

Essential Services Commission

Water Price Review 2009: Demand



Contents

1	Introduction	1
2	Assessment of the key assumptions	4
3	Population growth and demographic change	8
4	Restriction levels	14
5	Conservation	27
Appendices		
	Appendix A T140 Queensland's experience	37
	Appendix B City West Water	41
	Appendix C South East Water	51
	Appendix D Yarra Valley Water	60
	Appendix E Melbourne Water	67

1 Introduction

PricewaterhouseCoopers (PwC) has been engaged by the Essential Services Commission of Victoria (ESCV) to undertake a review and assessment of the demand forecasts prepared by the Victorian metropolitan urban water businesses.

The businesses have prepared these forecasts for inclusion in their Water Plans that set out the revenue and expenditure they propose to undertake over the years 2009-10 to 2012-13. The ESCV is currently undertaking the Melbourne Metropolitan Water Price Review 2009 that will assess the reasonableness of the proposals set out in the businesses' Water Plans.

The outcome of PwC's review of the businesses' demand forecasts will be an input into the ESCV's consideration of the businesses' Water Plans.

1.1 Objective of this review

PwC has been asked by the ESCV to provide advice on whether the demand forecasts proposed by the businesses:

- have been developed using appropriate forecasting methodologies or approaches, given the materiality of the forecasts for the businesses' revenue and resulting prices
- reflect reasonable assumptions about the key drivers of demand, including the impact of supply restrictions
- use the best available information, including historical data that can support trends in demand
- take account of current demand and economic conditions.

The services under consideration are all regulated water, sewerage, tradewaste and recycled water services.

In providing this advice, PwC has had regard to:

- any guidance issued by the ESCV with respect to how it will assess the businesses' proposed demand forecasts
- the information set out in the businesses' Water Plans (and accompanying templates) and any explanations that the businesses provide with respect to the basis used to derive the forecasts including any assumptions used
- comparisons amongst the businesses of their forecasting methodologies and assumptions and resulting forecasts
- relevant Victorian Government policies related to the water industry that impact on demand management, pricing, water conservation, metering and recycled water
- any readily available data and information that PwC has available to assess demand forecasts

- PwC's own experience in preparing and assessing the veracity of forecasts of demand for rural and urban water services in Victoria and other Australian states.

In the event that PwC does not believe that the businesses' proposed demand forecasts reflect these requirements, we are required to provide the ESCV with an alternative forecast. PwC has also been asked to identify any implications of adopting an alternative demand forecast for the relevant businesses' operating or capital expenditure requirements and/or prices.

1.2 Consultation

In order to provide meaningful assessment, conclusions and recommendations PwC has engaged the water businesses in a high level of consultation. PwC consultants initially met with each business individually in November 2008 (see table 1.1). The purpose of these meetings was to provide businesses with an opportunity to present the method and findings underlying their proposals in the Water Plans.

In light of the information provided in these meetings, and in the Water Plans themselves, PwC asked each business to provide further information addressing issues that preliminary analysis identified. Subsequently, PwC met with each business in December to discuss their responses to our information requests.

Table 1.1 Consultations

Date	Business	Consultation
21/11/08	SEW	Proposal discussion
25/11/08	YVW	Proposal discussion
17/11/08	CWW	Proposal discussion
21/11/08	MW	Proposal discussion
5/12/08	YVW	Further information
10/12/08	SEW	Further information
19/12/08	CWW	Further information
6/02/09	YVW	Draft report and response to draft discussion
17/02/09	SEW	Draft report and response to draft discussion
23/02/09	MW	Draft report and response to draft discussion

After consideration of this further information PwC developed a Draft Report that was circulated to all businesses. Businesses were given the opportunity to respond to the Draft. PwC met with a number of businesses in order to both brief them on our initial findings and then to walk through any response they wished to make. Formal responses were submitted to PwC between 20 February and 27 February.

These responses are taken into consideration in the findings we have outlined in this report.

Throughout the process of drafting this report, PwC has adopted an approach of openness and transparency aimed at allowing businesses the opportunity to fully inform our process.

1.3 Limitations

This report has been prepared consistently with the terms and conditions agreed to between PwC and the ESCV for the provision of services.

It has been prepared by PwC for the ESCV for the sole purpose of providing an indication of whether forecasts of demand for services prepared by the water businesses are reasonable. While PwC understands that the ESCV will make this report publicly available, it is not intended to be relied upon by any person other than the ESCV, nor is it to be used for any purpose other than that articulated above. Accordingly, PwC accepts no responsibility in any way whatsoever for the use of this report by any other persons or for any other purpose.

This report has been prepared using information provided to the ESCV and PwC by the businesses in their Water Plans and information templates. We have also relied on the information that we have received from the businesses in response to information requests that we have had.

Importantly, PwC has not undertaken any independent verification of the reliability, accuracy or completeness of this information. Therefore, it should not be construed that PwC has carried out any form of audit or other verification of the adequacy, completeness, mathematical accuracy, or reasonableness of the information provided by the businesses and upon which this report is based.

1.4 Structure of this report

The remainder of this report is structured as follows:

- Chapter 2 reviews the businesses' key assumptions that have been made
- Chapter 3 analyses the population growth and demographic changes that have been incorporated by the businesses
- Chapter 4 looks at the forecasts for the levels of water restrictions and their impacts on the demand forecasts
- Chapter 5 assesses the conservation measures and efforts that are in place across the community as a whole and the price elasticity of demand
- Appendix A provides a brief overview of the implementation of Target 140 in Queensland, which may have some parallels to the Target 155 program in Victoria
- Appendix B to E provides our assessment of each of the urban water businesses' demand forecasts.

2 Assessment of the key assumptions

In this chapter, we set out the framework that we have used to assess the key assumptions that most businesses have applied to develop their demand forecasts and provide our view on what the value of these assumptions might be over the next regulatory period. Our views on these assumptions are then used to assess each business's forecasts and the methodology and assumptions in developing their forecasts in Appendices B to E.

2.1 Key assumptions

In developing their demand forecasts for the 2008-2013 price review, each of the metropolitan water businesses has made assumptions in regard to:

- future growth in customer numbers
- the impact of non-price water conservation initiatives
- the likely impact of water consumption restrictions that will apply
- the effect of increased prices on water consumption
- the impact of 'bounce back'¹ on consumption.

While there is a degree of commonality between the businesses, each has assumed a different combination of these scenarios when developing their forecasts. For example, some businesses have factored in a price elasticity of demand while others have not.

In this section, we set out our approach to assessing the assumptions used by the metropolitan water businesses and set out some high level findings from our review. An analysis of each urban water business's assumptions is set out in Appendices B to E of this report.

2.2 Approach

To assess the assumptions used by the businesses, we have used the following principles as our starting point:

- 1 Consumer behaviour and water consumption patterns should not vary significantly between the businesses. The profile of

¹ The return of consumption levels after the easing of water restrictions to levels similar to pre-restriction consumption.

- consumption by a resident in Broadmeadows should not vary to any large degree from a consumer in Frankston.
- 2 Consumers will behave in a similar way when confronted with increased water prices. That is, price demand elasticity should be fairly consistent across businesses.
 - 3 Given the interconnectedness of Melbourne's water network, we would expect businesses to have similar restrictions programs.

Notwithstanding, we recognise that there may be local conditions, demographic patterns or other reasons (such as type and prevalence of domestic gardens) that may make it reasonable for a business to use different assumptions to develop its forecasts.

To test whether this is the case, we have engaged with each business to understand why its assumptions differ from the other businesses. We have also requested that the business concerned provide information or analysis that supports the assumptions it has used.

The other consideration that has framed our assessment has been the evidence available from third party or independent sources. Where possible, we have sought to identify independent third party views on:

- price demand elasticity impacts and the effectiveness of the various non-price water conservation measures proposed by the businesses
- future population trends and changes in demographics
- penetration of water conservation appliances.

Where available, we have tested the assumptions used by the businesses against the information and evidence available from these sources.

Again, we recognise that there may be reasons why the conditions being experienced by a particular business may warrant the use of an assumption that deviates from the views of these third party sources. We have engaged with the business concerned to understand why the assumption the business has used varies and to request further information or evidence be provided in support of that approach.

In late January PwC provided the ESCV with a draft report of its assessment. In this draft report, we had adjusted the businesses' forecasts where the information provided had not supported the assumptions, where better information had become available or where information had not been forthcoming from the business. In most cases, we adjusted the forecasts to bring them into line with the assumptions used by the other businesses and/or the evidence available from third party sources. In doing so, we gave consideration to local conditions and modified the final assumption used to develop a revised set of forecasts.

We stressed that the forecasts set out in that report were a draft view on the businesses forecasts and that there remained issues or questions on that we wished to resolve before providing our final view on the forecasts. Further communications with the businesses occurred prior to

the final report to ensure that we fully understood the businesses' forecasts and we had all the information we needed to formulate a final view on the businesses' demand forecasts. The majority of businesses provided responses to the draft report. These responses and further communications with businesses form the basis for any further amendments we have made to the forecast demands in this final report.

The businesses took the opportunity to materially revise their Water Plan forecasts. These revisions relate primarily to the updating of restrictions assumptions on the basis of an unanticipated fall in actual dam levels that has occurred post the Water Plan:

- CWW revised volumetric forecasts for water and sewage. CWW also revised connection numbers.
- SEW revised volumetric forecasts for water and sewage as well as connections for residential and non-residential customers.
- YVW revised volumetric forecasts for sewage and water.

Our analysis in this final report is based on the latest demand revisions submitted by the businesses.

2.3 Assessment

As noted above, the metropolitan water businesses have referred to three key assumptions underlying their demand forecasts — future connections growth based on population growth and demographic changes; the impact of non-price water conservation measures; and, the impact of restriction levels applying to water consumption and the effect of increased prices on water consumption.

All of the retail metropolitan businesses have based their forecasts on an 'end use model'. The model may be described as an industry based model that calculates total demand for water and sewerage volume based on end uses. That is, the model will generate estimates or forecasts of the water use associated with particular end uses (for example, appliances such as washing machines, dishwashers, and toilets).

The model then aggregates these water demands to derive a total water and sewerage demand. As part of this review we have spent considerable time developing an understanding of the end use model and reviewing its outcomes against alternative information sources. The resulting end use model demand forecasts have been adopted by the retail metropolitan businesses as the baseline forecasts and have been further amended to take into account water restrictions, and in some cases conservation strategies and price elasticity of demand.

The current end use models were originally developed on behalf of the Australian Commonwealth Scientific and Research Organization (CSIRO) and the metropolitan water businesses by the Institute for Sustainable Futures in 2005. This model has subsequently been updated and amended by each business to better suit its circumstances. Despite these variances there still remains a common model upon which the individual assumptions adopted by businesses can be assessed.

For this report we have undertaken a detailed review of the outcomes of this model, however this analysis does not constitute a detailed audit of the model itself. By testing the robustness of the underlying main assumptions of the model against independent third party source, we have focused the review on the outcomes of the model.

In undertaking our assessment we remain cognisant that the Victorian water sector appears at the centre of a confluence of events and uncertainties that make predicting water demand difficult. Much of the state is suffering severe drought conditions and it remains very uncertain whether these conditions will continue or whether normal rainfall patterns will return. Rainfall in the Melbourne area for the 2008 calendar year was 447mm, well below the annual average rainfall of around 650mm. Even if normal rainfall levels return, there are water conservation and demand management programs being implemented that may modify future demand patterns from those seen in the past. One of the largest uncertainties confronting this review has been how customer behaviour might respond to the lifting of water restrictions, and how fast this response will be.

Despite these uncertainties, we have had to formulate a view on the outlook for water supplies and the likely customer response to the lifting of restrictions and implementation of water conservation measures in order to assess the assumptions that the businesses have made.

In formulating this view, we have given consideration to the views and analysis provided by the businesses as well as the views and information of third party sources, such as the CSIRO and Bureau of Meteorology.

However, the uncertainties concerning the future have led us to err on the side of caution where we have been confronted with conflicting analysis and information. We believe that this approach is necessary to ensure that we do not recommend a set of forecasts that are overly optimistic and thus which could affect the future revenues that these businesses earn.

In the sections that follow, we set out our views on the likely trend in population and demographic changes, water inflows and resulting restriction levels and the effectiveness of water conservation measures. These views are used to assess the assumptions that have been used by the business when evaluating their forecasts. A business-by-business assessment is provided in appendices A to D of this report.

2.5 Conclusions

We have amended several of the water businesses demand forecasts. In most cases amendments relate to a recommended change in connection numbers have been amended to reflect the more recent Victoria in Future Report. Changes to residential connection numbers have a flow on effect on non-residential connections and volume forecasts. Other adjustments reflect a major revision in the assumed water use restriction levels. We have also made adjustments to consumption projections to reflect the implementation of the T155 program.

3 Population growth and demographic change

3.1 Residential water connections

Water Plans

The residential connections growth rates proposed by the retail water businesses in their Water Plans are outlined in table 3.1. To develop their forecasts, two of the businesses have relied on the Victorian Government's *Victoria in Future* report (ViF 2004). As the population groupings contained in the ViF report do not often translate directly to the water businesses' supply areas. Where this is the case, businesses have allocated shared areas between themselves.

South East Water (SEW) has further adjusted the forecasts to account for actual growth as reported in the most recent Census. SEW has adjusted populations for the years 2005-06 and 2007-08 and then applied the five year annual percentage growth rate for each local government area. City West Water (CWW) has adopted the ViF without any such amendments.

Alternatively Yarra Valley Water (YVW) has based its assumed connections growth on historical growth rates in actual connections over the preceding six year period (excluding a one off increment associated with the addition of a large number of Wallan customers).

We agree with the businesses' use of the ViF forecasts as the starting point for developing a set of residential customer number forecasts. In the Draft Report we noted that there has been an update of the ViF released subsequent to the Water Plan proposal. The 2004 ViF forecasts for households resulted in average per annum growth rates of 1.56%, 0.95% and 0.63% for CWW, SEW and YVW respectively. The newly released ViF forecasts provide for higher growth rates of 2.65%, 1.80% and 1.47% respectively.

According to the ViF forecasts, population will continue to increase in the future, with household sizes declining over the same period (mainly due to the ageing population). This combination means that the rate of growth for households is actually higher than the rate of population growth. It also states that overseas migration will be the greatest contributor to Victoria's future growth.

In our Draft Report we suggested that both CWW and SEW should amend their forecasts to reflect the new 2008 ViF forecasts. These forecasts are the most recent and it is reasonable to assume that they are more informed and therefore more likely to be accurate than those made in 2004.

Business response and final advice

In response to the Draft Report CWW did not amend its forecast connections while SEW did (see table 3.1).

Table 3.1 Proposed growth rates for water connections

Business	Water Plan		Draft Report		Response to Draft	
	Water Res	Water Non res	Water Res	Water Non res	Water Res	Water Non res
CWW	2.42	2.42	2.65	2.85	2.42	2.42
SEW	1.6	2.0	1.8	2.3	1.5	2.1
YVW	1.34	1.16	n.a	n.a	n.a	n.a

Note: growth rate is the annual compound growth rate for the period 2008-09 to 2012-13. n.a. not applicable. Draft Report refers to the suggested amendments made by PwC in its Draft Report.

CWW amended its volumetric forecast to reflect ViF 2008, however it did not amend its fixed charges for water or sewage. CWW responded that its Water Plan forecasts for connection numbers are based on 'offers' that have been given to land developers and other information the developers provide about market expectations. CWW stated that it ...

'is not inconsistent to have the two independent forecasts, as the population increase could largely be leading to increased numbers of occupants per household, rather than new household formations. This phenomenon would be expected in first home-buyer areas once they decide to start a family'
Correspondence CWW 11 March 2009.

PwC has taken the position that connection forecasts should be consistent with volumetric forecasts. There is an obvious dependency between the volume of water used and the number of connections. In general the higher the connections the greater the volume of water consumed. A major qualification to this relationship would be instances where household occupancy rates are increasing or decreasing at a rate different to that of connections. Where occupancy rates are increasing at a rate higher than new dwellings it would be reasonable to accept that volumetric consumption may be increasing faster than connections.

However, ViF08 is projecting a constant decline in occupancy rates over all CWW's local government areas for the time period under consideration. Contrary to CWW's response this trend would indicate that the growth in connections should exceed that in consumption.

We are also cognisant that CWW stated in its Water Plan that its forecasts were based on the ViF. To not amend them to reflect the latest ViF projections would represent a methodological change from the Water Plan, one which CWW has not fully justified. We note that the ViF08 projections incorporate more recent data than the Water Plans and should provide a better representation of actual outcomes than the projections developed for the ViF04. We also note that the connection

numbers based on ViF08 are more consistent with historical trends in connections than the Water Plan. For these reasons we are advising the Commission that PwC's amended connection projections should be adopted for the price review.

In response to our initial advice SEW has amended its projected customer connections. However, the amendment does not result in any material change to the forecasts. SEW's response is not consistent with the observable differences between ViF04 and ViF08 (as mentioned earlier). In its response SEW did not put forward any reason for its forecasts to differ from those derived from ViF08.

SEW noted that the ViF projections are amended to account for multiunit dwellings such as flats and units which do not attract service charges. Such an amendment should not affect the growth rate as projected by the ViF. SEW proposed that 30% of all new dwellings are multiunit for every year of the regulatory period. Given that the proportion of multiunit to detached dwellings is constant the growth rates for connections should not materially differentiate from those stated in the VIF for new households.

We have based our amendments for both CWW and SEW on ViF08 occupied dwellings series of projections. This series is the most appropriate given that the fixed service charges are levied on a per connection basis. We also note that basing our amendments on this series of data gave projections that were more consistent with historical trends for both CWW and SEW than were the forecasts proposed in the Water Plans.

3.2 Residential sewerage connections

Water Plans

The growth rates for water connections are broadly similar to the proposed growth rates for sewerage connections (see table 3.2). Expected growth rates for residential sewerage connections are generally marginally higher than water, reflecting either backlog programs or other established customers joining the sewage catchments.

As per water connections we advised the ESCV that connection numbers for CWW and SEW should be amended upwards consistent with the VIF 2008 in our Draft Report. In response to the Draft CWW did not amend its proposed residential sewage connections. As with residential water connections SEW has amended its forecasts, however these amendments do not fully reflect the extent of difference between the ViF04 and ViF08.

Table 3.2 Proposed growth rates for sewerage connections

Business	Water Plan		Draft Report		Response to Draft	
	Res	Non res	Res	Non res	Res	Non res
CWW	2.43	2.54	2.71	2.81	2.43	2.54
SEW	1.7	2.0	1.9	2.3	1.7	2.3
YVW	1.34	1.13	n.a.	n.a.	n.a.	n.a.

Note: growth rate is the annual compound growth rate for the period 2008-09 to 2012-13.
n.a. not applicable

Business response and final advice

As with water connections we have taken the position that neither CWW nor SEW in response to our initial advice have provided adequate information to show that the updated growth rates derived from the ViF08 are not applicable. Therefore we recommend that the residential sewerage connection forecasts be updated to reflect ViF08.

