181.40	8.07	9.94
19001-20,000	- 190.90	8.07	9.94
20001-21,000	- 200.39	8.07	9.94
21001-22,000	- 209.89	8.07	9.94
22001-23,000	- 219.38	8.07	9.94
23001-24,000	- 228.88	8.07	9.94
24001-25,000	- 238.37	8.07	9.94
25001-26,000	- 247.87	8.07	9.94
26001-27,000	- 257.37	8.07	9.94
27001-28,000	- 266.86	8.07	9.94
28001-29,000	- 276.36	8.07	9.94
29001-30,000	- 285.85	8.07	9.94
30001-35,000	- 314.34	8.07	9.94
35001-40,000	- 361.81	8.07	9.94
>40,000	- 409.29	8.07	9.94
Wastewater Payment Annual Variation by GRV (%)			
0-4,000	16.2%	13.9%	12.2%
4001-5,000	16.2%	13.9%	12.2%
5001-6,000	16.2%	13.9%	12.2%
6001-7,000	16.2%	13.9%	12.2%
7001-8,000	16.2%	13.9%	12.2%
8001-9,000	14.4%	12.6%	11.2%
9001-10,000	12.9%	11.4%	9.9%
10001-11,000	11.6%	9.9%	1.9%
11001-12,000	10.3%	1.6%	1.9%
12001-13,000	1.5%	1.6%	1.9%

13001-14,000	-6.0%	1.6%	1.9%
14001-15,000	-12.5%	1.6%	1.9%
15001-16,000	-18.2%	1.6%	1.9%
16001-17,000	-23.1%	1.6%	1.9%
17001-18,000	-24.9%	1.6%	1.9%
18001-19,000	-25.9%	1.6%	1.9%
19001-20,000	-26.9%	1.6%	1.9%
20001-21,000	-27.8%	1.6%	1.9%
21001-22,000	-28.8%	1.6%	1.9%
22001-23,000	-29.7%	1.6%	1.9%
23001-24,000	-30.6%	1.6%	1.9%
24001-25,000	-31.5%	1.6%	1.9%
25001-26,000	-32.3%	1.6%	1.9%
26001-27,000	-33.1%	1.6%	1.9%
27001-28,000	-33.9%	1.6%	1.9%
28001-29,000	-34.7%	1.6%	1.9%
29001-30,000	-35.5%	1.6%	1.9%
30001-35,000	-37.7%	1.6%	1.9%
35001-40,000	-41.1%	1.6%	1.9%
>40,000	-44.1%	1.6%	1.9%

Source: Authority analysis.

10 Appendix D Country Commercial Tariffs

Table 10.1 Recommended Water Corporation Country Commercial Water Tariffs, 2013/14 to 2015/16 (nominal dollars)

	Actual Implemented Tariffs 2012/13	Authority Recommended Tariffs 2013/14	Authority Recommended Tariffs 2014/15	Authority Recommended Tariffs 2015/16
Commercial Fixed Tariffs				
15mm & 20mm meter	188.10	181.75	185.57	189.47
25mm & 30mm meter	293.90	283.98	289.95	296.04
35mm, 38mm & 20mm meter	752.40	727.00	742.28	757.87
50mm meter	1,175.60	1,135.94	1,159.80	1,184.18
70mm, 75mm & 80mm meter	3,009.60	2,908.00	2,969.10	3,031.49
100mm meter	4,702.50	4,543.74	4,639.22	4,736.70
140mm & 150mm meter	10,580.60	10,223.42	10,438.24	10,657.58
200mm & 250mm meter	18,810.00	18,174.98	18,556.88	18,946.81
300mm & 3500mm meter	42,322.50	40,893.70	41,752.98	42,630.31
350mm meter	57,605.60	55,660.87	56,830.44	58,024.59
20mm meter (strata)	188.10	181.75	185.57	189.47
Commercial Demand Tariffs				
Class 1				
0-300kL, Group 1	1.72	1.62	1.53	1.44
>300kL, Group 1	1.90	1.73	1.58	1.44
0-300kL, Group 2	1.89	1.80	1.71	1.62
>300kL, Group 2	2.07	1.91	1.76	1.62
0-300kL, Group 3	2.07	1.99	1.91	1.83
>300kL, Group 3	2.25	2.10	1.96	1.83
Class 2				
0-300kL, Group 4	2.27	2.20	2.13	2.06
>300kL, Group 4	2.45	2.31	2.19	2.06
0-300kL, Group 5	2.49	2.43	2.38	2.33
>300kL, Group 5	2.67	2.55	2.44	2.33
0-300kL, Group 6	2.70	2.68	2.65	2.63
>300kL, Group 6	2.91	2.81	2.72	2.63

