Water Price Review 2013: Demand Forecasts

A REPORT PREPARED FOR THE ESSENTIAL SERVICES COMMISION

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Water Price Review 2013: Demand Forecasts

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Frontier Economics has been engaged by the ESC to undertake a review and assessment of the demand forecasts prepared by the Victorian regional urban, water businesses. The outcome of Frontier's review of the demand forecasts are summarised in Table 1.

Frontiers assessment was based on the following five criteria:

- Forecasts are based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts use the best available information
- Forecasts are statistically unbiased
- Forecasts account for different or changed tariff structures and elasticities.

For a detailed discussion of these criteria see Section 2.2 of the report.

Table 1: Summary of Frontiers findings

Water business	Finding
Barwon Water	• Forecasts appear to be based on appropriate forecasting methodologies although there is a lack of transparency around the specifics of the methodology for determining water volume forecasts. In particular Barwon Water has forecast bulk water demand before splitting this between residential and non-residential demand based on historical ratios. This approach means to is not possible to ascertain whether and how driver of demand separately affect residential and non-residential demand forecasts. More generally Barwon Water's forecasts appear to be in line with historical trends. • Forecasts reflect reasonable assumptions about the key drivers of demand. For example, Barwon Water's water volume forecasts take into account climatic conditions, bounce back, water conservation measures and recycled water substitution. • Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth. • In general the forecasts rely on end use models or simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts do not account for price elasticity. Barwon Water assumed this will have a negligible impact on demand.
Central Highlands Water	• Forecasts appear to be based on appropriate forecasting methodologies. CHW has adopted an end use model to develop its forecasts. We note that CHW's forecasts appear to be in line with historical trends. • Forecasts reflect reasonable assumptions about the key drivers of

	demand. • Forecasts generally use the best available information. However, Frontier identified a need to update CHW's end use model to include actual consumption data from 2011-12. • In general the forecasts rely on end use models or simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts account for a price elasticity factor of -0.03. The elasticity factor is based on observed behaviours on an average bill for CHW major supply centres.
Coliban Water	• Forecasts appear to be based on appropriate forecasting methodologies. • Forecasts generally reflect reasonable assumptions about the key drivers of demand. However, there were a number of aspects of CW's non-residential sewer and trade waste forecasts that Frontier could not validate given the available information. • Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth. Exceptions include trade waste where it appears CW made a number of assumptions without reference to historical trends. • In general the forecasts rely on regression analysis and simple growth estimates from observed values and averages, and are therefore not expected to be biased. • CW adopted an elasticity factor of -0.10 based on an econometric study which considered a number of supply areas.
East Gippsland Water	• Forecasts have not typically been based on appropriate forecasting methodologies. EGW's approach to forecasting connections is lacking in transparency and EGW did not provide a rationale for the consumption per connection figures used to generate the water volume forecasts. In general EGW has provided very little rationale for the forecasts provided and in many cases demand data in the main body of the water plan does not equate with data contained in the pricing template. • Forecasts do not reflect reasonable assumptions about the key drivers of demand. For example water use figures do not appear to take into account of the effect of climatic conditions on water use. • Forecasts appear to be generally based on extrapolating historic trends, but where other available information has been used, it has not been used appropriately or transparently. For example, VIF forecasts of population growth were used instead of dwelling growth in determining the residential connection forecasts. • Forecasts, were generally based on simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts do not account for price elasticity.
Goulburn Valley Water	• Forecasts appear to be based on appropriate, albeit basic forecasting methodologies. Typically GVW's forecasts are based on historical trends. However, in the case of water demand GVW adjusted historical estimates of average consumption to take account of other key drivers of demand. It should be noted that the specifics of how average water consumption forecasts have been adjusted is unclear as insufficient information has been provided on the models used. In general there is a lack of transparency surrounding GVW's water connection and

Summary of findings

	volume forecasts. The disaggregated data provided by GVW could not be reconciled with the figures provided in the financial template. However, the difference in most cases is not significant and so we have not deemed it necessary to pursue this. • Forecasts reflect reasonable assumptions about the key drivers of demand. In particular, GVW has considered the impact of climatic conditions in its forecasts taking as a starting point average consumption in a year with average climatic conditions and where supply was unrestricted (removing the need to consider bounceback). It has also assumed some minor ongoing water use efficiency. • Forecasts generally use the best available information including the VIF's 2012 forecasts of dwelling growth. • Forecasts were based on simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts do account for price elasticity as this was considered negligible.
Gippsland Water	• Forecasts appear to be based on appropriate forecasting methodologies except for the trade waste non-residential customer number forecasts and the water volume forecasts. GW's water demand forecasts are particularly questionable. They are based closely on an upper bound which in turn is based on adjusted historical estimates of average consumption which take account of how passed consumption levels may have been affected by some, but not all, the not other key drivers of demand (including climatic conditions). • Forecasts reflect reasonable assumptions about the key drivers of demand with the exception of the water volume forecasts – which neglected to transparently consider the impact of climatic conditions and restrictions on future demand. • Forecasts generally based on extrapolating historic trends but some use has been made of other available information. • GW's water volume forecasts are likely to be statistically biased. However, other forecasts were based on simple growth estimates from observed values and averages, and are therefore not expected to be biased. • The forecasts account for price elasticity.
GWMWater	• Forecasts were based on appropriate forecasting methodologies. • Forecasts reflect reasonable assumptions about the key drivers of demand. • Forecasts generally use the best available information, including VIF2012 household growth estimates. The assumption that 2015-16 would be a La Nina (wet) year was revised with the assumption of average conditions. • Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts do not account for price elasticity; however, given the relative inelasticity of water demand and the lack of material price changes, this review did not identify this as an issue of concern.
Lower Murray Water (urban)	• Forecasts were based on appropriate forecasting methodologies. • Forecasts reflect reasonable assumptions about the key drivers of demand. • Forecasts generally use the best available information. The review identified that more recent estimates of household growth (VIF2012)

	could be used to revise and improve forecasts. Some data errors were also identified and corrected. • Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased. The approach used to estimate per connection consumption at 488kL/yr appears to be robust. • Forecasts do account for price elasticity. Literature values were used, in line with the approach adopted for the previous price review.
North East Water	• With the exceptions of non-residential customers and trade waste customers, forecasts appear to be based on appropriate forecasting methodologies. Forecasts for non-residential customers appear to be based on blanket growth assumptions. • Forecasts reflect reasonable assumptions about the key drivers of demand. Exceptions include non-residential connections and trade waste. • Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth, the exception being forecasts that relate to non-residential customers. Non-residential forecasts do not appear to have referenced council planning expectations. • Forecasts for residential services generally rely on agent-based models and simple growth estimates from observed values and averages, and are therefore not expected to be biased due to method. • Forecasts do not appear to account for price elasticity.
South Gippsland Water	• Forecasts are generally based on basic but adequate forecasting methodologies, which typically involve continuing historical trends. There are some exceptions. Non-residential connections forecasts (general tariff) in the Southern region were not adequately explained and so have been amended to match historical rates of growth. We also have concerns about SGW's approach to forecasting residential connection growth by proportionally adjusting the VIF 2012 forecasts (see below). • Forecasts generally reflect reasonable assumptions about some of the key drivers of demand. However, not all key drivers were considered. SGW assumed some low level bounceback in its forecasts (given restrictions ended a number of years ago). However, it has not adequately accounted for climatic conditions in the region. In the last few years demand may be lower than average because of relatively wet climatic conditions. Adjustments to SGW forecasts have been made on this basis. • Forecasts generally make use the best available information such as the VIF's 2012 estimates of dwelling growth but not always in the most appropriate way. In the future SGW should seek household growth forecasts, from the VIF, which exclude the Philip Island area rather than attempting to adjust for this. • In general the forecasts rely on simple growth estimates from observed values and averages, and are therefore not expected to be statistically biased. • A price elasticity of -0.035 has been assumed in forecasting water demand, but not in relation to SGW's other services.
Wannon Water	• Forecasts were based on appropriate forecasting methodologies. • Forecasts reflect reasonable assumptions about the key drivers of

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	demand. • Forecasts generally use the best available information. The review identified that VIF2012 household growth estimates were available to revise and improve forecasts, but would not materially change the forecasts. • Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased. • Forecasts do not account for price elasticity, however, given the relative inelasticity of water demand and the lack of material price changes, this was not identified as an issue of concern.
Westernport Water	• Forecasts were based on appropriate forecasting methodologies. • Forecasts reflect reasonable assumptions about the key drivers of demand. • Forecasts generally use the best available information. The review identified that VIF2012 household growth estimates could be used to revise and improve forecasts. Some data errors were also identified and corrected. • Forecast approaches are simple growth estimates from observed values and are therefore not expected to be biased.

PART A Overview

PART A Overview

1. Introduction

In Victoria there are 12 regional government owned businesses that provide water and wastewater services to urban communities across the State. The services provided vary from business to business but typically include the treatment, distribution and reticulation of water and recycled water; the collection, transmission treatment and disposal of sewage; and trade waste services.

As monopoly providers these businesses are subject to economic regulation which is administered by the Essential Services Commission (ESC). The ESC is currently conducting a price review to regulated prices for the period 2013-14 to 2017-18. Demand forecasts are a central component of the price review. Demand forecasts have a direct impact on:

- Capital expenditure estimates — particularly where growth is a major driver of system augmentations.
- Operating and maintenance expenditure — particularly for expenditures that are volume related.
- Revenue and prices — for both fixed and volumetric charges.
- Service standards — ensuring that supply-demand balance is achieved, water pressure requirements are met and supply continuity is provided.

Therefore, it is important to ensure that demand forecasts are as accurate as possible in order to reduce regulatory risk and promote efficient regulatory outcomes.

1.1 Objective of the review

Frontier Economics has been engaged by the ESC to undertake a review and assessment of the demand forecasts prepared by the Victorian regional urban, water businesses.

The businesses have prepared these forecasts for inclusion in their water plans for the five years 2013-14 to 2017-18. The ESC is currently undertaking the Water Price Review 2013 that will assess the reasonableness of the proposals set out in the businesses' water plans.

The outcome of Frontier's review of the demand forecasts will be an input into the ESC's consideration of the businesses' water plans.

Frontier has been asked to review whether the forecasts:

- are based on appropriate forecasting methodologies
- reflect reasonable assumptions about the key drivers of demand
- use the best available information, including historical demand trends and relevant Water Supply and Demand Strategies
- are statistically unbiased
- account for different or changed tariff structures and elasticities.

1.2 Structure of this report

This report is structured to provide a broad summary of Frontier's Draft findings as well as providing a more detailed business specific examination of each of the businesses proposed forecasts. The report is structured as follows:

- Summary of findings — a broad overview of Frontiers findings.
- Part A
  - Chapter 1 — this chapter provides an introduction to the report.
  - Chapter 2 — this chapter outlines Frontier's approach to assessing the regional Victorian water businesses' demand forecasts for the regulatory period beginning 2013.
  - Chapter 3 — this chapter provides a broad overview of the different methods adopted by businesses in generating forecasts.
  - Chapter 4 — this chapter provides an overview of the main assumptions and information sources underlying businesses' forecasts.
- Part B
  - Chapters 1 to 12 — Business specific demand assessments.

2. Frontier's approach

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 the validity of these assumptions over the next regulatory period. Our views on these assumptions are then used to assess each business's forecasts and the methodology and assumptions used in developing their forecasts (reported in Part B).

2.1 The review process

This report presents Frontier's final advice to the Essential Services Commission regarding the appropriateness of the Victorian water businesses' demand forecasts. The report is the final stage in a process that involved our own analysis and managed consultation with the water businesses.

The initial analytical task was to review the information provided by the businesses in their submitted water plans and information templates. This initial review concentrated on establishing the completeness of the data provided by the businesses and identifying any underlying trends or anomalies in the data that required further investigation. In particular, Frontier identified:

- sudden changes in long-term trends that are unexplained
- changes in trends that are inconsistent with expectations
- inconsistencies with the data requirements of ESC.

Where any preliminary issues were identified during our initial scan they were addressed through an information/clarification request that was distributed to the relevant businesses. The requests outlined the issue identified and gave guidance on how the businesses should respond.

Where necessary Frontier directly liaised with the businesses on their initial submitted data and their responses to the information requests to ensure that any issues or perceived issues were not due to misunderstanding or basic error in the original submission.

Frontier then undertook a detailed assessment of the demand forecasts based on the information provided in the original water plan and the subsequent responses by the water businesses to information requests. Frontier provided the ESC with a draft report that outlined the approach Frontier had adopted in undertaking its assessment, the initial findings of its review and the recommended amendments to any forecasts deemed inappropriate.

Where Frontier believed the businesses' underlying assumptions were inappropriate we provided the ESC with reasonable, alternative forecasts that reflect more robust assumptions. These alternative forecasts were accompanied by an explanation of the reasoning supporting the alternative estimate, along with a description of the approach adopted by Frontier to generate the estimates.

Frontier's draft report was circulated to each of the businesses for comment. Frontier then undertook a round of consultation where businesses were invited to either meet with Frontier consultants on a face to face basis or to teleconference with the Frontier consultants. This round of consultation allowed the businesses to highlight any issues or concerns they may have with Frontier's findings and recommendations.

This final report takes into consideration all the information provided with the businesses' water plans and initial information requests along with the businesses responses to the Frontier's initial findings as laid out in the draft report.

2.2 Assessment of forecasts

The ESC has requested that the demand forecasts be assessed against five criteria:

- Forecasts are based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts use the best available information
- Forecasts are statistically unbiased
- Forecasts account for different or changed tariff structures and elasticities.

Frontier has interpreted these criteria in the context of the scope and nature of the review.

- Appropriate forecasting methodologies — businesses have adopted methods for forecasting that are capable of providing reliable forecasts if applied correctly. They may be consistent with sector practice, been previously subject to regulatory review or broadly acknowledged as appropriate.
- Forecasts should reflect reasonable assumptions about the key drivers of demand — the base assumptions underlying the forecasts should be credible and defendable.

- Forecasts should use the best available information, including historical demand trends and relevant Water Supply and Demand Strategies — all forecasts should not only reference historical data but should also be based on the most recent available data.

- Forecasts are statistically unbiased —Frontier has interpreted this criterion to mean that at a broad level the methods adopted by businesses do not appear to contain inherent systemic bias. It is worth noting that the scope and time available for this review meant Frontier was not able to undertake a comprehensive detailed review of the statistical robustness of each businesses' forecasts and forecast models

- Forecasts should account for different or changed tariff structures and price elasticities. Where businesses are proposing to amend their tariff structures the associated demand forecasts should also be amended to be consistent. For example, any business proposing to move from a three tier variable tariff to a two tier variable tariff will need to consider the impact of the tariff change on demand. Businesses will also need to consider how they have applied elasticity estimates to their forecasts.

On the basis of the information templates and the responses to information requests supplied by the businesses, Frontier has reviewed the businesses' proposed forecasts against the above criteria. In providing this advice we have had regard to:

- guidance issued by the ESC with respect to how it will assess the businesses' proposed demand forecasts

- the information set out in the businesses' Water Plans (and accompanying information templates), any explanations provided and their responses to our information requests

- comparison of proposed forecasts against historical trends

- comparisons of different businesses' forecasting methodologies, assumptions, and resulting forecasts

- relevant third party information such as Victorian Government policies which impact on demand and any readily available data and information on key demand drivers.

- Frontier'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

A more detailed framework for Frontier's assessment is set out in Box 1. It should be noted that our review of the proposed demand forecasts was high level in nature, in that it focused on the comparisons against historical trends and on the identification and validation (or otherwise) of the major assumptions underlying the forecasts. The review did not constitute a bottom up detailed audit of the mathematical integrity of each businesses forecasting model.

Box 1: Assessment Template

STEP 1 assessment of forecasting methods:

- the method's track record — historical ability to produce forecasts that are consistent with actual outcomes
- the logical validity of the approach
- the acceptance of the approach within the broader sector
- the method's internal consistency

STEP 2 comparison against historical trends

- identify historical trends
- compare proposal against trends
- identify material deviations from trend
- identification of underlying assumptions

STEP 3 comparison across similar businesses

- comparison of assumptions against those referenced by businesses with similar characteristics

STEP 4 consideration of third party evidence

- comparison of assumptions against those relevant evidence provided by third parties

STEP 5 amendment of forecasts where appropriate

- where Frontier has identified incomplete or inappropriate forecasts we will amend forecasts to better reflect more robust assumptions
- Frontier takes the approach that any amendments recommended to forecasts should be robust and defendable and based on observable evidence

2.2.1 Comparison against historical trends

Frontier assessed the scale and causes of any variances between the proposed forecasts and the observable trends based on historical data.

This step involved identifying trends in consumption based on historical data. Forecasts were then compared to historical trends to enable the identification of instances where businesses are assuming step changes in consumption or material deviations from historical trends.

2.2.2 Comparisons across similar businesses

To aid in this assessment Frontier compared and contrasted the assumptions and methodologies adopted by different businesses. Of particular importance in the assessment of the forecasts is the identification and reasonableness of the underlying assumptions regarding the impact of weather on outside water use, the degree of bounceback, consumer behaviour and growth.

In assessing the assumptions underlying demand we adopted the following expectations as a starting point:

- Consumer behaviour and water consumption patterns should not vary significantly between similar businesses. The profile of consumption by residents should not vary to any large degree across metropolitan retailers and regional urban businesses.

- Consumers will behave in a similar way when confronted with increased water prices assuming prices are set at a similar level. That is, price demand elasticity should be fairly consistent across businesses with similar types of customers.

These expectations are only intended to provide guidance to our assessment. 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. For example, for some businesses consumption could reflect seasonal tourism patterns. Similarly consumption by customers of the rural providers may reflect differing water availability.

Frontier recognises that there may be valid reasons why the conditions being experienced by a particular business warrant the use of an assumption that deviates from that adopted by other businesses or third party sources. We have engaged with the business concerned to understand why the assumption it has used differs and to request further information or evidence in support of that approach.

2.2.3 Consideration of third party evidence

Frontier also assessed the businesses' forecasts against evidence available from third parties or independent sources. Where possible, we identified independent third party views on:

- bounceback
- behavioural changes in water users including price demand elasticity impacts and the effectiveness of the various non-price water conservation measures proposed by the businesses
- future population and demographic trends
- availability of water resources
- trends in technology and water use and
- demand for commodities and commercial products produced by commercial water users.

2.3 Approach to adjusting forecasts

We have adjusted the businesses' forecasts where the information provided did not support the assumptions businesses' had used, or where information has not been forthcoming from the business. In most cases, we have 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.

Underlying Frontier's approach is a requirement that any amendments recommended to forecasts should be robust, defendable and based on observable evidence. There were instances throughout the review where Frontier expressed concerns regarding certain aspects of forecasts, however reliable alternative information upon which to base an adjustment was not available. In such instances we adopted a precautionary approach and accepted the businesses' forecasts subject to qualification.

3. Forecasting methods

The adequacy of a business's proposed demand forecasts depends on whether it has adopted an appropriate forecasting method.

Through the course of the review Frontier identified a range of methods for forecasting demand that had been adopted by water businesses across Victoria. This range extends from the extrapolation of historical trends through to the use of regression analysis and data intensive 'end use models' and agent based models.

In general the information provided in water plans and in response to information requests and the Draft report was not sufficient in order for Frontier to establish a detailed understanding of the approaches undertaken to forecast demand. In some instances this lack of information impeded Frontier's review of the businesses' forecasting approach. For example, Frontier found that EGW's approach to forecasting connections is lacking in transparency. In general EGW provided very little rationale for the forecasts and in many cases demand data in the main body of the water plan did not equate with demand data provided in the water plan information templates.

3.1 Trend extrapolation

Regional businesses primarily adopt an extrapolation approach. This approach is relatively simple and, in our experience, where applied correctly, will in most circumstances produce outcomes that are consistent with more complex forms of forecasting. Under such an approach it is important to ensure that the underlying historical data is complete and sufficient to capture underlying trends. It is also important to ensure that the approach to estimating growth trends is both valid and applied in a consistent manner. The other aspect of extrapolation that requires attention is the appropriateness of any assumptions made regarding any potential step change in any of the key drivers of demand over the forecast period.

In some instances water businesses adopted a simple extrapolation approach that was not appropriate. For example GW's approach to forecasting residential water demand is problematic. GW's approach was to adjust historical usage figures (based primarily on the application of elasticity impacts to actual consumption data) and then extrapolate the adjusted historical consumption over the regulatory period. This approach ignores the impact of other key drivers of demand such as the level of restrictions in place and climatic conditions and has the potential to introduce bias into the forecasts.

While not the most sophisticated approach to forecasting demand, Frontier recognises that trend extrapolation, if conducted in an appropriate manner, coupled with appropriate assumptions regarding changes in key demand drivers over the course of the regulatory period, is capable of generating reasonable demand forecasts. While trend extrapolation should not be considered best practice, we also acknowledge that such an approach has been accepted by the water industry in general over the course of many years.

Trend extrapolation is most appropriate where the main assumption is that the future will more or less be a continuation of the past. If the past was unusual (e.g. droughts) or the future is different (e.g. anticipated larger future price increases) then one needs to make appropriate adjustments to the trend analysis.

3.2 End use models

A small number of regional businesses used an end use models. Such models estimate total demand for water and sewerage demand based on end-uses — that is, the model generates forecasts of the water consumption associated with specific end uses (based on average water use by appliances such as washing machines, dishwashers and toilets, accounting for water use efficiency). The model then aggregates the volumes associated with specific water uses to derive a total water and sewerage demand. The resulting end use model demand forecasts are then adopted by the businesses as baseline forecasts and are further amended to take into account water restrictions, and in some cases conservation strategies and price elasticity of demand. For example, Barwon Water forecast its bulk water volume using a linear regression model in combination with an end use model.

Frontier accepts the use of end use models, where applied correctly, as an appropriate approach to demand forecasting. End use models have been utilised in the water sector for a long period of time and have been subject to review and approved by the ESC previously.

3.3 Regression analysis

A small number of regional businesses also utilised regression analysis. These included LMW and Barwon Water. For example LMW determined the forecast level of residential demand per connection based on econometric techniques. The analysis involved regressing average consumption per connection against average maximum temperature and average monthly rainfall per quarter.

Where utilised in an appropriate manner regression analysis has the potential to add material value to the forecasting of demand for water and sewerage services.

3.4 Agent based models

Some businesses have also begun to adopt agent-based modelling approaches to forecast demand. Agent-based models are similar to end use models in that they are a bottom-up approach to generating demand forecasts. However, unlike an end use model that relies on historical trends in the adoption of water efficient appliances and practices, agent-based models incorporate agents that react or interact with each other based on a set of pre-defined rules. These models are dynamic in nature and allow for the creation of complex outcomes.

These models are a relatively new approach to forecasting water demand. Frontier accepted the use of agent based models as an appropriate method given that it has been accepted by the ESC previously and has also been adopted by the ESC to facilitate its own understanding of demand forecasts. Examples of businesses that utilised agent based models include NEW and CHW.

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4. Assumptions underlying demand

4.1 The context of demand forecasts

Demand forecasts should reflect reasonable assumptions about the key drivers of demand, irrespective of the method adopted. There are many variables that can potentially impact on consumption forecasts for urban and rural water use. The materiality of these variables and their influence on demand will change over time.

For example, regulatory price reviews over the preceding five years have focused on the variables associated with drought, such as the availability of water resources and the level of water restrictions. Given recent rainfall, forecasts of water consumption over the next five years are likely to be less affected by these factors.

However, for this price review there is some uncertainty around some of the key drivers of demand. In particular, there is uncertainty about the long-term impact of climate change on trends of water availability post drought and how changing weather patterns will impact on outdoor use. Also with the recent easing of water use restrictions there may be some 'bounceback' in demand, whereby consumer behaviour changes given the increased water availability and the removal of restrictions.

The uncertainty associated with these factors may affect the robustness of demand forecasts, particularly in respect to demand for potable and recycled water.

4.2 Key assumptions for regional urban demand forecasts

The current identifiable drivers of demand include:

- Population and demographic changes — growth in population and in household density.
- Climate and water availability — natural rainfall patterns have a direct impact on the demand associated with agricultural and outdoor residential use. Climate also impacts on the amount of water in storage and can influence water availability.

- The materiality of 'bounceback' — the likely impact of easing water use restrictions given the effectiveness of past demand management initiatives and ongoing permanent water savings.
- Consumer behaviour — the effectiveness of the various non-price water conservation measures proposed by the businesses.
- Price demand elasticity impacts — taking into account the price effect of recent supply augmentations.

While population and demographic change, particularly growth in households, is the primary driver for variables associated with fixed charges (such as connection charges or fixed sewerage charges), it will also impact on aggregate forecasts of consumption as the number of customers increases. The other three drivers relate primarily to volumetric water use and where appropriate volumetric wastewater services.

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

4.3 Population growth and demographic change

Findings

Frontier supports the businesses' use of the Victorian in Future 2012 forecasts of household growth to generate connection and volume based forecasts, subject to allowances being made for differences in the composition of SLA and LGA as used in the VIF and areas for which businesses have a responsibility to provide services.

In a number of instances Frontier has amended individual forecasts to ensure consistency with the latest VIF forecasts.

Frontier has made amendments to forecasts to address unsubstantiated demographic assumptions.

In a number of instances Frontier amended forecasts for trade waste to be consistent with trends in historical data. In general Frontiers amendments related to unsubstantiated step declines observable in the forecasts for 2012-13.

A major driver of water consumption is growth in customer numbers. Of particular concern to the forecaster are population growth, demographic change and household density. All of these factors have a direct impact on residential consumption.

Growth in customer numbers is complicated by the fact that such numbers are based on household connections as opposed to being directly based on population. Consequently, it is important that businesses' forecasts consider not just population change but how such change translates into household numbers over the period and any anticipated trends in household composition. For example, household size may be growing which would imply that growth in household numbers will (all things being equal) be lower than growth in population.

However, where there are changes in demographics (such as decreases in household size and changes in household allotment size) consumption per connection may decline. This implies that the level of demand attributable to growth may need to be adjusted downward.

4.3.1 Victoria in Future

The principal third party evidence used by Frontier in assessing the businesses' forecasts of customer numbers are the population and demographic forecasts of Victoria in Future 2012 (VIF).

VIF sets out projections of population and households across Victoria. The projections are developed by the Spatial Analysis and Research Branch of the Department of Planning and Community Development (DPCD). VIF 2012 projections cover the period 2011 to 2051 for Victoria, metropolitan Melbourne and regional Victoria. Projections for smaller geographical areas (Statistical Local Areas and Local Government Areas) cover the period 2011 to 2031.

The projections are based on the 2011 ABS population estimates and supersede the projections published by DPCD in 2008.

Previously, DPCD published projections after each national Census, based on that Census year (e.g. VIF 2008 used 2006 as its base year). VIF 2012 improves on this process by providing inter-Censal projections based on the latest available Australian Bureau of Statistics (ABS) population estimates at 30 June 2011.

Victoria in Future projections are based on observable historical trends in population. A variety of factors influence the population size, age structure and distribution. When changes resulting from policy changes are observed and measured, DPCD's monitoring tools gather this evidence, and apply it in developing updated projections. Such updates assist the planning and service delivery functions of the Victorian Government.

Applying the VIF

While the VIF is generally considered to be a reliable estimate of population and household growth, several issues must be considered when comparing VIF based growth estimates to the connection growth estimates of businesses.

The major issue is that the VIF statistics are based on defined Statistical Local Areas (SLA) and Local Government Areas (LGA). These areas may or may not coincide with the service areas for which businesses are responsible. In some instances a SLA may cover a geographical area that includes within it areas for which different water businesses have obligations to supply services.

This shared nature of SLAs and LGAs can potentially affect the applicability of VIF forecasts. For example, a number of regional water businesses are responsible for supply in only part of a given SLA. An issue arises when the areas of a business's supply responsibility are characterised as small regional communities that have not evidenced any growth historically, nor are expected to experience growth in the future. If the same SLA contains larger growing communities that are outside of a business's supply area then the overall growth rate for the SLA is skewed and is not representative of the water business's supply area.

While our expectation is that where possible growth should equate with VIF forecasts, in instances where there are difference between the businesses forecasts and VIF we have considered the consistency of water demand forecasts with trends observed in historical data.

We have also been mindful that businesses have an incentive not to over state demand. The revenue risk associated with forecasts in the regulatory context means that businesses face an increased risk of insufficient revenue where demand growth is overstated.

Taking these considerations into account Frontier has taken a precautionary approach to its assessment of the forecasts and accepted growth forecasts that differ from VIF where:

- businesses evidenced consistency with historical trends, and
- the difference between the VIF and water businesses' growth rates was immaterial (i.e. one or two percentage points), and or
- businesses' forecasted growth exceeded that of the VIF.

4.3.2 Growth in residential water connections

The average per annum compound growth rates for residential water connections proposed by each of the businesses in their water plans are outlined below in Table 2. The table also includes the VIF 2012 forecasts for households based on the statistical areas serviced by each water business.

Frontier was able to replicate growth rates based on VIF 2012 for most of the regional businesses based on their water supply areas.

Only Barwon Water proposed growth that equated with the VIF forecasts. Of the remaining businesses approximately half forecast growth above the VIF and half forecast growth below the VIF (see table 1).