3.3 Non residential water and sewerage connections

Water Plans

Forecasting growth in non-residential connections is more difficult than residential growth. Non-residential customers are much less homogenous, both in the quantum of water use and the nature of that use and as such the variables driving growth are much harder to identify. For this reason growth rates for non-residential water and sewerage connections are generally derived from growth in residential connections.

However, businesses have used a variety of methods to derive non-residential connections from residential connections. SEW has taken the arithmetic mean of the ratio of non-residential over residential growth for the period 2001-02 to 2005-06 as the average non-residential growth rate. CWW has indicated that it also has used the historical mean of the non-residential to residential growth ratio.

Alternatively, YVW has used regression analysis to predict that there will be an additional 6.7 non-residential customers for every 100 residential customers. A comparison of the assumed growth rates is provided in table 3.3. We note that the YVW assumption is significantly lower than the other two metropolitan businesses.

Table 3.3 Proposed non-residential to residential ratios

Business	Non residential /residential
City West	11%
South East	12%
Yarra Valley	7%

Note: growth rate is the annual compound growth rate for the period 2008-09 to 2012-13.

These ratios are then used to derive estimates for non-residential connections over the period. For example, in the case of SEW, 12% of any new residential water connections in any given year will be equivalent to the forecast new non-residential connections in that year. The resulting growth rates are reported in table 3.4.

Table 3.4 Proposed growth rates for sewerage connections

Business	Water Plan		Draft Revision		Response to Draft	
	Water	Sew	Water	Sew	Water	Sew
CWW	2.42	2.54	2.85	2.81		
SEW	2.05	2.05	2.3	2.3	2.1	2.3
YVW	1.16	1.13	n.a	n.a.	n.a	n.a.

Note: growth rate is the annual compound growth rate for the period 2008-09 to 2012-13. n.a. not applicable

As with residential connections, it is reasonable to assume that new sewerage connections are correlated with water connections and this is true for most businesses. The one exception is YVW, where non-residential customer sewage connection growth is slightly less than water connections.

While we note the difficulties inherent in forecasting non-residential connections, comparisons with growth rates for the period 2005-06 to 2008-09 (most of which are actual data connections) indicates that in some cases the proposed demand schedules amount to a step change in growth. For example, the average compounding growth rate for the period 2005-06 to 2008-09 for CWW was 3.97% (water) and 4.17% (sewerage) which is significantly more than that proposed for the regulatory period. In some instances businesses are forecasting higher growth than the historical rates.

Given that non-residential connections are derived from residential connections, in our draft advice to the ESCV we recommended that connection numbers for CWW and SEW should be amended upwards consistent with the ViF 2008.

Business response and final advice

In response to the Draft CWW did not amend its proposed non-residential connections. SEW has responded to the draft by amending its projected connections such that they exceeded our amendments in the first two years of the regulatory period but fell below the suggested amendment in the final two years.

As with water connections we have taken the position that CWW has not provided adequate information to show that the updated growth rates derived from the ViF08 are not applicable. Therefore we recommend that the residential sewerage connection forecasts for CWW be updated to reflect ViF08.

While SEW has proposed non-residential connections that are broadly consistent with the suggested amendment, such connections are derived

from residential connections and given that we are recommending residential connections be amended to reflect ViF08 it then follows that non-residential connections should also be amended so as to remain consistent with the method proposed by SEW. To do otherwise would be to imply a different methodology other than that stated in the Water Plan had been applied to the derivation of non-residential connections.

Table 3.5 Recommendations

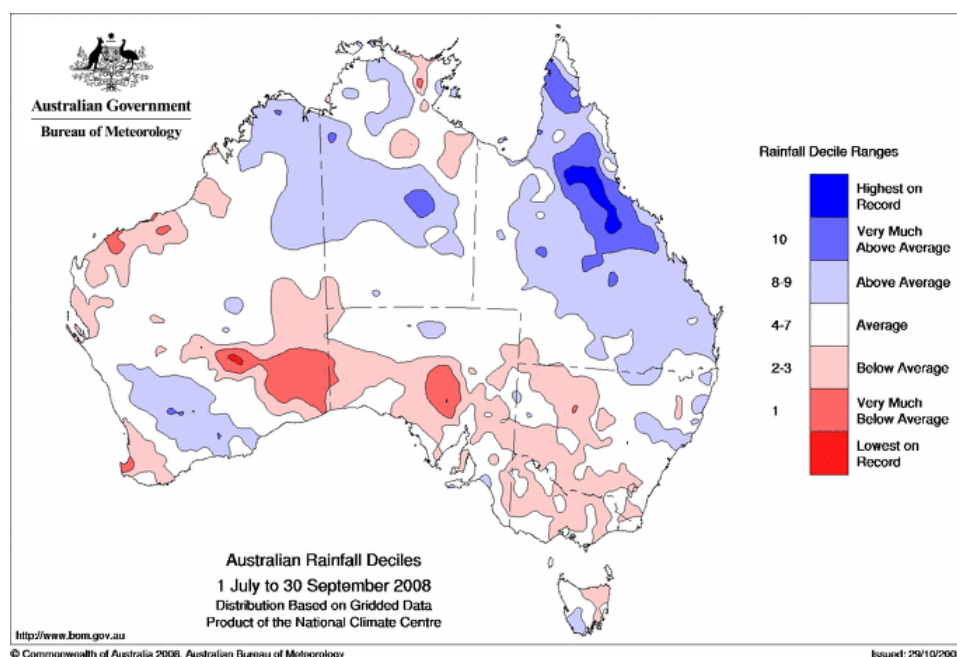
We have amended CWW's forecast connections for both water and sewage residential and non-residential customers to reflect ViF 08
We have amended SEW's forecast connections for both water and sewage residential and non-residential customers to reflect ViF 08
We have accepted YVWs method and proposal for customer connections

4 Restriction levels

One of the key factors that the businesses have considered when developing their demand forecasts has been their expectations about the availability of water over the next regulatory period. Most areas of Melbourne are currently experiencing some level of drought which has reduced the availability of water supplies and thus forced demand reductions upon customers. In some cases, dam levels are critical, severe restrictions apply and both businesses and government are investing in major projects to provide alternative sources of supply.

Figure 4.1 shows that recent rainfall levels have been below average for much of Victoria including the Melbourne metropolitan area.

Figure 4.1: Australian rainfall deciles: 1 July to 30 September 2008



A major determinate of the level of water consumption over the next regulatory period is the availability of water (water supply). The amount of water available for use will depend on whether there will be an easing of drought conditions and a return to more normal rainfall levels and/or the commissioning of major infrastructure projects such as the North South (Sugarloaf) pipeline and Melbourne's desalination plant. Increased water supply is expected to result in an increase in consumption, as water becomes more readily available and restrictions are eased.

Consistent with our framework, we have sourced information from third party sources where possible to develop a view on a likely scenario for water inflows over the next regulatory period. We have sought information from these sources on expected weather patterns and likely

rainfall levels and the impact of climate change on weather and rainfall levels.

At a high level, demand forecasts have been generated by first establishing baseline unrestricted demand using an end use model and then applying assumptions regarding restriction levels to that demand to produce the final restricted demand forecasts.

The major determinant of restriction levels is the availability of water. Where possible we have consulted with the ESCV's expenditure consultants to ascertain the likely timing of major augmentation projects.

There is a great deal of uncertainty over what rainfall levels will occur in the future and, in particular, how climate change will affect the pattern and quantity of rainfall. Due to this uncertainty, we believe more cautious assumptions on these matters are preferable to minimise the risk that we recommend demand forecasts that are overly optimistic.

4.1 Restriction levels

Water Plans

All of the businesses have developed their forecasts with reference to a common set of assumptions regarding future restriction levels. These assumptions are outlined in table 4.1.

The assumptions used in the Water Plan forecasts were prepared in June 2008 based on an 11 year average inflow (1997 to 2007). The expected levels of restriction were developed based on the Central Region Sustainable Water Strategy's (CRSWS) assumption of a long term average storage inflow reduction of 30% and water supply augmentations as outlined in the Our Water, Our Future – The Next Stage of the Government's Water Plan.

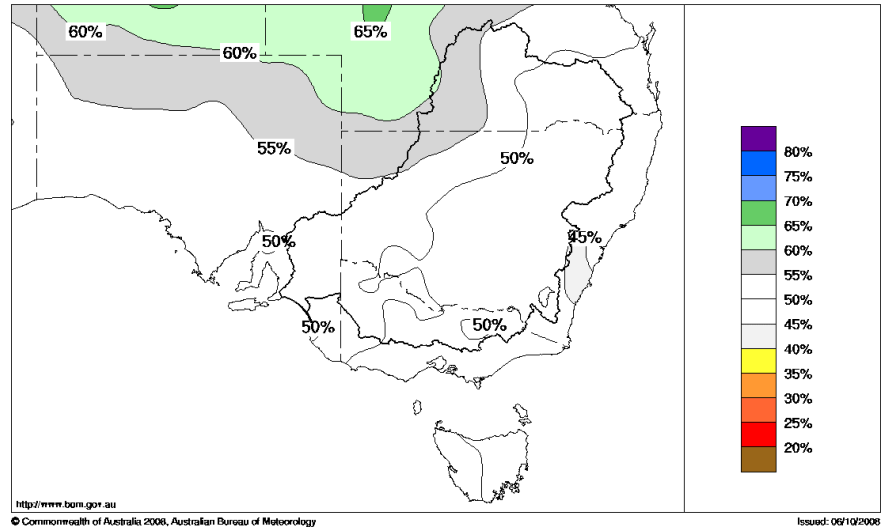
Table 4.1 Water Plan — proposed restrictions

Restriction levels	2008-09	2009-10	2010-11	2011-12	2012-13
Water Plan	3a	3a	2	1	PWS

Note: PWS is permanent water savings measures

We have attempted to source information on the most likely rainfall scenario over the next 5 to 10 years from the Bureau of Meteorology and other agencies. However, very little is publicly available on the likely rainfall scenario going forward. Available forecasts only extend out over the next twelve months, whereas we require forecasts for the next 6 to 7 years. The forecasts available at the time provided no adequate indication that the proposed restriction levels are inappropriate (see figure 4.2).

Figure 4.2: Chance of exceeding the median rainfall November 2008 to January 2009



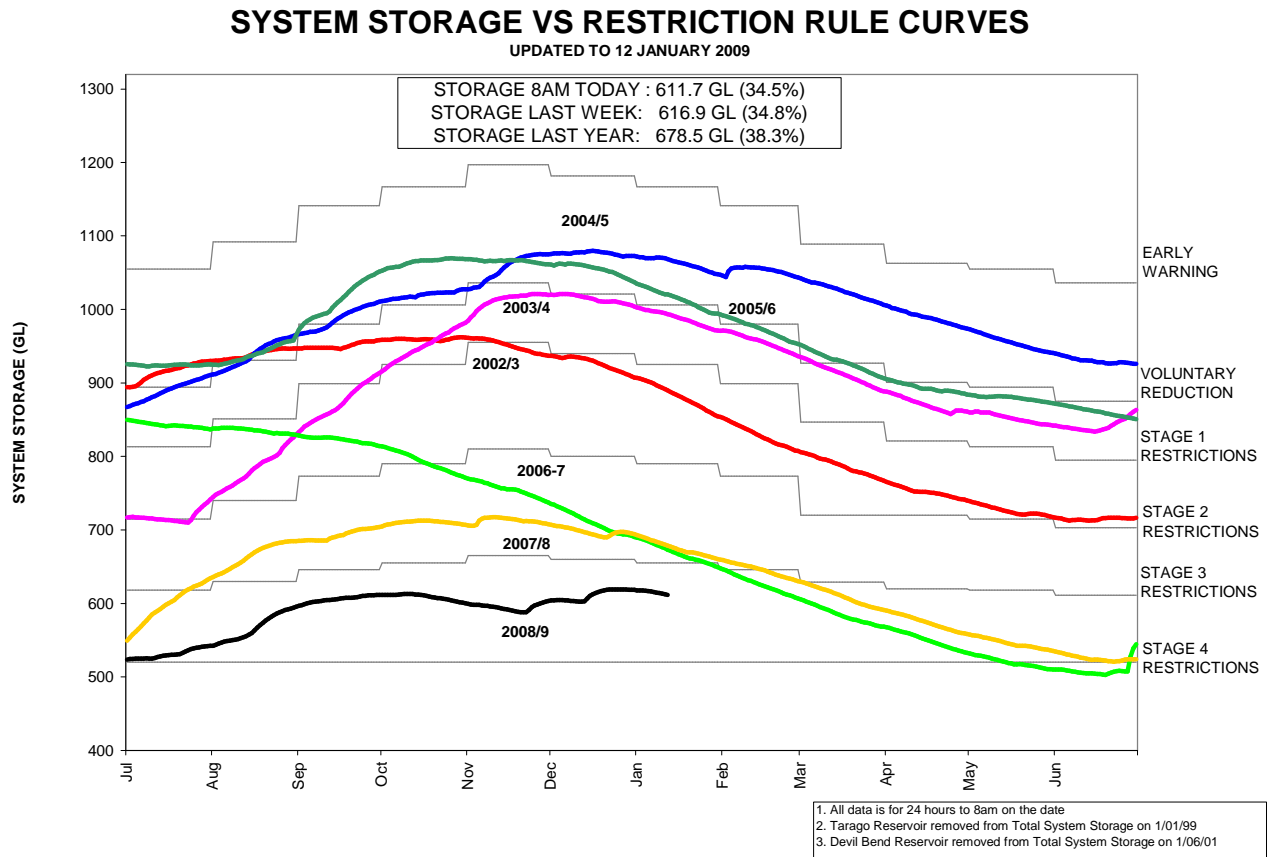
We have also sought to test the restriction assumptions by comparing the expected water demand and availability for 2008-09 against the actual data for the first quarter of the current year 2008-09. The resulting mixed responses do not provide a strong argument for amending restriction assumptions to account for overly conservative forecasts.

SEW indicated that a comparison of year to date bulk purchases show that 2008-09 first quarter is below that of the previous year and that consumption is expected to be marginally below that of 2007-08.

Information from Melbourne Water also supports the statement that consumption this year is marginally below that at the same time last year (see figure 4.3, the current year is the blue line situated at the bottom of the graph).

Given the uncertainty surrounding future inflows and the historical downward trend, we did not consider the underlying assumptions regarding restriction levels to be overly conservative.

Figure 4.3 Water volumes and restrictions — yearly comparisons



Source: Melbourne Water 2009

Business response and final advice

Subsequent to our initial advice all water businesses have reassessed their assumptions regarding the level of water restrictions. As noted by the businesses the forecasts for the 2009 Water Plans were prepared in June 2008 and were based on an 11 year average (1997 to 2007) for water supply. These projections did not account for:

- recent inflows and climatic conditions (such as low winter inflows in 2008)
- the introduction of T155 voluntary restrictions
- refined modelling of environmental flows
- updated population forecasts.

Subsequently in January and February Melbourne Water along with the three metropolitan retailers reviewed and revised the assumed restriction levels for the upcoming regulatory period (see table 4.2).

While the revised restriction levels reference both increased system yields resulting from major augmentations and environmental flow releases and qualifications, they primarily result from the unanticipated

low rainfall levels currently being experienced and the resulting low system storage.

Table 4.2 Proposed restrictions

Restriction levels	2008-09	2009-10	2010-11	2011-12	2012-13
Water Plan	3a	3a	2	1	PWS
Response to Draft Report	3a (T155)	3a (T155)	2	2	1

Note: PWS is permanent water savings measures

Given the uncertainty surrounding future inflows and the year to date performance of inflows and the implementation of T155 we consider the amended assumptions regarding restriction levels to be reasonable.

4.2 Restrictions (1 to 3a) and water consumption

While businesses have adopted a common set of assumptions regarding the level of restrictions, they have varied in the method they have adopted to determine the impact that restriction levels will have on consumption.

Restriction levels are expressed in a Drought Response Plan (DRP) developed for each business. These plans not only outline the restrictions, but they also forecast for each stage of restrictions the reduction in consumption that will result. These forecast reductions are uniform across businesses' DRP. However the manner in which these assumptions have been adopted for the forecasts varies across the businesses (see table 4.3).

Table 4.3 Demand reductions

Stage	1	2	3	3a	4
CWW (res)	0.0%	3.5%	8.7%	NR	15.2%
(non-res)	0.0%	2.9%	7.3%		12.8%
SEW (DRP)	2.5%	8.0%	NR	15.0%	17.5%
YVW (DRP)	2.5%	8.0%	12.0%	NR	17.5%

Note: NR is not reported

CWW has apportioned demand reductions between residential and non residential and have then discounted savings to account for conservation behaviour as expressed in the end use model.

SEW has applied the forecast reductions without amendment directly from the DRP to the forecast unrestricted total demand. SEW has then allocated approximately 37% of the volume reduction to non-residential customers with the remainder being allocated to residential customers.

YVW has adopted the same set of assumptions; it has estimated the drop in consumption by determining an equivalent reduction in its end

use model category for 'Residential Lawn and Garden'. YVW have applied restriction assumptions to non-residential customers, however these are not as material as for residential customers and the bulk of water savings delivered by non-residential customers is attributed to the waterMAP program.

Businesses have also had to apportion the incidents of water saving from restrictions across the blocks in their residential tiered tariff. SEW allocated the bulk of savings across block 2 and 3.

YVW has allocated the bulk of the savings to block 3. YVW has stated that its allocation is equivalent to a price elasticity of 0 for Block 1, -0.11 for Block 2 and -0.21 for Block 3. YVW has assumed all saving related to outdoor use and then applying these savings to the garden and lawn category of the end use model.

CWW has undertaken multivariate regression analysis. It regressed demand on seasonal base demand, gross state product, Our Water Our Future (conservation savings) and temperature. The results of the regression indicate that there are savings across all three blocks with the largest saving being achieved in the second block.

It is reasonable to expect the majority of savings from restrictions to fall on either the second or third block. The intention of the second and third blocks is to (on average) capture more discretionary use. It follows that discretionary use such as that targeted specifically by restrictions (level 1 thorough to 3a) should constitute the bulk of water savings (note that this does not refer to savings generated from the T155 program).

4.3 Restrictions (1 to 3a) and sewage discharge

Water Plan

SEW has made a number of assumptions regarding how restrictions impact on sewage discharge, these assumptions relate not only to a reduction in outdoor discharge (due to restrictions) but also references behaviour change within homes. SEW has made the following assumptions in relation to actual flows (as opposed to forecasted billable volumes which are derived from water consumption).

Table 4.5 Restriction volumes that do not flow to sewer (%)

Stage	1	2	3	3a	4
SEW	0.00	31.5%	N.R	100.00%	100.00%

Note: N.R not reported

That is for level 2 restrictions the volume of water saved that does not get returned to a sewer is 32%, this proportion increases to 100% during periods of 3a restrictions.