Class 3				
0-300kL, Group 7	2.94	2.95	2.96	2.96
>300kL, Group 7	3.16	3.10	3.03	2.96
0-300kL, Group 8	3.20	3.24	3.29	3.34
>300kL, Group 8	3.45	3.41	3.38	3.34
0-300kL, Group 9	3.47	3.57	3.67	3.77
>300kL, Group 9	3.75	3.76	3.76	3.77
Class 4				
0-300kL, Group 10	3.74	3.90	4.07	4.25
>300kL, Group 10	4.09	4.14	4.20	4.25
0-300kL, Group 11	4.08	4.30	4.54	4.80
>300kL, Group 11	4.45	4.56	4.68	4.80
0-300kL, Group 12	4.45	4.75	5.07	5.41
>300kL, Group 12	4.84	5.03	5.22	5.41
Class 5				
0-300kL, Group 13	4.85	5.24	5.66	6.11
>300kL, Group 13	5.28	5.54	5.82	6.11
0-300kL, Group 14	5.30	5.78	6.31	6.89
>300kL, Group 14	5.74	6.10	6.48	6.89
0-300kL, Group 15	5.78	6.38	7.04	7.77
>300kL, Group 15	6.26	6.72	7.23	7.77
Farmland				
Fixed Tariff	188.10	181.75	185.57	189.47
Demand Tariff	1.713	1.616	1.650	1.685

Source: Authority analysis.

11 Appendix E Impacts on Aqwest Customers

Table 11.1 Impacts on Aqwest Residential Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	160	179	199	222
100kL/annum	188	209	233	260
150kL/annum	215	240	267	298
200kL/annum	266	297	330	368
250kL/annum	317	353	394	438
300kL/annum	368	410	457	509
350kL/annum	419	467	520	579
400kL/annum	492	548	611	680
450kL/annum	565	630	701	781
500kL/annum	638	711	792	882
550kL/annum	735	818	912	1,015
600kL/annum	831	926	1,031	1,149
650kL/annum	928	1,033	1,151	1,282
700kL/annum	1,024	1,141	1,271	1,415
750kL/annum	1,140	1,270	1,414	1,571
Water Payment Annual Variation ($)				
50kL/annum		18	20	23
100kL/annum		21	24	27
150kL/annum		25	27	30
200kL/annum		30	34	38
250kL/annum		36	40	45
300kL/annum		42	47	52
350kL/annum		48	53	59
400kL/annum		56	62	70
450kL/annum		64	72	80
500kL/annum		73	81	90
550kL/annum		84	93	104
600kL/annum		95	105	117
650kL/annum		106	118	131
700kL/annum		117	130	145
750kL/annum		130	145	157

Water Payment Annual Variation (%)			
50kL/annum	11.4%	11.4%	11.4%
100kL/annum	11.4%	11.4%	11.4%
150kL/annum	11.4%	11.4%	11.4%
200kL/annum	11.4%	11.4%	11.4%
250kL/annum	11.4%	11.4%	11.4%
300kL/annum	11.4%	11.4%	11.4%
350kL/annum	11.4%	11.4%	11.4%
400kL/annum	11.4%	11.4%	11.4%
450kL/annum	11.4%	11.4%	11.4%
500kL/annum	11.4%	11.4%	11.4%
550kL/annum	11.4%	11.4%	11.4%
600kL/annum	11.4%	11.4%	11.4%
650kL/annum	11.4%	11.4%	11.4%
700kL/annum	11.4%	11.4%	11.4%
750kL/annum	11.4%	11.4%	11.1%

Source: Authority analysis.

Table 11.2 Impacts on Aqwest Pensioners; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	80	89	99	111
100kL/annum	94	105	117	130
150kL/annum	108	120	134	149
200kL/annum	133	148	165	184
250kL/annum	159	177	197	219
300kL/annum	184	205	228	254
350kL/annum	210	234	260	290
Water Payment Annual Variation ($)				
50kL/annum		9	10	11
100kL/annum		11	12	13
150kL/annum		12	14	15
200kL/annum		15	17	19
250kL/annum		18	20	22
300kL/annum		21	23	26
350kL/annum		24	27	30
Water Payment Annual Variation (%)				
50kL/annum		11.4%	11.4%	11.4%
100kL/annum		11.4%	11.4%	11.4%
150kL/annum		11.4%	11.4%	11.4%
200kL/annum		11.4%	11.4%	11.4%
250kL/annum		11.4%	11.4%	11.4%
300kL/annum		11.4%	11.4%	11.4%
350kL/annum		11.4%	11.4%	11.4%

Source: Authority analysis.