Most businesses stated that they had relied on VIF 2012 forecasts to some extent. More commonly population forecasts rather than household growth forecasts were considered. Where population forecasts were used it is our expectation that the demographic trends assumed by businesses to determine increased connections would be consistent with those used by VIF in determining its household series.

Table 2: Forecast growth rates for residential water connections

Business	Water Plan Proposal (%per annum)	VIF Households (%per annum)
Barwon Water	2.0	2.0
Central Highlands Water	1.6	1.8
Coliban Water	1.7	1.4
East Gippsland Water	1.3	1.7
Gippsland Water	1.8	1.5
Goulburn Valley Water	1.6	2.1
GWMWater	2.1*	-
Lower Murray Water (urban)	1.0	1.1
North East Water	1.4	1.2
South Gippsland Water	1 – 2.1	2.7
Westernport Water	2.0	2.3
Wannon Water	1.1	-

Source: Frontier estimates based on data from Water Price Review 2013 and VIF 2012. N.r. not reported. Average annual growth is calculated as the average compounding growth rate over the five year period from 2012/13 to 2017/18.
*Average annual growth is calculated as the average compounding growth rate over the regulatory period from 2013/14 to 2017/18.

Frontier identified a small number of instances where water businesses had simply applied population growth projections to connections without consideration for demographic change. For example Westernport Water had adopted a 2% growth rate based on the VIF population growth forecasts for the Bass Coast-Phillip Island SLA. Frontier amended the forecasts to reflect the VIF growth projects for households rather than the population, as these projections reflect demographic trends and are more appropriate for forecasting connections.

Assumptions regarding demographics also impacts on volumetric forecasts of water consumption. For example, a trend of increased occupancy rates will (all things being equal) potentially increase per connection consumption which will lead to higher aggregate levels of water use. For example, Westernport Water's volumetric forecasts were based on the assumption that all new connections were non-permanent in nature (i.e. holiday accommodation). Much less water is consumed in non-permanent residences than in permanent residences and

consequently Frontier was concerned that the demand forecasts were materially lower than they should be. Frontier amended Westernport Water's forecasts such that the forecast volumes attributable to growth referenced the current proportion of permanent and non-permanent growth residences.

Most businesses acknowledged that they utilised VIF to determine a baseline forecast for demand which they then amended to take into account a variety of other factors. However, few of the businesses explained in their water plan the detailed methodology that they used to translate the VIF forecasts into connection forecasts for their water supply area.

While some noted that they have used planning documents, local council or historical information to adjust the forecasts, there was often little detail provided on what specific adjustments were made.

In some instances, we found issues with the businesses' forecasts and have made adjustment to these. Frontier accepted forecasts where businesses' forecasts were within one or two percentage points of VIF 2012, were greater than VIF 2012 and or were consistent with historical trends. Where forecasts did not meet these criteria they were amended. For example, EGW forecast growth rates that were materially lower than the VIF forecasts. In the Draft Report Frontier amended EGW's forecasts (specifically, the 20mm, vacant land and multi-service connection numbers) to reflect the VIF's 2012 annual average household growth estimates for the East Gippsland region. In response to the Draft Report EGW accepted Frontier's revisions.

In some instances, Frontier identified that forecasts were based on VIF 2008 projections and therefore did not constitute a use of the most recent available data. In these instances we have amended forecasts to reflect VIF 2012 projections. For example, Frontier identified that VIF 2008 was used for forecasts by both LMW and Wannon Water. In the case of LMW Frontier was able to amend both the connections forecasts and the subsequent volumetric forecasts to reflect the latest VIF projections. These amendments were not possible for Wannon Water as the misalignment of SLA and service areas meant that adjusted SLA data was not available. We note that in the case of Wannon Water it should seek to amend its forecasts in response to the ESC's draft decision to reflect more recent VIF projections if they are available at that time.

4.3.3 Growth in residential sewerage connections

The average per annum compound growth rates for residential sewerage connections proposed by each of the businesses in their water plans are outlined below in table 2.

Our general expectation is that the growth rate for residential sewerage connections should be broadly similar to the growth rate for residential water connections. It is a common planning requirement that most new dwellings be serviced by both sewer and water reticulation services. However, we are also mindful that there are valid reasons that this expectation may not apply to some individual businesses. This is especially case where businesses service regional communities where growth relies on onsite sewage treatment (e.g. individual septic tanks).

Table 3: Forecast growth rates for residential sewerage connections

Business	Water Plan Proposal (%per annum)l	VIF (%per annum)
Barwon Water	2.0	2.0
Central Highlands Water	1.9	1.78
Coliban Water	1.7	1.4
East Gippsland Water	1.3	1.7
Gippsland Water	2.6	1.5
Goulburn Valley Water	1.4	2.1
GWMWater	n.a.	n.a.
Lower Murray Water (urban)	1.1	1.1
North East Water	na	1.2
South Gippsland Water	1.8	2.7
Westernport Water	2.0	2.3
Wannon Water	1.0	-

Source: Frontier estimates based on data from Water Price Review 2013 and VIF 2012. Average annual growth is calculated as the average compounding growth rate over the five year period from 2012/13 to 2017/18.

As with water connections Frontier was able to replicate growth rates for residential sewerage connections based on VIF 2012 for most of the metropolitan and regional businesses based on their sewerage service supply areas.

Again, most businesses relied on VIF 2012 forecasts to some extent. As with water connections a number of businesses have forecast that the growth in residential customer sewerage connections will be above the expected household

growth rate forecast by VIF (see table). Frontier notes that residential sewerage connection growth rates are largely consistent with residential water connection growth rates. In some instances regional businesses have used the same methodology to develop the sewerage forecasts as they did to develop water forecasts. As a result, in the instances where it was necessary to adjust the residential water connection forecasts it was also necessary to adjust the sewage connection forecasts. For example, sewerage growth rates were revised upwards in the Draft Report for EGW and Westernport Water in line with the amendments Frontier made to the business's water connection forecasts.

4.3.4 Growth in non-residential water, sewerage connections and trade waste customers

Forecasting growth in non-residential connections is more difficult than forecasting residential connections. As a group, 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 forecasts of non-residential connections from residential connections — in some instances growth rates for non-residential water and sewerage connections were derived from growth in residential connections, while in others historical trends were used as the basis for forecasting.

Commonly non-residential connections were forecast to grow at a slower rate than for residential connections. The rational provided by most businesses referenced historical growth rates and information they had received through consultation with commercial customers.

Trade waste customer numbers were commonly forecast to remain constant over the regulatory period, even in instances where a historical trend could be observed. In some instances historical data was highly volatile and as such did not provide for readily observable trends. In general where businesses forecasts included unsupported zero growth assumptions they were amended by Frontier in the Draft Report on the basis of identifiable historical trends. For example EGW's and NEW's trade waste forecasts were amended upwards based on observable trends in historical data.

4.4 Climate, water availability and rainfall substitution

Findings

No business has forecast restrictions over the course of the regulatory period. Frontier believes that this assumption is consistent with assumed climatic outlook and is appropriate.

In some instances businesses forecast specific weather events (such as La Nina floods). Frontier amended forecasts where such events were not supported by evidence.

One of the key factors that the businesses need to consider when developing demand forecasts is their expectations about water availability (mostly driven by rainfall) over the next regulatory period. Water availability affects consumption in both the short and long term. This will affect different businesses in different ways.

4.4.1 The impact of climate

For regional urban businesses rainfall can act as a direct substitute for potable and recycled water for outdoor use. In periods of high rainfall, outdoor use is expected to decline significantly as people no longer need access to potable water to sustain their gardens. Figure 1 shows the difference in rainfall this year (2011-12) compared to three years ago (2008-09). The figure shows a marked increase in rainfall particularly over the eastern parts of Victoria.

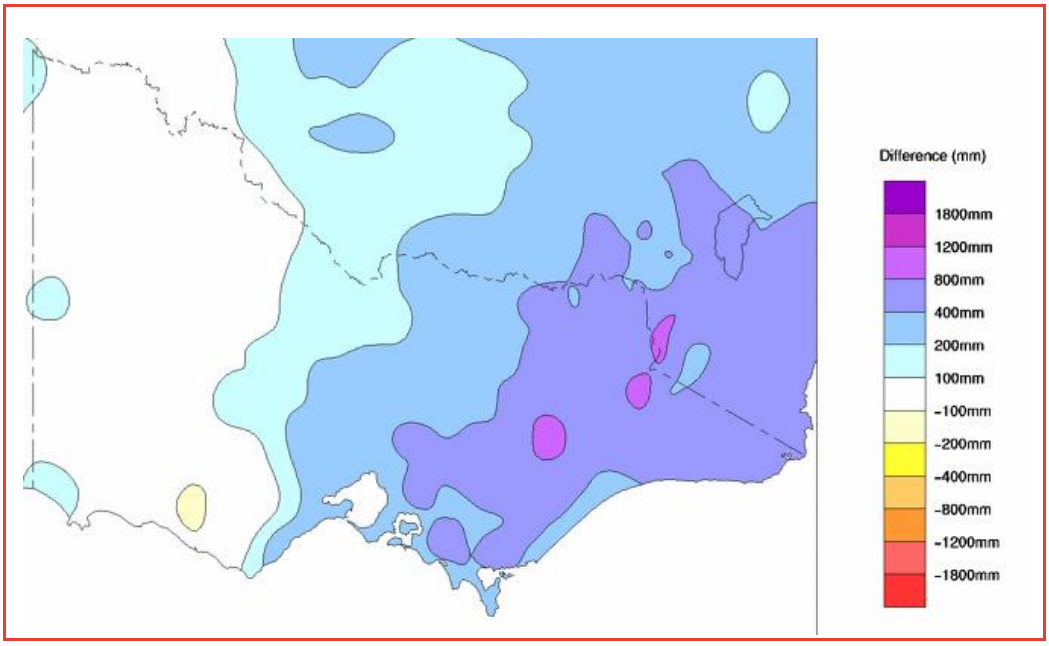
The impact of any increase in rainfall on potable and recycled water demand will depend on how the distribution of rainfall relates to seasonal consumption patterns. However, it is reasonable to assume that both domestic potable and recycled water consumption would decrease with increased rainfall (all things being equal). Past trends have been consistent with this prediction. The weighted average annual household water consumption across Victoria fell 6 per cent over the period 2009-10 to 2010-11 as the State returned to wetter conditions. Demand for recycled water fell by much more, around 35 per cent, particularly for agricultural uses[1].

Forecasting levels of rainfall is extremely difficult. Any forecast is invariably subject to high levels of uncertainty. The difficulties associated with forecasting

[1] ESC (2011), 'Water performance report: Performance of Urban water and sewerage businesses 2010-11', December 2011 (source: http://www.esc.vic.gov.au/getattachment/45958c7c-4ea6-4aaf-a082-2d08e783cb32/Performance-Report-2010-11-Metropolitan-and-region.pdf)

rainfall are exacerbated with the length of the forecast period. The Bureau of Meteorology's own Predictive Ocean Atmosphere Model for Australia only extends out to 90 days.

Figure 1: 3 year inter-annual rainfall difference 2011-12 to 2008-09



Source: Australian Bureau of Meteorology 2012

4.4.2 Climate assumptions

Regional businesses have observed that water use has declined significantly over the last regulatory period and that rainfall has increased over some of this period which is likely to have impacted on usage. However, businesses have often not explicitly or transparently considered the extent to which water availability has affected past consumption.

In some instances no rationale is provided for the consumption per connection figures that have been used to generate the water volume forecasts. Furthermore, these average water use figures do not appear to take into account of the effect of climatic conditions on water use. By ignoring this, many businesses are implicitly assuming that wet conditions will continue over the regulatory period.

In a number of instances Frontier requested businesses consider the most recent data from 2011-12 and 2012-13 (years which have generally been dryer and therefore characterised by greater water use). For example, CHW was requested to rerun its demand models to account for the most recent data in its forecasts.

No business has forecast restrictions over the course of the regulatory period. Frontier believes that this assumption is consistent with assumed climatic outlook and is appropriate.

In some instances businesses forecast the occurrence of specific weather events during the course of the regulatory period. For example GWMW forecast a La Nina flood year in 2015-16. In the draft report Frontier amended GWMW's forecasts to remove the impact of the La Nina flood year and asked GWMW to respond with evidence supporting its assumption. In response to the Draft Report GWMW accepted Frontier's revision.

4.5 Conservation and bounceback

Findings

Regional businesses have relied on historical trends in average water use in order to develop their forecasts. Frontier has accepted forecasts that are consistent with historical trends.

The relevance of bounceback to forecasts varies across regional businesses, depending on their history of restrictions. Typically where businesses are moving away from restrictions, they have appropriately included assumptions regarding bounce back.

4.5.1 Bounceback

Another important driver of current levels of water consumption is the extent of 'bounceback'. Bounceback is commonly defined as the degree to which consumption returns to pre-restriction levels once restrictions have been lifted and corresponding water use behaviour changes.

Most areas of Victoria are no longer facing the severe drought conditions that were experienced in the last decade with summer 2010-11 being one of the wettest on record. In May 2012, some 20 Victorian towns were subject to water restrictions (most subject to only stage 1 restrictions with 5 subject to Stage 2 and 3 restrictions). This is a significant easing of restrictions when compared to the recent past. In May 2011, 36 towns were subject to water restrictions, while close to 470 towns across Victoria were subject to restrictions during the peak of the drought in 2007[2]. Uniform Permanent Water Saving Rules remain in place since being introduced in December 2011.

[2] Data taken from http://www.water.vic.gov.au/monitoring/monthly/water_restrictions

Weighted average annual household water consumption across Victoria fell 6 per cent from 2009-10 to 2010-11 to a historic low of 143 kilolitres. The degree to which this trend of low levels of water use continues will depend on the amount of bounceback exhibited by water users.

What can be reasonably asserted is that consumption on a per-user or per-connection basis will remain lower than pre-restriction levels due to permanent behaviour change and the uptake of water efficient appliances. However, the actual degree to which bounceback will occur and the period of time over which it may occur are subject to considerable uncertainty.

From the perspective of our review, it was important that the water businesses' forecasts are consistent with trends observable over the last few years of actual consumption and where possible are supported by third party research.

Regional businesses have relied on historical trends in average water use in order to develop their forecasts. The relevance of bounceback to forecasts varies across regional businesses, depending on their history of restrictions. Typically where businesses are moving away from restrictions, they have appropriately included assumptions regarding bounce back.

4.5.2 Non-price based water conservation

A number of businesses have proposed implementing non-price water conservation measures to affect consumer behaviour over the next regulatory period. These measures may include water efficient appliance programs, indoor retrofitting and business efficiency programs. Businesses should also take into account water savings rules. These rules limit the extent of water use for outdoor activities such as odd/even day watering programs and prohibitions on pavement watering.

The level of information provided by businesses in support of the demand projections varies. Some regional businesses mentioned the impact of water conservation on water consumption. However, they have not generally explicitly or transparently considered how this should feed into their approach to forecasting future consumption. In the absence of any evidence of permanent water savings we have adjusted forecasts based on either a representative year or historical trends (whichever was appropriate).

4.6 Price elasticity of demand

Findings

A number of businesses have applied price elasticity factors to their forecasts. These elasticities are consistent with Frontier expectations.

The effect of changes in prices on demand over the regulatory period can be measured using estimates of the price elasticity of demand, which reflects the extent to which an increase in price will lead to a reduction in demand. Ideally, businesses' forecasts should take into account the impact of changing prices on demand through assumptions about the price elasticity of demand. The materiality of the impact of price elasticity of demand on forecasts will naturally increase the greater the proposed change in price. It is therefore important that where businesses are proposing significant price increases they have factored elasticity into their demand forecasts.

Assumptions regarding the level of price elasticity need to be transparent, as does the manner in which the price elasticity measure adopted has been reflected in the businesses' demand forecasts.

A number of water businesses have applied elasticity factors to their volumetric forecasts for residential water customers. These elasticity factors are outlined in Table 4Table 2. The most sophisticated application of elasticity was by LMW which applied elasticity based on level of consumption — the higher the level of consumption the greater the corresponding price response. LMW's approach is based primarily on a study undertaken by Abrams et al (2011).

Table 4: Elasticity factors

Business	Elasticity
Coliban Water	-0.10
Central Highlands Water	-0.03
Gippsland Water	-0-07
Lower Murray Water	-0.05 (0-300kL) -0.10 (300-600kL) -0.15 (>600kL)
South Gippsland Water	-0.04

Source: Water plans for CW, CHW, GW, LMW and SGW

Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are not material. This is in line with applying a zero price elasticity measure.

We note that, as part of the Urban and Rural Water Price Review 2008, the demand consultants applied a price elasticity estimate of -0.07 to the demand forecasts where it was believed necessary. The value of -0.07 was derived by taking the weighted average of different price elasticities in a 2004 water industry study undertaken by WSAA. WSAA's price elasticity estimates with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

However, for the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and material and in some cases permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity to demand on the basis that any subsequent amendment to demand is immaterial.

PART B Business Specific Analysis

1. Barwon Water

1.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing Barwon Water demand forecasts for the Water Price Review 2013.

1.2 Water Plan proposal

Barwon Water's forecast for the next regulatory period are outlined in Table 1.

Table 5: BW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	2.0%
Residential water volumes	2.5%
Non-residential water connections	2.0%
Non-residential water volumes	-1.1%
Residential sewerage connections	2.0%
Residential sewage volumes	n.a.
Non-residential sewerage connections	2.0%
Non-residential sewage volumes	2.1%
Residential recycled water connections	n.a.
Residential recycled water volumes (Class A)	234%
Non-residential recycled water connections	n.a.
Non-residential recycled water volumes	n.a.
Trade waste customer numbers	1.6%
Trade waste volumes	8.6%

Notes: n.a. Not applicable

Source: BW 2012 Water Plan

1.3 Water

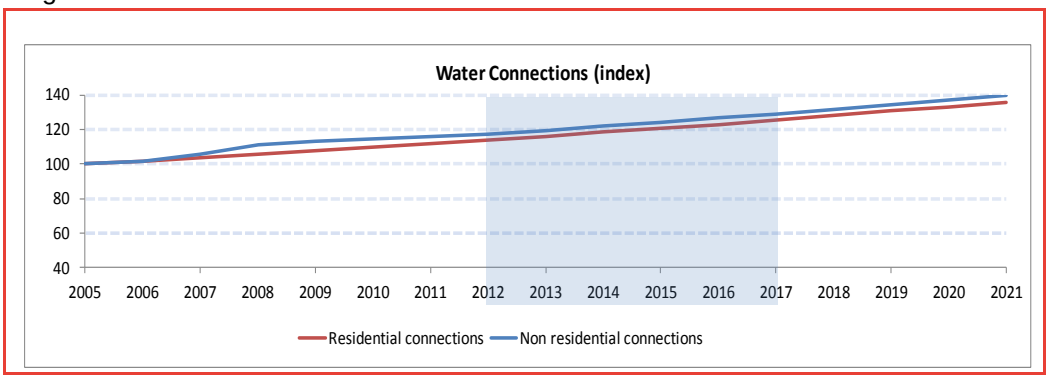
Customer connections

Residential and non residential water customer connections are forecast to grow at a compounding average rate of 2.0% per annum over the regulatory period. Barwon Water, in its response to queries raised in our draft report, indicated connection forecasts were based on the 2012 Victoria in Future (VIF) Occupied Private Dwellings projections.

Connection numbers are forecast to rise at a faster rate than population growth (10.3% over the regulatory period, in comparison with population rise of 8.3%). Barwon Water notes that this is due to a decline in the average household size and is consistent with historical trends.

Non-residential connections have been forecast to grow at the same rate as residential connections based on Barwon Water's assertion that the historical rates of growth of non-residential and residential new connections has been similar. This can be seen in the figure below.

Figure 2: Growth in residential and non residential water connections



Source: BW Water Plan

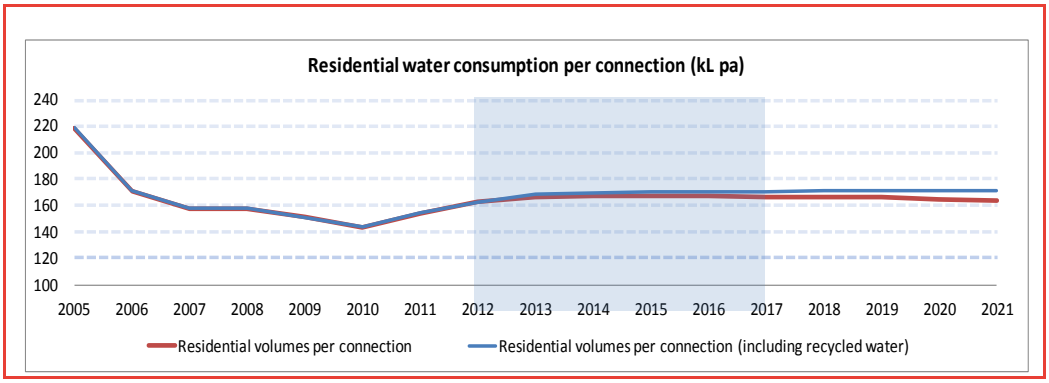
Water volumes

Barwon Water forecasts its bulk water volume using a linear regression model, in combination with an end use model. Non-revenue water is deducted from the bulk water volume to get the billable water volume which is then separated out into residential and non-residential demand using historical data (the split is assumed to remain constant over the regulatory period).

Total billable water volumes (residential and non-residential) are forecast to increase over the regulatory period at a compound average annual rate of 1.65% per annum

Residential water demand is forecast to increase at a compounding rate of 2.48% per annum over the period. This growth is primarily driven by customer growth as opposed to increases in average consumption which is forecast to grow from 154kL per connection (in 2011/12) to 166kL per connection (in 2013/14). For the rest of the regulatory period residential consumption per connection is forecast to remain stable at around 167kL per connection. This figure is close to the average for the period 2005/06 to 2011-12, of 165kL (see Figure 3).

Figure 3: Average residential consumption per connection



Source: BW Water Plan

It should be noted that Barwon Water did not estimate volumes per connection and then multiply this by the forecast growth in connections. Instead its demand forecasts (for the next ten years) are the outcome of a linear regression model (the "ISF Short Term Demand Model") which predicts bulk demand and consumption per capita under specified scenarios. A separate forecast of connection growth was developed. The ISF model was calibrated using historic bulk water demand, climate and restriction data for the period 2001 to 2011 as well as some assumptions relating to bounceback.

The key scenarios/assumptions inputted into the model in order to generate future restrictions relate to the following. These scenarios have been informed by other analysis.

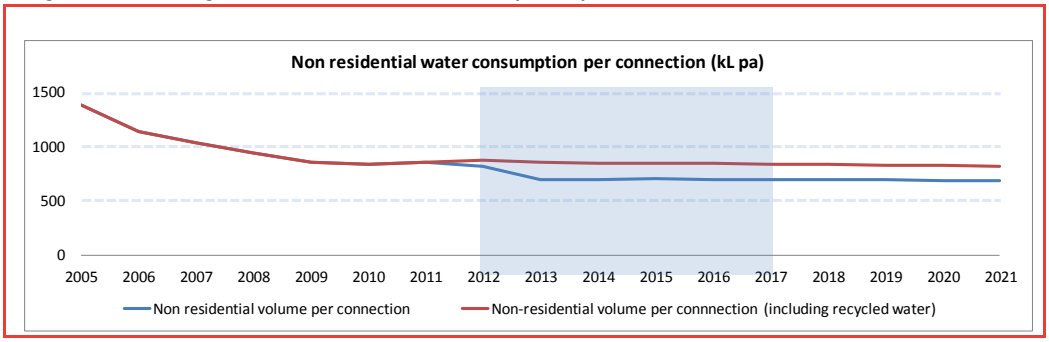
- Forecast climatic conditions — Barwon Water has based its forecasts on the climatic conditions in 2003/04 which was considered to be indicative of a median climate scenario based on its equivalence to the long term historical average.
- Population growth — Barwon Water uses VIF forecasts for population growth of approximately 1.6% per annum over the Water Plan. Barwon Water claims that population growth drives both residential and non-residential demand. Barwon Water notes that VIF growth forecasts do not adequately fit individual small towns such as Colac. So for some towns, growth rates are selected using Council data including where there is evidence of clear development drivers such as commitments to new

greenfield developments or new industry. No details of these town specific forecasts have been provided.

- Bounce back — Barwon Water has made allowance for bounce back in demand given the easing of water restrictions. It analysed changes in consumption following two recent periods of restriction. This analysis suggests bounce back could be somewhere within the range of 10% and 47%. For forecasting purposes it assumed a bounce back of 28%. This percentage represents a portion of the difference between average consumption per capita over the period 2001 to 2006 and 2006 to 2010. Over half of the bounceback is assumed to occur by 2012/13 (18%).
- Water conservation measures —Barwon Water considers that maintaining the rules in the 'Permanent Water Saving Plan' may result in water savings of between 1 to 2% of the 2013 Water Plan forecast demand. Further effort to reduce demand through direct investment in water efficiency or conservation programs will only occur in Colac, which is expected to result in savings equivalent to 0.5% of Barwon Water's total demand forecast.
- The price elasticity of water — Barwon Water has not allowed for price elasticity impacts as they consider these to be negligible.
- Recycled water substitution — Class A recycled water will mostly be charged at 80% of the cost of potable water. Hence Barwon Water has assumed that this supply will substitute for potable water over the regulatory period.

Non-residential consumption is forecast to decline at an average of 1.11% per annum (see Figure 4). Barwon Water claims this decline is due to the commissioning of the Northern Water Plant (NWP) which will substitute up to 1806 ML of drinking water per year for the Shell Geelong Refinery. After taking into account this substitution, non-residential demand (for water and Class A recycled water) is forecast to grow by an average of 1.16% per annum (compounded). Given non-residential connections are forecast to grow at a faster rate there is an implicit assumption that consumption per non-residential connection must be declining. When including recycled water demand this decline looks to be in the order of 0.81% per annum (see Figure 4).

Figure 4: Average non-residential consumption per connection



Source: BW Water Plan

Issues

Barwon Water's forecasts appear mostly reasonable and the draft review did not propose revisions:

- The connection growth forecasts appears to be based on VIF's projections of dwelling growth for the Greater Geelong region and also looks consistent with historical trends.
- The forecast growth in residential volumes per connection appears to take account of bounce back in demand. The forecast level of residential demand per connection (of 166kL per connection) closely resembles the average for the period 2005/06 to 2011/12 of 165kL per annum.
- The forecast decline in non-residential volumes per connection is slight and represents a slowdown from the decline evident in historic data.

We have one concern with Barwon Water's water connection and volume forecasts. Namely, the specifics of the water volumes forecasts are unclear and the estimates cannot be replicated with the data provided. The assumptions and drivers as described by Barwon Water appear reasonable, however, it is not clear whether and how these separately affect residential and non-residential demand forecasts.

BW has noted that its forecasts do not account for price elasticity because they believe that such impacts are immaterial. This approach is consistent with that of the majority of regional urban water businesses. It is also reasonable given BW has proposed no increases in water volume charges over the regulatory period.

Finding

Barwon Water's forecasts appear reasonable and so we do not consider that it is necessary to revise the proposed water volume and connection forecasts. However, we would suggest that in the future Barwon Water gives consideration to forecasting residential and non-residential volumes separately.

1.4 Sewage

Customer connections

The growth rate used to forecast water connections is also used to forecast growth in both residential and non residential sewerage connections (2.0% per annum compounding). This is understood to be based on VIF projections for occupied dwelling growth in the Greater Geelong region.

Volumes

Barwon Water notes volumetric forecast of residential sewage volumes has not been undertaken. This is because residential customers are charged a fixed fee.

Non-residential sewage volumes are forecast to grow at 2.09% per annum. Hence, this is primarily driven by connection growth.

Non-residential customers are changed a percentage of the metered water consumption per property. The difference in the forecasts of non-residential water and sewage volume forecasts suggest Barwon Water is assuming that a greater proportion of water used will be going to sewage. This does not appear to be an unreasonable assumption taking into account increasing housing density and therefore likely reductions in the relative proportion of water used outdoors.

Issues

No major concerns have been identified with Barwon Water's sewage forecasts.

Finding

We do not consider that it is necessary to revise the proposed sewage forecasts.

1.5 Trade waste

Customer connections

Barwon Water has forecasted a compounding average growth in trade waste customers of 1.6% per annum. This is driven by assumed growth in the number of commercial trade waste customers as the number of industrial customers forecast to fall over the regulatory period (by 2.7% per annum). These assumptions appear based on the continuation of the historic trends.

Volumes

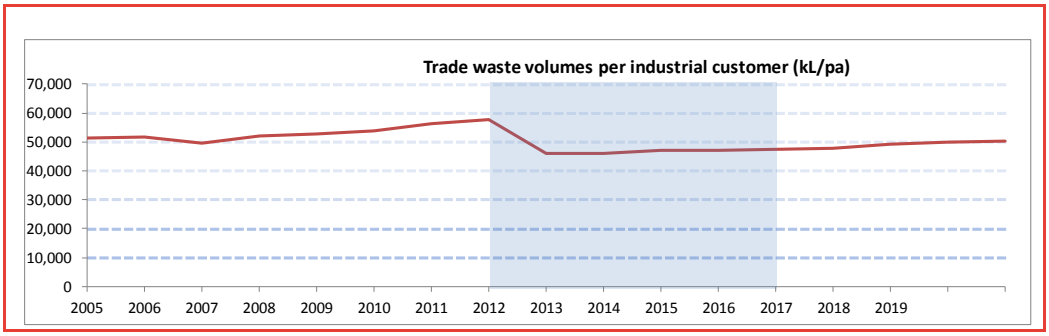
Barwon Water has indicated that overall trade waste volumes are expected to decline by 2% per annum over the regulatory period. However, using data in the pricing template volumes for Barwon Water's uncontracted trade waste customers are forecast to fall at a compound annual average rate of 8.6%. In our view, the disparity comes from the 2012/13 trade waste volume forecast figure included in the pricing template which appears to be out of line with both the historic and forecast data. We believe this relates to the way in which Barwon Water has treated contracted trade waste volumes (associated with Shell) which are included in the historic data but excluded from the forecast data.