CWW has used the end use model for estimating the growth rate for sewerage flows in the Water Plan 2008-13. By linking the end use model and the domestic sewage flow forecast model the reduction of indoor

water use through shower head exchange programs, washing machines and behavioural change are reflected in the sewerage model. CWW has assumed that restrictions are exclusively focused on external use and therefore have no material impact on sewerage volumes which are generated primarily from internal use. Subsequently CWW has not amended sewerage volumes to account for restrictions.

Table 4.6 shows the ratio of residential sewage to residential water volumes over time as proposed in the Water Plans. One of the general expectations in regard to residential sewage flows is that we would expect the proportion of water returned to the system as sewage to increase with restrictions. Restrictions primarily relate to outdoor water use of which only a small amount is returned as sewage. Therefore as these uses are restricted it is reasonable to expect the proportion of water returned as sewage to increase. Such a trend is clearly evident in table 4.6 for YVW. YVW have increased the proportion of sewage to water significantly in 2009-10.

Table 4.6 shows that both CWW and SEW and forecasting sewage to residential water ratios that decline or level out over the period.

Table 4.6 Residential sewage to water %— Water Plan

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12	2012-13
CWW	61.4	62.7%	62.4%	63.5%	63.5%	63.5%	63.5%	63.5%
SEW	67.3%	68.3%	69.0%	68.6%	68.4%	67.4%	66.7%	66.6%
YVW	63.5%	67.5%	66.9%	66.9%	77.4%	74.3%	71.5%	69.1%
Restrictions	1	2, 3	3a	3a	3a	2	1	PWS

Business response and final advice

In response to our initial advice SEW indicated that its formula for determining billable volumes automatically increases the volume of sewage during restrictions. The billed sewage disposal charge volumes are calculated based on discharge factors that incrementally decrease the higher a customer's level of consumption. During times of restrictions there is a rebalancing of customers away from high users towards low users and subsequently the number of customers facing higher discharge factors automatically increases. The revised sewage disposal charge volumes (see table 4.7) support SEW's response.

SEW stated that it expects these ratios to trend back to the longrun average over time as restrictions are lifted. CWW provided no response to this issue.

Table 4.7 Residential sewage to water %— SEW revised

	2008-09	2009-10	2010-11	2011-12	2012-13
Water Plan	68.6%	68.4%	67.4%	66.7%	66.6%
Revised	69.7%	69.6%	68.4%	67.7%	67.2%
Restrictions	3a	3a	2	2	1

We agree with YVW in that it is likely that there has been a step increase in the proportion of water consumption collected as sewage. This position is logical given the degree to which businesses have stated there have been permanent water savings achieved in external water use. Where there have been widespread adoptions of native gardening, drought resistant turf and the implementation of third pipe recycled water schemes, the proportion of water consumed which is returned to the system for treatment as sewerage must increase.

To the extent that the volumes billed for the Sewerage Disposal Charge are intended to reflect actual volumes of sewage the discharge factors should be increased.

However, determining what constitutes an appropriate volume is problematic. It would require survey and statistical analysis that falls outside of the scope of this current project. One place in which to start would be for the Sewerage Disposal Charge (SDC) formula to reference the expected impacts of restrictions on actual flows (see table 4.5).

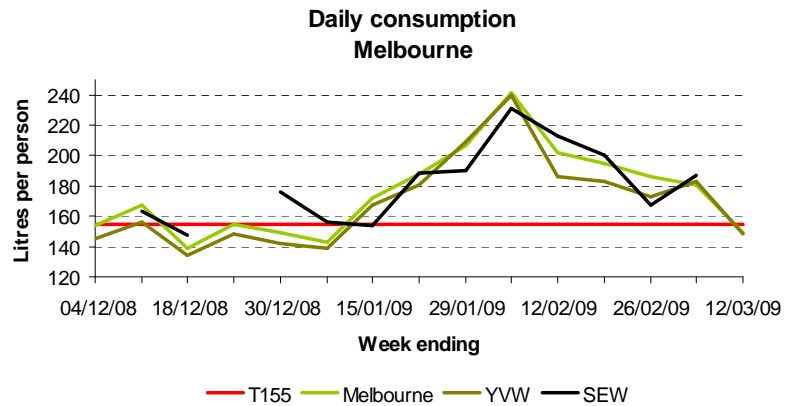
For the purposes of this report we have not amended CWW or SEW's sewerage disposal charge volumes for residential customers on the basis that we are not in a position to recommend alternative forecasts. However, we believe these volumes may be overly conservative and recommend that the Commission review the calculation of SDCs either prior to its final decision or before the next price review.

4.4 Restrictions — T155

In December 2008 the Victorian State Government launched the Target 155 campaign (T155). T155 is a voluntary restrictions program aimed at getting residential water users to reduce their consumption to no more than 155 litres per person per day.

Unlike previous mandatory restriction programs (ie levels 1 to 3a), T155 provides users with the flexibility to choose the manner in which they achieve the desired water savings. As part of the program advice is available to water users on how to achieve T155 by changing both indoor and outdoor water use behaviours.

Melbournian's water use is monitored and reported weekly on a litre per person per day basis. Since its inception the T155 program has had mixed results (see figure 4.4). It would appear that the initial positive response from consumers has been followed by a period when consumption clearly exceeded the target.

Figure 4.4 Daily consumption — litres per person per day

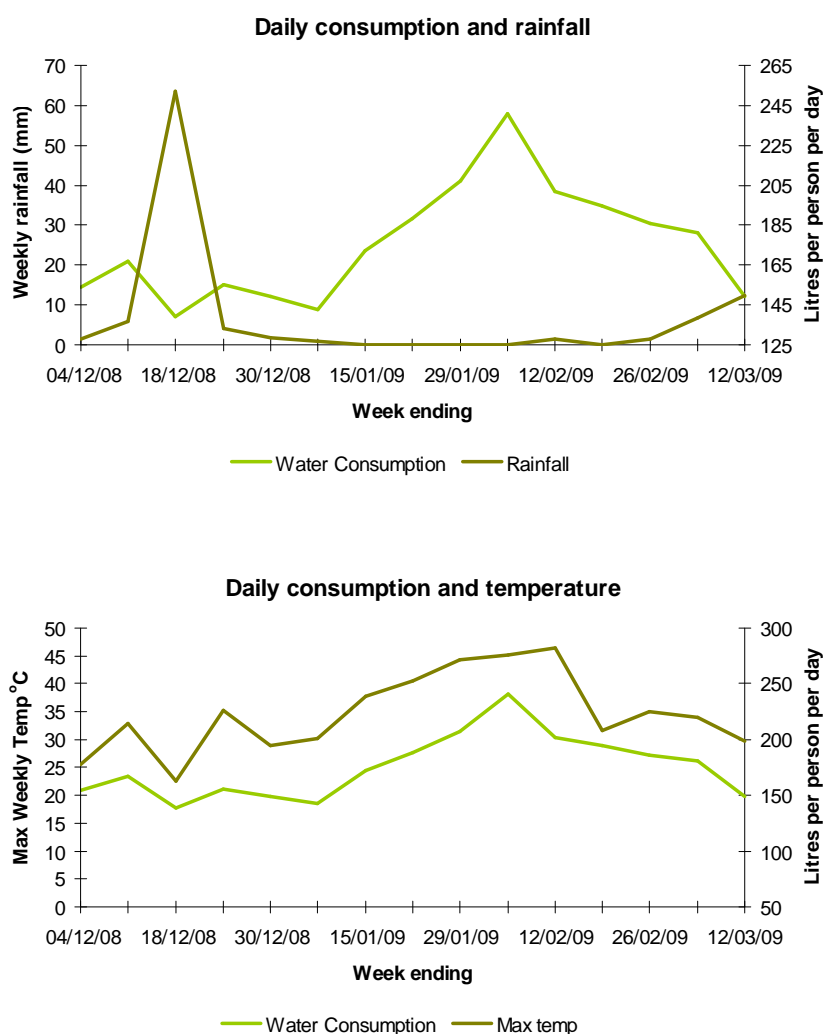
Note: The graph is indicative only, data provided for SEW is measured on a Saturday to Friday basis while data for YVW and Melbourne are measured on a Friday to Thursday week. CWW did not provide daily consumption numbers.

In December 2008 the average litre per person per day recorded for Melbourne is 175L. While aggregate statistics are readily available from DSE obtaining business specific data is more problematic. Of those businesses that were able to provide weekly data for litres per person per day YVW averaged 169L to date while SEW has averaged 181.1L, CWW did not provide business specific numbers.

We note also that there may be a relationship between levels of rainfall, temperature and daily consumption. Such a relationship for rainfall is logical in the sense that increased rain may substitute for potable water for outdoor use such as watering turf or gardens. As is inferred by figure 4.5 rainfall and daily consumption may be negatively correlated. In periods of increased rainfall daily consumption is low and in periods of low or no rainfall daily consumption increases. Temperature and daily consumption may be positively correlated (the higher the temperature the higher the daily consumption).

While the strength of such relationships needs to be tested statistically, at least recognising that there is some correlation between the daily water consumption and rainfall and temperature supports a conservative approach to anticipating the success of T155 in a period of anticipated low rainfall levels.

A similar program was introduced in south east Queensland in March 2007 — Target 140 (see appendix A for a detailed discussion). This program has largely been perceived as successful. Consumption in Queensland dropped from 180 litres per person per day to the targeted 140 litres within four months of program inception. In July 2008 the Queensland Water Commission amended its target to Target 170, the Queensland Water Commission is also anticipating amending the target in July 2009 to Target 200.

Figure 4.5 Daily consumption, rainfall and temperature

Source: BoM (2009) Daily Weather Observations: Melbourne, Our Water Our Future (2009) Target 155, Melbourne's Daily Water Consumption

In terms of comparing the Target 140 Program and the situation in Queensland to the circumstances surrounding water use and management in Victoria, it is necessary to consider both the way the initiative was implemented and the underlying forces at work. One of the primary differences between the T155 and T140 programs is that, unlike the Victorian program, participation in Queensland's T140 was not voluntary and was accompanied by both positive incentives for achieving target and penalties for excessive use.

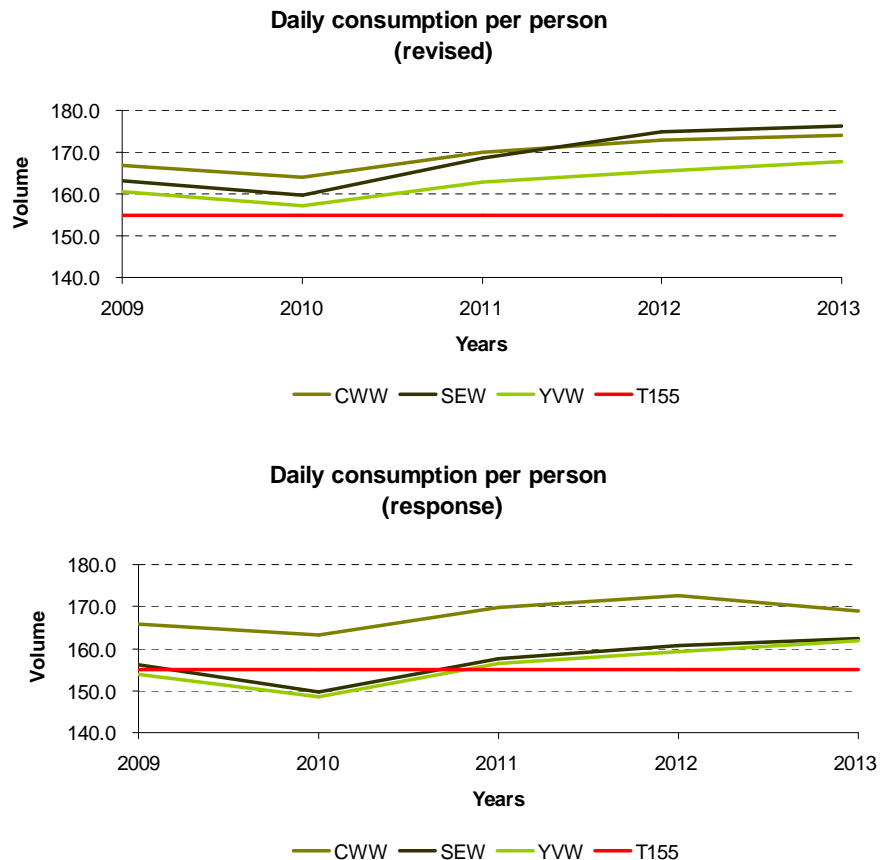
Much of the success surrounding the controlled decrease in water use in south east Queensland can be attributed to the fact that there was a genuine sense of trepidation at an individual, business and broader community level that south east Queensland was going to run out of water. This underlying factor helped to galvanise community acceptance and adoption of the Target 140 Program.

T155 and forecasted consumption

The water businesses have reflected T155 in consumption forecasts in a number of ways. CWW has submitted amended volumes that do not show any material impact from T155 on a per person per day basis. Alternatively both SEW and YVW have submitted responses that result in average daily consumption that exhibits a marked impact from T155 (see figure 4.6).

On the basis of the population forecasts in ViF08 and the volumetric projections provided by the businesses, both SEW and YVW are forecasting T155 to have both a material impact. They are predicting that the program will result in consumption levels lower than those targeted (on an average annual basis) during 2008-09 and 2009-10. They are also both proposing that there will be some form of residual water saving associated with T155 that will impact on subsequent years.

Figure 4.6 Daily consumption — Water Plan restrictions and response restrictions



Note. The first graph represents the Water Plan consumption as amended to reflect ViF08 and is converted to litres per person per day based on ViF08 population numbers. The second graph represents the final proposals put forward by the businesses and references T155.

SEW has indicated that it has based its anticipated savings from T155 on those associated with level 4 restrictions. Alternatively YVW has adopted a number of assumptions in its end use model, associated with the role out of more efficient shower heads and an anticipated decrease in shower times. Despite the businesses adopting different approaches they have both ended up with proposed per litre per day consumption profiles that are broadly similar.

We have a number of concerns regarding the proposed impact of T155, including:

- the mixed results to date
- CWW's apparent position that T155 will not impact materially on forecasts
- a possible correlation with rainfall levels and temperature and the anticipated lack of rainfall during the period under consideration
- bounce back from T155 may be stronger given that there is a far greater emphasis on internal water use and the scope to introduce permanent behaviour change with relatively inelastic indoor use would be considered to be more limited
- there are a number of important differences between the Queensland program T140 and Victoria's T155. The most significant of which is that Victoria's program is voluntary and is not accompanied by the positive and negative incentive schemes applied in Queensland.

Given our concerns we are recommending that the Commission take a precautionary approach to T155. Accordingly we have amended the businesses proposals such that they do not fall below an annual average of 155 litres per person per day. We have also amended the forecasts such that T155 does not impose any residual impacts on consumer behaviour in the years 2010-11 to 2012-13. This recommendation is supported by statements made by YVW that it expects that:

with the lifting of restrictions during 2010-11, behaviours will revert to pre campaign behaviours. YVW (2009) Formal response to draft audit report.

We note that this issue may need to be pursued further by the Commission after the release of its Draft Decision.

T155 has also had a material impact on some businesses non-residential water consumption projections. In particular, SEW materially revised its forecasts for non-residential water customers to account for the imposition of T155. While we have not capped the impact of T155 for the years in which it was applied, consistent with residential customers, we have removed the residual impact of the voluntary restrictions in the latter years of the regulatory period.

Table 4.7 Recommendations

The assumed revised restriction levels are not overly conservative
Businesses have rightly assumed a common set of restriction assumptions.
The manner in which restrictions (levels 1 to 3a) have been translated into actual water savings is acceptable
Recommend limiting assumed savings from T155 to an annual average of 155 litres per person per day
Recommend the forecasts be amended such that T155 does not impose any residual impacts on consumer behaviour in the years 2010-11 to 2012-13.

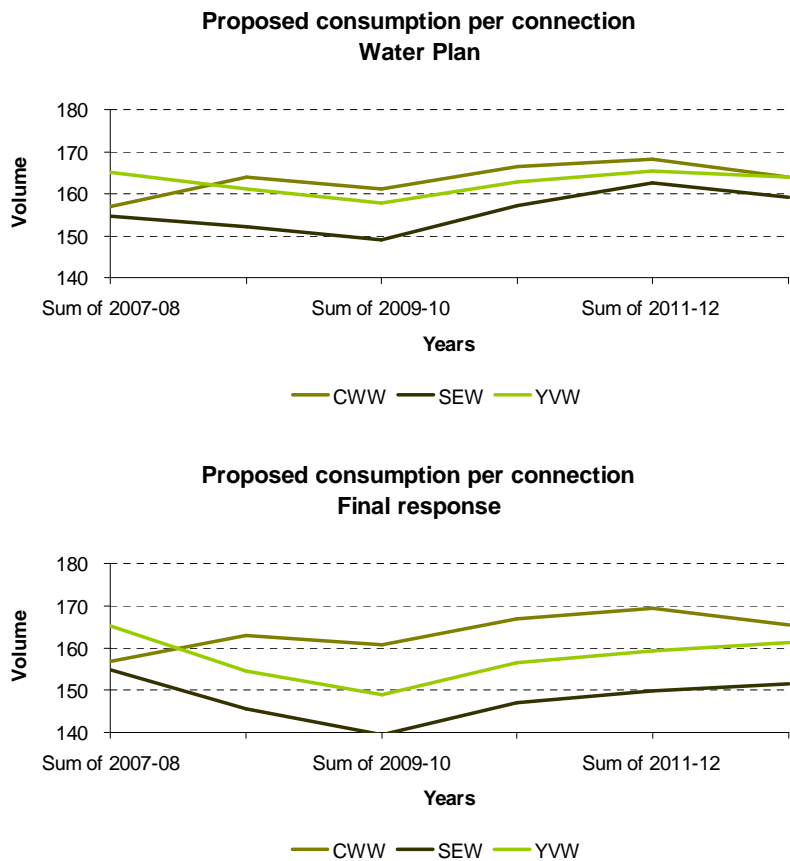
5 Conservation

5.1 Bounce back

Given predicted inflows and the expected commissioning of major augmentations such as Tarago in July 2009, Sugar Loaf Pipeline in 2010 and the desalination plant in 2012, restrictions are expected to ease towards the end of the forthcoming regulatory period (see table 4.1). It is reasonable to expect that as restrictions are eased consumption will return (if not fully then partially) to levels similar to pre-restriction consumption. This return to pre-restriction consumption levels is generally referred to as 'bounce back'.

How quickly customers return to consumption patterns and levels that were prevalent prior to restrictions coming into effect will influence the rate of growth in water demand over the period. The degree of bounce back assumed by each business for residential connections is illustrated in figure 5.1.

Figure 5.1 Average residential consumption per connection



In the recent Urban Water Price Review 2008 we assessed the bounce back in consumption following the easing of restrictions on a case-by-case basis, using a return of between 70% and 90% of pre-restriction levels over a two year period as a benchmark. In that assessment, we also gave consideration to the reasons given for the pattern each business has assumed.

As can be seen from figure 5.1, all metropolitan businesses have forecast consumption consistent with the benchmark adopted by PwC in the Urban Water Price Review 2008. We note that the degree of bounce back will differ from that reported in the graph once the ongoing effects of T155 have been removed.