Table 11.3 Impacts on Aqwest Commercial Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
Meter = 20mm, Usage = 250kL	498	554	618	688
Meter = 25mm, Usage = 1000kL	1,668	1,857	2,069	2,304
Meter = 40mm, Usage = 2ML	3,451	3,844	4,282	4,769
Meter = 50mm, Usage = 5ML	8,130	9,056	10,086	11,234
Meter = 80mm, Usage = 10ML	16,725	18,629	20,749	23,111
Meter = 100mm, Usage = 20ML	32,520	36,222	40,345	44,938
Meter = 150mm, Usage = 50ML	80,471	89,631	99,833	111,197
Water Payment Annual Variation ($)				
Meter = 20mm, Usage = 250kL		57	63	70
Meter = 25mm, Usage = 1000kL		190	211	235
Meter = 40mm, Usage = 2ML		393	438	487
Meter = 50mm, Usage = 5ML		925	1,031	1,148
Meter = 80mm, Usage = 10ML		1,904	2,120	2,362
Meter = 100mm, Usage = 20ML		3,702	4,123	4,592
Meter = 150mm, Usage = 50ML		9,160	10,202	11,364
Water Payment Annual Variation (%)				
Meter = 20mm, Usage = 250kL		11.4%	11.4%	11.4%
Meter = 25mm, Usage = 1000kL		11.4%	11.4%	11.4%
Meter = 40mm, Usage = 2ML		11.4%	11.4%	11.4%
Meter = 50mm, Usage = 5ML		11.4%	11.4%	11.4%
Meter = 80mm, Usage = 10ML		11.4%	11.4%	11.4%
Meter = 100mm, Usage = 20ML		11.4%	11.4%	11.4%
Meter = 150mm, Usage = 50ML		11.4%	11.4%	11.4%

Source: Authority analysis.

12 Appendix F Impacts on Busselton Water Customers

Table 12.1 Impacts on Busselton Water Residential Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	203	219	236	255
100kL/annum	244	263	283	306
150kL/annum	284	306	331	357
200kL/annum	341	368	397	428
250kL/annum	398	429	463	499
300kL/annum	454	490	529	570
350kL/annum	511	551	595	642
400kL/annum	575	621	669	722
450kL/annum	639	690	744	803
500kL/annum	703	759	819	883
550kL/annum	789	851	918	990
600kL/annum	874	943	1,018	1,098
650kL/annum	960	1,036	1,117	1,205
700kL/annum	1,045	1,128	1,217	1,312
750kL/annum	1,165	1,256	1,355	1,462
Water Payment Annual Variation ($)				
50kL/annum		16	17	19
100kL/annum		19	21	22
150kL/annum		22	24	26
200kL/annum		27	29	31
250kL/annum		31	34	36
300kL/annum		36	39	42
350kL/annum		40	43	47
400kL/annum		45	49	53
450kL/annum		50	54	59
500kL/annum		55	60	64
550kL/annum		62	67	72
600kL/annum		69	74	80
650kL/annum		76	82	88
700kL/annum		82	89	96
750kL/annum		92	99	107

Water Payment Annual Variation (%)			
50kL/annum	7.9%	7.9%	7.9%
100kL/annum	7.9%	7.9%	7.9%
150kL/annum	7.9%	7.9%	7.9%
200kL/annum	7.9%	7.9%	7.9%
250kL/annum	7.9%	7.9%	7.9%
300kL/annum	7.9%	7.9%	7.9%
350kL/annum	7.9%	7.9%	7.9%
400kL/annum	7.9%	7.9%	7.9%
450kL/annum	7.9%	7.9%	7.9%
500kL/annum	7.9%	7.9%	7.9%
550kL/annum	7.9%	7.9%	7.9%
600kL/annum	7.9%	7.9%	7.9%
650kL/annum	7.9%	7.9%	7.9%
700kL/annum	7.9%	7.9%	7.9%
750kL/annum	7.9%	7.9%	7.9%

Source: Authority analysis.