Putting this minor disparity aside Barwon Water has indicated that the decline in trade waste volumes is driven by:

- The forecast decline in the number of industrial customers, that would otherwise have produced greater volumes of trade waste when compared to commercial customers (whose numbers are growing).
- The number of large trade waste customers installing onsite resource efficiency systems, including on-site recycling plants.

These assumptions about the drivers of trade waste volumes appear reasonable. If it is assumed that industrial customers are the major producers of trade waste and that the forecasted decline in their numbers is the major driver of demand then we would expect the volume of trade waste per industrial customer remain mostly steady over time. Figure 5 below shows that this is mostly the case (excluding the impact of a change in the treatment of Shell trade waste volumes post 2012/13).

Figure 5: Trade waste volumes per industrial customer



Note: Includes contracted Shell volumes.

Source: Barwon Water WP

Loads

Trade waste loads are forecast to decrease in line with the volume reduction on the basis that the volume directly correlates to the contaminant load discharged to sewer. The concentration of contaminates is expected to remain constant. Data on this was not included in the pricing template.

Issues

It should be noted that forecasts for trade waste loads and customer numbers were not included in the pricing template and so have not been reviewed.

Finding

No revisions have been proposed for the trade waste volume forecasts.

1.6 Recycled water

Barwon Water will be supplying recycled water of different quality over the coming regulatory period. The demand forecasts for these different outputs have been based on the following.

- Class A (dual pipe) — Demand estimates are based on estimating residential end uses (i.e. toilet flushing, garden watering and irrigation of public open space) where substitution is acceptable and based on assumptions around development rates for new Greenfield developments (based on a desktop assessment of historical trends and council and developer projections).
- Biosolids Class A & C — Demands for biosolids were developed based on known volumes to be used by the plant as set out in the contract between Barwon Water and Plenary.
- Class C (Golf Course / Agriculture / Process) — Demands were based on historical averages and established known demands for key customers. Class C demand is assumed to remains constant over time.
- Northern Water Plant (NWP) Industrial Class A — Demand was developed by Shell based on the specific amounts required for industrial processes. These figures are specified into the contract with Shell and are assume to remain constant over time.

Issues

The Price Review spreadsheet only includes volumetric forecasts for Class A metered revenue demand (from the Stead Park and Plenary plants) which is forecast to grow significantly over the period. This growth is primarily the result

of the construction of the Black Rock water recycling facility, over the regulatory period. The forecasts for demand are project specific and based on estimates of acceptable residential end uses[3] (i.e. toilet and garden water use) and assumptions around greenfield development rates in areas that can be supplied by the plants.

Given the extent of structural change proposed, historical information provides no guidance on the validity of forecasts for the regulatory period. However, Barwon Water's project based approach for determining demand seems reasonable. Barwon Water has taken these assumptions around recycled water demand into account in determining its water demand forecasts.

The tariffs for the NWP Class A supply and the Biosolids supply is understood to be specified in contracts between Barwon Water and Shell and Plenary. Barwon Water has indicated this revenue has been included in the pricing review template as *"Non-Tariff Revenue– Recycled Water Contract Revenue"*. As a result demand forecasts were not provided for these sources of revenue and so have not been reviewed.

The draft review proposed that an additional line item be included to account for Class C recycled water supply for use by Golf Courses and Agriculture. In response to the draft, Barwon Water indicated that Class C supply was included in the price review template as *"Non-Tariff Revenue – Other Revenue"* meaning demand forecasts were not expressly included. As a result we have removed this additional line item from the demand forecasts.

Finding

We do not consider that it is necessary to revise the proposed recycled water forecasts.

1.7 Revisions to forecasts

On the basis of the analysis above we do not consider that it is necessary to revise Barwon Water's proposed forecasts.

1.8 Summary

This review of Barwon Water's urban demand forecasts found:

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3 Barwon Water has assumed that because recycled water will be supplied at a lower charge connected customers will substitute recycled water for potable water for these acceptable end uses.

- Forecasts appear to be based on appropriate forecasting methodologies although there is a lack of transparency around the specifics of the methodology for determining water volume forecasts. In particular Barwon Water has forecast bulk water demand before splitting this between residential and non-residential demand based on historical ratios. This approach means to it not possible to ascertain whether and how driver of demand separately affect residential and non-residential demand forecasts. More generally Barwon Water's forecasts appear to be in line with historical trends.

- Forecasts reflect reasonable assumptions about the key drivers of demand. For example, Barwon Water's water volume forecasts take into account climatic conditions, bounce back, water conservation measures and recycled water substitution.

- Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth.

- In general the forecasts rely on end use models or simple growth estimates from observed values and averages, and are therefore not expected to be biased.

- Forecasts do not account for price elasticity. Barwon Water assumed this will have a negligible impact on demand.

2. Central Highlands Water

2.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing Central Highlands Water (CHW) demand forecasts for the Water Price Review 2013.

2.2 Water Plan proposal

Table 6: CHW Water Plan proposal

Consumption parameter	Forecasted average growth rate (% per annum)
Residential water connections	1.6%
Residential water volumes	1.9% (over both block 1 and block 2)
Non-residential water connections	0.9%
Non-residential water volumes	1.7%
Residential sewerage connections	1.9%
Residential sewage volumes	n.a.
Non-residential sewerage connections	2.6%
Non-residential sewage volumes	8.8%
Residential recycled water connections	n.a.
Residential recycled water volumes	n.a.
Non-residential recycled water connections	n.a.
Non-residential recycled water volumes	n.a.

Notes: n.a. Not applicable

Source: CHW 2012 Water Plan

CHW's demand model is a spreadsheet model based on two spreadsheet files. The first is primarily a long range recast tool, with a 50 year horizon. The second is a short to medium term model (Corporate Plan/Water Plan model) designed to provide forecasts for the Corporate Plan and Water Plan.

The long range model forecast trend consumption against 2006 demand based on changes to population and customers with reduction to unit demands for the anticipated level of restrictions.

Population and household forecasts were based on VIF data. Unit demands were based on:

- A trend analysis of unit demands (per connection) to 2006. All subsequent years were based on the datum of the 2006 unit demands;
- Unit demands were adjusted by the ratio of persons per household;
- Unit demands were adjusted by a manual annual demand management saving; and,
- An average impact of restrictions as a percentage adjustment to the base demand.

Forecast demands in the current long range model assumed a trend decrease in the population per household, no annual saving from demand management and no restrictions.

The short range model is aimed at providing forecasts for the Corporate Plan and Water Plan period. The model takes the outputs of the long range model and provided annual forecasts for each restriction level based on the percentage adjustments developed in the long range model. This provided a limited scenario adjustment capability by selecting a forecast restriction level for each forecast year.

The model did not include an explicit selection for Permanent Water Saving Rules (PWSR). The model also made a manual percentage adjustment to allow matching with actual demand levels and extrapolate to future years.

CHW have amended its existing demand models to reference an end use model. As with metropolitan end use models, the model considers demand in a bottom up manner, based on a number of identified categories of major use. These major uses include:

- Showers
- Toilet
- Dishwasher
- Other indoor

- Projected adoption and penetration rates over time
- Outdoor watering
- Outdoor and hose use
- Rainwater tanks.

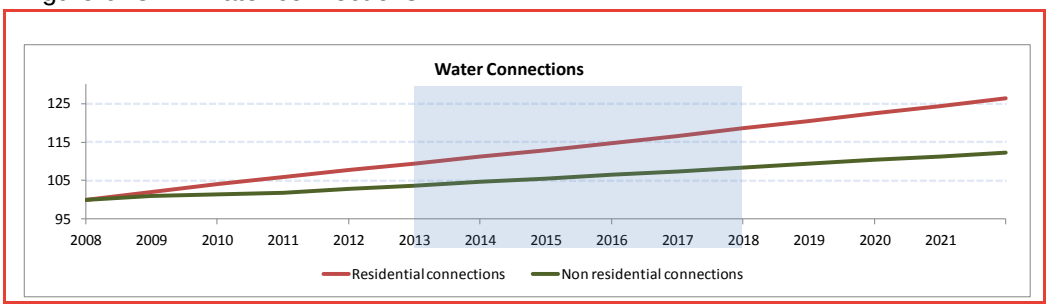
Frontier considers end use models to be an appropriate approach to forecasting.

2.3 Water

Customer connections

In its Water Plan CHW forecast average growth in connections of approximately 2.0 and 1.4% for residential and non-residential customers respectively (see Figure 6). VIF 2012 SLA Households and dwellings placed growth at approximately 1.78% per annum compounding.

Figure 6: CHW water connections



Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

After receipt of the water plan Frontier sent CHW a further information request. In response to our request for information regarding the forecast for the year 2012-13 CHW revised its historical data. This new data changed the base year for growth and correspondingly, CHW's forecast is now growth rates of 1.6% and 0.9% for residential and non-residential respectively. While the growth rates have changed the underlying number of connections has remained unchanged for the regulatory period.

Frontier notes that the revised forecasts are within a percentage point of VIF 2012 and appear to be consistent with historical trends. On this basis Frontier believes the forecasts are reasonable.

Water volumes

Based on revised historical numbers the water plan forecast equates with average annual growth of 2.3% pa compounding for residential customers which

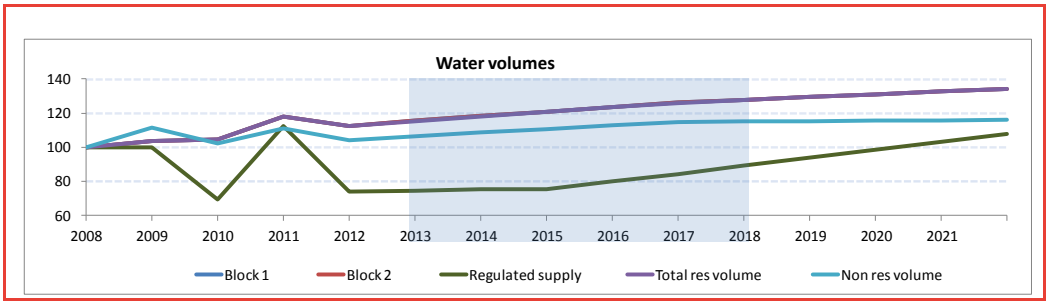
represents an average annual increase in water use per connection of 0.7%. Non-residential volumes increase by 2.0% per annum over the whole regulatory period.

CHW's forecasts include a price elasticity factor of -0.03 based on observed customer behaviour in its major supply areas.

Issues

The one concern Frontier has with the forecasts for water volumes is that there appears to be a decline from the last year of historical data in 2011-12 to the first year of forecasts 2012-13 that is unexplained in the water plan (see Figure 8).

Figure 7: CHW water volumes



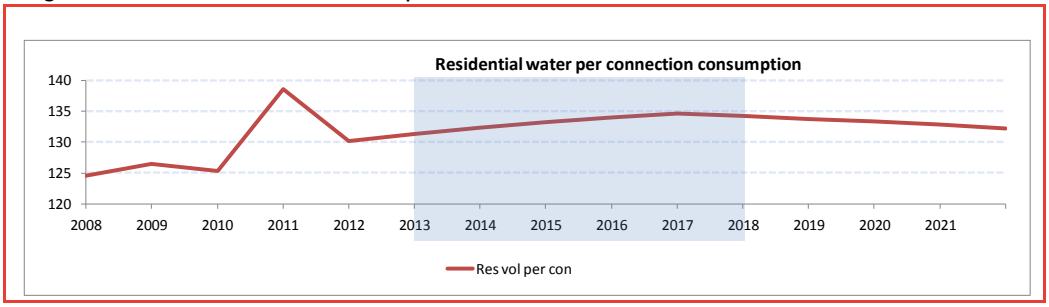
Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

The materiality of this step decline in growth rates for the forecasts is most evident when observing the forecast growth trends for residential water consumption per connection (see Figure 8). In response to queries from Frontier, CHW stated

> The 2011-12 actual were somewhat higher than originally projected and were impacted by climate / weather factors (longer period of hotter, dry days).

For the purposes of Frontier's draft report we assumed a level of average consumption per connection based on the last year of historical data (2011-12) and rolled this forward across the regulatory period for both tier one and tier two of the potable water supply based on CHW forecast trends for those years.

Figure 8: CHW residential water per connection



Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

In the draft report Frontier requested CHW track actual usage against forecast for 2012-13 on the grounds that the added consideration for the summer months of the current year may give a better indication of the validity of the original 2012-13 forecast.

While non-residential volumes also appear to exhibit a material decline in volumes from 2011-12 to 2012-13, Frontier notes that non-residential forecasts were developed separate to residential based on a non-residential monthly model. This model tracks monthly demands for each major customer and usage trends across all the systems supplied.

In Frontier's draft report we did not amend the non-residential volume forecasts but requested CHW respond to the Draft Report with further information regarding the drivers behind the assumed decline in volume.

In response to the draft report CHW indicated that data for the year was not referenced in its forecasts. CHW has updated its end use model to include data for the 2011/12 financial year. CHW in its response noted that the revised model is based on a limited period of data. Only one of the variables is clearly statistically significant (temperature), another variable (soil moisture index) is marginal and two (evaporation and rainfall) are not statistically significant with the amount of data available.

CHW state that its best-fit model is showing some bias in relation to the lack of inclusion of rainfall as a variable. CHW relate this to the increased frequency of large thunderstorm type rainfall events in the summer months of 2011/12 compared to previous climate based on predominately spring rains. As a result, CHW was concerned that the 2011/12 year was above average climate conditions and so may be overstating the impact of behaviour change for that year. Notwithstanding this analysis CHW accepted that the forecasts be amended to reflect the model updates for 2011/12 data.

The data provided by CHW was aggregate data for residential tiers 1 and 2 and non-residential volumetric tariffs. Frontier has updated the forecasts by assuming the same proportional split between these tariff classes over the course of the regulatory period as was originally proposed by CHW.

Finding

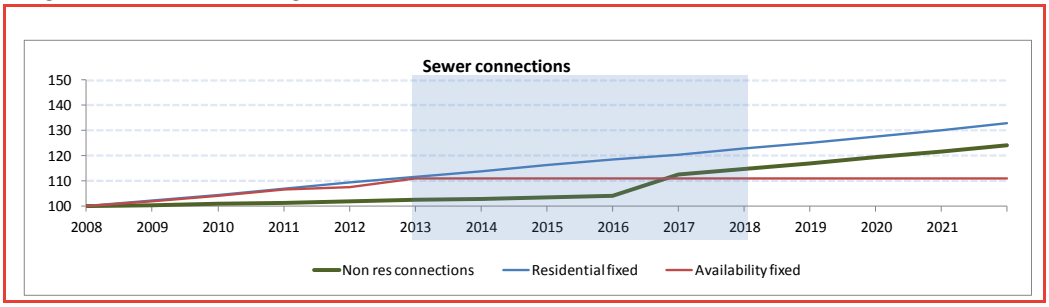
Frontier has amended CHW's forecasts to reflect the new updated volumes.

2.4 Sewage

Customer connections and volumes

Based on the revised historical numbers the water plan forecast equates with average annual growth of 1.9% pa compounding for residential. Non-residential connections are forecast to grow at 2.0% per annum compounding, this results in an increase in non-residential volumes of 8.8% per annum compounding (see Figure 9).

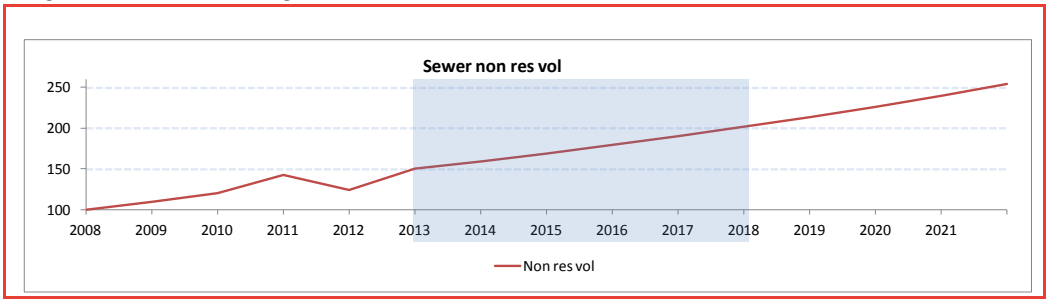
Figure 9: CHW sewerage connections



Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

In regard to volumes, Frontier notes that non-residential volumes are broadly consistent with historical trends, with the exception of 2012-13 (see Figure 10).

Figure 10: CHW sewage volumes



Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

Issues

One of the most notable elements of CHW forecast is a step increase in 2017-18 for non-residential customer connections (see Figure 9). This step increase is not consistent with the forecasts of non-residential connections for water, nor is there any evidence of an increase in connections evident in the volumetric forecasts (see Figure 10). Frontier assumes that as with water the sewerage forecasts for non-residential are undertaken through a separate modelling exercise and may reflect specific events, such as the commercial expansion of an

enterprise, we also note that the step increase does not contribute to more conservative forecasts.

From the Draft Report Frontier requested CHW provide further information outlining the key drivers behind the forecast.

In response to the Draft Report CHW reviewed the non-residential sewer forecasts and identified an underlying error in the formula used to calculate connection numbers. CHW provided Frontier with a revised forecast based on the historical non-residential growth rate of 0.5%. However the revised data was not materially different from the data provide for in the original water plan.

Finding

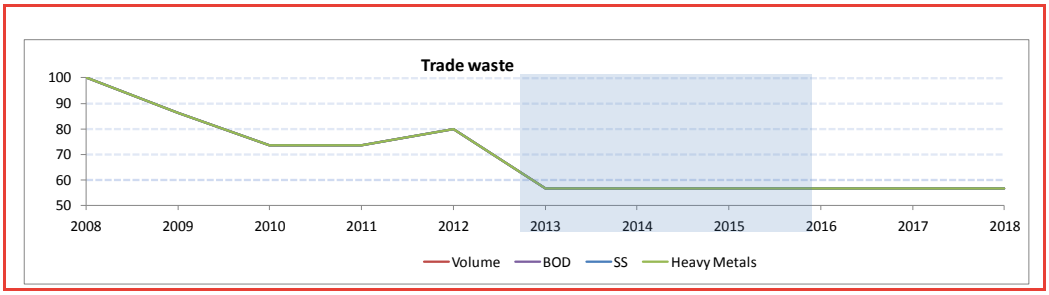
Frontier has not amended CHW's non-residential sewerage forecasts.

2.5 Trade waste

Customer connections and volumes

CHW is proposing that all trade waste parameters fall by an average 6.7% per annum, or in actuality a step decrease followed by no growth (see Figure 11).

Figure 11: CHW Trade Waste



Source: CHW 2012 Water Plan, CHW 2012 Response to information request.

Issues

While the Water Plan provides little information regarding the drivers for such forecasts, Frontier notes that there may be tariff rebalancing occurring during the regulatory period. In particular, Frontier notes that the forecasts for Minor B increase dramatically over the period.

In the draft report Frontier requested CHW provide further information outlining the key drivers behind the forecast for the regulatory period. We advised that in the absence of a response Frontier will adjust the forecasts to be consistent with the historical data.

In response to Frontier's draft report CHW identified an error in the historical data submitted to the ESC. CHW stated that the historical trade waste loads were back calculated quantities from revenue. CHW noted that these calculated loads were higher than the actual loads due to the use of surcharge rates for both Biological Oxygen Demand (BOD) and suspended solids. The surcharge rates, applied when set limits are exceeded, resulted in higher revenue for the same loads which results in an overstatement of demand.

When considering actual load a number of trade waste parameters exhibit growth in 2012-13 followed by a constant demand. The revised numbers indicate that the forecasts reflect recent actual trends. One exception is suspended solids. The actual suspended solids result for 2011-12 saw a major spike the quantity recorded due to a known, one-off incident from a major trade waste customer. CHW have indicated that the WP3 forecast excluded that one-off issue.

Finding

Based on the information received from CHW in response to the draft report Frontier does not consider that it is necessary to revise the proposed trade waste forecasts.

2.6 Revisions to forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Water					
Residential block 1 variable	5,822,188	5,961,713	6,097,627	6,230,270	6,362,394
Residential block 2 variable	1,940,729	1,987,238	2,032,542	2,076,757	2,120,798
Non-residential variable	3,077,338	3,139,125	3,200,035	3,260,268	3,320,550
Residential block 1 variable	5,972,436	6,075,658	6,172,861	6,269,430	6,381,937
Residential block 2 variable	1,990,812	2,025,219	2,057,620	2,089,810	2,127,312
Non-residential variable	3,156,752	3,199,123	3,239,518	3,280,760	3,330,750

2.7 Summary

This review of Central Highland Water's urban demand forecasts found:

- Forecasts appear to be based on appropriate forecasting methodologies. CHW has adopted end use model to develop its forecasts. We note that s CHW's forecasts appear to be in line with historical trends.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts generally use the best available information. However, Frontier identified a need to update CHW's end use model to include actual consumption data from 2011-12.
- In general the forecasts rely on end use models or simple growth estimates from observed values and averages, and are therefore not expected to be biased.
- Forecasts account for a price elasticity factor of -0.03. The elasticity factor is based on observed behaviours on an average bill for CHW major supply centres.

3. Coliban Water

3.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing Coliban Water demand forecasts for the Water Price Review 2013.

3.2 Water Plan proposal

Table 7: CW Water Plan proposal

Consumption parameter	Forecasted average growth rate (% per annum)
Residential water connections	1.7%
Residential water volumes	1.3% (Central 1.6%, Northern -1.0%)
Non-residential water connections	1.0%
Non-residential water volumes	-0.6%
Residential sewerage connections	1.7% (Environment 1, Environment 2 and Major Districts)
Residential sewage volumes	n.a.
Non-residential sewerage connections	1.0% (Environment 1, Environment 2 and Major Districts)
Non-residential sewage volumes	-8.7%
Residential recycled water connections	n.a.
Residential recycled water volumes	40.6%
Non-residential recycled water connections	n.a.
Non-residential recycled water volumes	0.0%
Trade waste customer numbers	n.a.
Trade waste volumes	All volumes forecast to grow with an incremental step in 2013-14 that ranges from 12% (year on year) to 144% year on year)

Notes: n.a. Not applicable
Source: CW 2012 Water Plan

Econometric modelling of the residential demand for water was undertaken by CW. Specific attention was paid to the effect of price. The study was carried out in conjunction with La Trobe University and emphasis was placed on residential

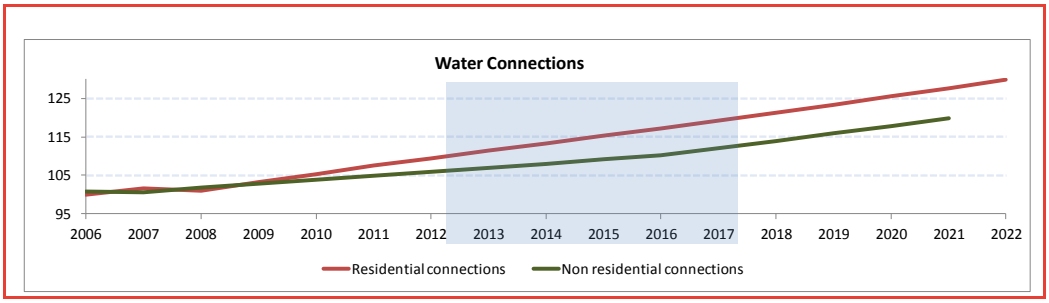
demand in the Bendigo region given its large customer base and greater availability of data.

3.3 Water

Customer connections

Residential and non-residential water customer connections are forecasted to grow. In its Water Plan CW forecast average connections growth of approximately 1.7% and 1.0% for residential and non-residential respectively. VIF 2012 SLA Households and dwellings placed growth at approximately 1.41% per annum compounding.

Figure 12: CW water connections

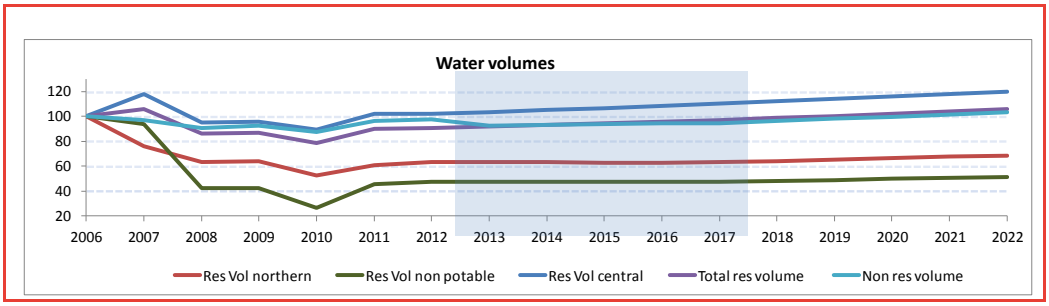


Source: CW (2012) Water Plan

Water volumes

CW has forecasts total residential volumes to grow by 1.3% per annum. This growth is made up of growth in residential volumes for the central area of 1.6% per annum coupled with growth in the northern area of -0.1% per annum. Volumes for residential non potable services are forecasts to remain constant over the period. Frontier notes that the forecasts are broadly consistent with recent historical data (see Figure 13).

Figure 13: CW water volumes



Source: CW (2012) Water Plan

CW's forecasts incorporate the impacts of price elasticity of demand. CW indicated that it undertook econometric modelling based on historical data with indicates that the effects of price as a demand management tool vary by location. An elasticity of -0.20 was obtained from the Bendigo model with the other Central towns being slightly less responsive to price. CW stated that northern zone towns were slightly more responsive to price increases during the study period.

For the purposes of the water plan CW incorporated an elasticity assumption of -0.10.

Issues

Frontier notes that the CW are assuming a greater rate of growth than VIF and are therefore not likely to be contributing to overly conservative forecasts. In addition the CW forecasts for connections are consistent with historical trends (see Figure 12).

Frontier notes that the forecasts are within a percentage point of VIF 2012 and appear to be consistent with historical trends. On this basis Frontier believes the forecasts are reasonable.

Finding

Frontier has accepted CW's forecasts for connections on the basis that they are consistent with historical growth.

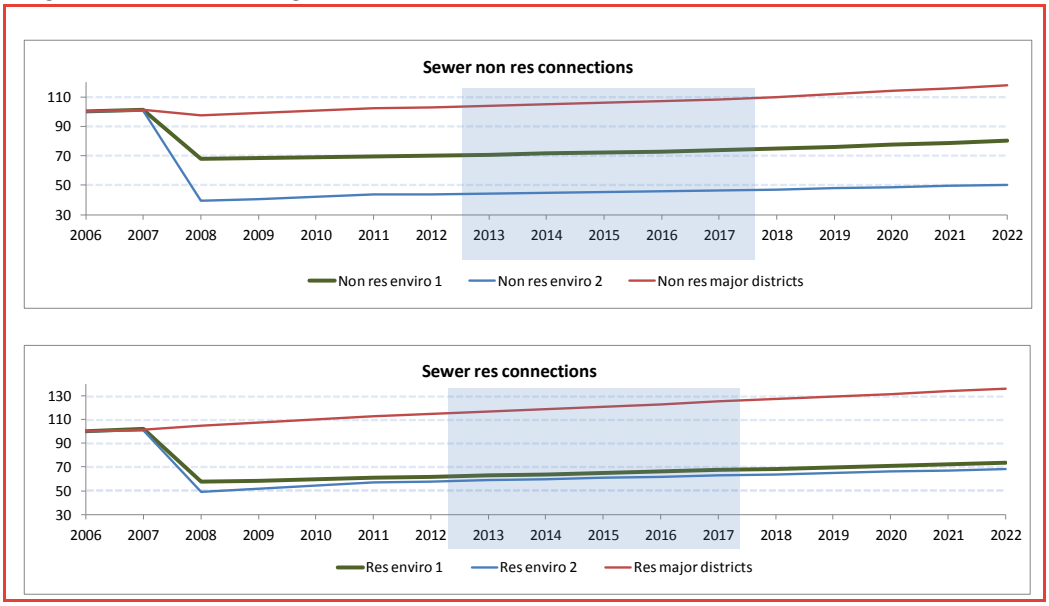
3.4 Sewage

Customer connections

In its Water Plan CW forecast average connections growth of approximately 1.7% and 1.0% for residential and non-residential sewerage connections respectively. VIF 2012 SLA Households and dwellings placed growth at approximately 1.41% per annum compounding.

Frontier notes that CW is assuming a greater rate of growth than VIF, However, the forecasts for connections are consistent with historical trends (see Figure 14).