However while the quantum of bounce back may satisfy the benchmark there are a couple of issues that need further examination. In particular, it is not clear why consumption per connection continues to decline over the period 2008-09 to 2009-10 despite no change in restriction levels (not shown in the figure).

Subsequent to the water receipt of the plans, the retail businesses were asked to provide more information in relation to bounce back and conservation issues. In particular they were asked to identify and quantify the primary drivers behind such behaviour.

In response the businesses identified the primary driver for this behaviour as ongoing savings achieved through conservation programs and the continued penetration of water efficient appliances

5.2 Non-priced based water conservation

Underlying the businesses proposals is an assumption that many of the water conservation measures introduced in recent years, such as water efficient appliances, as well as greater public appreciation of water and the impact of restrictions on their consumption behaviour will lead to permanent declines in water consumption. Thus, even with increased water inflows from augmentations and the removal of restrictions, these businesses believe that future baseline water consumption will be lower than the baseline level that has occurred in the past.

Further, the businesses propose implementing non-price water conservation measures over the next regulatory period. The measures include water efficient appliance programs, indoor retrofitting and business efficiency programs.

Unlike assumptions regarding restrictions, the assumptions about conservation are fed into the end use models and are reflected in the baseline forecasts produced by the end use models. For example, a business may assume that the penetration of more efficient washing machines in the new home market will result in 1% water savings per annum over the period.

The end use models are structured along six specific use categories. Use in each category is determined by the mix of relevant appliances (down to the brand and model level) and assumed usage patterns. Efficiency gains are expected over the period as a result of mandatory

minimum standards being applied to toilets, observable increases in the market share of four star efficient and front loading clothes washers, AAA shower head programs, rain water tanks and lower incidences of lawn.

The type and extent of specific appliances is determined by stock surveys undertaken by each business. In some cases such as YVW these surveys have been tested using sample studies. The following table outlines the assumed efficiencies for each category and the relevant major appliance class.

Table 5.1 Assumed efficiency gains – major end uses

Business	CWW	SEW	YVW
Clothes washers	1.99%	1.45%	2.72%
Dishwashers	-0.67%	-0.64%	0.99%
Toilets	0.80%	4.04%	2.28%
Shower	4.75%	4.73%	2.91%
Indoor Miscellaneous	0.57%	-0.17%	-0.05%
Outdoor – total	0.40%	0.37%	N/A
Lawn and garden		0.40%	
Car washing		-0.25%	

Note: efficiency gains are expressed as an average annual rate which is the annual compound savings rate for the period 2008-09 to 2012-13.

Table 5.1 provides the average annual assumed efficiency gains being proposed by businesses. Overall, most of the assumed efficiencies appear to be modest. The exceptions are efficiency gains in the shower category for all businesses and in the toilet category for SEW. Businesses were asked to respond to the draft report by providing further information regarding efficiency savings in these categories.

Table 5.2 outlines the assumptions that the businesses made regarding each category. In addition to these assumptions we have also reported the outcomes of a recent survey undertaken by the Department of Human Services (DHS). The DHS study provides a comparison with third-party information. These outcomes do not provide forecasts, but are used to “sense-check” the assumptions that the businesses have used.

Table 5.2 Underlying assumptions

Category/Business	Assumptions
Clothes washers	
CWW	The frequency of use was based on a survey done by YVW in 2004, whereby frequency equals - 1.193 +1.226 (average number of people per household) This is different for multi-unit and detached dwellings. Any new lots are assumed to have front-loading machines.
SEW	Assumed 2004-05 market share of 70% for top loaders and 30% for front loaders. Assumed that front-loaders market share will increase by 2%per year.
YVW	Assuming the stock of 4-star front-loading washing machines increasing from 10% in 2007-08 to 34% by 2012-13. Assumed that by 2012-13 an average of 4.9 loads per week (above the 2007-08 level of 4.6, but below the 2005-06 level of 5.3). This will result in an average decrease of 2.7% per year for total consumption.
DHS	The proportion of front-loading washing machines increased from 10% in 2001 to 20% in 2007.
Dishwashers	
CWW	Assumed virtually no change in the rate of water used for dishwashers, consistent with the first few years after 2000. The frequency of use is 4.4 times per week per household (or 0.63 per day).
SEW	Frequency of use is assumed to be 0.62 per household per day.
Toilets	
CWW	Average household found to have 1.5 toilets, of which 80% own a dual flush toilet. The average frequency of use was 3.8 times per day
SEW	Use was calculated on per capita per day basis, with an average of 3.5 times per day. Frequency of flushing per household in two (or more) toilet households is assumed to be 20% higher than for one toilet households. Average household had 1.5 toilets, of which 80% own a dual flush toilet
YVW	Continued replacement of single-flush toilets with dual-flush toilets assumed at the historical rate of change-over. This is expected to result in an average decrease of 1% per year for total consumption
DHS	The mean number of toilets per household remained at 1.6 for 2007. The proportion of households with dual flush toilets has risen to 85%.

Continued next page

Table 5.2 Underlying assumptions — continued

Showers	
CWW	Number of showerheads for detached dwellings ranged from 1.43 – 1.73, and 1.03-1.25 for multi-unit dwellings. Each member of a household showers an average of 6.2 times a week.
SEW	Calculate the AAA rated showerhead penetration based on the Melbourne Water Supply Demand Strategy outcome that the penetration must be 50% of existing homes by 2020.
YVW	New home regulations and retrofit programs will result in AAA-rated showers increasing from just under 20% in 2006-07 to 56% in 2012-13. This will reduce shower demand by an average of 2.8% per year for total consumption
DHS	Average number of showers for all households was 1.4 for 2007, with 44% of all households having at least one shower with water saving capabilities
Indoor Miscellaneous	
CWW	Bath use is assumed to be 0.44 times per week with 123L per use. The assumed use for hand basins was 3.8 per person per day, with an average length of time of 0.35 minutes. The assumed use for kitchen sink was 8.5 times per household, with an average time of 0.6 minutes. Laundry consumption was assumed to be 30L per household per week.
SEW	Bath use is assumed to be 0.44 times per week with 123L per use. The assumed use for hand basins was 3.8 per person per day, with an average length of time of 0.35 minutes. The assumed use for kitchen sink was 8.5 times per household, with an average time of 0.6 minutes. Laundry consumption was assumed to be 30L per household per week.
DHS	The penetration of baths among total households has decreased from 86% in 2001 to 82% in 2007.
Outdoor – total	
CWW	States adjustments for inclining block tariffs and restrictions are made outside the EUM.
SEW	From 2005-06, a reduction of 10-18% for the impact of inclining block tariffs, and 8% for the impact of permanent water saving measures. The total impact is estimated to be 8% of total residential external use. From 2005-06 onwards, adjustments built in to take account of reducing block sizes for detached houses. This adjustment applies to the new separate homes built each year. Expected to be reduction of 20% over 50 year period – reducing block size from 600 to 480 square metres.
YVW	Due to proposed price increases, assumed a 15% drop in demand for outdoor use by 2012-13.
DHS	28% of households in Melbourne stated that they no longer watered their garden at all. 18% of households stated that the water restrictions had no decreased their watering. The number of households with water tanks in Melbourne has increased from 3% in 2001, to 14% in 2007, with the average capacity for a tank in Melbourne of 4,899L.

Source: Business Water Plans, Department of Human Services' Victorian Utility Consumption Household Survey 2007

In our Draft Report we noted that some forecasts had adopted CRSWS targets as assumptions for efficiency. In particular, SEW and CWW has used this approach to determine efficiency gains in shower head programs. As a general rule targets should not be used to forecast the actual efficiency gains that may be achieved.

We suggested that in response to the Draft Report the businesses should resubmit these forecasts. Forecasts should ideally reference historical trends and any anticipated changes or events expected to occur over the forecast period. Basing forecasts on the achievement of targets may limit businesses from forecasting demand where it outperforms the target or alternatively does not allow for situations where the targets are not achieved.

In response to the Draft Report SEW stated that its assumed toilet savings were based on Western Australia, Metropolitan Water Authority 2004 end use measurement study and that it had assumed a relatively rapid uptake of the most efficient toilet type.

In addition SEW stated that its forecast savings in relation to showerheads are based on an assumed 50,000 new shower head exchanges for each year of the regulatory period.

Table 5.3 Showerhead exchange program.

Business	2006-07	2007-08	Year to date
CWW	n.r.	33,800	22,800
SEW	27,000	56,000	n.r.

Note: n.r. not reported

While we suspect that assumed savings associated with both showers and toilets may be overly optimistic we have not amended the forecasts as we could find no third party information on which to base more appropriate estimates. In the absence of conducting our own surveys across the greater Melbourne area we recommend that the Commission pursue this matter further after its Draft Decision.

The businesses have also made a number of assumptions regarding non-price conservation associated with non-residential customers. For example, YVW has forecast strong savings from the waterMAP program. YVW's top 45 commercial users are forecast to reduce consumption by 21% over the regulatory period (the bulk of which is attributable to a recycling initiative being undertaken with a large commercial customer and the closure of another commercial customer). For customers who use more than 10ML, YVW is forecasting a 16% reduction. Councils are assumed to reduce consumption by an average of 3% per annum (the bulk of which occurs during high level restrictions).

SEW generated volume estimates for its non-residential customers by determining the average for each individual property over the last five years. SEW has forecast a saving due to the introduction of the waterMAP and investment in more efficient processes and recycling. The decline in total non-residential consumption is forecast at

approximately 5% per annum. This number, while higher than residential customers, is below that of the historical trend.

CWW has forecast non-residential consumption to decline by 2.5% per annum. As with SEW, this number is lower than the historical decline trend. These declines are not distributed equally across customer classes and larger savings are attributed to larger customers. This is consistent with the type of savings pattern you would expect to see associated with waterMAP.

In relation to non-residential sewerage CWW has proposed sharp declines in volume from 2008-09 on wards. One of the primary drivers behind this decline is an assumption that the volume of non-residential water returned to sewer decreases to 34%. When queried about the decrease CWW responded that the 34% was based on the average of the preceding 7 years.

While 34% is consistent with the average of the previous 7 years its worth noting that these years exhibit a strong growth trend (see table 5.4), subsequently it would be inappropriate to forecast based on the long term average. In light of the observable growth trend we have taken the position that the short term average is more appropriate, and have adjusted CWW's non-residential sewerage volumes to reflect the average of the last three years at 0.37%.

Table 5.4 CWW, non-residential sewage/water, historical trend (%)

2001-02	2002-03	2003-04	2004-05	2005-06	2006-07	2007-08
0.32	0.32	0.33	0.35	0.36	0.37	0.38
average						0.35

5.3 Price based water conservation (price elasticity)

Residential water customers

In their Water Plans both CWW and SEW further amended the baseline consumption forecasts by discounting demand to take into account the impact of changing prices on residential demand through assumptions about the price elasticity of demand (see table 5.4).

Both businesses had adopted the same elasticity assumptions. The assumptions are derived from industry research Pricing for Demand Management (WSAA 2004). These same estimates were adopted during the Urban Water Price Review 2008 by PwC in accessing regional businesses demand forecasts. As with the previous review these estimates are currently the most appropriate available.

The manner in which these elasticity assumptions have been applied to the baseline demand forecasts varies between businesses. SEW applied elasticity by imposing a rule, for each year of the regulatory period savings from elasticity effects were compared to savings from restrictions. Where the effect of restrictions exceeded that of price

elasticity, no elasticity was applied. Where the effect of restrictions was less than that of elasticity, demand was amended to reflect price elasticity of demand. CWW has only applied elasticity towards the end of the regulatory period when restrictions are predicted to be lifted during 2012-13.

Table 5.5: Proposed water price elasticity of demand (%)

Business	Residential Tier 1	Residential Tier 2	Residential Tier 3	Non residential
City West	0.0	0.1	0.14	0.185
South East	0.0	0.1	0.15	0.185

Unlike CWW and SEW, YVW has not amended baseline demand to account for price elasticity of demand for either residential or non-residential customers.

While we agree that the elasticity estimates adopted by the businesses are appropriate we note that there are some fundamental differences between the metropolitan retail water businesses' forecasts and those proposed by regional urban businesses in the Urban Water Price Review 2008. One of the principal differences is that demand forecasts for the metropolitan businesses were generated by an 'end use model' where as most regional forecasts are generated based on population growth and assumptions of average consumption.

An end use model by definition makes a number of assumptions about the uptake of water efficient appliances and changes in water use behaviour. Both of these are in and of themselves the primary avenues through which consumers would respond to price increases. Price elasticity of demand by definition measures the responsiveness of demand to changes in price. Where prices increase we would expect to see consumers limiting their demand by adopting more efficient water use practices, the very same practices which are already factored into the end use model.

For this reason we believed that the risk of over stating consumer response to demand is increased by the addition of elasticity assumptions to a baseline demand forecast that already includes a demand response. This potential for double counting was also raised by YVW:

a customer who needs a new washing machine may decide to buy a replacement that is more water efficient because of the potential savings on their water bill. (YVW, Water Plan p.3-40)

For this reason we advised the Commission that forecasts be amended such that price elasticity of demand is not imposed on the baseline forecasts for residential water customers.

In response to our draft advice all businesses have adjusted their restriction assumptions such that there is no year in the regulatory period

that is not experiencing restrictions. Subsequently no business has embedded price elasticity of demand responses into their proposed forecasts for residential customers.

Non-residential customers

CWW has adopted an elasticity estimate based on the recommendations of ‘Pricing for Conservation in the Non-Residential Sector’ (ACIL Tasman 2007). The study recommends an elasticity of -0.2% for non residential customers. The elasticity estimate is based on an estimate of -0.8% adjusted for waterMAP plans. CWW has taken a less conservative approach and adopted an elasticity of -0.185%. SEW has based its non-residential elasticity assumption on the same study and has also adopted -0.185%.

As with residential water use we are concerned that there may exist a methodological issue with discounting consumption for both anticipated waterMAP savings and price elasticity of demand. Non-residential customers seeking to achieve water use efficiency through adopting waterMAP measures may in and of itself represent an elasticity response to price increases.

In response to our Draft Report CWW stated that water conservation measures are not as comprehensive or aggressive for the non-residential sector relative to residential customers. CWW also noted that the adoption of waterMAP program initiatives usually requires investment on behalf of the customer and that there are often lags between the initial investment and the realisation of water use efficiencies. Another complicating factor for non-residential water use is that the waterMAP program has not been extended across all non-residential customers.

After consideration of CWW’s response we have taken the position that as with residential customers there is a danger of double counting elasticity responses by applying an elasticity effect to those customers included in the waterMAP program.

Accordingly we have recommended that the proposed demand forecasts for non-residential customers be amended to exclude elasticity from those non-residential customers participating in the waterMAP program.

Table 5.6 Recommendations

The Commission pursue the issue of water use efficiency assumptions after the Draft Decision or prior to the next price review.

We have amended consumption forecasts to exclude price elasticity for Non-residential customers participating in the waterMAP program.

Appendices

Appendix A	T140 Queensland's experience	37
Appendix B	City West Water	41
Appendix C	South East Water	51
Appendix D	Yarra Valley Water	60
Appendix E	Melbourne Water	67

Appendix A T140 Queensland's experience

A.1 A brief overview

Target 140 was a central part of the Queensland Water Commission's integrated demand management plan to reduce water consumption in south east Queensland in the face of the worst drought on record. The campaign was implemented in March 2007 and specified that households were to reduce their average residential consumption to 140 litres of water per person per day.

During 2007-08, the initiative contributed to reducing the region's residential use by 24%, translating into an estimated additional saving of 39 billion litres. The campaign reduced water consumption from a pre-drought residential peak of more than 300 litres per person per day to an average 129 litres per person per day.

However, with recent rainfall and rising dam levels, Brisbane City, Ipswich City, Lockyer Valley Regional Council, Logan City, Moreton Bay Regional Council and Somerset Regional Council have implemented Target 170 (an easing of the restrictions from Target 140) from 31 July 2008. In addition, the QWC has released the Drought Exit Strategy which details the phased easing of water restrictions across SEQ based on specified dam level triggers and outlines permanent water conservation measures for the region to take effect once the drought is over. The following table A.1 and graph provide a summary of the measures implemented by the QWC:

Table A.1. Queensland water restrictions and target programs

Time Period	Restriction Level
Commenced 13 May 2005	Level 1 Restrictions
Commenced 3 October 2005	Level 2 Restrictions
Commenced 13 June 2006	Level 3 Restrictions
Commenced 1 November 2006	Level 4 Restrictions
Commenced 10 April 2007	Level 5 Restrictions
Commenced March 2007	Target 140 Program (Target 140's implementation straddled both Level 5 and 6 Restrictions)
Commenced 23 November 2007	Level 6 Restrictions
Commenced 31 July 2008	Target 170 Program and 'High Level' Restrictions
Commenced 1 July 2009 (residential); 30 March 2009 (non-residential)	Target 200 Program

Source: <http://www.qwc.qld.gov.au/tiki-index.php?page=Water%20restrictions>

A.2 Initiatives of Target 140

The Target 140 Program was a comprehensive suite of initiatives rolled out by the QWC. Each of the QWC's initiatives was underpinned by a detailed communications plan. Market research was conducted to monitor trends in water-related attitudes and behaviours. Some of these are set out below.