Table 12.2 Impacts on Busselton Water Pensioners; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
50kL/annum	102	110	118	127
100kL/annum	122	131	142	153
150kL/annum	142	153	165	178
200kL/annum	170	184	198	214
250kL/annum	199	214	231	250
300kL/annum	227	245	264	285
350kL/annum	256	276	297	321
Water Payment Annual Variation ($)				
50kL/annum		8	9	9
100kL/annum		10	10	11
150kL/annum		11	12	13
200kL/annum		13	14	16
250kL/annum		16	17	18
300kL/annum		18	19	21
350kL/annum		20	22	23
Water Payment Annual Variation (%)				
50kL/annum		7.9%	7.9%	7.9%
100kL/annum		7.9%	7.9%	7.9%
150kL/annum		7.9%	7.9%	7.9%
200kL/annum		7.9%	7.9%	7.9%
250kL/annum		7.9%	7.9%	7.9%
300kL/annum		7.9%	7.9%	7.9%
350kL/annum		7.9%	7.9%	7.9%

Source: Authority analysis.

Table 12.3 Impacts on Busselton Water Commercial Customers; Water Payments Only (nominal dollars)

	2012/13	2013/14	2014/15	2015/16
Water Payment ($)				
Meter = 20mm, Usage = 250kL	483	521	562	606
Meter = 25mm, Usage = 1000kL	1,537	1,657	1,787	1,928
Meter = 40mm, Usage = 2ML	3,216	3,467	3,740	4,034
Meter = 50mm, Usage = 5ML	7,430	8,010	8,641	9,321
Meter = 80mm, Usage = 10ML	15,430	16,634	17,943	19,356
Meter = 100mm, Usage = 20ML	29,722	32,040	34,563	37,285
Meter = 150mm, Usage = 50ML	73,289	79,006	85,227	91,937
Water Payment Annual Variation ($)				
Meter = 20mm, Usage = 250kL		38	41	44
Meter = 25mm, Usage = 1000kL		120	130	141
Meter = 40mm, Usage = 2ML		251	273	294
Meter = 50mm, Usage = 5ML		580	631	680
Meter = 80mm, Usage = 10ML		1,204	1,310	1,413
Meter = 100mm, Usage = 20ML		2,319	2,523	2,722
Meter = 150mm, Usage = 50ML		5,717	6,221	6,711
Water Payment Annual Variation (%)				
Meter = 20mm, Usage = 250kL		7.8%	7.9%	7.9%
Meter = 25mm, Usage = 1000kL		7.8%	7.9%	7.9%
Meter = 40mm, Usage = 2ML		7.8%	7.9%	7.9%
Meter = 50mm, Usage = 5ML		7.8%	7.9%	7.9%
Meter = 80mm, Usage = 10ML		7.8%	7.9%	7.9%
Meter = 100mm, Usage = 20ML		7.8%	7.9%	7.9%
Meter = 150mm, Usage = 50ML		7.8%	7.9%	7.9%

Source: Authority analysis.

13 Appendix G Dam Safety Charges

Calculation of Charges

In calculating the revenue requirement for the Corporation, the Authority has used the following values:

- a zero initial asset value as at 30 June 1995 for the purpose of calculating the dam storage charges for Harvey Water's irrigation water and the written down replacement value for the purpose of calculating the dam storage charges for Harvey Water's non-irrigation water;
- $12.5 million of the dam safety capital expenditure for Waroona Dam has been added to the regulatory asset value;
- the future dam safety capital expenditure that is added to the regulatory asset value includes all of Wellington and Drakesbrook dams;
- the productivity rate applied to the Corporation's operating expenditure is 2.0 per cent;
- the rate of return on the regulatory asset value is 4.03 per cent (pre-tax real);
- the value placed on recreational benefits at Logue Brook Dam is assumed to be 20 per cent of the revenue required to provide the dam service. The foregone recreational benefits are assigned as a cost to the Corporation;
- the value placed on recreational benefits at Waroona, Wellington and Drakebrook dams is assumed to be 20 per cent of the cost; and
- the dam safety and other costs attributed to customers are allocated on the basis of water allocations.

The allocation of the revenue requirement among the beneficiaries of the Corporation's dam services assumes that costs are allocated according to the volumes used from each dam, after an allowance for recreational benefits has been made.