Figure 14: CW Sewerage connections

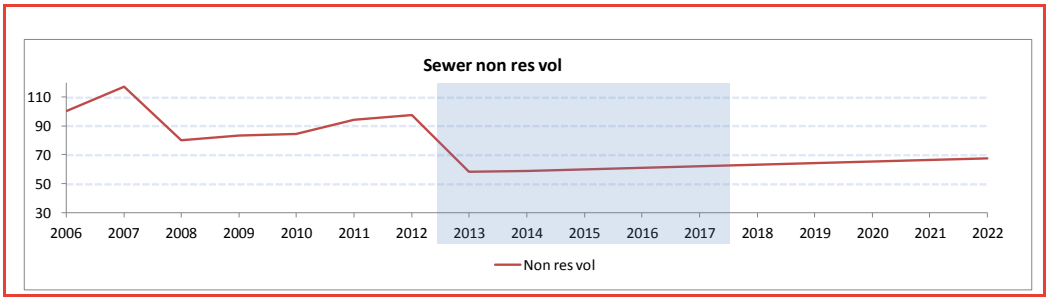


Source: CW (2012) Water Plan

Volumes

CW forecast low growth rates over the regulatory period for non-residential sewage volumes. CW also forecast a material step decrease in 2013-14 that was not adequately explained by the Water Plan (see Figure 15).

Figure 15: CW non-residential sewage volumes



Source: CW (2012) Water Plan

Issues

In response to a further information request from Frontier, CW indicated that the step decline was attributable to a program of CW to give small non-residential customers a free discharge of 230kL per customer. The aim of the program is to ensure that small non-residential customers pay the same as residential customers for an equivalent level of discharge.

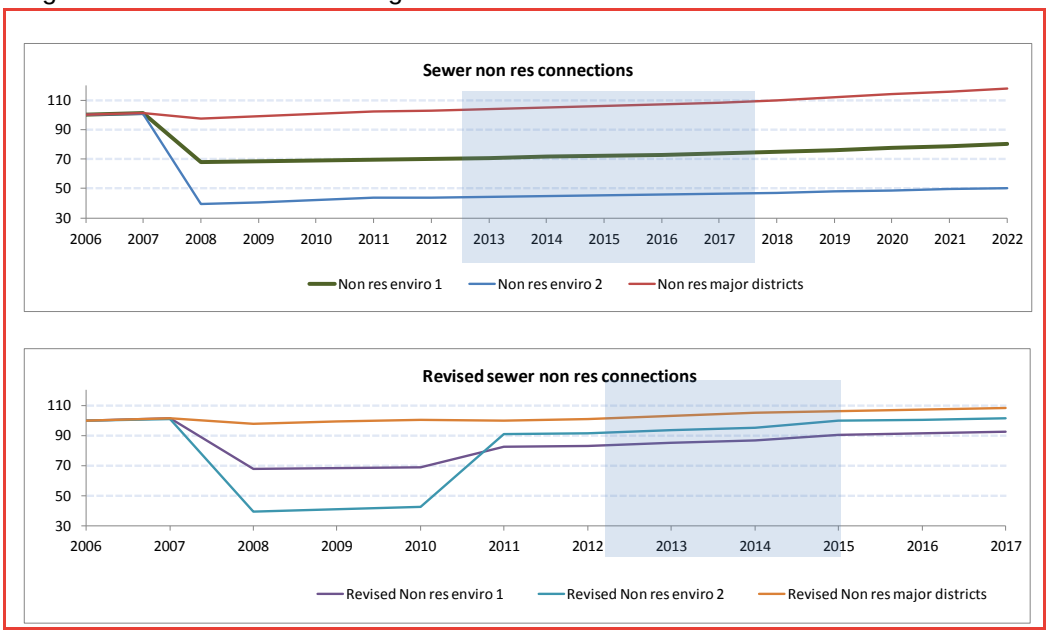
In the Draft Report Frontier requested further information to allow it to confirm the materiality of the decrease. Specifically Frontier requested CW provide the

number of customers in receipt of a free discharge and the quantum of the associated discharge.

In response to Frontier's draft report CW provided a totally revised set of sewerage forecasts for non-residential sewer connections and volumes and residential sewer connections. In consultation with Frontier, CW stated that the reasoning for the revision was recognition of an error in the collection of the underlying data.

A comparison between the water plan and the CW post water plan forecasts are provided in Figure 16. The revised forecasts show a small decrease in connections for major districts that is consistent with revised historical numbers and significant increases in growth for non-residential environment 1 and non-residential environment 2 customers.

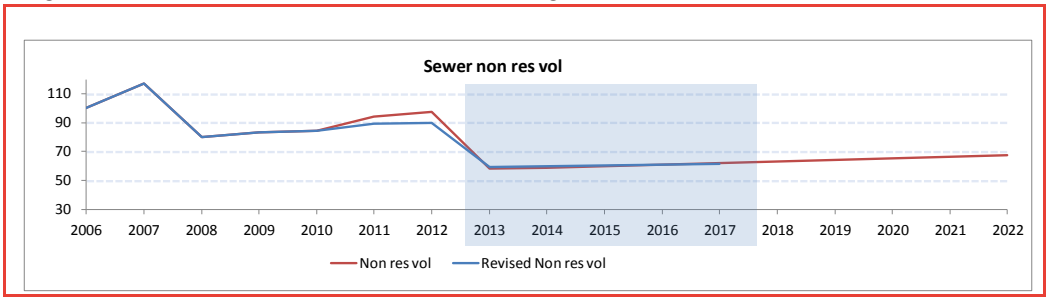
Figure 16: CW Revised sewerage connections



Source: CW (2012) Water Plan, CW (2013) Response to Draft Demand Report

Non-residential volumes have also been re submitted by CW (see Figure 17). These new volumes are essentially unchanged for the regulatory period but show a marginally small decline in volume in 2012-13.

Figure 17: CW Revised non-residential sewage volumes



Source: CW (2012) Water Plan, CW (2013) Response to Draft Demand Report

Frontier remains concerned regarding CW proposed sewage volumes for non-residential customers. In response to the draft report CW did not provide information requested regarding the quantum of customers receiving the 230kl free allowance that is stated as the primary driver behind the step decrease in 2013.

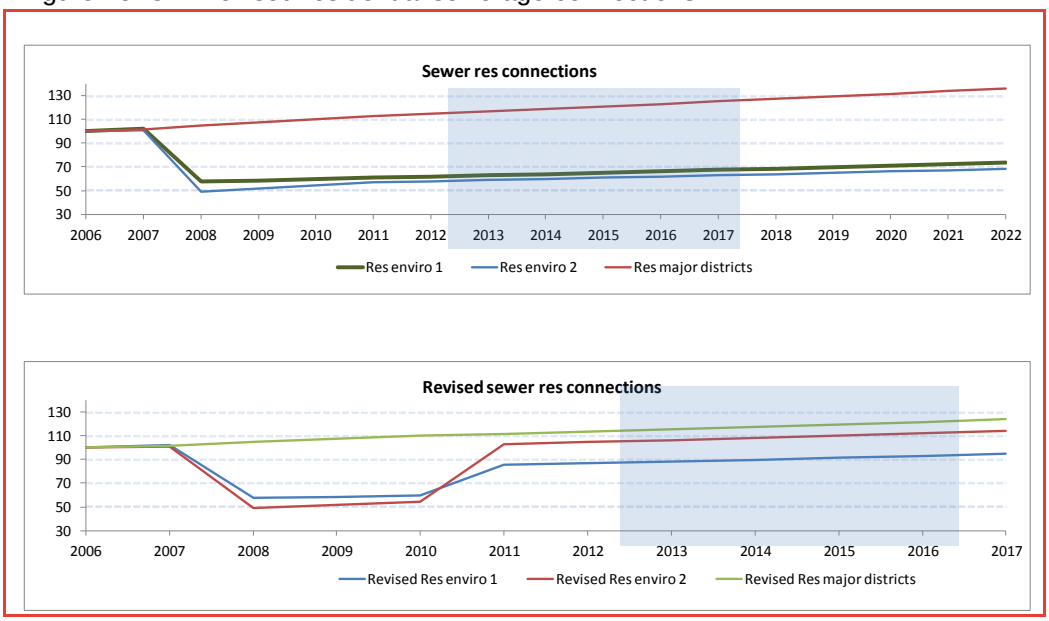
Based on the forecasts provided by CW this decrease amounts to a fall in demand of 498,297kL, implying that the scheme is being extended to approximately 2,166 non-residential customer or 41% of CW total non-residential customer base for that year.

In further information provided after the response to Frontier's draft report, CW indicated that the free discharge (based on 2011-12 data) would apply to:

- 1,125 customers who discharged volumes greater than 230kL
- 3,898 customers who forecast volumes lower than 230kL.

Resubmitted residential sewerage connections are reported in Figure 18. While the revised data appears to be consistent with the last two years of historical data, we note that there appears to an abnormality in the connections data between 2008 and 2010. This same abnormality is observable in the historical data for non-residential connections. We suggest that CW review its historical data for error.

Figure 18: CW Revised residential sewerage connections



Source: CW (2012) Water Plan, CW (2013) Response to Draft Demand Report

Finding

Frontier accepts CW's forecasts for non-residential sewer volumes on the basis of the information provided by CW's in regard to its free discharge program.

Frontier has amended CW's forecast for residential and non-residential sewerage to reflect revised forecasts. Frontier has accepted the revisions on the basis that they are consistent with recent historical trends.

3.5 Trade waste

Customer connections and volumes

CW has forecast trade waste demand to remain constant based on historical levels with zero growth in customer numbers.

Issues

We note that the assumption of zero growth in trade waste customers is not consistent with the assumptions of growth in non-residential sewerage connections and relatively strong growth in non-residential water connections. Frontier is concerned that such an approach may lead to overly conservative forecasts. Historical data for trade waste volumes indicates that some parameters should be subject to growth (see Table 8).

In the Draft Report Frontier requested CW revise its trade waste forecasts.

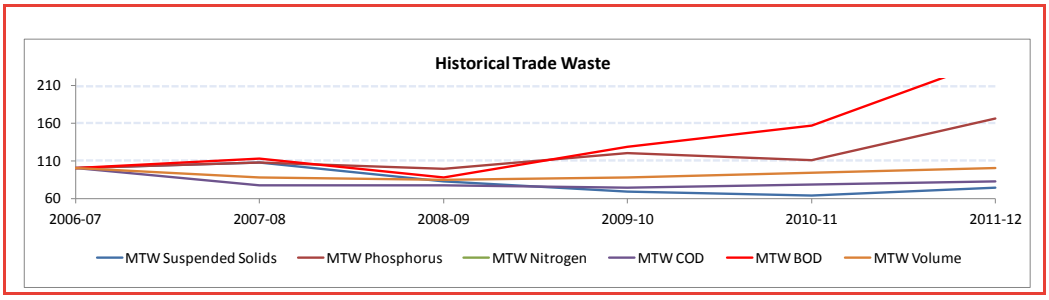
Table 8: CW historic trade waste growth rates

Trade Waste parameter	5 year average annual compounding growth rate (%) 2006-07 to 2011-12
Volume	0.02
BOD	19.74
COD	-3.76
Nitrogen	6.42
Phosphorus	10.73
Suspended Solids	-5.78

Source: CW (2012) response to information request.

In response to this Draft Report CW indicated that five year averages were not representative of growth over the period given high levels of volatility. An index of growth in trade historical trade waste based on data provided by CW is presented in Figure 19. CW forecasts are broadly consistent with historical trends, with the exception of BOD and phosphorus which have both evidenced strong growth historically.

Figure 19: CW Historical trade waste



Source: CW (2012) Water Plan, CW (2013) Response to Draft Demand Report

Finding

Frontier accepts CW's forecasts for Suspended Solids, Nitrogen, Volume and COD. However, both BOD and Phosphorus evidence growth in historical data. In the absence of any justification for excluding these historical trends from forecasts Frontier has amended CW's trade waste forecasts for Phosphorus in line with growth observable over the last five years of historical data.

Frontier has not amended CW's forecast of COD/BOD. Frontier notes that in the most recent data received CW is proposing to roll COD and BOC into a single COD/BOD charge. While we think it is reasonable to assume BOD will

experience positive growth over the regulatory period we note that COD demand is far greater than BOD and has historically been declining overtime. Therefore any growth impact of BOD in a combined charge is likely to be outweighed by long term declines in COD.

3.6 Recycled water

CW is proposing considerable growth for residential (40.6% per annum) and no growth for non-residential. The residential growth reflects large uptake in the first year of the regulatory period. The large increase in residential growth appears to be related to development in Bendigo's Peppercorns estate and Jackass Flat areas.

Issues

In the Draft Report Frontier expressed some concern over the materiality of the growth in residential recycled water being forecast by CW. Frontier requested that in response to this Draft Report CW confirms its forecasts for recycled water. In response CW confirmed its forecasts.

Finding

Frontier has accepted CW's forecasts for recycled water services.

3.7 Revisions to forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Sewerage					
Major Districts Residential	51,953	52,858	53,779	54,716	55,669
Enviro 1 Residential	2,740	2,787	2,836	2,885	2,935
Enviro 2 Residential	977	994	1,011	1,029	1,047
Major Districts Non-residential	4,925	4,974	5,023	5,073	5,123
Enviro 1 Non- residential	290	293	295	298	301
Enviro 2 Non-residential	127	129	130	131	133
All Districts non-residential	936,959	951,950	967,182	982,657	998,379
Trade Waste					
Phosphorous charge	35,215	35,215	35,215	35,215	35,215
Revised forecasts					
Sewerage					
Major Districts Residential	51,345	52,239	53,149	54,075	55,017
Enviro 1 Residential	3,844	3,911	3,979	4,048	4,119
Enviro 2 Residential	1,771	1,801	1,833	1,865	1,897
Major Districts Non-residential	4,878	4,958	5,022	5,072	5,123
Enviro 1 Non- residential	348	353	370	374	377
Enviro 2 Non-residential	269	273	286	288	291
All Districts non-residential	955,792	965,350	975,003	984,753	994,601
Trade Waste					
Phosphorous charge	32,142	35,591	39,410	43,639	48,321

3.8 Summary

This review of Coliban Water's urban demand forecasts found:

- Forecasts appear to be based on appropriate forecasting methodologies.
- Forecasts generally reflect reasonable assumptions about the key drivers of demand. However, there were a number of aspects of CW's non-residential sewer and trade waste forecasts that Frontier could not validate given the available information.
- Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth. Exceptions include trade waste where it appears CW made a number of assumptions without reference to historical trends.
- In general the forecasts rely on regression analysis and simple growth estimates from observed values and averages, and are therefore not expected to be biased.
- CW adopted an elasticity factor of -0.10 based on an econometric study which considered a number of supply areas.

4. East Gippsland Water

4.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing East Gippsland Water's (EGW) demand forecasts for the Water Price Review 2013.

4.2 Water Plan proposal

The table below summarises EGW's demand forecasts over the next regulatory period.

Table 9: EGW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections (including all multi-service connections and excluding vacant land connections)	1.3%
Residential water volumes	0.7%
Non-residential water connections (excluding multi-service and vacant land connections)	1.0%
Non-residential water volumes	0.8%
Residential EQTs	1.3%
Residential sewage volumes	n.a.
Non-residential EQTs	0.8%
Non-residential sewage volumes	n.a
Residential recycled water connections	n.a.
Residential recycled water volumes	n.a.
Non-residential recycled water connections	Not provided
Non-residential recycled water volumes	Not provided
Trade waste customer numbers	0%
Trade waste volumes	Not provided

Notes: n.a. Not applicable

Source: EGW 2012 Water Plan

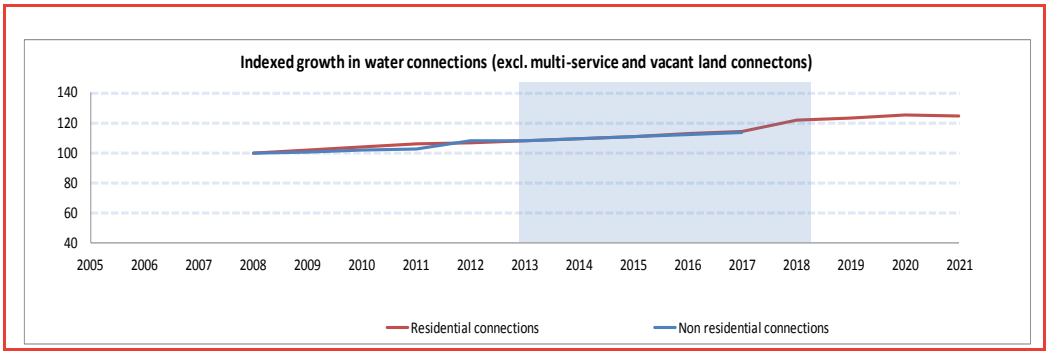
4.3 Water

Customer connections

Residential water customer connections (including multi service connections) are forecasted to grow at a compounding average rate of 1.3% per annum over the period 2012/13 to 2017/18. EGW has indicated the forecasts are based on Victoria in Future (VIF) 2008 and 2012 population growth forecasts and EGW own growth data. Although it is unclear how these sources have been combined in order to develop the growth rates used.

Non-residential connections have been forecast to grow at a rate of 1.0% compounding. This results from a forecast growth in connections of 0.5% between 2012/13 and 13/14 and growth of between 1.3% and 1.4% per annum for the regulatory period. No rationale is provided for these assumptions.

Figure 20: Actual and forecast connection numbers (indexed)



Source: EGW

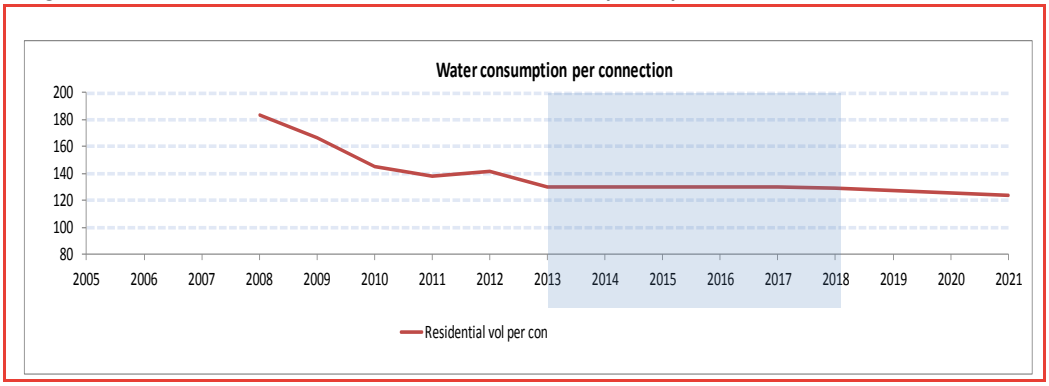
We note the water connection figures contained in the information template do not match the figures contained in the main body of the water plan (or its Growth and Demand forecast spreadsheet subsequently provided). EGW has confirmed that the numbers in the information template are accurate for billing purposes so these figures have been used in our analysis.

Water volumes

Residential water demand is forecast to increase at a compounding rate of 0.7% per annum over the regulatory period. This growth is driven by customer connection growth as demand per household is forecast to initially fall in 2013/14 before remaining steady at 132kL per connection for the remainder of the period. This figure is below the average demand per connection of 150kL for the period 2009/10 to 2011/12. However, over the past five years average

residential household use has been trending downwards (see Figure 21). EGW attributes this change to permanent change in customer behaviour as a result of their investments in water efficient technologies.

Figure 21: Actual and forecast residential consumption per connection



Source: EGW

EGW modelled various scenarios for residential and non residential customer water use volumes per connection. However, no rationale was provided for the assumptions adopted under these scenarios. In particular, these scenarios/assumptions do not appear to have been informed by other analysis regarding:

- The effect of climatic conditions on water use — EGW has not identified whether its historic figures around water use have been affected by the climatic conditions in those year.
- Bounce back — EGW does not see this as relevant and note that restrictions have not been in place since 2007/08 but that residential use continues to fall.
- The price elasticity of water — EGW has not allowed for price elasticity impacts as they consider these to be negligible.

Instead EGW equates the historic decline in residential water use per connection to customers installing water conservation measures which have resulted in a permanent decline in demand.

Non-residential consumption is forecast to grow at an average of 0.8% per annum (compounded). This is driven by assumptions around growth in the number of customer connections, as demand per connection is forecast to fall slightly over the regulatory period. Historic trends suggest non-residential water use has remained relatively stable since 2008/09 albeit with year to year fluctuations.

Issues

The draft review identified four key concerns with EGW's water connection and volume forecasts. These are discussed below.

First, EGW's approach to forecasting connection growth is lacking in transparency given it is based on various sources that are combined in an unexplained way.

Second, putting this lack of transparency aside, EGW's forecast of residential connection growth appears low. EGW appear to have relied on VIF forecasts of population growth rather than household growth. Population growth forecasts tend to be lower as they do not take account of changes in demographics or household composition.

The VIF 2012 forecast of household growth suggests EGW's growth in connections should be 1.7% pa over the period 2012/13-2016/17 and 1.8% in 2017/18 (based on assuming 2% of EGW's customers fall within the alpine shire and 98% in Gippsland – apportioned according to EGW existing property connections). These rates are higher than EGW assumed growth rates over the period of between 1.3% and 1.4%. In the draft report we amended EGW's residential connections (or more specifically 20mm, vacant land and multi-service connection numbers) to reflect the VIF's 2012 annual average household growth estimates for the East Gippsland region as described above. EGW in its response to the draft report accepted these revisions.

Third, EGW forecasts non residential connections to grow, over the regulatory period, at approximately the historical rate of growth. While, no rationale is provided for this assumption it appears reasonable.

Fourth, the residential water volume forecasts appear low. No rationale has been provided for the consumption per connection figures that have been used to generate the water volume forecasts. Furthermore, these water use figures do not appear to take into account of the effect of climatic conditions on water use. While water use declined significantly in 2010/11 and 2011/12 rainfall increased significantly over this period. By ignoring this, EGW is implicitly assuming that wet conditions will continue over the regulatory period. In the draft report we amended EGW's residential water volume forecasts by adopting the average of actual volumes per connection over the previous regulatory period (assumed to be 141kL per connection). EGW in its response to the draft report accepted these revisions. For the final report we have also adopted this approach but with more detail on the split between residential and non-residential connections the average of actual residential volumes per connection over the previous regulatory period amounts to 150kL per residential connection.

Our review also identified that EGW's forecasts do not account for price elasticity. EGW's approach is consistent with that of the majority of regional water businesses. EGW explicitly stated that they believe that such impacts are immaterial. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 price elasticity to the demand forecasts where it was believed necessary. This value was derived by taking the weighted average of a 2004 water industry study undertaken by WSAA. WSAA's price elasticity estimates with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

For the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, water use restrictions and changes to water use behaviours. For this reason we consider a conservative approach to elasticity is appropriate. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity to demand on the basis that any subsequent amendment to demand is immaterial. EGW has proposed a rise in water volumetric fees of around 7% over the regulatory period. Using a price elasticity of 0.07) equates to a price elasticity impact of 0.5%. This is considered immaterial and so the lack of consideration of price elasticity in not of concern.

Finding

EGW's forecasts for 20mm connections, vacant land and multi-service connections has been amended to reflect the VIF's 2012 annual average household growth estimates for the East Gippsland region of 1.7% pa over the period 2012/13-2016/17 and 1.8% in 2017/18.

EGW's residential volumes have been amended based on the amended connection forecasts and the average of the actual volumes per residential connection (150kL per connection) over the previous regulatory period. Where residential connections include 89% of the 20mm connections (based on data provided by EGW) and multi-service connections. .

4.4 Sewage

Customer connections

The growth rate used to forecast water connections growth has also been used to forecast growth in residential Equivalent Tenement Units or EQTs (growth of between 1.3% and 1.4% per annum for the regulatory period).

Non-residential EQTs have been forecast to grow at 0.8% over the period. The data shows a significant decline of -3.62% between 2012/2013 and 2013/14 and significant growth in the following year. The rationale is provided for these assumptions and we note this rate of growth is lower than the average rate of growth of 3.5% pa experienced over the period 2009/10 to 2011/12.

We note that the EQT figures contained in the information template do not match the figures contained in the main body of the water plan (or its Growth and Demand forecast spreadsheet subsequently provided). EGW has confirmed that the numbers in the information template are accurate for billing purposes so these figures have been used in our analysis.

Volumes

Sewage volumes have not been forecast as EGW only levies a fixed charge per EQT which is understood to be similar to a connection charge.

Issues

Our key concern with EGW's sewage EQT forecasts is that the forecast growth rates appear low for the same reasons as described in relation to water connections. Namely that EGW's forecasts of EQT growth appear low.

EGW appear to have relied on VIF forecasts of population growth rather than household growth. The VIF 2012 forecast of household growth suggests the growth in EQTs should be 1.7% pa over the period 2012/13-2016/17 and 1.8% in 2017/18 (based on assuming 2% of EGW's customers fall within the alpine shire and 98% in Gippsland – apportioned according to EGW existing property connections). These rates are higher than EGW assumed growth rates over the period of between 1.3% and 1.4%.

In the draft report we amended EGW's residential and non-residential EQT forecasts to reflect the VIF's 2012 annual average household growth estimates for the East Gippsland region as described above. EGW in its response to the draft report accepted these revisions.

Finding

EGW's residential and non-residential EQT growth forecasts have been amended to reflect the VIF's 2012 annual average household growth estimates for the East Gippsland region of 1.7% pa over the period 2012/13 to 2016/17 and 1.8% in 2017/18.

4.5 Trade waste

Customer connections

EGW has forecasted the number of trade waste customers to remain constant over the regulatory period at 382 connections. No rationale has been provided for this assumption.

Volumes and Loads

EGW are not charging a variable or per kL fee for trade waste over the regulatory period. Minor trade waste customers will only receive a fixed compliance/audit fee and the standard fee based on their EQT.

Major trade waste customers may receive an extra charge to treat trade waste based on the Mogden formula which assesses the load strength of waste discharged into the sewerage system.

EGW's has not included a forecast for trade waste loads and hence this has not been reviewed.

Issues

In the absence of any rationale for the figure adopted the number of trade waste customers seems slightly low at 382, given trade waste customer numbers grew by 1% pa on average over the previous regulatory period. It is not clear why EGW has not included any trade waste load forecasts in the price review sheet as this would seem to be a source of regulated revenue. EGW has indicated it has six major trade waste customers and that a total of approximately $86,000 is charged to these customers. Therefore, unless this revenue sources is accounted for elsewhere it should be included. EGW provided no comment on this in response to our draft report

Finding

EGW's forecast trade waste customer numbers have been amended to grow by 1% pa over the regulatory period in line with historical levels of growth.

We are unable to estimate a forecast for EGW's trade waste loads based on the information provided. However, we consider the absence of this data to be an issue as it would appear to be a source of regulated revenue. This revenue source may be accounted for elsewhere. If not, this will need to be addressed.

4.6 Recycled water

EGW is under stood to supply some recycled water under separately negotiated agreements for farming and recreational purposes.

EGW charges for this recycled water and it represents a regulated tariff. This revenue source may be accounted for elsewhere. If not this will need to be addressed. EGW provided no comment on this in response to our draft report

4.7 Revisions to forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Sewerage					
Service fee (EQT based)					
Sewerage Service Fee (EQT) - Non Res	4658	4818	4885	4953	5023
Sewerage Service Fee (EQT) - Res	16622	16838	17074	17313	17555
Sewerage Service Fee (EQT) - Vacant Land	3057	3126	3179	3216	3253
Sewerage Service Fee (EQT) - Res (final revised)	16752	17037	17326	17621	17938
Sewerage Service Fee (EQT) - Non Res (final revised)	4915	4999	5084	5170	5263
Trade Waste					
customers					
Trade waste Facility Charge	382	382	382	382	382
Trade waste Facility Charge (final revised)	408	412	416	420	425
Water					
Service Fee (connections)					
Water Service Fee - 20mm	20839	21110	21405	21705	22009
Water Service Fee - 20mm Multi Service Charge	427	433	439	445	451
Water Service Fee - 20mm Vacant Land	2550	2583	2619	2656	2693
Water Service Fee - 20mm (final revised)	20944	21300	21662	22031	22427
Water Service Fee - 20mm Vacant Land (final revised)	2560	2603	2648	2693	2741
Water Service Fee - 20mm Multi Service Charge (final revised)	808	821	835	849	865
Volumetric fee (kL)					
Water Volumetric Fee - Res	2547000	2584000	2622000	2657000	2693000
Water Volumetric Fee - Res (final revised)	2923456	2973154	3023698	3075101	3130453

4.8 Summary

This review of EGW's urban demand forecasts found the following.

- Forecasts have not typically been based on appropriate forecasting methodologies. EGW's approach to forecasting connections is lacking in transparency and EGW did not provide a rationale for the consumption per connection figures used to generate the water volume forecasts. In general EGW has provided very little rationale for the forecasts provided and in many cases demand data in the main body of the water plan does not equate with data contained in the pricing template.

- Forecasts do not reflect reasonable assumptions about the key drivers of demand. For example water use figures do not appear to take into account of the effect of climatic conditions on water use.
- Forecasts appear to be generally based on extrapolating historic trends, but where other available information has been used, it has not been used appropriately or transparently. For example, VIF forecasts of population growth were used instead of dwelling growth in determining the residential connection forecasts.
- Forecasts, were generally based on simple growth estimates from observed values and averages, and are therefore not expected to be biased.
- Forecasts do not account for price elasticity.