- Target 140 and its own suite of initiatives
 - Target 140 Residential Education Campaign: this was a high profile, coordinated education and awareness program aimed at achieving a specified average target for residential water use. It identified the benefits of improved water efficiency and provided tools for changing water use habits and behaviours. It also recognised the need for effective linkages between State and local governments to consistently emphasise key messages. The education program was part of an integrated communications campaign centred on substantial mass marketing
 - The provision of a 'Target 140 Water Saving Sheet' to enable families to monitor their consumption on an on-going basis (http://www.target140.com.au/myfiles/uploads/Target%20140%20documents/TARGET140_CUTS.pdf)
 - The provision of a 'Water Saving Calculator' for householders to calculate and monitor water use (<http://www.target140.com.au/tiki-index.php?page=Water%20-Saving%20Calculator>)
 - Recommended daily meter readings (<http://www.target140.com.au/-How+to+read+your+meter>)
 - The provision of a 'Water Use Survey' to assist householders monitor water use (<http://www.target140.com.au/Water+usage+survey>). For those households using above average water, the site then directs them to a set of water saving tips (<http://www.target140.com.au/tips>)
 - Major councils also have similar documentation publicly available (for example, Brisbane City Council: http://www.brisbane.qld.gov.au/bccwr/lib199/water-smart_city-indoor_water_saving_fact_sheet_08.pdf)
 - Ongoing education programs for schools
 - Other Councils have also administered complementary schemes. An example is Gold Coast Water's School Watersaver Education Program which has been designed to engage students in an awareness campaign that highlights the value of water (see http://www.goldcoastwater.com.au/t_gcw.asp?PID=3437 and http://www.goldcoastwater.com.au/attachment/goldcoastwater/education_make_water_mark09.pdf)
 - The preparation and submission of Water Efficiency Management Plans for businesses using more than 10ML/year (this was amended from Level 4 restrictions where businesses did not have to prepare a Water Efficiency Management Plan if they could demonstrate the achievement of a 25% reduction in water consumption over their last billing period)

- Restrictions aimed at the business community were accompanied with stakeholder engagement with peak industry groups
- A greater emphasis on high volume water users (HVWU) where HVWUs were required to complete and submit an audit of their water consumption as part of a strategy to encourage them to take further action
- Other state and local government funded programs
 - Home WaterWise Rebate Scheme provided by the Department of Natural Resources and Water (carried out by the Brisbane City Council in partnership with 20 other local councils). This scheme provided rebates for the installation of various water-saving devices around the home (outlined below).
 - Up to \$1000 for new rainwater tanks, including installation, pumps, diverters and a slab
 - \$200 rebate for a new 4-star (or better) WELS water-rated washing machine
 - \$150 per suite for new dual-flush toilet suites
 - Assistance with 50% of purchase and installation costs, of up to \$200 for an aboveground greywater system or \$500 towards the purchase and installation of a below-ground greywater system
 - Assistance with 50% of purchase price, up to \$30 per showerhead, to replace existing showerheads with new 3-star (or better) WELS water-rated showerheads
 - Up to \$200 for a swimming pool cover and/or roller
 - 4 minute shower timers distributed with the daily newspaper (<http://www.qwc.qld.gov.au/Free+shower+timer>)
 - \$20 household audit carried out by a licenced plumber, who would install a water efficient showerhead, place aerators in the taps and fix up to three leaking taps (<http://www.target140.com.au/Rebates>)
 - Certain Councils also administered complementary and overlapping schemes. See for instance the Gold Coast Home Watersaver Rebate Scheme. This scheme is similar in nature to the Home WaterWise scheme outlined above. Note that this scheme concluded 30 June 2008 (http://www.goldcoastwater.com.au/t_gcw.asp?PID=2439)
 - Business Water Efficiency Program: provides funding and technical support to help businesses save water and reduce water costs. It was funded by the Queensland Government, managed by Seqwater and delivered by the Brisbane City Council for Brisbane. Applications closed on 31 January 2008
- Development of a rigorous water restrictions compliance regime where the scope for on-the-spot fines and other penalties increased with non-compliance

- The following steps were implemented for excessive use and other non-compliance:
 - Household notified of their excessive use through their water bill
 - If continual non-compliance with the threshold, household notified again and asked to explain their excessive usage
 - If continual non-compliance, a \$450 fine and an outdoor watering ban will be imposed
 - If continual non-compliance, a flow restrictor will be installed and an additional penalty (\$1050 fine) will be imposed
- Note that households with a legitimate reason for high water use were exempt from these penalties. Excessive use was defined to mean more than 800 litres per household per day or 200 litres per person per day if there are five or more residents
- Reforms to water pricing and billing methods: this will require bills to be issued at a pre-determined fixed frequency with specific and consistent advice provided to customers about their water use. Billing information would include detailed information on water consumption, comparisons with average daily water consumption across the local area, and messages about water consumption and ways to help save water

A.3 Comparative Analysis

In terms of comparing the Target 140 Program and the situation in Queensland to the circumstances surrounding water use and management in Victoria, it is necessary to consider both the way the initiative was implemented and the underlying forces at work.

QWC's website carries weekly updates on dam levels and household consumption. If residents collectively were able to stick to the announced threshold, certain benefits (for example, watering plants) were granted.

Much of the success surrounding water use in south east Queensland can be attributed to the fact that there was a genuine sense of trepidation at an individual, business and broader community level that South East Queensland was going to run out of water. This underlying factor helped to galvanise community acceptance and adoption of the Target 140 Program.

Appendix B City West Water

B.1 Water Plan proposals

In its Water Plan CWW forecast the following over the next regulatory period

- Residential customer connections for water are forecasted to grow at an annual average rate of 2.4%. The forecasts are based on Victoria in Future (ViF) 2004. Non residential forecasts were derived on the basis of the historical average for the ratio of non-residential to residential new connections — 11%. Given the constant nature of this assumed relationship non-residential growth has also been forecast at 2.4%.
- Total water volumes (residential and non-residential) are forecast to increase over the regulatory period by an annual average of 0.4%. Residential water demand will increase by an average of 2.4% per annum over the period. The growth in consumption is driven by new customers connecting to the system as opposed to increased consumption from existing connections and also reflects high level restrictions in the base year (2008-09) preceding the regulatory period. Non-residential consumption is forecast to decrease by an average of 2.5% per annum.
- Residential sewerage volumes are forecast to grow at an annual average rate of 2.4% per annum. As with water growth in water volumes, the primary driver for increased sewerage volumes is new connections. Non-residential sewerage volumes are forecast to decrease in line with water volumes at 2.5% per annum. The decrease in sewerage volumes for non-residential customers is forecast to occur despite a strong growth in non-residential connections of 2.5% per annum. Residential sewerage connections are forecast to grow at 2.4% per annum.
- Recycled water is proposed to grow significantly during the period. Residential consumption reflects the establishment of dual pipe recycled water systems in the West Werribee area. Non-residential demand is also forecast to grow exponentially during the period. This growth reflects new consumption by the Altona Golf Course and a doubling of consumption by the Sunshine Golf Course.
- CWW are forecasting slow growth in customer agreements across most tradewaste Risk Ranks. The exception is Risk Rank 1 that is forecast to decrease by an annual average of 1.7%.

B.2 Customer connections

While we agree with CWW that ViF is the most appropriate basis upon which to base forecasts, we note that subsequent to the submission of CWW's Water Plan, the Department of Sustainability and Environment (ESC) has released ViF 2008. These detailed projections replace the projections published in 2004 (based on the 2001 Census), and any interim projections (based on the 2006 Census) issued by the Department of Planning and Community Development.

In our Draft Report we recommended that the forecasts for the forthcoming regulatory period should be based on the most reliable and accurate available at the time; accordingly, we amended CWW forecasts to reflect the latest ViF projections.

We also note that the revised ViF growth rate of 2.7% (based on occupied dwellings) is more consistent with the historical rates of 3.1% for residential and 3.97% for non-residential connections. The revised customer connection forecasts were based on local government area allocations provided by CWW.

Adopting updated ViF numbers caused amendments in residential and non-residential connections, sewerage connections, and water and sewerage volumes.

In response to our Draft Report CWW resubmitted their Water Plan projections for residential water connections. CWW amended its volumetric forecast to reflect ViF 2008, however it did not amend its fixed charges for water or sewerage. CWW responded that its Water Plan forecasts for connection numbers are based on 'offers' that have been given to land developers and other information the developers provide about market expectations. CWW stated that it ...

'is not inconsistent to have the two independent forecasts, as the population increase could largely be leading to increased numbers of occupants per household, rather than new household formations. This phenomenon would be expected in first home-buyer areas once they decide to start a family'

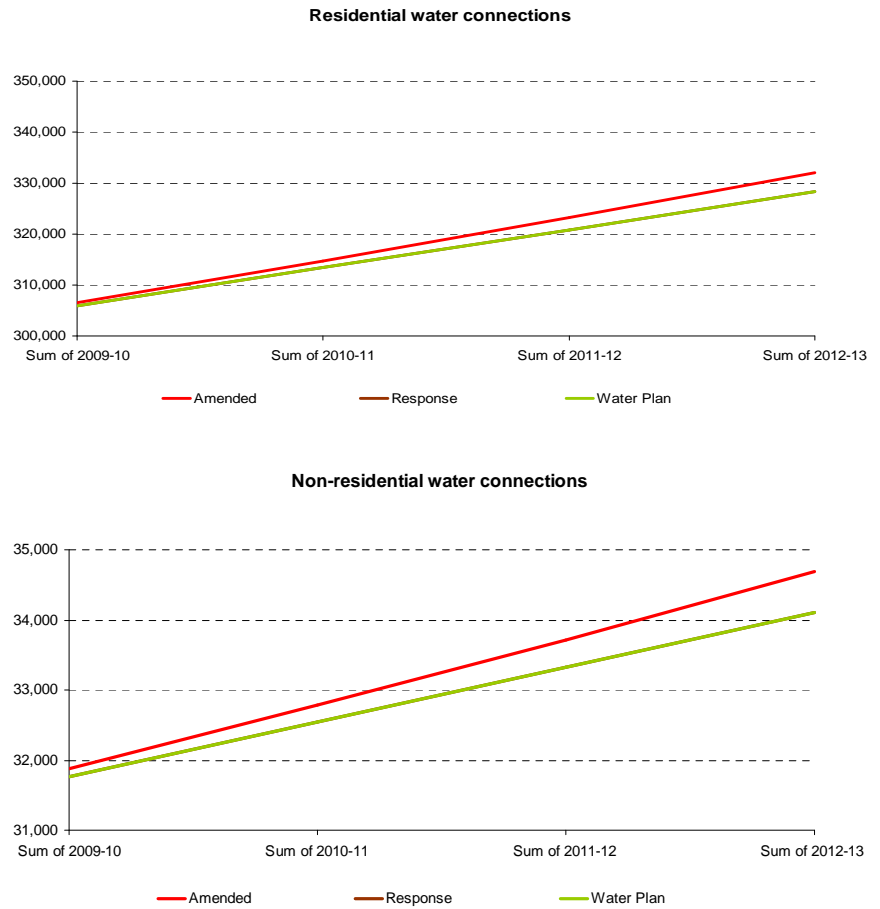
Correspondence CWW 11 March 2009.

PwC has taken the position that connection forecasts should be consistent with volumetric forecasts. We also note that ViF08 is projecting a constant decline in occupancy rates over all CWW's local government areas for the time period under consideration. Contrary to CWW's response this trend would indicate that the growth in connections should exceed growth in consumption.

We note that the ViF08 projections incorporate more recent data than the Water Plans and should provide a better representation of actual outcomes than the projections developed for the ViF04. We also note that the connection numbers based on ViF08 are more consistent with historical trends in connections than the Water Plan. For these reasons we are advising the Commission that PwC's amended connection projections should be adopted for the price review.

The difference between the initial Water Plan proposals and our final amendments are observable in figure B.1.

Figure B.1. Water connections, Water Plan and final amendment



B.3 Water volumes

The end uses model used to generate estimates of water volumes makes a number of assumptions about water conservation and water use efficiency associated with major appliances.

In our Draft Report we queried CWW on the assumptions underlying efficiency gains in the end use model. We noted that some forecasts had adopted CRSWS targets as assumptions for efficiency. In particular, CWW had used this approach to determine efficiency gains in shower head programs.

As a general rule targets should not be used to forecast what actual efficiency gains will be achieved. Forecasts should ideally reference historical trends and any anticipated changes or events expected to occur over the forecast period. Basing forecasts on the achievement of targets may limit businesses from forecasting demand where it outperforms the target or alternatively does not allow for situations where the targets are not achieved. We suggest that in response to the Draft Report the CWW resubmit these forecasts.

CWW's response includes actual data relating to the current shower replacement program and its performance against the appropriate target. CWW indicated that the amended volume forecasts it had submitted were based on efficiency gains in showers that referenced historical trends.

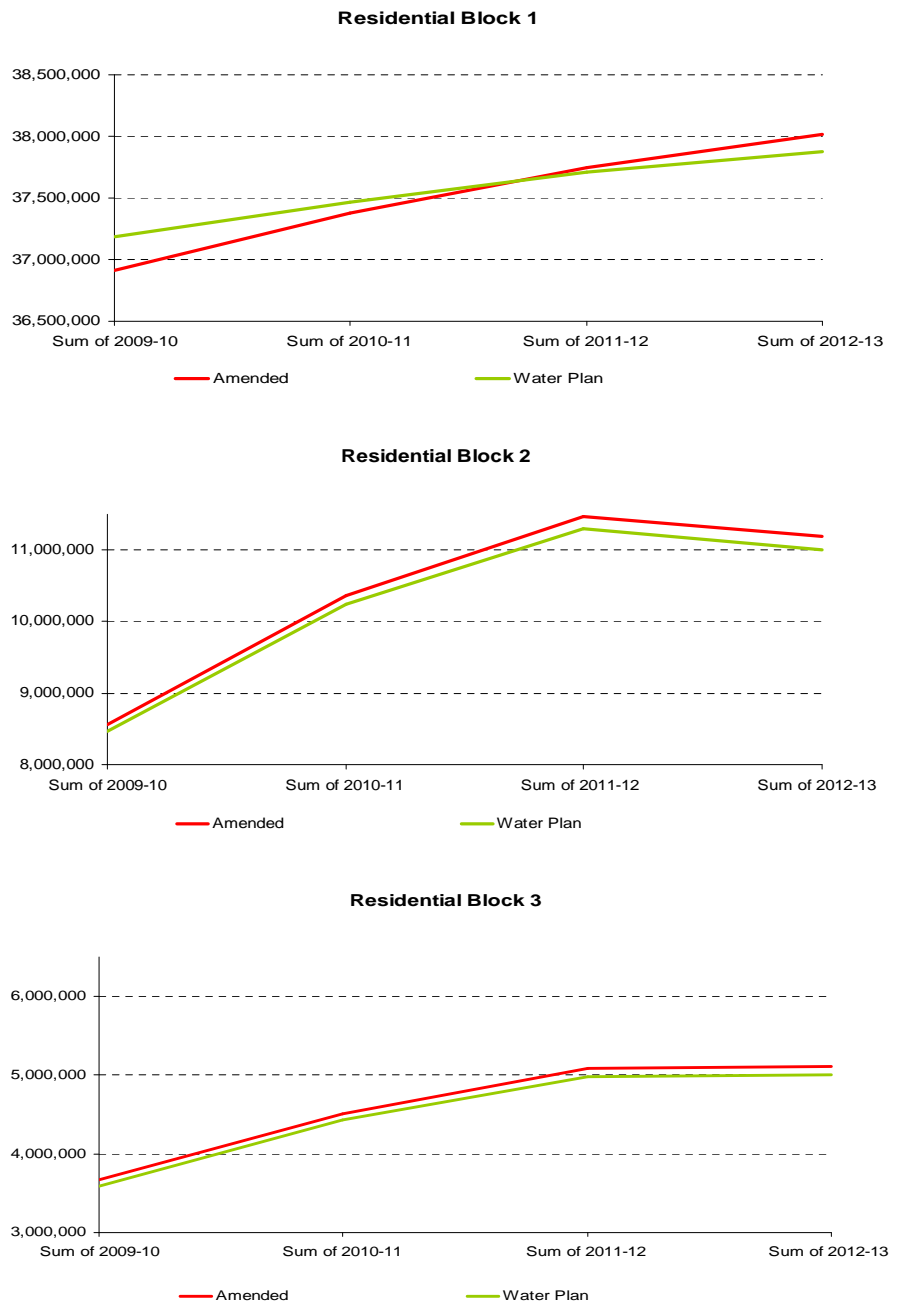
While PwC has some concerns that the assumed efficiency gains led to overly conservative consumption estimates. In the absence of any available third party data or undertaking our own end use survey, we have no basis upon which to suggest alternative rates to the Commission, therefore we recommend that the Commission pursue the issue of water use efficiency assumptions after the Draft Decision or prior to the next price review.

In response to our Draft Report CWW amended its assumed restriction levels over the regulatory period. However, despite the amendments these changes had no material impact on proposed water volumes (see figure B.2).

In regard to price elasticity of demand, we note that CWW has based their proposed volumes on estimates generated by an 'end use model'. We believe there is a methodological issue associated with imposing price elasticity of demand impact on baseline forecasts generated by end use models. A principal element of the end use models employed by water businesses are a number of assumptions regarding the uptake by consumers of more efficient water appliances and more efficient water use.

The reaction of consumers to limit consumption through adopting more efficient uses of water is an elasticity related response. Therefore, in order to avoid the risk of exaggerating such a response we have removed the elasticity assumptions from the forecasts. A more detailed discussion of this issue is provided in section 5.3 of the report.

Figure B.2. Residential water volumes: Water Plan and final amendment



In response to our Draft Report CWW submitted forecasts that excluded price elasticity of demand impacts on residential water use.

Subsequent to our Draft Report we have also raised with CWW the issue of applying elasticity of demand to non-residential customers participating in the waterMAP program. After consideration of CWW’s response we have taken the position that as with residential customers there is a danger of double counting elasticity responses by applying an elasticity effect to those customers included in the waterMAP program.

Accordingly we have amended non-residential demand forecasts to exclude elasticity from those non-residential customers participating in the waterMAP program.

B.4 Sewerage

We have adjusted sewerage connections and volumes to account for the recent ViF revisions.

In our Draft Report we have identified two issues that we pursued with CWW before the final report. In particular we sought clarification of how restrictions have been translated into sewerage flows.

CWW's response to our Draft Report stated that restrictions do not directly impact on sewage projections, under the assumption that all restriction measures impact on outdoor usage. The residential sewerage model relies on water forecasts generated from the end use model that takes into account water conservation programs including shower head exchange programs.

PwC has taken the position that it is highly probable that there has been a step increase in the proportion of water consumption that is subsequently collected as sewage. This position is logical given the degree to which business have stated there have been permanent water savings achieved in external water use. To the extent that the volumes billed for the Sewerage Disposal Charge are intended to reflect actual volumes of sewage the discharge factors should be increased.

However, determining what constitutes an appropriate volume is problematic. It would require survey and statistical analysis that falls outside of the scope of this current project.

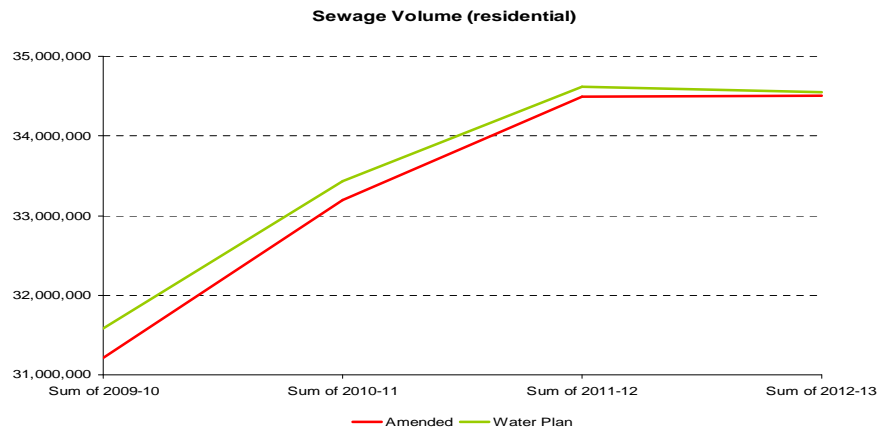
For the purposes of this report we have not amended CWW's sewerage disposal charge volumes for residential customers to account for restrictions on the basis that we are not in a position to recommend alternative forecasts. However, we do note that we believe these volumes may be overly conservative and recommend that the Commission review the calculation of SDCs either prior to its final decision or before the next price review.