Recreational Benefits

The South West dams and surrounding reservoir areas provide recreational benefits to a significant number of visitors. With the exception of Stirling and Samson Brook dams, which supply water to the IWSS, the dams in the South West are open to recreational use. The two most popular dams for recreational use are Waroona and Logue Brook, which offer a wide range of activities including cycling, bushwalking, sightseeing, horse riding, picnics, camping, water skiing, canoeing, windsurfing, swimming and fishing.

It should be noted that only Queensland and Western Australia permit extensive recreational access to major dams.[188] Surveys of recreational use at water resources (including dams) indicate a relatively low percentage (less than 15%) of 'active' recreational use such as fishing or canoeing.[189] Visitor surveys indicate that around 50 to 60 percent of visitors to the Wellington Dam area are Perth residents (typically either on a tour of the South West or who have made a specific trip to the dam to undertake activities such as canoeing or rafting), while the majority of the balance were local residents. Of these visitors, the most popular activities were bushwalking (undertaken by 60 percent of visitors) and swimming (undertaken by 40 percent).[190]

Australian studies have estimated values (including recreational values) for rivers and wetlands, the value of regulating water storage and flows (including the impact on irrigators) and the impact of recreational activities on water quality. Although accurately measuring recreational benefits from the South West dams is difficult, the Authority has reviewed a number of these Australian studies (see details below) to assist in its assessment of the recreational benefits and costs associated with the South West irrigation dams.

- water quality costs resulting from recreational activity at major irrigation dams are typically lower than the recreational benefits.[191] However, if irrigation dams are converted to drinking water supplies, recreational activities would typically cease and water quality costs can exceed recreational benefits; and

- there are differences between values for passive and active recreational use:

    - Studies of recreational use in other States indicate that passive use may be valued at less than $10 per visit[192], visits to National Parks may attract a midrange value of $25 a visit[193] while more active activities such as fishing and hunting may attract values at or above $50 per visit[194] (all in 2006 dollars).[195]

[188] http://www.nqwater.com.au/facts.htm

[189] See for example, Hinze Dam Alliance (2006), Hinze Dam Recreation Issues Paper; also Harman J. and G. Hertzler (1998), *Economic Evaluation of the Swan- Swan-Canning*, Report to the WA Estuarine Research Foundation, University of Western Australia (pub.).

[190] Smith, A. (2003), "Campsite impact monitoring in the temperate eucalypt forest of Western Australia: An integrated approach", Ph.D. Thesis Murdoch University, Western Australia.

[191] Monitoring for hydrocarbons, pathogens and turbidity is typically the major cost. Note also that cost estimates from the 15 major urban and rural water suppliers in Victoria showed total water monitoring costs to be around $1.5 million per annum (State Government of Victoria (July 2004), Drinking Water Quality Regulatory Framework For Victoria - Industry Draft Of The Safe Drinking Water Regulations: Consultation History, Analysis Of Submissions And New Cost Estimates). Department of Conservation and Land Management (1990), "Logue Brook Reservoir and Catchment Area: Management Plan 1990-2000"; also Department of Conservation and Land Management (1990), "Waroona Reservoir and Catchment Area: Management Plan 1990-2000. Also in Queensland, monitoring of water quality in dams has found no measurable adverse effects from water skiing and other recreational activities.

[192] See for example, Lockwood M. and K. Lindberg (1996), Nonmarket Economic Value of Recreation in Eurobodalla National per, Johnstone Centre of Parks, Recreation and Heritage, report No. 67.; also Sappideen, B. (1992), 'Valuing the Recreation Benefits of Sale Wetlands using Contingent Valuation', in Lockwood, M. & DeLacy, T. (eds), Valuing Natural Areas: Applications And Problems Of The Contingent Valuation Method. Johnstone Centre of Parks, Recreation and Heritage, Charles Sturt University.

[193] See for example, Read Sturgess and Associates (1999), *Economic Assessment of Recreational Values of Victorian Parks*. Report for the Department of Natural Resources and Environment, Victoria.

[194] See for example, Rolfe, J., Prayaga, P., Long, P., and R. Cheetham (2004), "Estimating the value of freshwater recreational fishing in three Queensland dams", Report for the Queensland Department of Primary Industries; also Whitten, SM and Bennett, JW 2001,'A travel cost study of duck hunting in the Upper South East of South Australia', *Australian Geographer, Vol. 33, No. 2, pp. 207–221, 2002*

- In Western Australia a valuation study was undertaken for the urbanised portions of the Swan-Canning Catchment in Perth which found that the per visit amount would be less than $5 per person (in 2006 dollars).[196]

Regarding valuation of recreational use of South West dams, the most relevant study for the purpose of this inquiry is the Lucas study in 1991 which estimated the recreational value of Logue Brook. This is the only valuation survey that has been undertaken of recreational benefits associated with the South West dams.