5. Goulburn Valley Water

5.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing Goulburn Valley Water's (GVW) demand forecasts for the Water Price Review 2013.

5.2 Water Plan proposal

The table below summarises GVW's demand forecasts over the next regulatory period.

Table 10: GVW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	1.6%
Residential water volumes	1.1%
Non-residential water connections	0.8%
Non-residential water volumes	0.8%
Residential sewerage connections	1.4%
Residential sewage volumes	1.8%
Non-residential sewerage connections	1.4%
Non-residential sewage volumes	1%
Recycled water connections	Not provided
Recycled water volumes	1.2%
Trade waste customer numbers	0.05%
Trade waste volumes	0.3%

Notes: n.a. Not applicable

Source: GVW 2012 Water Plan, and response to the information request

5.3 Water

Customer connections

GVW fixed water charge is based on customers' meter size. Connection numbers for the various meter categories are forecast to grow at an average compounding rate of between 0% and 1.8% per annum over the regulatory period.

Based on the disaggregated data provided in response to the information request residential water connections are forecasted to grow at an average rate of 1.6% per annum over the period 2012/13 to 2017/18 (see Figure 22). These forecasts were based on Victoria in Future (VIF) 2008 population growth forecasts and GVW's historical data. Forecasts were developed for each of GVW's major towns based on a consideration of the VIF forecasts and previous growth records. These were then aggregated.

Non-residential connections have been forecast to grow at an average rate of 0.8% per annum. These forecasts are also based on reviews conducted for each of GVW's major towns. GVW forecasts non residential connections to grow at a slower rate than residential connections. This is not unreasonable as over the last regulatory period the number of non-residential connections has remained relatively stable (see Figure 22).

Figure 22: Growth in water connections (indexed)

Source: GVW data provided in response to information request

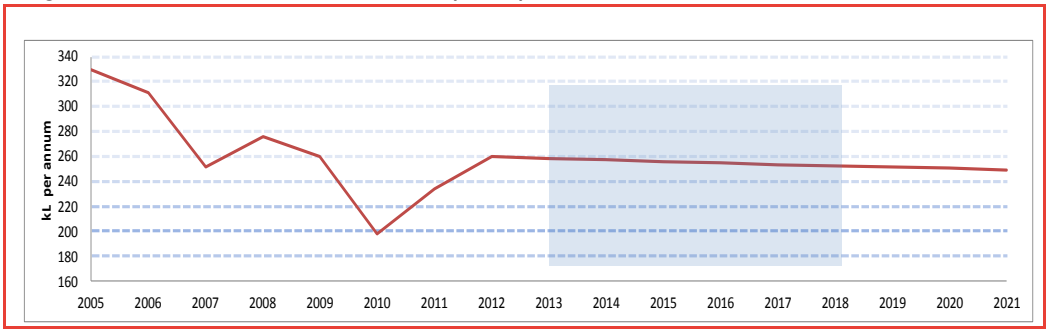
Water volumes

Residential water demand is forecast to increase at a compounding average rate of 1.1% per annum over the regulatory period. This growth is driven by customer connection growth as average consumption is forecast to fall slightly over the regulatory period (see Figure 23) from 258 to 253 kL per connection.

This figure of 258kL per connection mostly reflects the average demand for 2008/09 and 2009/10 which GVW consider to be the most representative years

— as demand was unrestricted and climatic conditions were close to average. Demand in 2010/11 and 2011/12 was understood to have been heavily impacted by high rainfall during summer. This appears to be a reasonable approach.

Figure 23: Residential water consumption per connection



Source: GVW data provided in response to information request

GVW states that two regression models were used to forecast residential water demand per connection. The models include climatic and restriction on use variables. Base on GVW description the resulting demand forecast is understood to assume:

- Average climatic conditions for the regulatory period and unrestricted supply.
- Some minor ongoing water use efficiency — Residential demand per connection for existing properties has been assumed to be similar to the average of the past 5 years. However, residential demand per connection for new properties is assumed to be less than the average for existing properties. Given smaller lot sizes, smaller garden areas/lawns and higher uptake of water efficient appliances.
- Negligible price elasticity impacts.

GVW has not made an allowance for bounceback in its demand forecast on the basis that recent demand has not been impacted by extended periods of high level water restrictions.

Non-residential (commercial) consumption is forecast to grow at an average of 0.8% per annum. This is driven entirely by assumed growth in the number of connections, as demand per connection is forecast to remain steady at current levels over the regulatory period.

GVW's forecasts for major industry demand are based on consultation with customers. Based on the limited information received from major customers, GVW's demand forecasts generally assume that major customer demand will remain steady at a level close to the average for the period 2008/09 to 20011/12.

Issues

GVW's water demand forecasts appear mostly reasonable. The 258kL consumption per connection figure draws on a reasonable approach of using representative data.

Our primary concern with GVW's water connection and volume forecasts relates to our inability to reconcile connection forecasts using the different data sources provided by GVW. GVW's pricing template does not disaggregate actual and forecast water volumes and connections between residential, non-residential and major customers (given customers are charges the same tariff). Disaggregated data was provided in the water plan and in response to the information request but this cannot not be precisely reconciled with the figures provided in the financial template. The result is that GVW's approach to forecasting connection growth is lacking in transparency. However, we note that the difference in most cases is not significant and so we have not deemed it necessary to pursue this.

Our draft review raised concerns with GVW's forecast of residential connection growth, suggesting that this was not based on the best available information and that it appeared low. In particular, GVW relied on VIF forecasts of population growth rather than data on household growth. Population growth forecasts tend to be lower as they do not take account of changes in demographics or household composition. Adding to this GVW also relied on VIF 2008 rather than 2012 forecasts. We proposed growth in 20mm connections be amended to reflect the VIF's 2012 forecast of occupied household growth, based on a weighted average of the SLA's[4] relevant to GVW. This resulted in connection growth rates higher than that assumed by GVW of 2.1% pa over the period 2012/13-2016/17 and 2.36% in 2017/18.

GVW's response to the draft review noted that the proposed growth rates were significantly influenced by high growth rates in Mitchell South. GVW noted that this SLA is within the urban growth boundary and contains towns such as Wallan and Beveridge that are not serviced by GVW and that are growing at a far faster rate than those serviced by GVW. GVW presented evidence on historical water connection growth in the towns it services in Mitchell South. This showed that residential connections grew by an average of 1.5% pa since 2006/07 which is far below the VIF's future projections of 6.92% over the period 2011-2016.

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4 Gr. Shepparton (C) - Pt A; Campaspe (S) – Kyabram;; Campaspe (S) – South; Gr. Shepparton (C) - Pt B East; Gr. Shepparton (C) - Pt B West; Moira (S) – East; Moira (S) – West; Mansfield (S); Strathbogie (S); Mitchell (S) – North; Mitchell (S) – South; Murrindindi (S) – East; Murrindindi (S) - West

GVW also re-estimated its water connection forecasts using a combination of historical growth rates and 2012 VIF estimated growth rates (taking the higher of the two except in Mitchell South). This analysis resulted in an average annual growth rate of 1.6% which mirrored that adopted in the Water Plan. On this basis they suggested that its originally submitted connection numbers should be retained, which seem reasonable.

We have also identified that the GVW's forecasts do not account for price elasticity. GVW's approach is consistent with that of the majority of regional urban water businesses. Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are not material. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 price elasticity to the demand forecasts where it was believed necessary. The value of -0.07 was derived by taking the weighted average of a 2004 water industry study undertaken by WSAA with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

However, for the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and material and in some cases permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity to demand on the basis that any subsequent amendment to demand is immaterial. For Water Plan 3, GVW has proposes an increase in water volume charges of CPI +2.4%. For this price increase the lack of consideration of price elasticity is not considered a concern.

Finding

Based on the additional information provided and additional analysis undertaken by GVW we consider that no change is required to the connection and volume forecasts presented in the Water Plan.

5.4 Sewage

Customer connections

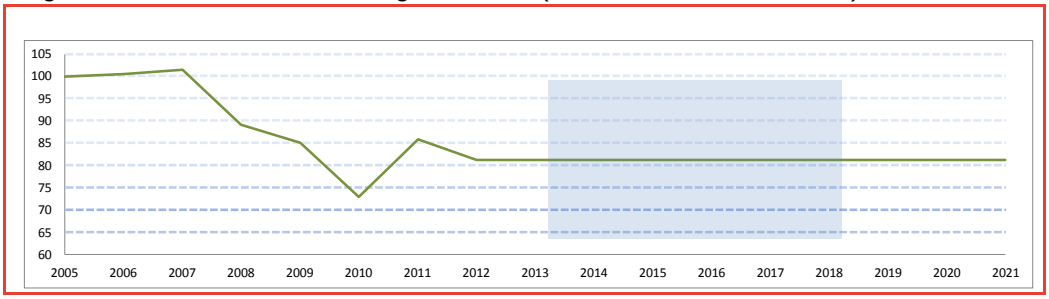
Both residential and non-residential sewerage connections have been forecast to grow at an average compounding rate of 1.4% per annum over the regulatory

period. This equates to GVW's estimate of the weighted average growth in residential and non-residential water connections.

Volumes

It is understood that the forecast sewage volumes provided are based on non-residential and industrial chargeable volumes. GVW has forecast these volumes to remain stable over the regulatory period (see Figure 24). This excludes residential volumes as GVW does not levy a variable charge on these customers. GVW's non-residential customers are charged based on a percentage of water consumed. Non residential customers are allocated an allowance of 180kL per annum that does not attract a volumetric charge while any volume in excess of this allowance attracts a usage fee.

Figure 24: Non-residential sewage volumes (indexed to 2005/06 levels)

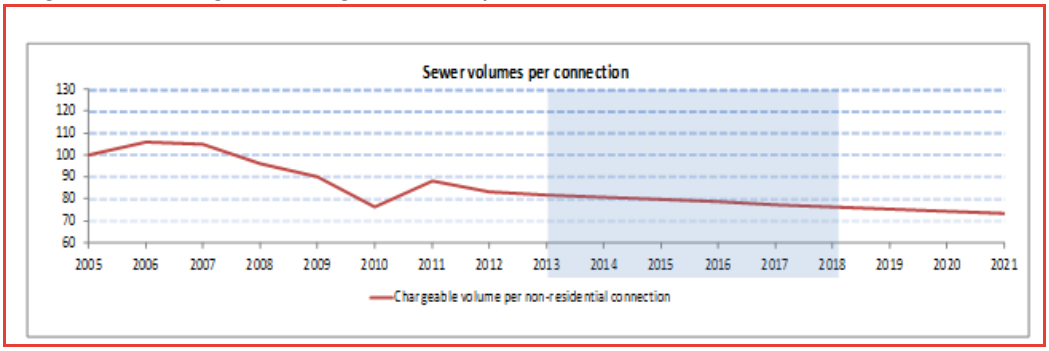


Source: GVW Water plan

Issues

GVW's forecast growth in chargeable volumes appears low. Initial discussions with GVW identified that its forecasts had assumed no change in average wastewater volumes per connection and that they take into account predicted growth in connections (of 0.8%). However, the draft review found that this did not appear to be the case as the forecast volumes remain flat while non-residential connections are forecast to increase. In response to our draft review GVW provided further information and indicated that the forecasts also reflect a longer term trend for reduced sewage volumes related to changes in consumer behaviour and the uptake of water efficient appliances. This appears to be the case as is shown in Figure 25 below.

Figure 25: Change in sewage volumes per non-residential connection



Finding

No change has been made to GVW's sewage connection or volume forecasts.

5.5 Trade waste

Customer connections

GVW has forecasted the number of minor trade waste customers to grow by an average of 0.3% over the regulatory period. This appears to be based on historical growth rates experienced over the previous regulatory period.

Volumes and Loads

Trade waste volume forecasts were not included in the financial template information provided. Instead trade waste revenue was included as contract revenue (which comprises of revenue from both volume and load based charges). However, volume forecasts were contained in the Water Plan. This data suggests trade waste volumes will fall by close to 1% per annum over the regulatory period.

These forecasts are largely based on the continuation of the historic trend as the majority of major customers could not provide future forecasts with any certainty.

Major trade waste customers are also understood to receive an extra charge based on the load strength of waste discharged into the sewerage system. GVW has noted that future concentration of charging parameters are largely assumed to reflect historic concentrations. However, GVW's has not provided any data on trade waste loads.

Issues

GVW has not included any trade waste volume or load forecasts in its pricing template instead Trade Water revenue has been accounted for under Trade Waste contract revenue. As a result, we are unable to comment on the adequacy of the volumetric and load based forecasts underpinning this revenue estimation.

Finding

No change is required to the connection and volume forecasts presented in the Water Plan.

5.6 Recycled water

GVW provides recycled water to customers primarily for irrigation and agricultural purposes.

Issues

GVW has not included a demand forecast for its recycled water supply in the financial template. Instead recycled water revenue has been included as a line item titled *"Recycled Water Contract Revenue"*. As a result, we are unable to comment on the adequacy of the demand forecasts underpinning this revenue.

Finding

Recycled Water revenue has been included as contract revenue as we are unable to comment on the adequacy of the demand forecasts underpinning this.

5.7 Revisions to Forecasts

No revisions have been made to GVW's forecasts.

5.8 Summary

This review of GVW's urban demand forecasts found the following.

- Forecasts appear to be based on appropriate, albeit basic forecasting methodologies. Typically GVW's forecasts are based on historical trends. However, in the case of water demand GVW adjusted historical estimates of average consumption to take account of other key drivers of demand. It should be noted that the specifics of how average water consumption forecasts have been adjusted is unclear as insufficient information has been

provided on the models used. In general there is a lack of transparency surrounding GVW's water connection and volume forecasts. The disaggregated data provided by GVW could not be reconciled with the figures provided in the financial template. However, the difference in most cases is not significant and so we have not deemed it necessary to pursue this.

- Forecasts reflect reasonable assumptions about the key drivers of demand. In particular, GVW has considered the impact of climatic conditions in its forecasts taking as a starting point average consumption in a year with average climatic conditions and where supply was unrestricted (removing the need to consider bounceback). It has also assumed some minor ongoing water use efficiency.

- Forecasts generally use the best available information including the VIF's 2012 forecasts of dwelling growth.

- Forecasts were based on simple growth estimates from observed values and averages, and are therefore not expected to be biased.

- Forecasts do account for price elasticity as this was considered negligible.

6. Gippsland Water

6.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing Gippsland Water's (GW's) demand forecasts for the Water Price Review 2013.

6.2 Water Plan proposal

The table below summarises GW's demand forecasts over the next regulatory period.

Table 11: GW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	1.8%
Residential water volumes	0.9%
Non-residential water connections	0.4%
Non-residential water volumes	1.2%
Major customer water connections	0.6%
Major customer water volumes (excluding contracted revenue)	4.6%
Residential sewerage connections	2.6%
Residential sewage volumes	n.a.
Non-residential sewerage connections	0.4%
Non-residential sewage volumes	-1.2%
Major customer sewerage connections	0%
Major customer sewage volumes	0%
Residential recycled water connections	n.a.
Residential recycled water volumes	n.a.
Non-residential recycled water connections	n.a.

Non-residential recycled water volumes	n.a.
Trade waste customer numbers	0%
Trade waste volumes	0%

Notes: n.a. Not applicable
Source: GW 2012 Water Plan

6.3 Water

Customer connections

Residential water customer connections are forecasted to grow at a compounding average rate of 1.75% per annum over the regulatory period.

GW has indicated that its connection forecasts are based on forecasts developed for all major regional towns. These town forecasts are developed based on mean historical growth rates. The resultant forecasts have been compared with forecasts based on the Victoria in Future (VIF) 2008 and 2012 projections, local council projections; and land supply availability including known development activity.

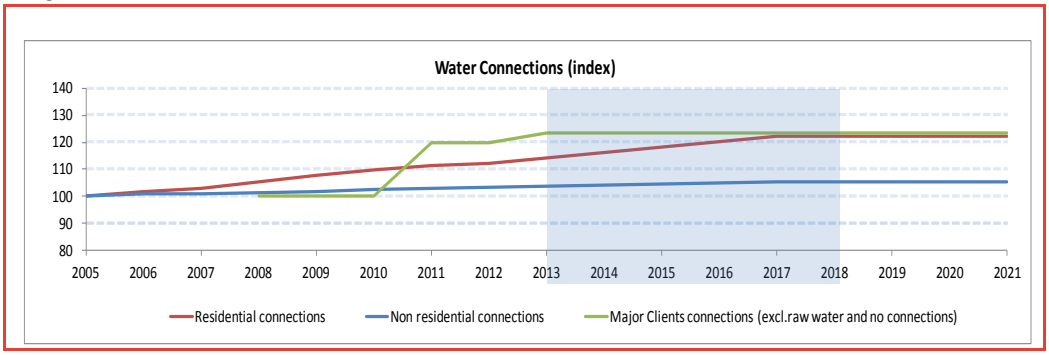
GW's residential connection numbers are forecast to rise at a faster rate than the VIF 2012 forecasts of growth in occupied households for the SLA's across which GW's operates (1.45% pa). Instead GW's forecasts are based on historical trends which show much higher growth rates.

GW non-residential connections have been forecast to grow at a slower rate of 0.36%. While no rationale was provided for this assumption it appears consistent with historical growth rates.

Major customer connections are forecasted to remain stable over the regulatory period[5].

5 Growing from 36 connections in 2012/13 to 37 in 2013/14 and remaining stable for the rest of the period.

Figure 26: Growth in customer connections

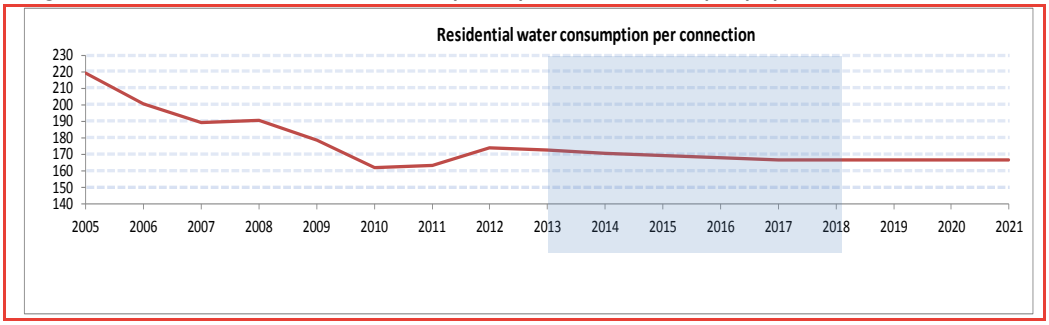


Source: GW Water Plan

Water volumes

Residential water demand is forecast to increase by an average of 0.9% per annum over the period. This growth in consumption is driven by growth in new customer connections as consumption per connection is forecast to decline over the regulatory period (see Figure 27).

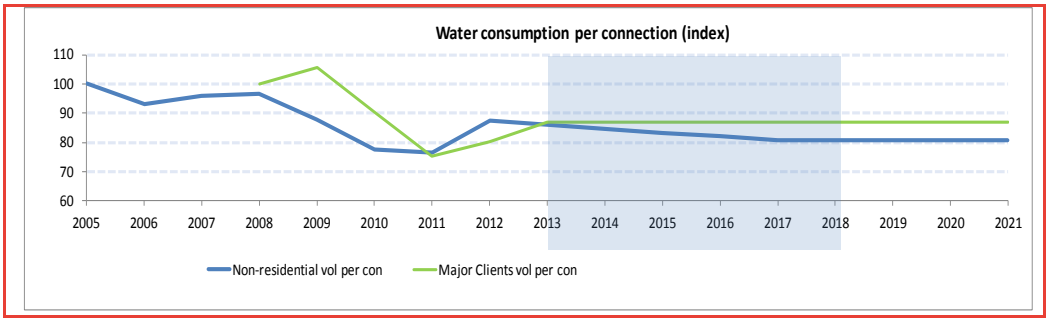
Figure 27: Residential water consumption per connection (kL pa)



Source: GW Water Plan

Non-residential consumption is forecast to decline at a compound average annual rate of 1.2% per annum based on assumptions relating to reduced consumption per connection (see Figure 28).

Figure 28: Growth in non-residential water consumption per connection



Source: GW Water Plan

The underlying challenge for GW in developing these forecasts is that it has seen significant volatility in consumption patterns in the region in recent years.To estimate an upper and lower bound for its residential water demand forecasts GW developed a trend line based on historical usage per connection (lower bound) and a trend line based on amended historical usage (upper bound). The upper bound was based on the average usage per connection over the period 2004/05 to 2007/08 and then 'adjusted' usage in the following years based on assuming average usage would have fallen by 2% annually rather than by the higher levels experienced. This adjustment was based on the assumption that, for the reasons outlined below, usage post 2007/08 is unreliable as a predictor of future demand:

- In 2008/09 and 2009/10 there were significant increases in the cost of water (30% and 28% respectively) and more average annual rainfall across the region which could have reduced consumption.
- In 2010/11 and 2011/12 there was record high rainfall, in some regions this was 30-50% higher than the eight year average, resulting in low average residential consumption.

The GW forecast of residential water demand for the regulatory period is then based on an annual 0.85% reduction from the amended consumption figure developed for 2011/12 as this is closest to the upper bound trend line described above. The resulting forecasts are above the lowest annual average consumption figure of 162 kL per annum.

To estimate non-residential water demand GW has taken a similar approach. This involved developing a trend line based on historical usage per connection (lower bound) and a trend line based on amended historical usage (upper bound). Where the upper bound is based on the average usage per connection over the period 2004/05 to 2007/08 and then 'adjusted' usage per connection in the following years assuming usage would have fallen by 1.81% annually. GW suggest this adjustment was made because of above average rainfall over this period making usage figures post 2008/09 unreliable as predictors of future non-residential demand. GW describes how non-residential demand is heavily affected by rainfall because as a significant proportion of its non-residential consumption is derived from local councils (for parks and gardens) and local farmers (to supply stock).

The GW forecast of non-residential water demand for the regulatory period is then based on an annual 1.5% reduction from the amended consumption figure developed for 2011/12 as this is closest to the upper bound trend line described above.

The result of this approach is that GW has not based its forecasts on explicit scenarios relating to climatic conditions, likely ongoing efficiencies or

assumptions around bouceback or future price elasticity. Although GW does note that it has not been required to implement water restrictions in any major towns within the region since restrictions were lifted in August 2007. Therefore, it does not expect any 'bounce back' from water restrictions over the regulatory period.

A significant proportion of the GW's supplies go to major customers including manufacturers and power stations. However, most of this water is supplied under contracts (and so forms part of its contract revenue). As such it is not within the scope of the demand review.

However, a small number of major customers are billed a scheduled tariff. The volumes demanded by these customers are forecast to remain constant over the regulatory period as a result of customer numbers and volumes per connection being assumed to remain constant (at a level close the average for the period 2008/09 to 2011/12).

Issues

We have concerns with GW's residential and non residential water volume forecasts. In particular, the way water demand forecasts are informed by upper and lower bounds which are based on extrapolations of historic trends and 'adjusted' trends in average consumption per connection.

The draft review identified that GW's approach to forecasting residential water demand is problematic. GW's approach primarily involves forecasting forward on the basis of historically falling trends in average consumption. For this to be appropriate all the drivers experienced in the past must continue to exert[6] a similar influence on demand in the future.

GW itself highlights in its water plan some reasons why historical usage may not be the most accurate guide to future usage. For example, it notes historical usage would have been impacted by water restrictions, bushfires, water price increases, and rainfall and climatic conditions[7].

However, GW has not transparently taken into account these drivers in developing its forecasts. Instead it has relied on four years of historical usage (over the period 2004/05 to 2007/08) and adjusted usage figures (from 2008/09 to 2011/12) to develop an upper bound which is then used to inform the forecasts selected. These adjusted figures amount to forecasts in themselves. GW

6 Albeit reduced influence given a logarithmic trend line has been adopted.

7 GW Water plan pg78

has stated the adjustments are intended to account for price elasticity impacts post 2007/08 and the impact of water saving initiatives.

GW was asked in the information request to more clearly outline the assumptions that underpin the adjustment factors used (for residential and non-residential). However, in its response it referred back to its Water Plan. This contained some data on price elasticity impacts but no supporting data on the likely impact of water saving initiatives.

In the draft review we noted that extrapolating forward a trend based on the data described above does not represent best practice in forecasting. GW itself has noted the subjectivity associated with this process. In particular, this approach ignores the key drivers of demand in the past (most notably climatic conditions). It also assumes restrictions, climatic conditions and price elasticity impacts experienced in the past will continue and hence introduces biases into the forecast. GW's Water Plan provided no evidence to support its implicit conclusion that average consumption will continue to fall over the coming regulatory period. Instead it has focussed on demonstrating that its forecasts are similar to the upper bound trend line with which we are concerned.

An alternative approach that could be considered more reliable would involve developing a linear regression model based on historic usage data and other causal drivers (such as rainfall levels, restriction levels and water prices).

In the absence of data that is sufficient to do this we have proposed selecting an average representative year from the historical data (which is unaffected by restrictions and where climatic conditions are close to average).

Accordingly, our draft review proposed that forecast residential volumes be re-estimated based on average consumption in 2009/10. This was on the basis that this was considered a representative year as it already includes the elasticity impact (resulting from significant past increases in the price of water) and it was a year in which the annual rainfall across the region was closer to average.

GW, in its response to the draft review, dismissed this approach, highlighting that it:

- does not take account of historic trends.
- does not consider 2009/10 to be a representative year as rainfall levels were below average in its eastern regions and above average in its western regions.
- does not take account of the impact of price rises since 2009/10.

Certainly, we would agree with GW that this approach of selecting a representative year is a less appropriate than developing a linear regression model

which would better take account of various drivers of water demand. However, this approach was not possible with the data available to us. In respect to each of the points above we note the following.

First, our approach does not give substantial credence to historical trends because, as GW highlights historical usage may not be the most accurate guide to future usage. For example, in its water plan GW has noted that the 5.9% reduction in residential usage recorded between 2006/07 and 2007/08 is unlikely to be sustainable given it is influenced by three significant factors that will not necessarily impact on future demand, namely water restrictions and higher rainfall levels[8]. We would also argue that the forecasts by relying on adjusted historical figures, where the adjustments are justified on the basis of price elasticity impacts implicitly assume that price rises of 30% (based on rises experienced in 2008/09 and 2009/10) will continue. This is not the case with GW proposing for Water Plan 3 average price increases of around 1% for its residential water usage charges.

Second, the selection of 2009/10 as a representative year is partially based on GW statement in the water plan that there was a return to more average annual rainfall across the regime at this time[9]. GW in response to the draft review did not suggested an alternative representative year but noted that some parts of its regions experienced above and some below average rainfall during this year. This statement suggests rainfall across GW's regions could still be considered average. In setting this proposed starting consumption we also considered whether it reflected average levels of consumption over the proceeding period.

Third, we acknowledge that the approach proposed by Frontier in the draft does not take into account the impact of price rises since 2009/10.

Despite its limitations we are still of the view that selecting a representative year is a more transparent, less biased way of forecasting future demand that better takes account of the primary drivers of water consumption. This is when compared to GW's approach of adjusting historic data (primarily to account for price elasticity impacts) and then extrapolating forward these adjusted historical trends in order to inform the forecasts set.

However, in the revisions proposed, in this final review, we have taken into account GW's concerns with respect to including price elasticity impacts that may have occurred since 2009/10 (the representative year selected). An additional relevant consideration is whether price elasticity impacts over the

8 GW Water Plan, p 79.

9 GW Water Plan p. 78

regulatory period should also be taken into account. As part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 to the demand forecasts where it was believed necessary. This value was derived by taking the weighted average of a 2004 water industry study undertaken by WSAA with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

For the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and material and in some cases permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. In general where businesses have not proposed material changes in price we have not imposed an elasticity on the basis that any subsequent amendment to demand is immaterial.

For Water Plan 3, GW has proposes average price increases of around 1% for its residential water usage charges over the regulatory period assuming an elasticity of -0.07 this price change would equate to a 0.07% fall in demand. We consider this to be immaterial, however, given GW's concerns we are prepared to make allowance for this and any rise in price in 2010/11 and 2011/12. GW indicated that its prices increased in real terms by 4.3% per annum over the period 2010/11 to 2012/13 equating to 13% over the 3 years. Assuming a price elasticity of -0.07 this could have been expected to lead to a decrease of close to 1%. Hence, we have proposed that the forecast in year 1 be based on average consumption in 2009/10 less 1%. Over the regulatory period the average level of consumption used to develop the forecasts has also been reduced by 0.07% pa to take account of elasticity impacts over the regulatory period.

GW's approach to forecasting non- residential water demand is also problematic for the same reasons as described above in relation to residential demand.

Finally, in our draft report we noted we had some concerns with GW forecasts of major customer (contracted) water consumption which are anticipated to reduce significantly from 2013/14 onwards. These forecasts are essentially outside the scope of this review given tariffs for these customers are not included in the schedule. However, consumption by these customers is between 38 and 45GL making this a major source of GW's revenue. While we made no amendments to GW's major customer volume forecasts we noted that GW may have overstated the forecast decline[10]. In response to the draft report GW

10 The original rationale for this forecasted reduction related to the Federal Government implementing a voluntary Contract for Closure Program (for power generators) which has now been abandoned. As of July 2012, Energy Brix Australia downsized its operations. We note that while this has reduced

indicated that the ceasing of Energy Brix operations accounts for the majority of the forecast decline noting that their historical water consumption has average 5 to 7 GL per annum. We acknowledge this may account for a significant proportion of the forecasted fall.