In response to our Draft Report CWW changed the residential sewage to water ratio from 64% (as evident in the Water Plan projections) to 62% without explanation. Given that CWW was not seeking to materially amend its forecasts in response to the Draft Report and that the imposition of T155 is target on both indoor and outdoor use, we have amended the residential sewerage volumes to reflect the ratio of sewer to water originally proposed by CWW.

In relation to non-residential sewerage CWW has proposed sharp declines in volume from 2008-09 on wards. One of the primary drivers behind this decline is an assumption that the volume of non-residential water returned to sewer decreases to 34%. When queried about the decrease CWW responded that the 34% was based on the average of the preceding 7 years.

While 34% is consistent with the average of the previous 7 years its worth noting that these years exhibit a strong growth trend (see table 5.4), subsequently it would be inappropriate to forecast based on the long term average. In light of the observable growth trend we have taken the position that the short term average is more appropriate, and have adjusted CWW's non-residential sewerage volumes to reflect the average of the last three years at 0.37%. We consider this amendment to be conservative as the alternative would be to apply a growth rate based on the seven years. The reason we have adopted this approach is that restrictions are expected to ease and water to become more available towards the end of the regulatory period and this may result in a reversal of the long term trend.

Figure B.3. Sewage volumes: Water Plan and final amendment



B.5 Tradewaste

In its Water Plan CWW forecasted decreases in all tradewaste parameters. These forecasts are broadly consistent with historical trends based on actual data.

CWW has forecast no material growth in application fees, customer agreements and food waste charges. As with tradewaste parameters these forecasts are consistent with historical trends.

We can find no reason to amend CWW's tradewaste forecasts.

B.6 Recycled water

In our Draft Report we noted that recycled water is proposed to grow significantly during the regulatory period due to the establishment of third pipe systems and new demand from two non-residential customers.

We note that a large proportion of CWW's forecasted recycled water is dependent on the timing of the commission of the associated capital works. These capital expenses were under review at the time of the Draft Report.

Subsequent to our Draft Report, the ESCV's expenditure consultants have made a number of recommendations regarding CWW's proposed recycled water works program, including the removal of West Werribee Dual Water Supply Scheme and a one year deferral of the Altona Recycled Water Project.

If the ESCV's accepts this advice in its Draft Decision, CWW's recycled water forecasts will need to be amended. Such an amendment may also impact on forecast consumption of non-recycled potable water depending on the degree of substitution assumed within the Water Plan.

For the purposes of this Final Report we have accepted CWW's proposed recycled water forecasts.

B.7 Revised forecasts

We have adjusted CWW's forecasts for customer connections to reflect the most recent edition of ViF. This amendment has resulted in further amendments to water and sewerage volumes and to non-residential customer numbers. We have also amended non-residential water volumes to remove elasticity impacts to avoid any double counting of such impacts resulting from participation in waterMAPs programs. The revised forecasts are set out in table B1.

Demand relating to fixed service charges for both water and sewerage residential customers were amended by imposing the ViF forecasted growth numbers on 2008-09 customer numbers. Amendments to non residential customers were based on the assumption that 11% of new water customers is an appropriate proxy for non residential customer growth.

Non residential water volumes were amended to account for the recommended new customer numbers. Residential sewage volumes were amended based on the ratio of sewage to water proposed by CWW (64% for each year of the regulatory period). Residential sewerage connections were amended on the basis of the ratio of sewerage to water connections. Non-residential connections and volumes were also amended to account for population growth.

Service	Tariff Description	Category	Status	Sum of 2009-10	Sum of 2010-11	Sum of 2011-12	Sum of 2012-13
Recycled Water		Domestic	Proposal	0	0	116,921	279,380
		Non Domestic	Proposal	375,000	1,710,000	3,252,000	3,445,000
Sewerage	Service Charge	Domestic	Proposal	304,739	312,239	319,739	327,239
		Domestic	Amendment	305,293	313,565	322,059	330,782
	Residential Volume	Domestic	Amendment	31,215,001	33,191,894	34,498,029	34,508,583
			Proposal	31,282,665	33,114,860	34,301,244	34,228,902
	Non Domestic Volume	Non Domestic	Proposal	12,721,942	12,634,772	12,233,235	11,943,923
		Non Domestic	Amendment	13,917,353	13,865,318	13,480,574	13,223,110
Non Domestic Service	Non Domestic	Proposal	30,348	31,127	31,906	32,685	
	Non Domestic	Amendment	30,403	31,259	32,138	33,039	
Trade Waste	(blank)	Food Waste charges	Proposal	1	1	1	1
	BOD (Biochemical Oxygen Demand)		Proposal	10,465,678	9,897,713	9,403,548	8,972,114
	Category A	Food Waste charges	Proposal	10	10	10	10
	Category B	Food Waste charges	Proposal	2	2	2	2
	Category C	Food Waste charges	Proposal	8	8	8	8
	Category D	Food Waste charges	Proposal	0	0	0	0
	Category F	Food Waste charges	Proposal	0	0	0	0
	Hospitals and other institutions (per bed);	Food Waste charges	Proposal	3,812	3,812	3,812	3,812
	Inorganic TDS (Total Dissolved Solids)		Proposal	28,041,592	27,810,350	27,678,818	27,560,358
	Risk Rank 1	Application Fee	Proposal	8	8	8	8
		Cust Agreements	Proposal	22	22	21	21
	Risk Rank 2	Application Fee	Proposal	5	5	5	5
		Cust Agreements	Proposal	21	22	22	22
	Risk Rank 3	Application Fee	Proposal	8	8	8	8
		Cust Agreements	Proposal	40	40	40	40
	Risk Rank 4	Application Fee	Proposal	44	44	44	44
		Cust Agreements	Proposal	310	311	312	312
	Risk Rank 5	Application Fee	Proposal	558	555	553	526
		Cust Agreements	Proposal	5,378	5,410	5,439	5,466
	SS (Suspended Solids)		Proposal	5,468,283	5,201,430	4,967,584	4,762,297
	TKN (Nitrogen)		Proposal	765,867	728,564	695,872	667,169
	Volume		Proposal	9,811,565	9,334,818	8,917,009	8,550,181
	Water	Non-Domestic Usage	Non Domestic	Proposal	37,065,780	36,811,806	35,641,917
Non-Domestic Usage		Non Domestic	Amendment	37,765,476	37,624,275	36,580,253	35,881,612
Residential Block 1		Domestic	Proposal	37,185,319	37,467,005	37,714,401	37,873,572
Residential Block 1		Domestic	Amendment	36,913,608	37,380,049	37,749,268	38,020,552
Residential Block 2		Domestic	Proposal	8,463,812	10,234,508	11,301,753	11,003,145

Residential Block 2	Domestic	Amendment	8,560,744	10,361,646	11,472,928	11,187,358
Residential Block 3	Domestic	Proposal	3,596,428	4,428,310	4,981,290	5,006,846
Residential Block 3	Domestic	Amendment	3,664,690	4,509,396	5,085,028	5,115,929
Service Charge	Domestic	Proposal	305,892	313,392	320,892	328,392
	Non Domestic	Proposal	31,771	32,550	33,329	34,108
Service Charge	Domestic	Amendment	306,449	314,723	323,220	331,947
	Non Domestic	Amendment	31,876	32,786	33,721	34,683

Appendix C South East Water

C.1 Water Plan proposals

In its Water Plan SEW has forecast the following over the next regulatory period

- Residential customer connections for water are forecasted to grow at an annual average rate of 1.6%. The forecasts are based on Victoria in Future (ViF) 2004. Non residential forecasts were derived on the basis of the historical average for the ratio of non-residential to residential new connections — 12%. Non-residential growth has been forecast at 2.0%.
- Total water volumes (residential and non-residential) are forecast to increase over the regulatory period by an annual average of 3.4%. Residential water demand will increase by an average of 2.7% per annum over the period. The growth in consumption is driven by new customers connecting to the system as opposed to increased consumption from existing connections and also reflects high level restrictions in the base year (2008-09) preceding the regulatory period. Non-residential consumption is forecast to increase by an average of 5.1% per annum.
- Residential sewerage volumes are forecast to grow at an annual average rate of 1.97% per annum. As with growth in water volumes, the primary driver for increased sewerage volumes is new connections. Non-residential sewerage volumes are forecast to increase at 4.2% per annum. SEW is proposing growth in non-residential connections of 2.0% per annum. Residential sewerage connections are forecast to grow at 1.7% per annum.
- Recycled water is proposed to grow significantly during the period. The forecasts are based on the long term broad hectare projections derived from the urban development program 2007.
- SEW are forecasting a slow decline across all tradewaste parameters of 0.3% per annum. However customer numbers are projected to grow over the period at an annual rate of 3% per annum.

C.2 Customer connections

In our Draft Report we noted that subsequent to the submission of SEW's Water Plan, the DSE has released ViF 2008. These detailed projections replace the projections published in 2004 (based on the 2001 Census), and any interim projections (based on the 2006 Census) issued by the Department of Planning and Community Development.

The forecasts for the forthcoming regulatory period should be based on the most reliable and accurate available at the time; accordingly, we have amended SEW's forecasts to reflect the latest ViF projections.

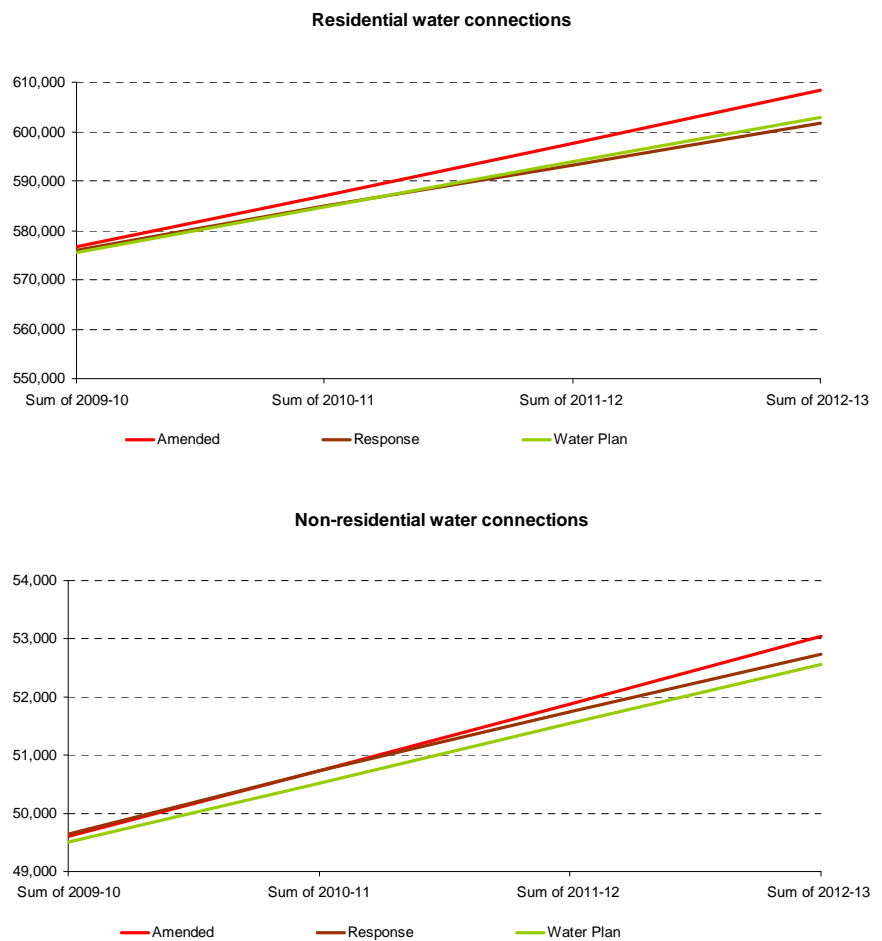
We also noted that the revised ViF growth rate of 1.8% (based on occupied dwellings) is more consistent with the historical rates of 1.84%

for residential connections (for the period 2005-06 to 2008-09). The revised customer connection forecasts were based on local government area allocations provided by SEW.

In response to our initial advice SEW amended its projected customer connections. However, the amendment does not result in any material change to the forecasts. SEW's response is not consistent with the observable differences between ViF04 and ViF08 (as mentioned earlier). In its response SEW did not put forward any reason for its forecasts to differ from those derived from ViF08.

SEW has noted that the ViF projections are amended to account for multiunit dwellings such as flats and units which do not attract service charges. Such an amendment should not affect the growth rate as projected by the ViF. SEW have proposed that 30% of all new dwellings are multiunit for every year of the regulatory period. Given that the proportion of multiunit to detached dwellings is constant the growth rates for connections should not materially differentiate from those stated in the ViF for new households. We have amended SEW's forecast connections for both water and sewage residential and non-residential customers to reflect ViF 08 (see figure C.1)

Figure C.1. Water Plan and revised proposals



Non-residential customer numbers have been amended accordingly based on the method outlined in SEW’s Water Plan for deriving non-residential connection numbers.

Adopting updated ViF numbers has caused amendments in residential and non-residential connections, sewerage connections, and water and sewerage volumes.

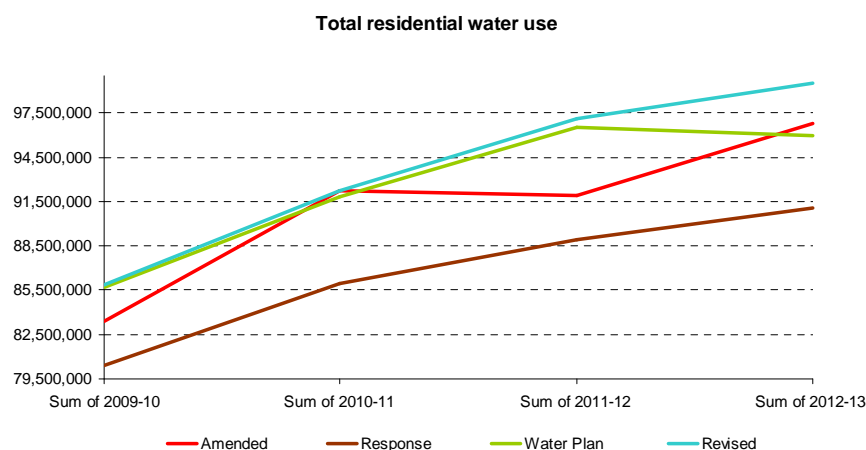
C.3 Water volumes

At a broad level, our original advice to the ESCV was to increase SEW’s proposed forecasts to reflect increased populations and the removal of price elasticity. In response to our advice SEW proposed fully revised forecasts based on new restriction assumptions and the imposition of T155. As discussed above SEW’s response did not reflect our advice regarding increased connections.

As can be seen from the figure below our final advice to ESCV provides for total residential water consumption that while less than that proposed in the Water Plan and our initial advice, reflects the newly assumed restriction levels and is less conservative than that proposed by SEW in response to our Draft Report. The main drivers for this are our adoption of higher connection and population numbers and our capping of T155 and subsequent removal of T155’s residual impacts.

The process via which we have arrived at our advice and the details associated with our findings are discussed below.

Figure C.2. Water Plan and revised proposals



The end uses model used to generate estimates of water volumes makes a number of assumptions about water conservation and water use efficiency associated with major appliances. In our Draft Report we queried SEW on the assumptions underlying efficiency gains in the end use model.

We note that some forecasts have adopted CRSWS targets as assumptions for efficiency. In particular, SEW has used this approach to determine efficiency gains in shower head programs.

As a general rule, targets should not be used to forecast the actual efficiency gains estimated to be achieved. Forecasts should ideally reference historical trends and any anticipated changes or events expected to occur over the forecast period. Basing forecasts on the achievement of targets may limit businesses from forecasting demand where it outperforms the target or alternatively does not allow for situations where the targets are not achieved. We suggested that in response to the Draft Report the SEW resubmit these forecasts.

We also noted that SEW had assumed per annum efficiency gains of 4.04% for toilets. This assumption was significantly higher than both CWW (0.8%) and YVW (2.28%).

SEW's response to the Draft Report included actual data relating to the current shower replacement program and its performance against the appropriate target. CWW indicated that the amended volume forecasts it had submitted were based on efficiency gains in showers that referenced historical trends.

While PwC has some concerns that the assumed efficiency gains led to overly conservative consumption estimates. In the absence of any available third party data or undertaking our own end use survey, we have no basis upon which to suggest alternative rates to the Commission, therefore we recommend that the Commission pursue the issue of water use efficiency assumptions after the Draft Decision or prior to the next price review.

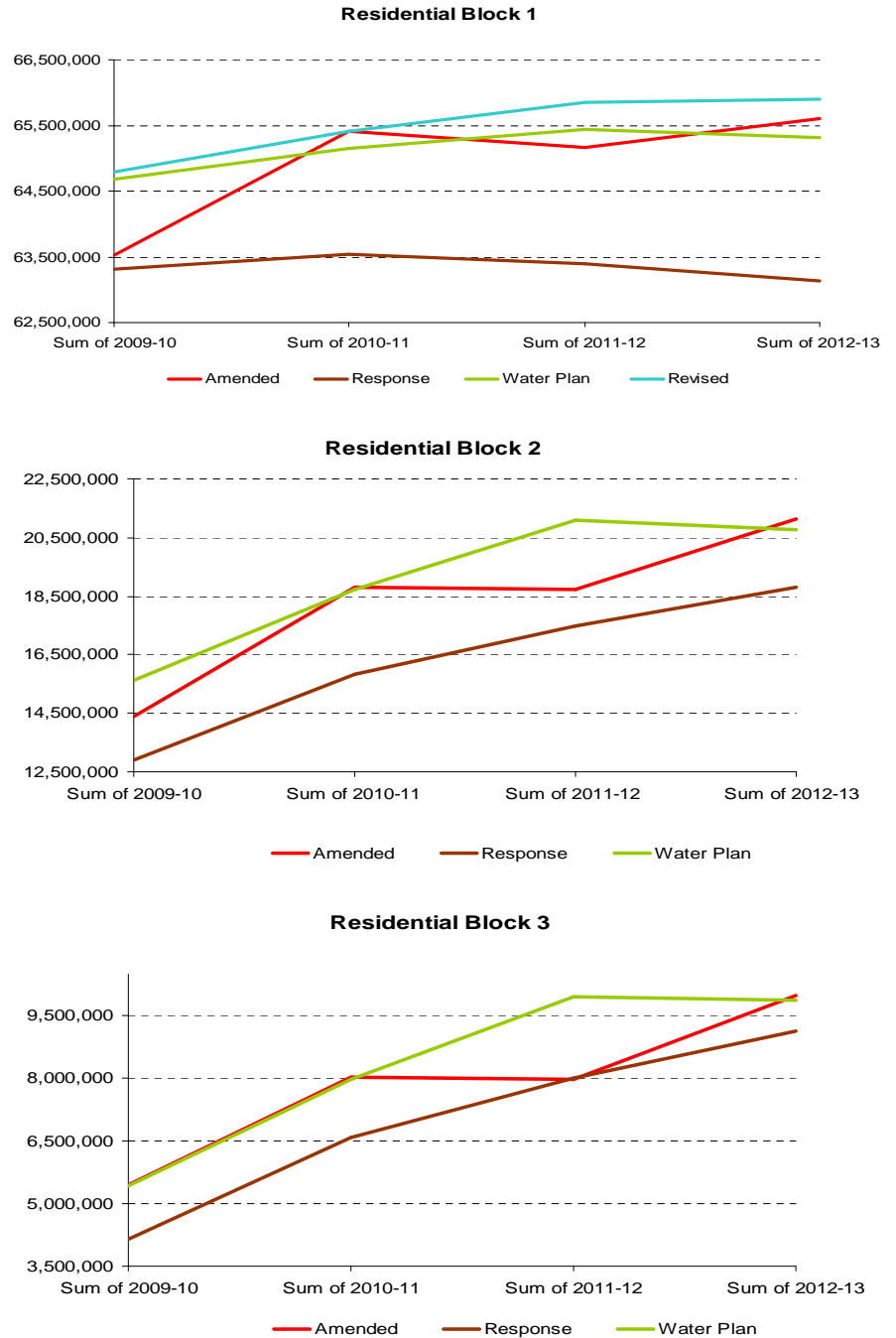
In regard to price elasticity of demand, we noted in our Draft Report that SEW based their proposed volumes on estimates generated by an 'end use model'. We believe there is a methodological issue associated with imposing the price elasticity of demand impact on base line forecasts generated by end use models. A principal element of the end use models employed by water businesses are a number of assumptions regarding the uptake by consumers of more efficient water appliances and more efficient water use.