The Lucas study estimated that visitors incurred costs in the range of $13 to $30 per visit, depending on the assumption about the opportunity cost of their travel time in 2006 dollars.[197]

Given that the Lucas result of $13 to $30 per visit is between estimates of the value of passive and active recreational use in other studies, the Lucas range appears reasonable.

Waroona, Drakesbrook and Wellington dams also have extensive recreational activities[198] and a significant number of visitors.[199] However, the Authority considers that there is insufficient information to undertake a robust analysis of the recreational value of each of these dams. For the purpose of the BWSA, the Authority has assumed that 20 percent may represent a reasonable estimate of the proportion of benefits attributable to recreational usage at these dams.

[195] Assigning a value to recreational benefits is difficult because the valuation methods often involve surveys using hypothetical scenarios for goods and services that have a market value. A common problem is that respondents may misstate their 'true' willingness to pay, given the nature of the hypothetical scenario (that is, answers often reflect the respondents' intentions rather than their actual behaviour).

[196] Harman J. et al (1998), op. cit. - found that respondents were willing to pay around $15 (in 2006 dollars) per person per annum to protect existing non-use and use values (use values are the value derived from actual use of the good or service (e.g. recreation) while non-use values include indirect values such as conservation values). Given that recreational use typically involved 3-4 visits per year, the per visit amount would be less than $5 per person.

[197] Using the travel cost method, a proportion of post-tax hourly wage is taken to represent the opportunity cost of travel time. In the Lucas study, the base case assumed a proportion of 0.3 (resulted in a value of $13 per visit) while the upper range assumed a proportion of 1.0 (resulted in a value of $30 per visit).

[198] For example, the Wellington Dam area has camping, swimming, canoeing and white water rafting. Water skiing occurs at Stockton Lake, 20km east of Wellington Reservoir.

[199] For example, the traffic count on Wellington Weir Road for 2004/05 was 79,391 (Tourism WA (July 2006), "Australia's South West Tourism Perspective 2005").

14 Appendix H Glossary

ACCC	Australian Competition and Consumer Commission
ACG	Allen Consulting Group
ACT	Australian Competition Tribunal
ADF	Augmented Dickey Fuller
AER	Australian Energy Regulator
Agreement	Bulk Water Supply Agreement
ANCOLD	Australian National Committee on Large Dams
Aqwest	Bunbury Water Board
ATCO	ATCO Australia Pty. Ltd.
Authority	Economic Regulation Authority
CAPM	Capital Asset Pricing Model
Cardno	Cardno Limited
CGS	Commonwealth Government Securities
CSO	Community Service Obligation
DBNGP	Dampier to Bunbury Natural Gas Pipeline
DM	Diebold-Mariano test
EBIT	Earnings Before Interest and Tax
EBITDA	Earnings Before Interest, Taxation, Depreciation and Amortisation
ERA	Economic Regulation Authority
ERP	Equity Return Premium
ESC	Essential Services Commission of Victoria
ESCOSA	Essential Services Commission of South Australia
GDP	Gross Domestic Product
Granger	Granger Causality Test
GRV	Gross Rental Value
Harvey Water	South West Irrigation Co-operative
IPART	Independent Pricing and Regulatory Tribunal of New South Wales
IRCR	Independent Competition and Regulatory Commission
IWRP	Integrated Water Resource Planning
kL	Kilolitres
LRMC	Long Run Marginal Cost
MJA	Marsden Jacob Associates
ML	Megalitres
MRP	Market Risk Premium
MWH	South West Irrigation Management Co-operative
NPV	Net Present Value
PLC	Publicly Listed Company
QCA	Queensland Competition Authority

`RBA	Reserve Bank of Australia
Recycled Water Inquiry	Inquiry into the Pricing of Recycled Water in Western Australia
ROA	Return on Asset
RWPP	Recycled Water Pricing Policy
SFG	SFG Consulting
SIBC	Strategic Investment Business Case
SSDP	Southern Seawater Desalination Plant
WACC	Weighted Average Cost of Capital
WAGN	WA Gas Networks
WTP	Willingness to Pay