Finding

On the basis of the issues described above we have made the following amendments to GW's water demand and connection forecasts.

- Forecast residential volumes have been re-estimated based on a starting consumption in 2012/13 of 177 kL/connection. This is based on average consumption in 2009/10 of 179 kL/connection amended to take account of price elasticity impact since this time. GW will have increased prices in real terms by 4.3% per annum over the period 2010/11 to 2012/13 equating to 13% over the 3 years. Assuming a price elasticity of -0.07 this could have been expected to lead to a decrease of close to 1% or 177kL. This also equates to the average consumption over the period 2007/08 to 2011/12. Over the regulatory period the level of consumption has been reduced by 0.07% pa to take account of ongoing elasticity impacts.
- Forecast non-residential volumes have been re-estimated based on average consumption in 2009/10 of 364 kL/connection. For the same reason as described in relation to residential demand. This 364 kL/connection is held constant for the regulatory period.

6.4 Sewage

Customer connections

GW forecasts residential and non residential sewage customer connections to grow at 2.6% and 0.4% per annum. These forecasts are understood to be based on the approach used to determine the growth in water connections. Although, we note forecast growth in residential sewer connections is higher than the growth forecast in relation to water connections.

Consistent with its approach adopted in water, major customer sewerage connections are forecast to remain stable.

Energy Brix Australia overall capacity significantly it may not fully explain the forecasted impact on water demand.

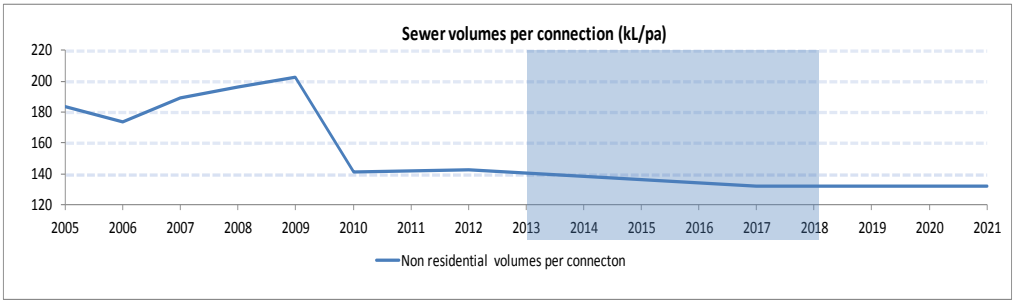
Volumes

Residential sewage volumes have not been forecast as no volumetric tariff is levied.

Non-residential sewage volumes are forecast to decline at 1.2% per annum over the regulatory period. This appears to be driven by the assumption that sewage volumes are likely to decline in line with water usage. When considering sewage volumes per connection there is a significant decline in volumes in 2010/11 which persists in 2011/12 (see Figure 29).

Consistent with its approach adopted in relation to water, major customer volumes are forecast to remain stable.

Figure 29: GW Non-residential sewage volumes per connection



Issues

GW provided very little detail in its water plan as to the basis of its sewage volume and connection forecasts. In response to our draft report GW identified that its non-residential sewage volume forecasts are based on a proportion (35.07%) of its water volume forecasts. This proportion is based on the median non residential wastewater/water volume percentage for the proceeding 5 year period. Given very similar connection growth is forecast for non-residential water and sewage approach does not seem to be an unreasonable.

However, we were unable to replicate the estimate GW claim they have used and instead have found the proportion varied between 38% and 48% over the preceding 5 years. In the last two year this percentage has remained stable at close to 39%.

Furthermore, because the non-residential sewage volumetric forecasts are based on the water volume forecasts the revisions we have made in relation to waster will be relevant here.

Finding

Non-residential sewage volumes have been re-estimated based on the revisions made to the non-residential water volume forecasts; and a non residential wastewater/water volume percentage of 39%.

6.5 Trade waste

Connections

GW has forecasted trade waste customer numbers to remain stable over the regulatory period.

Volumes and Loads

GW has a quality based tariff for trade waste customers which it introduced in 2010. The result being that trade waste customers receive (in addition to their annual fee) a volumetric charge and a quality based charge. GW has assumed trade waste volumes and loads will remain constant over the regulatory period.

GW is unable to provided any historical information on trade waste volumes or loads, as no such data exists, as a result we are unable to comment on the adequacy of the forecasts.

Issues

Historically the number of trade waste customers appears to have been growing. However, GW has assumed that trade waste customer numbers will remain stable over the regulatory period. In our draft report we revised the non-residential trade waste customer number forecasts in line with historical growth rates.GW accepted this revision in their response to the draft report.

Finding

Trade waste customer number forecasts have been revised such that they now grown in line with historical growth trends at a rate of 0.6% per annum.

6.6 Recycled water

We understand that recycled water is currently available from GW. However, the total output is provided under contract to a major customer (and so any revenue forms part of GW's contract revenue). As such it has not been considered within the demand review.

6.7 Revisions to Forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Sewerage					
Non Residential (kL)					
Volumetric	701,991	693,831	685,757	677,769	669,867
Volumetric (revised final)	815,773	818,754	821,735	824,717	827,698
Trade Waste					
Non Residential (customers)					
Annual Fee	836	836	836	836	836
Annual Fee (revised final)	841	846	851	856	861
Water					
Non Residential (kL)					
Volumetric	2,044,965	2,021,046	1,997,385	1,973,979	1,950,826
Volumetric (revised final)	2,091,726	2,099,370	2,107,014	2,114,658	2,122,302
Residential (kL)					
Volumetric	10,377,570	10,469,349	10,558,817	10,646,009	10,730,955
Volumetric (revised final)	10,669,878	10,852,630	11,035,121	11,217,351	11,399,321

6.9 Summary

This review of GW's urban demand forecasts found the following.

- Forecasts appear to be based on appropriate forecasting methodologies except for the trade waste non-residential customer number forecasts and the water volume forecasts. GW's water demand forecasts are particularly questionable. They are based closely on an upper bound which in turn is based on adjusted historical estimates of average consumption which take account of how passed consumption levels may have been affected by some, but not all, the key drivers of demand (including climatic conditions).

- Forecasts reflect reasonable assumptions about the key drivers of demand with the exception of the water volume forecasts – which neglected to transparently consider the impact of climatic conditions and restrictions on future demand.

- Forecasts generally based on extrapolating historic trends but some use has been made of other available information.

- GW's water volume forecasts are likely to be statistically biased. However, other forecasts were based on simple growth estimates from observed values and averages, and are therefore not expected to be biased.

- The forecasts account for price elasticity.

7. GWMWater (GWMW)

7.1 Introduction

This chapter contains the businesses specific analysis undertaken by Frontier as part of the review of demand forecasts for the Water Price Review 2013

7.2 Water Plan proposal

Table 12: GWMW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections (potable supply)	2.1%
Residential water volumes (potable supply)	1.9%
Sewerage connections	1.1%
D&S capacity (peak and off peak)	5.8%
D&S volumes	0.0%
Groundwater customers	0.0%
Surface water customers	0.0%
Headworks	0.0%
Irrigation customers	-100%

Notes: n.a. Not applicable

Source: GWMW 2012 Water Plan

7.3 Water

Demand forecasts in the Water Plan were developed using TechnologyOne's Enterprise Budgeting module. The system calculates total demands for each year based on a number of input variables.

Customer connections

Connection numbers in the Water Plan were based on draft VIF estimates from 2011. Discussions with GWMW have since confirmed that the Water Plan pricing template was updated with final VIF 2012 estimates.

Water volumes

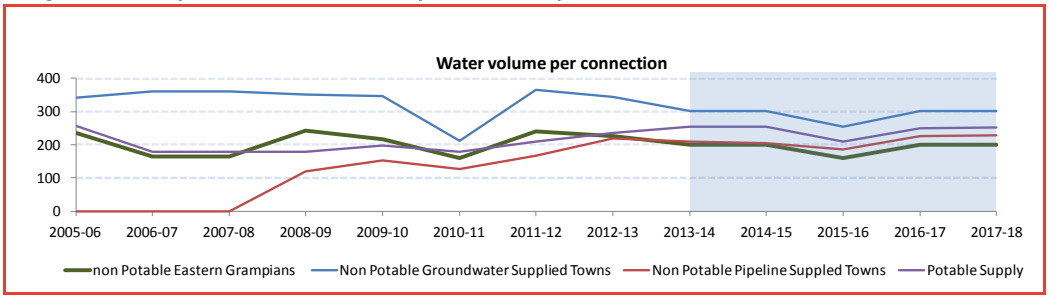
The approach used by GWMW to forecast demand volumes (and bounceback) was unique among the Victorian business reviewed by this study. Broadly speaking, their approach was to:

- Observe historical water demands and the level of restrictions in place
- Adjusted these historically observed volumes to an estimate of unrestricted demand. This involves apply a factor to historical forecasts based on the level of restrictions that was in place
- Apply a 10% reduction factor to adjust for anticipated further water saving behaviour
- Assume that future demand will be in the context of Permanent Water Saving Rules in all years.

Combining these assumptions GWMW's forecast of water demand under Permanent Water Savings Rules are forecast as being 14% below unrestricted levels of consumption.

GWMW made assumptions in regard to seasonal conditions — that 4 years in the regulatory period are average years and 1 year is a La Nina year (i.e. 2015-16 is a wet year) when residential consumption is adjusted (see Figure 30).

Figure 30: Impact of 2015-16 wet year assumptions



Source: GWMW data in ESC template, historical observations and forecasts.

Issues

During consultation, GWMW indicated that the factors used to estimate historical unrestricted demand were informed by analysis undertaken on data from across the Wimmera Mallee. This data and analysis was provided to us, but did not appear to provide a strong basis for the adjustment values used.

GWMW noted that their use of the 10% reduction factor was based on CHW (2010), a basic survey of the adoption of water efficient gardens in Horsham, and GWMW internal analysis of water consumption data. GWMW has sensitivity

analysis to demonstrate that it was more reasonable than using 20% (which would have forecast demand to be at drought level) and 0%.

GWMW's overall forecast of water demand (under Permanent Water Savings Rules) being 14% below unrestricted levels of consumption is in line with the assumptions adopted by LMW (urban). LMW forecast demand to be 12% below unrestricted demand levels which was supported by econometric analysis. On this basis, our draft review did not propose to revise this forecast.

The draft review did not consider that it was reasonable to forecast a La Nina flood year in 2015-16 (and therefore forecast that demand under PWSR is 35% below unrestricted average demand). As a result the draft review proposed to revise 2015-16 forecasts by calculating new 2015-16 consumption per connection figures based on the average of the 2014-15 and 2016-17 forecasts. This was applied to the connection data to provide revised forecasts of 2015-16 volumes. This proposed revision was accepted by GWMW.

The review also identified that the GWMW's forecasts do not account for price elasticity. GWMW's approach is consistent with that of the majority of regional urban water businesses. Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are not material. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 to the demand forecasts where it was believed necessary. The value of -0.07 was derived by taking the weighted average of a 2004 water industry study undertaken by WSAA. WSAA's with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

However, for the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and in some cases permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity on the basis that any subsequent amendment to demand would be immaterial.

For Water Plan 3, GWMW has proposed price increases of 3.07% from 2012-13 to 2013-14. This is not considered a material price changes, and so this review has not identify the lack of including price elasticity as an issue of concern.

Finding

Revise as per the draft review and agreed by GWMW. These revised forecasts are provided in Table 14.

7.4 Sewage and Trade waste

Customer connections

Customer connection forecasts were estimated relative to urban demands and GWMW reported that VIF 2012 forecasts had been used.

Volumes

Sewage volumes under 'Variable Sewerage Volumetric (formerly Large Towns)' are forecast to drop to zero in 2015-16 to 2017-18. Volumetric tariffs only apply to non-residential customers.

Issues

GWMW noted they are planning on phasing out volumetric charges for wastewater and increasing trade waste charges over the first 3 years, the template data is consistent with this.

Consistent with the draft review no revisions are proposed.

Finding

No revisions required.

7.5 Groundwater

Our initial analysis noted significant movements in groundwater forecasts.

Discussions with GWMW revealed that:

- It is assumed there will be no demand change in groundwater licence volumes or number of licence holders. There has been minimal trading in historically.
    - The exception is changes in volumes for mining operations. The main reason for the increase from 2011-12 relates to mining operations acquiring new licences. Other identified issues with projecting demands include potential reductions in volumes for mining operations and

potential newly available groundwater volumes of 2500ML under the West Wimmera Groundwater Management Strategy.

- GWMW are transitioning all groundwater customers to a common tariff over the next Water Plan period.

Consistent with the draft review no revisions are proposed.

Finding

No revisions required.

7.6 Irrigation

The Wimmera Irrigation System has been subject to an Irrigator Led Group Proposal (ILGP) to close the system and sell 28 GL of irrigation entitlements to the Commonwealth Government.

The IGLP was been accepted by the Commonwealth with the final sale process completed in December 2012.

This has resulted in no future Irrigation water demands.

7.7 Domestic and Stock pipeline

The Water Plan reports D&S demands from their supply sources in 2011 (see table below).

Table 13: Rural demand volumes

Supply System	Current rural demand - 2011 (ML)
Northern Mallee Pipeline	1,467
SS 5 Wimmera Mallee Pipeline	295
SS 6 Wimmera Mallee Pipeline	457
SS 1,2,3,4 Wimmera Mallee Pipeline	3,524
Eastern Grampians	40
Total	5,783

Source: GWMW final WSDS 2012

Discussion in the Water Plan suggests that the Wimmera Mallee Pipeline (WMP) is forecast to have a baseline rural demand (not including rural households) of 2,262 ML. This is based on the following assumptions:

- Water use assumptions for the current enterprise mix provide an accurate future rural demand profile.
- Average water use per dry sheep equivalent is 1,496 litres/hectare/year and average water use per hectare of dryland cropping is 500 litres/hectare/year
- The enterprise mix between cropping and grazing for different parts of the region will not change significantly.

Consistent with the draft review no revisions are proposed.

Finding

No revisions required.

7.8 Bulk Water

There are three tariffs/customer groups for GWMW's bulk water/headworks:

- Bulk water – consisting of fixed and variable elements.
- Recreation Lake Water – only variable elements.
- Environment water – consisting of fixed and variable elements.

The bulk water headworks volume forecast is flat over the regulatory period, at a level which represents the average demand of the past two years.

We note the WSDS (p.41) states 'where no data exists due to relatively new products (e.g. recreation lake entitlement) then the available water volumes from the BE have been used'. This assumption is considered reasonable given the lack of alternative data.

The forecast for environmental water is based on the assumption that the ILGP (see section 7.6) will sell irrigation water to the Commonwealth will result in full demand for Environment water.

Issues

The draft review did not identify issues of concern nor propose changes to these forecasts.

Finding

No revision.

7.9 Revisions to forecasts

The table below details the revisions proposed to GWMW's forecasts

Table 14: Revisions to forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Residential volume					
non Potable Eastern Grampians	47671	47786	36580	48398	49010
Non Potable Groundwater Supplied Towns	248242	249317	189420	251579	253267
Non Potable Pipeline Suppled Towns	574806	507804	216619	261399	254418
Potable Supply	4379978	4417706	3511735	4684064	4721694
Residential volume (revised)					
non Potable Eastern Grampians	47671	47786	48378	48398	49010
Non Potable Groundwater Supplied Towns	248242	249317	250822	251579	253267
Non Potable Pipeline Suppled Towns	574806	507804	268547	261399	254418
Potable Supply	4379978	4417706	4661636	4684064	4721694

Source: ESC template and Frontier revisions.

7.10 Summary

This review of GWMW's demand forecasts found:

- Forecasts were based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.

- Forecasts generally use the best available information, including VIF2012 household growth estimates. The assumption that 2015-16 would be a La Nina (wet) year was revised with the assumption of average conditions.
- Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased.
- Forecasts do not account for price elasticity, however, given the relative inelasticity of water demand and the lack of material price changes, this review did not identify this as an issue of concern.

8. Lower Murray Water (Urban)

8.1 Introduction

This chapter contains the businesses specific analysis undertaken by Frontier as part of the review of demand forecasts for the Water Price Review 2013.

8.2 Water Plan proposal

Table 15: LMW (Urban) Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	1.01%
Residential water volumes	0.67% (over both tier 1, 2 & 3)
Non-residential water connections	0.76%
Non-residential water volumes	0.76%
Residential sewerage connections	1.11%
Residential sewage volumes	n.a.
Non-residential sewerage connections	1.38%
Non-residential sewage volumes	n.a.
Residential recycled water connections	n.a.
Residential recycled water volumes	n.a.
Non-residential recycled water connections	n.a.
Non-residential recycled water volumes	n.a.
Trade waste customer numbers	1.15%
Trade waste volumes	n.a.

Notes: n.a. Not applicable

Source: LMW (urban) 2012 Water Plan

8.3 Water

Customer connections

LMW has used the Victoria in Future's (VIF) 2008 forecasts for growth in numbers of households.

Growth in the number of non-residential customers is assumed to mirror the growth of residential customers and to maintain the existing relationship between actual and equivalent connections.

Water volumes

The LMW water plan reports that the forecast level of residential demand per connection was established using econometric techniques. The analysis involved regressing average consumption per connection against average maximum temperature and average monthly rainfall per quarter. LMW reported the fit of the regression was quite good, with an adjusted R squared of 78.7%.

The regression analysis was used to estimate the level of residential demand per connection, under a future assumption of Permanent Water Saving Rules (PWSR) in all years of Water Plan 3. While the coefficient on PWSR was small and statistically insignificant; it was used in the analysis. The resulting forecasts of demand under PWSR "bounced back" to 488 kL/yr, around 88% of its pre-restriction level, rather than 100%..

The LMW forecast approach reportedly considered elasticity and made an adjustment for price responsiveness of water demand. Given that their own study did not provide clear results, values from the literature were used. This is in line with the approach adopted for the previous price review. The price elasticity assumptions for each consumption tier are in line with academic studies which have estimated the price responsiveness of residential demand for water.

LMW customer demands are responsive to weather conditions. For the Water Plan 3 period, LMW took a weighted average of the demand forecasts that resulted under two scenarios — one assuming long term average weather conditions (over the past 60 years) and one assuming short term average conditions (assessed over the previous 6 years). These two forecasts were equally weighted (in the previous regulatory period, long and short term averages were weighted 30:70 given the uncertainty around when and if the drought would break)

The combination of these assumptions provided an estimated expected demand per connection of 488 kL per annum over the existing residential base. LMW has

assumed that new properties use 80% of the water consumed by existing properties.

In forecasting the estimated average water demand per non-residential connection, LMW considered that 2011-12 outcomes provided a reliable predictor of future non residential consumption. Hence this was used as the basis of the forecasts for the Water Plan 3 period. It is assumed that volumes per non-residential equivalent connection remain constant over the review period (and beyond). LMW has not assumed any impact on non-residential demand due to price elasticity.

Issues

The assumption to include the Permanent Water Saving Rules coefficient is considered valid given the alternative of assuming PWSR demands are 100% of unrestricted demands.

We consulted LMW regarding the basis for assuming that new properties use 80% of the water consumed by existing properties. In response, it was revealed that:

- Data shows that new plots are, on average, 66% of the size of existing plots, which would reduce outdoor water use.
- For indoor water use, LMW considered an Abrams (2011) study of Sydney water consumption, which estimates the difference in long term demand between households participating in water efficiency programs and households that do not. Based on the LMW assumption that new households are water efficient and existing households are on average not, the Abrams results estimate water efficient household demand is 85% of existing household demand (at a representative price of $0.80). LMW also noted that not all existing households are without any water efficient appliances, so considered that 85% for indoor demand was an upper-bound.
- Given that total household demand is a mix of outdoor and indoor water demand, LMW considered that (on balance) 80% was a reasonable assumption.

This is a rough methodology, but we consider it to be sufficient for the purposes of new property assumption in a region of relatively low growth.

Our draft review noted that the growth estimates from VIF2008 have been superseded by the VIF2012 estimates which are now available and therefore the relevant forecasts required revisions. The draft review proposed that that LMW forecasts be revised in the following ways:

- Forecast of Domestic Water Service Connections from 2012-13 were revised using VIF 2012 estimate of 1.11% growth in households
- Forecast of Domestic Water Service volumes (first, second and third tiers) were revised based on revised Domestic Water Service Connections and assuming the same consumption per connection.

In response to the draft review, LMW agreed with the revised assumptions and the use of VIF2012 forecasts of household growth to generate connection and volume based forecasts.

Finding

In line with the recommendations in the draft review LMW's Domestic Water Service Connection and Volumes forecast have been revised. The proposed approach was accepted by Lower Murray Water.

The revised forecast are provided in Table 14.

8.4 Sewage

Customer connections

LMW's Water Plan states 'For the period 2011-12 and beyond, growth in equivalent connections is assumed to reflect the household growth forecasts. Growth in the number of non-residential customers is assumed to mirror the growth of residential customers.

Issues

The draft review found that the revisions for growth in residential water connections identified above (i.e. to reflect VIF 2012 forecasts) needed to be applied to LMW's equivalent residential sewerage connection forecasts (in absolute terms rather than on a percentage basis).

Also, consultation with LMW during the draft review process identified an error in the non residential equivalent connections presented in the Water Plan template — growth in 2013-14 to 2017-18 is not the same as growth to 2012-13. LMW agreed that the change of 75 should be 65 to 2012-13.

The draft review proposed that LMW forecasts be revised in the following ways:

- Revise forecast of Domestic Sewerage Service Connections based on same absolute growth as per the revised Domestic Water Service Connections
- Correcting identified errors in Non-Domestic Sewerage Service Connections.

In response to the draft review, LMW agreed with use of VIF2012 forecasts and the proposed revisions.

Finding

The growth rate and identified error require revisions. The approach proposed in the draft review and accepted by Lower Murray Water has been used to revise LMW's forecasts.

Revised forecast provided in Table 14.

8.5 Trade waste

Customer connections

Connections for minor trade waste customers are forecast to grow at a rate of 40 connections per annum except over the period 2015-16 to 2016-17, during which was a change of 20 connections was forecast.

Issues

Consultation with LMW for the draft review identified an error in forecasting minor trade waste connections. This was corrected in the draft review and accepted by Lower Murray Water.

Finding

The identified error requires revision, and was corrected as accepted by Lower Murray Water.

Revised forecast provided in Table 14.

8.6 Recycled water

The water plan includes forecasted volumes for recycled water.

LMW sells recycled water to a customer by agreement. The recycled water is from the Koorlong Wastewater Treatment Plant and is commercial in confidence. The income is included under contract revenue in the ESC template.

8.7 Revisions to forecasts

Maintained or revised (as explained above)

Table 16: Revised forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Sewerage					
Domestic Service Charge	24892	25170	25448	25728	26012
Domestic Service Charge [revised]	24912	25214	25519	25828	26140
Non Domestic Service Charge	4618	4683	4748	4813	4878
Non Domestic Service Charge [revised]	4628	4693	4758	4823	4888
Minor trade waste charge	3002	3042	3082	3102	3142
Minor trade waste charge [revised]	3002	3042	3082	3122	3162
Water					
Domestic Service Charge	27251	27529	27807	28087	28371
Domestic Service Charge [revised]	27271	27573	27878	28187	28499
Domestic First tier	8743170	8823448	8903726	8984648	9066861
Domestic First tier [revised]	8749468	8837412	8926411	9016479	9107635
Domestic Second tier	2611828	2625091	2638354	2651754	2665425
Domestic Second tier [revised]	2613709	2629246	2645076	2661148	2677412
Domestic Third Tier	1793796	1787839	1781881	1775924	1769966
Domestic Third Tier [revised]	1795089	1790668	1786421	1782215	1777926

Source: ESC template and Frontier revisions.

8.8 Summary

This review of Lower Murray Water's urban demand forecasts found:

- Forecasts were based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts generally use the best available information. The review identified that more recent estimates of household growth (VIF2012) could be used to revise and improve forecasts. Some data errors were also identified and corrected.
- Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased. The approach used to estimate per connection consumption at 488 kL/yr appears to be robust.
- Forecasts do account for price elasticity. Literature values were used, in line with the approach adopted for the previous price review.

9. North East Water

9.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing North East Water's demand forecasts for water, sewage and trade waste for the Water Price Review 2013.

9.2 Water Plan proposal

Table 17: NEW Water Plan proposal

Consumption parameter	Forecast average growth rate (% per annum)
Water connections (residential and non-residential)	1.27%
Water volumes (residential and non-residential)	2.5%
Water volumes – major customers	0.35%
Sewerage connections	-0.1%
Minor trade waste	0.00%
Trade waste	
Chemical Oxygen Demand	0.2%
Sodium	-0.1%
Suspended solids	-0.2%
Total Dissolved Solids	0.3%
Total Kjeldahl Nitrogen	-0.5%
Total Phosphorus	-0.5%
Volume	-0.1%

Notes: n.a. Not applicable

Source: NEW 2012 Water Plan

NEW has used a number of approaches to generate demand forecasts for the regulatory period. These approaches range from principal agent modelling for residential customers to the adoption of simple growth assumptions for non-residential customers.

NEW has based its forecasts on a medium climate change scenario, with average rainfall and temperature conditions over the regulatory period. It is not anticipating any restrictions beyond permanent water savings rules.

9.3 Water

Customer connections

NEW does not apply differentiated tariffs based on customer class (such as residential and non-residential), rather NEW tariffs are differentiated by region (A, B or C) and meter size.

In order to access NEW's forecasts Frontier needed to obtain much more detailed data than was available in NEW's Water Plan. This data was provided by NEW in response to requests for information and allowed us to analyse the forecasts based on customer type. The connections growth rates underlying the NEW forecasts are reported in Table 18.

Table 18: NEW growth rate assumptions

Customer class	Growth Rate (% per annum)
Residential customers	1.4%
Commercial	0.0%
Industrial	0.0%

Source: Frontier estimates based on NEW (2012) correspondence

Water volumes

As with water connections NEW's tariff schedule and accompanying demand forecasts do not fully distinguish between customer classes. NEW currently employs a single volumetric charge for residential and commercial customers and separate volumetric charge for major customers.

In response to an information request from Frontier, NEW provided the data needed to disaggregate the volumetric demand into customer class (see Table 19).

Table 19: NEW Water Plan, growth in water volumes

Customer class	Growth Rate (% per annum)
Residential customers	3.4%
Commercial customers	0.0%
Industrial customers	0.0%
Major customers	-2.11%

Source: Frontier estimates based on NEW (2012) correspondence

Frontier notes that on a per connection basis NEW is forecasting that consumption increase over the regulatory period by 1.9% per annum. It is not clear from the information provided to Frontier if NEW have applied price elasticity to the volumetric forecasts.

Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are not material. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants engaged by the ESC applied an elasticity estimate of -0.07 price elasticity to the demand forecasts where it was believed necessary. The value of -0.07 was derived by taking the weighted average of estimates identified in a 2004 water industry study undertaken by WSAA. WSAA's price elasticity estimates are based on 80% indoor use and 20% indoor use (PWC 2008).

However, for the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and material (and in some cases, permanent) changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity to demand on the basis that any consequent amendment to demand would be immaterial. For Water Plan 3, NEW has proposed an increase in water volume charges of CPI +2% per annum. For this relatively moderate price increase the lack of consideration of price elasticity is not considered a concern.

NEW is assuming 0.0% growth in non-residential water consumption.

Issues

NEW has based its forecast residential connections on Victoria in Future 2008 (VIF). NEW did not provide the detailed methodology that it has used to translate the VIF forecasts into forecasts for its water supply area. In the draft report Frontier noted that the NEW forecasts of 1.4% are less than the historical average of 1.89% (average annual compounding growth rate for the period 2005-06 to 2011-12, see Table 20).

In response to Frontier's draft report NEW provided estimates of growth in connections based purely on VIF 2012 projections adjusted for its areas of supply. The VIF projections gave a growth of 1.2% per annum which is acceptably close to the NEW forecasts.

Table 20: NEW Water Plan, historical growth in customer connections

Customer class	Growth Rate (% per annum)
Residential customers	1.89%
Commercial customers	2.66%
Industrial customers	4.41%

Source: Frontier estimates based on NEW (2012) correspondence

In the draft report Frontier noted that the assumed zero growth rates for commercial and industrial customers underlying NEW's forecasts are not consistent with residential growth in the area nor are they consistent with historical growth for the non-residential customers over the preceding six year period (see Table 20). One of the underlying forecasting assumptions widely accepted within the water sector is that there is a positive relationship between residential and non-residential customer growth. NEWs non-residential forecasts are not consistent with this general expectation.

In its water plan NEW did not provided adequate justification for its assumption regarding zero connection growth for non-residential customers. In the draft report Frontier proposed to apply the historical growth rates from the period 2005-06 to 2011-12 to the base year 2012-13 and then roll these growth rates forward across the regulatory regime.

In response to the draft report NEW contended that more recent trends evidenced a decline in non-residential customers (see Figure 31).