The reaction of consumers to limit consumption through adopting more efficient uses of water is an elasticity related response. Therefore, in order to avoid the risk of exaggerating such responses we had amended SEW's forecasts to remove elasticity impacts in the final year of the regulatory period.

Subsequent to our Draft Report we have also identified the issue of applying elasticity of demand to non-residential customers participating in the waterMAP program. We have taken the position that, as with residential customers, there is a danger of double counting elasticity responses by applying an elasticity effect to those customers included in the waterMAP program. Accordingly we have amended non-residential demand forecasts to exclude elasticity from those non-residential customers participating in the waterMAP program.

In response to the Draft Report SEW has revised its restriction schedule for the regulatory period. The revised schedule reflects the imposition of Target 155 (see figure C.3).

Figure C.3. Residential water volumes - Water Plan, response to draft and final amendments



The new restriction assumptions have had a material impact on SEW's demand projections. We have amended the projections to reflect the new restriction assumptions. However we are concerned that the proposed

amendments resulting from the imposition of T155 may lead to overly conservative forecasts (this issue is discussed in full in section 4.4). We have further amended SEW's forecasts such that assumed savings from T155 do not exceed those associated with achieving the target. We have also amended the forecasts such that T155 does not impose any residual impact on consumer behaviour for the years 2010 to 2013.

Consistent with our approach to YVW we have amended the forecasts such that the anticipated savings from T155 are realised in the first and second block of the tiered tariff. The reason being that the program itself is focused on both indoor and outdoor use and given the pre-existing high levels of restrictions it is more appropriate to assume these savings would occur in blocks one and two as opposed to two and three.

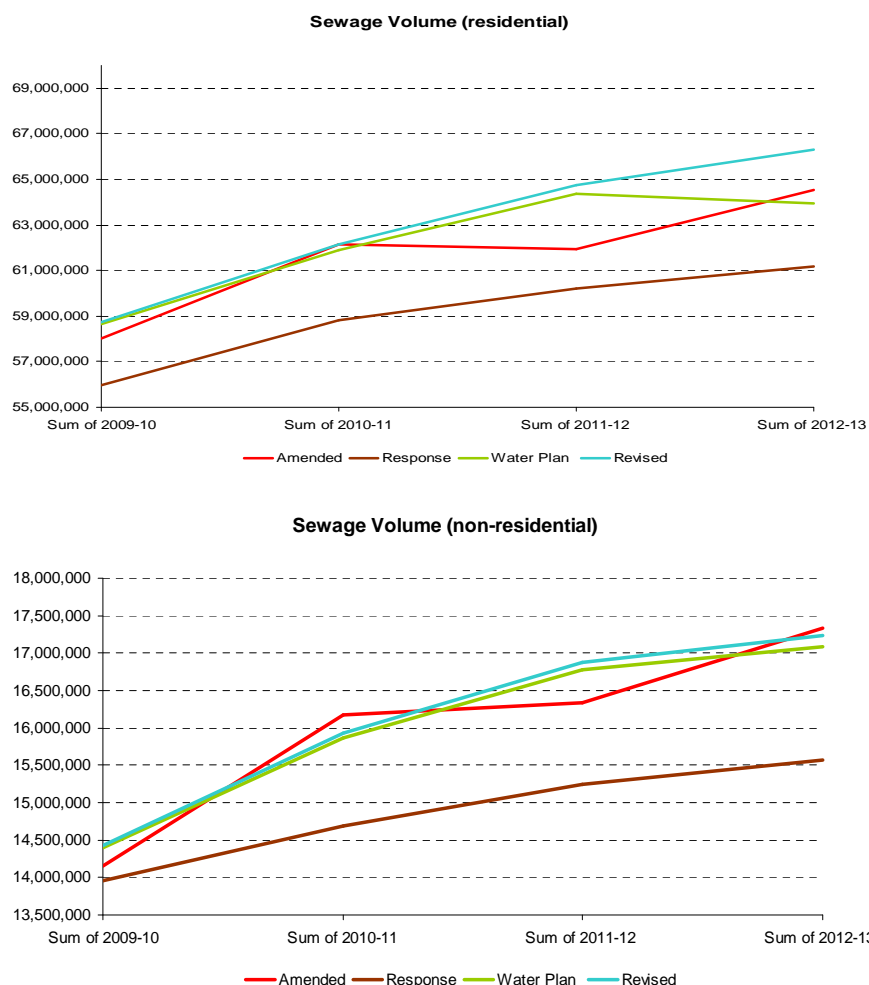
We also note that SEW materially revised its forecasts for non-residential water customers to account for the imposition of T155. While we have not capped the impact of T155 for the years in which it was applied for non-residential customers, we have removed the residual impact of the voluntary restrictions in the latter years of the regulatory period in a manner consistent with our treatment of residential consumption.

C.4 Sewerage

SEW's forecasts are based on historical usage and mass balance forecasts. We have adjusted sewerage connections and volumes to account for the recent ViF revisions and amended water volumes.

The increase in sewage volumes for non-residential customers in the year 2010-11 reflects both the removal of elasticity impacts on >10ML customers in that year and the increased customer numbers due to VIF 2008.

Figure C.4. Water Plan and revised proposals



C.5 Tradewaste

SEW are forecasting a slow decline across all tradewaste parameters of 0.3% per annum. However customer numbers are projected to grow over the period at an annual rate of 3% per annum.

We have not amended any of SEW’s tradewaste forecasts for this report.

C.6 Recycled water

SEW supply several classes of recycled water from non-potable through to potable water. Class A recycled water is supplied to residential customers through mandated third pipe schemes. Class C recycled water is provided to non-potable customers.

C.7 Revised forecasts

We have adjusted SEW's forecasts for customer connections to reflect the most recent edition of ViF. This amendment has resulted in further amendments to water and sewerage volumes and to non-residential customer numbers. We have also amended non-residential water volumes to remove elasticity impacts to avoid any double counting of such impacts resulting from waterMAP programs. The revised forecasts are set out in table C1.

Non residential water connections are were amended on the basis of the amended residential connections and the ratio of proposed non-residential connections to proposed residential connections.

Sewerage connections for non-residential customers have been amended using the same approach.

Sewerage connections for residential customers have been amended on the basis of the ratio of proposed sewer to water connections. This approach assumes that the backlog program will adjust with the change in the number of connections.

Water volumes were first adjusted for changes in connections for both residential and non residential customers. Residential forecasts were amended further to account for new assumptions regarding restriction levels and the introduction of T155.

We have made amendments to the schedules provided by SEW in response to our Draft Report to reflect our concerns over the assumed impacts of T155 on water consumption. Specifically we have placed a floor of 155 litres per person per day and have removed any residual impacts of T155 from the subsequent years. In order to do this we have assumed the per connection consumption associated with each level of restriction as proposed by SEW in its Water Plan are applicable. For example, where SEW had originally proposed per connection consumption for a level 2 restriction in its water plan we took this to apply to the revised numbers in its response where level 2 restrictions were being applied. We accounted for assumed conservation due to long run trends in water use efficiency by deriving an annual average efficiency gain based on SEWs end use model output and applying this to the restriction level per connection use where appropriate.

The final amended numbers also reflect a rebalancing of the anticipated savings from the imposition of T155 such that they fall equally on blocks one and two as opposed to two and three.

Sewerage volumes were also adjusted to account for the above amendments.

Service	Tariff Description	Category	Status	Sum of 2009-10	Sum of 2010-11	Sum of 2011-12	Sum of 2012-13
Recycled Water		Residential	Water Plan Proposal	166,472	296,355	420,133	566,853
	Residential	Service charge	Water Plan Proposal	1,580	2,474	3,733	5,075
Sewerage	Non Residential	Disposal charge	Amended	14,151,012	16,173,812	16,334,888	17,328,856
			Water Plan Proposal	14,401,649	15,862,683	16,777,678	17,087,234
		Service charge	Amended	44,341	45,353	46,379	47,421
			Water Plan Proposal	44,260	45,175	46,090	47,001
	Residential	Disposal charge	Amended	58,023,516	62,152,033	61,923,102	64,525,779
			Water Plan Proposal	58,642,490	61,908,124	64,360,160	63,938,678
		Service charge	Amended	547,859	558,095	568,584	579,430
			Water Plan Proposal	546,858	555,905	565,036	574,300
Trade Waste		Charge for volume discharged	Water Plan Proposal	5,502,836	5,498,299	5,478,220	5,457,377
		Charge per kg of BOD discharged	Water Plan Proposal	8,574,502	8,567,432	8,536,145	8,503,667
		Charge per kg of Nitrogen discharged	Water Plan Proposal	462,215	461,834	460,148	458,397
		Charge per kg of Oxidised Sulphur discharged (if >100mg/L<500mg/L)	Water Plan Proposal	210,710	210,537	209,768	208,970
		Charge per kg of SS discharged	Water Plan Proposal	3,108,900	3,106,336	3,094,992	3,083,216
	>100,000kL	Annual charge	Water Plan Proposal	22	23	24	24
	>2,500kL ≤ 25,000kL	Annual charge	Water Plan Proposal	282	290	298	307
	>25,000kL ≤ 100,000kL	Annual charge	Water Plan Proposal	38	39	40	42
	≤2,500kL	Annual charge	Water Plan Proposal	7,378	7,599	7,820	8,041
	Water		Fire Service charge	Water Plan Proposal	17,268	17,642	18,016
		Non potable water from Bunyip Main Race	Water Plan Proposal	75,649	75,649	75,649	75,649
Non Residential		Bunyip Main Race supply customers	Water Plan Proposal	142	144	146	148
		Service Charge	Amended	49,594	50,725	51,873	53,038
		Service charge	Water Plan Proposal	49,503	50,526	51,549	52,568
		Usage charge	Amended	29,374,972	34,009,124	34,347,824	36,873,053
			Water Plan Proposal	29,878,635	33,354,904	35,700,235	36,736,859
Residential		Bunyip Main Race supply customers	Water Plan Proposal	174	175	176	177
		Service Charge	Amended	576,630	587,009	597,575	608,331
		Service charge	Water Plan Proposal	575,576	584,705	593,846	602,945
Residential - Block 1		Usage charge	Amended	63,522,734	65,408,037	65,167,113	65,604,428
			Water Plan Proposal	64,672,934	65,151,351	65,436,040	65,314,830
Residential - Block 2		Usage charge	Amended	14,388,197	18,790,407	18,721,194	21,145,351
			Water Plan Proposal	15,628,176	18,716,666	21,091,077	20,774,806
Residential - Block 3		Usage charge	Amended	5,443,695	8,021,288	7,991,742	9,991,807
			Water Plan Proposal	5,433,748	7,989,809	9,966,161	9,872,861

Appendix D Yarra Valley Water

D.1 Water Plan proposals

In its Water Plan YVW has forecast the following over the next regulatory period

- Residential customer connections for water are forecasted to grow at an annual average rate of 1.3%. The forecasts are based on the historical average over the last six years (excluding the addition of Wallan to YVW's network in 2005-06). Non residential forecasts were derived by regressing non-residential customers on residential customers. For every 100 new residential customers YVW is predicting 6.7 non-residential customers. Non-residential growth has been forecast at 1.2%.
- Total water volumes (residential and non-residential) are forecast to increase over the regulatory period by an annual average of 1.6%. Residential water demand will increase by an average of 1.8% per annum over the period. The growth in consumption is driven by new customers connecting to the system as opposed to increased consumption from existing connections and also reflects high level restrictions in the base year (2008-09) preceding the regulatory period. Non-residential consumption is forecast to increase by an average of 0.8% per annum.
- Total sewerage volumes are forecasted to increase over the regulatory period by an annual average of 2.4%. Residential sewerage volumes are forecast to grow at an annual average rate of 2.6% per annum. As with water growth in water volumes, the primary driver for increased sewerage volumes is new connections. Non-residential sewerage volumes are forecast to increase at 0.83% per annum. YVW is proposing growth in non-residential connections of 1.1% per annum. Residential sewerage connections are forecast to grow at 1.3% per annum.
- Recycled water is proposed to grow significantly during the period. The growth is driven by the implementation of third pipe schemes.
- YVW are forecasting tradewaste customer numbers to remain relatively stable over the course of the regulatory period. However, YVW is also forecasting significant declines in some volumetric tradewaste parameters. For example, TDS is forecasted to decline by an annual average of 10% over the period, tradewaste volumes (that is flows associated with the tradewaste volumetric charge, category 3) are also forecast to decline by 9.7% per annum over the same period.

D.2 Customer connections

Unlike SEW and CWW, YVW has based its customer connection forecasts on the historical average for the preceding six year period. YVW is proposing an average annual rate of 1.34% for residential connections and non-residential growth has been forecast at 1.16%.

We note that these forecasts are consistent with historical trend of 1.33% per annum and that they are only marginally different from the latest Victoria in Future forecasts of 1.47% per annum. For these reasons we consider YVW's connection forecasts to be reasonable.

D.3 Water volumes

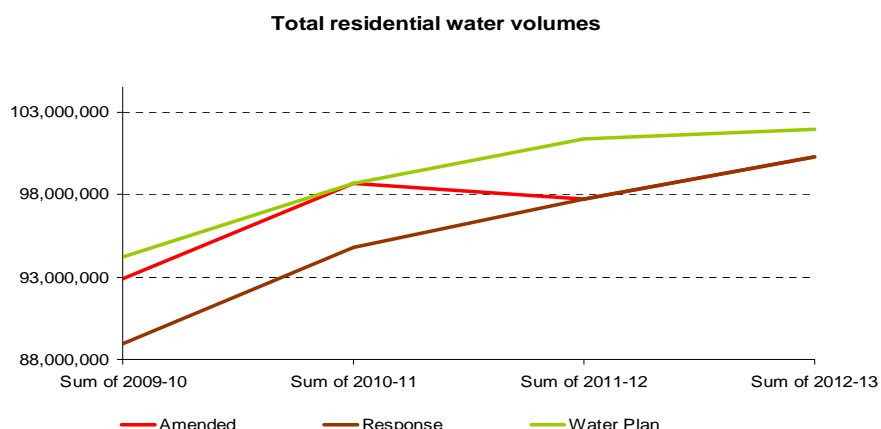
As with the other retail metropolitan businesses YVW generated forecasts for residential water volumes using an end use model. YVW has also adopted a number of assumptions regarding permanent water savings and use efficiency. Upon request YVW provided us with the efficiency assumptions underlying the end use model forecasts. These assumptions appear reasonable and are generally consistent with or less conservative than the other retailers.

YVW did not apply any elasticity assumptions to forecasted residential consumption in its Water Plan. YVW has noted in its demand manual accompanying the Water Plan that a consumer's response to price has a direct impact on behaviour patterns and the uptake of water efficient appliances. As such it is already imbedded in the end use model. We agree with YVW's approach to elasticity.

Non-residential demand was forecast for five different categories ranging from Melbourne Top 200 commercial users to Schools. Forecasts generally show a decrease in use at the beginning of the regulatory period followed by a period of bounce back. In the Draft Report we saw no reason to amend YVW's non-residential volume forecasts.

In response to the Draft Report YVW has revised its restriction schedule for the regulatory period. The revised schedule reflects lower than expected storage levels in Melbourne's dams and the imposition of Target 155.

Figure D.1. Total Residential water volumes — Water Plan, response and final amendment



The new restriction assumptions have had a material impact on YVW's demand projections. We have amended the projections to reflect the new assumptions.

We are concerned that the proposed amendments resulting from the imposition of T155 may lead to overly conservative forecasts (this issue is discussed in full in section 4.4). We have amended YVW's forecasts such that assumed savings from T155 do not exceed those associated with achieving the target. We have also amended the forecasts such that T155 does not impose any residual impact on consumer behaviour for the years 2010 to 2013.