Figure 31: NEW Response, historical connections for non-residential customers

Connections	2011/12	2010/11	2009/10	2008/09
Commercial Customers	4,264	4,240	4,252	4,418
Industrial Customers	482	475	475	487
Total	**4,746**	**4,715**	**4,727**	**4,905**
Change %	**0.7%**	**-0.3%**	**-3.6%**	**-**

Source: NEW (2013) response draft report.

It is worth noting that the NEW response shows positive growth in both commercial and industrial customers for 2011-12 (see Figure 31) and that the time series provided by NEW in its response is relatively short and may exclude preceding years of positive growth. Frontier is concerned that NEW is basing its assumption on two years of negative growth for 2008-09 to 2009-10 and 2009-10 to 2010-11, which may not be representative of underlying trends.

Frontier also noted that the data provide in response to its draft report differs from that provided with the Water Plan. Further investigation of the NEW response identified material errors in the forecasts submitted with the water plan and in the information given by NEW to Frontier in response to information requests. For example, the historical customer number data by meter type supplied to Frontier by NEW were in fact an approximation based on forecasts used for budgeting purposes. In response to our inquiry NEW confirmed that this data was not indicative of actual connections and was inappropriate to use for analysis.

Subsequent to NEW's response to the draft report, Frontier requested that NEW provide accurate historical data on connections. This data was provided in an aggregate form per customer type (see Table 21). NEW were unable to provide this data on a meter size basis consistent with the prices levied for connections. Given the inability of NEW to provide disaggregated data based on meter size Frontier continues to have reservations regarding the reliability of NEW's data.

Table 21: NEW historical connections

	2005-06	2006-07	2007-08	2008-09	2009-10	2010-11	2011-12
Water Plan							
Commercial	3,803	3,984	4,056	4,049	4,211	4,439	4,452
Industrial	376	402	424	438	471	489	487
Final revised data submission							
Commercial	3,858	3,932	4,072	4,418	4,252	4,240	4,264
Industrial	387	400	442	487	475	475	482

Source: NEW response to information request, NEW final resubmission of historical data.

Based on NEW's final data submission the historical average annual growth trend since 2005-06 for commercial customers is approximately 1.16% per annum (including the two years of contraction in 2009-10 and 2010-11) and 2.19% per annum for industrial customers. We note that since 2005-06 industrial customer numbers contracted from 2008-09 to 2009-10, but have shown positive growth in every other year under consideration.

Frontier has sought to confirm the appropriateness of NEW's zero growth in commercial and industrial customers by comparison with the planning expectations of councils serviced by NEW. In particular, Frontier obtained information from Wodonga City Council regarding expectations of growth in commercial and industrial activities over the five year regulatory period. The council indicated that it is anticipating positive commercial growth over the next five years (pers. comm. Wodonga City Council Economic Development Team March 1 2013). This growth expectation is evident in the City of Wodonga (2011) Economic Development Strategy 2011to 2013 which clearly identifies two specific key commercial areas that are being actively developed by the Council — CBD developments and the Logic industrial park. Other commercial developments include the Baranduda Enterprise Park, 56 Lincoln Causeway and CBD West. The Logic development comprises a 580-hectare site of Industrial Use Zone 1 and Business Use Zone 4 lots for a broad range of business types.

Finding

Frontier has amended NEW's forecasts for connections to account for expected growth in non-residential customers. Frontier has also amended NEW's volumetric forecasts to account for expected growth in non-residential customer connections.

In doing so Frontier has adopted NEW's residential growth rates and applied them to all connections in each meter class. Frontier acknowledges that this growth rate is slightly higher than that observable for historical commercial connections. Ideally Frontier would have adopted the individual historical growth rates for commercial and industrial customers for each of the meter charges levied by NEW. However, NEW was unable to provide Frontier with detailed data to allow for the identification and application of growth rates based on customer class and metre size.

In the absence of this data Frontier has applied the overall growth rate for residential customers to non-residential connections on the basis that such an approach, while simplistic, is consistent with the approach adopted by a number of other regional businesses.

Given that the 1.4% per annum growth rate represents a weighted average over all NEW's areas of supply, Frontier has applied the growth across all meter classes, including those with relatively small customer bases. In some instances a small customer base has meant that the application of the growth assumption has had little or no impact on customer numbers.

Frontier has also had to adjust volume forecasts to account for the assumed growth in non-residential customer numbers. This adjustment was made by adopting the average per connection volume proposed in the water plan and applying it to the amended connections forecasts to generate a total volume.

9.4 Sewage

Customer connections

NEW's sewerage connections growth forecasts are consistent with those used for proposed water connections. It is reasonable to assume that growth dwellings will be serviced by both water and sewerage.

Issues

As with water connections, Frontier recognises that sewerage connections should be amended to reflect the positive growth assumption for commercial and industrial customers. However, Frontier does not have enough information regarding the relationship between sewerage and trade waste tariff classes and non-residential users to confidently make any amendments to the forecasts.

Frontier suggests that in response to this report NEW should review its sewerage forecasts for consistency with Frontier's positive growth assumption for industrial and commercial customers.

Finding

Frontier has not amended North East Water's sewage forecasts on the basis that there is insufficient information regarding tariff class and users types to make informed and meaningful amendments.

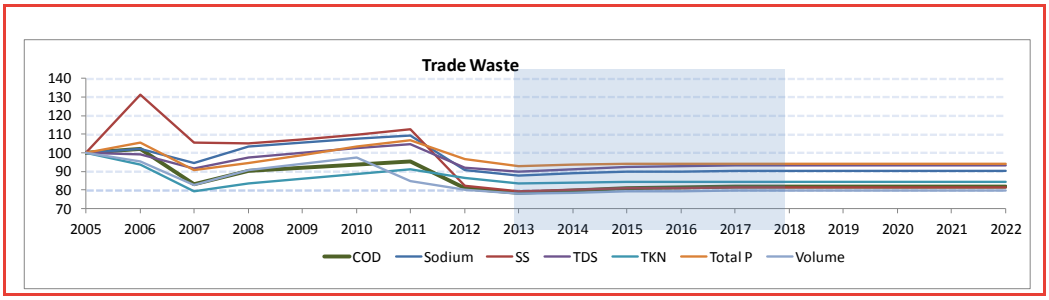
9.5 Trade waste

Customer connections and volumes

NEW's water plan does not provide comprehensive information regarding the method and reasoning behind NEW's trade wast volume forecasts. However, Frontier noted in the draft report that with the exception of sodium, recent historical data provided in the water plan indicates that trade waste volumes have been increasing over time (see Figure 32), for the period 2007 to 2011-12.

Frontier also noted that in 2012-13, NEW had forecast significant declines in trade waste growth. This step decline was not supported by information in the water plan. NEW is forecasting that trade waste over the regulatory period from 2013-14 onwards will remain relatively stable.

Figure 32: NEW Water Plan, trade waste growth



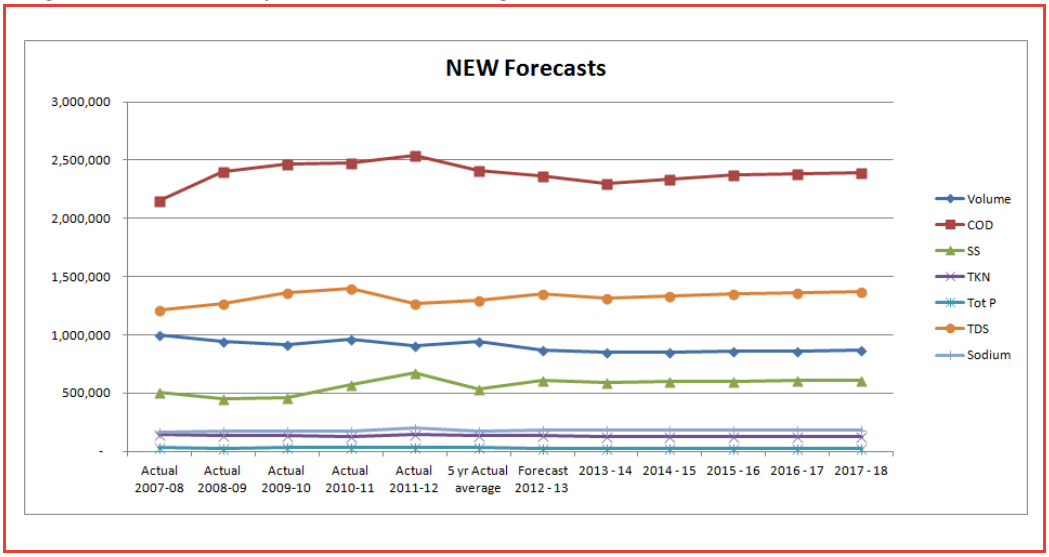
Source: Index based on NEW (2012) Water Plan, 2005=100

Issues

In the draft report Frontier questioned the validity of the assumed step decline in volumes for 2012-13 and amended NEW's trade waste forecasts for that year to reflect volumes in 2011-12.

In response to Frontier's draft report NEW provided information based on five year averages from 2007-08 to 2011-12 (see Figure 33). Care must be taken when interpreting Figure 33. Between 2011-12 and 2012-13 the graph plots the average of the preceding five years. This is misleading as in some cases the plotting of the average make the data series appear smoother than it is and acts to lessen the step change.

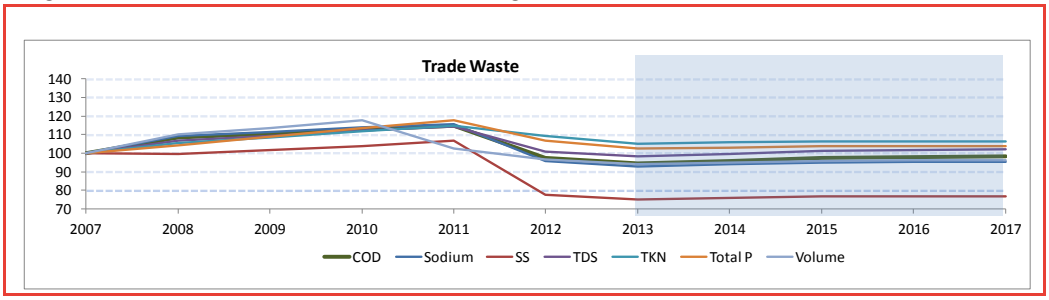
Figure 33: NEW Response, trade waste growth



Source: NEW (2013) Response to Frontier's draft report.

We also note that in its response to the draft report NEW based its forecasts on a shorter historical period than Frontier considered. Figure 34 shows the trends in trade waste volumes rebased to 2007-08 based on the Water Plan data. A decline is still evident in forecasts for the year 2012-13.

Figure 34: NEW Water Plan, trade waste growth 2007-08 to 2011-12

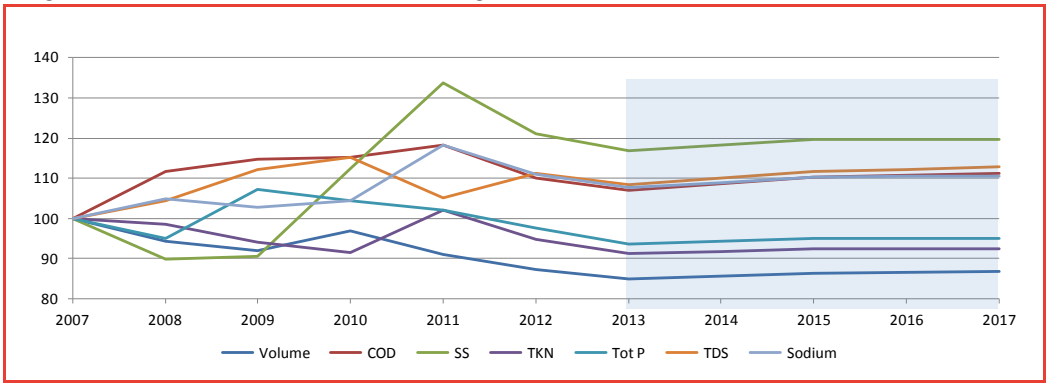


Source: Index based on NEW (2012) Water Plan, 2007-08=100

Frontier was unable to reproduce the graph provided by NEW in its response. It appeared that NEW's response was based on a different set of data than that provided in the Water Plan.

Further investigation identified material errors in the forecasts submitted with the water plan by NEW. It should be noted that NEW had previously confirmed the validity of the water plan data. Subsequent to NEW's response to the draft report, Frontier requested that NEW provide accurate historical data on trade waste volumes. This data was provided for each of the trade waste parameters (see Figure 35).

Figure 35: NEW Revised: trade waste growt



Source: Index based on NEW (2013) information response, 2007-08=100

Based on the final revised data, step declines in 2012-13 are still evident in SS, COD, sodium and TKN. Gradual declines consistent with historical trends are evident in the data for Total Potassium and volume. The only evidence provided by NEW in response to Frontier's concerns regarding the step decline was the following statement:

> Trade waste actual water volumes have decreased over the period due to combination of a reduction in major trade waste customers and implementation of onsite efficiencies in relation to potable water usage (NEW 2013 Response).

NEW did not provide any indication of the number of trade waste customers expected to leave the system nor any quantification of the volumetric trade waste parameters associated with those customers. In addition, NEW's proposal could not be verified based on water plan data as the water plan only contains information regarding the volumes/loads associated with trade waste parameters.

Finding

Frontier has amended NEW's forecasts for trade waste to correct the identified data errors. The water plan data was revised to reflect the actual historical data provided in the NEW (2013) information response.

Given the lack of explanatory evidence supporting the assumed step decline, Frontier has further amended NEW's forecasts for COD and TKN to remove the decline in 2012-13 by basing the volumes for 2012-13 on the average volume over the preceding five year period and then extrapolating over the regulatory period based on NEW's proposed year-on-year growth rates. Frontier did not amend SS and sodium as the historic data appeared to be more volatile and the five year average was less than the volume forecast by NEW.

9.6 Revisions to forecasts

Table 22: NEW Water Plan forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Trade Waste					
Trade Waste COD	2,300,253	2,335,022	2,371,319	2,381,868	2,392,497
Trade Waste TKN	128,428	129,282	130,203	130,133	130,052
Fixed Water charges (by metre)					
20A	33,179	33,672	34,190	34,698	35,214
20B	6,663	6,725	6,796	6,864	6,932
20C	5,498	5,510	5,545	5,577	5,611
25A	1,106	1,106	1,106	1,106	1,106
25B	163	163	163	163	163
25C	178	178	178	178	178
32A	216	216	216	216	216
32B	53	53	53	53	53
32C	33	33	33	33	33
40A	182	182	182	182	182
40B	40	40	40	40	40
40C	46	46	46	46	46
50A	196	196	196	196	196
50B	58	58	58	58	58
50C	32	32	32	32	32
80A	43	43	43	43	43
100A	52	52	52	52	52
150A	21	21	21	21	21
Volumetric water charge					
Volumetric	9,976,571	10,295,460	10,630,902	10,968,905	11,314,070

Table 23: NEW Frontier revisions to forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Trade Waste					
Trade Waste COD	2,339,296	2,374,655	2,411,568	2,422,296	2,433,106
Trade Waste TKN	131,741	132,617	133,562	133,490	133,407
Water					
20A	33,159	33,623	34,094	34,571	35,055
20B	6,659	6,752	6,847	6,943	7,040
20C	5,495	5,572	5,650	5,729	5,809
25A	1,121	1,137	1,153	1,169	1,186
25B	163	165	168	170	172
25C	178	180	183	186	188
32A	219	222	225	228	232
32B	53	54	54	55	56
32C	33	33	34	34	35
40A	185	187	190	192	195
40B	40	41	41	42	42
40C	46	47	47	48	49
50A	199	202	204	207	210
50B	58	59	60	60	61
50C	32	32	33	33	34
80A	44	44	45	45	46
100A	53	53	54	55	56
150A	21	22	22	22	23
Volumetric	9,976,174	10,316,784	10,664,453	`11,020,777	11,384,843

9.7 Summary

This review of NEW's urban demand forecasts found:

- With the exceptions of non-residential customers and trade waste customers, forecasts appear to be based on appropriate forecasting methodologies. Forecasts for non-residential customers appear to be based on blanket growth assumptions.
- Forecasts reflect reasonable assumptions about the key drivers of demand. Exceptions include non-residential connections and trade waste.
- Forecasts generally use the best available information such as the VIF's 2012 estimates of dwelling growth, the exception being forecasts that relate to non-residential customers. Non-residential forecasts do not appear to have referenced council planning expectations.
- Forecasts for residential services generally rely on agent-based models and simple growth estimates from observed values and averages, and are therefore not expected to be biased due to method.
- Forecasts do not appear to account for price elasticity.

10. South Gippsland Water

10.1 Introduction

This chapter contains the specific analysis undertaken by Frontier in reviewing South Gippsland Water's (SGW's) demand forecasts for the Water Price Review 2013.

10.2 Water Plan proposal

The table below summarises SGW's demand forecasts over the next regulatory period.

Table 24: SGW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	
East/West region	1.0%
Southern region	2.1%
Residential water volumes	1.5%
Non-residential water connections (general tariff, vacant land agreements and concessions)	
East/West region	0.5%
Southern region	0.7%
Non-residential water volumes	0.5%
Major customer water connections	n.a
Major customer water volumes	-2.4%
Residential sewerage connections	1.8%
Residential sewage volumes	n.a
Non-residential sewerage connections	0.8%
Non-residential sewage volumes	0%
Residential recycled water connections	n.a

Residential recycled water volumes	n.a
Trade waste customer numbers	0%
Trade waste volumes	0%

Notes: n.a. Not applicable

Source: SGW 2012 Water Plan

10.3 Water

Customer connections

SWG has forecasted its general tariff customer connections (residential and non-residential) to grow at a compounding average rate of 2.0% in its southern network and 0.9% in its East/West network.

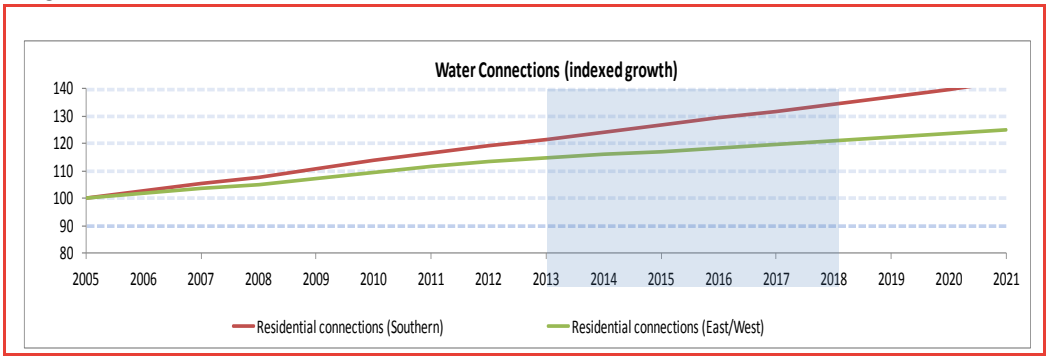
SGW residential connection forecasts are based on 'adjusted' VIF 2012 household growth forecasts for the LGAs[11] most relevant to its regions. These adjustments appear to be based on the historical relationship between VIF forecasts and its actual data on growth rates in these regions.

For its southern region SGW's forecasts residential connections to grow at 2.1% per annum. This equates to 72.5% of the VIF 2012 Bass Coast forecasts of household growth (2.9% pa over the period 2011 to 2016, and 2.7% pa from 2016 to 2021). The adjustment is based on the difference between the VIF's historical growth forecasts (3.1%) and SGW's actual residential (including vacant land) connection growth (2.3%) over the period 2005/06 to 2011/12. SGW claims this adjustment is necessary as the Bass Coast LGA is not entirely representative of the areas it supplies. In particular, SGW note that the Bass Coast LGA includes the high growth area of Phillip Island which is not part of the SWG's serviced region. However, we note that the VIF 2012 estimate of household growth for the SLA *Bass Coast (S) - Phillip Is.* is 2.25% and for the SLA *Bass Coast (S) Balance* is 3.23% (and the growth for the combination of both SLAs is 2.93%).

SGW forecasts residential connections in its East/West district to grow at a slower rate of 1.0%. This is based on the weighted average VIF 2012 forecasts for the South Gippsland and Wellington LGA.

11 SWG uses the Bass Coast LGA forecasts for its southern district and the weighted average of the Wellington and South Gippsland LGA forecasts for its East/West region.

Figure 36: Growth in actual and forecast residential connections



Source: SGW Water Plan

SGW's non-residential connections (general tariff, concessions, agreements and undeveloped land) have been forecast to grow at a slower rate of 0.7% in its Southern region and 0.5% in its East/West region. SGW claims these forecasts are based on historical rates of growth in the regions. Although, this does not appear to be the case in the Southern region where non-residential connection grew by 1.6% over the period 2006/07 to 2011/12.

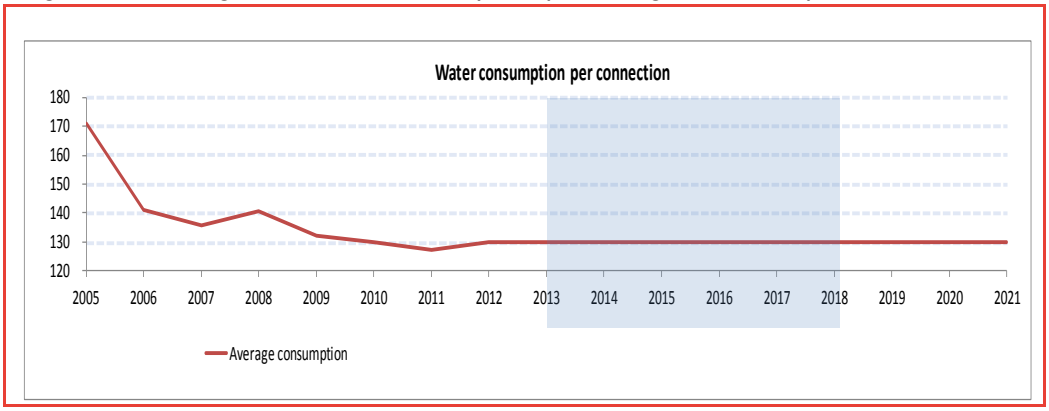
Water volumes

Residential water demand is forecast to increase by an average of 1.5% per annum over the period. This growth in consumption is driven by growth in new customer connections as consumption per connection is forecast to remain steady over the regulatory period. The average residential consumption used in developing these forecasts appears to be based on 2010/11 consumption levels.

SGW has seen significant falls in average consumption over the last 10 years (see Figure 37). Part of this decline may have been the result of widespread Stage 4 restrictions in place in 2006/07 and 2007/08 and in some areas in 2008/09.

SGW notes that climatic conditions have varied from extreme dry to extreme wet over the last regulatory period, however, they appear not to have taken this into account. Instead SGW is of the view that permanent customer behaviour change has taken place following customer education and the installation of water saving appliances.

Figure 37: Average residential consumption (excluding vacant land)



Source: SGW water plan data

Non-residential consumption is forecast to grow at a compound average annual rate of 0.5% per annum. This is also driven by growth in new customer connections as consumption per connection is forecast to remain steady over the regulatory period (at levels close to those experienced in 2010/11).

SGW has stated that some bounceback has been assumed in the forecast residential and non-residential demands for 2012/13 (1.7% for residential consumption and 4.5% for non-residential customers). Although given restrictions ended a number of years ago, this seems more likely to be SGW mechanisms for accounting for the fact that demand in recent years may be lower than average given it has be a relatively wet period. A price elasticity of -0.035 has also been assumed in forecasting the average consumption. This appears to be a reasonable assumption.

Major customer volumes are forecasted to decline at a compound average annual rate of -2.4%. These forecasts appear to be based on discussions with major clients where efficiencies of between 0 and 25% have been assumed.

Issues

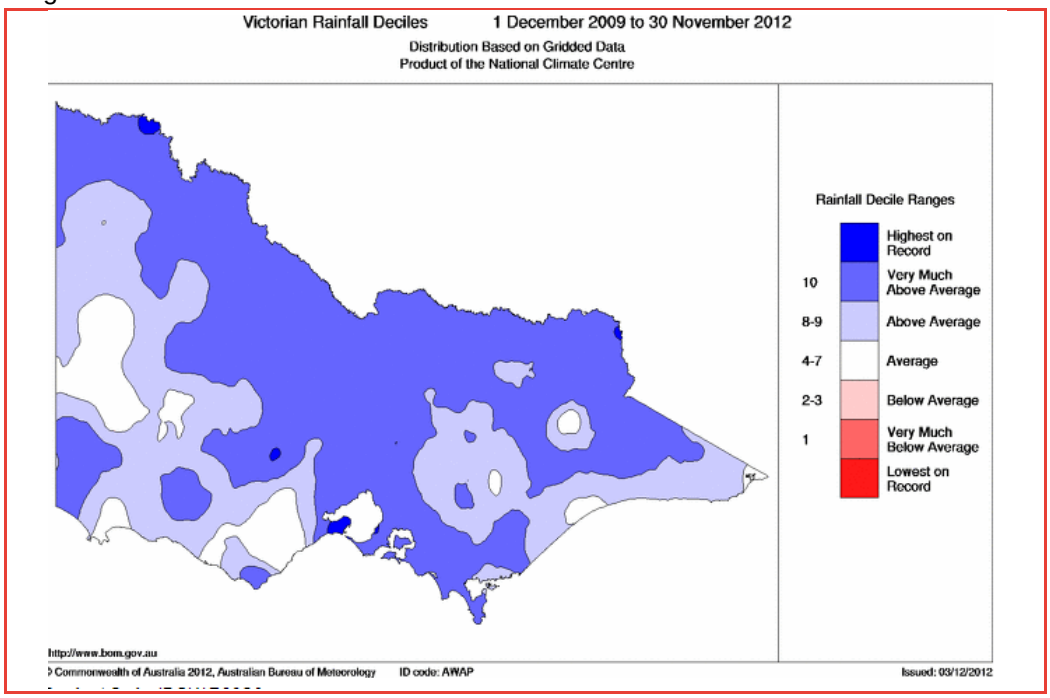
We have some concerns with SGW's water connection and volume forecasts. These are identified below.

First, SGW's approach to forecasting residential connection growth in its Southern region by proportionally adjusting the VIF 2012 forecasts is not ideal. A better approach would be to seek household growth forecasts which exclude the Philip Island area from the VIF.This may be possible using custom VIF data (as used by a number of other regional water businesses, but not available in the timeframe of this review) or to at least use SLA data if these disaggregate appropriately. However, without further information we are unable to make an adjustment to forecasts on this basis.

Second, SGW claims its non-residential estimates are based on historical rates of growth, however, this does not seem to be the case in the Southern region where non-residential connections grow by 1.7% over the period 2005/06 to 2011/12. In response to our draft report SGW agreed with our recommendation to vary non-residential forecasts in the Southern region in line with historical growth rates.

Third, the residential water volume forecasts appear slightly low. SGW has forecasted that residential water consumption will remain relatively stable over the regulatory period based on current levels of average consumption. However, the average water use figures adopted do not clearly take into account of the impact of climatic conditions on water use. BOM data shows that since December 2009 to November 2012 rainfall has been 'very much above average' across SGW's region (see Figure 38). This is likely to have led to lower average consumption levels during 2010/11 and 2011/12. By ignoring this, SGW is implicitly assuming that wet conditions will continue over the coming regulatory period.

Figure 38: Victorian Rainfall Deciles for 1 Dec 2009 to 30 Nov 2012



Source: BOM climate maps

We highlighted that we had concerns with SGW forecast residential volumes in our draft report but that with the data available we were not in a position to revise these. We noted alternative forecasting approaches that SGW could consider include selecting an average representative year from the historical data or developing a linear regression model that relates actual historic average

consumption data to various causal drivers (such as rainfall levels and water prices).

In response to the draft report SGW proposed utilising the 2009/10 financial year as an "average representative year". Noting that the Bureau of Meteorology twelve monthly (2009/10) rainfall deciles show the South Gippsland Region to be either 'Average' or 'Above Average' for the 2009/10 period. On this basis they proposed revisions to the general tariff and vacant land (both residential/non residential) average consumption.

We have adopted the 2009/10 residential average consumption figures, but have kept the non-residential consumption figures as originally forecast. This is because it is not clear that climatic conditions are likely to have been such a major driver of non-residential consumption.

Findings

On the basis of the issues described above we have made the following amendments to SGW's water demand and connection forecasts.

- Non-residential connections forecasts (general tariff) in the Southern region have been amended to grow by 1.7% per annum based on historical rates of growth.
- General tariff and vacant land water demand volumes (which incorporate both residential and non-residential demand) have been increased as a result of:
  - adjusting the residential average consumption figures to those experienced in 2009/10;
  - revising the non-residential connection forecast in the Southern region.

10.4 Sewage

Customer connections

SGW forecasts residential and non residential sewage customer connections to grow at 1.8% and 0.8% per annum.

SGW stated that its residential forecasts are based on the weighted average VIF 2012 forecast of household growth in the Bass Coast, Gippsland and Wellington LGAs. While its non-residential forecasts are based on historical growth data for commercial customers.

Volumes

Forecasts of residential and non-residential sewage volumes (of domestic quality) were not included in the template as no volumetric tariff is levied.

Issues

We cannot replicate the precise residential and non-residential connection growth forecast using the methodology that SGW describes and the data in its pricing template. However, the connection data in the pricing template appears to forecast a higher rate of growth which is less of a concern.

Finding

While we have concerns about the transparency of SGW's approach we do not consider that it is necessary to revise the proposed forecasts.

10.5 Trade waste

Connections

SGW has forecasted cistern and minor trade waste customer numbers to remain stable over the regulatory period based on 2011/12 levels.

SGW also has 3 major trade waste customers with whom it has individual Trade Waste Agreements.

Volumes and Loads

SGW has forecasted minor trade waste and cistern sewage volumes to remain stable over the regulatory period at close to 2011/12 levels.

SGW has not provided a forecast of major trade waste volumes or loads as this revenue has been included as contract revenue.

Issues

The customer numbers and volumes forecast for cistern and minor trade waste customer numbers are based on 2011/12 levels. For the most part these forecasts are consistent with historical trends whereby customer numbers and volumes have remained relatively flat.

SGW has not provided a forecast of major trade waste volumes or loads. This revenue source is understood to have been accounted for under contract

revenue. As such we have not reviewed the adequacy of the demand forecasts underpinning the revenue estimates.

Finding

Based on the data provided no revisions have been proposed to SGW's trade waste and cistern volume and customer connection forecasts.

10.6 Recycled water

We understand that SGW intends to levy a recycled water tariff during the regulatory period. However, SGW has not provided a forecast of recycled water waste volumes. We understand this revenue source (which amount to $3,000 in 2011/12) is accounted for as contract revenue. As such we have not reviewed the adequacy of the demand forecasts underpinning the revenue estimates.

10.7 Revisions to Forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Trade Waste					
Fixed					
Minor TW Category 1	111	111	111	111	111
Minor TW Category 2	11	11	11	11	11
Minor TW Category 3	58	58	58	58	58
Variable					
Minor TW All Categories	53000	53000	53000	53000	53000
Water					
Fixed (customers)					
Developed-Southern	9164	9351	9542	9730	9915
Undeveloped-Southern	590	601	613	625	636
Concessional-Southern	169	170	171	172	173
Agreements-Southern	140	141	142	143	144
Developed-Southern (revised final)	9170	9361	9556	9748	9937
Undeveloped-Southern (revised final)	591	604	617	629	642
Concessional-Southern (revised final)	172	175	178	181	184
Agreements-Southern (revised final)	141	143	145	147	150
Variable					
2nd & 3rd Billing	2292614	2317999	2343758	2369527	2396199
1st Billing	945542	956011	966634	977262	988262
2nd & 3rd Billing (revised final)	2332051	2360463	2389256	2418037	2448826
1st Billing (revised final)	961806	973524	985399	997269	1009968

10.14 Summary

This review of SGW's urban demand forecasts has found the following.

- Forecasts are generally based on basic but adequate forecasting methodologies, which typically involve continuing historical trends. There are some exceptions. Non-residential connections forecasts (general tariff) in the Southern region were not adequately explained and so have been amended to match historical rates of growth. We also have concerns about SGW's approach to forecasting residential connection growth by proportionally adjusting the VIF 2012 forecasts (see below).

- Forecasts generally reflect reasonable assumptions about some of the key drivers of demand. However, not all key drivers were considered. SGW assumed some low level bounceback in its forecasts (given restrictions ended a number of years ago). However, it has not adequately accounted for climatic conditions in the region. In the last few years demand may be lower than average because of relatively wet climatic conditions. Adjustments to SGW forecasts have been made on this basis.

- Forecasts generally make use the best available information such as the VIF's 2012 estimates of dwelling growth but not always in the most appropriate way. In the future SGW should seek household growth forecasts, from the VIF, which exclude the Philip Island area rather than attempting to adjust for this.

- In general the forecasts rely on simple growth estimates from observed values and averages, and are therefore not expected to be statistically biased.

- A price elasticity of -0.035 has been assumed in forecasting water demand, but not in relation to SGW's other services.

11. Wannon Water

11.1 Introduction

This chapter contains the businesses specific analysis undertaken by Frontier as part of the review of demand forecasts for the Water Price Review 2013.

11.2 Water Plan proposal

Table 25: WNW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	1.08%
Residential water volumes	0.30%
Non-residential water connections	0.79%
Non-residential water volumes	0.69%
Residential sewerage connections	1.04%
Residential sewage volumes	n.a.
Non-residential sewerage connections	1.01%
Non-residential sewage volumes	n.a
Residential recycled water connections	n.a.
Residential recycled water volumes	n.a.
Non-residential recycled water connections	n.a.
Non-residential recycled water volumes	n.a.
Trade waste customer numbers	n.a.
Trade waste volumes	n.a.

Notes: n.a. Not applicable

Source: WNW 2012 Water Plan

11.3 Water

The assessment of WP3 water demand forecasts had to take into account the tariff restructure implemented by Wannon Water in order to compare forecasts with historical trends. The table below compares Wannon Water's tariffs in Water Plan 2 and 3.

Table 26: Water tariff groups

Water Plan 2	Water Plan 3
Group 1: Portland, Heywood and Port Fairy	Group A: Allansford, Noorat/Glenormiston, Camperdown, Cobden, Heywood, Koroit, Lismore/Derrinallum, Mortlake, North Otway Pipeline, Port Fairy, Portland, Purnim, Simpson, Terang and Warrnambool
Group 2: Allansford, Noorat/Glenormiston, Camperdown, Cobden, Koroit, Lismore/Derrinallum, Mortlake, North Otway Pipeline, Purnim, Simpson, Terang and Warrnambool	
Group 3: Balmoral, Caramut, Cavendish, Dunkeld, Glenthompson, Hamilton, Penshurst and Tarrington	Group B: Balmoral, Caramut, Cavendish, Dunkeld, Glenthompson, Hamilton, Penshurst and Tarrington
Group 4: Peterborough, Port Campbell, and Timboon	Group C: Peterborough, Port Campbell and Timboon
Group 5: Dartmoor, Casterton, Coleraine, Macarthur, Merino and Sandford	Group D: Dartmoor, Casterton, Coleraine, Macarthur, Merino and Sandford
	Group E: Darlington

Source: WNW Final Water Plan 3.

Demand forecasts are documented in Wannon Water's 2012-2060 Water Supply Demand Strategy. Separate forecasts are provided for residential, non-residential, rural, and major customer consumption for each of Wannon Water's 14 supply systems.

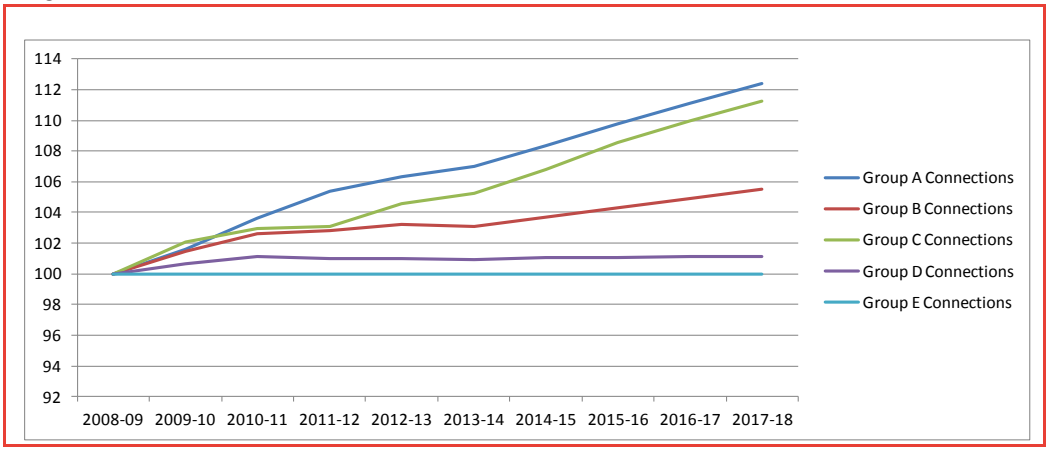
Customer connections

Wannon Water's Water Plan states that property connections are forecast to grow at 1.06% per annum n, in line with recent historical outcomes. The growth assumptions vary by Tariff Group, but are based on Victoria in Future (VIF) 2008 estimates.

The growth estimates from VIF2008 are applied to both the residential and non residential (excluding major and rural customers) connections in the forecast. The baseline assumes that the number of major and rural connections will remain constant into the future.

Wannon Water claims that the tariff groups do not align neatly with SLAs, for which VIF forecasts are available. Wannon Water was provided with confidential estimated town growth rates underlying the publicly available VIF2008 data, in order to construct growth forecasts for their tariff groups (sets of towns).

Figure 39: Index of residential water connections



Water volumes

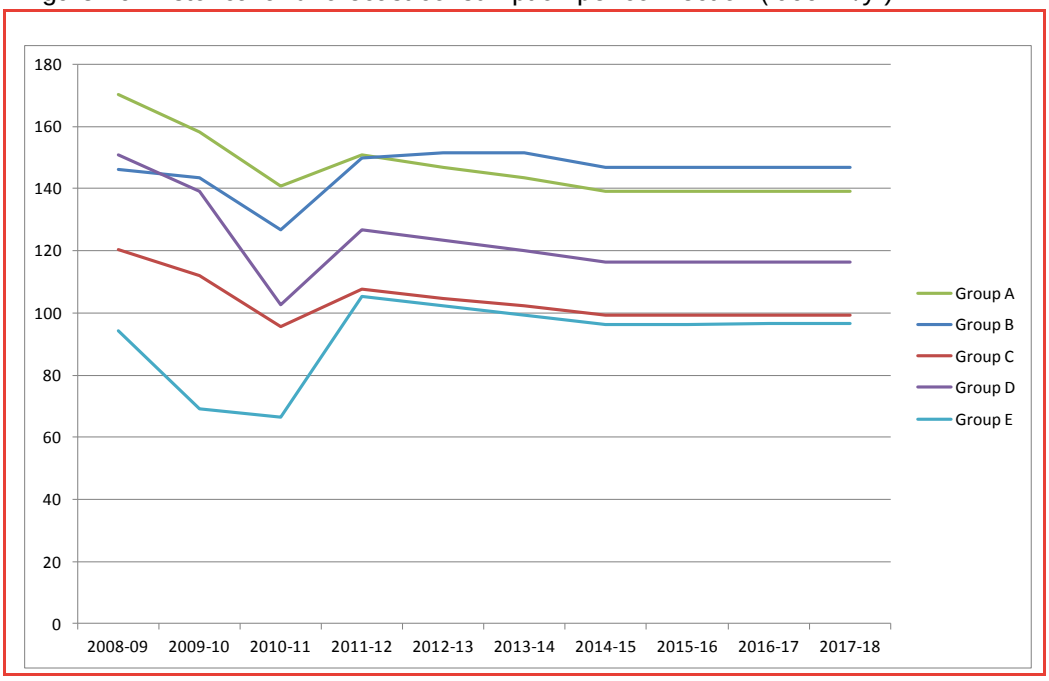
The Wannon Water WSDS shows a declining trend in residential consumption per dwelling from 2005-06 to 2010-11 for the major urban centres of Warrnambool, Hamilton, Portland and Camperdown. This downward trend was applied to all residential consumption groups in the forecast, but predicted to end after 2014-2015.

Warrnambool's per connection residential consumption was observed to reduce by 2.7% per year from 2006 to 2011. This trend was applied to all residential consumption groups in the forecast, to 2014-2015. The forecast for the following four years is constant.

The forecast for Hamilton residential consumption (that would have occurred without restrictions) was based on observations from nearby Casterton (proportional change), with an additional 5% reduction assumed due to awareness and conservation investments resulting from the restriction period. This resulted in an estimate of 12.8% bounceback from observed Hamilton residential consumption of 148kL pa to 167 kL pa. This same 12.8% factor was applied to Glenthompson residential consumption since these customers also faced restrictions in 2009-10.

Wannon Water's analysis of residential use per connection in Warrnambool identified an annual decline of 4.5 kL (2.7%). The baseline demand projection applies this reduction to all residential use out to 2015.

Figure 40: Historical and forecast consumption per connection ('000 kL/yr)



Source: WNW Data

Non-residential (potable and non-potable) water use includes major customers, rural customers and other non-residential users such as shops and retail outlets, small to medium manufacturing businesses, food service and accommodation providers as well as charitable and private sporting properties and facilities. Major customers include eight Milk/Food Processing customers as well as Metal Refinement, Pharmaceutical Products, Health Services and Port Facility.

Milk and food processing industries are by far the largest category of industry and are highly dependent on overseas markets. Because of difficulties in arriving at accurate long term forecasts of market demand it is not possible to project demand with any certainty. Wannon has based its forecast on the assumption that there will be some industry growth and some water efficiency improvements such that the net effect will be no substantial increase in total demand over the forecast period.

Wannon Water found trends in rural and non residential use did not give a strong indication of what will happen into the future and therefore the baseline demand projection assumes that per connection use will remain constant.

Weather assumptions are based on the median scenarios for the Wannon region, and included wet and dry scenarios as sensitivity bounds on the possible range of future outcomes.

Issues

The growth estimates from VIF2008 have been superseded by the VIF2012 estimates which are now available. The more recent growth estimates (in VIF2012) are higher than growth estimates relied upon in Wannon Water's demand forecast, as shown in Table 27. The difference between the VIF's estimate growth rates is significant. However when applied to WNW's demand forecasts the difference is less than 1.5 percentage points over 5 years of the Water Plan 3 period.

In any case, we are unable to revise the forecasts based on VIF2012 since confidential disaggregation of VIF data would be required.

Table 27: Comparison of household growth projection (2011 to 2016)

	VIF2008	VIF2012	difference
Hamilton	3.22%	4.02%	25%
Portland	4.96%	5.37%	8%
Warrnambool	8.17%	9.60%	18%

Source: VIF data provided by Wannon Water.

The draft review noted that not using VIF2012 estimates was not ideal, however the use of VIF2008 estimates do not lead to significant underestimation. This was accepted by Wannon Water, who saw no value in pursuing the matter further.

In calculating the Hamilton bounceback estimate, Wannon Water has made an arbitrary assumption of a 5% reduction due to awareness and conservation investments. It is reasonable that some adjustment is made, however, the quantum of the adjustment if not grounded in data. This assumption, however, only affects a subset of Group B towns and therefore is not considered a significant concern and revisions have not been proposed. This was accepted by Wannon Water.

The review also identified that the Wannon Water's forecasts do not account for price elasticity. Wannon Water's approach is consistent with that of the majority of regional urban water businesses. Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are not material. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 to the demand forecasts where

it was deemed necessary. The value of -0.07 was derived by taking the weighted average of a 2004 water industry study undertaken by WSAA with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

However, for the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and in some cases permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity on demand on the basis that any subsequent amendment will be immaterial.

For Water Plan 3, Wannon Water has proposed small price decreases across the tariff groups and inclining blocks from 2012-13 to 2013-14 — ranging from -2.0% to -2.1%. Given the relative inelasticity of water demand and this lack of a material price changes, this review did not identify the lack of price elasticity as an issue of concern.

Finding

No revisions have been made.

11.4 Sewage

The assessment of WP3 sewerage demand forecasts had to take into account the tariff restructure implemented by Wannon Water as outline in the table below.

Table 28: Sewerage tariff groups

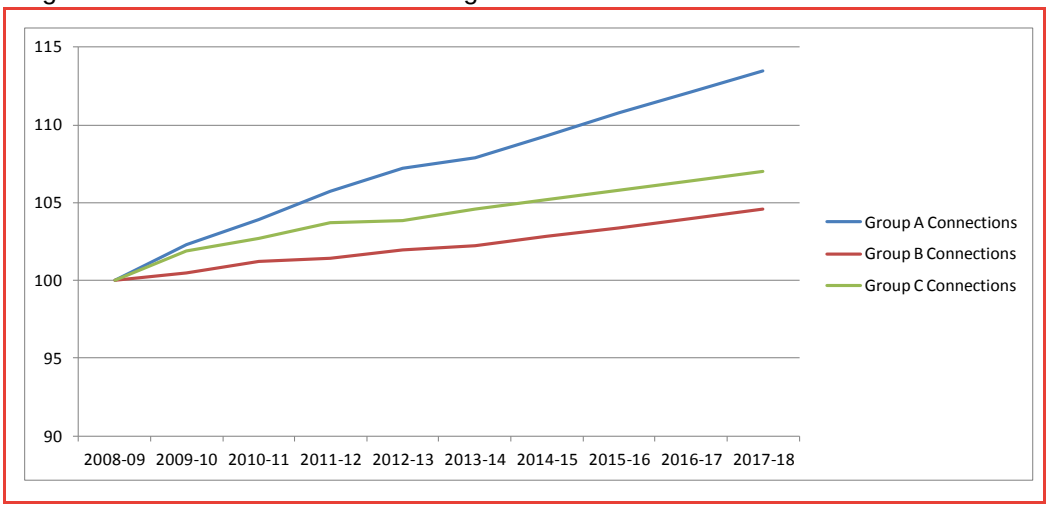
Current	Water Plan 3
Group 1: Allansford, Koroit, Mortlake, Peterborough, and Timboon	Group A: Allansford, Camperdown, Cobden, Dunkeld, Koroit, Mortlake, Noorat/Glenormiston, North Otway Pipeline, Peterborough, Port Campbell, Port Fairy, Purnim, Timboon and Warrnambool.
Group 2: Camperdown, Cobden, Noorat/Glenormiston, North Otway Pipeline, Purnim and Warrnambool.	
Group 5: Dunkeld, Port Campbell and Port Fairy	
Group 3: Casterton, Coleraine and Hamilton	Group B: Casterton, Coleraine and Hamilton
Group 4: Heywood and Portland	Group C: Heywood and Portland

Source: WNW Final Water Plan 3.

Customer connections

Forecast growth in connections for residential and non-residential sewerage were based on VIF2008.

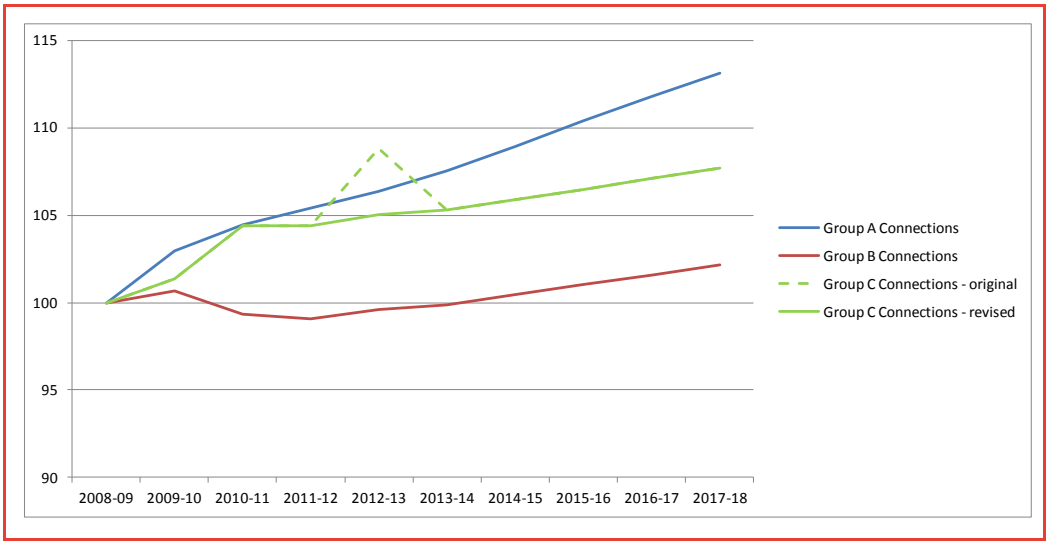
Figure 41: Index of residential sewerage connections



Source: ESC template data

Forecast growth in non residential connections as shown in Figure 42 below. It should be noted that the 2012-13 Group C non-residential sewerage data reported in the original data template contained an error and was revised to 690.

Figure 42: Index of non-residential sewerage connections



Source: ESC template data

Issues

Similar to water demand forecasts, forecasts of connections for residential and non-residential sewerage were based on VIF2008 estimates. Therefore these forecasts suffer from the same deficiencies as discussed in relation to the water forecasts above. Further, it is difficult to compare forecast growth in water and sewerage connections due to difference in the set of towns encompassed by the tariff groups.

Our draft review identified that, as with the water demand forecasts, it is not ideal that VIF2012 estimates are not used, however the use of VIF2008 estimates does not lead to significant underestimation. No revision was recommended, and this was accepted by Wannon Water in their response to the draft review.

Finding

No revisions have been made.

11.5 Draft forecasts

No revisions have been made and forecasts are maintained as per the template submitted to the ESC.

11.6 Summary

This review of Wannon Water's demand forecasts found:

- Forecasts were based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts generally use the best available information. The review identified that VIF2012 household growth estimates were available to revise and improve forecasts, however would not materially change the forecasts.
- Forecast approaches are simple growth estimates from observed values and averages, and are therefore not expected to be biased.
- Forecasts do not account for price elasticity, however, given the relative inelasticity of water demand and the lack of material price changes, this was not identified as an issue of concern.

12. Westernport Water

12.1 Introduction

This chapter contains the business specific analysis undertaken by Frontier as part of the review of demand forecasts for the Water Price Review 2013.

12.2 Water Plan proposal

Table 29: WPW Water Plan proposal

Consumption parameter	Proposed average growth rate (% per annum)
Residential water connections	2.0%
Residential water volumes	1.0%
Non-residential water connections	0.92%
Non-residential water volumes	1.0%
Residential sewerage connections	2.0%
Residential sewage volumes	n.a.
Non-residential sewerage connections	4.26%
Non-residential sewage volumes	n.a.
Residential recycled water connections	9.04%
Residential recycled water volumes	1.91%
Non-residential recycled water connections	3.93%
Non-residential recycled water volumes	0%
Trade waste customer numbers	n.a.
Trade waste volumes	n.a.

Notes: n.a. Not applicable.

Source: WPW 2012 Water Plan

12.3 Water

Westernport Water's water demand forecasts for the Water Plan 3 period were derived from historic water consumption levels, population growth projections and recent trends in water usage. The Water Plan (p. 26) reports that the population and demographics information used includes:

- 2006 Census of Population and Housing from the Australian Bureau of Statistic (ABS);
- Victoria in the Future (VIF) 2012 from the Department of Planning and Community Development;
- 2006 Analysis – Coastal Report - Towns in Time - Department of Planning and Community Development;
- Bass Coast Shire Council (BCSC) – Community Profile and Statistics
- 2011 Census data (June 2012).

Customer connections

Westernport Water's forecast growth in residential water connections of 2.0% per year. The Water Plan (p. 24) states that this growth in residential connections is in line with VIF2012 population growth forecast for Phillip Island.

Water volumes

Westernport Water's forecast growth in residential water volumes of 1.0% per year. This is derived by applying the following rates of water consumption (Water Plan, p.24) to the above connection growth forecasts:

- Existing residential water connection consumption of 73 kL/year
- New water connection consumption of 37 kL/year.

Total non-residential (commercial) water consumption has been forecast to remain steady at 255 ML/year, being the average non-residential water demand for the period 2004/5 – 2009/10.

Issues

The 2.0% growth rate used is the VIF 2012 population growth forecast for the Bass Coast (S) - Phillip Island SLA. Applying an estimate of population growth when forecasting residential water connections is problematic. The VIF forecast for number of dwellings is preferable and should be applied to forecast growth in the number of household residential connections. The VIF2012 growth of 'Bass Coast (S) - Phillip Is.' is 2.25% per year

Consultation with Westernport Water identified that the report current rates of water consumption of 73kL/yr and 37kL/yr are estimates of consumption by permanent residences and non-permanent residences, respectively. We do not consider it reasonable to assume that all new connections have the consumption characteristics of non-permanent residences (i.e. very low).

Our draft review found that revisions were required and proposed the following revisions to the forecast residential connections:

- The reported 2012-13 observations were increased at a growth rate of 2.25% pa over the regulatory period. Which is consistent with the VIF 2012 forecast of dwelling growth in 'Bass Coast (S) - Phillip Is.'

The following revisions to the residential forecast volumes were also proposed:

- The reported 2012-13 connection forecasts where disaggregated by according to current residency status based on information provided by Westernport Water (44% permanent and 56% non-permanent).
- The permanent and non-permanent connections forecasts were both increased at a growth rate of 2.25% pa. This provides a total that is consistent with above. This approach assumes that new dwellings/connections have the same mix of residency status as the current customer base.
- The initial forecasts of consumption per connection (by residency status) provided by Westernport Water (of (117kL/yr for permanent and 35kL/yr for non-permanent dwellings) were applied to the respective connection forecasts.

In response to the draft review, Westernport accepted these revisions to the residential connections and volumes forecasts.

Some forecasts of non-residential type connections are entered as zero for the remainder of WP3 after positive values for 2013-14. To address this error, the draft review proposed that the Non-Residential 32mm and 50mm connection numbers for 2013-14 were used for all years in the Water Plan 3 period.

In response to the draft review, Westernport agreed that the identified issue was an omission of data and proposed amended figures. The growth in these amended figures is in line with other non-residential connection types.

The review also identified that the Westernport Water's forecasts do not account for price elasticity. Westernport Water's approach is consistent with that of the majority of regional urban water businesses. Where a business has not explicitly identified that they have incorporated price elasticity impacts in their forecasts, we have assumed that this is because they believe that such impacts are immaterial. This is in line with applying a zero price elasticity measure.

We note that, as part of Urban and Rural Water Price Review 2008, the demand consultants applied an elasticity estimate of -0.07 to the demand forecasts where it was believed necessary. The value of -0.07 was derived using the weighted average of a 2004 water industry study undertaken by WSAA with the weights based on 80% indoor use and 20% indoor use (PWC 2008).

For the purposes of this review, we are concerned that the 2004 estimate of elasticity may not be appropriate given the impact of the recent drought, the recent history of water use restrictions and in some cases the permanent changes in water use behaviours. For this reason we have taken a conservative approach to elasticity. Given the relative inelasticity of water use, where businesses have not proposed material changes in price we have not imposed an elasticity on the basis that any subsequent amendment to demand will be immaterial.

For Water Plan 3, Westernport Water has proposed to remove the inclining block tariff. For a residential customer consuming in the Block 2 tariff in 2012-13, then the price change for marginal water consumption into 2013-14 is 0.17%. Given the relative inelasticity of water demand and this lack of a material price changes, this review did not identify the lack of including price elasticity as an issue of concern.

Finding

Revisions are required to Westernport Water's water demand forecasts. In particular, revisions are proposed for the residential connections and volumes forecast as proposed in our draft review and accepted by Westernport Water. Forecasts of non-residential connections are revised as per the amended figures provided by Westernport Water in response to the draft review.

Revised forecasts are provided in Table 14.

12.4 Sewage

Customer connections

Residential connections were forecast to grow at a rate of 2% pa based on VIF2012 population growth forecasts for Philip Island.

Non-residential connections were forecast to grow at 5% pa for two or more cisterns, and 1% pa for 1 cistern customers.

Issues

As with the water forecasts, our draft review found that the VIF2012 forecast of growth in dwelling numbers is preferable for forecasting residential connections, rather than population growth estimates.

Accordingly, in the draft review we proposed revisions to the residential connections forecast based on using the reported 2012-13 observations and increasing these at a growth rate of 2.25% (consistent with the VIF 2012 growth of dwellings in 'Bass Coast (S) - Phillip Is.').

This revision was accepted by Westernport Water.

Finding

Revisions are required. The revision proposed to the sewerage connection forecasts are as per the draft review and as accepted by Westernport Water.

The revised forecast is provided in Table 14.

12.5 Recycled water

Customer connections & Volumes

Westernport Water assumed recycled water growth of 75 residential connections per year, and residential volume growth of 61 kL/yr.

Non-residential volumes are forecast to remain constant through the Water Plan 3 period.

Issues

No issues were identified in the draft review nor identified by Westernport Water.

Finding

No revisions proposed.

12.6 Revisions to forecasts

Forecasts that have been revised (as per the discussion above) are presented in the table below.

Table 30: Revised forecasts

	2013-14	2014-15	2015-16	2016-17	2017-18
Sewerage					
Residential Sewer Access Charge	13418	13686	13960	14239	14524
Residential Sewer Access Charge - revised	13638	13945	14260	14581	14910
Water					
Non-Residential 32mm Access Charge	40	0	0	0	0
Non-Residential 32mm Access Charge - revised	40	40	40	41	41
Non-Residential 50mm Access Charge	15	0	0	0	0
Non-Residential 50mm Access Charge - revised	15	16	16	17	17
Residential Water Access Charge	14776	15071	15373	15680	15994
Residential Water Access Charge - revised	14813	15147	15488	15837	16194
Residential Variable Charge - Block 1	1044295	1054737	1065285	1075938	1086697
Residential Variable Charge - Block 1 - revised	1052881	1076621	1100897	1125719	1151102

Source: ESC template and Frontier revisions.

12.7 Summary

This review of Westernport Water's demand forecasts found:

- Forecasts were based on appropriate forecasting methodologies.
- Forecasts reflect reasonable assumptions about the key drivers of demand.
- Forecasts generally use the best available information. The review identified that VIF2012 household growth estimates could be used to revise and improve forecasts. Some data errors were also identified and corrected.
- Forecast approaches are simple growth estimates from observed values and are therefore not expected to be biased.

Forecasts do not account for price elasticity, however, given the relative inelasticity of water demand and the lack of material price changes, this review did not identify this as an issue of concern.

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