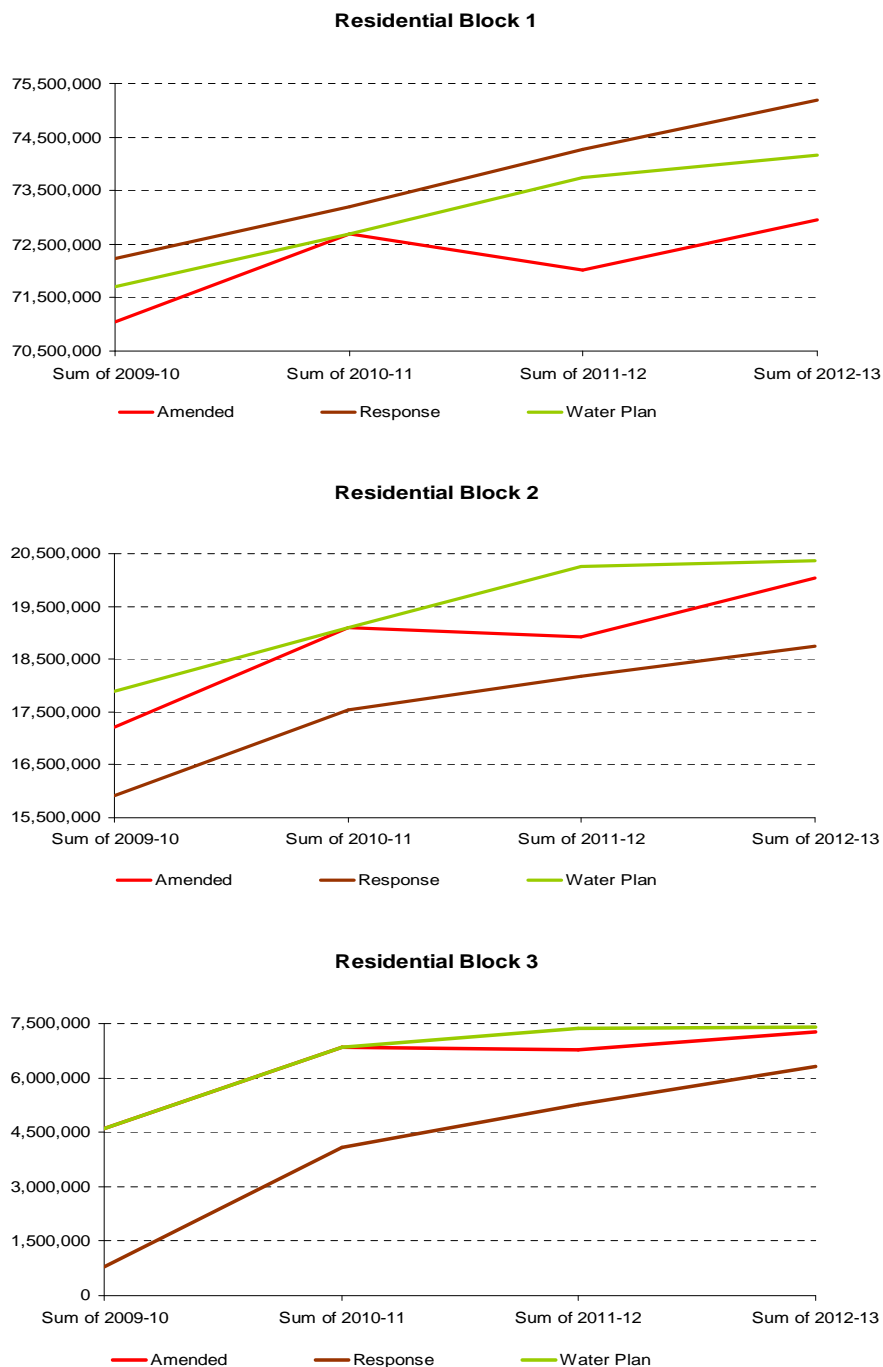
For YVW the impact of T155 extends only to 2010-11. Consumption levels in both 2011-12 and 2012-13 are consistent with those originally proposed in the Water Plan for years with equivalent restriction levels (allowing for ongoing water use efficiency). Subsequently, we have only emended 2010-11 to remove residual T155 impacts.

Our amendment is based on the level of water consumption proposed for level 2 restrictions in the Water Plan — given that both the response and Water Plan proposals for the year in question are set at level 2 restrictions and that there has been no revision of any other assumptions.

In response to the Draft Report YVW proposed that the anticipated savings for residential customers from T155 should be levied on the third tier of the inclining block tariff. We believe such an approach is not consistent with the aims and objectives of T155 which focuses on both indoor and outdoor usage. Accordingly, we have allocated the assumed savings equally across both the first and second tier of the block tariff.

We also note that in response to our Draft Report YVW revised the proportional share across all tiers for each year of the regulatory period, without explanation. We have amended YVW's response such that the proportional share of tariff blocks reflects that proposed in the Water Plan for the appropriate level of restriction.

Figure D.2. Residential water volumes — Water Plan, response and final amendment

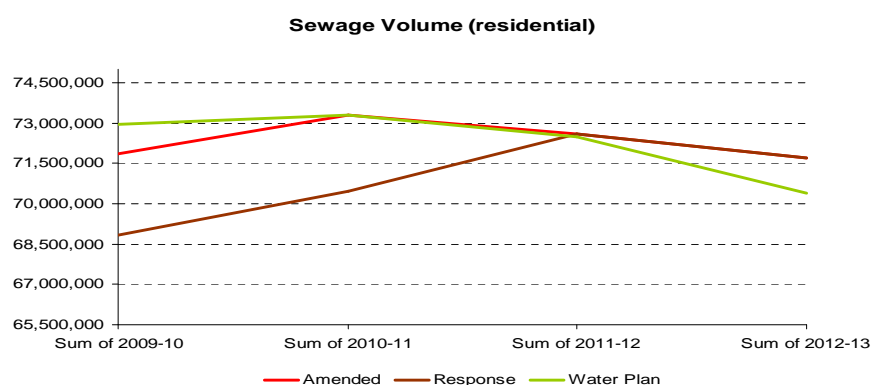


D.4 Sewerage

As with the other retailers YVW has employed an end use model to assist in the generation of estimated sewage collection over the regulatory period. The resulting forecast was adjusted to account for backlog. Non-residential volumes are calculated as the residual between total inflows and the sum of the estimated residential flows, inflows and infiltration. We see no reason to amend YVW's residential and non-residential volume forecasts.

In response to the Draft Report YVW amended its volumetric sewage projections inline with the new volume forecasts resulting from the amended restrictions schedule. Our final recommendation to the ESCV references YVW's response, however, it also reflects the limits we applied to savings from T155 and the subsequent adjustment in 2010-11 to reinstate level 2 consumption as proposed in the Water Plan.

Figure D.3. Residential sewage volumes — Water Plan, response and final amendment



D.5 Tradewaste

YVW has forecast low or in some cases no growth in tradewaste customers over the regulatory period. We note that these forecasts are consistent with historical trends.

D.6 Recycled water

YVW's recycled water demand is driven primarily by the commencement of third pipe schemes and the continued customer of a number of golf courses and other commercial customers.

We have noted that recycled water is proposed to grow significantly during the regulatory period due to the establishment of third pipe systems.

D.7 Revised forecasts

We have adjusted YVW's forecasts to account for its new revised restriction schedule. We have also adjusted the resulting volume projections to reflect our concerns over the treatment of T155.

We have amended the forecasts such that they don't reflect pre person per litre per day consumption less than T155. These calculations are based on the ViF2008 population forecasts for those relevant local statistical areas as advised by YVW.

Residual impacts from T155 have been removed from the year 2010-11. These calculations rely on the proposed consumption associated with level 2 restrictions as originally proposed by YVW for 2010-11.

T155 impacts have also been distributed evenly between tiers 1 and 2 of the inclining block tariff to reflect the focus of the program on both indoor and outdoor use.

Increased residential volumes also impact on residential sewage volumes. Residential sewage volumes were adjusted based on the ratio of proposed residential sewage volume to residential water volume.

Service	Tariff Description	Category	Status	Sum of 2009-10	Sum of 2010-11	Sum of 2011-12	Sum of 2012-13
Recycled Water	Service Charge	Non-residential	Proposal	19	32	44	57
		Residential	Proposal	1,650	2,990	4,330	4,470
	Usage Charge	Non-residential	Proposal	280,168	290,936	301,104	301,872
		Residential	Proposal	52,500	116,000	183,000	220,000
Sewerage	Service Charge	Non-residential	Proposal	37,300	37,700	38,200	38,600
		Residential	Proposal	563,700	570,900	578,500	585,800
	Sewage Disposal Charge (SDC)	Non-residential	Amended	11,458,614	11,852,574	11,818,599	12,074,900
			Proposal	11,792,954	11,967,092	12,047,568	12,303,599
		Residential	Amended	71,873,363	73,293,383	72,602,120	71,691,827
		Proposal	72,946,963	73,277,670	72,494,982	70,388,147	
Trade Waste	BOD	Category 3	Proposal	11,426,861	10,789,229	7,601,069	7,601,069
	Discharge < 2,500 kL/year	Service Charge	Proposal	5,478	5,533	5,588	5,644
	Discharge > 100,000 kL/year	Service Charge	Proposal	15	15	15	15
	Discharge 2,500.1-25,000 kL/year	Service Charge	Proposal	386	388	390	393
	Discharge 25,000.1-100,000 kL/year	Service Charge	Proposal	28	28	28	28
	SS	Category 3	Proposal	6,610,101	6,502,720	5,965,817	5,965,817
	TDS	Category 3	Proposal	15,936,801	15,029,808	10,494,843	10,494,843
	TN	Category 3	Proposal	250,302	247,943	236,151	236,151
Volumetric Charge	Category 3	Proposal	8,130,124	7,683,498	5,450,365	5,450,365	
Water	Service Charge	Non-residential	Proposal	40,700	41,200	41,600	42,100
		Residential	Proposal	597,300	605,400	613,400	621,500
	Usage Charge	Non-residential	Amended	25,464,000	26,339,000	26,264,000	26,833,000
			Proposal	26,206,565	26,593,538	26,772,372	27,341,330
	Usage Charge Block 1	Residential	Amended	71,047,119	72,692,988	72,007,361	72,960,522
			Proposal	71,716,703	72,692,988	73,754,789	74,154,722
	Usage Charge Block 2	Residential	Amended	17,211,545	19,097,375	18,917,252	20,032,513
			Proposal	17,881,129	19,097,375	20,250,592	20,360,401
	Usage Charge Block 3	Residential	Amended	4,601,408	6,855,042	6,790,386	7,274,965
			Proposal	4,601,408	6,855,042	7,354,162	7,394,040

Appendix E Melbourne Water

E.1 Water Plan proposals

In its Water Plan MW has forecast the following over the next regulatory period

- Water headworks services are charged on a per ML basis and are expected to grow over the period by an annual average of:
 - CWW, 0.19%
 - SEW, 2.87%
 - YVW, 1.41%
 - WW, 0.0%
 - GW, 21.61%
- Water transfer services are expected to grow on a per ML basis over the regulatory period by an annual average of:
 - CWW, 0.19%
 - SEW, 2.87%
 - YVW, 1.41%
 - WW, 0.0%
- Sewage volumes have been forecast for both the Eastern and Western treatment plants on a per retail water business basis. Volumes are forecasted to increase over the regulatory period for both the eastern and western treatment plant. The exception to the trend is discharge collected by YVW which is expected to decline over the period.
- MW noted that 95% of recycled water in Melbourne is sourced from either the Western or Eastern treatment plant. Of the two main consumers of recycled water from the Eastern Treatment Plant, MW is predicting no change in consumption. For the Western Treatment Plant, MW is forecasting an average annual decrease in recycled water provided to Southern Rural Water of 4.87% and an average annual increase of water provided to CWW of 26%.
- BOD/ and inorganic TDS and TN/TKN are forecast to decrease in the Western system due to the closure of two major industrial customers.

E.2 Revised forecasts

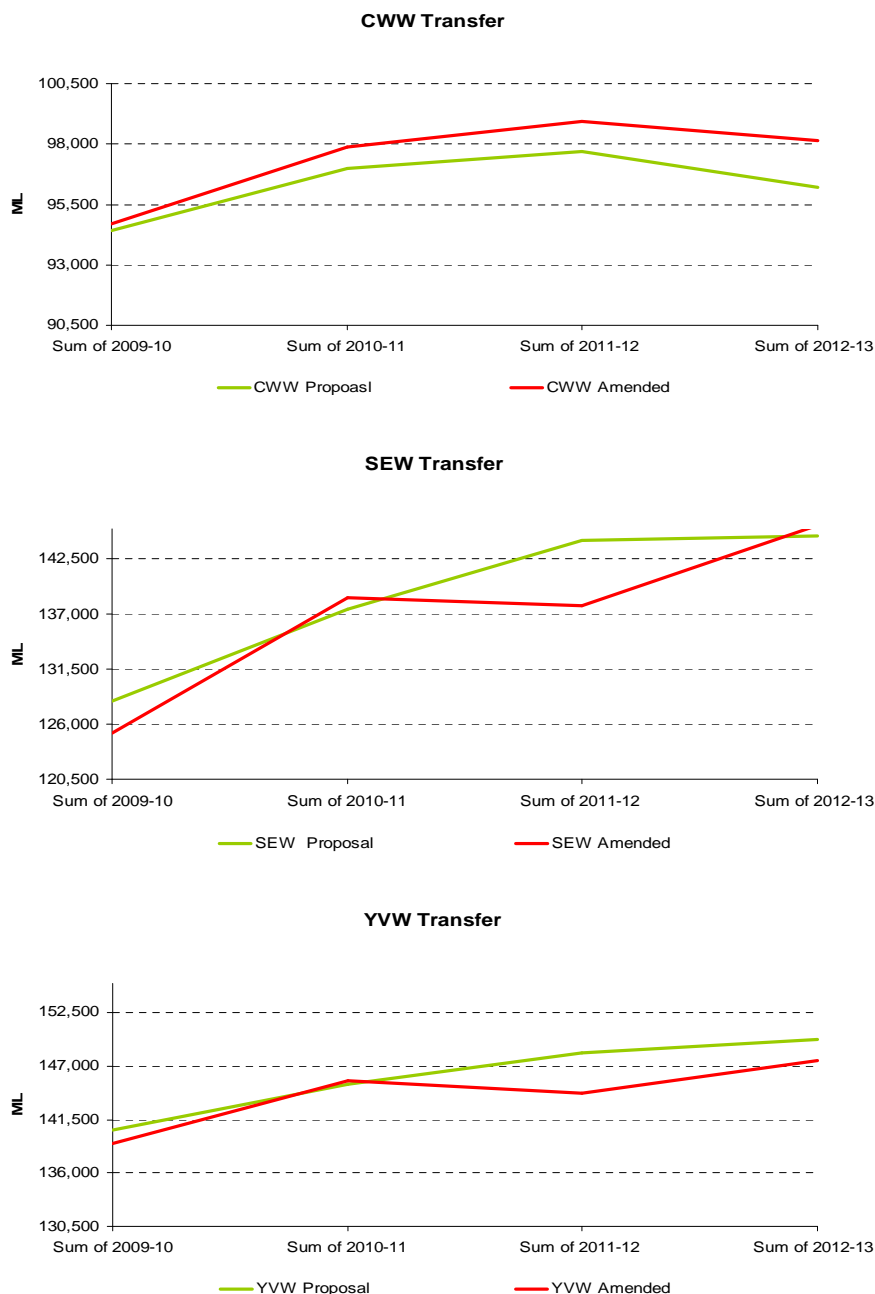
As wholesale or bulk water supplier to the three metropolitan water businesses MW's demand forecasts are dependent on the demand projections of the other metropolitan water businesses.

Correspondingly, MW's approach to developing demand forecasts has been to work with the businesses in developing their metropolitan retail

forecasts. Accordingly they have participated in the establishment of an agreed set of assumptions in addition to undertaking reviews of the retail water businesses forecasts to confirm they are reasonable.

Given this approach we have amended MW's forecasts to reflect the amendments made in the retail businesses forecasts subsequent to the Water Plans (see figure E.1).

Figure E.1. Transfer volumes — Water Plan and final amendment



For SEW and YVW the amendments most commonly resulted in a reduction in forecast volumes. This reduction reflects both the application

of the T155 program in 2009-10 and the revising of restriction levels for the subsequent years of the regulatory period. For CWW the amendments resulted in a small increase in forecast volumes. This is the result of both revisions made to reflect ViF 2008 and CWW's expectation that revised restriction levels would not have material impacts on consumption.

In our Draft Report we set out the method by which we had amended MW's forecasts.

- In relation to water volume, we are aware that MW's demands include non revenue water and that their estimation is complicated. For example, SEW's forecast non revenue water is based on estimated unavoidable annual real losses (based on length of mains, number of service connections, length of unmetered pipe between main and metre and average operating pressure), unauthorised usage plus metering inaccuracies. For the purposes of these amendments we have estimated non revenue water based on the historical ratio of the difference between retail business forecasted consumption and total water supplied by Melbourne Water to total water supplied.
- As with water volumes we realise that the estimation of sewerage flows is complicated. Outside of those flows included in the retail businesses demand forecasts, flows to Melbourne Water will also contain such things as rain dependent inflow, infiltration and unaccounted for sewage. We are also aware that the businesses and Melbourne Water employ a 'mass balance method' to allocate flows to treatment plants. The amendments we have made are based on the ratio of the difference between the businesses forecast discharges and MW's total discharge for each business to the total discharge for each businesses.
- Where business discharge sewage to both the Eastern and Western Treatments plants, amendments are based on the proportional allocation of flows proposed by businesses in their Water Plans.

Neither Melbourne Water nor any of the metropolitan retail water businesses raised any concerns about the above approach in response to the Draft Report. Accordingly we have employed the same method for the Final Report.

Service	Tariff Description	Category	Status	Sum of 2009-10	Sum of 2010-11	Sum of 2011-12	Sum of 2012-13
Sewerage		CWW	proposal	1	1	1	1
		SEW	proposal	1	1	1	1
		YVW	proposal	1	1	1	1
	Eastern	SEW	Amended	68,232	78,068	77,682	81,116
			proposal	68,996	77,551	80,354	80,347
		YVW	Amended	42,801	43,683	44,676	45,149
	Trade waste - BOD Eastern		proposal	47,700	47,675	47,625	47,507
		SEW	proposal	6,900	6,900	6,800	6,800
		YVW	proposal	1,700	1,700	1,700	1,700
	Trade waste - BOD Western	CWW	proposal	8,500	8,000	7,600	7,200
		SEW	proposal	1,400	1,400	1,400	1,400
		YVW	proposal	9,600	9,000	5,800	5,800
	Trade waste - SS Eastern	SEW	proposal	2,800	2,800	2,800	2,700
		YVW	proposal	3,400	3,400	3,400	3,400
	Trade waste - SS Western	CWW	proposal	4,500	4,200	4,000	3,800
		SEW	proposal	200	200	200	200
		YVW	proposal	3,200	3,000	2,500	2,500
	Trade waste - TDS/inorganic TDS Eastern	SEW	proposal	4,200	4,200	4,200	4,200
	Trade waste - TDS/inorganic TDS Eastern	YVW	proposal	1,000	1,000	1,000	1,000
	Trade waste - TDS/inorganic TDS Western	CWW	proposal	20,500	20,300	20,200	20,100
		SEW	proposal	200	200	200	200
		YVW	proposal	5,000	4,600	2,700	2,700
	Trade waste - TN/TKN Eastern	SEW	proposal	300	300	300	300
		YVW	proposal	100	100	100	100
	Trade waste - TN/TKN Western	CWW	proposal	600	600	500	500
		SEW	proposal	100	100	100	100
		YVW	proposal	200	200	200	200
	Western	CWW	Amended	61,887	64,179	65,400	64,980
			proposal	60,340	62,396	63,432	62,858
		SEW	Amended	25,652	28,415	28,014	29,255
			proposal	25,939	28,227	28,978	28,977
		YVW	Amended	53,447	54,221	55,217	55,757
	Water	Headworks		proposal	59,564	59,177	58,862
CWW			Amended	94,682	97,874	98,931	98,144
			proposal	94,430	97,005	97,700	96,233
GW			proposal	211	261	301	351
SEW			Amended	125,109	138,627	137,830	145,821
			proposal	128,310	137,512	144,345	144,823
WW			proposal	11,251	11,251	11,251	11,251
YVW			Amended	138,991	145,466	144,168	147,574
Transfer			proposal	140,391	145,096	148,322	149,725
		CWW	Amended	94,682	97,874	98,931	98,144
			proposal	94,430	97,005	97,700	96,233
		GW	proposal	1	1	1	1
		SEW	Amended	125,109	138,627	137,830	145,821
			proposal	128,310	137,512	144,345	144,823
	proposal	11,251	11,251	11,251	11,251		
	proposal	140,391	145,096	148,322	149,725		
	proposal	140,391	145,096	148,322	149,725		

